

ARMY GROWTH AND FORCE STRUCTURE REALIGNMENT AT FORT LEWIS, WASHINGTON

Traffic Impact Study - Final



*Transportation Strategies for
Sustainability*

Prepared for:



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September 2010

Army Growth and Force Structure Realignment at Fort Lewis, Washington

Transportation Impact Study

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1. INTRODUCTION

The purpose of this study is to evaluate the impacts to local roadways and intersections resulting from the Army Growth and Force Structure Realignment at Fort Lewis, Washington. All technical analyses related to this section are included in the technical Appendices.

The Army requires an Environmental Impact Statement (EIS) to support the Army's Growth and Force Structure Realignment at Fort Lewis, Washington. As part of the EIS work, the Army prepared a traffic study to analyze the impacts of specific stationing, construction, and training proposals identified in the Army's 2007 Army EIS and resulting record of decision (ROD), and to analyze the impacts from relevant past, present, and reasonably foreseeable future actions related to the GTA actions. The purpose of the proposed action is to implement the Fort Lewis and Yakima Training Center actions described in the GTA ROD, and other actions not identified in the ROD, which are interconnected and are essential to the success of implementing the GTA actions. This will allow the Army to station an optimally configured force of appropriately sized units capable of meeting the current and future needs of our nation's combatant commanders, and ensure adequate quality of life standards for soldiers and their families at Fort Lewis.

The Army has developed a plan to station and realign units to optimize training, leader development, and combat readiness. The stationing plan integrates BRAC, GDPR, and Army Growth and is facilitated by military construction. In December 2007, the Deputy Chief of Staff of the Army validated the Army's stationing plan to grow by 74,200 active and reserve component soldiers. This growth includes the stationing of approximately 560 additional active duty soldiers, augmentation of existing units by approximately 1,320 soldiers at Fort Lewis and may include the realignment of a medium combat aviation brigade to the installation.

The need for organizational growth and realignment of the Army focuses on three primary areas. These areas of need include:

- Supporting increased security and defense mission requirements
- Sustaining Force Readiness.
- Preserving soldier and family quality of life.

Fort Lewis, including the Yakima Training Center (YTC), is one of the Army's premier stationing locations. The installation provides a state of the art training environment to prepare soldiers for the missions they will need to execute when deployed abroad, and a high quality of life to support soldiers and their families, when stationed at home. The Army needs to generate a sustainable supply of trained and ready forces and has selected Fort Lewis as a permanent stationing location for a contingent of these forces. As part of the need for action, Fort Lewis must take those actions necessary to support the stationing decisions made by the Deputy Chief of Staff of the Army as part of the ROD for the Programmatic EIS for Army Growth and Force Structure Realignment.

Fort Lewis is an 86,176-acre military reservation located in western Washington, in Pierce and Thurston counties, approximately 35 miles south of Seattle and 7 miles northeast of Olympia. Interstate 5 (I-5), which is the main transportation corridor in the Puget Sound region, runs through the installation. Fort Lewis is bordered on the north by McChord Air Force Base (AFB) and suburban and commercial development; on the east and south by rural areas, forestland, and several small communities; and on the west by Puget Sound, the Nisqually Indian Reservation, and rural areas that surround Olympia. Fort Lewis is a major facility for both weapons qualification and field training.

The cantonment area provides soldier support facilities. This built-up area, separated by I-5 into the Main Post and the North Fort, contains soldier and family housing; administrative, maintenance, community support, recreational, supply, and storage facilities: utilities; classrooms; and simulation training facilities.

STUDY INTERSECTIONS AND ANALYSIS SCENARIOS

For this study, the impacts on adjacent roadways were measured by the effect of project traffic on traffic operations at key intersections during the AM (0700 to 0900) and PM (1600 to 1800) peak periods. Three of the study intersections are on-post (located within Fort Lewis), while five locations are located just outside the gates. All the intersections analyzed are illustrated in **Figure 1** and include:

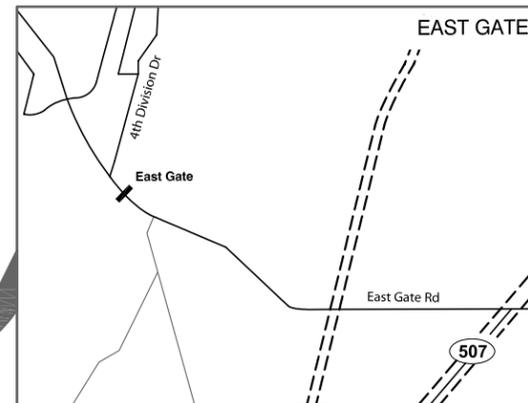
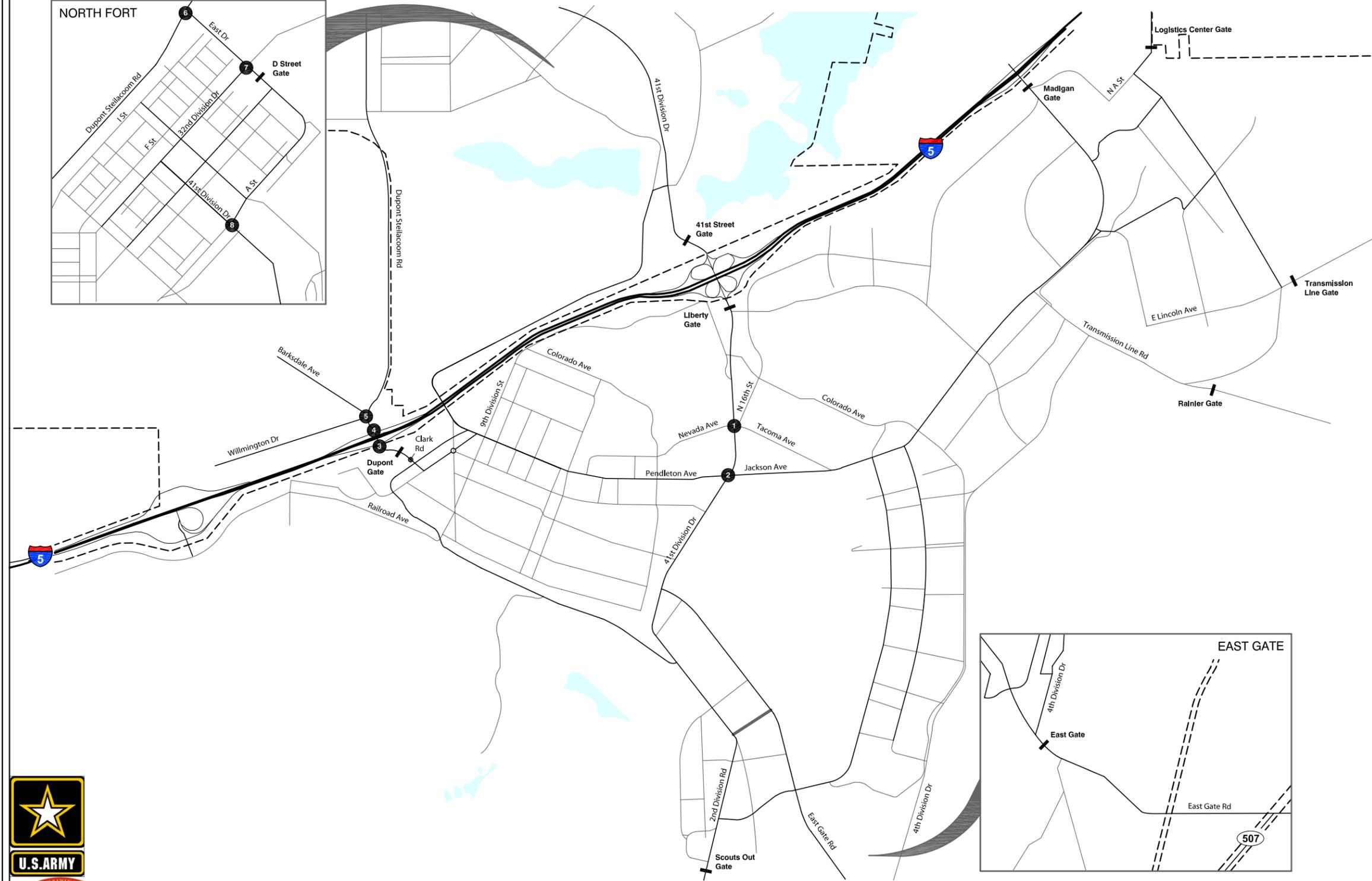
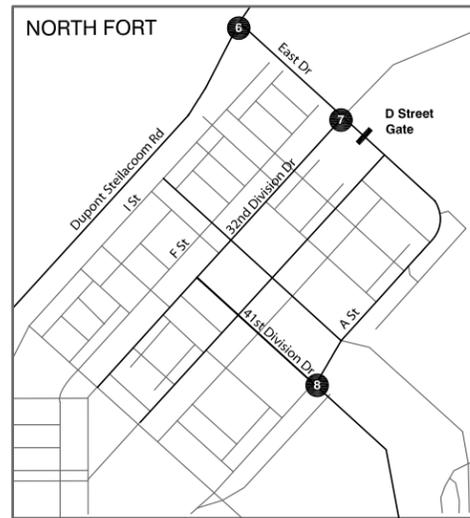
1. 41st Division Drive / Nevada Avenue / Tacoma Avenue (on-post)
2. 41st Division Drive / Pendleton Avenue (on-post)
3. I-5 NB Ramps / Barksdale Avenue / Clark Road (off-post)
4. I-5 SB Ramps / Barksdale Avenue / Clark Road (off-post)
5. DuPont-Steilacoom Road / Barksdale Avenue / Wilmington Drive (off-post)
6. DuPont-Steilacoom Road / East Drive (off-post)
7. North Gate Road / East Drive (off-post)
8. 41st Division Drive / A Street (on-post)

For this analysis, the following alternatives were evaluated:

- **Existing Conditions** – Existing Year 2008 AM and PM peak hour conditions based on counts collected in the fall of 2007 or 2008.
- **Alternative 1 - Year 2015 No Action** – Year 2015 conditions based on expected growth in the area (approximately 5percent).
- **Alternative 2 - Year 2015 Grow-the-Army (GTA) Actions** – Year 2015 No Action plus the addition of a Stryker Brigade Combat Team (SBCT) to Fort Lewis. The addition of the brigade would result in approximately a 6percent growth over the No Action scenario.
- **Alternative 3 - Year 2015 Combat Service Support (CSS)** – Year 2015 GTA plus the addition of approximately 1,000 additional CSS soldiers. The addition of the soldiers would result in approximately a 10percent growth over the No Action scenario.
- **Alternative 4 - Year 2015 Medium Combat Aviation Brigade (CAB)** – Year 2015 CSS plus the addition of a medium combat Aviation Brigade. The addition of the soldiers would result in approximately a 20percent growth over the No Action scenario.

ANALYSIS METHODS

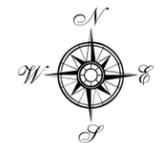
Transportation engineers and planners commonly use the term level of service (LOS) to measure and describe the operational status of the local roadway network. LOS is a qualitative measure describing operational conditions within a traffic flow, and the perception of these conditions by drivers or passengers. These conditions include factors such as speed, delay, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. Levels of service are given letter designations, from A to F, with LOS A representing the best operating conditions (free flow, little delay) and LOS F the worst (congestion, long delays). Generally, LOS A and B are high, LOS C and D are moderate, and LOS E and F are low. **Table 1** summarizes the relationship between control delay and LOS for signalized and unsignalized intersections. At signalized and all-way stop-controlled intersections, LOS is based on the weighted average control delay of all movements measured in seconds per vehicle. At side-street stop-controlled intersections, the LOS rating is based on the control delay for each minor movement.



Legend

-  Study Intersection
-  Installation Boundary
-  Access Control Point (Gate)

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Figure 1
**Project Study Area
and Study Intersections**

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
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Signalized Intersections

The operations of the signalized intersections were analyzed using the methodology contained in *Highway Capacity Manual (HCM) 2000* (Transportation Research Board, 2000). This methodology determines the level of service by comparing the average control delay for all vehicles approaching the intersection to the delay thresholds shown in **Table 1**.

Unsignalized Intersections

For the unsignalized (side-street stop-controlled) intersections, the level of service calculations were conducted using the method in Chapter 17 of the *2000 Highway Capacity Manual*. The LOS rating is based on the average control delay expressed in seconds per vehicle. At side-street stop-controlled intersections, the control delay (and LOS) is calculated for each controlled movement, the left-turn movement from the major street, and for the entire intersection. For controlled approaches composed of a single lane (such as the approaches to the roundabout), the control delay is computed as the average of all movements in that lane. The delays for the entire intersection and for the movement or approach with the highest delay are reported. **Table 1** also presents the thresholds for unsignalized intersections.

TABLE 1. INTERSECTION LEVEL OF SERVICE DEFINITIONS		
Level of Service	Description of Traffic Conditions	Average Control Delay Per Vehicle (Seconds)
Signalized Intersections ¹		
A	Insignificant Delays: No approach phase is fully utilized and no vehicle waits longer than one red indication.	≤10
B	Minimal Delays: An occasional approach phase is fully utilized. Drivers begin to feel restricted.	>10-20
C	Acceptable Delays: Major approach phase may become fully utilized. Most drivers feel somewhat restricted.	>20-35
D	Tolerable Delays: Drivers may wait through more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.	>35-55
E	Significant Delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long vehicle queues form upstream.	>55-80
F	Excessive Delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	>80

Table 1 Continued Intersection Level of Service Definitions		
Unsignalized Intersections ²		
A	No delay for stop-controlled approaches.	≤10
B	Operations with minor delay.	>10-15
C	Operations with moderate delays.	>15-25
D	Operations with some delays.	>25-35
E	Operations with high delays, and long queues.	>35-50
F	Operation with extreme congestion, with very high delays and long queues unacceptable to most drivers.	>50
Sources: ¹ HCM 2000, Chapter 16, Signalized Intersections. Values shown are in seconds/vehicle. ² HCM 2000, Chapter 17, Unsignalized Intersections.		

REPORT ORGANIZATION

This report is divided into five chapters as described below:

Chapter 1 – Introduction discusses the study purpose, analysis scenarios and methods, and organization of this report.

Chapter 2 – Existing Conditions describes the current transportation facilities and traffic operations in the project vicinity, including the surrounding roadway network, typical weekday morning (AM) and evening (PM) peak hour vehicular traffic volumes, and intersection operations.

Chapter 3 – Project Traffic presents relevant project information, such as a description of each of alternative (including troop levels), and discusses the method used to estimate project traffic (trip generation, distribution, and assignment).

Chapter 4 – Year 2015 Conditions presents the results of the intersection operations analysis for Year 2015 No Action, as well as with each project scenario, and addresses project traffic impacts and mitigation measures.

Chapter 5 – Yakima Training Center presents the impacts of troop increases for each project scenario to the Yakima Training Center.

Chapter 6 – Conclusions and Recommendations presents a summary of all recommended improvements for the Project site (including intersection, parking, and access).

2. EXISTING CONDITIONS

The following section describes the existing transportation conditions in the study area focusing on the transportation facilities, traffic volumes, and traffic operational conditions. The year 2008 was used to represent the existing conditions in the study area.

STUDY AREA

On-Post Roadways

Three types of roadways are found within the boundaries of Fort Lewis: Primary, Secondary, and Tertiary.

Primary roadways function as arterials, serving as the major through routes within the Fort and providing connections to I-5 and the surrounding major highways. The typical posted speed limit is 35 miles per hour (mph). The Primary roadways include: *41st Division Drive, Pendleton Avenue, Jackson Avenue, Stryker Avenue, East Gate Road, Railroad Avenue, Rainier Avenue, 2nd Division Drive and 3rd Division Drive.*

The main entrance and thoroughfare on the Main Post and North Fort Lewis is 41st Division Drive. On the Main Post, 41st Division Drive has five lanes and a posted speed limit of 35 mph, and provides access to the Town Center area of the Main Post. The Town Center area, which is generally bounded by 41st Division Drive, Nevada Avenue, N Division Street, and Liggett Avenue, contains the Post Exchange (PX), Commissary, bowling alley, movie theatre and many other retail, office, recreational, and social support services. At the North Fort, 41st Division Drive south of A Street has four lanes and a raised, planted median with concrete curb and gutter on both sides of the roadway. There is a concrete sidewalk on the east side of the road, separated from the roadway by a planter strip, and signed and marked 4-foot wide on-street bike lanes in both directions.

Pendleton Avenue, the primary east-west arterial in the Town Center area, has three lanes with a center two-way left turn lane and a posted speed limit of 25 mph. It is the only street in the Town Center with a continuous pedestrian walkway. Other nearby streets do not have continuous designated pedestrian facilities. Pendleton Avenue continues west under I-5 providing access to the North Fort area within the secured boundaries of Fort Lewis.

Several streets in the North Fort area, including 41st Division Drive (north of A Street) have recently been improved and widened to 32 feet (curb to curb) to provide 5-foot wide striped bike lanes on both sides of the street. The streets also have new curbs, gutters and sidewalks.

Secondary roadways function as collectors, distributing traffic between the Primary and Tertiary roadways. Secondary roads provide functionality over mobility and typically have two travel lanes and a posted speed limit of 25 mph. The secondary roads on-post include: *Liggett Avenue, Bitar Avenue, Colorado Avenue, Nevada Avenue, Tacoma Avenue, Transmission Line Road and A Street.*

Tertiary roadways are the third type of roadway at the Fort. They function as local roads and streets providing driveway access to buildings, parking lots, and residential housing areas. These roads and streets typically have two travel lanes and low speed limits of 25 mph or less.

Off-Post Roadways

Several roadways off-post provide access to/from the Fort to the surrounding area.

Interstate-5 (I-5), an 8-lane freeway with a posted speed limit of 60 mph, is the main highway that provides access to/from the Fort from the surrounding communities to the north, south and west.

DuPont-Steilacoom Road, on the west side of the North Fort, is a 2-lane arterial with a posted speed limit of 45 mph. This roadway provides access to the cities of DuPont and Steilacoom, and to the North Fort

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area via East Drive. East Drive connects North Fort Lewis to North Gate Road, providing access to the City of Lakewood. North Gate Road is a 2-lane arterial with a posted speed limit of 35 mph.

Clark Road provides access to the Main Post for vehicles coming from south of the Fort and the City of DuPont.

East Gate Road and **SR 507** provide access to the Main Post from the east. SR 507 is a 2-lane state highway with a posted speed limit of 50 mph; East Gate Road has two lanes and a posted speed limit of 45 mph outside the post.

The other major state highways surrounding Fort Lewis are State Route 512 (SR 512) to the north, SR 510 to the south, and SR 7 located to the east.

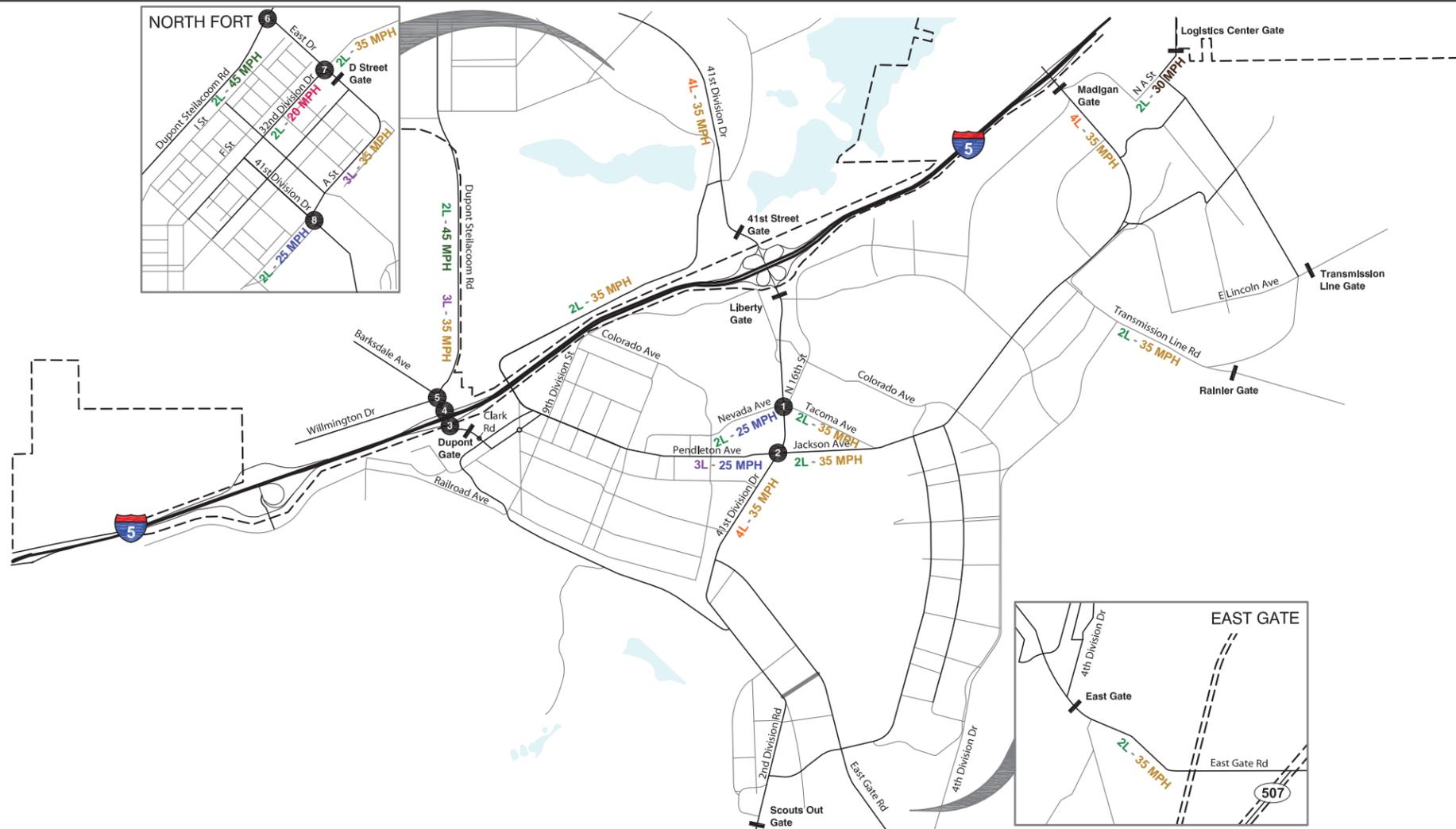
ACCESS CONTROL POINTS AND OPERATIONS

Access onto the post is restricted to authorized personnel only and controlled via 10 access control points (ACPs) or gates, as shown on **Figure 2**. The primary ACPs are the Liberty (Main) Gate, the Madigan Gate, the 41st Street (North Fort Lewis) Gate and the DuPont Gate. Secondary gates serving the Fort are the D Street Gate, the East Gate, the Logistics Center Gate, the Transmission Line Gate, Rainier, and the Scouts Out Gate.

Visitors to Fort Lewis are directed to use Liberty Gate, where the Visitor's Center issues temporary passes for limited access onto the post.

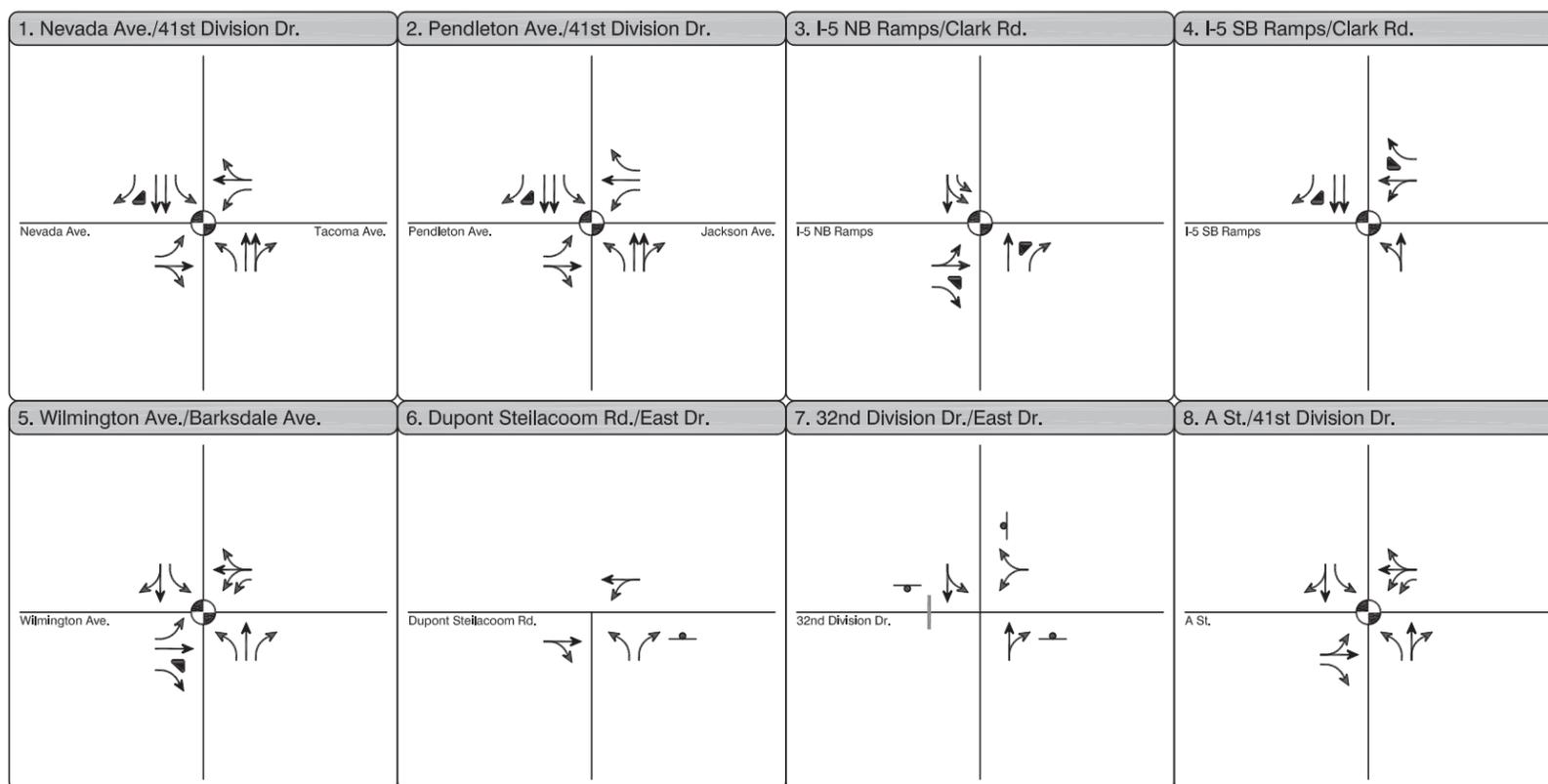
From I-5, the main exits to Fort Lewis are:

- Steilacoom DuPont Road exit (# 119) provides access to the Main Post via the DuPont Gate and Clark Road.
- The Fort Lewis/North Fort Lewis exit (# 120) provides access to the Main Post via the Liberty (Main) Gate and the North Fort via the 41st Street Gate.
- The Madigan Hospital/Camp Murray exit (# 122) provides access to Madigan Hospital and Camp Murray (the adjacent National Guard center located on the north side of I-5).
- The Thorne Lane/Tillicum/Lakewood exit (# 123) provides access to the Logistics Center gate, via Murray Road.



Legend

- Turn Lane
- 2L Number of Lanes
- 35 MPH Posted Speed Limit
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access



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Figure 2
Existing Traffic Characteristics

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TRANSIT SERVICE

Transit services accessible by Fort Lewis personnel are provided by Intercity Transit and Sound Transit, as shown on Error! Reference source not found.. Pierce Transit provides bus service on Fort Lewis and to the surrounding communities. Transit route #207 provides service from the Fort Lewis Bus Depot, located at Building 2166 on 12th Street and Liggett Avenue in the Town Center of the Main Post, to Madigan Hospital. Route #207 buses run once per hour on weekdays.

Transit route #206 provides service to on-Post and off-Post destinations, including the following:

- Madigan Hospital
- Logistics Center
- American Lake Gardens
- Tillicum
- Lakewood Transit Center
- Lakewood Towne Center
- Lakewood
- Employment Security Office
- Saint Clare Hospital
- Ponders Corner

Transit route #206 buses run every one-half hour on weekdays. North Fort has no transit service.

Intercity Transit provides both weekday and weekend “Olympia Express” service between Olympia and Lacey to Lakewood (SR 512 Park & Ride and Sound Transit’s Lakewood Station) and various points in Tacoma. Intercity Transit and Pierce Transit both operate the Express service under the same name, although operated independently of each other. Transfer connections are available from the Olympia Express to Pierce Transit Route 206 that serves Fort Lewis.

Sound Transit regional bus (Route 592) provides daily commuter service connecting the Lakewood station to Tacoma and Seattle. Commuter rail will eventually be provided to the Lakewood station with service to Seattle.

Appendix A depicts the transit routes and provides copies of the maps and timetables for both of these routes. North Fort Lewis has no transit service at the present time.

Additionally, Pierce Transit and Intercity Transit provide regular vanpools to Fort Lewis from surrounding cities. As of October 2009, there were approximately 36 vanpools operating to Fort Lewis from Pierce and Thurston Counties. A list of the current vanpools, their destinations, and the contact information for each route is provided in **Appendix A**.

EXISTING TRAFFIC VOLUMES

On-Post Volumes

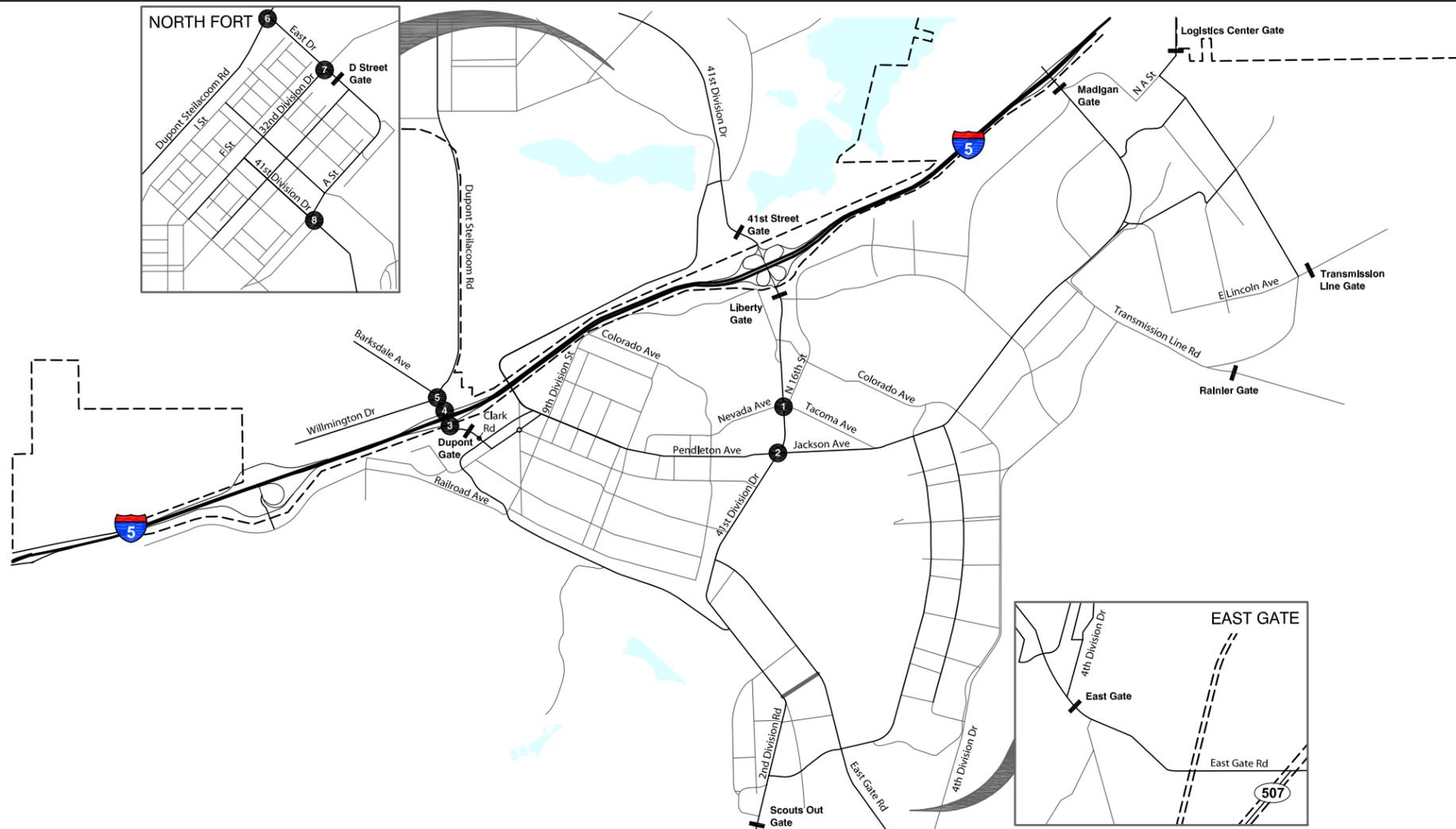
Figure 3 shows the existing AM and PM peak hour traffic volumes at the study intersections. The existing peak hour volumes were obtained from two sources. The manual turning movement traffic counts conducted in the fall of 2007 or in 2008 by the traffic volume counting firm Trafficcount, Inc., or those obtained from the July 2008 *Fort Lewis Comprehensive Traffic/Transportation Study*. The firm conducted the counts from 0700 to 0900 and from 1600 to 1800 in order to correspond with the surrounding (off-post) peak periods of traffic volume during the course of a typical weekday.

Figure 4 shows the existing AM and PM peak hour and average weekday daily traffic volumes at each of the 10 operational access gates, as well as the roadway peak hour volumes at other key locations. Most of the gate traffic volumes are from recent machine-recorded traffic volume counts, also conducted by Trafficcount, Inc. These machine-recorded (tube) volume counts are for three consecutive weekdays (Tuesday to Thursday), from December 9 to 11, 2008, at the following locations:

- Murray Road SW, south of 150th Street SW (Logistics Center Gate)

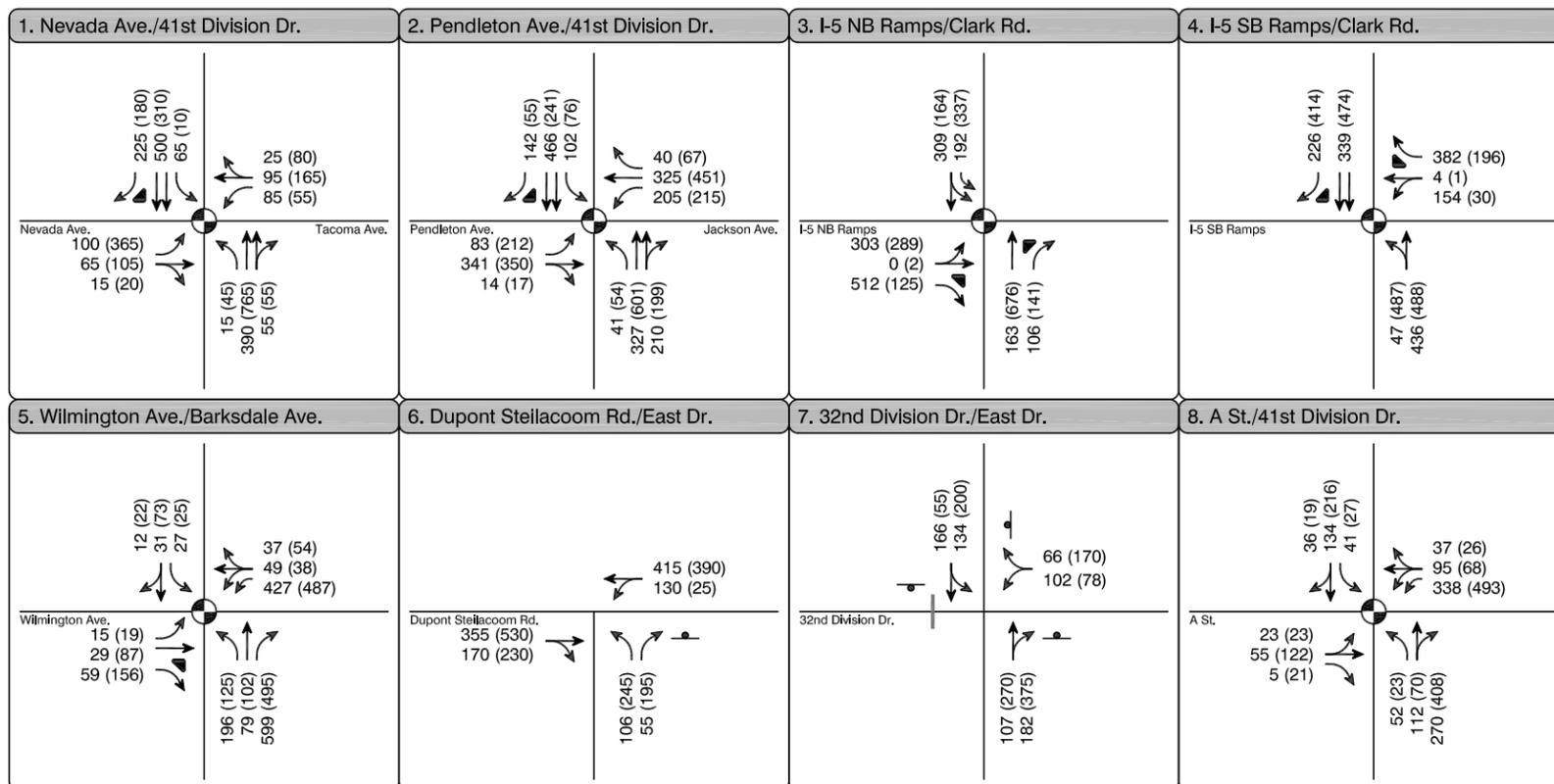
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- Jackson Avenue, south of I-5 (Madigan Gate)
- 41st Division Drive, south of I-5 (Main Gate)
- 41st Division Drive, north of I-5 (North Fort Gate)
- Clark Road, south of I-5 (DuPont Gate)
- East Drive, south of North Gate Rd. (North Gate)
- East Gate Road, west of SR 507 (East Gate)

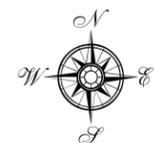


Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access



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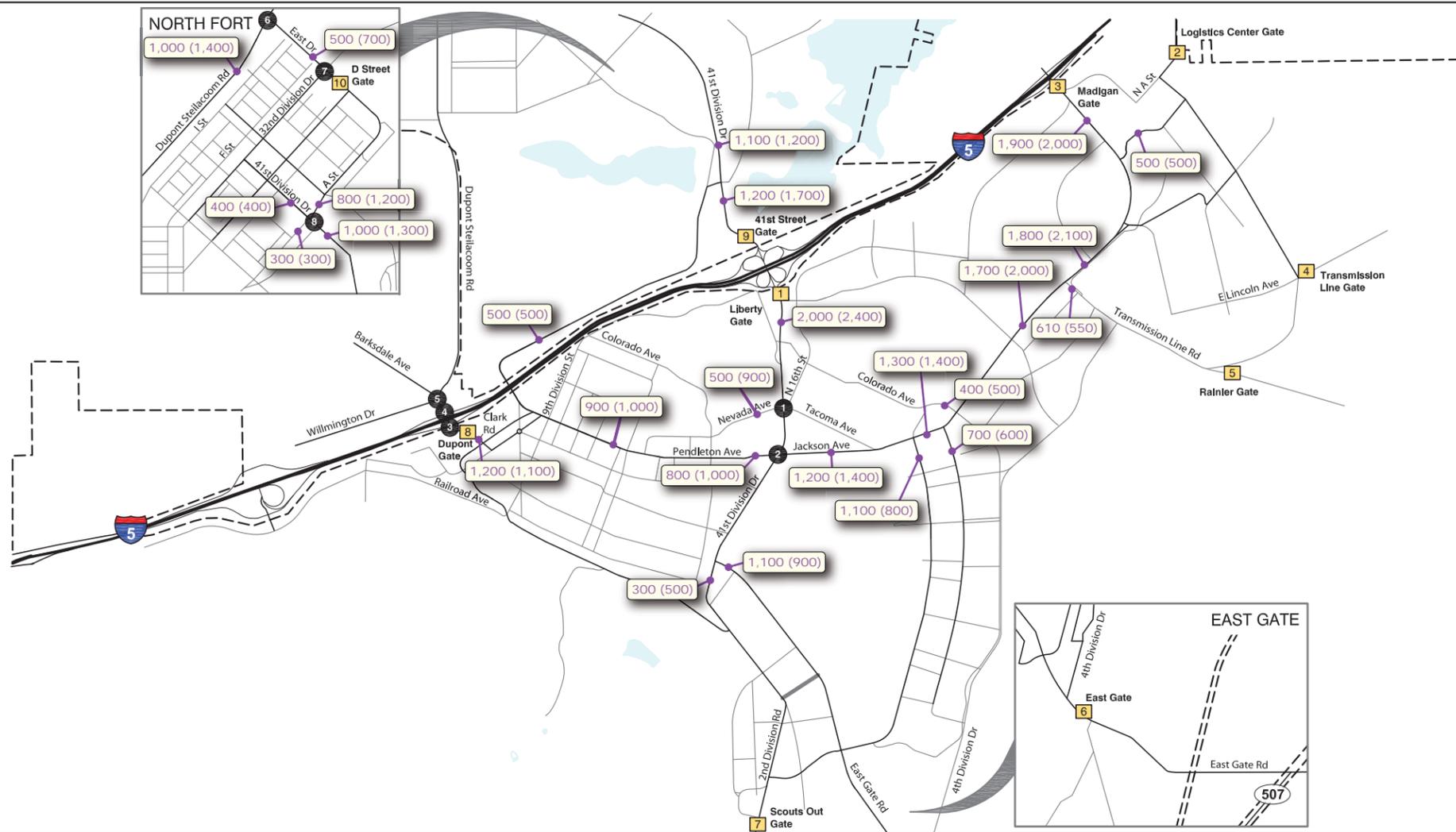


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Figure 3
Existing AM/PM
Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
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Legend

- Turn Lane
- AM (PM) [Avg Wkdy] Peak Hour & Average Weekday Traffic Volume
- Roadway Link Volume
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access

Note:
Peak Hour Traffic Counts were collected in early December 2008.

Roadway link volumes obtained from the Transpo Group July 2008 Fort Lewis Comprehensive Traffic/Transportation Installation Study.

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1. Liberty (Main) Gate	2. Logistics Center Gate	3. Madigan Gate	4. Transmission Line Gate	5. Rainier Gate
<p>1,460 (730) [13,840] 41st Division Dr.</p> <p>390 (1,720) [15,210]</p>	<p>480 (90) [3,850] N.A. St.</p> <p>20 (620) [3,870]</p>	<p>1,440 (890) [12,210] Jackson Ave.</p> <p>625 (1,860) [13,440]</p>	<p>[800]</p> <p>E Lincoln Ave.</p>	<p>[1,170]</p> <p>Transmission Line Rd.</p>
6. East Gate	7. Scouts Out Gate	8. Dupont Gate	9. 41st Street (North Fort) Gate	10. D Street Gate
<p>730 (135) [4,010]</p> <p>East Gate Rd. 10 (770) [3,990]</p>	<p>[120]</p> <p>2nd Division Rd.</p>	<p>1,110 (215) [7,410] Clark Rd.</p> <p>40 (950) [6,800]</p>	<p>525 (730) [8,320] 41st Division Dr.</p> <p>675 (640) [10,010]</p>	<p>270 (130) [3,990] East Dr.</p> <p>290 (645) [3,700]</p>



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Figure 4
*Existing Gate and
Roadway Link Traffic Volumes*

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
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The tube counts at these gates show the start of the AM peak period is 0500. This corresponds to soldiers arriving on the post for regular physical training (PT), which typically occurs during the morning hours before work. The typical workday on-post is from about 0700 to 1600. This is also consistent with the gate volume PM peak hour, which is from 1600 to 1700.

The entering gate volumes for the minor Rainier Gate, Transmission Line Gate, and Scouts Out Gate were obtained from the 2006 ACP throughput data provided by the Fort Lewis Public Works staff. The Public Works staff provided the most current gate volume data collected by the Fort Lewis Security Services Office. This data shows that in 2006 there was an average of 38,879 vehicles entering Fort Lewis per day (including weekends and holidays). Based on the estimated average weekday 2006 ACP volumes at the minor gates and the recent counts conducted by Trafficcount, Inc. at the higher volume gates, Fort Lewis currently has an average of 57,396 vehicles entering the Fort during an average weekday and generates an average total (entering and exiting) volume of 114,805 vehicles per weekday.

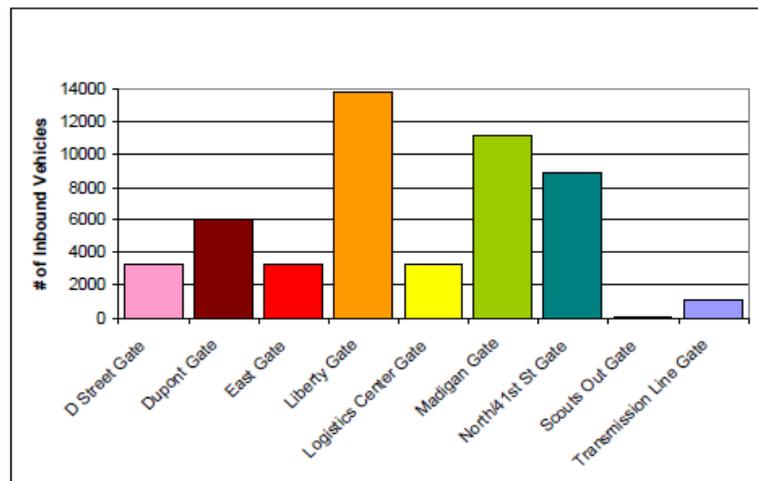
Note that this average weekday entering volume does not include nor account for the lower traffic volumes generated during the weekends and holidays. This is the reason the current average volume is significantly higher than the 2006 average daily traffic volume. **Appendix B** provides all of the traffic volume count data summary sheets.

Figure 5, obtained from the July 2008 *Fort Lewis Comprehensive Traffic/ Transportation Study* prepared by The Transpo Group, Inc., indicates that the average weekday traffic volume entering the fort was approximately 48,000 vehicles in 2007/2008. Note that the Rainier Gate is not included in this table. The 2006 ACP throughput data shows that this gate had a daily average of 1,171 vehicles accessing this gate in 2006.

Comparing the 2007/2008 traffic/ transportation study volumes (including the Rainier Gate volume) to the recent (December 2008) gate counts suggests a one-year traffic volume increase of 16.7percent (57,396/49,171) on Fort Lewis (from late 2007 to late 2008).

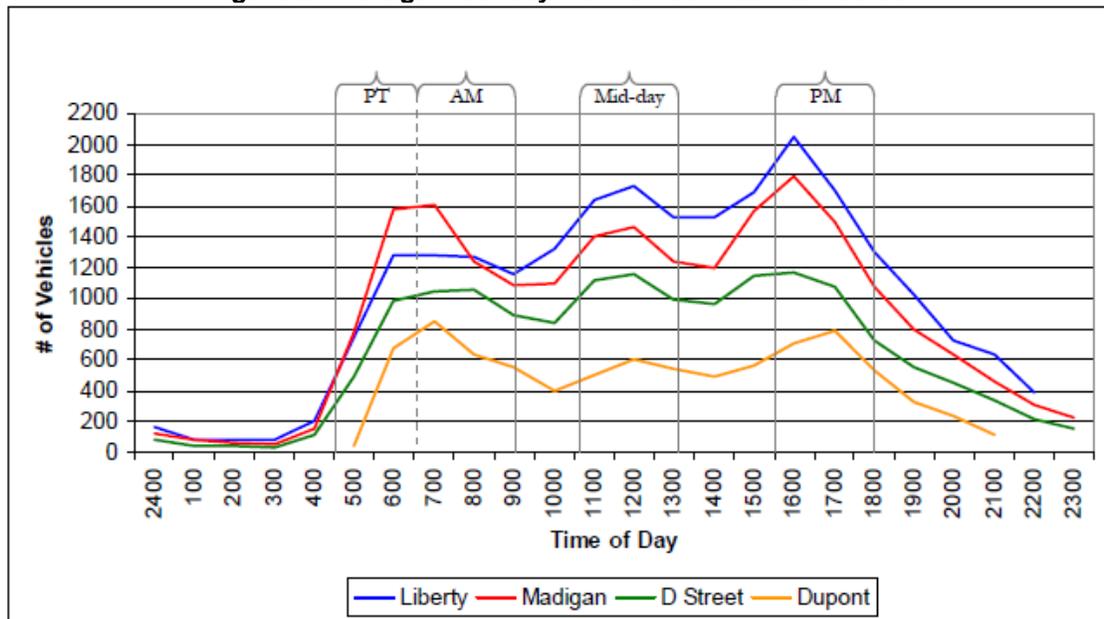
Figure 5. 2008 Average Weekday Inbound Traffic Volumes

Figure 6 shows an hourly breakdown of the average weekday traffic volumes at the four primary ACPs based on “historical daily traffic volumes.” The four primary gates, the Liberty (Main) Gate, the Madigan Gate, the 41st Street (North) Gate and the DuPont Gate process 75 percent of the daily traffic generated on Fort Lewis. Figure 5 and the recent gate counts show that the PM peak hour, from 1600 to 1700, is the highest hour of traffic volume generating approximately 8.2 percent of the total average weekday traffic on Fort Lewis. The AM peak hour of traffic on Fort Lewis generally occurs from about 0600 to 0700 and generates about 7.4 percent of the total weekday traffic.



The gate volume counts and Figure 5 show that the mid-day (lunchtime) period also generates a large percentage of the vehicles. The Town Center area experiences a large traffic volume during the mid-day period, mostly due to the numerous exercise, recreational, shopping and eating establishments located in this area of the fort.

Figure 6. Average Weekday Traffic Volumes Near Gates



Source: July 2008 Fort Lewis Comprehensive Traffic/Transportation Study

Interstate-5 Volumes

The Washington State Department of Transportation (WSDOT) 2007 Annual Traffic Report shows that I-5 carries, on average, approximately 111,000 vehicles per day at the DuPont Steilacoom Road exit (#119). North of the Fort Lewis/North Fort Lewis exit (#120), I-5 carries an estimated average of 127,000 vehicles per day. Just north of the Thorne Lane exit (#123), I-5 carries, on average, 146,000 vehicles per day. During the afternoon peak hour, the volumes on I-5 range from 8,500 vehicles at the south exit (#119) to more than 11,000 vehicles at the north exit (#123) to Fort Lewis. **Appendix B** provides the WSDOT volume data.

EXISTING INTERSECTION OPERATIONS

Table 2 shows the existing LOS and average control delay for each study intersection. The LOS was calculated using procedures in the Transportation Research Board *2000 Highway Capacity Manual* (HCM). The *Synchro* computer software package, which is consistent with the HCM, was used to analyze all intersections. For side-street stop-controlled intersections, the overall intersection and the worst case minor controlled approach or movement delay are shown in seconds per vehicle. **Appendix C** provides the LOS data summary sheets.

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**TABLE 2.
EXISTING INTERSECTION LEVEL OF SERVICE RESULTS**

Intersection	Traffic Control ¹	AM Peak Hour		PM Peak Hour		
		Delay ²	LOS	Delay ²	LOS	
1	41 st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	16	B	44	D
2	41 st Division Drive/Pendleton Avenue	Signal	38	D	50	D
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	23	C	46	D
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	12	B	46	D
5	DuPont-Steilacoom Road/Barksdale Avenue/Wilmington Drive	Signal	29	C	29	C
6	DuPont-Steilacoom Road/East Drive	SSSC	7 44	A E - NB	>50 >50	F F - NB
7	North Gate Road/East Drive	AWSC	11	B	34	D
8	41 st Division Drive/A Street	Signal	29	C	35	C

Note: **Bold** indicates unacceptable operation.
 1. Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled
 Source: Fehr & Peers, 2009.

All study intersections operate at LOS D or better for both the AM and PM peak hour, except two intersections. During the PM peak hour the DuPont-Steilacoom Road/East Drive intersection operates at LOS F. It should be noted that the side-street northbound movement at the DuPont-Steilacoom Road/East Drive intersection also operates at LOS E during the AM peak hour. On-post, the high volume 41st Division Drive/Nevada Avenue/Tacoma Avenue and 41st Division Drive/Pendleton Avenue intersections currently both operate at LOS D or better during both peak hours, except 41st Division Drive/Pendleton Avenue, which operates at LOS E during the PM peak hour.

The July 2008 *Fort Lewis Comprehensive Traffic/Transportation Study* indicated that the 41st Division Drive/Pendleton Avenue intersection currently operates at LOS E during the mid-day peak hour. This is most likely due to the retail shopping and restaurants located just to the west of this intersection, in the Town Center area.

The study identified other intersections on or around the post that are currently operating at LOS E or F:

- West Way/Clark Road (AM and PM)
- Tacoma Avenue/Pendleton Avenue (AM and PM)
- N 23rd Street/Pendleton Avenue (PM)
- 3rd Division Drive/Pendleton Avenue (AM and PM)
- N 20th Street/Colorado Avenue (PM)
- East Gate Road/SR 507 (PM)
- Stryker Avenue/41st Division Drive (PM)

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The unsignalized intersections of West Way/Clark Road, Tacoma Avenue/Pendleton Avenue, 3rd Division Drive/Pendleton Avenue, and DuPont-Steilacoom Road/East Drive all operate at LOS F for all three peak time periods during an average weekday. Therefore, these are likely the worst operating intersections on or around Fort Lewis.

GATE OPERATIONS

The LOS and traffic throughput capacity at the Fort Lewis gates is not readily measurable due to the varying level of security maintained at these gates, affecting both the service capacity and extent of delay. The level of security changes with the level of threat and the amount of defense posture needed at these gates. Therefore, gate operations are not only affected by traffic flow, but also by security levels as well.

Fort Lewis public works staff previously indicated that the Liberty (Main) Gate has the longest delays due to the number of visitors and amount of vehicle traffic. The inbound vehicle queues can sometimes back up to the I-5 ramps, causing traffic congestion and deterioration of the level of service.

During the AM peak hour, Madigan Gate also experiences heavy traffic congestion. Queues extend back along Jackson Avenue from the gate to the I-5/155th Street SW (Berkeley Avenue SW)/ Jackson Avenue interchange. The I-5 southbound off-ramp backs up onto the I-5 main line, with vehicles in the queue generally waiting on the paved shoulder of the freeway. This is an on-going problem during the AM peak hour. The other access gates to Fort Lewis are functioning satisfactorily.

3. PROJECT TRAFFIC

This section describes the procedures used to develop project traffic estimates, including project trip generation, distribution, and assignment characteristics. The results are used to evaluate potential impacts the project would have on the surrounding roadway network.

FORT LEWIS BACKGROUND

As noted earlier, Fort Lewis is an 86,176-acre military reservation located in western Washington, in Pierce and Thurston counties, approximately 35 miles south of Seattle and 7 miles northeast of Olympia. Interstate 5 (I-5), which is the main transportation corridor in the Puget Sound region, runs through the installation. Fort Lewis is bordered on the north by McChord Air Force Base (AFB) and suburban and commercial development; on the east and south by rural areas, forestland, and several small communities; and on the west by Puget Sound, the Nisqually Indian Reservation, and rural areas that surround Olympia. Fort Lewis is a major facility for both weapons qualification and field training. It is home to the 1st Corps Headquarters and other major units. Army Reserve units and the Washington Army National Guard also use Fort Lewis facilities. Out-of-state Army units and units from allied nations periodically train at Fort Lewis as well.

Fort Lewis also accommodates a variety of nonmilitary activities. These activities include recreation, commercial timber harvest, and Native American traditional ways of life. Primary recreational activities are hunting, fishing, horseback riding, and other outdoor activities. Soldier support facilities are provided in the cantonment area. This built-up area, separated by I-5 into the Main Post and North Fort, contains Soldier and family housing; administrative, maintenance, community support, recreational, supply, and storage facilities; utilities; classrooms; and simulation training facilities. The Fort Lewis training area serves as an active military training facility for both weapons qualification and field training. The downrange area comprises the land area outside the cantonment area, including live-fire ranges, training lands, and impact areas.

YAKIMA TRAINING CENTER BACKGROUND

The Yakima Training Center (YTC) is a training installation located in central Washington northeast of the town of Yakima and west of the Columbia River. YTC encompasses approximately 327,231 acres in Yakima and Kittitas counties. Although the active Army Units assigned to Fort Lewis and the 81st HBCT of the Washington Army National Guard are the principal users of YTC, other units and forces also use YTC. They include the Special Operations Command, Marine Corps, Air Force, Navy, Coast Guard, local and federal law enforcement, and allied forces from Canada and Japan. Currently, YTC plays a major role as part of the Stryker Center of Excellence. The Center of Excellence (Fort Lewis and YTC) is responsible for concept development, lessons learned, and technical and tactical expertise for future SBCTs. It also assists the Army in distributing lessons learned from the SBCTs. YTC includes both maneuver areas and live-fire ranges. In particular, the central impact area (CIA) and Multi-purpose Range Complex (MPRC) are used for training with conventional and tactical weapons. The CIA is used primarily for tank, artillery, and infantry gunnery. The MPRC is a tank and infantry live-fire range with remotely controlled moving and pop-up targets.

PROPOSED ACTION SUMMARY

The Proposed Action will implement those actions from FY 2010 through 2015 needed to support the Army's decisions on growth and realignment at Fort Lewis and YTC. These actions would allow the Army to achieve a size and composition that is better able to meet national security and defense requirements; modify the force in accordance with Army Transformation; sustain unit equipment and training readiness; and preserve the quality of life for the soldiers and their families. Fort Lewis and YTC must take actions to support the strategic deployment and mobilization requirements of the nation's combatant commanders to ensure they will have the forces necessary to support regional contingency operational requirements.

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Specifically, the Proposed Action includes:

- Training of all three SBCTs simultaneously with other currently stationed major subordinate units at Fort Lewis and YTC;
- Stationing the new units and accommodating the augmented units identified in the Fort Lewis portions of the ROD for the 2007 GTA Final Programmatic EIS;
- Updating the Fort Lewis and YTC Area Development Plans to accommodate these defined and potential stationing actions;
- Potentially stationing at Fort Lewis and YTC CSS units with up to 1,000 soldiers; and
- Potentially stationing at Fort Lewis and YTC a medium CAB with up to 2,800 soldiers.

The Proposed Action would result in the following:

- **Troop-Level Increase** – Accommodate an overall increase in soldiers who would work, live, and train at Fort Lewis and YTC. Under the Proposed Action, approximately 5,800 new soldiers (new GTA units, existing units augmented under GTA, new CSS units, and a medium CAB) would be stationed at Fort Lewis. In addition, Fort Lewis must construct the facilities needed to support the additional soldiers and to replace substandard facilities currently occupied by a third SBCT stationed at Fort Lewis with facilities meeting Army standards. An SBCT consists of approximately 4,100 Soldiers and 1,000 unit vehicles and all accompanying equipment.
- **Staged Stationing of Troops** – Include continuous re-stationing and transformation of Fort Lewis force structure, expected to be completed by the year 2013. As the Army proceeds with transformation planning, the total unit strength may vary throughout the implementation period (although these variations relate to smaller units below the BCT level). Troop arrival schedules at Fort Lewis from re-stationing, deployment, and facilities for the SBCT would affect the timing of implementing new training requirements.
- **Facility Construction/Renovation and/or Deconstruction/Demolition** – Remove facilities and infrastructure that are no longer needed, relocate facilities to support new construction, construct new facilities and infrastructure, and renovate existing facilities and infrastructure to support the new population and training activities. Construction under the Proposed Action would take place at Fort Lewis and YTC.
- **Timing of Construction Projects** – Accomplish construction in phases throughout the implementation period. The timing of construction projects would be contingent upon funding availability and priorities.
- **Live-Fire Training and Maneuvers** – Provide for training for existing and new units stationed at Fort Lewis while balancing additional or different maneuver training, live-fire training, and environmental management to meet the Army's integrated goals of maintaining military training readiness and sustaining lands for continued use (Section 1.2.2). Live-fire training and maneuver activities under the Proposed Action would be similar to those described for the No Action Alternative. The requirements of training three SBCTs simultaneously with all other major units; however, could result in increased frequency of use of maneuver training areas and weapons firing ranges. YTC is anticipated to support most of the requirements for maneuver training at the battalion level and above.
- **Training Strategy** – Continue training under the Proposed Action throughout Fort Lewis and YTC in accordance with the suitability of the land for different training activities (e.g., maneuver or live-fire) and the ability to sustain the land.

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- **Environmental and Training Conditions** – Factors beyond the Army's control, such as regional instability, troop deployments, and climatic conditions, affect the implementation of training. Because environmental and training conditions are dynamic, the Army would monitor training activity under the Proposed Action and respond to changing conditions to sustain the land for training and provide maximum troop readiness.

ALTERNATIVE 2 - GROW-THE-ARMY ACTION

As announced in the ROD for the GTA Final Programmatic EIS, Fort Lewis was selected to receive several new units and increases to some existing units. About 30 percent of the changes involve new units and the rest involve increases to existing units, including the three SBCTs.

An SBCT is a rapidly deployable unit designed for early entry into operational scenarios. The SBCT is capable of deploying with all combat gear and equipment loaded on the vehicle so that it can begin supporting military operations immediately upon its arrival. The increased mobility and speed of the SBCT allows the unit to quickly respond and prevent, contain, stabilize, or resolve small-scale conflicts. An SBCT participates in major wartime operations as a subordinate component within a division or corps, in a variety of possible roles. The SBCT was designed for increased armored protection, reduced logistical support requirements, and rapid deployment. It uses a highly mobile, medium-weight armored combat/combat support platform, which requires a minimum of logistical support to allow the SBCT to function as more of an expeditionary unit requiring less re-supply. Preconfigured in ready-to-fight combined arms packages, the entire SBCT is designed to be rapidly deployed anywhere in the world in a few days time.

The SBCT is organized primarily as a combined arms, mounted infantry organization. The Stryker Infantry Carrier Vehicle serves as the platform for infantry carriers, mobile gun systems, mortars, reconnaissance, surveillance, and target acquisition elements, anti-tank carriers, engineer mobility support vehicles, nuclear/biological/chemical reconnaissance, as well as many of the command and control carriers within the brigade. The SBCT extends the tactical mobility of Commanders in the operational theaters of war and increases the firepower available to support dismounted infantry assaults.

SBCTs move mostly by road, with limited off-road or cross-country operations. The SBCT uses Stryker vehicles to traverse terrain and obstacles to ensure protected delivery of infantry squads to their dismount points. Although the Stryker can maneuver across slopes that are less than 30 percent in pitch and up slopes that are less than 60 percent grade, most mounted movement occurs on roads or unrestricted terrain. This operation allows SBCTs to take full advantage of the Stryker's speed.

In addition, maximum road usage provides the best fuel efficiency (Taylor 2004). The Stryker vehicle travels 5.7 miles per gallon of fuel on roads. In contrast, off-road, cross-country operations result in degradations in performance of as much as 45 to 60 percent (about 2.92 miles per gallon of fuel).

The SBCT uses many of the weapon systems of traditional Army brigades. In addition to these systems, the SBCT incorporates upgraded technologies and more advanced systems, including the Mobile Gun System (MGS), the M777 lightweight howitzer, and reconnaissance and target acquisition systems.

Travel Demand

Implementation of the ROD for the 2007 GTA Final Programmatic EIS would increase the population at Fort Lewis and YTC beyond those scheduled to be stationed there. Most of the soldiers will bring families with them, which would increase the number of people living on Fort Lewis. Additional civilians and contractors would be needed at both Fort Lewis and YTC between FY 2010 and FY 2015 to help construct, maintain, and operate the new facilities.

The travel demand analysis assumes a proportional relationship between the numbers of stationed soldiers and the number of vehicle trips within and outside of Fort Lewis. This assumption provides a conservative method for assessing the multiple effects of an increase in the soldier population of Fort

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Lewis and accounts for increases in trips for soldiers residing in off-installation housing, military families, army civilians, contractors, and other travel needed to support the stationed soldiers.

The GTA Alternative will add a Stryker Brigade to Fort Lewis increasing the number of soldiers to 31,000 in FY 2015, a 6.4 percent increase in the troop population over the No Action Alternative. Because the alternative adds troops to housing throughout the Fort, the traffic assumption is that the increase of vehicle trips at intersections would grow proportionately to the 11.7 percent increase over existing troop population.

ALTERNATIVE 3 - COMBAT SERVICE SUPPORT LOGISTICS UNITS

Combat Service Support (CSS) Logistics (Sustainment) units are responsible for transporting fuel, munitions, parts, food, medical supplies, and battlefield casualties during training and operational scenarios. In addition, these units maintain vehicles, recover destroyed or damaged vehicles, and provide medical care to injured Soldiers. CSS units primarily consist of transportation, quartermaster, medical, and headquarters units and functions. The number of Soldiers in the CSS units varies with the function and mission of each unit. As many as 1,000 Soldiers spread across these units may be stationed at Fort Lewis and YTC in the future.

CSS units use a wide variety of vehicles. Vehicles assigned to each unit are based in part on the types of units they are supporting and the missions they need to accomplish. Wheeled vehicles are capable of on-road and off-road maneuver, but will more often travel on-road.

The following sections describe the mission, numbers of Soldiers, and primary equipment for each of the four types of CSS units likely to be stationed at Fort Lewis and YTC.

Transportation Units

- **Mission.** The mission of the Transportation component is to transport, distribute, and issue general military supplies and equipment. Military supplies and equipment include ammunition; fortification and construction materials; water, subsistence, and water purification equipment; petroleum products; repair parts and end items; and medical supplies.
- **Soldiers.** Transportation units typically consist of company-sized organizations of 100 to 200 soldiers.
- **Primary Equipment.** Transportation units primarily use High Mobility Multi-wheeled Vehicles (HMMWVs), other light trucks, cargo trucks with 5-ton or larger capacity, and fuel trucks (5,000 gallon). In addition, they may have Heavy Equipment Transport (HET) trucks, which they use for transporting armored combat vehicles.

Quartermaster Units

- **Mission.** The mission of the Quartermaster component is to receive, store, and issue general military supplies and equipment. These supplies and equipment include fortification and construction material, water, subsistence, repair parts, and medical supplies.
- **Soldiers.** Quartermaster units typically consist of platoon-to company-sized organizations of 30 to 120 Soldiers.
- **Primary Equipment.** Quartermaster units use HMMWVs and cargo trucks with 5-ton capacity.

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Medical Units

- **Mission.** The mission of the Medical component is to provide health care support during training and operational deployments.
- **Soldiers.** Medical units vary in size with the type of medical unit and function.
- **Primary Equipment.** HMMWVs, some configured as medical evacuation vehicles, and cargo trucks with 5-ton capacities.

Headquarters Units

- **Mission.** The mission of Headquarters units includes collecting information, conducting planning and staffing, disseminating guidance to subordinate units, and overseeing operations. Headquarters units are responsible for the command and control of units in Garrison and during training and operational deployments. These units are typically collocated with combat maneuver units during maneuver rotations.
- **Soldiers.** Headquarters units vary in size with the mission and function of the headquarters. Typically, they range from 50 to 400 Soldiers, depending on the span of operational control and number of subordinate units.
- **Primary Equipment.** Headquarters units use HMMWVs, other light trucks, and cargo trucks with 5-ton or larger capacities.

Travel Demand

The CSS Alternative will add 1,000 new CSS soldiers in addition to the GTA troop levels. The troop total would increase to 32,000 soldiers, a 3.2 percent increase over the GTA alternative and a 9.9 percent increase over No Action levels. The travel demand analysis assumes a proportional relationship between the number of stationed soldiers and the number of vehicle trips within and outside of Fort Lewis. Because the study assumes that the CSS soldiers would be based in the North Fort area, the increases in traffic volumes were adjusted to reflect higher levels of traffic to and from the North Fort.

This assumption provides a conservative method to assess the multiple effects of an increase in the soldier population of Fort Lewis and accounts for increases in trips for soldiers residing in off-base housing, military families, army civilians, contractors, and other travel needed to support the stationed soldiers.

ALTERNATIVE 4 - MEDIUM COMBAT AVIATION BRIGADE

The Army is considering Fort Lewis and other locations for the re-stationing of a medium Combat Aviation Brigade (CAB) in the 2010 to 2013 time frame. Re-stationing a medium CAB at Fort Lewis and YTC would support the three SBCTs and other units already stationed at Fort Lewis and YTC by supporting and enhancing integrated training.

A medium CAB plans, prepares, executes, and assesses aviation and combined arms operations to support division and maneuver brigades to find, fix, and destroy enemy forces at a decisive time and place. The structure of the medium CAB is tailored to the types of BCTs it supports. Each medium CAB can support up to five BCTs. They are organized into two attack/reconnaissance battalions, an assault battalion, a general support battalion, an aviation support battalion (medium), and an air traffic service company. Typical mission essential tasks of a medium CAB include the following:

- Conduct air assault operations
- Conduct air defense operations

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- Conduct air movement operations
- Conduct air volcano (scatterable mine dispensing system) operations
- Conduct command, control, communications, computers, and intelligence operations
- Conduct combat service support operations
- Conduct combat support operations
- Conduct deployment/redeployment operations
- Conduct fast rope insertion and extraction system/special patrol infiltration/exfiltration system operation
- Conduct mission planning/preparation
- Conduct mobility, counter mobility and survivability operations
- Conduct reconnaissance and surveillance operations
- Conduct stability operations and support operations
- Conduct casualty evacuation

Medium CABs use a variety of equipment and are authorized 110 helicopters. Each attack battalion has 24 attack helicopters (AHs). The assault battalion has 30 utility helicopters (UHs). In addition to eight UHs, the general support battalion has 12 cargo helicopters (CHs) and 12 medivac helicopters (UHs). Finally, a CAB is accompanied by approximately 700 tactical vehicles, including light trucks, fuelers, and transport vehicles.

Travel Demand

This alternative will add a Medium CAB of approximately 2,800 soldiers above the CSS Alternative. This would represent a total increase of 25.4 percent of FY 2008 levels. The travel demand analysis assumes a proportional relationship between the numbers of stationed soldiers and the number of vehicle trips within and outside of Fort Lewis. Because the Medium CAB soldiers would be stationed near the airfield, the increases in traffic volumes were adjusted to reflect higher levels of traffic volumes along Pendleton Avenue, 41st Division Drive and 2nd Division Drive. This assumption provides a conservative method for assessing the multiple effects of an increase in the soldier population of Fort Lewis and accounts for increases in trips for soldiers residing in off-installation housing, military families, army civilians, contractors, and other travel needed to support the stationed soldiers.

4. YEAR 2015 CONDITIONS

This section discusses Year 2015 traffic conditions for each project alternative, as well as No Action operations.

PLANNED ROADWAY IMPROVEMENTS

Several local roadway improvements have been identified by local jurisdictions to be completed by Year 2015 analysis. However, planned but unfunded modifications to Fort Lewis are not included in the analysis. These access modifications include the 4-lane overpass spanning I-5 to connect Main Post to North Fort, the closure of the Main Gate, and the development of a new gate serving North Fort. The analysis also does not assume the completion of the Cross-Base Highway, which is currently unfunded for completion. The potential effects of this facility are identified below.

Pierce County

Pierce County's 2009-2014 Transportation Improvement Program (TIP) identifies numerous road improvement projects located near Fort Lewis, primarily east of the Fort in the Spanaway area. The relevant capacity and concurrency improvement projects include:

- **Canyon Road E Widening** – from 192nd Street E north to 1,000 feet south of 176th Street East. This project would widen the existing roadway to provide additional lanes. Construction not expected to start before 2014.
- **Canyon Road E Widening** – from 172nd Street E north to 160th Street East. This portion of Canyon Road E failed concurrency in 2005 and will be widened to provide additional lanes. Construction for this project is expected in 2011.
- **Canyon Road E Southerly Extension** – from 192nd Street E south to 260th Street East. This project will construct a new roadway as part of the new extension of the Canyon Road E corridor. Construction of some portions of the extension are expected in 2011, however, completion is not expected before 2014.
- **176th Street E Widening** – from B Street E east to 14th Avenue East. This portion of 176th Street E failed concurrency in 2005 and will be widened to provide additional lanes. Construction for this project could begin sometime in 2012 to 2014.
- **176th Street E Widening** – from 14th Avenue E to Waller Road East. This portion of 176th Street E also failed concurrency in 2005. Widening will provide additional lanes, with completion in 2011.
- **176th Street E Widening** – from Waller Road E to 500 feet west of 51st Avenue East. This portion of 176th Street E failed concurrency in 2003. The project will widen the roadway to provide additional lanes, with completion in 2011.
- **Spanaway Loop Road S** – from Military Road S to Tule Lake Road South. This road is expected to fail concurrency in 2012. The project will widen and reconstruct the road to provide additional lanes. Preliminary engineering for this project is expected in 2012 to 2014.

Additional transportation improvement project information can be found on the internet version of the County's 2009-2014 TIP at <http://www.co.pierce.wa.us/xml/abtus/ourorg/pwu/tpp/tip/2009-2014%20TIP.pdf>

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Washington State Department of Transportation (WSDOT)

Review of the WSDOT website identified the following transportation improvement projects near Fort Lewis:

- **Cross Base Highway (SR-704)** – WSDOT and Pierce County are planning a new 4-lane limited access east-west highway between I-5 and SR 7. The highway will be 6 miles long and run from the I-5/N Thorne Lane/Murray Road SW interchange to the SR 7/176th Street E intersection. The design of this highway will accommodate future expansion to six lanes. The project will relocate the existing I-5/N Thorne Lane /Murray Road SW interchange 300 feet southwest and reconstruct it to accommodate additional traffic and relieve congestion on I-5. The project will also build a connection to a new single lane southbound connector road from Gravelly Lake Drive SW to N Thorne Lane. At the east end of the project, modification to the SR 7 /176th Street E intersection will include additional turn lanes. The Cross Base Highway will provide access via three signalized intersections, two in American Lake Gardens and one at Spanaway Loop Road South Extension. At American Lake Gardens, the two intersections will be at 150th Street SW and Woodbrook Road. From 150th Street SW, a west turn will provide access onto Fort Lewis via the Logistics Center gate.

The project will also provide another access at approximately the midpoint of the project, at A Street. On Fort Lewis a new overpass would be constructed over the Burlington Northern Santa Fe (BNSF) railroad line. Lincoln Road will be realigned to connect to the new A Street access onto the Fort, and a new access road between Fort Lewis and McChord AFB would be constructed. The first phase of construction began in 2008 at the Spanaway Loop Road S/176th Street E intersection. Currently the completion date of the Cross Base Highway project is unknown. It is possible completion could occur by 2015, the horizon year for this study.

A Final Environmental Impact Statement (FEIS), dated September 2003, and Record of Decision (ROD), dated July 2004, for this project address the mitigation measures at the impacted Pierce County roads and intersections east of Fort Lewis.

- **Tacoma/Pierce County HOV Program** – This is a series of region-wide projects intended to build high-occupancy vehicle (HOV) lanes on I-5, SR-16 and SR-167. These projects will widen the roadways to ease traffic congestion in Tacoma and the metropolitan areas north of Fort Lewis. Design and construction of six funded projects are scheduled for completion by 2016.
- **Tacoma Rail Bypass of Point Defiance** – This project will re-route passenger trains, including Amtrak Cascades to a bypass rail line to increase speeds and improve travel time. This project will reroute passenger trains to an inland route that parallels I-5 on the west side. Most freight trains will continue to use the existing BNSF tracks in the Point Defiance area of Tacoma and along Puget Sound through Tacoma, Steilacoom and DuPont. The WSDOT State Rail and Marine Office issued a Determination of Non-Significance for this project, finding that there would be no significant transportation impacts. The study examined potential effects of the added trains to traffic delays crossing the tracks. Overall, the expected impacts were found to be minimal. The rail project is expected to implement several improvements to traffic signal coordination, signing, ramp configurations and intersection geometrics to facilitate safe crossings of the railroad by vehicles and non-motorized modes.

Additional information on these WSDOT projects can be found at
<http://www.wsdot.wa.gov/projects/?s=county-pierce,funding,location,route#listing>

City of DuPont and Town of Steilacoom

The City of DuPont and the Town of Steilacoom do not have any road improvement projects identified near Fort Lewis.

City of Lakewood

The City of Lakewood's *Six Year Comprehensive Transportation Improvement Program 2009-2014* identified one road improvement project near Fort Lewis. This project, on Union Avenue, from Berkeley Street SW to N Thorne Lane, would widen the street to add a two-way left turn lane, bicycle lanes, sidewalks and street lighting. The expected year of completion for this project is 2014.

The City of Lakewood is conducting the *I-5 Transportation Alternatives Analysis and Operations Model Study* in coordination with WSDOT. The study will recommend regional improvements to I-5 and various interchanges, including those serving Fort Lewis. Implementation of these improvements will be prioritized along with other regional transportation projects.

ALTERNATIVE 1 - YEAR 2015 NO ACTION

As stated previously, the Army has planned several transportation facilities for construction. **Figure 7** shows the assumed intersection lane configuration at each of the eight study intersections. The primary facilities affecting conditions under the No Action Alternative are as follows:

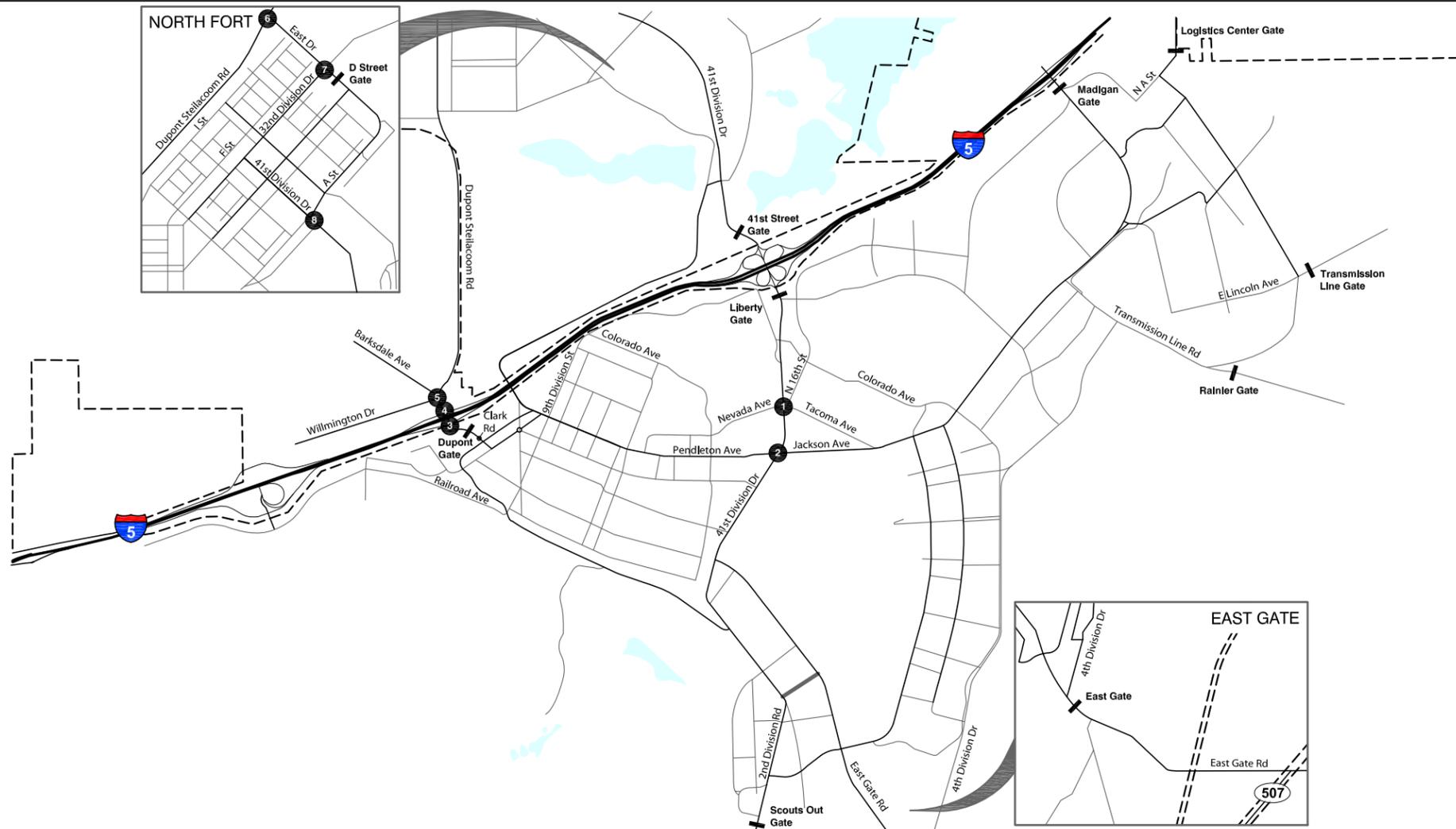
- Upgrade Madigan Gate with road revisions.
- Add DuPont Gate connection to Pendleton Avenue and upgrade Pendleton Avenue to four lanes from DuPont Gate to 8th Street.
- Upgrade 41st Division Drive to multi-way boulevard from A Street to I Street.

Access Control Points and Operations

The ACP volumes assume the existing gate locations and configurations. The analysis assumes that the 41st Division Drive secured I-5 overpass and the new North Fort gate would not be completed by 2015. The travel demand from the change in Force Structure would add approximately 340 vehicles entering the ACPs in the AM peak hour and 360 vehicles leaving the ACPs in the PM peak hour. These demands would be spread across most of the existing and planned ACPs.

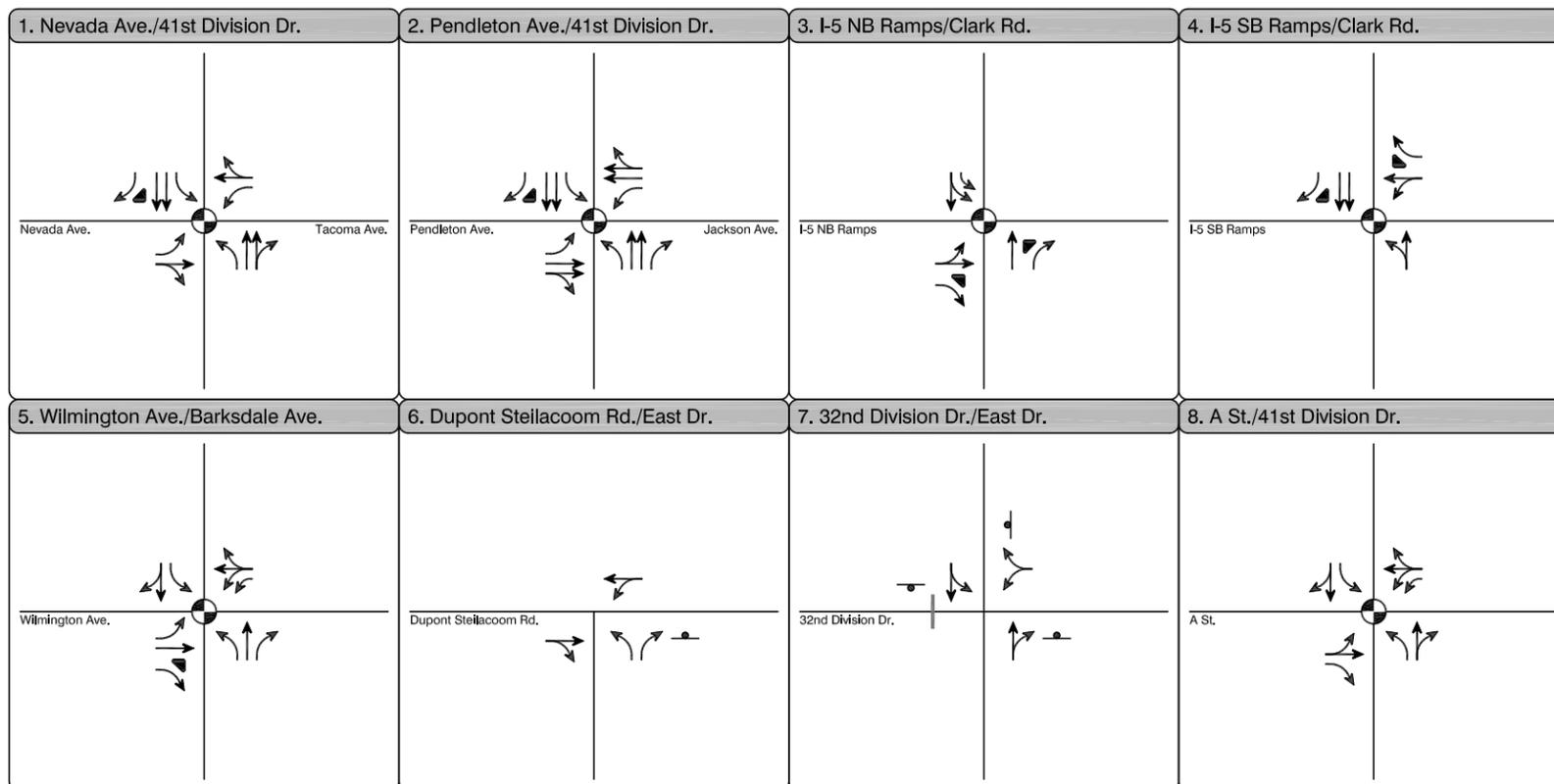
Intersection Volumes and Levels of Service

Based on the increase in troops planned under the No Action Alternative, the intersection volumes during the 2015 AM and PM peak hours will increase by 4.9 percent compared to the 2008 existing conditions. **Figure 8** shows the 2015 No Action AM and PM peak hour intersection volumes for the eight study intersections.



Legend

- Turn Lane
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access



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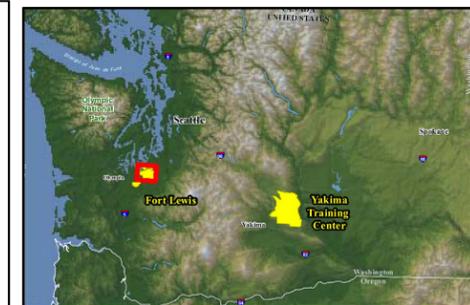
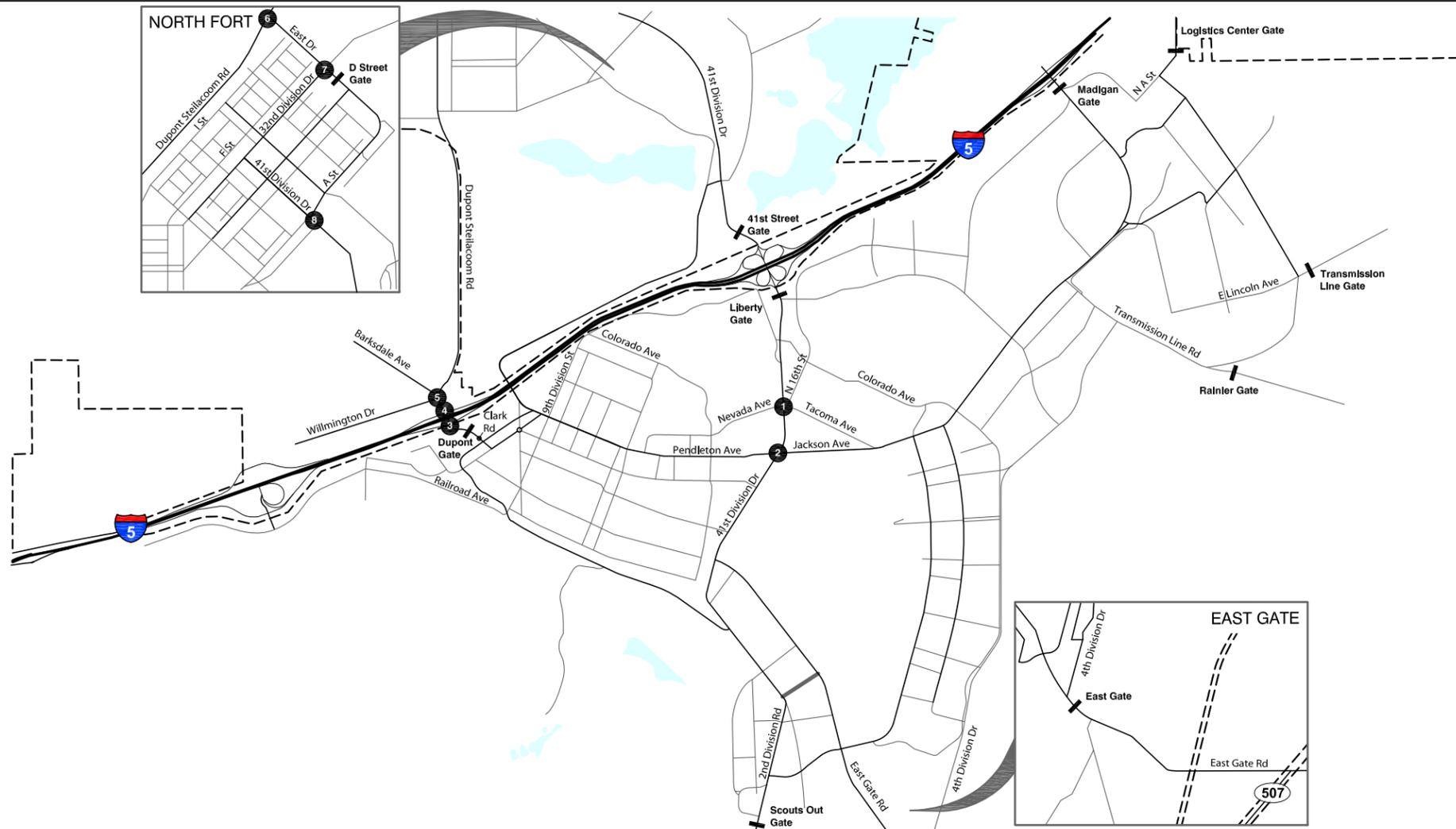


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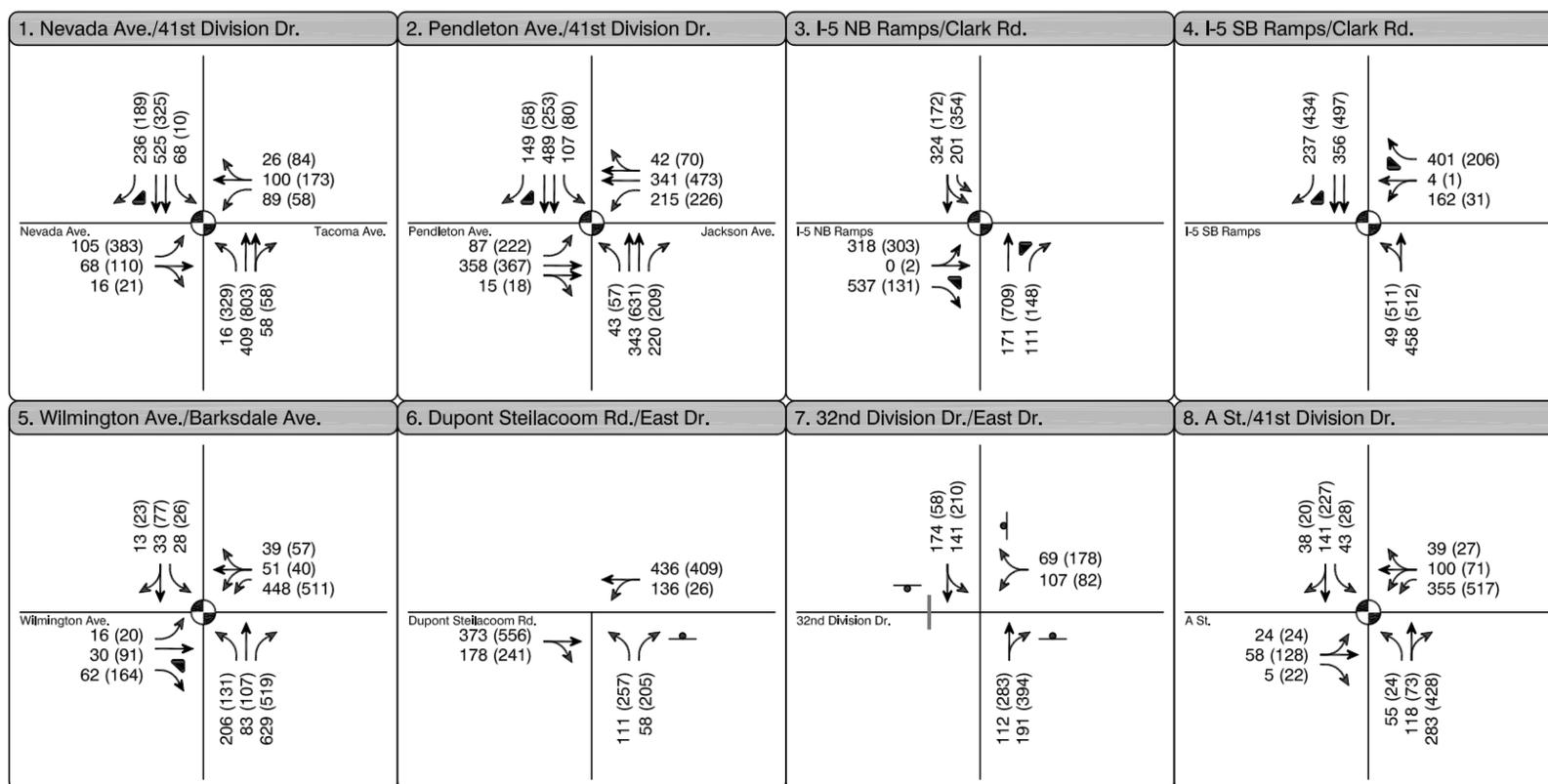
Figure 7
No Action Traffic Characteristics
Future Lane Configurations

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/18/2009	File: fig07_na_flconfig.dwg
Prepared By: TR	Layout: fig07_na_flconfig.pdf



Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access



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Figure 8
No Action AM/PM
Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/18/2009	File: fig08_na_phtv.dwg
Prepared By: TR	Layout: fig08_na_phtv.pdf

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

The No Action Alternative will increase traffic volumes and the study intersections will generally experience longer intersection delays compared to existing conditions. The intersection of 41st Division Drive/Pendleton Avenue would improve operations compared to existing conditions, because a northbound right-turn lane will be added and Pendleton Avenue will be widened from one through lane to two through lanes in each direction. **Table 3** shows the existing and No Action LOS and average control delay for each study intersection.

Intersection		Traffic Control ¹	AM Peak Hour		PM Peak Hour	
			2008 Existing	2015 No Action	2008 Existing	2015 No Action
			LOS (Delay)	LOS (Delay)	LOS (Delay)	LOS (Delay)
1	41 st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (16)	B (17)	D (44)	D (52)
2	41 st Division Drive/Pendleton Avenue	Signal	D (38)	C (30)	D (50)	D (36)
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (23)	D (46)	D (49)
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (12)	D (46)	D (53)
5	DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (29)	C (30)	C (29)	C (29)
6	DuPont-Steilacoom Road/East Drive	SSSC	A (7) NB-E (44)	A (8) NB-F (>50)	F (>50) NB-F (>50)	F (>50) NB-F (>50)
7	North Gate Road/East Drive	AWSC	B (11)	B (11)	D (34)	E (44)
8	41 st Division Drive/A Street	Signal	C (29)	C (31)	C (35)	D (36)

Note: **Bold** indicates unacceptable operation.
 1. Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled
 Source: Fehr & Peers, 2009.

During the AM peak hour, all study intersections would operate at LOS C or better. The unsignalized two-way stop-controlled intersection of DuPont-Steilacoom Road/East Drive would operate overall at LOS A, but the northbound approach would operate at LOS F.

During the PM peak hour, the intersection of DuPont-Steilacoom Road/East Drive would continue to operate at LOS F with intersection delay predicted to increase by 30 percent between existing conditions and the No Build Alternative. The all-way stop-controlled intersection of North Gate Road/East Drive would worsen from LOS D under existing conditions to LOS E with the No Action Alternative due to higher traffic volumes.

Interstate-5 Volumes and Operations

The majority of new vehicle trips entering and leaving the ACPs under the No Action Alternative would access Fort Lewis from I-5. For 2015, the peak hour volumes to and from Fort Lewis on I-5 are expected to increase by 330 vehicles compared to existing. The effect on I-5 traffic is an increase of 1-2 percent of the 2008 peak hour freeway traffic volumes.

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

The *I-5 Transportation Alternatives Analysis and Operations Model Study* examined traffic conditions along I-5 to the year 2030. The 2030 forecasts indicate that demand for travel on I-5 would exceed the capacity of the existing freeway by up to 30 percent throughout the study area. This demand is primarily due to regional population and employment growth. In general, demands along I-5 would exceed the current freeway capacity by approximately one full lane of traffic.

To address this projected growth in demand along I-5, the study is evaluating several system-wide concepts, including Intelligent Transportation System improvements, demand management, transit system improvements, I-5 mainline improvements, and parallel corridor improvements. Preliminary findings showed that these strategies could provide some relief to the I-5 mainline, but they would not substantially address operational issues at the ramp terminals.

In response, the I-5 study is examining several interchange improvement concepts at DuPont-Steilacoom Road (Exit 119), 41st Division Drive (Exit 120), Berkeley Street (exit 122), and Thorne Lane (Exit 123). In the 2030 baseline condition (i.e. without interchange improvements), LOS F conditions are forecasted during the PM peak hour at both Exits 119 and 120, while Exits 122 and 123 would operate at LOS D or better. The interchange concepts being tested are expected to improve conditions at these interchanges to LOS E or better. Results of the I-5 study are expected later in 2010.

Transit Conditions

The No Action Alternative would likely increase the transit ridership demand on Pierce Transit Routes #206 and #207 proportional to the increase in Force Structure (approximately 5 percent). Demand for vanpool service would also increase. No changes in transit routes are anticipated, although the growing population at North Fort will increase the market for transit services to that portion of the installation.

Non-motorized Conditions

The No Action Alternative will increase pedestrian and bicycle usage within the Fort consistent with the change in Force Structure. Several of the programmed street projects (e.g. Pendleton and 41st Division) will include improved provisions for pedestrians and bicycles.

Live-Fire and Maneuver Training Direct and Indirect Effects

This action is not expected to effect transportation conditions.

Traffic Impacts

As stated previously, the analysis assumed that the Cross-Base Highway would not be built by 2015. Based on the *Cross-Base Highway (State Route 704) I-5 to SR 7 Final Environmental Impact Statement*, (USDOT, FHWA, WSDOT, September 2003) construction of the highway would probably have little effect on operation on I-5 around interchanges serving the base. However, the highway would improve access to Fort Lewis and McChord Air Force Base (AFB), as well as I-5, and intersection operations on the Main Post would likely improve. The Cross-Base Highway would also improve connectivity between residents living in mid-Pierce County and north Thurston County, with two of the largest planned employment sites in Pierce County (Frederickson and DuPont), as well as Fort Lewis and McChord Air Force Base.

Volumes on I-5 and local County roadways are expected to increase around 1 percent under the No Action Alternative. Minimal operational impacts to these roadways are expected.

Mitigation

The DuPont-Steilacoom Road/East Drive intersection would operate at LOS F with an estimated 73 seconds of delay during the 2015 PM peak hour. A traffic signal or a roundabout would improve

intersection performance to LOS B. The intersection meets peak hour signal warrants but further study is required to confirm if a signal or roundabout is warranted at other times of the day.

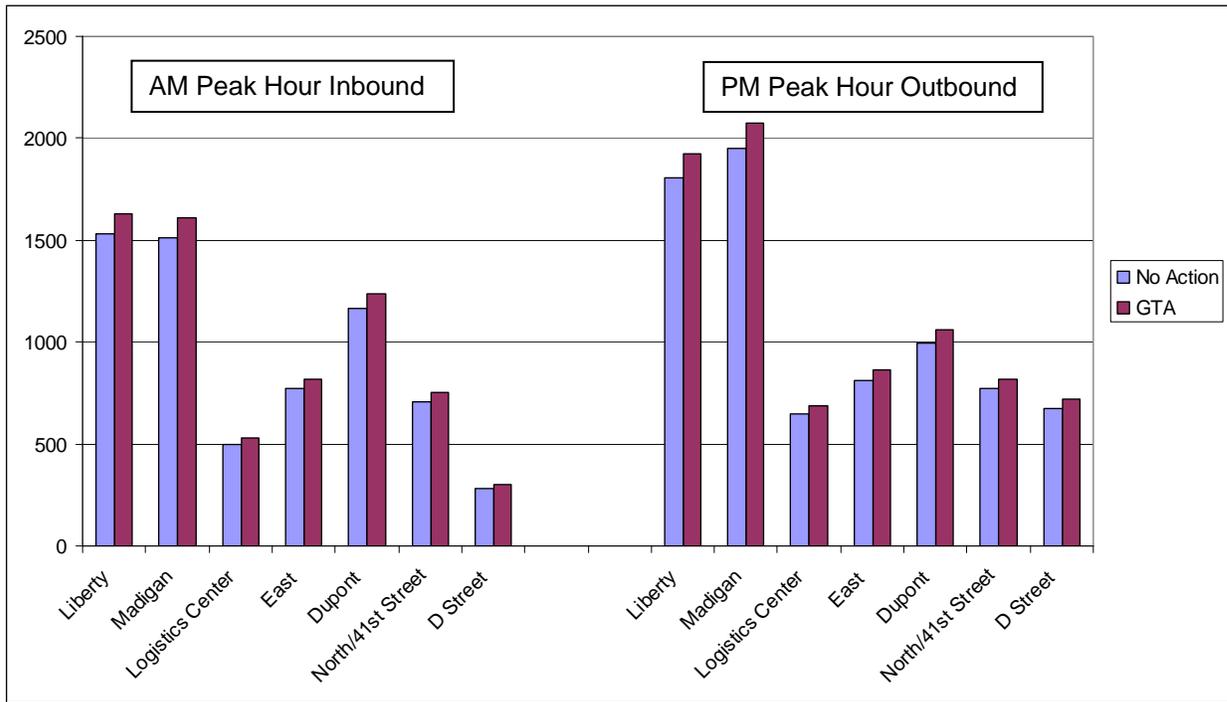
ALTERNATIVE 2 – GROW-THE-ARMY (GTA) ACTIONS

The Grow-the-Army (GTA) Alternative has no additional transportation facilities planned for construction.

Access Control Points and Operations

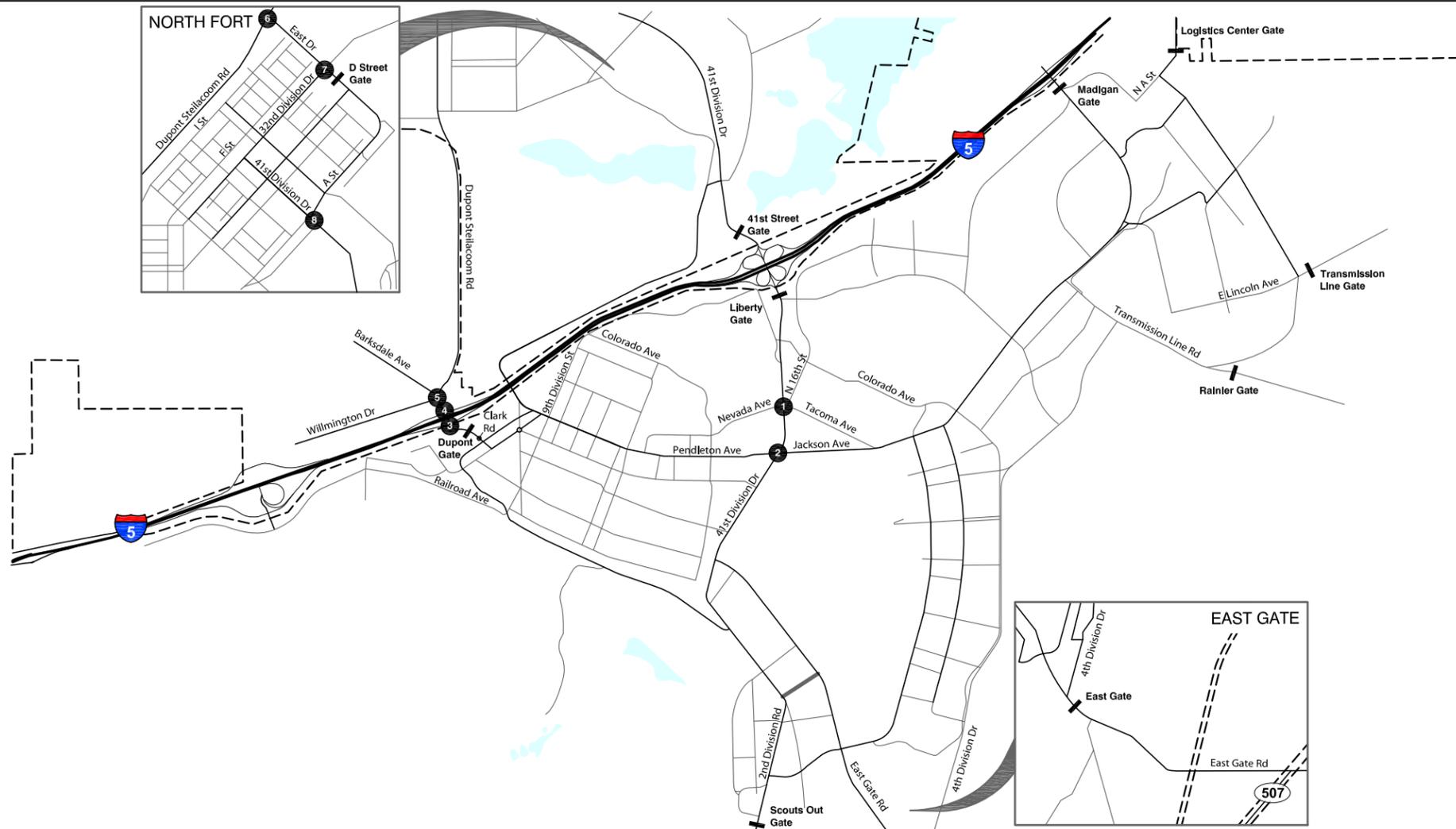
The expected change in ACP volumes is shown on **Figure 9**. Compared to the No Action levels, the travel demand from the change in Force Structure would add approximately 470 vehicles entering the ACPs in the AM peak hour and 490 vehicles leaving the ACPs in the PM peak hour. The demand represents a 6.4 percent increase during the AM and PM peak hours compared to the No Action Alternative. The demand would be spread across most of the existing and planned ACPs.

Figure 9. ACP Volumes with GTA Alternative



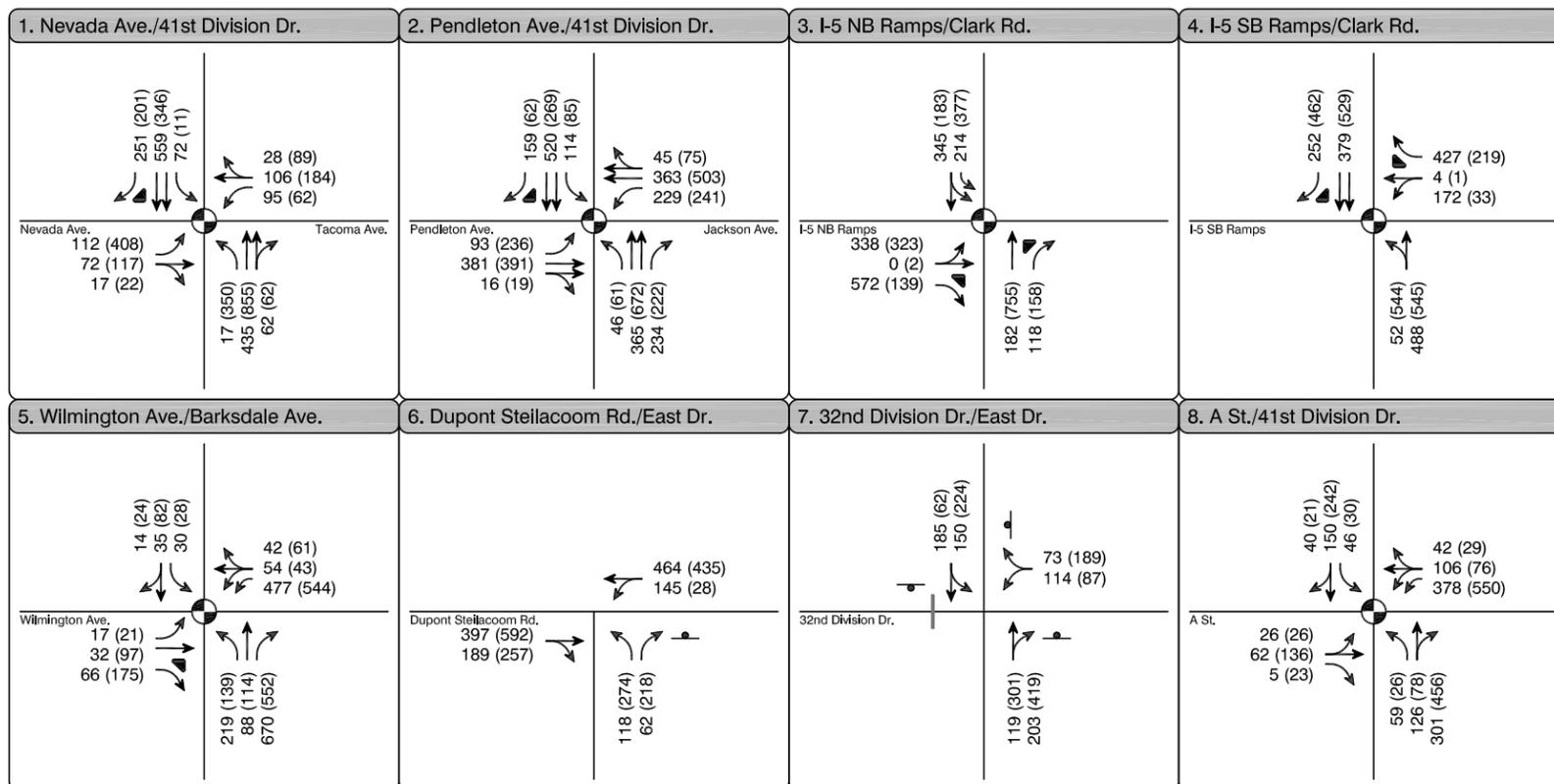
Intersection Volumes and Levels of Service

The increase in troops planned under the GTA Alternative will increase 2015 AM and PM peak hour volumes by 6.4 percent compared to the No Action Alternative. **Figure 10** shows the 2015 GTA Alternative AM and PM peak hour intersection volumes for the eight study intersections.

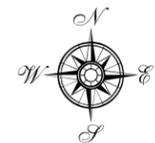


Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access



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Figure 10
Alternative 2 GTA AM/PM
Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/18/2009	File: fig10_alt2_phtv.dwg
Prepared By: TR	Layout: fig10_alt2_phtv.pdf

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

The increased traffic volumes with the GTA Alternative results in each of the study intersections operating at the same or worse LOS compared to the No Action Alternative. The increases in intersection delay ranges from less than one second to 28 seconds. **Table 4** compares the No Action and GTA Alternative LOS and average control delay for each study intersection.

Intersection		Traffic Control ¹	AM Peak Hour		PM Peak Hour	
			No Action	GTA	No Action	GTA
			LOS (Delay)	LOS (Delay)	LOS (Delay)	LOS (Delay)
1	41 st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (17)	B (18)	D (52)	E (65)
2	41 st Division Drive/Pendleton Avenue	Signal	C (30)	C (32)	D (36)	D (39)
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (24)	D (49)	E (56)
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (13)	D (53)	E (72)
5	DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (30)	C (30)	C (29)	C (29)
6	DuPont-Steilacoom Road/East Drive	SSSC	A (8) NB-F (>50)	B (13) NB-F (>50)	F (>50) NB-F (>50)	F (>50) NB-F (>50)
7	North Gate Road/East Drive	AWSC	B (11)	B (12)	E (44)	F (>50)
8	41 st Division Drive/A Street	Signal	C (31)	C (33)	D (36)	D (39)

Note: **Bold** indicates unacceptable operation.
 1. Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled
 Source: Fehr & Peers, 2009.

During the AM peak hour, all study intersections would operate at LOS C or better under the GTA Alternative. However, the side-street approach at the DuPont-Steilacoom Road/East Drive would operate at LOS F.

During the PM peak hour, the unsignalized intersection of DuPont-Steilacoom Road/East Drive would operate at LOS F with both the No Action Alternative and the GTA Alternative. This is due to northbound vehicles on East Drive finding insufficient gaps on DuPont-Steilacoom Road. The all-way stop-controlled intersection of North Gate Road/East Drive would deteriorate from LOS E with No Action to LOS F with the GTA Alternative.

The higher traffic volumes with the GTA Alternative would cause operations at the 41st Division Drive/Nevada Avenue/Tacoma Avenue intersection to deteriorate from LOS D with the No Action Alternative, to LOS E with the GTA Alternative.

The I-5 interchange at Barksdale Avenue/Clark Road would become more congested with the GTA Alternative, but both the northbound and southbound ramp intersections would continue to operate at LOS E with the GTA Alternative.

Interstate-5 Volumes and Operations

The majority of new vehicle trips entering and leaving the ACPs due to the change in force structure under Alternative 2 (GTA) would access I-5. Total peak hour volumes on I-5 under Alternative 2 are expected to increase by 460 vehicles by 2015 compared to No Action. The effect on I-5 traffic is an increase of 2-3 percent compared to the No Action volumes.

Transit Conditions

With the GTA Alternative, the demand for transit service would likely increase demand on Pierce Transit Routes #206 and #207 proportional to the increase in Force Structure (approximately a 6.5 percent increase compared to the No Action Alternative). Demand for vanpool service would also increase. Changes to the transit routes are not anticipated, although the growing population at North Fort would increase the market for transit services to that portion of the Fort.

Non-motorized Conditions

The GTA Alternative will increase pedestrian and bicycle usage within the Fort consistent with the change in Force Structure. Several of the programmed pedestrians and bicycle provisions of the street projects (e.g. Pendleton and 41st Division) from the No Action Alternative will serve the growing non-motorized demands.

Live-Fire and Maneuver Training Direct and Indirect Effects

This action is not expected to effect transportation conditions.

Traffic Impacts

As stated previously, the analysis assumed that the Cross-Base Highway would not be built by 2015. Once the Cross-Base Highway is built, it would likely have very little impact to intersection operations under the GTA alternative.

Volumes on I-5 and local County roadways are expected to increase around 3 percent under the GTA Alternative. Minimal operational impacts to these roadways are expected.

Mitigation

The DuPont-Steilacoom Road/East Drive intersection would operate at LOS F with an estimated 101 seconds of delay during the 2015 PM peak hour for the GTA Alternative. As with the No Action Alternative mitigation, installing a traffic signal or a roundabout would improve intersection performance to LOS B.

The all-way stop-controlled intersection of North Gate Road/East Drive would worsen to LOS F operation during the 2015 PM peak hour with the GTA Alternative. Constructing a northbound right-turn lane, to accommodate the forecasted 420 vehicles making the right turn, would improve intersection operations to LOS C.

With signal timing modifications, intersection operations would improve from LOS E to LOS D for the three intersections of 41st Division Drive/Nevada Avenue/Tacoma Avenue, I-5 NB Ramps/Barksdale Avenue/Clark Road, and I-5 SB Ramps/Barksdale Avenue/Clark Road.

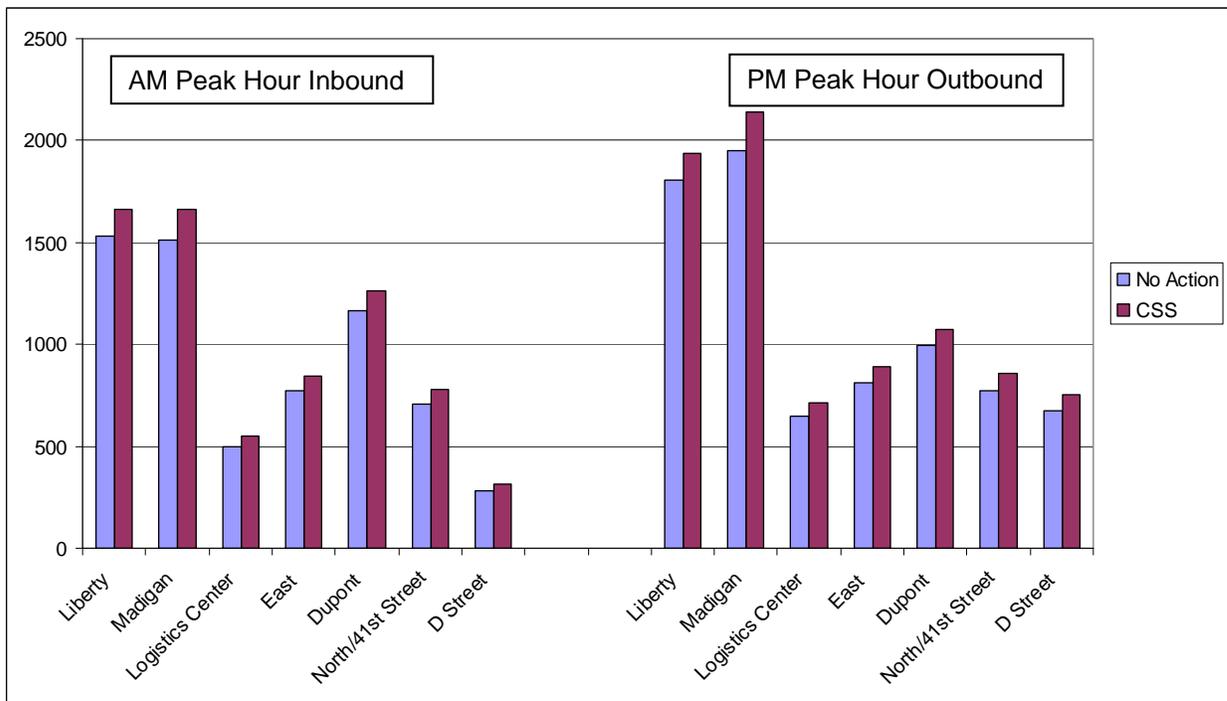
ALTERNATIVE 3 – COMBAT SERVICE SUPPORT (CSS) SOLDIERS

No additional transportation facilities are planned for construction as part of the Combat Service Support (CSS) Alternative.

Access Control Points and Operations

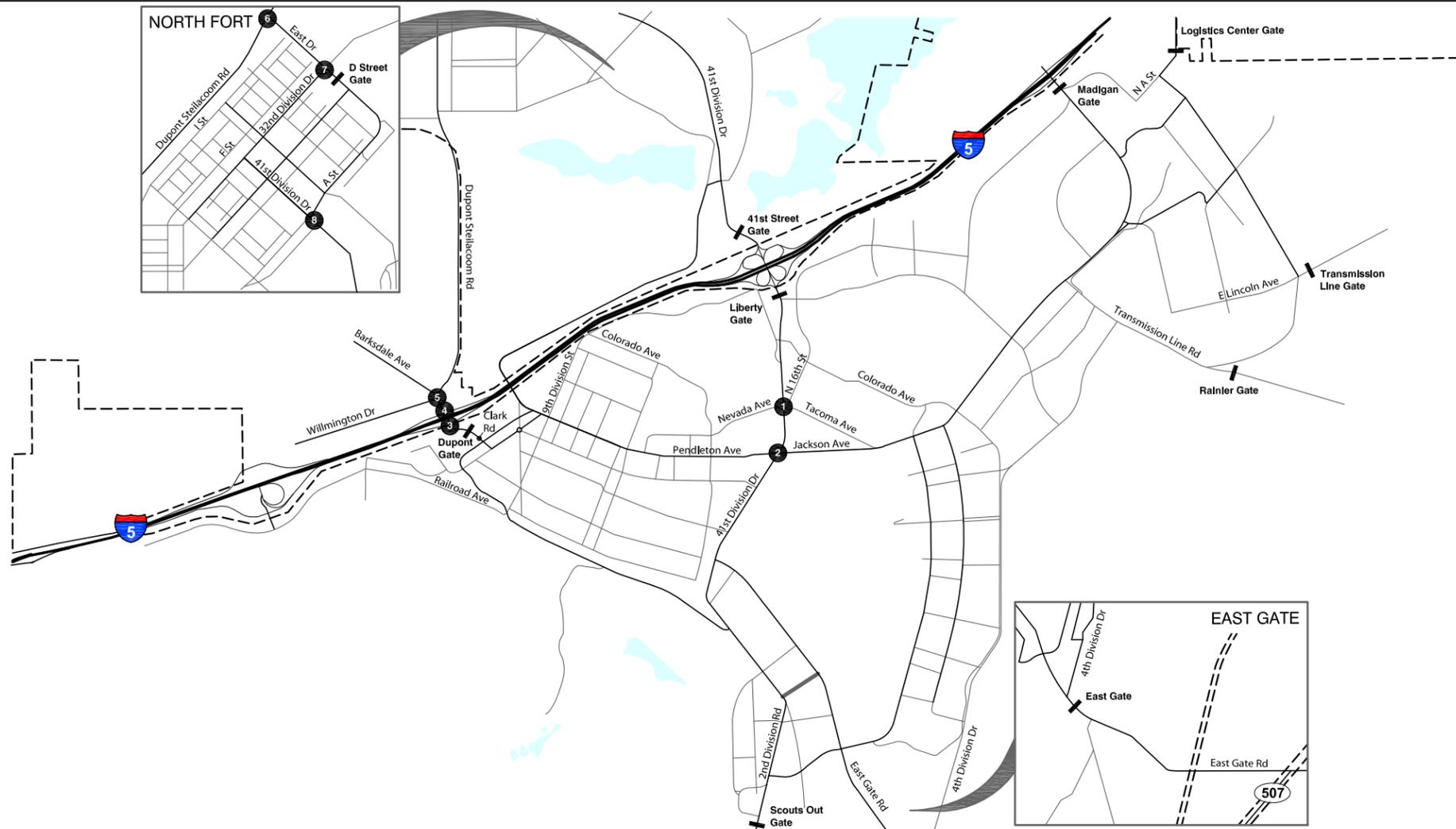
The expected change in ACP volumes is shown on **Figure 11**. Compared to the No Action levels, the travel demand from the change in Force Structure would add approximately 620 vehicles entering the ACPs in the AM peak hour and 710 vehicles leaving the ACPs in the PM peak hour. These demands represent a 9.9 percent increase during the AM and PM peak hours compared to the No Action Alternative. The demand would be focused at the North Fort ACPs due to the concentration of CSS soldiers at that location.

Figure 11. ACP Volumes with CSS Alternative



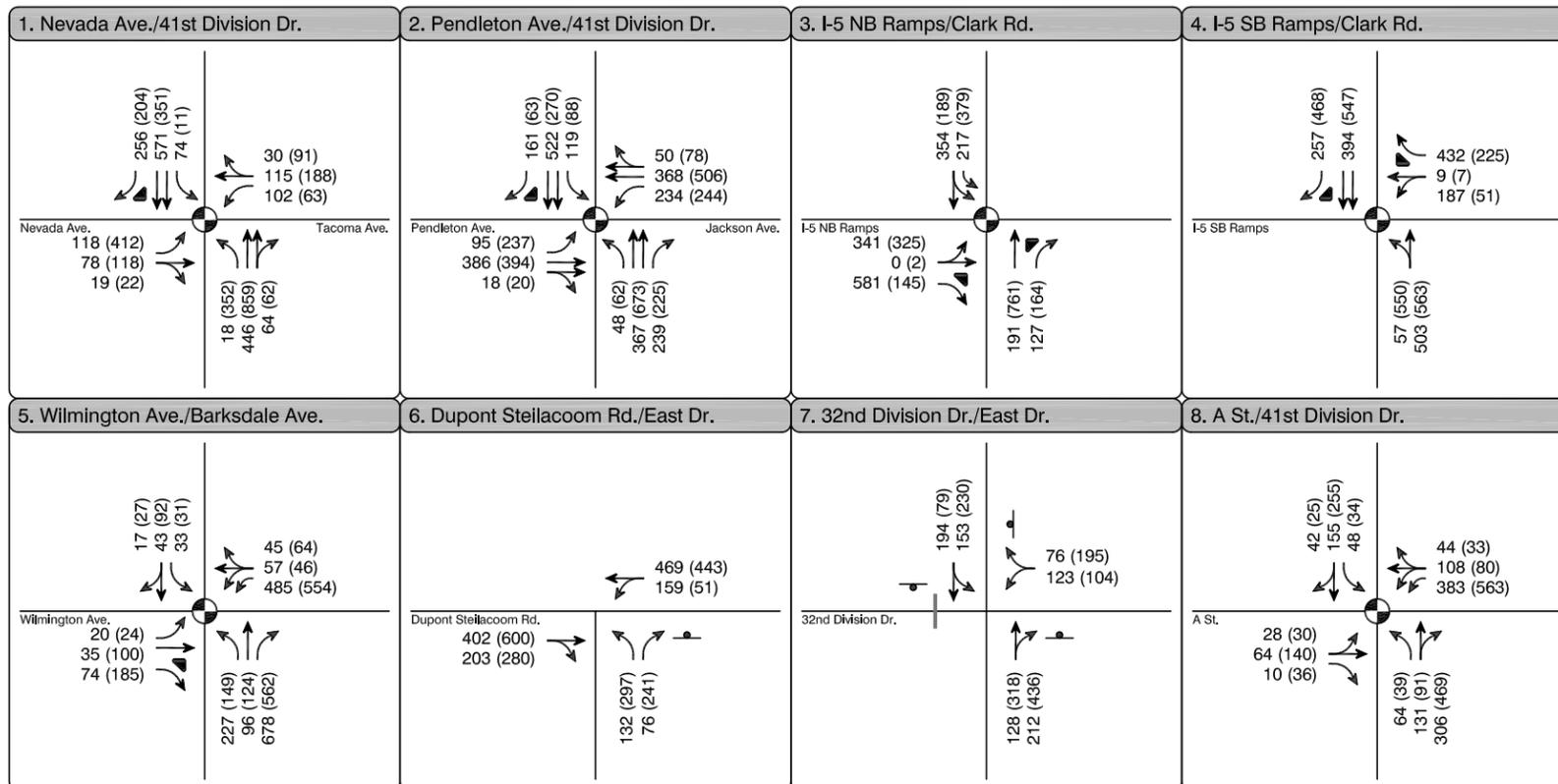
Intersection Volumes and Levels of Service

The increase in troops with the CSS Alternative would increase AM and PM peak hour volumes by a forecasted 3.2 percent compared to the GTA Alternative and 9.9 percent compared to the No Action Alternative. **Figure 12** shows the 2015 CSS Alternative AM and PM peak hour intersection volumes for the eight study intersections.

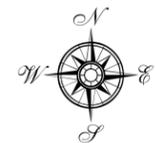


Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access



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Figure 12
Alternative 3 CSS Soldiers
AM/PM Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/18/2009	File: fig12_alt3_phtv.dwg
Prepared By: TR	Layout: fig12_alt3_phtv.pdf

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

The CSS Alternative will increase traffic volumes and the study intersections will experience longer intersection delays compared to the No Build Alternative. **Table 5** compares the No Action and CSS Alternative LOS and average control delay for the study intersections.

Intersection		Traffic Control ¹	AM Peak Hour		PM Peak Hour	
			No Action	CSS	No Action	CSS
			LOS (Delay)	LOS (Delay)	LOS (Delay)	LOS (Delay)
1	41 st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (17)	B (18)	D (52)	E (66)
2	41 st Division Drive/Pendleton Avenue	Signal	C (30)	C (32)	D (36)	D (41)
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (24)	D (49)	E (56)
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (14)	D (53)	F (>80)
5	DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (30)	C (30)	C (29)	C (29)
6	DuPont-Steilacoom Road/East Drive	SSSC	A (8) NB-F (>50)	C (22) NB-F (>50)	F (>50) NB-F (>50)	F (>50) NB-F (>50)
7	North Gate Road/East Drive	AWSC	B (11)	B (13)	E (44)	F (>50)
8	41 st Division Drive/A Street	Signal	C (31)	C (34)	D (36)	D (43)

Note: **Bold** indicates unacceptable operation.
 1. Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled
 Source: Fehr & Peers, 2009.

During the 2015 AM peak hour, all study intersections would continue to operate at the same LOS as with the No Action Alternative except for the DuPont-Steilacoom Road/East Drive intersection. However, it would continue to operate acceptably.

During the 2015 PM peak hour, the two unsignalized intersections of DuPont-Steilacoom Road/East Drive and North Gate Road/East Drive would operate at LOS F. The CSS Alternative would also worsen operations at the 41st Division Drive/Nevada Avenue/Tacoma Avenue intersection, from LOS D with the No Action Alternative to LOS E.

The I-5 southbound ramps/Barksdale Avenue/Clark Road intersection would get worse, going from LOS D with the No Action Alternative to LOS F with the CSS Alternative. The forecasted 550 northbound left-turning vehicles and 560 through vehicles would exceed the capacity for a single northbound lane. The adjacent intersection at the I-5 northbound ramps would approach capacity with LOS E operations.

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

Interstate-5 Volumes and Operations

The majority of new vehicle trips entering and leaving the Fort Lewis ACPs due under Alternative 3 (CSS) would access I-5. Total peak hour volumes on I-5 are expected to increase by 700 vehicles under compared to the No Action Alternative. The effect on I-5 traffic is an increase of 3-4 percent compared to No Action volumes.

Transit Conditions

The CSS Alternative would likely increase ridership demand on Pierce Transit Routes #206 and #207 but in a proportionately lower than the increase in Force Structure (approximately 10 percent compared to the No Action Alternative). Demand for vanpool service would also increase. Given the concentration of CSS soldiers in the North Fort and lack of existing bus service to that installation, there is limited potential for transit usage.

Non-motorized Conditions

The CSS Alternative will increase pedestrian and bicycle usage particularly within the North Fort consistent with the change in Force Structure.

Live-Fire and Maneuver Training Direct and Indirect Effects

This action is not expected to effect transportation conditions.

Traffic Impacts

As stated previously, the analysis assumed that the Cross-Base Highway would not be built by 2015. Once the Cross-Base Highway is built, it would likely have very little impact to intersection operations under the GTA alternative.

Volumes on I-5 and local County roadways are expected to increase around 3 percent under the CSS Alternative. Minimal operational impacts to these roadways are expected.

Mitigation

The DuPont-Steilacoom Road/East Drive intersection would operate at LOS F with a forecasted 143 seconds of delay during the 2015 PM peak hour with the CSS Alternative. A traffic signal would improve intersection performance to LOS C. However, unlike the No Action and GTA Alternatives, a roundabout would not accommodate the higher PM peak hour traffic volumes projected with the CSS Alternative.

The all-way stop-controlled intersection of North Gate Road/East Drive would operate at LOS F during the 2015 PM peak hour with the CSS Alternative. Construction of a northbound right-turn lane would improve operations to LOS C.

With signal timing modifications, the 41st Division Drive/Nevada Avenue/Tacoma Avenue intersection would improve from LOS E to LOS D.

The I-5 southbound ramps/Barksdale Avenue/Clark Road intersection would operate at LOS F and the I-5 northbound ramps intersection would operate at LOS E. The LOS at these two intersections would improve to LOS D with signal timing changes.

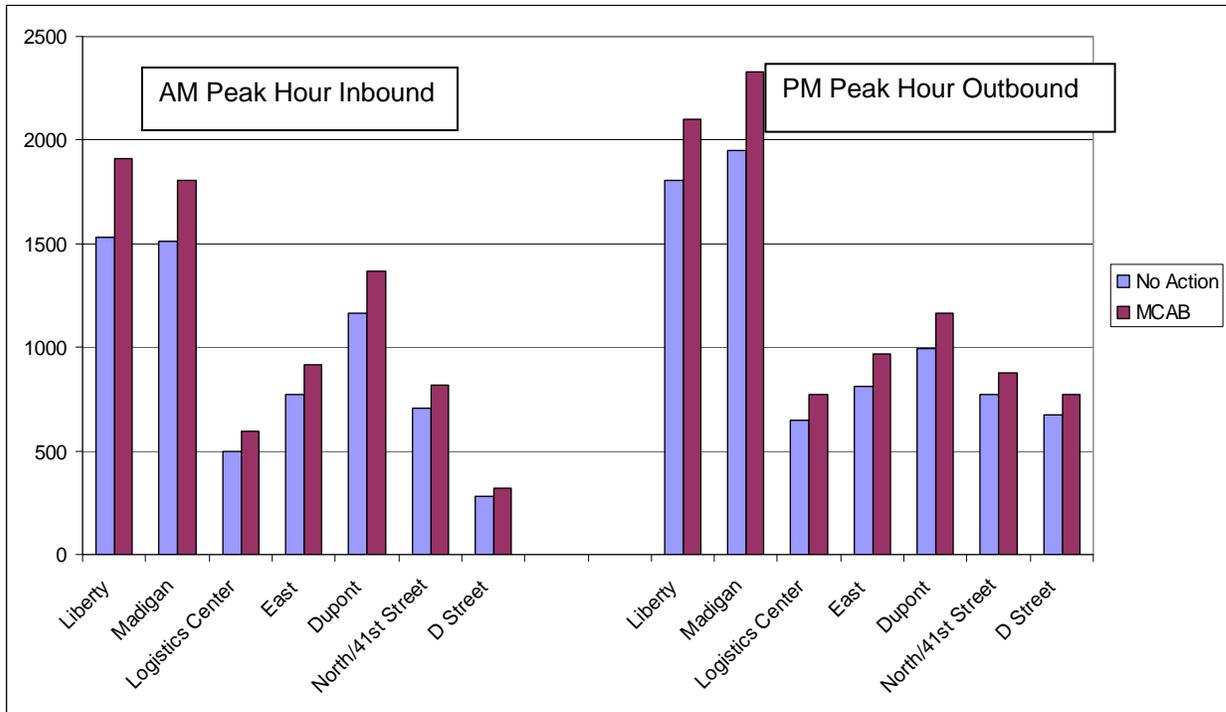
ALTERNATIVE 4 - MEDIUM COMBAT AVIATION BRIGADE (CAB)

No additional transportation facilities are planned for construction as part of the Medium Combat Aviation Brigade (CAB) Alternative.

Access Control Points and Operations

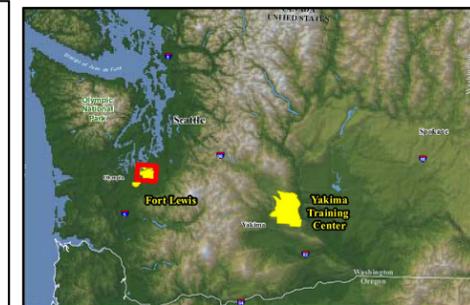
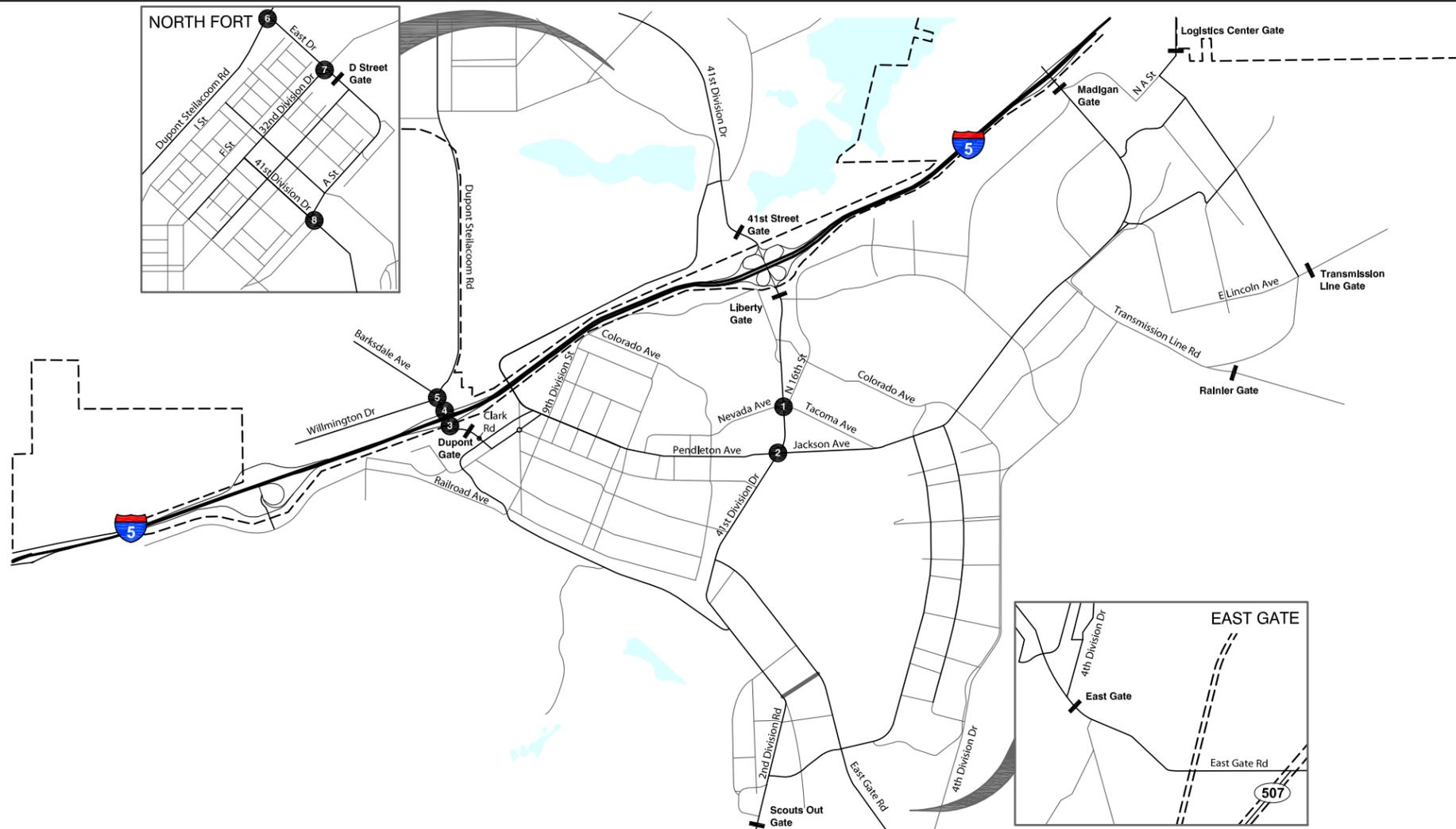
The expected change in ACP volumes is shown in **Figure 13**. Compared to the No Action levels, the travel demand from the change in Force Structure would add approximately 1,390 vehicles entering the ACPs in the AM peak hour and 1,330 vehicles leaving the ACPs in the PM peak hour. These demands represent a 19.4 percent increase during the AM and PM peak hours compared to the No Action Alternative. The demand would be focused at the Main Post ACPs due to the concentration of CSS soldiers near the airfield.

Figure 13. ACP Volumes with Medium CAB Alternative



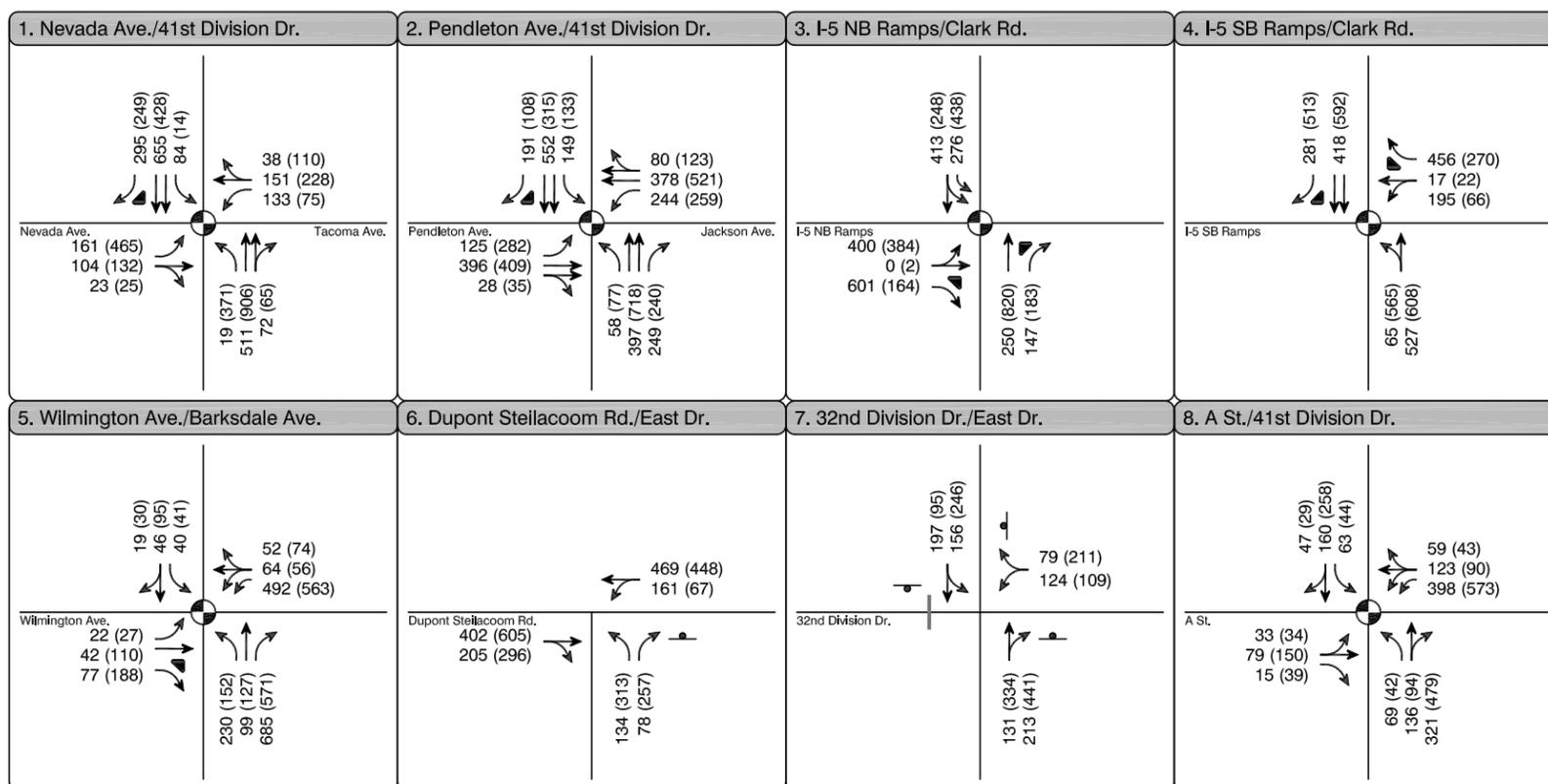
Intersection Volumes and Levels of Service

The increase in troops planned under the Medium CAB Alternative will increase 2015 AM and PM peak hour volumes by 19.4 percent compared to the No Action Alternative. **Figure 14** shows the 2015 Medium CAB Alternative AM and PM peak hour intersection volumes for the eight study intersections.



Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access



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Figure 14
Alternative 4 Medium CAB
AM/PM Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/18/2009	File: fig14_alt4_phtv.dwg
Prepared By: TR	Layout: fig14_alt4_phtv.pdf

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

The increased traffic volumes with the Medium CAB Alternative will cause the study intersections to experience longer intersection delays compared to the No Build Alternative. **Table 6** shows the No Action and Medium CAB Alternative LOS and average control delay for the study intersections.

Intersection	Traffic Control ¹	AM Peak Hour		PM Peak Hour		
		No Action	CAB	No Action	CAB	
		LOS (Delay)	LOS (Delay)	LOS (Delay)	LOS (Delay)	
1	41 st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (17)	C (22)	D (52)	F (>80)
2	41 st Division Drive/Pendleton Avenue	Signal	C (30)	D (35)	D (36)	D (51)
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (31)	D (49)	E (78)
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (15)	D (53)	F (>80)
5	DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (30)	C (31)	C (29)	C (29)
6	DuPont-Steilacoom Road/East Drive	SSSC	A (8) NB-F (>50)	C (23) NB-F (>50)	F (>50) NB-F (>50)	F (>50) NB-F (>50)
7	North Gate Road/East Drive	AWSC	B (11)	B (13)	E (44)	F (>50)
8	41 st Division Drive/A Street	Signal	C (31)	D (40)	D (36)	D (46)

Note: **Bold** indicates unacceptable operation.
 1. Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled
 Source: Fehr & Peers, 2009.

All intersections would operate at LOS D or better during the 2015 AM peak hour. However, the side-street movement at the DuPont-Steilacoom Road/East Drive intersection would operate at LOS F due to insufficient gaps on DuPont-Steilacoom Road.

During the 2015 PM peak hour, the two unsignalized intersections of DuPont-Steilacoom Road/East Drive and North Gate Road/East Drive would operate at LOS F. The Medium CAB Alternative would cause operations to worsen at the 41st Division Drive/Nevada Avenue/Tacoma Avenue intersection, from LOS D with the No Action Alternative, to LOS F. The 465 eastbound left-turning vehicles in a single left-turn lane is the primary cause of the intersection delay.

The I-5 interchange with Barksdale Avenue/Clark Road would be significantly over capacity with the Medium CAB Alternative. The intersection of the I-5 southbound ramps would operate at LOS F and the I-5 northbound ramps intersection would operate at LOS E. The interchange has a 3-lane cross section over I-5, which is not sufficient to carry the high volumes projected during the 2015 PM peak hour.

Interstate-5 Volumes and Operations

The majority of new vehicle trips entering and leaving the ACPs under Alternative 4 (CAB) would access

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

I-5. Total peak hour traffic volumes on I-5 are expected to increase by 1,380 under Alternative 4, compared to the No Action Alternative. The resulting effect on I-5 traffic would be an increase of 4-8 percent compared to No Action volumes.

Transit Conditions

The Medium CAB Alternative is likely to increase the ridership on Pierce Transit Routes #206 and #207 in proportion to the increase in Force Structure (approximately 19 percent compared to the No Action Alternative). Demand for vanpool service would also increase. Given the concentration of Medium CAB soldiers at the Main Post with access to existing bus services, transit usage is likely to increase.

Non-motorized Conditions

The Medium CAB Alternative will increase pedestrian and bicycle usage particularly within the North Fort area consistent with the change in Force Structure. Several of the programmed pedestrians and bicycle provisions of the street projects (e.g. Pendleton and 41st Division) from the No Action Alternative will serve the growing non-motorized demand.

Live-Fire and Maneuver Training Direct and Indirect Effects

This action is not expected to effect transportation conditions.

Traffic Impacts

As stated previously, the analysis assumed the Cross-Base Highway is not built. With the CAB Alternative, there would be an increase in traffic on the Main Post, but the Cross-Base Highway would likely have very little impact to intersection operations, as with the No Action Alternative.

Volumes on I-5 and local County roadways are expected to increase around 5 percent under the CAB Alternative. Impacts to these roadways may require capacity or operational improvements to be coordinated with County and WSDOT consistent with regional plans.

Mitigation

The DuPont-Steilacoom Road/East Drive intersection would operate at LOS F with a forecast of 179 seconds of delay during the 2015 PM peak hour. A traffic signal would improve intersection operations to LOS C.

The all-way stop-controlled intersection of North Gate Road/East Drive would operate at LOS F during the 2015 PM peak hour. Constructing a northbound right-turn lane would improve intersection operations to LOS C.

The I-5 interchange at Barksdale Avenue/Clark Road would be over capacity during the 2015 PM peak hour. The I-5 southbound ramps/Barksdale intersection would operate at LOS F and the northbound ramps intersection would operate at LOS E. While signal-timing changes would improve operations at these two intersections, reconstruction of the interchange would be required to mitigate the two intersections back to the No Action operation of LOS D.

5. YAKIMA TRAINING CENTER

The transportation of troops and equipment between Fort Lewis and the Yakima Training Center (YTC) occurs in convoys as directed by Fort Lewis Regulation 55-2. The annual number of convoys between Fort Lewis and the YTC is highly variable. Convoys typically consist of six or more vehicles organized to operate as a column or the dispatch of 10 or more vehicles per hour to the same destination over the same route. The approved convoy route from Fort Lewis to the YTC is I-5 to I-405 to I-90 to I-82. The convoys are timed to avoid the primary rush hours of 0600 to 0900 and 1500 to 1700 on I-5 and I-405 (Brayton 2009).

STUDY AREA AND ROADWAYS

Figure 15 shows the location of the Yakima Training Center and the surrounding region in Yakima County. The 327,000-acre (roughly 511 square mile) training center is near the City of Yakima and its surrounding suburb communities. Access is via I-82, the major north-south interstate freeway in the area, which is a divided freeway with two travel lanes in each direction near the training center.

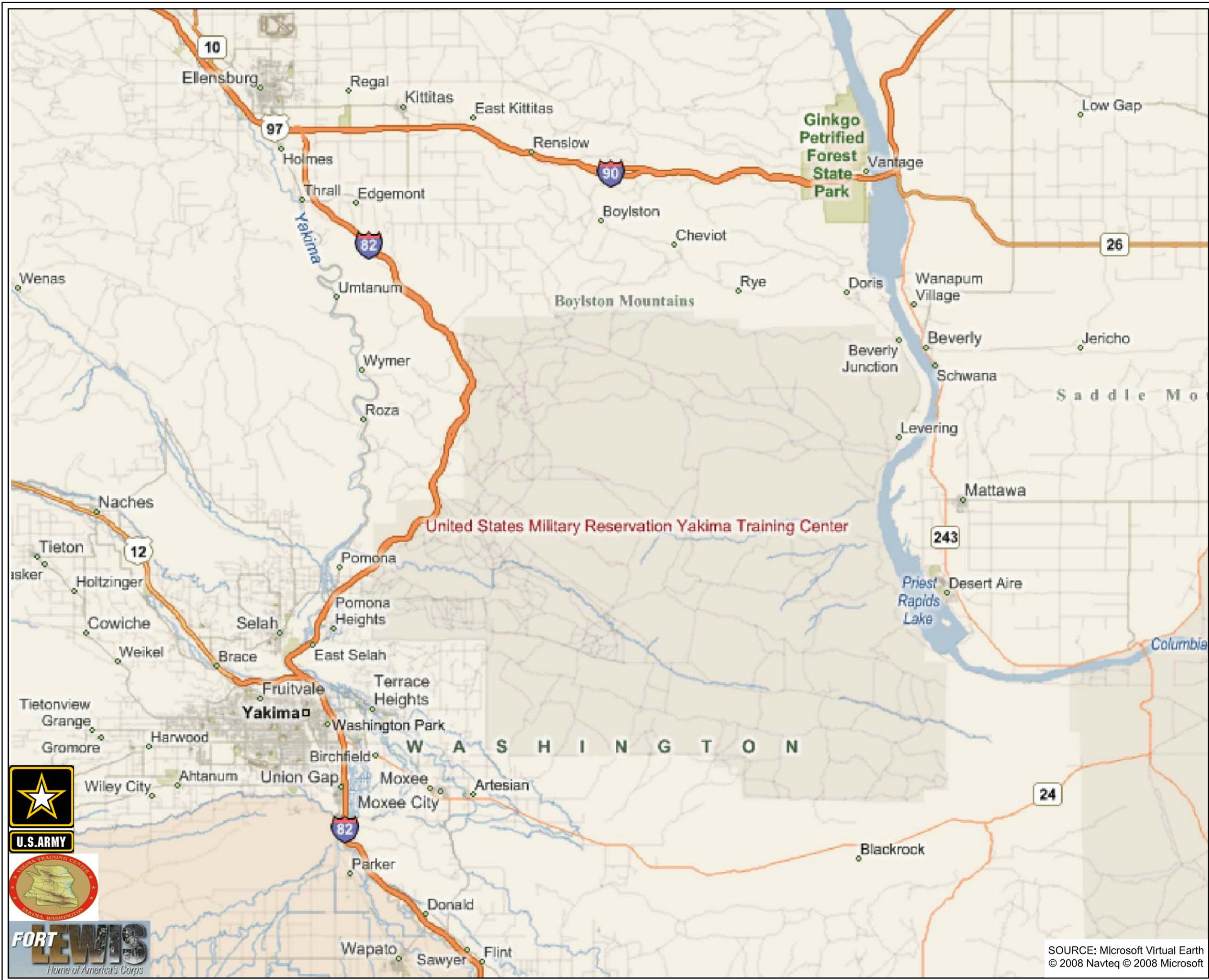
Figure 16 shows the associated roadway network adjacent to and within the main post area of the Yakima Training Center. From I-82, two access points are available: the primary access via Firing Center Road (Exit #26), the main ACP onto the post; the second is from Military Road (Exit #11) which provides an entry point for military convoys only. At all other times it is typically gated and locked. An additional access is available via E Pomona Road, which crosses I-82 but does not have access onto it. This access is only used when there is freight arriving by rail; otherwise, it also remains gated and locked.

EXISTING POPULATION AND TRAFFIC VOLUMES

About 550 full-time civilian and military employees currently work full time at the training center. There is no on-post housing, so the post employees, soldiers and their families live off-post in the Yakima Valley area, with Selah, Yakima and Naches being the leading residential areas. The center has supported maneuvers and training involving more than 15,000 troops in the past. However, the center is currently providing training for an average of 2,200 soldiers. Presently, fixed barracks are available as temporary housing for up to 2,500 personnel.

Figure 16 shows the existing AM and PM peak hour and average weekday traffic volumes on the pertinent roads associated with the center. The counts show that Firing Center Road has the highest volume of vehicles (2,533) during an average weekday. All of the other roads experience relatively low traffic volumes. Yakima County Public Works staff provided the counts, which were all taken in June 2007. The traffic volume count summary sheets are attached in **Appendix B**.

On I-82, the WSDOT 2007 *Annual Traffic Report* shows an average of approximately 16,000 vehicles per day just north of the Firing Center Road (Exit #26). At milepost 27.12, just south of the Firing Center Road ramps 18,000 average daily vehicles were counted in 2006. The pertinent WSDOT volume data is also provided in **Appendix B**.



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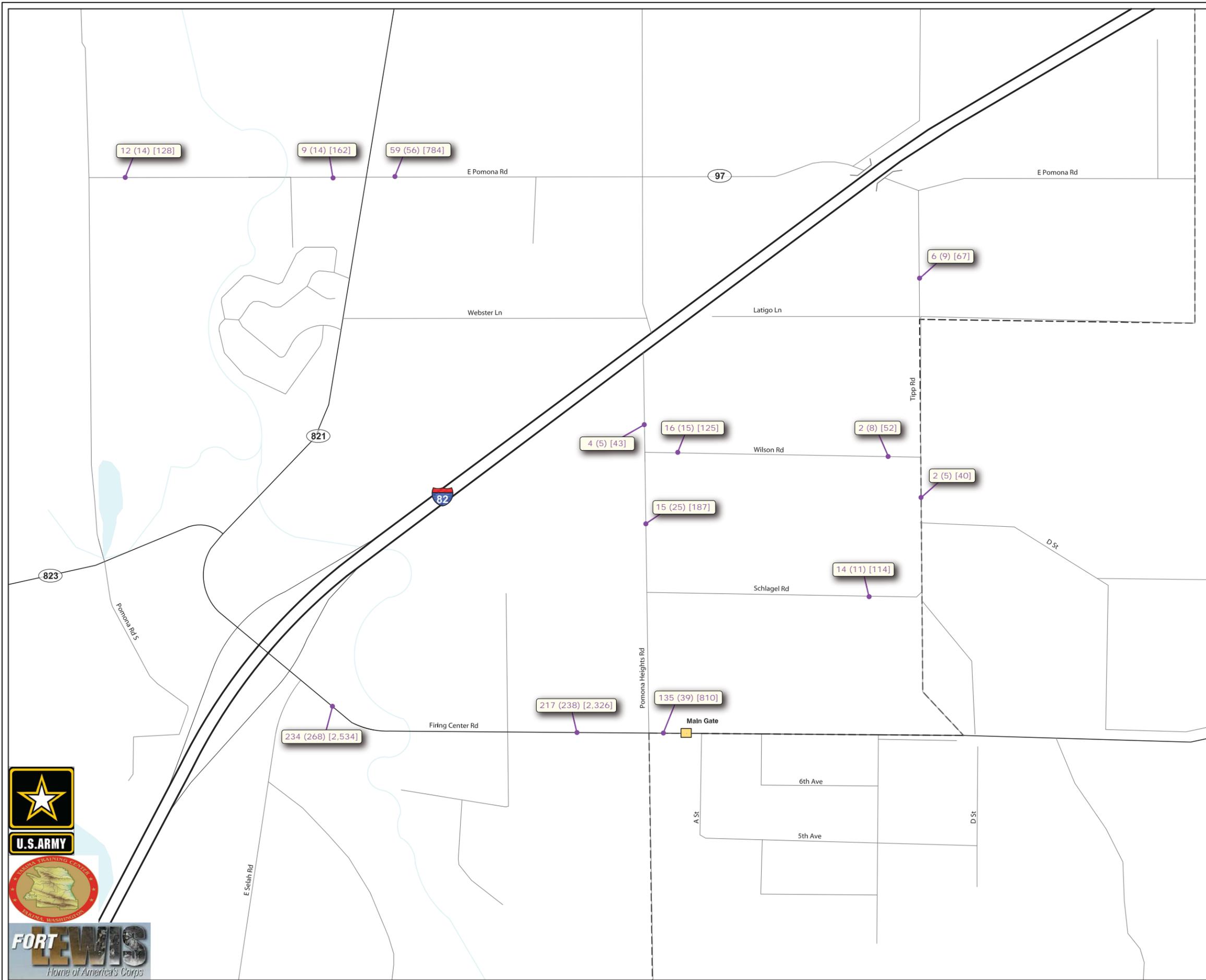
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 Home of America's Corps

FORT LEWIS GTA EIS

*Figure 15
 Vicinity Map
 Yakima Training Center*

SOURCE: Microsoft Virtual Earth
 © 2008 Navteq © 2008 Microsoft

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/18/2009	File: fig15_fl_map.dwg
Prepared By: TR	Layout: fig15_fl_map.pdf



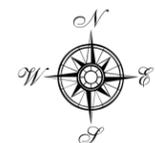
Legend

- AM (PM)
[Avg Wkdy] Peak Hour & Average Weekday Traffic Volume
- Installation Boundary
- Access Control Point (Gate)

Note:
AM Peak Hour is from approximately 0700 - 0800. PM Peak Hour is from approximately 1600 - 1700.

All counts taken in June 2007.

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*Figure 16
Yakima Training Center
2007 Volumes*

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/18/2009	File: fig16_ytc_2007_vols.dwg
Prepared By: TR	Layout: fig16_ytc_2007_vols.pdf

GATE OPERATIONS AND TRAFFIC VOLUMES

The Yakima Training Center Main ACP is located on Firing Center Road just east of Pomona Heights Road. **Figure 16** shows that just east of Pomona Heights Road an average of 135 vehicles entered and exited from the post during the 0700 to 0800 AM peak hour in June 2007. During the PM peak hour from 1500 to 1600, 39 vehicles were counted. A total of 810 vehicles were counted at this location during an average weekday.

The Main ACP has one lane operating in both directions (1 entering/1 exiting). Because there is only one entering lane, relatively long queues and wait times are sometimes experienced when entering the post. This has been reported to be the case, when a large military convoy arrives or if there are several commercial trucks entering the post.

ALTERNATIVE 1 - NO ACTION

No additional transportation facilities are planned for construction as part of the No Action Alternative. **Table 7** lists the types of traffic and transportation impacts at YTC under the No Action Alternative.

TABLE 7. SUMMARY OF POTENTIAL TRAFFIC AND TRANSPORTATION IMPACTS AT YTC UNDER NO ACTION	
Activity Group	YTC
Construction Direct and Indirect Effects	⊙
Live-fire Training Direct and Indirect Effects	○
Maneuver Training Direct and Indirect Effects	○
Cumulative Impacts	⊙
⊗ = Significant	+ = Beneficial Impact
⊘ = Significant but mitigable to less than significant	N/A = Not Applicable
⊙ = Less than Significant	
○ = No Impact	

Access Control Points (ACPs) and Operations

Under the No Action Alternative, the ACPs and operations are anticipated to remain the same as they are currently. The daily traffic volumes at the gates and on the on-post streets would not measurably increase. The frequency of the training session traffic at YTC is anticipated to slightly increase through 2015 due to standard growth level increases at Fort Lewis; however this increase would be negligible.

The type of maneuver training would not change under the No Action Alternative. The larger unit maneuvers at the battalion and brigade level would continue to occur at YTC. The number of troops participating in a training session is expected to remain at existing levels under the No Action Alternative and no additional impacts to traffic and transportation are anticipated.

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Traffic Impacts

The type of training and the number of troops participating in a training session are expected to remain at the existing level under the No Action Alternative and no additional impacts to traffic and transportation are anticipated.

Regional growth in population and employment is expected to increase traffic volumes on I-82 by less than one percent per year. Negligible operations impacts are expected because I-82 has sufficient capacity to accommodate the change in traffic.

Mitigation

No traffic or transportation-related mitigation is necessary under the No Action Alternative.

ALTERNATIVE 2 – GROW-THE-ARMY (GTA) ACTIONS

No additional transportation facilities are planned for construction under GTA Alternative. **Table 8** lists the types of traffic and transportation impacts at YTC under the GTA Alternative.

TABLE 8. SUMMARY OF POTENTIAL TRAFFIC AND TRANSPORTATION IMPACTS AT YTC UNDER GTA	
Activity Group	YTC
Construction Direct and Indirect Effects	⊕
Live-fire Training Direct and Indirect Effects	○
Maneuver Training Direct and Indirect Effects	⊕
Cumulative Impacts	⊕
⊗ = Significant	+ = Beneficial Impact
⊖ = Significant but mitigable to less than significant	N/A = Not Applicable
⊙ = Less than Significant	
○ = No Impact	

Access Control Points (ACPs) and Operations

Under the GTA Alternative, the ACPs and operations are anticipated to remain the same as they are currently. The traffic volumes at the gates and on the on-post streets would not measurably increase on a daily basis. The frequency of the training session traffic at the YTC is anticipated to increase by up to 50 percent because the number of SBCTs training at the YTC will increase from two to three.

Live-Fire and Maneuver Training Direct and Indirect Effects

Live-fire training activities at YTC under GTA Alternative would have no impact on traffic and transportation.

Under the GTA Alternative, the larger unit maneuvers at the battalion and brigade levels would continue to occur at YTC. The number of troops participating in a training session is expected to remain at existing levels. The number of SBCTs training at YTC will increase from two to three under the GTA Alternative.

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This is anticipated to increase the frequency of the training sessions at YTC and the frequency of convoys between Fort Lewis and YTC by 50 percent.

Traffic Impacts

The added number of convoys under the GTA Alternative would have a negligible effect on traffic operations along I-82.

Mitigation

No traffic or transportation-related mitigation is necessary under the GTA Alternative.

ALTERNATIVE 3 – COMBAT SERVICES SUPPORT (CSS) SOLDIERS

No additional transportation facilities are planned for construction as part of the CSS Alternative. **Table 9** lists the types of traffic and transportation impacts at YTC under CSS Alternative.

TABLE 9. SUMMARY OF POTENTIAL TRAFFIC AND TRANSPORTATION IMPACTS AT YTC UNDER CSS	
Activity Group	YTC
Construction Direct and Indirect Effects	⊙
Live-fire Training Direct and Indirect Effects	○
Maneuver Training Direct and Indirect Effects	⊙
Cumulative Impacts	⊙
⊗ = Significant	+ = Beneficial Impact
⊘ = Significant but mitigable to less than significant	N/A = Not Applicable
⊙ = Less than Significant	
○ = No Impact	

Access Control Points (ACPs) and Operations

The convoy sizes and subsequent traffic volumes at the gates and on the on-post streets are anticipated to increase by 3.2 percent compared to the GTA Alternative. This increase is proportional to the growth in troop levels at Fort Lewis.

Live-Fire and Maneuver Training Direct and Indirect Effects

Live-fire training activities at YTC under the CSS Alternative would have no impact on traffic and transportation.

The type of maneuver training will not change with the CSS Alternative. Typically, the larger unit maneuvers at the battalion and brigade level will continue to occur at the YTC. The number of troops participating in each training session is expected to increase by 3.2 percent compared to the GTA Alternative.

Army Growth and Force Structure Realignment at Fort Lewis, Washington Transportation Impact Study - FINAL

YTC. The increased size of the convoys would have a negligible effect on traffic operations along I-82. Under the CAB Alternative, some of the trips between Fort Lewis and Yakima would be made by helicopter.

Mitigation

No traffic or transportation-related mitigation is necessary for the CAB Alternative.

6. CONCLUSION AND RECOMMENDATIONS

The following sections describe the key findings of the build alternatives analysis. All impacts are described in comparison to Alternative 1 – No Action.

FREEWAY OPERATIONS

Alternative 2 – GTA

The effect on I-5 traffic is an increase of approximately 2.5 percent of the 2008 peak hour freeway volumes. Convoys from Fort Lewis to the YTC travel along I-5, I-405, I-90 and I-82. However, no impacts to any of these freeways are expected.

Alternative 3 – CSS

Total peak hour volumes on I-5 are expected to increase by 700 vehicles, approximately 3.1 percent of the 2008 peak hour freeway volumes. Convoys from Fort Lewis to the YTC travel along I-5, I-405, I-90 and I-82. However, no impacts to any of these freeways is expected.

Alternative 4 – CAB

Total peak hour volumes on I-5 are expected to increase by 1,380, about 5.5 percent of the 2008 peak hour freeway volumes. Impacts to these roadways may require capacity or operational improvements to be coordinated with County and WSDOT consistent with regional plans. Convoys from Fort Lewis to the YTC travel along I-5, I-405, I-90 and I-82. However, the convoys are not expected to impacts any of these freeways.

TRANSIT AND NON-MOTORIZED OPERATIONS

Alternative 2 – GTA

Demand for transit service would likely increase on Pierce Transit Routes #206 and #207 by about 6.5 percent compared to the No Action Alternative. Demand for vanpool service would also increase. However, no impact to transit service is expected.

Pedestrian and bicycle usage within the Fort would increase consistent with the change in Force Structure. However, no impact to bike or pedestrian facilities is expected.

Alternative 3 – CSS

Demand for transit service would likely increase on Pierce Transit Routes #206 and #207 by about 10 percent compared to the No Action Alternative. Demand for vanpool service would also increase. However, no impact to transit service is expected.

Pedestrian and bicycle usage within the Fort would increase consistent with the change in Force Structure. However, no impact to bike or pedestrian facilities is expected.

Alternative 4 – CAB

Demand for transit service would likely increase on Pierce Transit Routes #206 and #207 by about 19 percent compared to the No Action Alternative. Demand for vanpool service would also increase. However, no impact to transit service is expected.

Pedestrian and bicycle usage within the Fort would increase consistent with the change in Force Structure. However, no impact to bike or pedestrian facilities is expected.

INTERSECTION OPERATIONS

Alternative 2 – GTA

The DuPont-Steilacoom Road/East Drive intersection would operate at LOS F with an estimated 101 seconds of delay during the 2015 PM peak hour for the GTA Alternative. As with the No Action Alternative mitigation, installing a traffic signal or a roundabout would improve intersection performance to LOS B.

The all-way stop-controlled intersection of North Gate Road/East Drive would worsen to LOS F operation during the 2015 PM peak hour with the GTA Alternative. Constructing a northbound right-turn lane, to accommodate the forecasted 420 vehicles making the right turn, would improve intersection operations to LOS C.

With signal timing modifications, intersection operations would improve from LOS E to LOS D for the three intersections of 41st Division Drive/Nevada Avenue/Tacoma Avenue, I-5 NB Ramps/Barksdale Avenue /Clark Road, and I-5 SB Ramps/Barksdale Avenue/Clark Road.

Alternative 3 – CSS

The DuPont-Steilacoom Road/East Drive intersection would operate at LOS F with a forecasted 143 seconds of delay during the 2015 PM peak hour with the CSS Alternative. A traffic signal would improve intersection performance to LOS C. However, unlike the No Action and GTA Alternatives, a roundabout would not accommodate the higher PM peak hour traffic volumes projected with the CSS Alternative.

The all-way stop-controlled intersection of North Gate Road/East Drive would operate at LOS F during the 2015 PM peak hour with the CSS Alternative. Construction of a northbound right-turn lane would improve operations to LOS C.

With signal timing modifications, the 41st Division Drive/Nevada Avenue/Tacoma Avenue intersection would improve from LOS E to LOS D.

The I-5 southbound ramps/Barksdale Avenue/Clark Road intersection would operate at LOS F and the I-5 northbound ramps intersection would operate at LOS E. The LOS at these two intersections would improve to LOS D with signal timing changes.

Alternative 4 – CAB

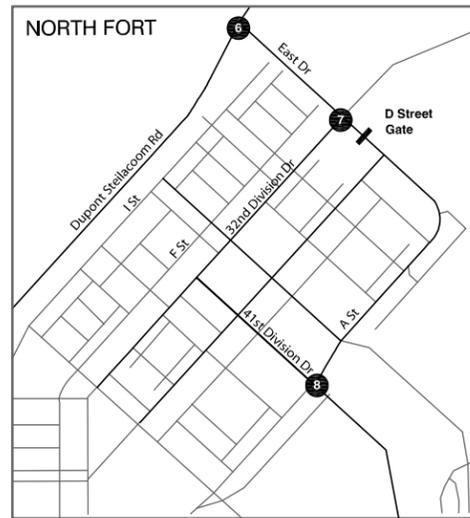
The DuPont-Steilacoom Road/East Drive intersection would operate at LOS F with a forecast of 179 seconds of delay during the 2015 PM peak hour. A traffic signal would improve intersection operations to LOS C.

The all-way stop-controlled intersection of North Gate Road/East Drive would operate at LOS F during the 2015 PM peak hour. Constructing a northbound right-turn lane would improve intersection operations to LOS C.

The intersection of 41st Division Drive/Nevada Avenue/Tacoma Avenue would perform at LOS F during the 2015 PM peak hour. The intersection could be improved to LOS D by changing the east-west signal timing to split phase operations and modifying the eastbound approach from a left-turn lane and shared through-right lane to a left-turn lane and a shared left-through-right lane.

The I-5 interchange at Barksdale Avenue/Clark Road would be over capacity during the 2015 PM peak hour. The I-5 southbound ramps/Barksdale intersection would operate at LOS F and the northbound ramps intersection would operate at LOS E. While signal-timing changes would improve operations at these two intersections, reconstruction of the interchange would be required to mitigate the two intersections back to the No Action operation of LOS D.

**APPENDIX A:
TRANSIT ROUTES
VANPOOLS**



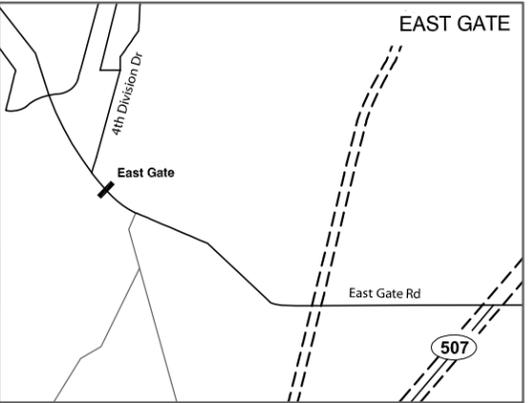
Lakewood Transit Center
To Tacoma/Seattle
To Tacoma



Legend

- Study Intersection
- Installation Boundary
- Access Control Point (Gate)
- Daily Service
- Peak Hours Only
- Midday Service
- Olympia Express (Olympia to Tacoma)
- Pierce Transit**
- Route 206
- Route 207B
- Route 207G
- Route 207P
- Sound Transit**
- Route 592

Dupont Park-and-Ride
To Olympia



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Figure Public Transit Service

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 4/29/2010	File: fig0x_trans_serv.dwg
Prepared By: TR	Layout: fig0x_trans_serv.pdf

Route

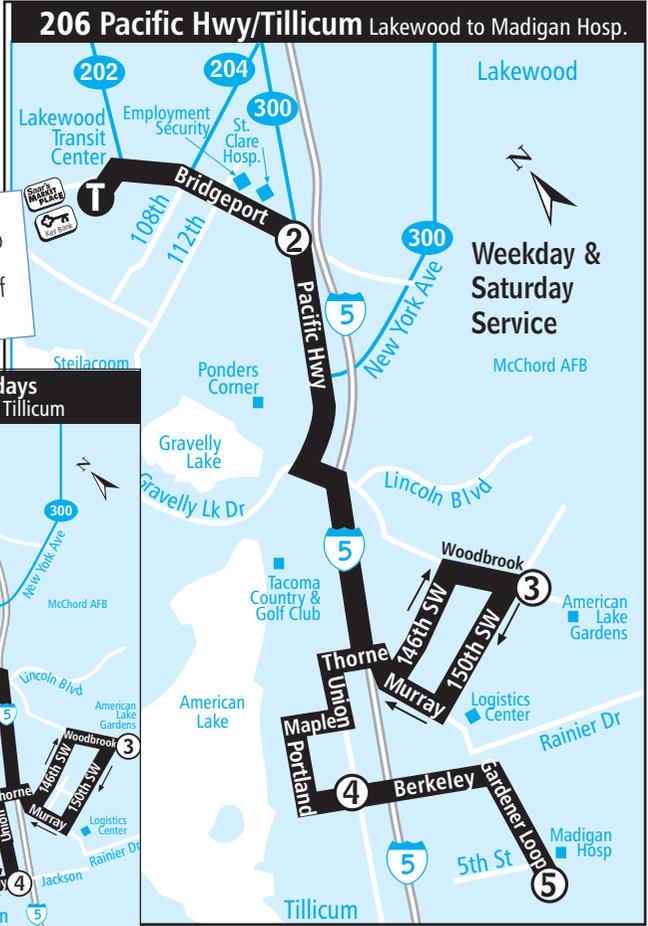
206

Pacific Hwy/Tillicum/Ft Lewis-Lakewood to Tillicum

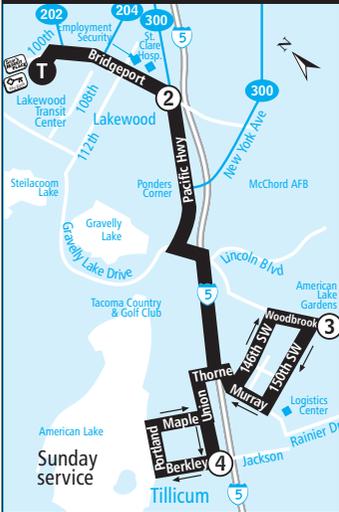
207

206 Pacific Hwy/Tillicum Lakewood to Madigan Hosp.

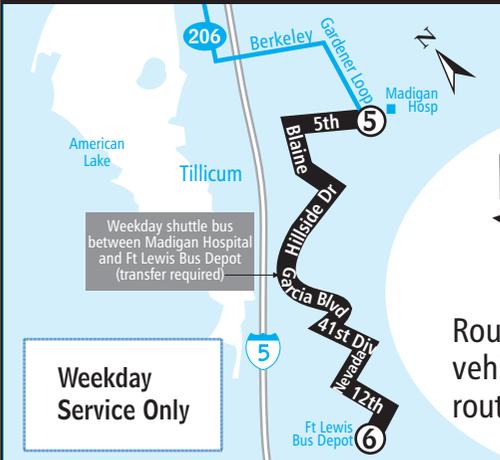
IMPORTANT NOTE:
Passengers wishing to enter Ft. Lewis **MUST** have a Department of Defense ID Card.



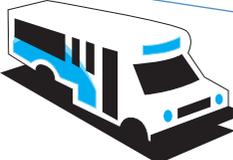
206 Sundays Lakewood to Tillicum



207 Fort Lewis – Madigan Hospital to Fort Lewis



Security procedures may affect bus operations at Ft. Lewis.
Call 253.581.8000
or visit piercetransit.org
for more information.



Route 207 is using a Bus PLUS vehicle, it's still the same fixed route service!

Route **206** Pacific Hwy/Tillicum/Ft Lewis-Tillicum to Lakewood
207

207 Weekdays

To Madigan

Fort Lewis Depot	Madigan Hospital
6	5
---	---
---	---
---	---
6:21 _{am}	6:35
---	---
---	---
7:30	7:44
---	---
8:24	8:38
---	---
9:24	9:38
---	---
10:24	10:38
---	---
11:29	11:44
---	---
12:29 _{pm}	12:44
---	---
1:30	1:45
---	---
2:32	2:47
---	---
3:32	3:47
---	---
4:32	4:47
---	---
5:32	5:47
---	---
6:26	6:40
---	---
---	---
---	---

206 Weekdays

Madigan to Lakewood

Madigan Hospital	Berkeley & Union	150th & Woodbrook	Pacific Hwy & Bridgeport	Lakewood Transit Center
5	4	3	2	T
----	4:33 _{am}	4:43	4:51	4:58
5:37	5:42	5:52	6:00	6:08
6:07	6:12	6:22	6:30	6:38
6:37	6:42	6:52	7:00	7:08
7:07	7:12	7:22	7:30	7:38
7:30	7:35	7:46	7:55	8:04
8:00	8:05	8:16	8:25	8:34
8:30	8:35	8:46	8:55	9:04
9:00	9:05	9:16	9:25	9:34
9:30	9:35	9:46	9:55	10:04
10:00	10:05	10:16	10:25	10:34
10:30	10:35	10:46	10:55	11:04
11:00	11:05	11:16	11:26	11:35
11:30	11:35	11:46	11:56	12:08 _{pm}
12:00	12:05	12:16	12:26	12:38
12:28	12:33	12:44	12:55	1:08
12:58	1:03	1:14	1:25	1:38
1:28	1:33	1:44	1:55	2:08
1:58	2:03	2:14	2:25	2:38
2:30	2:35	2:46	2:56	3:08
3:00	3:05	3:16	3:26	3:38
3:30	3:35	3:46	3:56	4:08
4:00	4:05	4:16	4:26	4:38
4:30	4:35	4:46	4:56	5:08
5:00	5:05	5:16	5:26	5:38
5:25	5:30	5:40	5:49	6:00
5:54	5:59	6:09	6:17	6:28
6:26	6:31	6:41	6:49	7:00
7:05	7:10	7:20	7:28	7:41
8:02	8:07	8:17	8:25	8:38
9:12	9:17	9:27	9:35	9:43
10:15	10:20	10:30	10:38	10:46

Route **206** Pacific Hwy/Tillicum/Ft Lewis-Lakewood to Tillicum
207

206 Weekdays

Lakewood to Madigan

Lakewood Transit Center	Pacific Hwy & Bridgeport	150th & Woodbrook	Berkeley & Union	Madigan Hospital
T	2	3	4	5
5:02 _{am}	5:06	5:13	5:20	5:24
6:15	6:19	6:27	6:35	6:40
6:45	6:49	6:57	7:05	7:10
7:15	7:20	7:29	7:38	7:43
7:45	7:50	7:59	8:08	8:13
8:15	8:20	8:29	8:38	8:43
8:45	8:50	8:59	9:08	9:13
9:15	9:20	9:29	9:38	9:43
9:45	9:50	9:59	10:08	10:13
10:15	10:20	10:29	10:38	10:43
10:45	10:51	11:00	11:11	11:19
11:15	11:21	11:30	11:41	11:49
11:45	11:51	12:00 _{pm}	12:11	12:19
12:15	12:21	12:30	12:41	12:49
12:45	12:51	1:00	1:11	1:19
1:15	1:21	1:32	1:42	1:50
1:45	1:51	2:02	2:12	2:22
2:15	2:21	2:32	2:42	2:52
2:45	2:51	3:02	3:12	3:22
3:15	3:21	3:32	3:42	3:52
3:45	3:51	4:02	4:12	4:22
4:15	4:21	4:32	4:42	4:52
4:45	4:51	5:02	5:12	5:22
5:15	5:21	5:32	5:42	5:52
5:45	5:51	6:02	6:12	6:22
6:15	6:20	6:29	6:38	6:45
6:45	6:50	6:59	7:08	7:15
7:15	7:20	7:29	7:38	7:45
7:45	7:50	7:59	8:08	8:15
8:45	8:50	8:58	9:06	9:12
9:50	9:55	10:03	10:11	10:15
10:52	10:57	11:05	11:13	11:17

207 Weekdays

To Ft Lewis

Madigan Hospital	Fort Lewis Depot
5	6
5:52 _{am}	6:09
6:42	6:59
7:12	7:30
7:45	8:03
---	---
8:45	9:03
---	---
9:45	10:03
---	---
10:45	11:03
---	---
11:51	12:09 _{pm}
---	---
12:51	1:09
---	---
1:52	2:10
---	---
2:54	3:12
---	---
3:54	4:12
---	---
4:54	5:12
---	---
5:54	6:12
---	---
6:47	7:04
---	---
---	---
---	---
---	---
---	---

206 Saturdays

Lakewood to Madigan					Madigan to Lakewood				
Lakewood Transit Center	Pacific Hwy & Bridgeport	150th & Woodbrook	Berkeley & Union	Madigan Hospital	Madigan Hospital	Berkeley & Union	150th & Woodbrook	Pacific Hwy & Bridgeport	Lakewood Transit Center
T	2	3	4	5	5	4	3	2	T
6:45am	6:49	6:57	7:05	7:10	7:10am	7:15	7:24	7:32	7:39
7:15	7:19	7:27	7:35	7:40	7:40	7:45	7:54	8:02	8:09
7:45	7:49	7:57	8:05	8:10	8:10	8:15	8:24	8:32	8:39
8:15	8:19	8:27	8:35	8:40	8:40	8:45	8:54	9:02	9:09
8:45	8:49	8:57	9:05	9:10	9:10	9:15	9:24	9:32	9:39
9:15	9:19	9:27	9:35	9:40	9:40	9:45	9:54	10:02	10:09
9:45	9:49	9:57	10:05	10:10	10:10	10:15	10:24	10:32	10:39
10:15	10:19	10:27	10:35	10:40	10:40	10:45	10:54	11:02	11:09
10:45	10:50	10:59	11:07	11:12	11:10	11:15	11:24	11:32	11:39
11:15	11:20	11:29	11:37	11:42	11:36	11:41	11:51	12:01pm	12:09
11:45	11:50	11:59	12:07pm	12:12	12:06	12:11	12:21	12:31	12:39
12:15	12:20	12:29	12:37	12:42	12:36	12:41	12:51	1:01	1:09
12:45	12:50	1:00	1:09	1:15	1:06	1:11	1:21	1:31	1:39
1:15	1:20	1:30	1:39	1:45	1:36	1:41	1:51	2:01	2:09
1:45	1:50	2:00	2:09	2:15	2:06	2:11	2:21	2:31	2:39
2:15	2:20	2:30	2:39	2:45	2:36	2:41	2:51	3:01	3:09
2:45	2:50	3:00	3:09	3:15	3:04	3:09	3:20	3:30	3:39
3:15	3:20	3:30	3:39	3:45	3:34	3:39	3:50	4:00	4:09
3:45	3:50	4:00	4:09	4:15	4:04	4:09	4:20	4:30	4:39
4:15	4:20	4:30	4:39	4:45	4:34	4:39	4:50	5:00	5:09
4:45	4:50	5:00	5:09	5:15	5:04	5:09	5:20	5:30	5:39
5:15	5:20	5:30	5:39	5:45	5:34	5:39	5:50	6:00	6:09
5:45	5:50	6:00	6:09	6:15	6:06	6:11	6:21	6:31	6:39
6:15	6:20	6:30	6:39	6:45	6:34	6:39	6:49	6:59	7:07
6:45	6:50	7:00	7:08	7:13	7:06	7:11	7:21	7:29	7:35
7:15	7:20	7:30	7:38	7:43	7:34	7:39	7:49	7:57	8:03
7:45	7:50	8:00	8:08	8:13	8:06	8:11	8:21	8:29	8:35
8:15	8:20	8:30	8:38	8:43	9:06	9:11	9:19	9:27	9:33
8:45	8:50	9:00	9:08	9:13	10:18	10:23	10:31	10:39	10:45
9:50	9:55	10:05	10:13	10:18					
10:50	10:55	11:05	11:13	11:18					

206 Sundays

Lakewood to Berkley & Union				Berkley & Union to Lakewood			
Lakewood Transit Center	Pacific Hwy & Bridgeport	150th & Woodbrook	Berkeley & Union	Berkeley & Union	150th & Woodbrook	Pacific Hwy & Bridgeport	Lakewood Transit Center
T	2	3	4	4	3	2	T
7:45am	7:49	7:56	8:05	8:05am	8:14	8:22	8:29
8:45	8:49	8:56	9:05	9:05	9:14	9:22	9:29
9:45	9:49	9:56	10:05	10:05	10:14	10:22	10:29
10:45	10:49	10:56	11:08	11:08	11:17	11:25	11:32
11:45	11:49	11:56	12:08	12:08pm	12:18	12:28	12:36
12:45pm	12:50	12:59	1:10	1:10	1:20	1:30	1:38
1:45	1:50	1:59	2:10	2:10	2:20	2:30	2:38
2:45	2:50	2:59	3:10	3:10	3:20	3:30	3:38
3:45	3:50	3:59	4:10	4:10	4:20	4:30	4:38
4:45	4:50	4:59	5:10	5:10	5:20	5:30	5:38
5:45	5:50	5:59	6:10	6:10	6:20	6:30	6:38
6:45	6:50	6:59	7:10	7:10	7:20	7:30	7:38
7:45	7:49	7:57	8:06	8:06	8:15	8:23	8:30
8:45	8:49	8:57	9:06	9:06	9:15	9:23	9:30
9:50	9:54	10:02	10:11	10:11	10:20	10:28	10:35

**APPENDIX B:
TRAFFIC COUNTS**

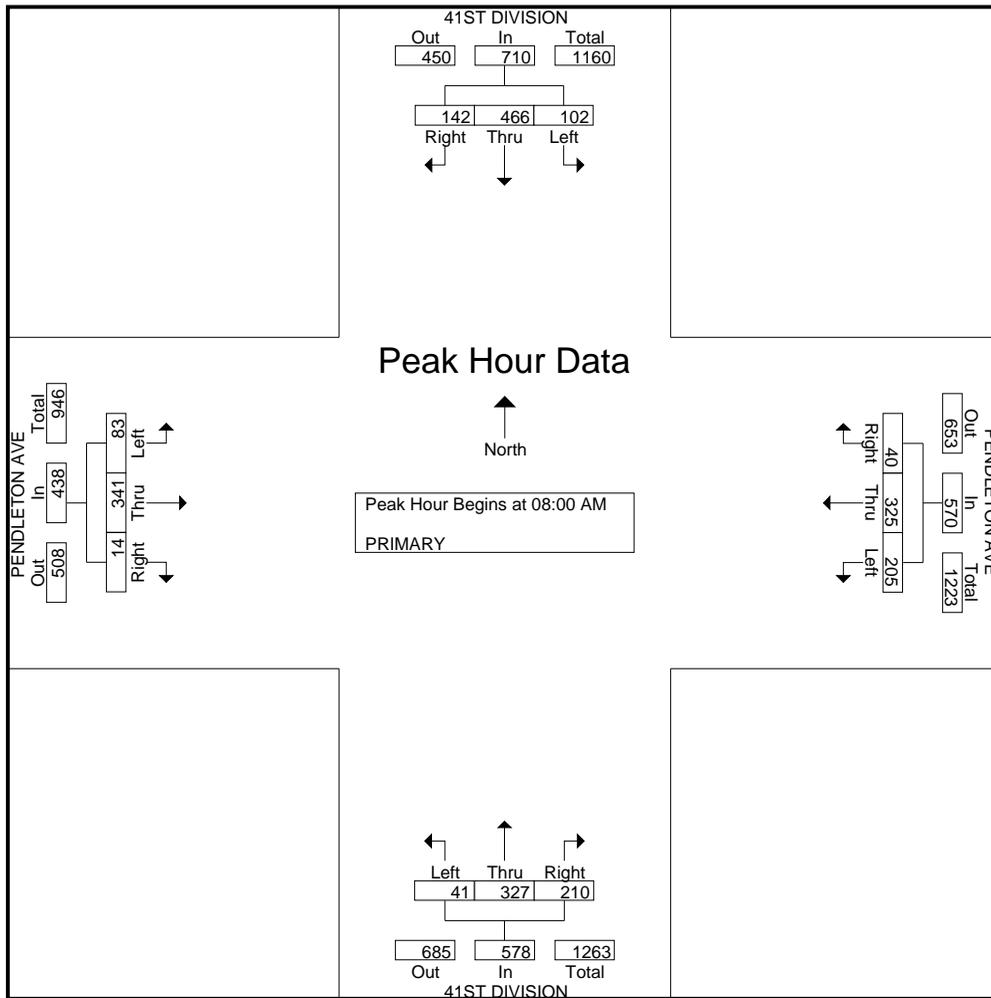
TRAFFICOUNT, INC

P O BOX 2508
OLYMPIA, WA 98507
(360) 491-8116

FT LEWIS, WASHINGTON
41ST DIVISION DR
PENDLETON AVE
LOC #06A TPG07309M

File Name : 06A
Site Code : 00000006
Start Date : 11/28/2007
Page No : 2

Start Time	41ST DIVISION From North				PENDLETON AVE From East				41ST DIVISION From South				PENDLETON AVE From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	38	99	10	147	4	64	37	105	33	109	4	146	6	69	21	96	494
08:15 AM	33	83	21	137	13	77	51	141	43	69	8	120	3	79	25	107	505
08:30 AM	37	140	26	203	14	91	52	157	68	77	7	152	1	92	19	112	624
08:45 AM	34	144	45	223	9	93	65	167	66	72	22	160	4	101	18	123	673
Total Volume	142	466	102	710	40	325	205	570	210	327	41	578	14	341	83	438	2296
% App. Total	20	65.6	14.4		7	57	36		36.3	56.6	7.1		3.2	77.9	18.9		
PHF	.934	.809	.567	.796	.714	.874	.788	.853	.772	.750	.466	.903	.583	.844	.830	.890	.853



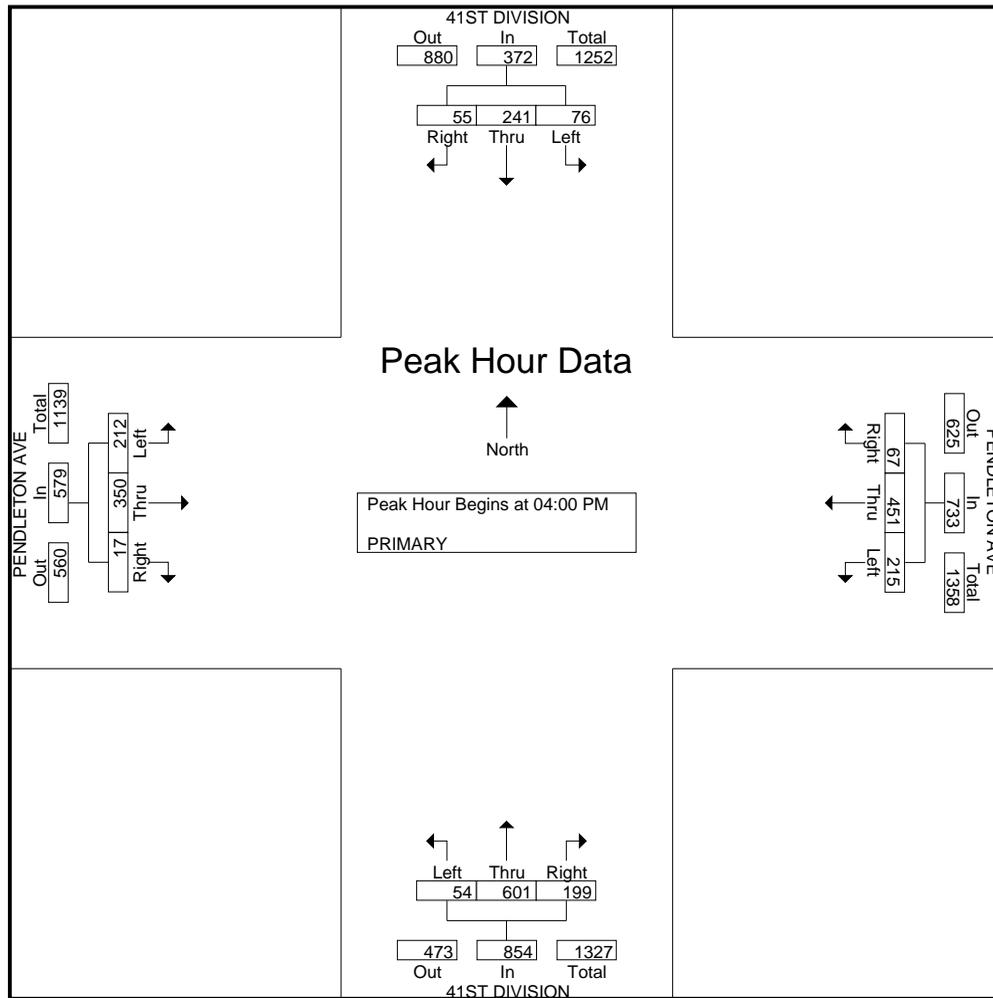
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FT LEWIS, WASHINGTON
41ST DIVISION DR
PENDLETON AVE
LOC #06P TPG07309M

File Name : 06-P
Site Code : 00000006
Start Date : 11/28/2007
Page No : 2

Start Time	41ST DIVISION From North				PENDLETON AVE From East				41ST DIVISION From South				PENDLETON AVE From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	11	56	17	84	15	99	48	162	50	147	16	213	3	73	56	132	591
04:15 PM	19	65	10	94	18	121	44	183	44	144	16	204	2	101	49	152	633
04:30 PM	9	74	23	106	10	104	65	179	67	201	18	286	3	104	51	158	729
04:45 PM	16	46	26	88	24	127	58	209	38	109	4	151	9	72	56	137	585
Total Volume	55	241	76	372	67	451	215	733	199	601	54	854	17	350	212	579	2538
% App. Total	14.8	64.8	20.4		9.1	61.5	29.3		23.3	70.4	6.3		2.9	60.4	36.6		
PHF	.724	.814	.731	.877	.698	.888	.827	.877	.743	.748	.750	.747	.472	.841	.946	.916	.870



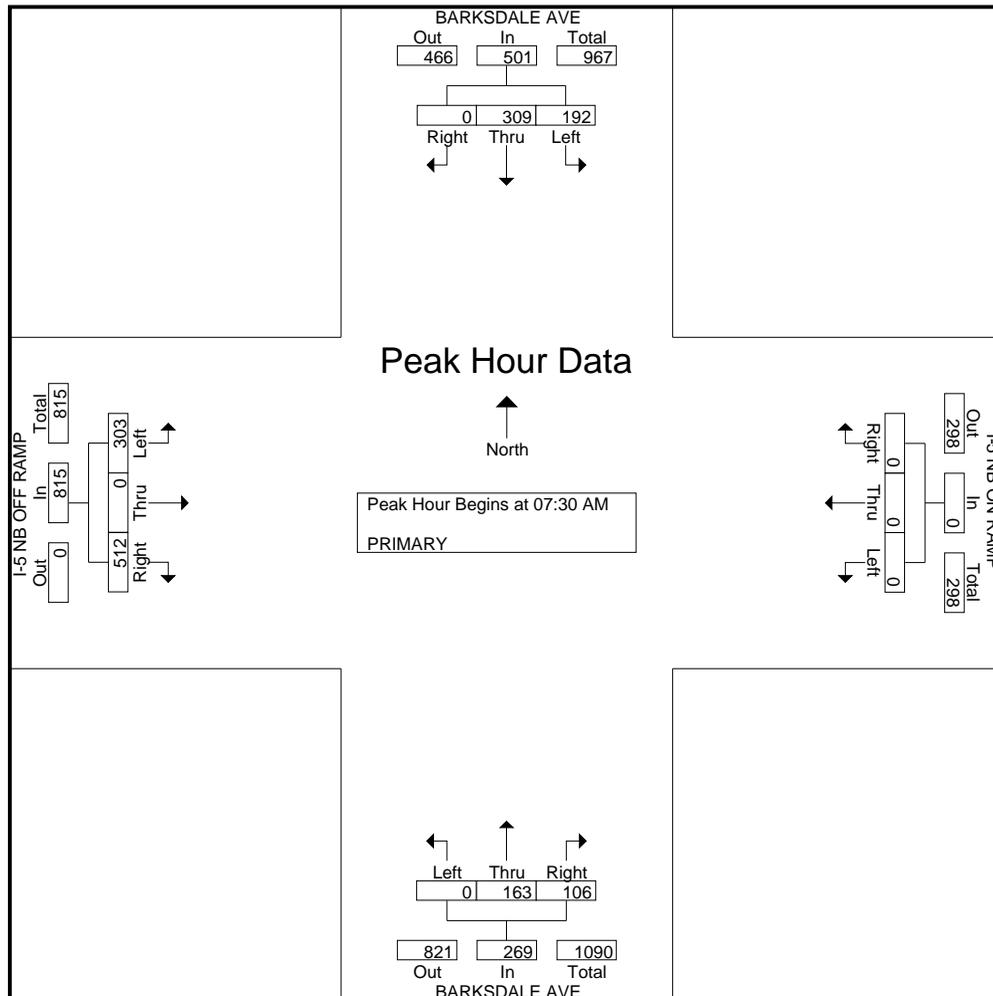
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(360) 491-8116

FT LEWIS, WASHINGTON
BARKSDALE AVE
I-5 NB ON/OFF RAMP
LOC #1B-A TPG07309M

File Name : 01B-A
Site Code : 00000001
Start Date : 11/13/2007
Page No : 2

Start Time	BARKSDALE AVE From North				I-5 NB ON RAMP From East				BARKSDALE AVE From South				I-5 NB OFF RAMP From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	100	50	150	0	0	0	0	28	54	0	82	154	0	98	252	484
07:45 AM	0	81	56	137	0	0	0	0	31	41	0	72	143	0	76	219	428
08:00 AM	0	55	42	97	0	0	0	0	25	43	0	68	105	0	71	176	341
08:15 AM	0	73	44	117	0	0	0	0	22	25	0	47	110	0	58	168	332
Total Volume	0	309	192	501	0	0	0	0	106	163	0	269	512	0	303	815	1585
% App. Total	0	61.7	38.3		0	0	0		39.4	60.6	0		62.8	0	37.2		
PHF	.000	.773	.857	.835	.000	.000	.000	.000	.855	.755	.000	.820	.831	.000	.773	.809	.819



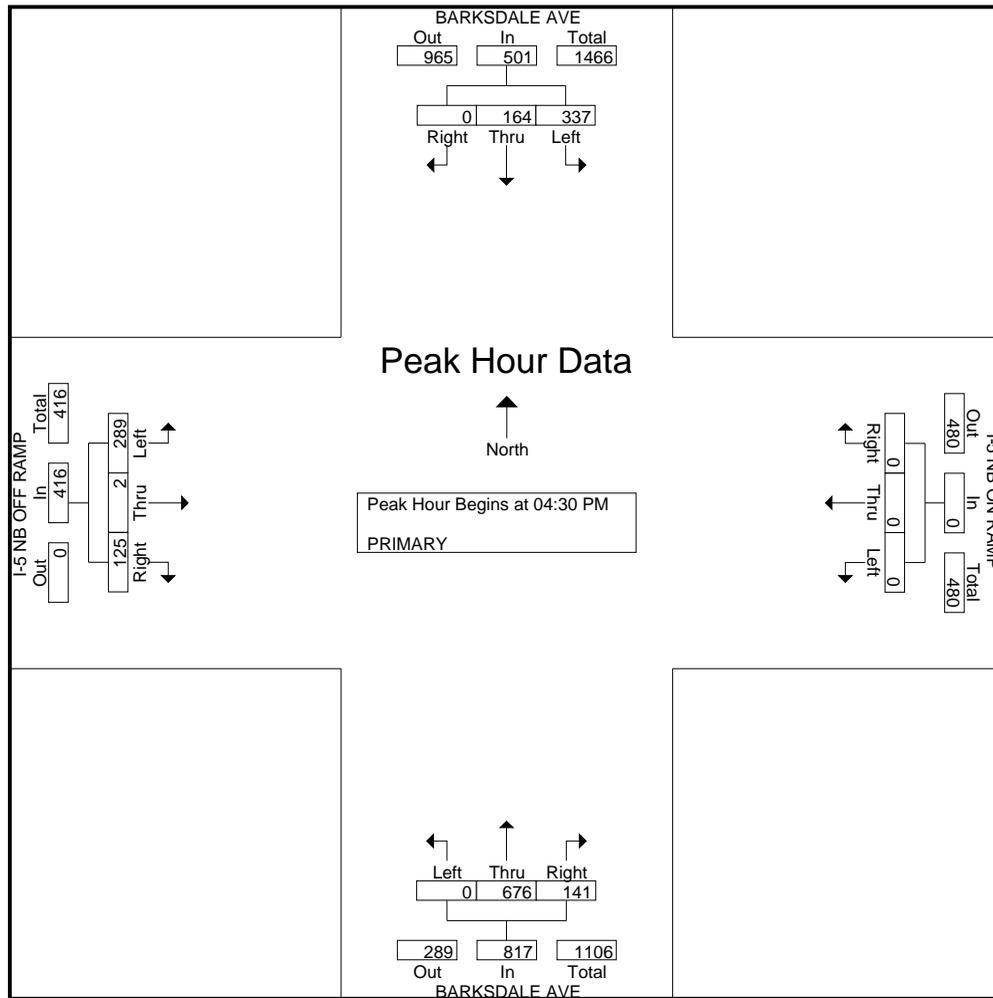
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FT LEWIS, WASHINGTON
BARKSDALE AVE
I-5 NB ON/OFF RAMPS
LOC #1B-P TPG07309M

File Name : 01B-P
Site Code : 0000001
Start Date : 11/13/2007
Page No : 2

Start Time	BARKSDALE AVE From North				I-5 NB ON RAMP From East				BARKSDALE AVE From South				I-5 NB OFF RAMP From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	53	102	155	0	0	0	0	65	176	0	241	29	1	58	88	484
04:45 PM	0	49	80	129	0	0	0	0	31	167	0	198	34	0	83	117	444
05:00 PM	0	33	88	121	0	0	0	0	14	179	0	193	23	0	81	104	418
05:15 PM	0	29	67	96	0	0	0	0	31	154	0	185	39	1	67	107	388
Total Volume	0	164	337	501	0	0	0	0	141	676	0	817	125	2	289	416	1734
% App. Total	0	32.7	67.3		0	0	0		17.3	82.7	0		30	0.5	69.5		
PHF	.000	.774	.826	.808	.000	.000	.000	.000	.542	.944	.000	.848	.801	.500	.870	.889	.896



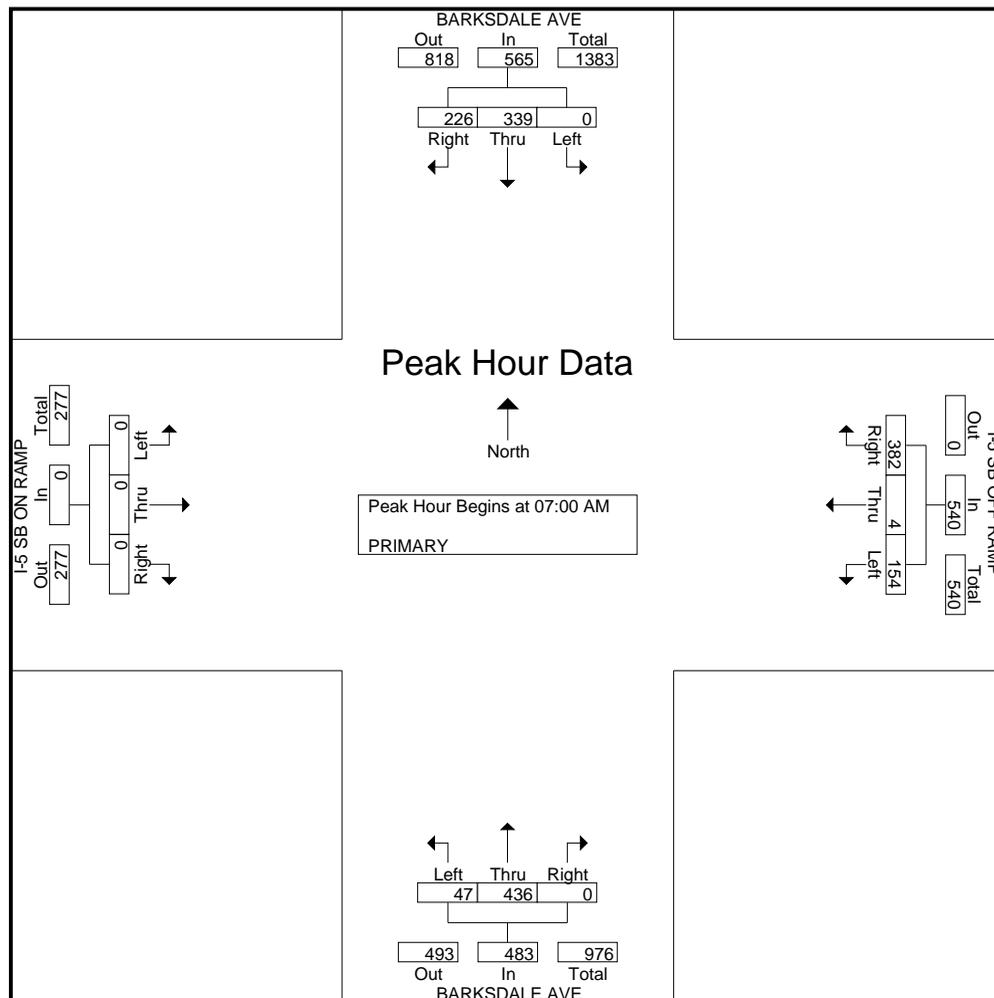
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FT LEWIS, WASHINGTON
BARKSDALE AVE
I-5 SB ON/OFF RAMPS
LOC #01A-A TPG07309M

File Name : 01A-A
Site Code : 00000001
Start Date : 11/13/2007
Page No : 2

Start Time	BARKSDALE AVE From North				I-5 SB OFF RAMP From East				BARKSDALE AVE From South				I-5 SB ON RAMP From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	58	83	0	141	97	1	43	141	0	115	13	128	0	0	0	0	410
07:15 AM	54	86	0	140	81	0	41	122	0	110	11	121	0	0	0	0	383
07:30 AM	63	93	0	156	91	0	48	139	0	105	14	119	0	0	0	0	414
07:45 AM	51	77	0	128	113	3	22	138	0	106	9	115	0	0	0	0	381
Total Volume	226	339	0	565	382	4	154	540	0	436	47	483	0	0	0	0	1588
% App. Total	40	60	0		70.7	0.7	28.5		0	90.3	9.7		0	0	0		
PHF	.897	.911	.000	.905	.845	.333	.802	.957	.000	.948	.839	.943	.000	.000	.000	.000	.959



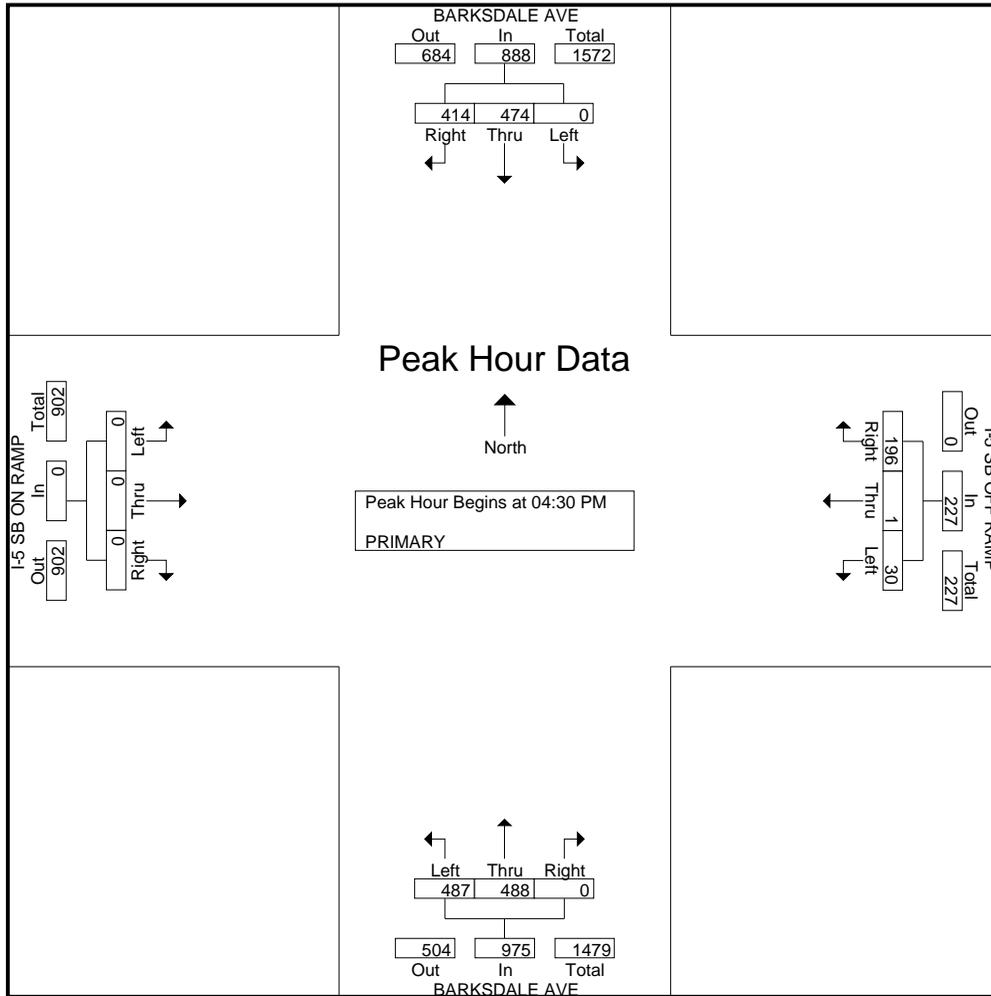
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FT LEWIS, WASHINGTON
BARKSDALE AVE
I-5 SB ON/OFF RAMPS
LOC #01A-P TPG07309M

File Name : 01A-P
Site Code : 00000001
Start Date : 11/13/2007
Page No : 2

Start Time	BARKSDALE AVE From North				I-5 SB OFF RAMP From East				BARKSDALE AVE From South				I-5 SB ON RAMP From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	101	148	0	249	68	1	8	77	0	109	129	238	0	0	0	0	564
04:45 PM	118	124	0	242	49	0	7	56	0	130	120	250	0	0	0	0	548
05:00 PM	104	106	0	210	38	0	5	43	0	131	140	271	0	0	0	0	524
05:15 PM	91	96	0	187	41	0	10	51	0	118	98	216	0	0	0	0	454
Total Volume	414	474	0	888	196	1	30	227	0	488	487	975	0	0	0	0	2090
% App. Total	46.6	53.4	0		86.3	0.4	13.2		0	50.1	49.9		0	0	0		
PHF	.877	.801	.000	.892	.721	.250	.750	.737	.000	.931	.870	.899	.000	.000	.000	.000	.926



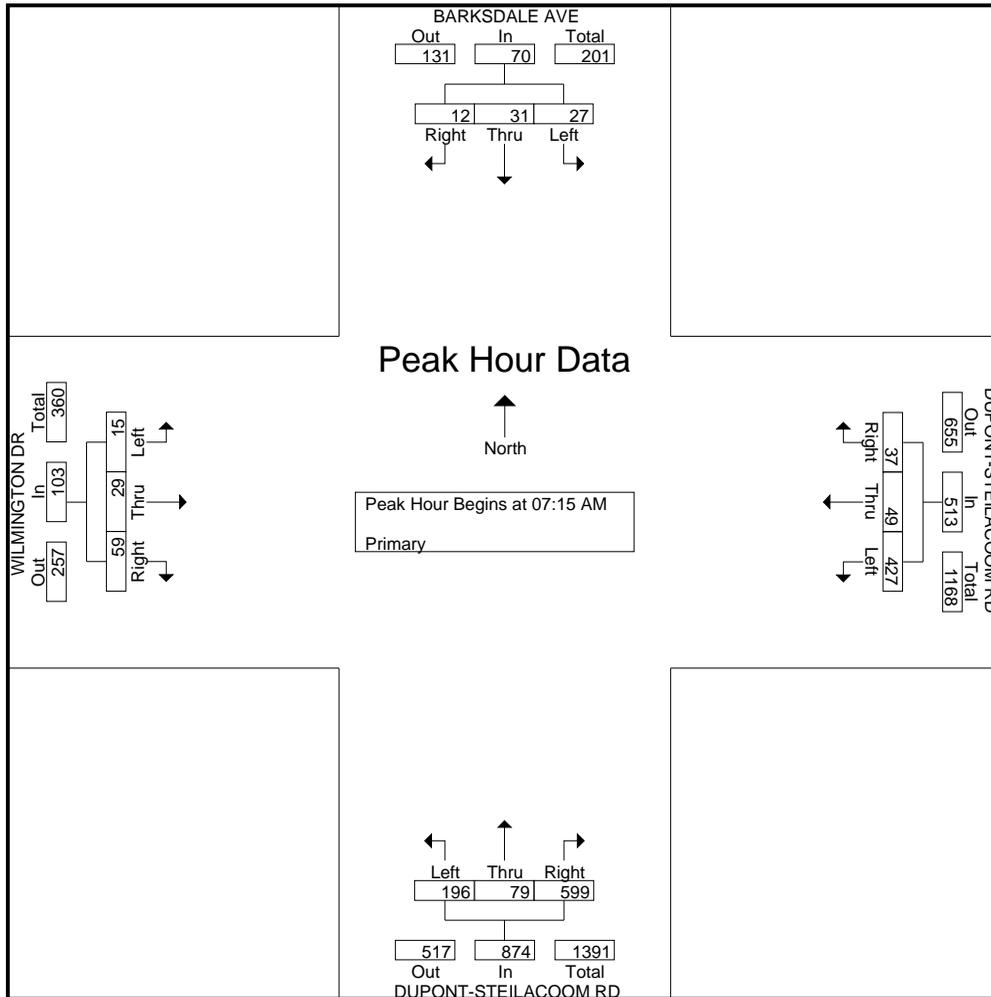
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DUPONT, WASHINGTON
DUPONT-STEILACOOM RD
BARKSDALE AVE
LOC# 06A COD08266TM

File Name : COD27506A
Site Code : 0000006
Start Date : 10/1/2008
Page No : 2

Start Time	BARKSDALE AVE From North				DUPONT-STEILACOOM RD From East				DUPONT-STEILACOOM RD From South				WILMINGTON DR From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	2	9	5	16	6	13	124	143	151	20	28	199	11	8	4	23	381
07:30 AM	1	8	11	20	7	13	114	134	172	21	49	242	21	6	5	32	428
07:45 AM	6	10	7	23	11	12	98	121	162	18	71	251	16	9	2	27	422
08:00 AM	3	4	4	11	13	11	91	115	114	20	48	182	11	6	4	21	329
Total Volume	12	31	27	70	37	49	427	513	599	79	196	874	59	29	15	103	1560
% App. Total	17.1	44.3	38.6		7.2	9.6	83.2		68.5	9	22.4		57.3	28.2	14.6		
PHF	.500	.775	.614	.761	.712	.942	.861	.897	.871	.940	.690	.871	.702	.806	.750	.805	.911



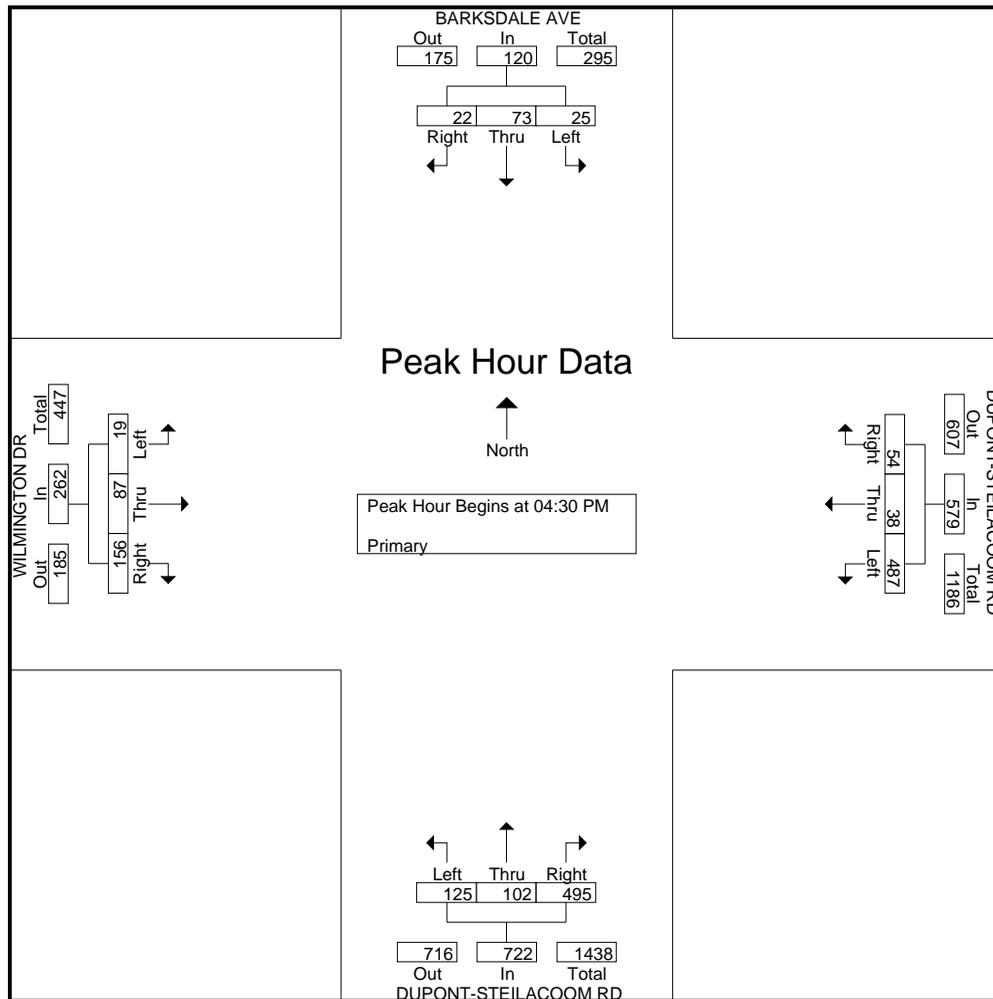
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traffcount@msn.com
(360)491-8116

DUPONT, WASHINGTON
DUPONT-STEILACOOM RD
BARKSDALE AVE
LOC# 06P COD08266TM

File Name : COD27506P
Site Code : 0000006
Start Date : 10/1/2008
Page No : 2

Start Time	BARKSDALE AVE From North				DUPONT-STEILACOOM RD From East				DUPONT-STEILACOOM RD From South				WILMINGTON DR From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	4	17	6	27	16	3	98	117	123	21	26	170	67	23	3	93	407
04:45 PM	9	19	8	36	11	15	135	161	126	32	29	187	24	22	6	52	436
05:00 PM	7	17	7	31	15	15	148	178	121	19	34	174	28	27	3	58	441
05:15 PM	2	20	4	26	12	5	106	123	125	30	36	191	37	15	7	59	399
Total Volume	22	73	25	120	54	38	487	579	495	102	125	722	156	87	19	262	1683
% App. Total	18.3	60.8	20.8		9.3	6.6	84.1		68.6	14.1	17.3		59.5	33.2	7.3		
PHF	.611	.913	.781	.833	.844	.633	.823	.813	.982	.797	.868	.945	.582	.806	.679	.704	.954



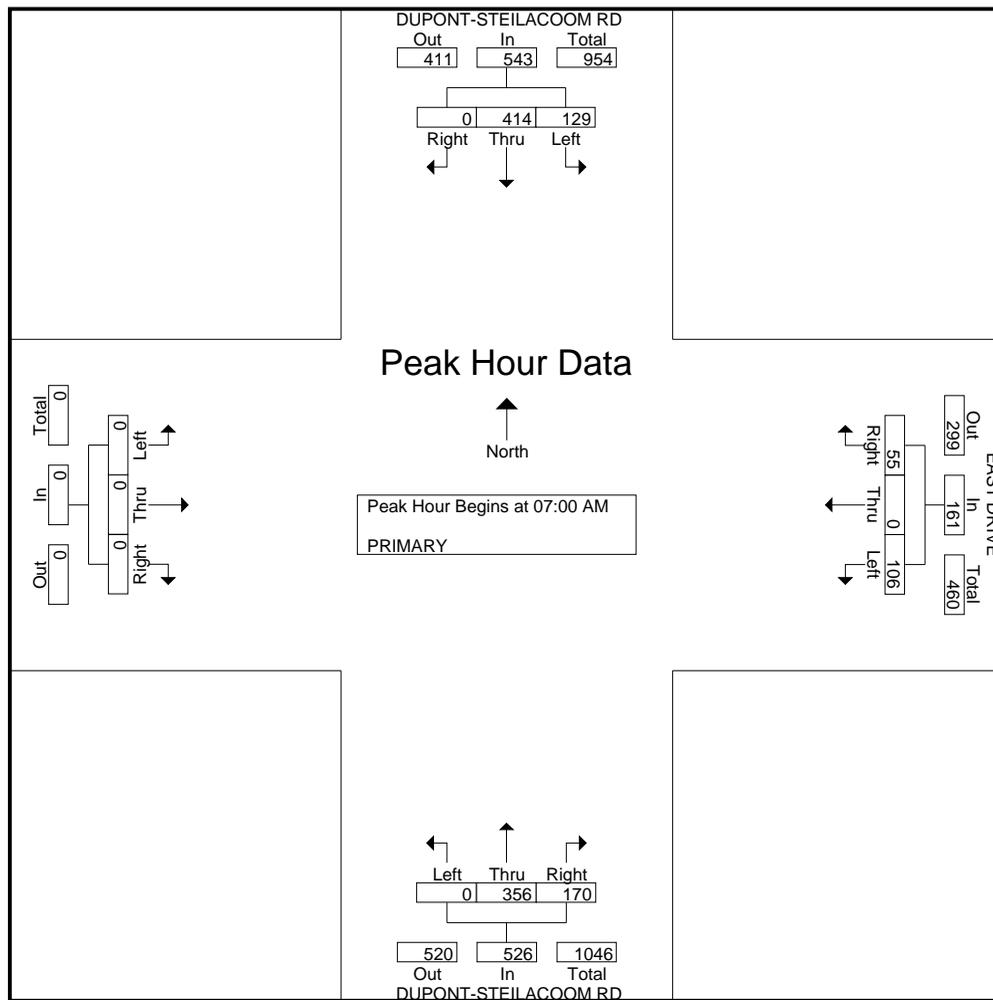
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FT LEWIS, WASHINGTON
DUPONT-STEILACOOM RD
EAST DRIVE
LOC #15A TPG07309M

File Name : 15A
Site Code : 0000015
Start Date : 11/15/2007
Page No : 2

Start Time	DUPONT-STEILACOOM RD From North				EAST DRIVE From East				DUPONT-STEILACOOM RD From South				From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	99	28	127	8	0	22	30	43	92	0	135	0	0	0	0	292
07:15 AM	0	105	42	147	10	0	28	38	29	68	0	97	0	0	0	0	282
07:30 AM	0	105	31	136	22	0	33	55	47	99	0	146	0	0	0	0	337
07:45 AM	0	105	28	133	15	0	23	38	51	97	0	148	0	0	0	0	319
Total Volume	0	414	129	543	55	0	106	161	170	356	0	526	0	0	0	0	1230
% App. Total	0	76.2	23.8		34.2	0	65.8		32.3	67.7	0		0	0	0		
PHF	.000	.986	.768	.923	.625	.000	.803	.732	.833	.899	.000	.889	.000	.000	.000	.000	.912



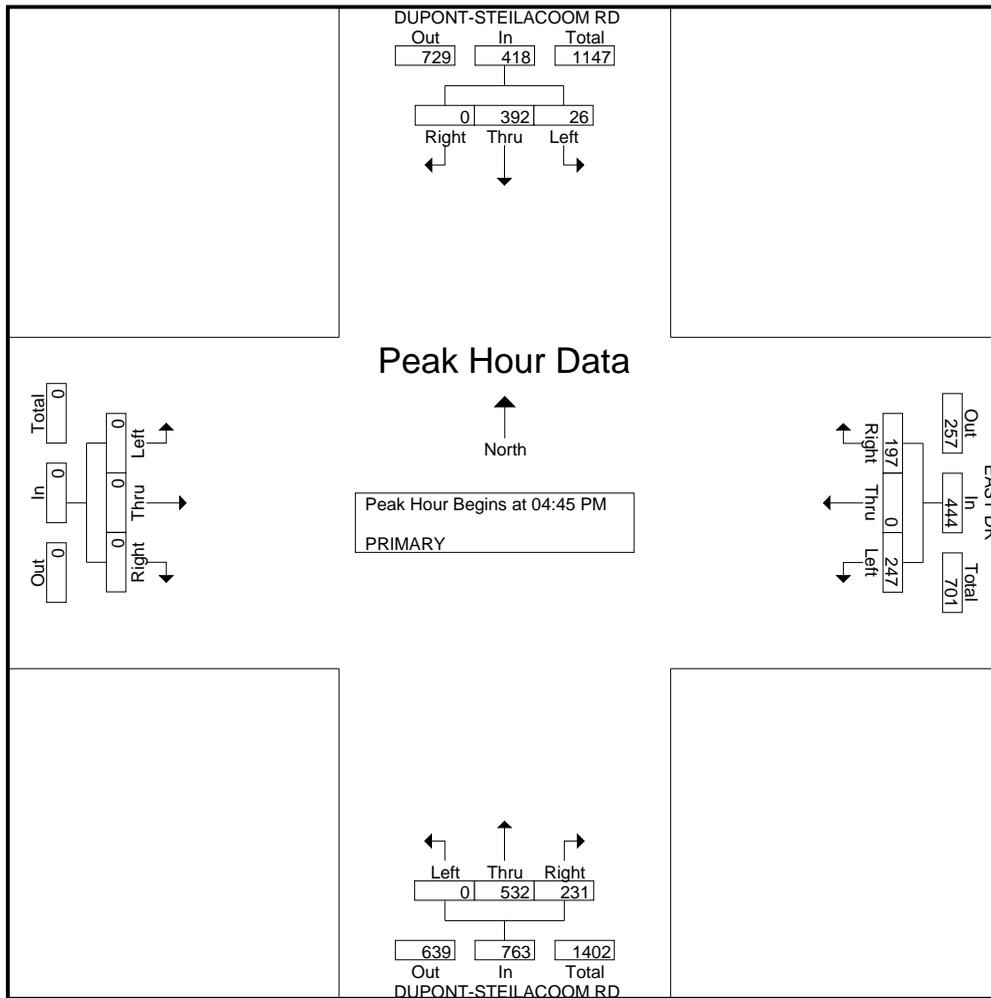
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FT LEWIS, WASHINGTON
DUPONT-STEILACOOM RD
EAST DRIVE
LOC #15P TPG07309M

File Name : 15P
Site Code : 0000015
Start Date : 11/15/2007
Page No : 2

Start Time	DUPONT-STEILACOOM RD From North				EAST DR From East				DUPONT-STEILACOOM RD From South				From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	112	4	116	68	0	63	131	46	108	0	154	0	0	0	0	401
05:00 PM	0	111	11	122	40	0	53	93	72	132	0	204	0	0	0	0	419
05:15 PM	0	85	5	90	46	0	69	115	50	136	0	186	0	0	0	0	391
05:30 PM	0	84	6	90	43	0	62	105	63	156	0	219	0	0	0	0	414
Total Volume	0	392	26	418	197	0	247	444	231	532	0	763	0	0	0	0	1625
% App. Total	0	93.8	6.2		44.4	0	55.6		30.3	69.7	0		0	0	0		
PHF	.000	.875	.591	.857	.724	.000	.895	.847	.802	.853	.000	.871	.000	.000	.000	.000	.970



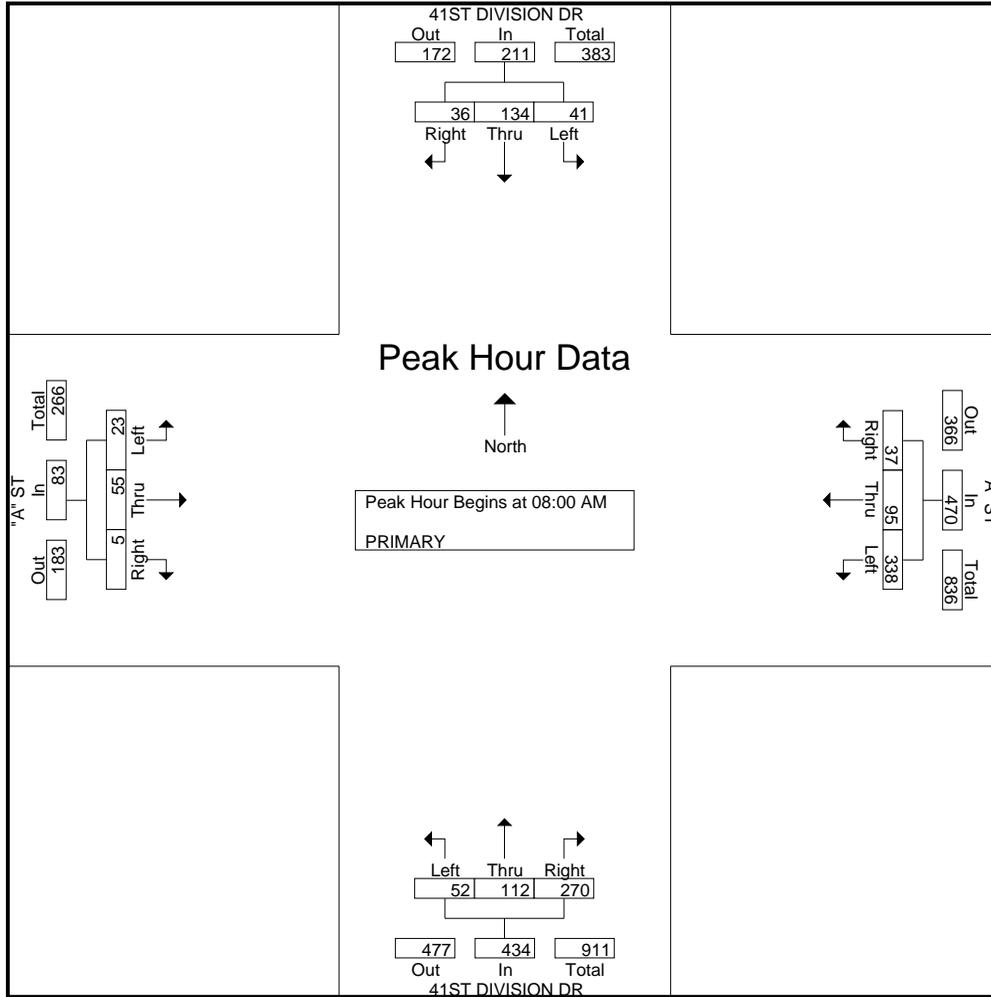
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 OLYMPIA, WASHINGTON 98507
 (360) 491-8116

FORT LEWIS, WASHINGTON
 41ST DIVISION DR
 "A" ST
 LOC# 01A TPG07274TM

File Name : TPG29101A
 Site Code : 0000001
 Start Date : 10/18/2007
 Page No : 2

Start Time	41ST DIVISION DR From North				"A" ST From East				41ST DIVISION DR From South				"A" ST From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	1	46	7	54	6	13	74	93	49	14	3	66	2	4	12	18	231
08:15 AM	12	25	11	48	5	12	81	98	57	37	4	98	1	11	2	14	258
08:30 AM	12	29	9	50	9	25	98	132	82	25	18	125	1	13	5	19	326
08:45 AM	11	34	14	59	17	45	85	147	82	36	27	145	1	27	4	32	383
Total Volume	36	134	41	211	37	95	338	470	270	112	52	434	5	55	23	83	1198
% App. Total	17.1	63.5	19.4		7.9	20.2	71.9		62.2	25.8	12		6	66.3	27.7		
PHF	.750	.728	.732	.894	.544	.528	.862	.799	.823	.757	.481	.748	.625	.509	.479	.648	.782



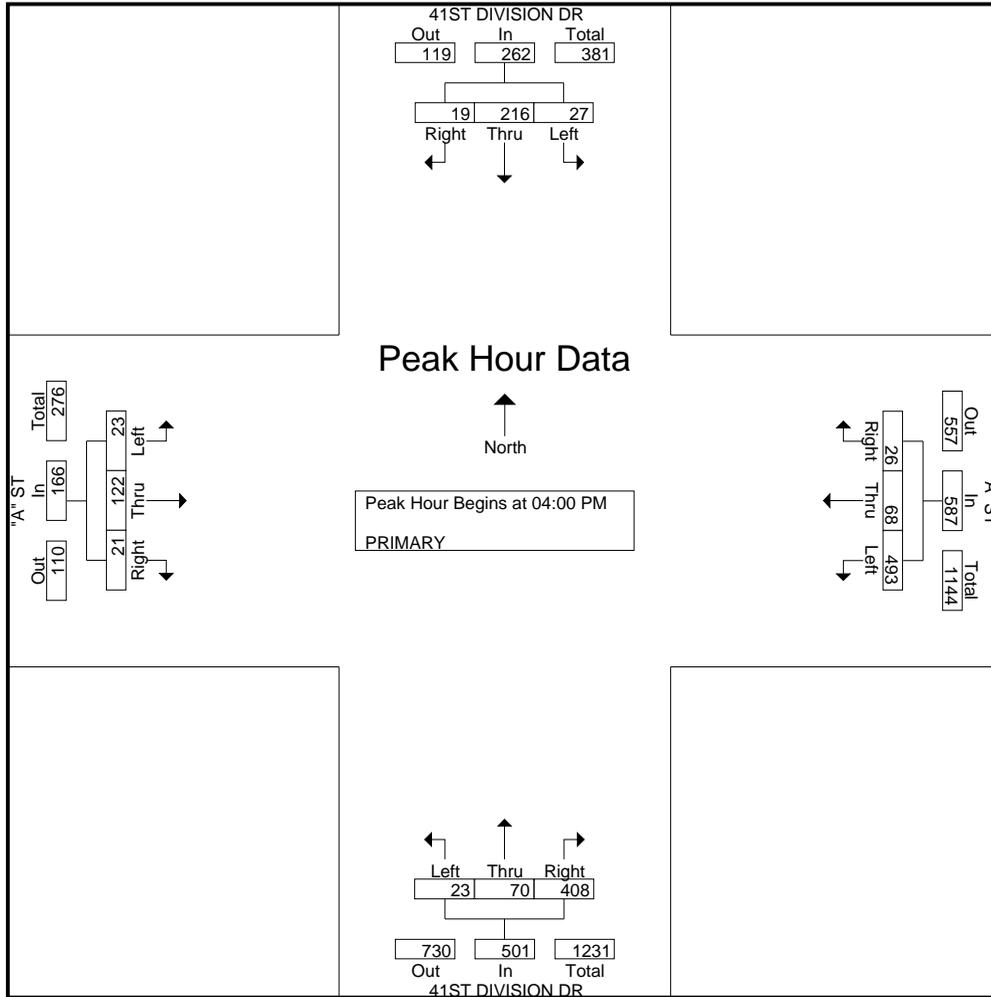
TRAFFICCOUNT, INC.

P.O. BOX 2508
 OLYMPIA, WASHINGTON 98507
 (360) 491-8116

FORT LEWIS, WASHINGTON
 41ST DIVISION DR
 "A" ST
 LOC# 01P TPG07274TM

File Name : TPG29101P
 Site Code : 0000001
 Start Date : 10/18/2007
 Page No : 2

Start Time	41ST DIVISION DR From North				"A" ST From East				41ST DIVISION DR From South				"A" ST From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	4	55	3	62	6	19	112	137	102	20	3	125	2	22	6	30	354
04:15 PM	6	66	7	79	5	9	146	160	121	21	6	148	12	46	8	66	453
04:30 PM	5	64	11	80	5	19	116	140	90	15	14	119	6	42	6	54	393
04:45 PM	4	31	6	41	10	21	119	150	95	14	0	109	1	12	3	16	316
Total Volume	19	216	27	262	26	68	493	587	408	70	23	501	21	122	23	166	1516
% App. Total	7.3	82.4	10.3		4.4	11.6	84		81.4	14	4.6		12.7	73.5	13.9		
PHF	.792	.818	.614	.819	.650	.810	.844	.917	.843	.833	.411	.846	.438	.663	.719	.629	.837





Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3591 Count ID SP#06-001

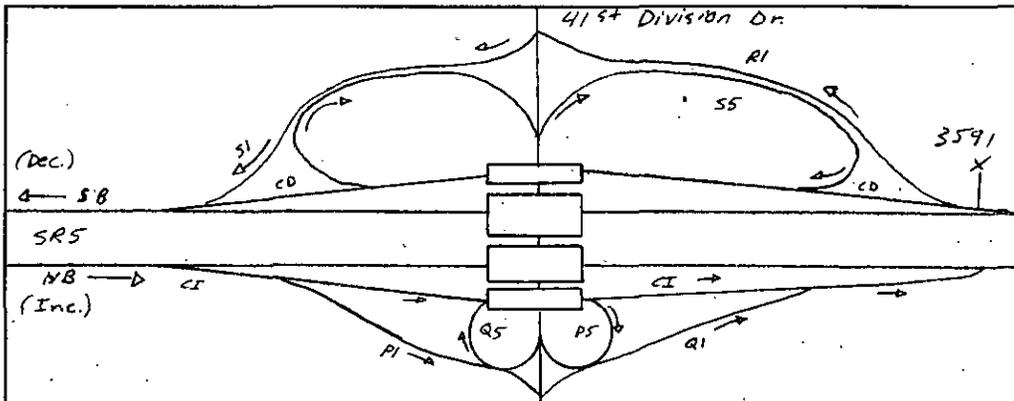
SR 5 RRT/RRQ CD/RI/SS MP 0.00

Leg 2 Direction SB OSID _____

Station Description - ON SR5 SB offramp to 41st Division Dr / Fort Lewis
on SR 5 SB off Bump to Fort Lewis Bld

Date	Day	Time	Comments
1/30/06	2	1429	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Set o.k. JM/MH 6.6
1/31	3	1005	Manual (1) <u>32</u> (2) _____ Counter (1) <u>32</u> (2) _____ check o.k. JM/MH 6.6
2/1	4	1143	Manual (1) <u>32</u> (2) _____ Counter (1) <u>32</u> (2) _____ check o.k. JM/MH 6.6
2/2	5	1056	Manual (1) <u>28</u> (2) _____ Counter (1) <u>28</u> (2) _____ check o.k. JM/MH 6.6
2/3	6	1007	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ P/V JM/MH 6.5

Sketch



North

J. Mills / M. Heathscott
Field Person

DOT-RNB515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
TRIP SURVEY
15 MINUTE TRAFFIC COUNT SUMMARY

DATE 03/21/06
TIME 09:14:48
PAGE 66

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	COUNTER NUMBER	LEG 2	DIRECTION OF TRAFFIC												LANE	ALL	OF					
						SOUTHBOUND						RAMP TO FORT LEWIS RD													
02/02/06 THURSDAY		AM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		DAILY TOTAL									
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15	28	15	20	11	19	129	237	133	117	118	152	186	188	146	142	128	152	121	124	116	85	60	29	29	
15-30	27	21	13	8	22	271	240	142	144	102	183	202	175	157	142	145	185	116	120	96	85	68	48	48	
30-45	26	16	13	12	54	365	264	165	172	107	135	136	178	136	129	132	124	105	88	90	56	40	40	40	
45-00	18	10	15	27	103	332	237	159	174	112	129	156	278	161	128	143	172	128	124	98	91	48	43	43	
TOT	99	62	61	58	198	1097	978	798	621	480	484	627	945	702	567	560	574	606	489	473	398	351	232	160	11620

AM PEAK HOUR 0515 TO 0615 VOLUME 1205
PM PEAK HOUR 1215 TO 0115 VOLUME 947

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	COUNTER NUMBER	LEG 2	DIRECTION OF TRAFFIC												LANE	ALL	OF					
						SOUTHBOUND						RAMP TO FORT LEWIS RD													
02/03/06 FRIDAY		AM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		DAILY TOTAL									
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15	30	24	18	18	31	76	126	204	132	129	129	111	12	1	2	3	4	5	6	7	8	9	10	11	12
15-30	24	11	25	20	36	171	143	247	160	129	129	111	12	1	2	3	4	5	6	7	8	9	10	11	12
30-45	20	28	19	35	54	264	184	170	186	123	129	111	12	1	2	3	4	5	6	7	8	9	10	11	12
45-00	22	21	27	41	69	209	191	187	173	117	117	111	12	1	2	3	4	5	6	7	8	9	10	11	12
TOT	96	84	89	114	190	720	644	808	631	498	498	627	945	702	567	560	574	606	489	473	398	351	232	160	11620

AM PEAK HOUR 0630 TO 0730 VOLUME 826
PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06
TOTAL HOURS FOR COUNT 91

3 DAYS
AVG WEEKDAY VOL 11471 X SEASONAL ADJ. FACTOR 1.0000 = 11471 X AXLE CORR FACTOR 0.8776 = ESTIMATED AVG DAILY TRAFFIC 10067
PEAK HOUR PERCENTAGES: K = 12.39 D = 100.00
PEAK HOUR LOCATION : VOLUME = 1421 DATE: 02/01/06 TIME: 05:15 AM

AM TOTAL 3874
PM TOTAL 0



Interval 60 min. 15 min.

Count(volume) Speed
 Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 SB R112116 SB
Direction Channel 2 SB 5512095 U
Data Hog # 3163

Counter No. 5-3555 Count ID SP#06-001

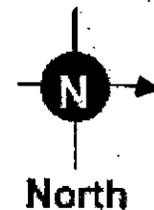
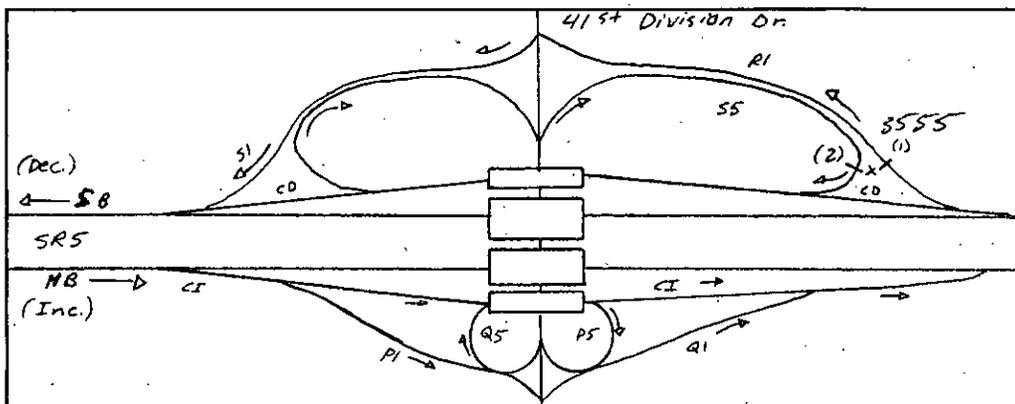
SR 5 RRT/RRQ R1 12116 MP 0.00

Leg 2 Direction see 1-2 OSID

Station Description - ON channel 1=005 R1 12116 / channel 2=005 55 12095
ON SR 5 SB off Ramp to Fort Lewis Rd

Date	Day	Time	Comments
1/30/06	2	1137	Manual (1) 5 (2) 5 Counter (1) 5 (2) 5 Set o.k. Jm/MH 6.7
1/31	3	1011	Manual (1) 11 (2) 7 Counter (1) 11 (2) 7 check o.k. Jm/MH 6.5
2/1	4	1148	Manual (1) 9 (2) 15 Counter (1) 9 (2) 15 check o.k. Jm/MH 6.7
2/2	5	0905	Manual (1) 5 (2) 5 Counter (1) 5 (2) 5 check o.k. Jm/MH 6.4
2/3	6	0842	Manual (1) 2 (2) 2 Counter (1) 2 (2) 2 P/O Jm/MH 6.4

Sketch



J. Mills/M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR 005 R112116	MP 000.00	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC		LANE ALL	OF
				SOUTHBOUND			
COUNT IDENTIFIER	06-001	COUNTER NUMBER	053555	DESCRIPTION: ON SR 5 SB OFF RAMP TO FORT LEWIS RD			
01/30/06 MONDAY		AM HOURS	PM HOURS				
12	1	2	3	4	5	6	7
1	2	3	4	5	6	7	8
		8	9	10	11	12	1
		9	10	11	12	1	2
		10	11	12	1	2	3
		11	12	1	2	3	4
		12	1	2	3	4	5
		1	2	3	4	5	6
		2	3	4	5	6	7
		3	4	5	6	7	8
		4	5	6	7	8	9
		5	6	7	8	9	10
		6	7	8	9	10	11
		7	8	9	10	11	12
		8	9	10	11	12	TOTAL
00-15							
15-30							
30-45							
45-00							
HOUR							
TOT							
		AM PEAK HOUR	PM PEAK HOUR	0000 TO 0015 VOLUME	0	AM TOTAL	49
		1215 TO 0115 VOLUME	277	PM TOTAL	1667		

01/31/06 TUESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL		

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

SR 005 R112116 MP 000.00	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC		LANE ALL OF		
			SOUTHBOUND	FORT LEWIS RD	9	10	
COUNT IDENTIFIER 06-001	COUNTER NUMBER 053555	DESCRIPTION: ON SR 5 SB OFF RAMP TO FORT LEWIS RD					
02/02/06 THURSDAY	AM HOURS	PM HOURS					
12 1 2	3 4 5	6 7 8	9 10 11	12 1 2	3 4 5	6 7 8	9 10 11
12 1 2	3 4 5	6 7 8	9 10 11	12 1 2	3 4 5	6 7 8	9 10 11
00-15	9 6 4	5 6 7	8 9 10	11 12 1	2 3 4	5 6 7	8 9 10
15-30	9 6 4	5 6 7	8 9 10	11 12 1	2 3 4	5 6 7	8 9 10
30-45	6 4	5 6 7	8 9 10	11 12 1	2 3 4	5 6 7	8 9 10
45-00	6 11	28 104	103 43	32 40	45 53	36 37	30 37
HOUR							
TOT	30 16 27 27	52 331 408 314	185 136 145 163 233 199	184 207 178 160	123 154 148 145	98 70	3733
			AM PEAK HOUR 0530 TO 0630 VOLUME 420				AM TOTAL 1834
			PM PEAK HOUR 1215 TO 0115 VOLUME 261				PM TOTAL 1899

02/03/06 FRIDAY	AM HOURS		PM HOURS		LANE ALL OF		
	3 4 5	6 7 8	9 10 11 <th>12 1 2 <th>3 4 5 <th>6 7 8</th> <th>9 10 11 </th></th></th>	12 1 2 <th>3 4 5 <th>6 7 8</th> <th>9 10 11 </th></th>	3 4 5 <th>6 7 8</th> <th>9 10 11 </th>	6 7 8	9 10 11
12 1 2	3 4 5	6 7 8	9 10 11	12 1 2	3 4 5	6 7 8	9 10 11
00-15	16 10 4	11 18 47	46 98 43				
15-30	9 6 8	11 16 118	50 98 53				
30-45	11 11 7	25 172 73	82 82				
45-00	7 7 9	24 31 104	82 73				
HOUR							
TOT	43 34 28 71	90 441 251 351	96				1405
			AM PEAK HOUR 0500 TO 0600 VOLUME 441				AM TOTAL 1405
			PM PEAK HOUR 0000 TO 0000 VOLUME 0				PM TOTAL 0

01/30/06 THRU 02/03/06
 TOTAL HOURS FOR COUNT 92

3 DAYS
 AVG WEEKDAY VOL 3710 X SEASONAL ADJ. FACTOR 1.0000 = 3710 X AXLE CORR FACTOR 0.8776 = ESTIMATED AVG DAILY TRAFFIC 3256

PEAK HOUR PERCENTAGES: K = 12.88 D = 100.00
 PEAK HOUR LOCATION : VOLUME = 478 DATE: 01/31/06 TIME: 05:15 AM



Interval 60 min. 15 min.

Count(volume) Speed
 Binned(CL/SP) Raw

Lane No 1 2

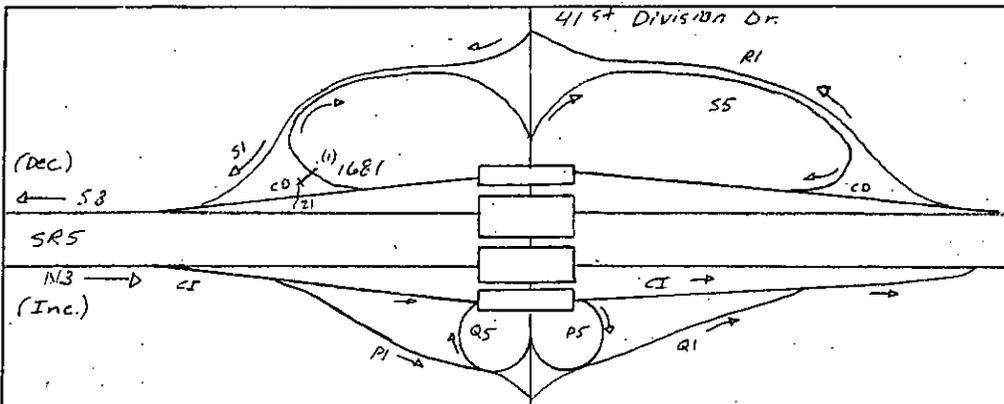
Direction Channel 1 WB R512084 SB LN 1 of 2
Direction Channel 2 WB CD12135 SB LN 2 of 2
Data Hog # 3163

Counter No. 5-1681 Count ID SP#06-001
SR 5 RRT/RRQ CD12135 MP 0.51
Leg 1 Direction See 1-2 OSID. _____

Station Description - ON channel 1 = 005 R5 12084 / channel 2 = 005 CD 12135
on SB 5 SB Collector - Distributor from Fort Lewis Rd.

Date	Day	Time	Comments
1/30/06	2	1150	Manual (1) 3 (2) 3 Counter (1) 3 (2) 3 Set o.k. Jm/MH 6.5
1/31	3	1018	Manual (1) 27 (2) 2 Counter (1) 27 (2) 2 check o.k. Jm/MH 6.4
2/1	4	1152	Manual (1) 19 (2) 9 Counter (1) 19 (2) 9 check o.k. Jm/MH 6.4
2/2	5	0911	Manual (1) 7 (2) 6 Counter (1) 7 (2) 6 check o.k. Jm/MH 6.3
2/3	6	0847	Manual (1) 2 (2) 2 SV Counter (1) 2 (2) 2 SV p/w Jm/MH 6.3

Sketch



J.M. Hils/M. Heathscott
Field Person

DATE 03/21/06
 TIME 09:14:48
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DOT-RNB515A-B
 SR 005 CD12135 MP 000.51 OFF SYSTEM ID. LANE 2 OF 2
 COUNT IDENTIFIER 06-001 COUNTER NUMBER 051681 DESCRIPTION: ON SR 5 SB COLLECTOR DISTRIBUTOR FROM FORT LEWIS RD
 LEG 1 DIRECTION OF TRAFFIC SOUTHBOUND

DATE	TIME	AM HOURS												PM HOURS												DAILY TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
01/30/06	MONDAY	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11
00-15																										
15-30																										
30-45																										
45-00																										
HOUR																										
TOT																										

DATE	TIME	AM HOURS												PM HOURS												DAILY TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
01/31/06	TUESDAY	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11
00-15																										
15-30																										
30-45																										
45-00																										
HOUR																										
TOT																										

DATE	TIME	AM HOURS												PM HOURS												DAILY TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
02/01/06	WEDNESDAY	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11
00-15																										
15-30																										
30-45																										
45-00																										
HOUR																										
TOT																										

DATE	TIME	AM PEAK HOUR 0000 TO 0545 VOLUME												PM PEAK HOUR 0430 TO 0530 VOLUME												AM TOTAL	PM TOTAL	DAILY TOTAL	
		0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10				11
01/30/06	MONDAY	0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12	0	2175
01/31/06	TUESDAY	0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12	0	2175
02/01/06	WEDNESDAY	0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12	0	2311

DATE	TIME	AM PEAK HOUR 1100 TO 1200 VOLUME												PM PEAK HOUR 0445 TO 0545 VOLUME												AM TOTAL	PM TOTAL	DAILY TOTAL	
		0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10				11
01/30/06	MONDAY	0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12	0	2175
01/31/06	TUESDAY	0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12	0	2175
02/01/06	WEDNESDAY	0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12	0	2311

SR 005 CD12135 MP 000.51 OFF SYSTEM ID. LANE 2 OF 2

COUNT IDENTIFIER 06-001 COUNTER NUMBER 051681 DESCRIPTION: ON SR 5 SB COLLECTOR DISTRIBUTOR FROM FORT LEWIS RD

DATE	TIME	DIRECTION OF TRAFFIC SOUTHBOUND												DAILY TOTAL									
		LEG 1						LEG 2															
		AM HOURS		PM HOURS		AM HOURS		PM HOURS		AM HOURS		PM HOURS											
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
02/02/06	THURSDAY	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	
00-15		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	
15-30		5	4	10	17	19	19	26	25	49	42	41	50	105	176	69	60	35	38	16	10		
30-45		3	2	8	11	27	17	24	30	50	40	40	39	54	96	67	39	28	33	23	8		
45-00		1	2	2	5	22	33	23	15	24	54	36	43	77	125	143	74	44	27	34	26	13	
HOUR		6	1	4	11	15	19	16	9	41	63	39	42	69	166	96	48	39	30	39	17	9	
TOT		36	12	19	8	28	58	96	67	121	192	164	163	178	250	492	258	182	120	144	82	40	
		AM PEAK HOUR 1100 TO 1200 VOLUME						PM PEAK HOUR 0445 TO 0545 VOLUME						AM TOTAL		PM TOTAL							
		192						679						720		2682							

02/03/06 FRIDAY

DATE	TIME	DIRECTION OF TRAFFIC SOUTHBOUND												DAILY TOTAL									
		LEG 1						LEG 2															
		AM HOURS		PM HOURS		AM HOURS		PM HOURS		AM HOURS		PM HOURS											
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15		2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	
15-30		3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	
30-45		3	3	2	1	9	9	21	25														
45-00		3	2	2	5	13	19	21															
HOUR		4	1	6	13	22	60	21															
TOT		23	13	10	7	9	27	57	139	67													
		AM PEAK HOUR 0730 TO 0830 VOLUME						PM PEAK HOUR 0000 TO 0000 VOLUME						AM TOTAL		PM TOTAL							
		145						352						352		0							

SR 005 CD12135 MP 000.51 OFF SYSTEM ID. LEG 1 DIRECTION OF TRAFFIC SOUTHBOUND LANE 12 OF 2
 COUNT IDENTIFIER 06-001 COUNTER NUMBER 051681 DESCRIPTION: ON SR 5 SB COLLECTOR DISTRIBUTOR FROM FORT LEWIS RD

01/30/06 MONDAY	AM HOURS					PM HOURS					DAILY TOTAL						
	1	2	3	4	5	6	7	8	9	10		11	12				
00-15						167	160	130	152	167	214	163	111	74	55	64	32
15-30						178	157	132	143	157	185	130	107	55	59	54	34
30-45						210	130	161	152	167	188	104	104	67	75	39	32
45-00						179	132	116	164	223	181	126	93	78	61	49	14
hour						734	579	539	611	714	768	551	415	274	250	206	112
TOT																	5753

01/31/06 TUESDAY	AM HOURS					PM HOURS					DAILY TOTAL															
	1	2	3	4	5	6	7	8	9	10		11	12													
00-15						196	138	107	126	100	126	149	148	132	115	168	199	157	151	87	72	54	34			
15-30						24	245	118	207	123	125	112	146	187	127	128	142	191	238	153	102	77	63	46	18	
30-45						73	330	152	179	169	103	123	159	204	149	130	160	202	202	131	128	80	82	64	26	
45-00						76	286	134	155	175	116	133	169	227	125	134	179	220	177	115	95	100	61	53	31	
hour						194	981	600	679	574	470	468	600	767	549	524	596	781	816	556	476	344	278	197	109	10752
TOT																									4759	

02/01/06 WEDNESDAY	AM HOURS					PM HOURS					DAILY TOTAL														
	1	2	3	4	5	6	7	8	9	10		11	12												
00-15						174	160	123	146	109	143	175	160	141	134	163	207	197	133	107	84	73	36	36	
15-30						20	224	137	206	146	123	129	151	189	147	175	189	225	155	131	98	77	48	26	
30-45						36	307	154	148	165	108	121	155	192	140	154	170	214	168	126	95	78	40	40	
45-00						85	319	154	133	182	121	160	153	217	145	159	188	235	134	123	79	51	38	21	
hour						156	971	619	647	616	498	519	602	773	599	601	667	802	654	513	379	290	199	123	11277
TOT																									4819

AM PEAK HOUR 0000 TO 0000 VOLUME 0
 PM PEAK HOUR 0445 TO 0545 VOLUME 810
 AM PEAK HOUR 0515 TO 0615 VOLUME 1057
 PM PEAK HOUR 0430 TO 0530 VOLUME 882

SR 005 CD12135 MP 000.51 OFF SYSTEM ID. LEG 1 DIRECTION OF TRAFFIC SOUTHBOUND LANE 12 OF 2

COUNT IDENTIFIER 06-001 COUNTER NUMBER 051681 DESCRIPTION: ON SR 5 SB COLLECTOR DISTRIBUTOR FROM FORT LEWIS RD

DATE	TIME	PM HOURS												DAILY TOTAL													
		3	4	5	6	7	8	9	10	11	12	1	2														
02/02/06	THURSDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
00-15		33	14	11	8	12	93	149	132	106	106	112	142	189	172	140	135	193	259	155	135	107	88	52	24		
15-30		31	14	9	6	15	216	156	180	124	127	109	182	182	162	143	149	199	303	162	110	84	82	63	40		
30-45		26	8	13	9	35	263	187	143	137	96	109	148	239	178	152	165	216	220	157	123	81	94	57	40		
45-00		15	11	14	15	84	239	154	132	146	86	132	186	231	151	120	159	258	183	134	123	98	91	44	32		
TOT		105	47	47	38	146	811	646	587	513	415	462	658	841	663	555	608	866	965	608	491	370	355	216	136	11149	

AM PEAK HOUR 0515 TO 0615 VOLUME 867
PM PEAK HOUR 0445 TO 0545 VOLUME 1040

AM TOTAL 4475
PM TOTAL 6674

DATE	TIME	AM HOURS												DAILY TOTAL													
		3	4	5	6	7	8	9	10	11	12	1	2														
02/03/06	FRIDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
00-15		28	17	15	7	13	46	92	133	115																	
15-30		16	9	15	12	28	60	109	168	121																	
30-45		17	15	17	12	32	105	143	162	162																	
45-00		17	21	22	14	44	113	128	157																		
TOT		78	62	69	45	117	324	472	620	398																2185	

AM PEAK HOUR 0700 TO 0800 VOLUME 620
PM PEAK HOUR 0000 TO 0000 VOLUME 0

AM TOTAL 2185
PM TOTAL 0

01/30/06 THRU 02/03/06 92
TOTAL HOURS FOR COUNT

3 DAYS
AVG WEEKDAY VOL 11059 X SEASONAL ADJ. FACTOR 1.0000 = 11059 X AXLE CORR FACTOR 0.8776 = ESTIMATED AVG DAILY TRAFFIC 9705

PEAK HOUR PERCENTAGES: K = 9.56 D = 100.00
PEAK HOUR LOCATION: VOLUME = 1057 DATE: 01/31/06 TIME: 05:15 AM



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2 LN 1 of 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3473 Count ID SP#06-001

CD 12135 0.67

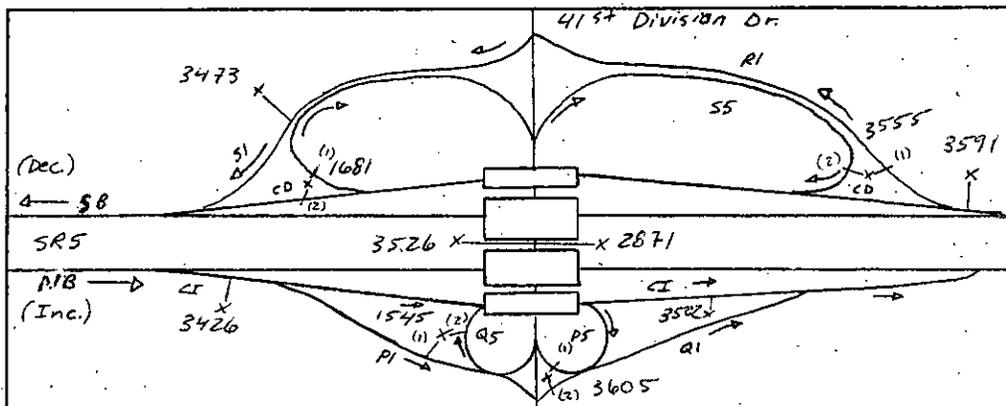
SR 5 RRT/RRQ 5172068 MP 0.00

Leg 2 Direction SB OSID _____

Station Description - ON SRS SB onramp from 41st Division Dr
on SB SB Collector - Distributor from Fort Lewis Rd

Date	Day	Time	Comments
1/30/06	2	1155	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ <u>Set o.k. JM/MH 6.6</u>
1/31	3	1024	Manual (1) <u>4</u> (2) _____ Counter (1) <u>4</u> (2) _____ <u>check o.k. JM/MH 6.4</u>
2/1	4	1153	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ <u>check o.k. JM/MH 6.4</u>
2/2	5	0912	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ <u>check o.k. JM/MH 6.4</u>
2/3	6	0850	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ <u>P/U JM/MH 6.4</u>

Sketch



J.M. Hs/M. Heathscott
Field Person

DOT-RNB515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION

DATE 03/21/06
TIME 09:14:48
PAGE 76

TRIP SYSTEM
15 MINUTE TRAFFIC COUNT SUMMARY

SR 005 CD12135 MP 000.67 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC SOUTHBOUND LANE 1 OF 2

COUNT IDENTIFIER 06-001 COUNTER NUMBER 053473 DESCRIPTION: ON SR 5 SB COLLECTOR DISTRIBUTOR FROM FORT LEWIS RD

02/02/06 THURSDAY		PM HOURS												DAILY TOTAL													
		12	1	2	3	4	5	6	7	8	9	10	11	12	11	10	9	8	7	6	5	4	3	2	1	12	
00-15	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11		
15-30	4	1	9	10	7	10	18	10	6	10	39	11	15	23	47	42	32	16	12	7	5	4	4	4	1		
30-45	2	2	5	1	15	8	4	15	19	14	14	11	33	46	44	31	8	5	4	4	5	4	4	4	4		
45-00	1	1	8	10	16	6	5	10	17	10	16	17	29	44	46	15	12	5	9	4	4	4	4	1	1		
HOUR																											
TOT	8	6	2	1	16	27	51	41	26	40	59	78	56	55	103	189	188	101	53	32	26	14	2	1174	2		
		AM PEAK HOUR 0715 TO 0815 VOLUME												59	AM TOTAL												277
		PM PEAK HOUR 0400 TO 0500 VOLUME												189	PM TOTAL												897

02/03/06 FRIDAY		PM HOURS												DAILY TOTAL													
		12	1	2	3	4	5	6	7	8	9	10	11	12	11	10	9	8	7	6	5	4	3	2	1	12	
00-15	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11		
15-30	4	1	6	1	5	11	13	12	9	15	19	14	11	33	46	44	31	8	5	4	4	4	4	4	4		
30-45	1	1	2	2	2	3	19	9	2	2	11	16	2	2	11	16	16	16	16	16	16	16	16	16	16		
45-00	1	2	2	2	2	2	11	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16		
HOUR																											
TOT	7	4	2	10	10	31	53	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	153		
		AM PEAK HOUR 0715 TO 0815 VOLUME												63	AM TOTAL												153
		PM PEAK HOUR 0000 TO 0000 VOLUME												0	PM TOTAL												0



Interval 60 min. 15 min.

Count(volume) Speed
 Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 WB R512084 U

Direction Channel 2 WB CD12135 LN 2 of 2 -SB

Data Hog # 3163

Counter No. 5-1681 Count ID SP#06-001

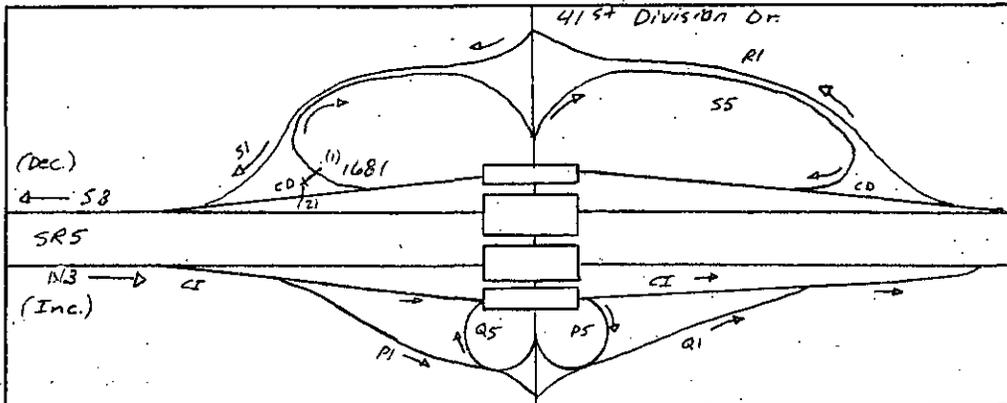
SR 5 RRT/RRQ CD 12135 MP 0.00

Leg 2 Direction see 1-2 OSID. _____

Station Description - ON channel 1=005 R5 12084 /channel 2=005 CD 12135
on SR 5 SB Collector - Distributor from Fort Lewis Rd

Date	Day	Time	Comments
1/30/06	2	1150	Manual (1) 3 (2) 3 Counter (1) 3 (2) 3 Set o.k. JM/MH 6.5
1/31	3	1018	Manual (1) 27 (2) 2 Counter (1) 27 (2) 2 check o.k. JM/MH 6.4
2/1	4	1152	Manual (1) 19 (2) 9 Counter (1) 19 (2) 9 check o.k. JM/MH 6.4
2/2	5	0911	Manual (1) 7 (2) 6 Counter (1) 7 (2) 6 check o.k. JM/MH 6.3
2/3	6	0847	Manual (1) 2 (2) 2 SV Counter (1) 2 (2) 2 SV p/u JM/MH 6.3

Sketch



North

J. Mills/M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

SR 005 CD12135	MP 000.67	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC	SOUTHBOUND	LANE 12	OF 2	COUNT IDENTIFIER 06-001																			
								COUNTER NUMBER 051681	* DESCRIPTION: ON SR 5 SB COLLECTOR DISTRIBUTOR FROM FORT LEWIS RD	AM HOURS		PM HOURS		AM PEAK HOUR 0000 TO 0000 VOLUME		PM PEAK HOUR 0430 TO 0530 VOLUME		AM TOTAL	PM TOTAL								
01/30/06	MONDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
00-15															50	48	55	63	146	159	130	42	38	24	37	12	
15-30															62	51	55	63	94	162	87	57	19	27	34	8	
30-45															55	47	55	90	155	146	67	54	17	45	20	11	
45-00															45	48	49	95	172	128	67	45	21	28	20	4	
HOUR															212	194	214	311	567	595	351	198	95	124	111	35	3007
TOT																											

01/31/06	TUESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	
																												AM PEAK HOUR 0000 TO 0000 VOLUME
00-15															49	37	21	43	53	130	188	102	72	43	23	26	19	
15-30															21	34	23	68	46	132	237	83	53	27	21	25	7	
30-45															22	26	31	84	43	157	155	77	66	31	34	36	11	
45-00															26	28	43	79	57	178	118	56	61	42	28	16	16	
HOUR															118	125	118	274	199	698	318	252	143	106	103	53	4302	
TOT																												

02/01/06	WEDNESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	
																												AM PEAK HOUR 1100 TO 1200 VOLUME
00-15															43	28	31	37	66	134	146	123	69	43	30	44	15	
15-30															29	23	36	52	72	122	170	97	75	32	27	27	11	
30-45															26	27	35	87	54	148	153	94	49	29	39	16	11	
45-00															27	33	45	61	39	171	135	78	56	26	23	10		
HOUR															125	111	147	237	211	575	604	392	249	130	119	110	47	4275
TOT																												

AM PEAK HOUR 1100 TO 1200 VOLUME		PM PEAK HOUR 0430 TO 0530 VOLUME		AM TOTAL	PM TOTAL
274	760	274	760	1126	3176
237	640	237	640	1086	3189

SR 005 CD12135 MP 000.67 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC SOUTHBOUND LANE 12 OF 2

COUNT IDENTIFIER 06-001 COUNTER NUMBER 051681 * DESCRIPTION: ON SR 5 SB COLLECTOR DISTRIBUTOR FROM FORT LEWIS RD

DATE	THURSDAY	AM HOURS												PM HOURS												DAILY TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
02/02/06	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15	14	10	7	3	6	17	27	37	29	32	35	88	53	56	73	152	218	101	76	47	45	18	11			
15-30	16	3	3	2	9	20	37	26	31	39	63	55	55	51	72	148	250	90	56	35	38	27	8			
30-45	9	3	8	2	2	10	23	48	31	19	39	73	50	57	110	171	187	105	52	35	39	30	13			
45-00	5	2	6	1	4	19	25	22	14	51	80	49	54	59	98	210	142	63	51	35	48	21	10			
TOT	44	18	21	9	8	44	85	147	116	93	161	251	242	219	233	353	681	797	359	235	152	170	96	42	4576	

AM PEAK HOUR 1100 TO 1200 VOLUME 251
PM PEAK HOUR 0445 TO 0545 VOLUME 865

DATE	FRIDAY	AM HOURS												PM HOURS												DAILY TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
02/03/06	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15	11	5	3	3	7	10	15	26	40																	
15-30	7	4	2	4	10	24	32	33																		
30-45	9	3	3	6	9	25	79	30																		
45-00	3	8	4	1	2	8	24	55																		
TOT	30	17	10	9	19	37	88	192	103																505	

AM PEAK HOUR 0730 TO 0830 VOLUME 207
PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06
TOTAL HOURS FOR COUNT 92

3 DAYS
AVG WEEKDAY VOL 4384 X SEASONAL ADJ. FACTOR 1.0000 = 4384 X AXLE CORR FACTOR 0.8776 = ESTIMATED AVG DAILY TRAFFIC 3847

PEAK HOUR PERCENTAGES: K = 19.73 D = 100.00
PEAK HOUR LOCATION : VOLUME = 865 DATE: 02/02/06 TIME: 04:45 PM

AM TOTAL 505
PM TOTAL 0



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3426 Count ID SP# 06-001

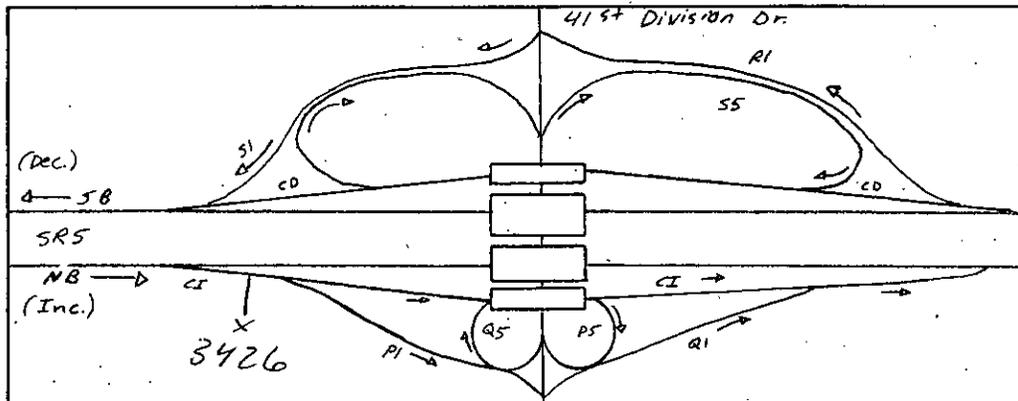
SR 5 RRT/RRQ CI 12046 MP 0.00

Leg 2 Direction NB OSID _____

Station Description - ON SRS NB offramp to Fort Lewis / 41st Division Dr
on SR 5 NB off ramp to Fort Lewis Rd

Date	Day	Time	Comments
1/30/06	2	1108	Manual (1) <u>1</u> (2) _____ Counter (1) <u>1</u> (2) _____ Set o.k. JM/MH 6.6
1/31	3	1145	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ check o.k. JM/MH 6.4
2/1	4	0903	Manual (1) <u>24</u> (2) _____ Counter (1) <u>24</u> (2) _____ check o.k. JM/MH 6.4
2/2	5	0845	Manual (1) <u>12</u> (2) _____ Counter (1) <u>12</u> (2) _____ check o.k. JM/MH 6.4
2/3	6	0824	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ P/U JM/MH 6.4

Sketch



North

J. Mills/M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM M
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR 005 CI12046 MP 000.00 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND LANE ALL OF

COUNT IDENTIFIER 06-001 COUNTER NUMBER 053426 DESCRIPTION: ON SR 5 NB OFF RAMP TO FORT LEWIS RD

DATE	TIME	DAILY TOTAL																
		00-15	15-30	30-45	45-00	TOT	01	02	03	04	05	06	07	08	09	10	11	12
01/30/06	MONDAY	37	42	39	20	23	30	20	15	6	12	23	4	8	9	10	11	12
00-15		31	35	26	25	38	35	29	19	18	11	20	8	6	12	23	4	8
15-30		26	48	43	27	31	39	24	21	22	9	23	7	6	11	20	8	6
30-45		36	63	51	31	33	43	27	17	13	20	13	7	13	20	13	7	13
45-00		93	183	142	122	122	140	110	82	73	46	66	26	46	66	64	26	46
TOT																		

AM PEAK HOUR 0000 TO 0000 VOLUME 0 AM TOTAL 93
 PM PEAK HOUR 1215 TO 0115 VOLUME 188 PM TOTAL 1176

01/31/06 TUESDAY

DATE	TIME	DAILY TOTAL																
		00-15	15-30	30-45	45-00	TOT	01	02	03	04	05	06	07	08	09	10	11	12
01/31/06	TUESDAY	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11	12	11
00-15		11	12	1	2	3	4	5	6	7	8	9	10	11	12	11	12	11
15-30		34	36	41	32	20	27	40	27	17	20	22	16	11	11	11	9	9
30-45		34	35	30	30	30	41	43	28	20	22	16	11	11	11	9	9	9
45-00		55	55	36	27	17	30	35	21	18	18	19	11	8	8	8	8	8
TOT		167	179	135	119	94	145	165	98	75	73	68	48	36	36	36	36	36

AM PEAK HOUR 0515 TO 0615 VOLUME 632 AM TOTAL 2128
 PM PEAK HOUR 1230 TO 0130 VOLUME 185 PM TOTAL 1235

02/01/06 WEDNESDAY

DATE	TIME	DAILY TOTAL																
		00-15	15-30	30-45	45-00	TOT	01	02	03	04	05	06	07	08	09	10	11	12
02/01/06	WEDNESDAY	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11	12	11
00-15		11	12	1	2	3	4	5	6	7	8	9	10	11	12	11	12	11
15-30		31	37	36	21	17	25	39	27	24	13	15	10	11	11	11	11	11
30-45		35	41	34	17	26	37	30	25	21	24	18	19	5	5	5	5	5
45-00		55	55	37	21	36	39	26	17	16	14	20	12	12	12	12	12	12
TOT		167	191	143	75	105	146	123	90	74	75	80	47	35	35	35	35	35

AM PEAK HOUR 0515 TO 0615 VOLUME 571 AM TOTAL 2103
 PM PEAK HOUR 1200 TO 0100 VOLUME 191 PM TOTAL 1184

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR 005 CI12046	MP 000.00	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC NORTHBOUND												LANE ALL	OF																																																						
				DESCRIPTION: ON SR 5 NB OFF RAMP TO FORT LEWIS RD																																																																			
COUNT IDENTIFIER	06-001	COUNTER NUMBER	053426													AM TOTAL	PM TOTAL																																																						
02/02/06 THURSDAY		AM HOURS		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL																																											
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
TOT	20	12	14	23	96	441	493	329	210	160	133	129	197	159	112	119	210	217	101	78	59	78	54	25	3469																																														

02/03/06 FRIDAY	AM HOURS	PM HOURS	AM PEAK HOUR 0600 TO 0700 VOLUME	PM PEAK HOUR 0430 TO 0530 VOLUME	AM TOTAL	PM TOTAL																				
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	2060	1409
TOT	27	9	11	47	113	459	324	280	45	482	0	1315	0													

01/30/06 THRU 02/03/06
 TOTAL HOURS FOR COUNT 92

3 DAYS
 AVG WEEKDAY VOL 3373 X SEASONAL ADJ. FACTOR 1.0100 = 3407 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 2885
 PEAK HOUR PERCENTAGES: K = 18.74 D = 100.00
 PEAK HOUR LOCATION : VOLUME = 632 DATE: 01/31/06 TIME: 05:15 AM



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3502 Count ID SP#06-001

0.45

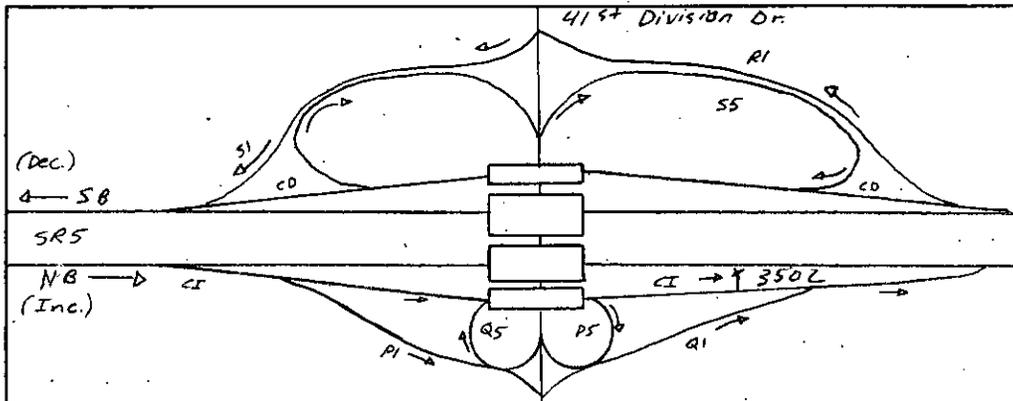
SR 5 RRT/RRQ CS 12046 MP 0.49

Leg 2 Direction NR OSID _____

Station Description - ON SRS NR Onramp from 41st Division Dr. / SRS
on SRS Collector-distributor to SR 5NB

Date	Day	Time	Comments
1/30/06	2	1211	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ <i>Set o.k. JM/MH 6.3</i>
1/31	3	1200	Manual (1) <u>10</u> (2) _____ Counter (1) <u>10</u> (2) _____ <i>check o.k. JM/MH 6.3</i>
2/1	4	0931	Manual (1) <u>9</u> (2) _____ Counter (1) <u>9</u> (2) _____ <i>check o.k. JM/MH 6.3</i>
2/2	5	0917	Manual (1) <u>6</u> (2) _____ Counter (1) <u>6</u> (2) _____ <i>check o.k. JM/MH 6.3</i>
2/3	6	0854	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ <i>P/O JM/MH 6.3</i>

Sketch



North

J. Mills / M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR 005 CI12046 MP 000.45 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND LANE ALL OF

COUNT IDENTIFIER 06-001 COUNTER NUMBER 053502 DESCRIPTION: ON SR 5 COLLECTOR DISTRIBUTOR TO SR 5 NB

DATE	THURSDAY												DAILY TOTAL	
	12	1	2	3	4	5	6	7	8	9	10	11		12
02/02/06	12	1	2	3	4	5	6	7	8	9	10	11	12	11
00-15	9	3	3	1	3	2	30	39	54	35	39	53	78	16
15-30	5	7	1	2	4	7	27	41	41	59	35	48	45	6
30-45	6	4	7	1	17	36	55	44	44	34	76	50	52	8
45-00	8	2	1	3	12	37	41	40	48	45	80	70	74	20
HOUR	28	16	11	4	11	38	130	176	179	186	153	257	243	50
TOT														4071

AM PEAK HOUR 1100 TO 1200 VOLUME 257
 PM PEAK HOUR 0400 TO 0500 VOLUME 542

DATE	FRIDAY												DAILY TOTAL	
	12	1	2	3	4	5	6	7	8	9	10	11		12
02/03/06	12	1	2	3	4	5	6	7	8	9	10	11	12	11
00-15	17	1	1	2	18	18	17	43	76					11
15-30	10	2	3	6	7	13	30	40	82					10
30-45	8	9	2	8	5	14	39	75	101					11
45-00	5	1	3	8	7	15	61	49						12
HOUR	40	13	9	24	37	60	147	207	259					796
TOT														1189

AM PEAK HOUR 0745 TO 0845 VOLUME 308
 PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06
 TOTAL HOURS FOR COUNT 91

3 DAYS FACTOR GROUP R091 FACTOR GROUP R091
 AVG WEEKDAY VOL 3885 X SEASONAL ADJ. FACTOR 1.0100 = 3924 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 3322

PEAK HOUR PERCENTAGES: K = 13.95 D = 100.00
 PEAK HOUR LOCATION : VOLUME = 542 DATE: 02/02/06 TIME: 04:00 PM



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 NBPI NB

Direction Channel 2 NBQ5 U

Data Hog # 3163

Counter No. 5-1545 Count ID SP#06-001

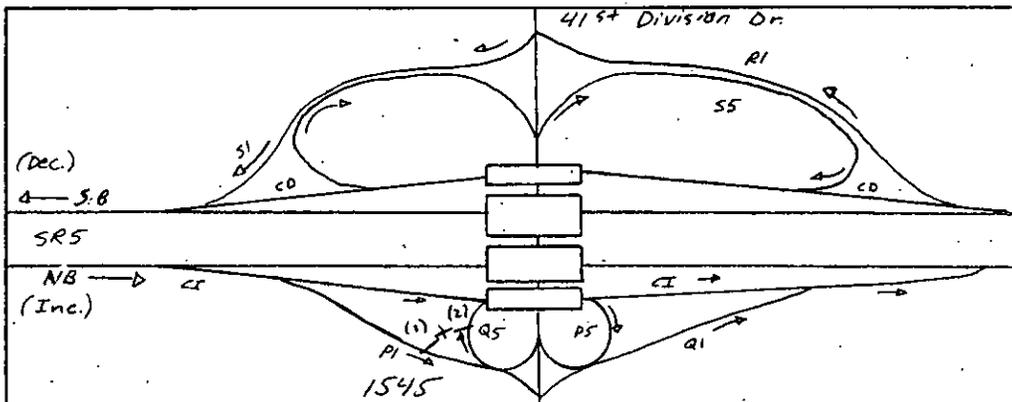
SR 5 RRT/RRQ PI 120066 MP 0.00

Leg 2 Direction see 1-2 OSID

Station Description - ON channel 1 = 005 PI 120066 channel 2 = 005 Q5 12087
On SR 5 NB off Ramp to Fort Lewis Rd

Date	Day	Time	Comments
1/30/06	2	1114	Manual (1) <u>2</u> (2) <u>9</u> Counter (1) <u>2</u> (2) <u>9</u> Set o.k. JM/MH 6.6
1/31	3	1150	Manual (1) <u>5</u> (2) <u>9</u> Counter (1) <u>5</u> (2) <u>9</u> check o.k. JM/MH 6.4
2/1	4	0925	Manual (1) <u>12</u> (2) <u>26</u> Counter (1) <u>12</u> (2) <u>26</u> check o.k. JM/MH 6.4
2/2	5	0849	Manual (1) <u>9</u> (2) <u>3</u> Counter (1) <u>9</u> (2) <u>3</u> check o.k. JM/MH 6.4
2/3	6	0826	Manual (1) <u>2</u> (2) <u>2</u> Counter (1) <u>2</u> (2) <u>2</u> P/U JM/MH 6.4

Sketch



J.M. Iles / M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RN515A-B

SR 005 P112066 MP 000.00 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND LANE ALL OF

COUNT IDENTIFIER 06-001 COUNTER NUMBER 051545 DESCRIPTION: ON SR 5 NB OFF RAMP TO FORT LEWIS RD

DATE	AM HOURS			PM HOURS			DAILY TOTAL			
	4	5	6	7	8	9	10	11	12	
02/02/06 THURSDAY	3	4	5	6	7	8	9	10	11	12
12	2	3	4	5	6	7	8	9	10	11
1	3	4	5	6	7	8	9	10	11	12
00-15	2	2	15	57	64	50	27	40	26	21
15-30	6	1	3	16	87	51	33	32	17	26
30-45	3	3	15	92	92	46	45	27	27	25
45-00	1	4	8	32	73	41	62	24	33	26
TOT	12	8	16	78	323	316	188	167	123	103

AM PEAK HOUR 0515 TO 0615 VOLUME 330
 PM PEAK HOUR 1215 TO 0115 VOLUME 168

02/03/06 FRIDAY

DATE	AM HOURS			PM HOURS			DAILY TOTAL			
	4	5	6	7	8	9	10	11	12	
12	2	3	4	5	6	7	8	9	10	11
1	3	4	5	6	7	8	9	10	11	12
00-15	2	1	4	11	43	60	40	26		
15-30	6	4	2	19	76	49	37			
30-45	4	2	1	8	22	101	61	35		
45-00	5	3	8	37	78	45	37			
TOT	20	8	7	22	89	298	215	149	26	

AM PEAK HOUR 0515 TO 0615 VOLUME 315
 PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06 92
 TOTAL HOURS FOR COUNT

3 DAYS
 AVG WEEKDAY VOL 2367 X SEASONAL ADJ. FACTOR 1.0100 = 2391 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 2024

PEAK HOUR PERCENTAGES: K = 19.22 D = 100.00
 PEAK HOUR LOCATION: VOLUME = 455 DATE: 01/31/06 TIME: 05:15 AM

Note: Count high



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 P5 NB NB

Direction Channel 2 Q1 NB U

Data Hog # 3163

Counter No. 5-3605 Count ID SP#06-001

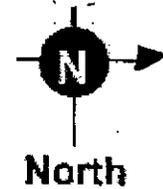
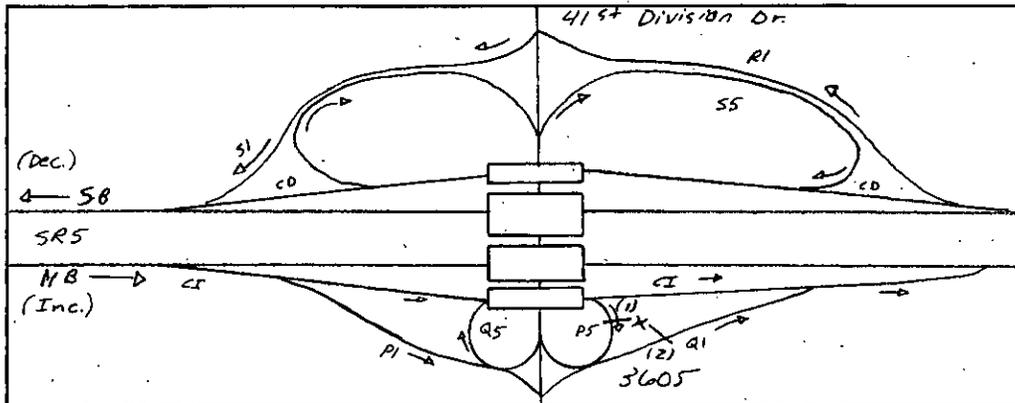
SR 5 RRT/RRQ P5 12090 MP 0.00

Leg 2 Direction see 1-2 OSID

Station Description - ON channel 1=005 P5 12090 / channel 2=005 Q1 12107
ON SR 5 NB off Ramp to Fort Lewis Road

Date	Day	Time	Comments
1/30/06	2	1204	Manual (1) 1 (2) 5 Counter (1) 1 (2) 5 Set o.k. JM/MH 6.8
1/31	3	1155	Manual (1) 1 (2) 33 Counter (1) 1 (2) 33 check o.k. JM/MH 6.6
2/1	4	0912	Manual (1) 1 (2) 16 Counter (1) 1 (2) 16 check o.k. JM/MH 6.6
2/2	5	0854	Manual (1) 3 (2) 17 Counter (1) 3 (2) 17 check o.k. JM/MH 6.6
2/3	6	0831	Manual (1) 2 (2) 2 SV Counter (1) 2 (2) 2 SV p/w JM/MH 6.6

Sketch



J. Mills / M. Heathscott
Field Person



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3398 Count ID SP#06-001

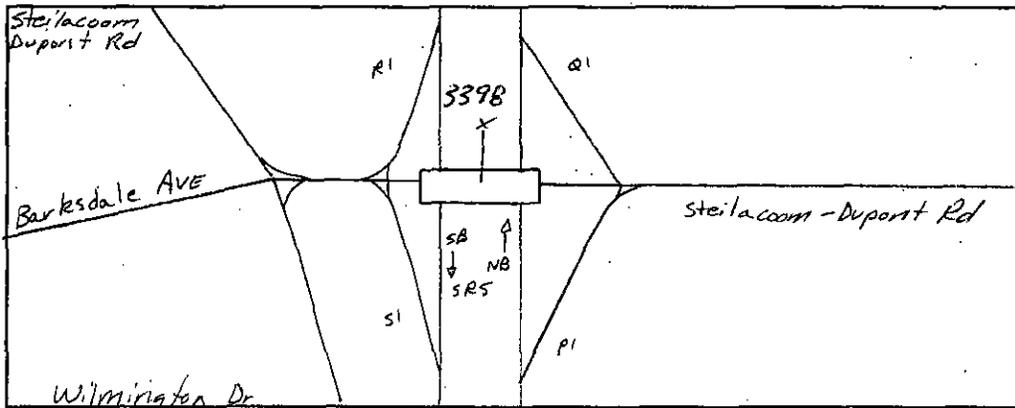
SR 5 RRT/RRQ LX 1901 MP 0.01

Leg 2 Direction WB OSID _____

Station Description - ON Steilacoom-Duport Rd E/o SR 5 SB Ramps
On Duport Rd E/o SR 5 SB Ramps

Date	Day	Time	Comments
1/30/06	2	1040	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ Set o.k. JM/IMH 6.7
1/31	3	1046	Manual (1) <u>22</u> (2) _____ Counter (1) <u>22</u> (2) _____ check o.k. JM/IMH 6.4
2/1	4	0848	Manual (1) <u>19</u> (2) _____ Counter (1) <u>19</u> (2) _____ check o.k. JM/IMH 6.5
2/2	5	0832	Manual (1) <u>20</u> (2) _____ Counter (1) <u>20</u> (2) _____ check o.k. JM/IMH 6.5
2/3	6	0817	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ P/U JM/IMH 6.5

Sketch



J. Mills / M. Heathscott
Field Person



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3547 Count ID SI#06-001

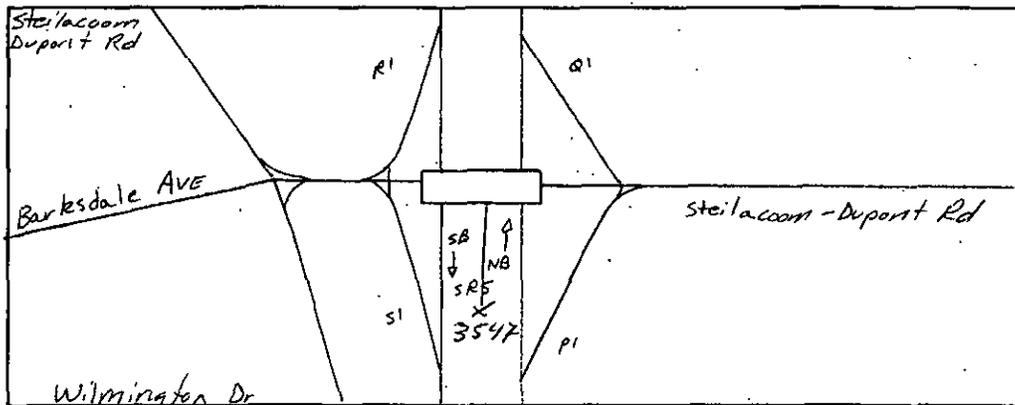
SR 5 RRT/RRQ LX 11901 MP 0.01

Leg 2 Direction EB OSID _____

Station Description - ON Steilacoom - Dupont Rd E/o SRS SB Ramps
ON Dupont Rd E/o SRS SB Ramps

Date	Day	Time	Comments
1/30/06	2	1041	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ Set o.k. JMM/IMH 6.7
1/31	3	1047	Manual (1) <u>36</u> (2) _____ Counter (1) <u>36</u> (2) _____ check o.k. JMM/IMH 6.4
2/1	4	0847	Manual (1) <u>38</u> (2) _____ Counter (1) <u>38</u> (2) _____ check o.k. JMM/IMH 6.4
2/2	5	0831	Manual (1) <u>39</u> (2) _____ Counter (1) <u>40</u> (2) _____ AC=1 check o.k. JMM/IMH 6.4
2/3	6	0815	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ P/U JMM/IMH 6.4

Sketch



J. Mills / M. Heathscott
Field Person

SR 005 LX11901 MP 000.01 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC WESTBOUND LANE ALL OF
 COUNT IDENTIFIER 06-001 COUNTER NUMBER 053398 DESCRIPTION: ON DUPONT RD E/O SR 5 SB RAMPS

DATE	TIME	DAILY TOTAL												
		1	2	3	4	5	6	7	8	9	10	11	12	
01/30/06	MONDAY	12	1	2	3	4	5	6	7	8	9	10	11	12
00-15														
15-30														
30-45														
45-00														
HOUR														
TOT														

DATE	TIME	DAILY TOTAL												
		1	2	3	4	5	6	7	8	9	10	11	12	
01/31/06	TUESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12
00-15														
15-30														
30-45														
45-00														
HOUR														
TOT														

DATE	TIME	DAILY TOTAL												
		1	2	3	4	5	6	7	8	9	10	11	12	
02/01/06	WEDNESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12
00-15														
15-30														
30-45														
45-00														
HOUR														
TOT														

AM PEAK HOUR 1100 TO 1200 VOLUME 452 AM TOTAL 542
 PM PEAK HOUR 0415 TO 0515 VOLUME 866 PM TOTAL 4114

AM PEAK HOUR 0700 TO 0800 VOLUME 600 AM TOTAL 2776
 PM PEAK HOUR 0445 TO 0545 VOLUME 891 PM TOTAL 4702

AM PEAK HOUR 0700 TO 0800 VOLUME 697 AM TOTAL 3011
 PM PEAK HOUR 0445 TO 0545 VOLUME 958 PM TOTAL 4936

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	COUNTER NUMBER	DIRECTION OF TRAFFIC												LANE ALL	OF										
					LEG 2						WESTBOUND																	
					DESCRIPTION: ON DUPONT RD E/O SR 5 SB RAMPS																							
					AM HOURS		PM HOURS		AM HOURS		PM HOURS		AM HOURS		PM HOURS													
					4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY	TOTAL	
02/02/06	THURSDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY	TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11	12			
00-15		2	1	1	6	36	52	127	136	84	68	114	157	130	117	132	202	246	175	91	47	47	32	10	11			
15-30		4	2	2	14	42	92	162	106	71	77	116	123	142	140	155	230	265	154	75	50	33	23	8	10			
30-45		5	9	2	9	37	120	199	78	81	85	156	93	119	131	176	240	280	137	53	49	19	10	10	3			
45-00		4	11	13	8	25	49	136	158	80	68	101	160	104	105	148	176	238	84	64	28	18	12					
HOUR																												
TOT		15	23	18	16	54	164	400	646	400	304	331	546	477	496	536	639	910	1012	550	283	174	102	55	22	8173		

AM PEAK HOUR 0715 TO 0815 VOLUME 655
 PM PEAK HOUR 0445 TO 0545 VOLUME 1029

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	COUNTER NUMBER	DIRECTION OF TRAFFIC												LANE ALL	OF										
					LEG 2						WESTBOUND																	
					DESCRIPTION: ON DUPONT RD E/O SR 5 SB RAMPS																							
					AM HOURS		PM HOURS		AM HOURS		PM HOURS		AM HOURS		PM HOURS													
					4	5	6	7	8	9	10	11	12 <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> <th>12</th> <th>DAILY</th> <th>TOTAL</th>	1	2	3	4	5	6	7	8	9	10	11	12	DAILY	TOTAL	
02/03/06	FRIDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY	TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11	12			
00-15		1	1	7	11	9	27	85	113	122																		
15-30		5	5	4	2	16	53	71	160																			
30-45		6	5	2	3	14	54	105	153																			
45-00		4	6	9	4	16	34	105	135																			
HOUR																												
TOT		16	17	22	20	55	168	366	561	122																		

AM PEAK HOUR 0715 TO 0815 VOLUME 570
 PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/02/06 THRU 02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

02/03/06		TOTAL HOURS FOR COUNT		92	
3	DAYS	7866	X	SEASONAL	ADJ.
7945	X	AXLE	CORR	FACTOR	0.8467
=	ESTIMATED	AVG.	DAILY	TRAFFIC	6727

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR	COUNT	IDENTIFIER	MP	SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC												LANE ALL	OF							
						EASTBOUND						SB RAMPS														
005	LX11901	06-001	000.01	053547	ON DUPONT RD E/O SR 5																					
						DESCRIPTION: ON DUPONT RD E/O SR 5 SB RAMPS																				
						PM HOURS																				
02/02/06	THURSDAY	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
00-15		6	4	5	6	7	8	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
15-30		7	1	5	4	41	101	135	100	86	64	97	127	120	77	96	82	114	63	28	35	17	11	7	8	
30-45		5	2	1	8	98	119	114	110	85	57	97	129	82	81	129	123	179	39	31	40	16	10	7		
45-00		1	2	2	28	126	149	132	143	75	74	91	149	66	80	99	92	60	41	19	36	14	6	2		
HOUR		19	12	15	20	49	287	456	509	429	372	282	357	513	388	320	405	395	362	216	108	136	66	34	24	5774
TOT																										
						AM PEAK HOUR 0630 TO 0730 VOLUME 531												AM TOTAL 2807								
						PM PEAK HOUR 1215 TO 0115 VOLUME 525												PM TOTAL 2967								

SR	COUNT	IDENTIFIER	MP	SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC												LANE ALL	OF							
						EASTBOUND						SB RAMPS														
005	LX11901	06-001	000.01	053547	ON DUPONT RD E/O SR 5																					
						DESCRIPTION: ON DUPONT RD E/O SR 5 SB RAMPS																				
						PM HOURS																				
02/03/06	FRIDAY	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
00-15		1	2	8	9	3	36	96	97	67																
15-30		11	1	1	3	10	41	71	126																	
30-45		2	5	1	9	14	73	78	145																	
45-00		3	1	5	20	93	98	112																		
HOUR		17	9	10	26	47	243	343	480	67																1242
TOT																										
						AM PEAK HOUR 0700 TO 0800 VOLUME 480												AM TOTAL 1242								
						PM PEAK HOUR 0000 TO 0000 VOLUME 0												PM TOTAL 0								

01/30/06 THRU 02/03/06 92
 TOTAL HOURS FOR COUNT

3 DAYS
 AVG WEEKDAY VOL 5778 X SEASONAL ADJ. FACTOR 1.0100 = 5836 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 4941

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
15 MINUTE TRAFFIC COUNT SUMMARY

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC												LANE	ALL	OF											
					ON DUPONT RD E/O SR 5 SB RAMPS						BOTH WAYS																			
					DESCRIPTION: ON DUPONT RD E/O SR 5 SB RAMPS																									
					COUNTER NUMBER 053547																									
					AM HOURS			PM HOURS			PM HOURS			PM HOURS																
					1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY	TOTAL
02/02/06	THURSDAY				1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15		8	5	7	15	18	83	139	255	212	210	210	210	155	186	265	250	199	213	300	355	248	121	72	51	17	19	19		
15-30		11	3	7	18	83	193	297	206	206	157	141	213	250	262	217	251	217	251	312	379	217	103	85	50	34	15	15		
30-45		10	14	4	17	135	239	313	188	166	142	253	222	201	212	305	363	359	176	84	89	84	89	35	20	10	10	10		
45-00		5	13	15	53	175	285	290	223	143	175	251	253	171	228	275	330	281	125	83	64	32	64	18	2	2	2	2		
TOT		34	35	33	36	103	451	856	1155	829	676	613	903	990	884	856	1044	1305	1374	766	391	310	168	89	46	13947	13947			

AM PEAK HOUR 0700 TO 0800 VOLUME 1155
PM PEAK HOUR 0430 TO 0530 VOLUME 1427

02/03/06	FRIDAY	DIRECTION OF TRAFFIC												LANE	ALL	OF											
		ON DUPONT RD E/O SR 5 SB RAMPS						BOTH WAYS																			
		DESCRIPTION: ON DUPONT RD E/O SR 5 SB RAMPS																									
		COUNTER NUMBER 053547																									
		AM HOURS			PM HOURS			PM HOURS			PM HOURS																
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY	TOTAL
00-15		2	3	15	20	12	63	181	210	189																	
15-30		16	6	5	5	26	94	142	286																		
30-45		8	10	3	12	28	127	183	298																		
45-00		7	7	9	9	36	127	203	247																		
TOT		33	26	32	46	102	411	709	1041	189																2589	2589

AM PEAK HOUR 0700 TO 0800 VOLUME 1041
PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06 92
TOTAL HOURS FOR COUNT

3 DAYS
AVG WEEKDAY VOL 13644 X SEASONAL ADJ. FACTOR 1.0100 = 13780 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 11668

PEAK HOUR PERCENTAGES: K = 10.46 D = 69.31
PEAK HOUR LOCATION : VOLUME = 1427 DATE: 02/02/06 TIME: 04:30 PM



Interval 60 min. 15 min.

Count(volume) Speed
 Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____
Direction Channel 2 _____
Data Hog # 3163

Counter No. 5-2871 Count ID SP#06-001

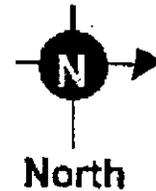
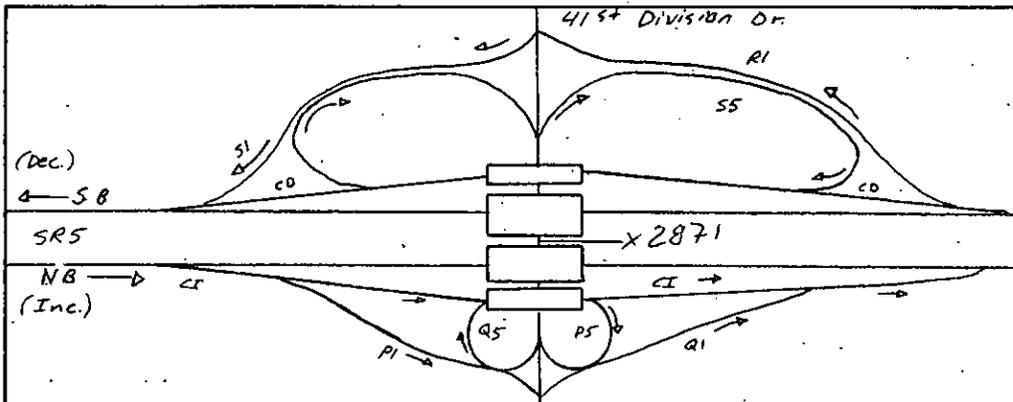
SR 5 RRT/RRQ LX12087 MP 0.08

Leg 2 Direction WB OSID _____

Station Description - ON 41st Division Dr / Fort Lewis Rd w/o SR 5 NB Ramps
ON Fort Lewis Rd E/O SR 5 SB Ramps

Date	Day	Time	Comments
1/30/06	2	1127	Manual (1) <u>5</u> (2) _____ Counter (1) <u>5</u> (2) _____ Set o.k. JMM/MH 6.6
1/31	3	1031	Manual (1) <u>23</u> (2) _____ Counter (1) <u>23</u> (2) _____ check o.k. JMM/MH 6.4
2/1	4	0918	Manual (1) <u>41</u> (2) _____ Counter (1) <u>41</u> (2) _____ check o.k. JMM/MH 6.3
2/2	5	0900	Manual (1) <u>30</u> (2) _____ Counter (1) <u>30</u> (2) _____ check o.k. JMM/MH 6.4
2/3	6	0839	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ P/U JMM/MH 6.3

Sketch



J. Mills / M. Heathscott
Field Person



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3526 Count ID SP#06-001

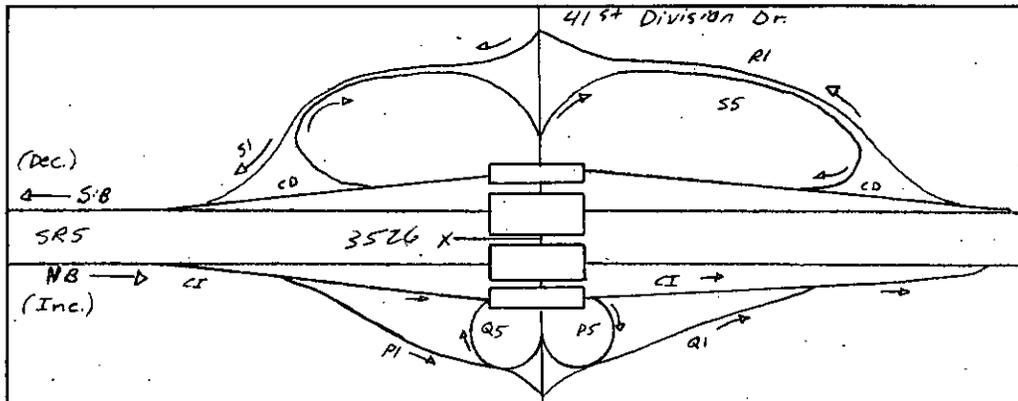
SR 5 RRT/RRQ LX 12087 MP 0.08

Leg 2 Direction EB OSID _____

Station Description - ON 41st Division Dr / Fort Lewis Rd w/o SR 5 NB Ramps
On Fort Lewis Rd E/O SR 5 SB Ramps

Date	Day	Time	Comments
1/30/06	2	1122	Manual (1) <u>5</u> (2) _____ Counter (1) <u>5</u> (2) _____ Set o.k. JM/MH 6.3
1/31	3	1030	Manual (1) <u>50</u> (2) _____ Counter (1) <u>50</u> (2) _____ check o.k. JM/MH 6.2
2/1	4	0919	Manual (1) <u>50</u> (2) _____ Counter (1) <u>50</u> (2) _____ check o.k. JM/MH 6.2
2/2	5	0900	Manual (1) <u>50</u> (2) _____ Counter (1) <u>50</u> (2) _____ check o.k. JM/MH 6.2
2/3	6	0838	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ P/O JM/MH 6.2

Sketch



North

J. Mills/M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR 005 LX12087	MP 000.08	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC		WESTBOUND		LANE ALL OF					
				COUNT IDENTIFIER	COUNTER NUMBER	052871	DESCRIPTION: ON FORT LEWIS RD E/O SR 5 SB RAMPS	AM HOURS	PM HOURS	AM TOTAL	PM TOTAL		
01/30/06	MONDAY	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15													
15-30													
30-45													
45-00													
HOUR													
TOT													5354
													341
													591
													786
													802
													448
													300
													163
													133
													58
													341
													5013

01/31/06	TUESDAY	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15																									
15-30																									
30-45																									
45-00																									
HOUR																									
TOT																									8648
																									341
																									5013

02/01/06	WEDNESDAY	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15																									
15-30																									
30-45																									
45-00																									
HOUR																									
TOT																									8577
																									341
																									5013

AM PEAK HOUR 0000 TO 0000 VOLUME	PM PEAK HOUR 0430 TO 0530 VOLUME	AM PEAK HOUR 0700 TO 0800 VOLUME	PM PEAK HOUR 0445 TO 0545 VOLUME	AM TOTAL	PM TOTAL

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

LANE ALL OF

SR 005 LX12087 MP 000.08 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC WESTBOUND

COUNT IDENTIFIER 06-001 COUNTER NUMBER 052871 DESCRIPTION: ON FORT LEWIS RD E/O SR 5 SB RAMPS

DATE	TIME	DAILY TOTAL																						
		1	2	3	4	5	6	7	8	9	10	11	12											
02/02/06	THURSDAY	1	2	3	4	5	6	7	8	9	10	11	12											
00-15		11	6	3	5	42	109	127	82	104	94	143	121	142	221	273	147	90	52	62	39	17		
15-30		16	7	3	8	60	100	123	73	81	71	129	123	135	150	224	300	128	81	58	48	29	11	
30-45		14	4	12	7	8	106	122	81	92	80	136	132	154	189	283	225	129	80	67	69	37	20	
45-00		7	2	8	9	26	105	125	111	76	71	113	177	149	153	281	174	111	73	58	56	29	18	
HOUR																								
TOT		57	24	29	23	47	313	454	483	312	348	358	546	554	524	634	1009	972	515	324	235	134	66	8742

AM PEAK HOUR 1100 TO 1200 VOLUME 546
PM PEAK HOUR 0430 TO 0530 VOLUME 1137

DATE	TIME	DAILY TOTAL																						
		1	2	3	4	5	6	7	8	9	10	11	12											
02/03/06	FRIDAY	1	2	3	4	5	6	7	8	9	10	11	12											
00-15		21	7	7	6	59	90	98	110															
15-30		12	10	2	10	13	83	54	100	77														
30-45		10	3	4	18	22	122	80	143															
45-00		8	7	18	18	118	93	151																
HOUR																								
TOT		51	28	20	52	59	382	317	492	187														1588

AM PEAK HOUR 1100 TO 1200 VOLUME 546
PM PEAK HOUR 0430 TO 0530 VOLUME 1137

AM TOTAL 2994
PM TOTAL 5748

01/30/06 THRU 02/03/06 92
TOTAL HOURS FOR COUNT

3 DAYS FACTOR GROUP R092 FACTOR GROUP R092
AVG WEEKDAY VOL 8656 X SEASONAL ADJ. FACTOR 1.0000 = 8656 X AXLE CORR FACTOR 0.8776 = ESTIMATED AVG DAILY TRAFFIC 7597

AM PEAK HOUR 0715 TO 0815 VOLUME 504
PM PEAK HOUR 0000 TO 0000 VOLUME 0

AM TOTAL 1588
PM TOTAL 0

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
15 MINUTE TRAFFIC COUNT SUMMARY

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC												LANE ALL OF									
					EASTBOUND						SB RAMPS															
005	LX12087	06-001	053526	06-001	ON FORT LEWIS RD E/O SR 5 SB RAMPS																					
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL	
01/30/06	MONDAY																									
00-15													299	264	204	250	305	295	212	156	89	68	63	38		
15-30													262	258	219	207	261	307	170	135	102	80	58	42		
30-45													302	300	247	236	263	239	186	133	84	69	40	35		
45-00													321	291	227	203	260	244	165	94	90	72	40	17		
HOUR																										
TOT													623	1152	996	862	980	1066	1073	733	518	365	289	201	132	8990

AM PEAK HOUR 0000 TO 0000 VOLUME 0
PM PEAK HOUR 1200 TO 0100 VOLUME 1152

AM TOTAL 623
PM TOTAL 8567

01/31/06	TUESDAY	AM HOURS												PM HOURS												DAILY TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15																										
15-30																										
30-45																										
45-00																										
HOUR																										
TOT																										

AM PEAK HOUR 0515 TO 0615 VOLUME 1260
PM PEAK HOUR 0430 TO 0530 VOLUME 1209

AM TOTAL 7275
PM TOTAL 8439

02/01/06	WEDNESDAY	AM HOURS												PM HOURS												DAILY TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15																										
15-30																										
30-45																										
45-00																										
HOUR																										
TOT																										

AM PEAK HOUR 0515 TO 0615 VOLUME 1307
PM PEAK HOUR 0430 TO 0530 VOLUME 1219

AM TOTAL 7677
PM TOTAL 9331

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
15 MINUTE TRAFFIC COUNT SUMMARY

SR	MP	MP	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC												LANE ALL	OF									
COUNT IDENTIFIER	06-001	COUNTER NUMBER	053526	DESCRIPTION: ON FORT LEWIS RD E/O SR 5 SB RAMPS																							
02/02/06 THURSDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL	
00-15	37	12	11	15	98	237	227	209	199	186	261	301	258	237	244	305	266	266	182	142	100	67	37				
15-30	29	23	11	6	17	240	249	279	222	225	179	259	260	285	243	273	288	326	223	169	104	98	72	46			
30-45	31	14	16	8	40	338	297	231	260	203	205	267	376	265	240	226	300	249	199	158	106	124	63	41			
45-00	17	14	11	19	86	321	261	233	263	185	207	319	358	254	253	245	280	295	190	145	105	98	39	55			
HOUR																											
TOT	114	63	50	44	158	997	1044	970	954	812	777	1106	1295	1042	973	988	1173	1136	878	654	457	420	241	179	16325		

AM PEAK HOUR 0530 TO 0630 VOLUME 1145
PM PEAK HOUR 1200 TO 0100 VOLUME 1295

02/03/06 FRIDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL	
00-15	49	18	15	8	35	62	172	212	289																		
15-30	28	9	20	18	44	97	173	265	266																		
30-45	19	28	17	19	38	175	223	274																			
45-00	24	16	22	24	60	202	255	267																			
HOUR																											
TOT	120	71	74	69	177	536	823	1018	555																	3443	

AM PEAK HOUR 0730 TO 0830 VOLUME 1096
PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06	TOTAL HOURS FOR COUNT	92
3 DAYS		
AM WEEKDAY VOL	16416 X SEASONAL ADJ. FACTOR 1.0000 =	16416
AXLE CORR FACTOR 0.8776 =	ESTIMATED AVG DAILY TRAFFIC	14407
AM TOTAL		3443
PM TOTAL		0

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC												LANE ALL OF									
					E/O SR 5 SB RAMPS						BOTH WAYS															
01/30/06 MONDAY		DESCRIPTION: ON FORT LEWIS RD E/O SR 5 SB RAMPS												DAILY TOTAL												
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15													428	397	324	387	481	523	355	229	139	105	113	62		
15-30													394	375	341	338	422	525	300	221	143	112	90	53		
30-45													488	373	366	413	496	428	268	211	120	126	66	53		
45-00													476	328	306	453	399	258	157		126	114	65	22		
HOUR													964	1764	1473	1337	1571	1852	1181	818	528	457	334	190	14344	
TOT																										

01/31/06 TUESDAY		DIRECTION OF TRAFFIC												LANE ALL OF												
		E/O SR 5 SB RAMPS						BOTH WAYS																		
AM PEAK HOUR 0000 TO 0000 VOLUME 0		DESCRIPTION: ON FORT LEWIS RD E/O SR 5 SB RAMPS												DAILY TOTAL												
PM PEAK HOUR 0430 TO 0530 VOLUME 1997																										
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15													402	375	324	329	463	536	366	299	159	143	100	61		
15-30													345	355	350	343	495	552	316	226	146	101	81	37		
30-45													472	510	272	415	517	490	269	221	149	119	74	45		
45-00													465	500	313	416	573	414	251	168	164	96	59	55		
HOUR																										
TOT																										

02/01/06 WEDNESDAY		DIRECTION OF TRAFFIC												LANE ALL OF												
		E/O SR 5 SB RAMPS						BOTH WAYS																		
AM PEAK HOUR 1100 TO 1200 VOLUME 1726		DESCRIPTION: ON FORT LEWIS RD E/O SR 5 SB RAMPS												DAILY TOTAL												
PM PEAK HOUR 0430 TO 0530 VOLUME 2178																										
12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15													364	381	352	379	453	515	461	263	176	158	120	59		
15-30													364	364	364	405	475	518	352	253	183	139	93	53		
30-45													492	459	341	530	527	348	207	175	125	80	53			
45-00													433	518	409	423	511	457	288	258	179	111	65	51		
HOUR																										
TOT																										

AM TOTAL		PM TOTAL	
10589	13773	964	13380
1776	2074	1764	1473
1661	1661	1571	1852
1181	1181	1181	818
981	981	457	334
713	713	528	457
533	533	334	190
216	216	334	190
25585	25585	14344	14344



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3416 Count ID SP#06-001

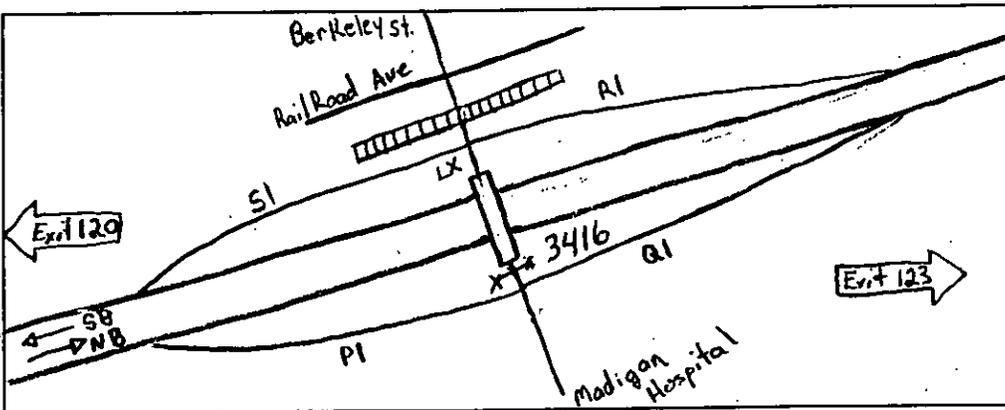
SR 5 ART/RRQ LX-12268 MP 0.00

Leg 2 Direction W1B OSID _____

Station Description - ON Berkeley St West of SR-5 NB ramps.
On Berkeley St E/O SR 5 SB Ramps

Date	Day	Time	Comments
1/30/06	2	1229	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Set OK MH/IM 6.7
31/06	3	0948	Manual (1) <u>15</u> (2) _____ Counter (1) <u>15</u> (2) _____ Check OK MH/IM 6.5
2/1/06	4	0946	Manual (1) <u>18</u> (2) _____ Counter (1) <u>18</u> (2) _____ Check OK MH/IM 6.5
2/06	5	0927	Manual (1) <u>15</u> (2) _____ Counter (1) <u>15</u> (2) _____ Check OK MH/IM 6.5
3/06	6	0904	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Check OK Plu MH/IM 6.5

Sketch



Heathcott M. / Mills J.
Field Person



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-1684 Count ID SP#06-001

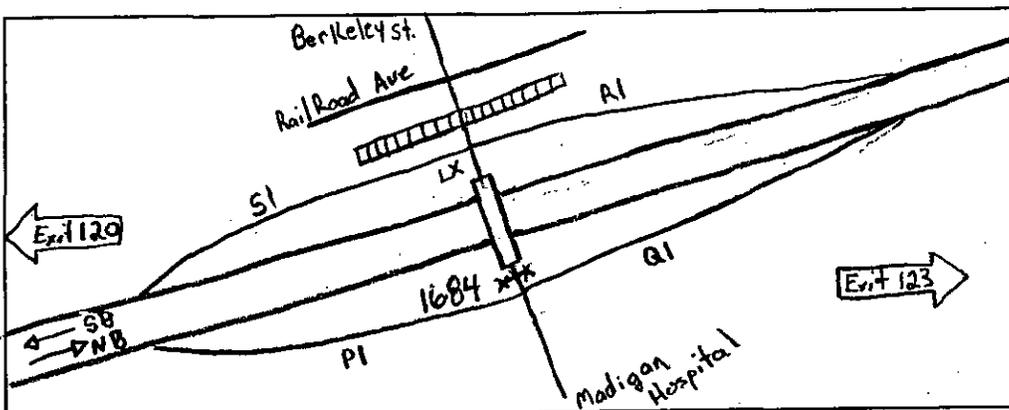
SR 5 RRT/RRQ LX-122-68 MP 0.00

Leg 2 Direction E1B OSID _____

Station Description - ON Berkeley st West of I5R-5 NB ramps
On Berkeley St E/O SR 5 SB Ramps

Date	Day	Time	Comments
1/30/06	2	1230	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Set OK MH/IM 6.4
31/06	3	0949	Manual (1) <u>45</u> (2) _____ Counter (1) <u>45</u> (2) _____ check OK MH/IM 6.3
2/1/06	4	0945	Manual (1) <u>32</u> (2) _____ Counter (1) <u>32</u> (2) _____ check OK MH/IM 6.3
2/06	5	0927	Manual (1) <u>26</u> (2) _____ Counter (1) <u>26</u> (2) _____ check OK MH/IM 6.3
3/06	6	0904	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ check OK P/u MH/IM 6.3

Sketch



Heathscott M. / Mills J.
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC		LANE ALL OF	
					WESTBOUND	EASTBOUND	WESTBOUND	EASTBOUND
SR 005	LX12268	MP 000.00		LEG 2	DIRECTION OF TRAFFIC		LANE ALL OF	
	COUNT IDENTIFIER	06-001	COUNTER NUMBER	053416	DESCRIPTION: ON BERKELEY ST E/O SR 5 SB RAMPS			
02/02/06 THURSDAY								
12	1	2	3	4	5	6	7	8
12	2	3	4	5	6	7	8	9
13	10	4	3	1	5	27	39	90
15-30	8	4	2	5	17	29	74	55
30-45	5	7	2	1	6	24	45	91
45-00	7	4	2	4	9	36	54	72
TOT	33	25	10	13	82	155	276	264

AM HOURS	PM HOURS		AM TOTAL	PM TOTAL
	11	12		
11	12	1	2	3
12	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9
6	7	8	9	10
7	8	9	10	11
8	9	10	11	12
9	10	11	12	TOTAL
10	11	12	TOTAL	6507

AM HOURS	PM HOURS		AM TOTAL	PM TOTAL
	11	12		
11	12	1	2	3
12	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9
6	7	8	9	10
7	8	9	10	11
8	9	10	11	12
9	10	11	12	TOTAL
10	11	12	TOTAL	905

AM HOURS	PM HOURS		AM TOTAL	PM TOTAL
	11	12		
11	12	1	2	3
12	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9
6	7	8	9	10
7	8	9	10	11
8	9	10	11	12
9	10	11	12	TOTAL
10	11	12	TOTAL	2139

01/30/06 THRU 02/03/06
 TOTAL HOURS FOR COUNT 92
 3 DAYS
 AVG WEEKDAY VOL 6457 X SEASONAL ADJ. FACTOR 1.0000 = 6457 X AXLE CORR FACTOR 0.8776 = ESTIMATED AVG DAILY TRAFFIC 5667
 FACTOR GROUP R092
 FACTOR GROUP R092



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3527 Count ID SI#06-001

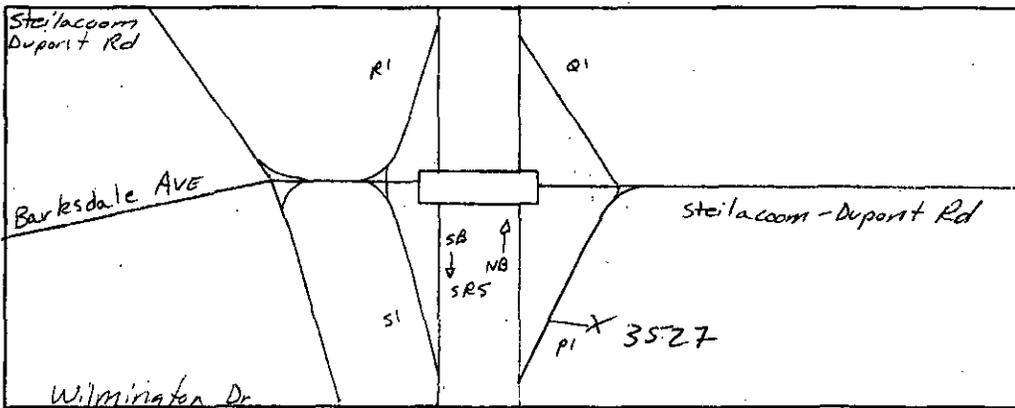
SR 5 RRT/RRQ PI 11867 MP 0.00

Leg 2 Direction NB OSID _____

Station Description - ON SR5 NB Offramp to Steilacoom-Duport Rd
On SR5 NB off ramp to Dupont Rd

Date	Day	Time	Comments
1/30/06	2	1034	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ Set o.k. JM/MH 6.7
1/31	3	1134	Manual (1) <u>20</u> (2) _____ Counter (1) <u>20</u> (2) _____ check o.k. JM/MH 6.6
2/1	4	0842	Manual (1) <u>50</u> (2) _____ Counter (1) <u>50</u> (2) _____ check o.k. JM/MH 6.6
2/2	5	0825	Manual (1) <u>38</u> (2) _____ Counter (1) <u>38</u> (2) _____ check o.k. JM/MH 6.6
2/3	6	0809	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ P/U JM/MH 6.6

Sketch



J. Mills / M. Heathscott
Field Person

DOT-RN8515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
TRIP SYSTEM
15 MINUTE TRAFFIC COUNT SUMMARY

DATE 03/21/06
TIME 09:14:48
PAGE 22

SR 005 P111867 MP 000.00 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND LANE ALL OF

COUNT IDENTIFIER 06-001 COUNTER NUMBER 053527 DESCRIPTION: ON SR 5 NB OFF RAMP TO DUPONT RD

THURSDAY	AM HOURS			PM HOURS			DAILY TOTAL
	3	4	5	3	4	5	
12	2	3	4	1	2	3	11
1	3	4	5	1	2	3	12
3	1	2	7	81	83	101	265
3	2	6	12	55	53	60	170
5	2	13	163	98	61	74	344
4	10	11	29	65	73	121	279
TOT	15	23	61	494	865	862	2655

AM PEAK HOUR 0630 TO 0730 VOLUME 948
PM PEAK HOUR 0445 TO 0545 VOLUME 456

FRIDAY	AM HOURS			PM HOURS			DAILY TOTAL
	3	4	5	3	4	5	
12	2	3	4	1	2	3	11
1	3	4	5	1	2	3	12
1	2	5	6	32	160	169	361
7	5	4	2	15	72	124	211
4	4	3	3	14	164	177	355
2	6	8	6	18	166	163	347
TOT	14	17	20	56	434	624	1964

AM PEAK HOUR 0700 TO 0800 VOLUME 782
PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06 92
TOTAL HOURS FOR COUNT

3 DAYS
AVG WEEKDAY VOL 6507 X SEASONAL ADJ. FACTOR 1.0100 = 6572 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 5565

PEAK HOUR PERCENTAGES: K = 14.57 D = 100.00
PEAK HOUR LOCATION: VOLUME = 948 DATE: 02/02/06 TIME: 06:30 AM

AM TOTAL 3872
PM TOTAL 2653

AM TOTAL 1964
PM TOTAL 0



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3606 Count ID SP#06-001

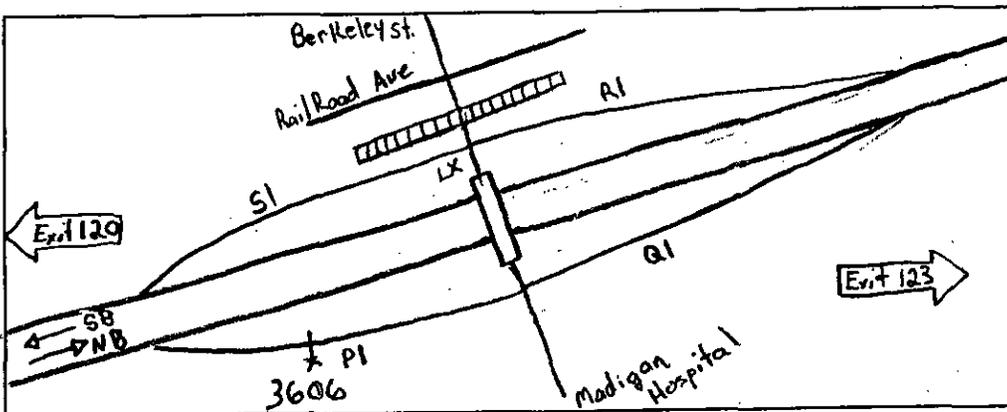
SR 5 RRT/RRQ PI-12240 MP 0.00

Leg 2 Direction N/B OSID _____

Station Description ON SR-5 NB offramp to Berkeleyst

Date	Day	Time	Comments
1/30/06	2	1218	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Set OK MH/IM 6.6
31/06	3	1205	Manual (1) <u>17</u> (2) _____ Counter (1) <u>17</u> (2) _____ check OK MH/IM 6.4
2/1/06	4	0938	Manual (1) <u>15</u> (2) _____ Counter (1) <u>15</u> (2) _____ check OK MH/IM 6.4
2/06	5	0922	Manual (1) <u>13</u> (2) _____ Counter (1) <u>13</u> (2) _____ check OK MH/IM 6.4
3/06	6	0859	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ check OK P/u MH/IM 6.4

Sketch



Heathcott M. / Mills J.
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 T R I P S S Y S T E M
 15 MINUTE TRAFFIC COUNT SUMMARY

LEG 2 DIRECTION OF TRAFFIC NORTHBOUND

SR 005 P112240 MP 000.00 OFF SYSTEM ID. LANE ALL OF
 COUNT IDENTIFIER 06-001 COUNTER NUMBER 053606 DESCRIPTION: ON SR 5 NB OFF RAMP TO BERKELEY ST

DATE	AM HOURS		PM HOURS		AM HOURS		PM HOURS		AM TOTAL		PM TOTAL		DAILY TOTAL											
	1	2	3	4	5	6	7	8	9	10	11	12												
01/30/06 MONDAY	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15													66	79	68	45	44	48	34	22	25	18	6	
15-30												78	87	47	54	58	42	35	16	17	22	18	13	
30-45												103	67	57	54	63	49	33	17	11	12	10		
45-00												81	79	52	62	58	43	26	15	14	6	3		
HOUR												184	290	287	234	215	223	182	128	70	72	54	32	1971
TOT																								

AM PEAK HOUR 0000 TO 0000 VOLUME 0
 PM PEAK HOUR 1230 TO 0130 VOLUME 328

DATE	AM HOURS		PM HOURS		AM HOURS		PM HOURS		AM TOTAL		PM TOTAL		DAILY TOTAL											
	1	2	3	4	5	6	7	8	9	10	11	12												
01/31/06 TUESDAY	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15													92	62	47	38	46	54	37	33	23	11	8	
15-30												84	44	49	64	39	52	27	16	21	14	10		
30-45												87	56	43	46	43	27	20	15	12	4			
45-00												79	55	53	52	65	47	29	24	12	15	6		
HOUR												342	306	217	192	200	193	198	120	93	71	52	28	4787
TOT																								

AM PEAK HOUR 0645 TO 0745 VOLUME 587
 PM PEAK HOUR 1215 TO 0115 VOLUME 344

DATE	AM HOURS		PM HOURS		AM HOURS		PM HOURS		AM TOTAL		PM TOTAL		DAILY TOTAL											
	1	2	3	4	5	6	7	8	9	10	11	12												
02/01/06 WEDNESDAY	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15													86	83	62	58	49	64	59	44	31	23	15	
15-30												84	70	80	60	52	80	55	38	28	19	13	7	
30-45												94	64	68	76	52	62	73	26	22	23	8	6	
45-00												87	70	57	57	69	66	67	25	21	13	20	8	
HOUR												351	285	280	251	222	272	254	133	102	78	53	36	5207
TOT																								

AM PEAK HOUR 0700 TO 0800 VOLUME 643
 PM PEAK HOUR 1200 TO 0100 VOLUME 351

AM TOTAL 2775
 PM TOTAL 2012

AM TOTAL 2890
 PM TOTAL 2317



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3594 Count ID SI#06-001

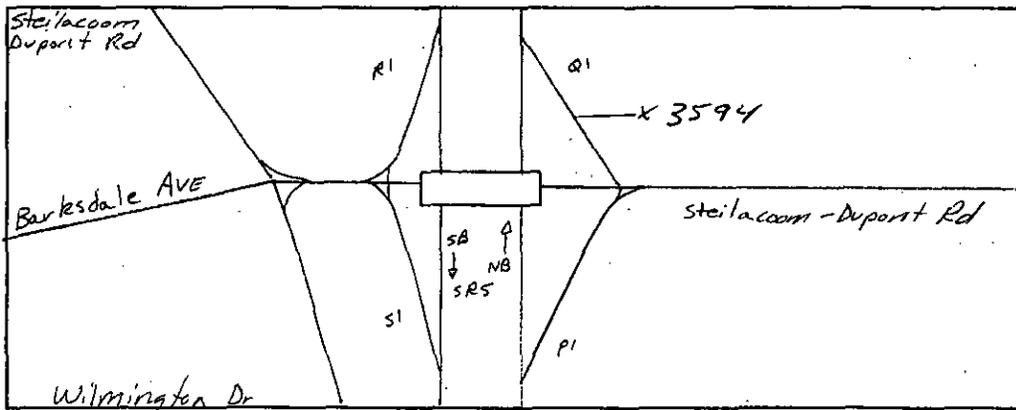
SR 5 RRT/RRQ Q1 11938 MP 0.00

Leg 2 Direction NB OSID _____

Station Description - ON SRS NB onramp from Steilacoom - Dupont Rd
On SR 5 NB on Bamp from Dupont Rd

Date	Day	Time	Comments
1/30/06	2	1102	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Set o.k. JIM/MH 6.7
1/31	3	1139	Manual (1) <u>13</u> (2) _____ Counter (1) <u>13</u> (2) _____ check o.k. JIM/MH 6.4
2/1	4	0855	Manual (1) <u>24</u> (2) _____ Counter (1) <u>24</u> (2) _____ check o.k. JIM/MH 6.4
2/2	5	0838	Manual (1) <u>14</u> (2) _____ Counter (1) <u>14</u> (2) _____ check o.k. JIM/MH 6.4
2/3	6	0820	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ P/U JIM/MH 6.4

Sketch



J. Mills / M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
TRIP SYSTEM
15 MINUTE TRAFFIC COUNT SUMMARY

SR 005 Q111938 MP 000.00 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND LANE ALL OF

COUNT IDENTIFIER 06-001 COUNTER NUMBER 053594 DESCRIPTION: ON SR 5 NB ON RAMP FROM DUPONT RD

DATE	TIME	AM HOURS												PM HOURS												DAILY TOTAL		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12			
01/30/06	MONDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
00-15															96	60	62	70	125	131	62	26	20	14	18	7		
15-30															56	67	59	69	106	113	54	36	11	16	14	11		
30-45															100	82	72	62	137	137	41	14	16	12	6	6		
45-00															59	57	59	58	104	71	43	14	22	14	5	3		
TOT															215	302	250	252	324	472	388	200	90	69	56	43	27	2688

DATE	TIME	AM PEAK HOUR 0000 TO 0000 VOLUME												PM PEAK HOUR 0430 TO 0530 VOLUME												AM TOTAL	PM TOTAL				
		8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12													
01/31/06	TUESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12					
00-15															55	73	54	86	65	117	121	63	34	29	11	11	5				
15-30															66	78	66	64	119	91	50	31	18	15	14	4	4				
30-45															77	71	57	68	61	49	53	120	125	88	54	2	8				
45-00															69	61	83	94	73	53	56	91	106	66	40	33	17				
TOT															261	251	264	295	273	231	262	340	467	366	207	113	75	59	33	23	4265

DATE	TIME	AM PEAK HOUR 1100 TO 1200 VOLUME												PM PEAK HOUR 0415 TO 0515 VOLUME												AM TOTAL	PM TOTAL				
		8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12													
02/01/06	WEDNESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12					
00-15															55	81	66	43	66	139	118	62	45	26	18	9	9				
15-30															63	78	59	68	64	110	116	58	30	16	17	13	3				
30-45															80	52	51	70	127	169	86	44	23	19	22	4	7				
45-00															60	64	55	74	60	45	67	75	134	63	48	27	6				
TOT															272	247	239	282	278	229	248	332	552	383	212	125	87	70	32	25	4309

DATE	TIME	AM PEAK HOUR 0715 TO 0815 VOLUME												PM PEAK HOUR 0400 TO 0500 VOLUME												AM TOTAL	PM TOTAL		
		8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12											
TOT																												1736	2573

DOT-RNB515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
TRIP SYSTEM
15 MINUTE TRAFFIC COUNT SUMMARY

DATE 03/21/06
TIME 09:14:48
PAGE 32

SR 005 Q111938 MP 000.00 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND LANE ALL OF

COUNT IDENTIFIER 06-001 COUNTER NUMBER 053594 DESCRIPTION: ON SR 5 NB ON RAMP FROM DUPONT RD

DATE	AM HOURS		PM HOURS		DAILY TOTAL	
	3-4	5-6	3-4	5-6	7-8	9-10
02/02/06 THURSDAY	2	3	1	2	5	6
12-1	3	4	12	1	10	11
12-2	4	5	11	12	9	10
00-15	6	7	64	64	74	78
15-30	8	8	43	51	108	115
30-45	5	3	46	87	123	130
45-00	2	2	70	60	137	129
AM HOUR	3	4	5	6	7	8
TOT	21	12	15	18	257	284

AM PEAK HOUR 1100 TO 1200 VOLUME 357
PM PEAK HOUR 0330 TO 0430 VOLUME 452

DATE	AM HOURS		PM HOURS		DAILY TOTAL	
	3-4	5-6	3-4	5-6	7-8	9-10
02/03/06 FRIDAY	2	3	1	2	5	6
12-1	3	4	11	12	10	11
12-2	4	5	12	1	9	10
00-15	7	10	39	45	50	59
15-30	1	1	9	37	95	95
30-45	5	1	17	30	54	77
45-00	3	1	18	26	53	62
AM HOUR	3	4	5	6	7	8
TOT	17	10	9	29	138	189

AM PEAK HOUR 0715 TO 0815 VOLUME 293
PM PEAK HOUR 0000 TO 0000 VOLUME 0

01/30/06 THRU 02/03/06 92
TOTAL HOURS FOR COUNT

3 DAYS
AVG WEEKDAY VOL 4320 X SEASONAL ADJ. FACTOR 1.0100 = 4363 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 3694

PEAK HOUR PERCENTAGES: K = 12.78 D = 100.00
PEAK HOUR LOCATION : VOLUME = 552 DATE: 02/01/06 TIME: 04:00 PM

AM TOTAL 1857
PM TOTAL 2530

AM TOTAL 780
PM TOTAL 0



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3560 Count ID SP#06-001

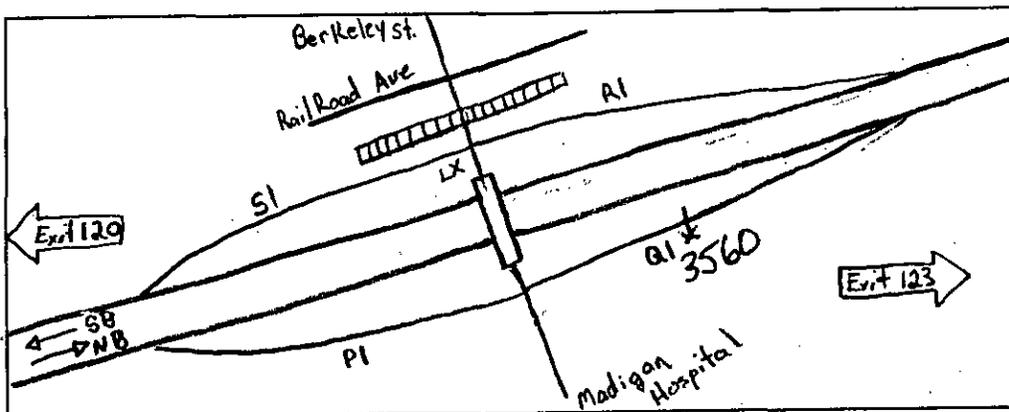
SR 5 RRT/RRQ Q1-12305 MP 0.00

Leg 2 Direction N/B OSID _____

Station Description - ON SR-5 NB on ramp from Berkeley st.

Date	Day	Time	Comments
1/30/06	2	1247	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Set OK MH/IM 6.6
31/06	3	1210	Manual (1) <u>28</u> (2) _____ Counter (1) <u>28</u> (2) _____ Check OK MH/IM 6.4
2/1/06	4	0953	Manual (1) <u>27</u> (2) _____ Counter (1) <u>27</u> (2) _____ water in tube / not counting fixed at 0956 Check OK MH/IM 6.4
2/06	5	0932	Manual (1) <u>20</u> (2) _____ Counter (1) <u>20</u> (2) _____ Check OK MH/IM 6.4
3/06	6	0908	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Check OK P/u MH/IM 6.4

Sketch



Heathcott M. / Mills J.
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

LANE ALL OF

SR 005 Q112305 MP 000.00 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND
 COUNTY IDENTIFIER 06-001 COUNTER NUMBER 053560 DESCRIPTION: ON SR 5 NB ON RAMP FROM BERKELEY ST

DATE	AM HOURS		PM HOURS		AM PEAK HOUR		PM PEAK HOUR		AM TOTAL		PM TOTAL		DAILY TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
01/30/06 MONDAY	12	1	2	3	4	5	6	7	8	9	10	11	12
00-15													
15-30													
30-45													
45-00													
HOUR													
TOT													

DATE	AM HOURS		PM HOURS		AM PEAK HOUR		PM PEAK HOUR		AM TOTAL		PM TOTAL		DAILY TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
01/31/06 TUESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12
00-15													
15-30													
30-45													
45-00													
HOUR													
TOT													

DATE	AM HOURS		PM HOURS		AM PEAK HOUR		PM PEAK HOUR		AM TOTAL		PM TOTAL		DAILY TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
02/01/06 WEDNESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12
00-15													
15-30													
30-45													
45-00													
HOUR													
TOT													

Water in tube

Water in tube

2736
4410

1283
6529

DOT-RN8515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
TRIP SURVEY SUMMARY
15 MINUTE TRAFFIC COUNT SUMMARY

DATE 03/21/06
TIME 09:14:48
PAGE 94

SR 005 Q112305 MP 000.00 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC NORTHBOUND LANE ALL OF

COUNT IDENTIFIER 06-001 COUNTER NUMBER 053560 DESCRIPTION: ON SR 5 NB ON RAMP FROM BERKELEY ST

DATE	THURSDAY	AM HOURS					PM HOURS					DAILY TOTAL														
		12	1	2	3	4	5	6	7	8	9		10	11	12											
02/02/06	12	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	118	
	1	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	8960		
00-15	20	6	1	4	13	28	78	91	93	113	155	184	111	155	209	258	253	199	136	60	46	27	32	32		
15-30	14	9	4	3	38	34	79	67	99	108	155	140	135	141	172	263	158	154	132	57	61	47	28	28		
30-45	17	18	7	4	8	23	49	100	71	103	129	196	124	115	163	246	274	168	153	56	63	42	32	32		
45-00	21	17	9	7	14	31	84	77	77	103	121	219	113	148	163	245	296	178	120	97	51	53	27	26	26	
TOT	72	61	29	16	29	105	195	334	306	398	471	725	561	509	622	872	1091	757	626	473	224	223	143	118	118	
									AM PEAK HOUR 1100 TO 1200 VOLUME	725					AM TOTAL	2741				PM PEAK HOUR 0400 TO 0500 VOLUME	1091				PM TOTAL	6219

DATE	FRIDAY	AM HOURS					PM HOURS					DAILY TOTAL															
		12	1	2	3	4	5	6	7	8	9		10	11	12												
02/03/06	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1314	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1314		
00-15	16	11	7	9	6	16	37	75	103																		
15-30	17	12	5	4	4	18	41	64	90																		
30-45	23	15	16	9	13	22	60	142	89																		
45-00	13	12	4	7	13	28	82	140	91																		
TOT	69	50	32	29	36	84	220	421	373																		
									AM PEAK HOUR 0730 TO 0830 VOLUME	475					AM TOTAL	1314				PM PEAK HOUR 0000 TO 0000 VOLUME	0					PM TOTAL	0

01/30/06 THRU 02/03/06
TOTAL HOURS FOR COUNT 78

2 DAYS
AVG WEEKDAY VOL 9043 X SEASONAL ADJ. FACTOR 1.0000 = 9043 X AXLE CORR FACTOR 0.8776 = ESTIMATED AVG DAILY TRAFFIC 7998
FACTOR GROUP R092
K = 12.64 D = 100.00
VOLUME = 1143 DATE: 02/01/06 TIME: 04:15 PM



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-3452 Count ID SP#06-001

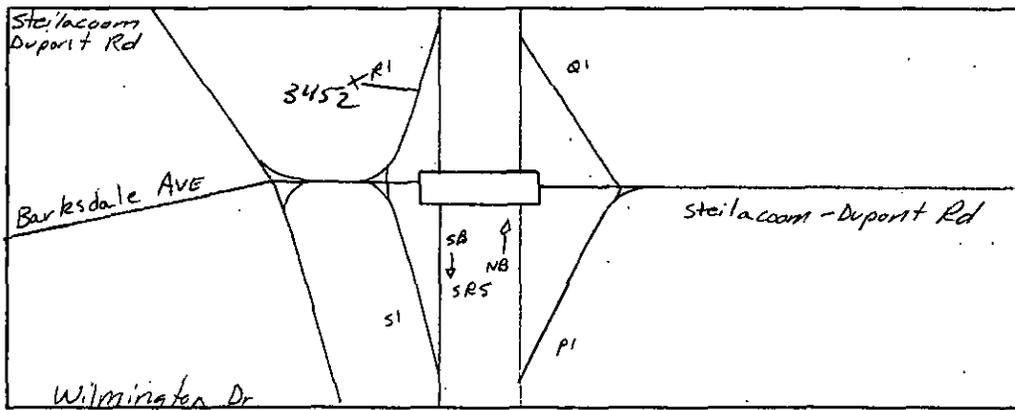
SR 5 RRT/RRQ RI 11933 MP 0.00

Leg 2 Direction SB OSID _____

Station Description - ON SR5 SR offramp to Steilacoom - Dupont Rd
On SR5 SB offramp to Dupont Rd

Date	Day	Time	Comments
1/30/06	2	1437	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Set o.k. JMM/IMH 6.3
1/31	3	1040	Manual (1) <u>15</u> (2) _____ Counter (1) <u>15</u> (2) _____ check o.k. JMM/IMH 6.3
2/1	4	1200	Manual (1) <u>23</u> (2) _____ Counter (1) <u>23</u> (2) _____ check o.k. JMM/IMH 6.3
2/2	5	1104	Manual (1) <u>23</u> (2) _____ Counter (1) <u>23</u> (2) _____ check o.k. JMM/IMH 6.3
2/3	6	End 0:45 1023	Manual (1) <u>1</u> (2) _____ Counter (1) <u>1</u> (2) _____ P/U JMM/IMH 6.5

Sketch



J. Mills / M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RNB515A-B

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	COUNTER NUMBER	DIRECTION OF TRAFFIC SOUTHBOUND												LANE ALL OF											
					LEG 2						DESCRIPTION: ON SR 5 SB OFF RAMP TO DUPONT RD																	
					AM HOURS			PM HOURS			PM HOURS			PM HOURS														
					4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL		
02/02/06	THURSDAY				3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
12	1	2	3	4	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
00-15	8	4	2	2	22	22	22	22	129	117	106	53	50	96	84	53	48	65	69	55	42	31	20	17	9	9		
15-30	5	7	1	3	2	28	76	137	129	129	73	54	73	66	72	63	54	60	80	40	40	32	36	14	14	14		
30-45	4	10	3	8	4	81	99	152	105	87	63	71	85	76	47	50	70	61	54	33	33	28	19	24	11	11		
45-00	3	13	4	3	16	91	131	189	118	71	94	81	101	51	40	61	85	60	39	36	36	32	15	2	6	6		
HOUR																												
TOT	20	34	10	16	34	222	368	607	469	337	264	275	348	283	203	213	280	270	188	151	123	90	57	40	4902			



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-4431 Count ID SP#06-001

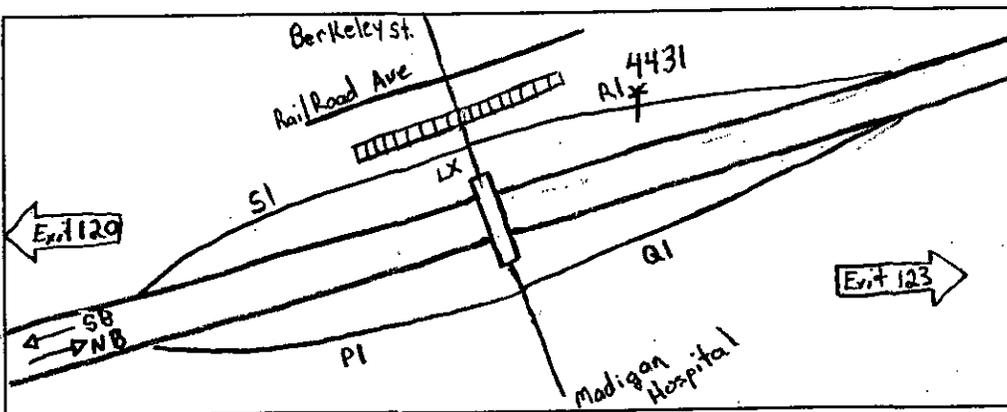
SR 5 RRT/RRQ R1-12295 MP 0.00

Leg 2 Direction S1B OSID _____

Station Description - ON SR-5 SB off ramp to Berkeley st

Date	Day	Time	Comments
1/30/06	2	1416	Manual (1) <u>3</u> (2) _____ Counter (1) <u>3</u> (2) _____ Set OK MH/JM 6.4
3/1/06	3	0941	Manual (1) <u>29</u> (2) _____ Counter (1) <u>29</u> (2) _____ Check OK MH/JM 6.3
2/1/06	4	1131	Manual (1) <u>21</u> (2) _____ Counter (1) <u>21</u> (2) _____ Check OK MH/JM 6.3
2/06	5	1043	Manual (1) <u>26</u> (2) _____ Counter (1) <u>26</u> (2) _____ Check OK MH/JM 6.3
3/06	6	0953	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ Check OK P/u MH/JM 6.3

Sketch



Heathcott M. / Mills J.
Field Person



Interval 60 min. 15 min.

Count(volume) Speed
 Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____
Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-2924 Count ID SI#06-001

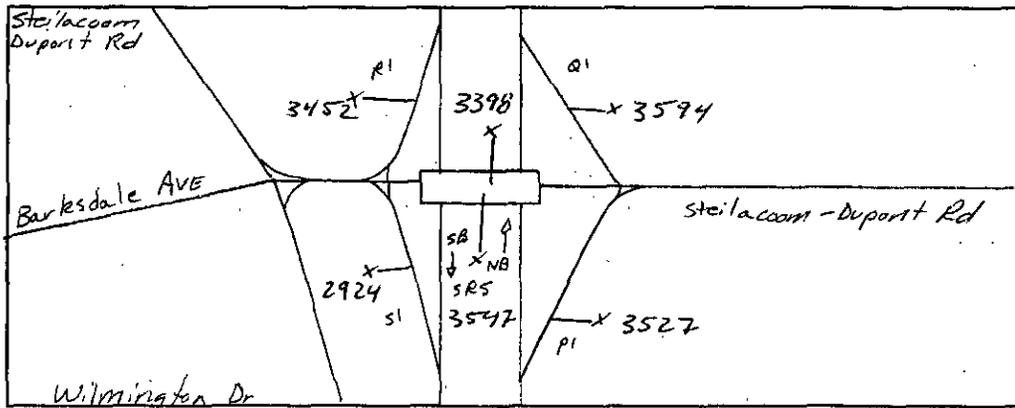
SR 5 RRT/RRQ SI 11864 MP 0.01

Leg 2 Direction SB OSID _____

Station Description - ON SRS SB onramp from Steilacoom - Dupont Rd
on SR 5 SB onramp from Dupont Rd Wye Conn

Date	Day	Time	Comments
1/30/06	2	1442	Manual (1) <u>2</u> (2) Counter (1) <u>2</u> (2) Set o.k. JM/IMH 6.3
1/31	3	1054	Manual (1) <u>19</u> (2) Counter (1) <u>19</u> (2) check o.k. JM/IMH 6.2
2/1	4	1205	Manual (1) <u>26</u> (2) Counter (1) <u>26</u> (2) check o.k. JM/IMH 6.2
2/2	5	1111	Manual (1) <u>13</u> (2) Counter (1) <u>13</u> (2) check o.k. JM/IMH 6.2
2/3	6	1051 ENO 1000	Manual (1) <u>3</u> (2) Counter (1) <u>3</u> (2) P/U JM/IMH 6.2

Sketch



J. Mills / M. Heathscott
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

SR 005 S111864	MP 000.01	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC		SOUTHBOUND		LANE ALL OF							
				COUNT IDENTIFIER	COUNTER NUMBER	052924	DESCRIPTION: ON SR 5 SB ON RAMP FROM DUPONT RD WYE CONN	AM	PM	AM	PM				
01/30/06	MONDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
00-15															
15-30															
30-45															
45-00															
HOUR															
TOT															2776

01/31/06	TUESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
00-15															
15-30															
30-45															
45-00															
HOUR															
TOT															5848

02/01/06	WEDNESDAY	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL
00-15															
15-30															
30-45															
45-00															
HOUR															
TOT															5740

AM PEAK HOUR 0000 TO 0000 VOLUME		PM PEAK HOUR 0415 TO 0515 VOLUME	
AM	PM	AM	PM
0	757	0	757
AM PEAK HOUR 0715 TO 0815 VOLUME		PM PEAK HOUR 0430 TO 0530 VOLUME	
464	782	458	768

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

DOT-RN8515A-B

SR	COUNT IDENTIFIER	MP	OFF SYSTEM ID.	COUNTER NUMBER	052924	DIRECTION OF TRAFFIC SOUTHBOUND												LANE ALL	OF								
						LEG 2						ON SR 5 SB ON RAMP FROM DUPONT RD WYE CONN															
		THURSDAY		FRIDAY		SATURDAY		SUNDAY		MONDAY		TUESDAY		WEDNESDAY		TOTAL											
		AM HOURS		AM HOURS		AM HOURS		AM HOURS		AM HOURS		AM HOURS		AM HOURS		AM TOTAL											
		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM TOTAL											
02/02/06	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL	
00-15	9	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	11	12	5708	
15-30	4	1	6	1	10	34	105	61	41	69	70	74	101	87	145	211	208	104	57	39	31	6	11	32	11		
30-45	3	3	2	1	11	52	115	50	41	69	108	69	71	86	179	177	163	99	56	29	20	10	12	10	12		
45-00	4	3	1	2	4	16	53	88	50	59	80	88	66	99	137	193	133	78	52	34	21	8	3	5	3		
HOUR																											
TOT	20	9	4	10	24	53	165	389	239	205	278	345	321	324	341	574	763	708	386	221	138	97	36	58	58	5708	
																	AM TOTAL	1741			PM TOTAL	3967					

02/03/06		FRIDAY		SATURDAY		SUNDAY		MONDAY		TUESDAY		WEDNESDAY		TOTAL											
		AM HOURS		AM HOURS		AM HOURS		AM HOURS		AM HOURS		AM HOURS		AM TOTAL											
		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM HOURS		PM TOTAL											
00-15	9	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	DAILY TOTAL	
15-30	3	1	5	11	14	58	64	73	69																
30-45	7	6	5	6	36	106	67	61																	
45-00	9	1	5	6	39	107	64	57																	
HOUR																									
TOT	28	10	3	10	20	54	152	360	248	236	69														1190
																	AM TOTAL	1190			PM TOTAL	0			

01/30/06 THRU 02/03/06 91
 TOTAL HOURS FOR COUNT
 3 DAYS
 AVG WEEKDAY VOL 5765 X SEASONAL ADJ. FACTOR 1.0100 = 5823 X AXLE CORR FACTOR 0.8467 = ESTIMATED AVG DAILY TRAFFIC 4930
 PEAK HOUR PERCENTAGES: K = 13.69 D = 100.00
 PEAK HOUR LOCATION : VOLUME = 789 DATE: 02/02/06 TIME: 04:15 PM



Interval 60 min. 15 min.

Count(volume) Speed

Binned(CL/SP) Raw

Lane No 1 2

Direction Channel 1 _____

Direction Channel 2 _____

Data Hog # 3163

Counter No. 5-1672 Count ID SP#06-001

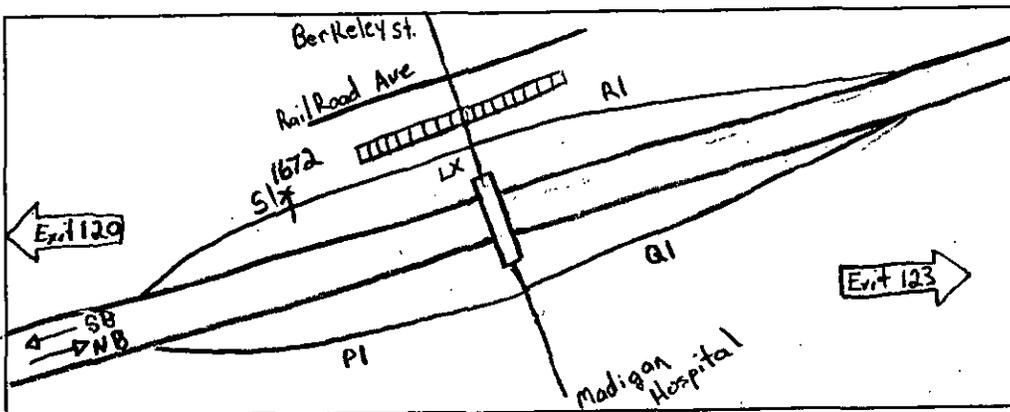
SR 5 RRT/RRQ 51-12233 MP 0.00

Leg 2 Direction S/B OSID _____

Station Description - ON SR-5 SB on ramp from Berkeley st

Date	Day	Time	Comments
1/30/06	2	1420	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ set OK MH/JM 6.4
31/06	3	0957	Manual (1) <u>9</u> (2) _____ Counter (1) <u>9</u> (2) _____ check OK MH/JM 6.4
2/1/06	4	1136	Manual (1) <u>15</u> (2) _____ Counter (1) <u>15</u> (2) _____ check OK MH/JM 6.3
2/06	5	1050	Manual (1) <u>16</u> (2) _____ Counter (1) <u>16</u> (2) _____ check OK MH/JM 6.3
3/06	6	0958	Manual (1) <u>2</u> (2) _____ Counter (1) <u>2</u> (2) _____ check OK Plu MH/JM 6.3

Sketch



Heathscott M. / Mills J.
Field Person

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
 TRIP SYSTEM
 15 MINUTE TRAFFIC COUNT SUMMARY

SR 005 S112233 MP 000.00	OFF SYSTEM ID.	LEG 2	DIRECTION OF TRAFFIC		LANE ALL OF	
			SOUTHBOUND	SOUTHBOUND	LANE ALL OF	OF
COUNT IDENTIFIER 06-001	COUNTER NUMBER 051672	DESCRIPTION: ON SR 5 SB ON RAMP FROM BERKELEY ST				
01/30/06 MONDAY		AM HOURS	PM HOURS			DAILY TOTAL
12 1	2 3 4 5	1 2 3 4 5	6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12		
15-30			109 159 126 83 52 30 24 14 10			
30-45			72 130 90 68 59 36 33 16 15			
45-00			63 106 148 98 67 48 33 20 19 10			
HOUR			87 104 146 74 65 32 28 19 11			
TOT			150 391 583 388 283 191 127 103 68 46 2330			
		AM PEAK HOUR 0000 TO 0500 VOLUME	0	AM TOTAL	PM TOTAL	2330
		PM PEAK HOUR 0400 TO 0500 VOLUME	583			

01/31/06 TUESDAY	AM HOURS	PM HOURS	AM PEAK HOUR 1100 TO 1200 VOLUME	PM PEAK HOUR 0400 TO 0500 VOLUME	AM TOTAL	PM TOTAL	DAILY TOTAL
12 1	2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	284	401	552	407	138 103 68 61 4339
15-30			282 339 237 284	401	552	407	138 103 68 61 4339
30-45			170 179 238 282	401	552	407	138 103 68 61 4339
45-00			170 179 238 282	401	552	407	138 103 68 61 4339
TOT			170 179 238 282	401	552	407	138 103 68 61 4339
	AM PEAK HOUR 1100 TO 1200 VOLUME	282	AM TOTAL	PM TOTAL	1228	3111	
	PM PEAK HOUR 0400 TO 0500 VOLUME	552					

02/01/06 WEDNESDAY	AM HOURS	PM HOURS	AM PEAK HOUR 1100 TO 1200 VOLUME	PM PEAK HOUR 0400 TO 0500 VOLUME	AM TOTAL	PM TOTAL	DAILY TOTAL
12 1	2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	293	479	561	421	162 113 71 58 4670
15-30			293 308 314 291	479	561	421	162 113 71 58 4670
30-45			205 188 231 293	479	561	421	162 113 71 58 4670
45-00			205 188 231 293	479	561	421	162 113 71 58 4670
TOT			205 188 231 293	479	561	421	162 113 71 58 4670
	AM PEAK HOUR 1100 TO 1200 VOLUME	293	AM TOTAL	PM TOTAL	1292	3378	
	PM PEAK HOUR 0400 TO 0500 VOLUME	561					

**APPENDIX C:
LOS CALCULATION WORKSHEETS**

**2008 AM PEAK HOUR
LOS CALCULATION WORKSHEETS**

2008 Existing AM
1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	65	15	85	95	25	15	390	55	65	500	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1711		1770	1804		1719	3374		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1711		1770	1804		1719	3374		1752	3505	1568
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	116	76	17	99	110	29	17	453	64	76	581	262
RTOR Reduction (vph)	0	12	0	0	13	0	0	10	0	0	0	0
Lane Group Flow (vph)	116	81	0	99	126	0	17	507	0	76	581	262
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	7.4	8.5		6.6	7.7		0.8	23.1		6.0	28.3	62.2
Effective Green, g (s)	7.4	8.5		6.6	7.7		0.8	23.1		6.0	28.3	62.2
Actuated g/C Ratio	0.12	0.14		0.11	0.12		0.01	0.37		0.10	0.45	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	199	234		188	223		22	1253		169	1595	1568
v/s Ratio Prot	c0.07	0.05		0.06	c0.07		0.01	c0.15		c0.04	0.17	
v/s Ratio Perm												c0.17
v/c Ratio	0.58	0.35		0.53	0.56		0.77	0.40		0.45	0.36	0.17
Uniform Delay, d1	25.9	24.3		26.3	25.7		30.6	14.5		26.5	11.1	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.3	0.9		2.7	3.3		93.0	0.2		1.9	0.1	0.2
Delay (s)	30.2	25.2		29.0	28.9		123.6	14.7		28.4	11.2	0.2
Level of Service	C	C		C	C		F	B		C	B	A
Approach Delay (s)		28.0			28.9			18.1			9.5	
Approach LOS		C			C			B			A	

Intersection Summary

HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	62.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

2008 Existing AM
2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	83	341	14	205	325	40	41	327	210	102	466	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1736	1816		1719	1810	1538	1770	3332		1787	3574	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1736	1816		1719	1810	1538	1770	3332		1787	3574	1599
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	98	401	16	241	382	47	48	385	247	120	548	167
RTOR Reduction (vph)	0	1	0	0	0	0	0	86	0	0	0	121
Lane Group Flow (vph)	98	416	0	241	382	47	48	546	0	120	548	46
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot		Free	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						Free						6
Actuated Green, G (s)	8.7	29.4		19.0	39.7	104.0	6.9	23.2		12.4	28.7	28.7
Effective Green, g (s)	8.7	29.4		19.0	39.7	104.0	6.9	23.2		12.4	28.7	28.7
Actuated g/C Ratio	0.08	0.28		0.18	0.38	1.00	0.07	0.22		0.12	0.28	0.28
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	145	513		314	691	1538	117	743		213	986	441
v/s Ratio Prot	0.06	c0.23		c0.14	0.21		0.03	c0.16		c0.07	0.15	
v/s Ratio Perm						0.03						0.03
v/c Ratio	0.68	0.81		0.77	0.55	0.03	0.41	0.73		0.56	0.56	0.10
Uniform Delay, d1	46.3	34.7		40.4	25.2	0.0	46.6	37.5		43.2	32.2	28.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.8	9.8		10.7	1.2	0.0	2.3	3.8		3.4	0.7	0.1
Delay (s)	58.1	44.6		51.1	26.4	0.0	48.9	41.3		46.6	32.9	28.2
Level of Service	E	D		D	C	A	D	D		D	C	C
Approach Delay (s)		47.1			33.4			41.9			33.9	
Approach LOS		D			C			D			C	
Intersection Summary												
HCM Average Control Delay			38.3				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			104.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			68.2%			ICU Level of Service				C		
Analysis Period (min)			15									

c Critical Lane Group

2008 Existing AM
3: I-5 NB Off-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗					↑	↗	↘	↕	
Volume (vph)	303	0	512	0	0	0	0	163	106	192	309	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1583					1845	1568	1531	1607	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1583					1845	1568	1531	1607	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	370	0	624	0	0	0	0	199	129	234	377	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	110	0	0	0
Lane Group Flow (vph)	0	370	624	0	0	0	0	199	19	211	400	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	3%	3%	3%	12%	12%	12%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2			1	1
Permitted Phases			Free							2		
Actuated Green, G (s)	30.5		120.0					17.6	17.6	59.9	59.9	
Effective Green, g (s)	30.5		120.0					17.6	17.6	59.9	59.9	
Actuated g/C Ratio	0.25		1.00					0.15	0.15	0.50	0.50	
Clearance Time (s)	4.0							4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0							3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	450		1583					271	230	764	802	
v/s Ratio Prot	c0.21							c0.11		0.14	c0.25	
v/s Ratio Perm			0.39						0.01			
v/c Ratio	0.82		0.39					0.73	0.08	0.28	0.50	
Uniform Delay, d1	42.2		0.0					49.0	44.2	17.5	20.0	
Progression Factor	1.00		1.00					1.00	1.00	0.39	0.44	
Incremental Delay, d2	11.5		0.7					9.9	0.2	0.9	2.2	
Delay (s)	53.7		0.7					58.8	44.4	7.7	11.0	
Level of Service	D		A					E	D	A	B	
Approach Delay (s)	20.5							53.1			9.8	
Approach LOS	C		A					D			A	

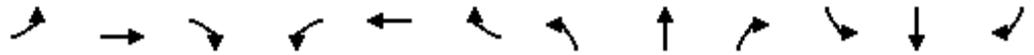
Intersection Summary

HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

2008 Existing AM
4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	154	4	382	47	436	0	0	339	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)					1742	1553		1854			3438	1538
Flt Permitted					0.95	1.00		0.95			1.00	1.00
Satd. Flow (perm)					1742	1553		1767			3438	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	160	4	398	49	454	0	0	353	235
RTOR Reduction (vph)	0	0	0	0	0	270	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	164	128	0	503	0	0	353	235
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	2%	2%	2%	5%	5%	5%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					12.0	12.0		35.0			27.5	60.0
Effective Green, g (s)					12.0	12.0		35.0			27.5	60.0
Actuated g/C Ratio					0.20	0.20		0.58			0.46	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					348	311		1042			1576	1538
v/s Ratio Prot					c0.09			c0.06			0.10	
v/s Ratio Perm						0.08		c0.22				0.15
v/c Ratio					0.47	0.41		0.48			0.22	0.15
Uniform Delay, d1					21.2	20.9		7.2			9.8	0.0
Progression Factor					1.00	1.00		1.10			0.96	1.00
Incremental Delay, d2					1.2	1.1		0.3			0.3	0.2
Delay (s)					22.4	22.0		8.3			9.7	0.2
Level of Service					C	C		A			A	A
Approach Delay (s)		0.0			22.1			8.3			5.9	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

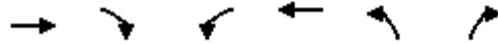
c Critical Lane Group

2008 Existing AM
5: Willmington Dr & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	29	59	427	49	37	196	79	599	27	31	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1785	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1785	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	16	32	65	469	54	41	215	87	658	30	34	13
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	0	0	7	0
Lane Group Flow (vph)	16	32	65	281	277	0	215	87	658	30	40	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	5.2	5.2	120.0	25.1	25.1		19.8	68.7	120.0	5.0	53.9	
Effective Green, g (s)	5.2	5.2	120.0	25.1	25.1		19.8	68.7	120.0	5.0	53.9	
Actuated g/C Ratio	0.04	0.04	1.00	0.21	0.21		0.16	0.57	1.00	0.04	0.45	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	77	81	1583	352	350		292	1067	1583	74	802	
v/s Ratio Prot	0.01	0.02		c0.17	0.17		c0.12	0.05		0.02	0.02	
v/s Ratio Perm			0.04						c0.42			
v/c Ratio	0.21	0.40	0.04	0.80	0.79		0.74	0.08	0.42	0.41	0.05	
Uniform Delay, d1	55.4	55.9	0.0	45.0	45.0		47.6	11.5	0.0	56.1	18.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.93	1.03	1.00	1.00	1.00	
Incremental Delay, d2	1.3	3.2	0.0	11.9	11.6		8.4	0.1	0.7	3.6	0.1	
Delay (s)	56.8	59.0	0.0	57.0	56.6		52.5	12.0	0.7	59.7	18.7	
Level of Service	E	E	A	E	E		D	B	A	E	B	
Approach Delay (s)		24.8			56.8			13.3			34.7	
Approach LOS		C			E			B			C	
Intersection Summary												
HCM Average Control Delay			29.4			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			45.1%			ICU Level of Service			A			
Analysis Period (min)			15									
c	Critical Lane Group											

2008 Existing AM
6: Dupont Steilacoom Hwy & East Dr



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	355	170	130	415	105	55
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	390	187	143	456	115	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			390		1132	390
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			390		1132	390
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		42	91
cM capacity (veh/h)			1168		197	658

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	390	187	143	456	176
Volume Left	0	0	143	0	115
Volume Right	0	187	0	0	60
cSH	1700	1700	1168	1700	260
Volume to Capacity	0.23	0.11	0.12	0.27	0.68
Queue Length 95th (ft)	0	0	10	0	111
Control Delay (s)	0.0	0.0	8.5	0.0	43.6
Lane LOS	A			E	
Approach Delay (s)	0.0		2.0		43.6
Approach LOS				E	

Intersection Summary					
Average Delay			6.6		
Intersection Capacity Utilization			45.1%	ICU Level of Service	A
Analysis Period (min)			15		

2008 Existing AM
7: 32nd Division Dr & East Dr

HCM Unsignalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	102	0	66	0	107	182	134	166	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	111	0	72	0	116	198	146	180	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	0	183	314	326								
Volume Left (vph)	0	111	0	146								
Volume Right (vph)	0	72	198	0								
Hadj (s)	0.00	-0.08	-0.34	0.12								
Departure Headway (s)	5.8	5.3	4.5	4.9								
Degree Utilization, x	0.00	0.27	0.39	0.45								
Capacity (veh/h)	532	614	767	703								
Control Delay (s)	8.8	10.3	10.4	11.8								
Approach Delay (s)	0.0	10.3	10.4	11.8								
Approach LOS	A	B	B	B								
Intersection Summary												
Delay			10.9									
HCM Level of Service			B									
Intersection Capacity Utilization			52.6%	ICU Level of Service	A							
Analysis Period (min)			15									

2008 Existing AM
8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	23	55	5	338	95	37	52	112	270	41	134	36	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5		
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00		
Frt		1.00	0.85	1.00	0.98			1.00	0.85	1.00	0.97		
Flt Protected		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00		
Satd. Flow (prot)		1801	1553	1649	1659			1852	1599	1752	1786		
Flt Permitted		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00		
Satd. Flow (perm)		1801	1553	1649	1659			1852	1599	1752	1786		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
Adj. Flow (vph)	29	71	6	433	122	47	67	144	346	53	172	46	
RTOR Reduction (vph)	0	0	5	0	7	0	0	0	275	0	10	0	
Lane Group Flow (vph)	0	100	1	303	292	0	0	211	71	53	208	0	
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	1%	1%	1%	3%	3%	3%	
Turn Type	Split		Perm	Split			Split		Perm	Split			
Protected Phases	3	3		4	4		2	2		1	1		
Permitted Phases			3						2				
Actuated Green, G (s)		8.6	8.6	19.7	19.7			15.5	15.5	13.3	13.3		
Effective Green, g (s)		8.6	8.6	19.7	19.7			15.5	15.5	13.3	13.3		
Actuated g/C Ratio		0.11	0.11	0.26	0.26			0.21	0.21	0.18	0.18		
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5		
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0		
Lane Grp Cap (vph)		206	178	433	435			382	330	310	316		
v/s Ratio Prot		c0.06		c0.18	0.18			c0.11		0.03	c0.12		
v/s Ratio Perm			0.00						0.04				
v/c Ratio		0.49	0.00	0.70	0.67			0.55	0.22	0.17	0.66		
Uniform Delay, d1		31.2	29.5	25.0	24.8			26.7	24.8	26.2	28.8		
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00		
Incremental Delay, d2		2.4	0.0	5.1	4.2			1.9	0.4	0.1	3.8		
Delay (s)		33.6	29.5	30.1	29.0			28.6	25.1	26.3	32.5		
Level of Service		C	C	C	C			C	C	C	C		
Approach Delay (s)		33.4			29.6			26.5			31.3		
Approach LOS		C			C			C			C		
Intersection Summary													
HCM Average Control Delay			29.0									HCM Level of Service	C
HCM Volume to Capacity ratio			0.62										
Actuated Cycle Length (s)			75.1									Sum of lost time (s)	18.0
Intersection Capacity Utilization			50.2%									ICU Level of Service	A
Analysis Period (min)			15										
c Critical Lane Group													

**2008 PM PEAK HOUR
LOS CALCULATION WORKSHEETS**

2008 Existing PM
1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	365	105	20	55	165	80	45	765	55	10	310	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1717		1770	1772		1719	3404		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1717		1770	1772		1719	3404		1752	3505	1568
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	435	125	24	65	196	95	54	911	65	12	369	214
RTOR Reduction (vph)	0	7	0	0	19	0	0	5	0	0	0	0
Lane Group Flow (vph)	435	142	0	65	272	0	54	971	0	12	369	214
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	26.4	38.6		6.9	19.1		4.7	25.6		0.9	21.8	90.0
Effective Green, g (s)	26.4	38.6		6.9	19.1		4.7	25.6		0.9	21.8	90.0
Actuated g/C Ratio	0.29	0.43		0.08	0.21		0.05	0.28		0.01	0.24	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	490	736		136	376		90	968		18	849	1568
v/s Ratio Prot	c0.26	0.08		0.04	c0.15		c0.03	c0.29		0.01	0.11	
v/s Ratio Perm												0.14
v/c Ratio	0.89	0.19		0.48	0.72		0.60	1.00		0.67	0.43	0.14
Uniform Delay, d1	30.4	16.0		39.8	33.0		41.7	32.2		44.4	28.9	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.4	0.1		2.6	6.8		10.3	29.7		66.1	0.4	0.2
Delay (s)	47.8	16.1		42.5	39.7		52.1	61.9		110.5	29.2	0.2
Level of Service	D	B		D	D		D	E		F	C	A
Approach Delay (s)		39.7			40.2			61.4			20.4	
Approach LOS		D			D			E			C	

Intersection Summary

HCM Average Control Delay	44.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2008 Existing PM
2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	212	350	17	215	451	67	54	601	199	76	241	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1850		1787	1881	1599	1787	3441		1736	3471	1553
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1850		1787	1881	1599	1787	3441		1736	3471	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	244	402	20	247	518	77	62	691	229	87	277	63
RTOR Reduction (vph)	0	1	0	0	0	0	0	27	0	0	0	44
Lane Group Flow (vph)	244	421	0	247	518	77	62	893	0	87	277	19
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	Prot			Prot		Free	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						Free						6
Actuated Green, G (s)	17.6	31.5		19.6	33.5	112.6	7.0	33.1		8.4	34.5	34.5
Effective Green, g (s)	17.6	31.5		19.6	33.5	112.6	7.0	33.1		8.4	34.5	34.5
Actuated g/C Ratio	0.16	0.28		0.17	0.30	1.00	0.06	0.29		0.07	0.31	0.31
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	277	518		311	560	1599	111	1012		130	1063	476
v/s Ratio Prot	0.14	0.23		c0.14	c0.28		0.03	c0.26		c0.05	0.08	
v/s Ratio Perm						c0.05						0.01
v/c Ratio	0.88	0.81		0.79	0.93	0.05	0.56	0.88		0.67	0.26	0.04
Uniform Delay, d1	46.5	37.8		44.6	38.3	0.0	51.3	37.9		50.7	29.4	27.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	26.1	9.9		13.0	21.5	0.1	6.0	9.2		12.3	0.1	0.0
Delay (s)	72.6	47.6		57.6	59.8	0.1	57.3	47.1		63.1	29.6	27.5
Level of Service	E	D		E	E	A	E	D		E	C	C
Approach Delay (s)		56.8			53.7			47.7			36.1	
Approach LOS		E			D			D			D	

Intersection Summary

HCM Average Control Delay	49.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	112.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2008 Existing PM
3: I-5 NB Off-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	289	2	125	0	0	0	0	676	141	337	164	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0		
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95		
Frt		1.00	0.85					1.00	0.85	1.00	1.00		
Flt Protected		0.95	1.00					1.00	1.00	0.95	0.98		
Satd. Flow (prot)		1792	1599					1900	1615	1681	1739		
Flt Permitted		0.95	1.00					1.00	1.00	0.95	0.98		
Satd. Flow (perm)		1792	1599					1900	1615	1681	1739		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	321	2	139	0	0	0	0	751	157	374	182	0	
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	72	0	0	0	
Lane Group Flow (vph)	0	323	139	0	0	0	0	751	85	273	283	0	
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	0%	0%	0%	2%	2%	2%	
Turn Type	Split		Free					Perm		Split			
Protected Phases	4	4						2		1	1		
Permitted Phases			Free					2					
Actuated Green, G (s)		24.8	120.0					50.8	50.8	32.4	32.4		
Effective Green, g (s)		24.8	120.0					50.8	50.8	32.4	32.4		
Actuated g/C Ratio		0.21	1.00					0.42	0.42	0.27	0.27		
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0		
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		370	1599					804	684	454	470		
v/s Ratio Prot		c0.18						c0.40		0.16	c0.16		
v/s Ratio Perm			0.09					0.05					
v/c Ratio		0.87	0.09					0.93	0.12	0.60	0.60		
Uniform Delay, d1		46.1	0.0					33.0	21.1	38.2	38.2		
Progression Factor		1.00	1.00					1.00	1.00	1.09	1.09		
Incremental Delay, d2		19.7	0.1					17.7	0.1	5.7	5.5		
Delay (s)		65.8	0.1					50.7	21.2	47.3	47.2		
Level of Service		E	A					D	C	D	D		
Approach Delay (s)		46.0			0.0			45.6			47.2		
Approach LOS		D			A			D			D		
Intersection Summary													
HCM Average Control Delay		46.2		HCM Level of Service				D					
HCM Volume to Capacity ratio		0.82											
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				12.0					
Intersection Capacity Utilization		75.3%		ICU Level of Service				D					
Analysis Period (min)		15											

c Critical Lane Group

2008 Existing PM
4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	30	1	196	487	488	0	0	474	414
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.95	1.00		0.98			1.00	1.00
Satd. Flow (prot)					1726	1538		1817			3539	1583
Flt Permitted					0.95	1.00		0.56			1.00	1.00
Satd. Flow (perm)					1726	1538		1043			3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	32	1	211	524	525	0	0	510	445
RTOR Reduction (vph)	0	0	0	0	0	195	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	33	16	0	1049	0	0	510	445
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					9.1	9.1		97.9			72.4	120.0
Effective Green, g (s)					9.1	9.1		97.9			72.4	120.0
Actuated g/C Ratio					0.08	0.08		0.82			0.60	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					131	117		1015			2135	1583
v/s Ratio Prot					0.02			c0.22			0.14	
v/s Ratio Perm						0.01		c0.62				c0.28
v/c Ratio					0.25	0.14		1.03			0.24	0.28
Uniform Delay, d1					52.2	51.8		11.0			11.0	0.0
Progression Factor					1.00	1.00		5.01			0.52	1.00
Incremental Delay, d2					1.2	0.6		28.6			0.3	0.4
Delay (s)					53.4	52.4		84.0			6.0	0.4
Level of Service					D	D		F			A	A
Approach Delay (s)		0.0			52.6			84.0			3.4	
Approach LOS		A			D			F			A	

Intersection Summary			
HCM Average Control Delay	46.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2008 Existing PM
5: Willmington Dr & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	87	156	487	38	54	125	102	495	25	73	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1798	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1798	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	20	92	164	513	40	57	132	107	521	26	77	23
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	6	0
Lane Group Flow (vph)	20	92	164	308	294	0	132	107	521	26	94	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	11.3	11.3	120.0	28.0	28.0		13.9	60.1	120.0	4.6	50.8	
Effective Green, g (s)	11.3	11.3	120.0	28.0	28.0		13.9	60.1	120.0	4.6	50.8	
Actuated g/C Ratio	0.09	0.09	1.00	0.23	0.23		0.12	0.50	1.00	0.04	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	175	1583	392	388		205	933	1583	68	761	
v/s Ratio Prot	0.01	c0.05		c0.18	0.18		c0.07	0.06		0.01	0.05	
v/s Ratio Perm			0.10						c0.33			
v/c Ratio	0.12	0.53	0.10	0.79	0.76		0.64	0.11	0.33	0.38	0.12	
Uniform Delay, d1	49.8	51.8	0.0	43.2	42.9		50.7	15.9	0.0	56.3	21.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.98	1.00	1.00	1.00	
Incremental Delay, d2	0.3	2.8	0.1	10.0	8.3		3.3	0.1	0.3	3.6	0.3	
Delay (s)	50.1	54.6	0.1	53.1	51.1		54.0	15.6	0.3	59.9	21.4	
Level of Service	D	D	A	D	D		D	B	A	E	C	
Approach Delay (s)		21.9			52.1			11.8			29.3	
Approach LOS		C			D			B			C	

Intersection Summary

HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

2008 Existing PM
6: Dupont Steilacoom Hwy & East Dr



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	530	230	25	390	245	195
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	546	237	26	402	253	201
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			546		1000	546
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			546		1000	546
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		4	63
cM capacity (veh/h)			1023		263	537

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	546	237	26	402	454
Volume Left	0	0	26	0	253
Volume Right	0	237	0	0	201
cSH	1700	1700	1023	1700	340
Volume to Capacity	0.32	0.14	0.03	0.24	1.34
Queue Length 95th (ft)	0	0	2	0	550
Control Delay (s)	0.0	0.0	8.6	0.0	201.0
Lane LOS			A		F
Approach Delay (s)	0.0		0.5		201.0
Approach LOS					F

Intersection Summary					
Average Delay			54.9		
Intersection Capacity Utilization			60.1%	ICU Level of Service	B
Analysis Period (min)			15		

2008 Existing PM
7: 32nd Division Dr & East Dr

HCM Unsignalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop				Stop
Volume (vph)	0	0	0	78	0	170	0	270	375	200	55	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	86	0	187	0	297	412	220	60	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	0	273	709	280								
Volume Left (vph)	0	86	0	220								
Volume Right (vph)	0	187	412	0								
Hadj (s)	0.00	-0.31	-0.31	0.19								
Departure Headway (s)	7.3	6.1	5.0	6.0								
Degree Utilization, x	0.00	0.46	0.98	0.47								
Capacity (veh/h)	459	577	722	592								
Control Delay (s)	10.3	14.1	49.6	14.1								
Approach Delay (s)	0.0	14.1	49.6	14.1								
Approach LOS	A	B	E	B								
Intersection Summary												
Delay			34.0									
HCM Level of Service			D									
Intersection Capacity Utilization			75.9%	ICU Level of Service	D							
Analysis Period (min)			15									

2008 Existing PM
8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	122	21	493	68	26	23	70	408	27	216	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00	
Satd. Flow (prot)		1830	1568	1698	1705			1822	1568	1770	1840	
Flt Permitted		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00	
Satd. Flow (perm)		1830	1568	1698	1705			1822	1568	1770	1840	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	27	145	25	587	81	31	27	83	486	32	257	23
RTOR Reduction (vph)	0	0	21	0	4	0	0	0	414	0	3	0
Lane Group Flow (vph)	0	172	4	352	343	0	0	110	72	32	277	0
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	3%	3%	3%	2%	2%	2%
Turn Type	Split		Perm	Split			Split		Perm	Split		
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases			3						2			
Actuated Green, G (s)		13.8	13.8	22.3	22.3			12.2	12.2	16.2	16.2	
Effective Green, g (s)		13.8	13.8	22.3	22.3			12.2	12.2	16.2	16.2	
Actuated g/C Ratio		0.17	0.17	0.27	0.27			0.15	0.15	0.20	0.20	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0	
Lane Grp Cap (vph)		306	262	459	461			269	232	348	361	
v/s Ratio Prot		c0.09		c0.21	0.20			c0.06		0.02	c0.15	
v/s Ratio Perm			0.00						0.05			
v/c Ratio		0.56	0.02	0.77	0.74			0.41	0.31	0.09	0.77	
Uniform Delay, d1		31.6	28.7	27.7	27.5			31.9	31.4	27.1	31.4	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.9	0.0	7.7	6.6			1.2	0.9	0.0	8.5	
Delay (s)		34.4	28.7	35.4	34.1			33.1	32.3	27.2	39.9	
Level of Service		C	C	D	C			C	C	C	D	
Approach Delay (s)		33.7		34.8				32.4		38.6		
Approach LOS		C		C				C		D		
Intersection Summary												
HCM Average Control Delay			34.5			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			82.5			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			58.1%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

ALTERNATIVE 1
2015 AM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 1 AM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	68	16	89	100	26	16	409	58	68	525	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1708		1770	1805		1719	3374		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1708		1770	1805		1719	3374		1752	3505	1568
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	122	79	19	103	116	30	19	476	67	79	610	274
RTOR Reduction (vph)	0	13	0	0	13	0	0	10	0	0	0	0
Lane Group Flow (vph)	122	85	0	103	133	0	19	533	0	79	610	274
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	7.5	8.8		6.6	7.9		0.8	23.7		6.0	28.9	63.1
Effective Green, g (s)	7.5	8.8		6.6	7.9		0.8	23.7		6.0	28.9	63.1
Actuated g/C Ratio	0.12	0.14		0.10	0.13		0.01	0.38		0.10	0.46	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	199	238		185	226		22	1267		167	1605	1568
v/s Ratio Prot	c0.07	0.05		0.06	c0.07		0.01	c0.16		c0.05	0.17	
v/s Ratio Perm												c0.17
v/c Ratio	0.61	0.36		0.56	0.59		0.86	0.42		0.47	0.38	0.17
Uniform Delay, d1	26.4	24.6		26.9	26.1		31.1	14.6		27.1	11.2	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.5	0.9		3.6	3.9		129.4	0.2		2.1	0.2	0.2
Delay (s)	31.9	25.5		30.5	29.9		160.5	14.8		29.2	11.4	0.2
Level of Service	C	C		C	C		F	B		C	B	A
Approach Delay (s)		29.1			30.2			19.8			9.7	
Approach LOS		C			C			B			A	

Intersection Summary

HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	63.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	358	15	215	341	42	43	343	220	107	489	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	3450		1719	3382		1770	3539	1583	1787	3574	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	3450		1719	3382		1770	3539	1583	1787	3574	1599
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	102	421	18	253	401	49	51	404	259	126	575	175
RTOR Reduction (vph)	0	2	0	0	8	0	0	0	203	0	0	124
Lane Group Flow (vph)	102	437	0	253	442	0	51	404	56	126	575	51
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	8.5	19.5		18.3	29.3		5.1	19.1	19.1	12.0		26.0
Effective Green, g (s)	8.5	19.5		18.3	29.3		5.1	19.1	19.1	12.0		26.0
Actuated g/C Ratio	0.10	0.22		0.21	0.33		0.06	0.21	0.21	0.13		0.29
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0		5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	166	757		354	1115		102	760	340	241		1045
v/s Ratio Prot	0.06	c0.13		c0.15	0.13		0.03	0.11		c0.07		c0.16
v/s Ratio Perm									0.04			0.03
v/c Ratio	0.61	0.58		0.71	0.40		0.50	0.53	0.16	0.52		0.55
Uniform Delay, d1	38.6	31.0		32.9	23.0		40.7	30.9	28.4	35.8		26.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	6.6	1.3		6.7	0.3		3.8	0.7	0.2	2.0		0.6
Delay (s)	45.2	32.3		39.6	23.3		44.5	31.7	28.6	37.8		27.1
Level of Service	D	C		D	C		D	C	C	D		C
Approach Delay (s)		34.7			29.2			31.5				27.9
Approach LOS		C			C			C				C

Intersection Summary

HCM Average Control Delay	30.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

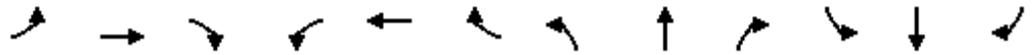
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3: I-5 NB Off-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	318	0	537	0	0	0	0	171	111	201	324	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1583					1845	1568	1531	1607	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1583					1845	1568	1531	1607	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	388	0	655	0	0	0	0	209	135	245	395	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	115	0	0	0
Lane Group Flow (vph)	0	388	655	0	0	0	0	209	20	220	420	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	3%	3%	3%	12%	12%	12%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free							2		
Actuated Green, G (s)		31.7	120.0					18.1	18.1	58.2	58.2	
Effective Green, g (s)		31.7	120.0					18.1	18.1	58.2	58.2	
Actuated g/C Ratio		0.26	1.00					0.15	0.15	0.49	0.49	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		468	1583					278	237	743	779	
v/s Ratio Prot		c0.22						c0.11		0.14	c0.26	
v/s Ratio Perm			0.41					0.01				
v/c Ratio		0.83	0.41					0.75	0.09	0.30	0.54	
Uniform Delay, d1		41.6	0.0					48.8	43.8	18.6	21.5	
Progression Factor		1.00	1.00					1.00	1.00	0.39	0.44	
Incremental Delay, d2		11.5	0.8					10.9	0.2	1.0	2.6	
Delay (s)		53.1	0.8					59.7	44.0	8.3	12.2	
Level of Service		D	A					E	D	A	B	
Approach Delay (s)		20.3			0.0			53.5			10.8	
Approach LOS		C			A			D			B	
Intersection Summary												
HCM Average Control Delay		22.9			HCM Level of Service				C			
HCM Volume to Capacity ratio		0.66										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				12.0			
Intersection Capacity Utilization		53.7%			ICU Level of Service				A			
Analysis Period (min)		15										

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔	↔		↕			↕↕	↔
Volume (vph)	0	0	0	162	4	401	49	458	0	0	356	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)					1742	1553		1854			3438	1538
Flt Permitted					0.95	1.00		0.95			1.00	1.00
Satd. Flow (perm)					1742	1553		1762			3438	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	169	4	418	51	477	0	0	371	247
RTOR Reduction (vph)	0	0	0	0	0	251	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	173	167	0	528	0	0	371	247
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	2%	2%	2%	5%	5%	5%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					12.4	12.4		34.6			27.1	60.0
Effective Green, g (s)					12.4	12.4		34.6			27.1	60.0
Actuated g/C Ratio					0.21	0.21		0.58			0.45	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					360	321		1028			1553	1538
v/s Ratio Prot					0.10			c0.06			0.11	
v/s Ratio Perm						c0.11		c0.23				0.16
v/c Ratio					0.48	0.52		0.51			0.24	0.16
Uniform Delay, d1					21.0	21.1		7.6			10.1	0.0
Progression Factor					1.00	1.00		1.08			0.95	1.00
Incremental Delay, d2					1.2	1.6		0.3			0.3	0.2
Delay (s)					22.2	22.8		8.6			9.9	0.2
Level of Service					C	C		A			A	A
Approach Delay (s)		0.0			22.6			8.6			6.0	
Approach LOS		A			C			A			A	

Intersection Summary		
HCM Average Control Delay	12.4	HCM Level of Service B
HCM Volume to Capacity ratio	0.52	
Actuated Cycle Length (s)	60.0	Sum of lost time (s) 13.0
Intersection Capacity Utilization	58.7%	ICU Level of Service B
Analysis Period (min)	15	

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	30	62	448	51	39	206	83	629	28	33	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1785	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1785	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	18	33	68	492	56	43	226	91	691	31	36	14
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	8	0
Lane Group Flow (vph)	18	33	68	295	291	0	226	91	691	31	42	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	6.5	6.5	120.0	25.9	25.9		20.5	66.6	120.0	5.0	51.1	
Effective Green, g (s)	6.5	6.5	120.0	25.9	25.9		20.5	66.6	120.0	5.0	51.1	
Actuated g/C Ratio	0.05	0.05	1.00	0.22	0.22		0.17	0.55	1.00	0.04	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	96	101	1583	363	362		302	1034	1583	74	760	
v/s Ratio Prot	0.01	0.02		c0.18	0.17		c0.13	0.05		0.02	0.02	
v/s Ratio Perm			0.04						c0.44			
v/c Ratio	0.19	0.33	0.04	0.81	0.80		0.75	0.09	0.44	0.42	0.06	
Uniform Delay, d1	54.2	54.6	0.0	44.7	44.6		47.3	12.5	0.0	56.1	20.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.94	1.04	1.00	1.00	1.00	
Incremental Delay, d2	0.9	1.9	0.1	13.0	12.1		8.6	0.1	0.8	3.8	0.1	
Delay (s)	55.2	56.5	0.1	57.7	56.7		53.3	13.1	0.8	59.9	20.4	
Level of Service	E	E	A	E	E		D	B	A	E	C	
Approach Delay (s)		24.1			57.2			13.7			35.5	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			29.6			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			46.3%			ICU Level of Service			A			
Analysis Period (min)			15									
c	Critical Lane Group											



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	373	178	136	436	111	58
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	410	196	149	479	122	64
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			410	1188		410
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			410	1188		410
tC, single (s)			4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			87	33		90
cM capacity (veh/h)			1149	181		642

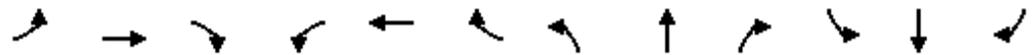
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	410	196	149	479	186
Volume Left	0	0	149	0	122
Volume Right	0	196	0	0	64
cSH	1700	1700	1149	1700	240
Volume to Capacity	0.24	0.12	0.13	0.28	0.77
Queue Length 95th (ft)	0	0	11	0	140
Control Delay (s)	0.0	0.0	8.6	0.0	57.5
Lane LOS	A			F	
Approach Delay (s)	0.0		2.0		57.5
Approach LOS				F	

Intersection Summary					
Average Delay			8.4		
Intersection Capacity Utilization			46.9%	ICU Level of Service	A
Analysis Period (min)	15				

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7: 32nd Division Dr & East Dr

HCM Unsignalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	107	0	69	0	112	191	141	174	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	116	0	75	0	122	208	153	189	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	191	329	342
Volume Left (vph)	0	116	0	153
Volume Right (vph)	0	75	208	0
Hadj (s)	0.00	-0.08	-0.34	0.12
Departure Headway (s)	5.9	5.4	4.6	5.0
Degree Utilization, x	0.00	0.29	0.42	0.47
Capacity (veh/h)	515	604	756	695
Control Delay (s)	8.9	10.6	10.8	12.4
Approach Delay (s)	0.0	10.6	10.8	12.4
Approach LOS	A	B	B	B

Intersection Summary			
Delay		11.4	
HCM Level of Service		B	
Intersection Capacity Utilization	54.7%		ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↔			↖	↗	↖	↗	
Volume (vph)	24	58	5	355	100	39	55	118	283	43	141	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	0.98			1.00	0.85	1.00	0.97	
Flt Protected		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1800	1553	1649	1658			1852	1599	1752	1786	
Flt Permitted		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00	
Satd. Flow (perm)		1800	1553	1649	1658			1852	1599	1752	1786	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	31	74	6	455	128	50	71	151	363	55	181	49
RTOR Reduction (vph)	0	0	5	0	7	0	0	0	288	0	10	0
Lane Group Flow (vph)	0	105	1	318	308	0	0	222	75	55	220	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Turn Type	Split		Perm	Split			Split		Perm	Split		
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases			3						2			
Actuated Green, G (s)		8.9	8.9	20.6	20.6			16.1	16.1	13.9	13.9	
Effective Green, g (s)		8.9	8.9	20.6	20.6			16.1	16.1	13.9	13.9	
Actuated g/C Ratio		0.11	0.11	0.27	0.27			0.21	0.21	0.18	0.18	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0	
Lane Grp Cap (vph)		207	178	438	441			385	332	314	320	
v/s Ratio Prot		c0.06		c0.19	0.19			c0.12		0.03	c0.12	
v/s Ratio Perm			0.00						0.05			
v/c Ratio		0.51	0.00	0.73	0.70			0.58	0.23	0.18	0.69	
Uniform Delay, d1		32.2	30.4	25.9	25.7			27.6	25.5	26.9	29.8	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.7	0.0	6.1	5.0			2.3	0.4	0.1	4.8	
Delay (s)		34.9	30.4	32.0	30.6			29.9	25.9	27.0	34.6	
Level of Service		C	C	C	C			C	C	C	C	
Approach Delay (s)		34.6		31.3				27.4			33.2	
Approach LOS		C		C				C			C	

Intersection Summary

HCM Average Control Delay	30.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	77.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

ALTERNATIVE 1
2015 PM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 1 PM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	383	110	21	58	173	84	47	803	58	10	325	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1717		1770	1771		1719	3403		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1717		1770	1771		1719	3403		1752	3505	1568
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	456	131	25	69	206	100	56	956	69	12	387	225
RTOR Reduction (vph)	0	7	0	0	19	0	0	5	0	0	0	0
Lane Group Flow (vph)	456	149	0	69	287	0	56	1020	0	12	387	225
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	26.8	39.5		7.1	19.8		4.7	25.8		1.0	22.1	91.4
Effective Green, g (s)	26.8	39.5		7.1	19.8		4.7	25.8		1.0	22.1	91.4
Actuated g/C Ratio	0.29	0.43		0.08	0.22		0.05	0.28		0.01	0.24	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	490	742		137	384		88	961		19	847	1568
v/s Ratio Prot	c0.27	0.09		0.04	c0.16		c0.03	c0.30		0.01	0.11	
v/s Ratio Perm												0.14
v/c Ratio	0.93	0.20		0.50	0.75		0.64	1.06		0.63	0.46	0.14
Uniform Delay, d1	31.4	16.1		40.5	33.5		42.5	32.8		45.0	29.5	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	24.5	0.1		2.9	7.8		14.1	46.8		52.7	0.4	0.2
Delay (s)	55.9	16.3		43.4	41.2		56.6	79.6		97.8	29.9	0.2
Level of Service	E	B		D	D		E	E		F	C	A
Approach Delay (s)		45.8			41.6			78.4			20.5	
Approach LOS		D			D			E			C	

Intersection Summary

HCM Average Control Delay	52.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	91.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Alt 1 PM

2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	222	367	18	226	473	70	57	631	209	80	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3514		1787	3506		1787	3574	1599	1736	3471	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3514		1787	3506		1787	3574	1599	1736	3471	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	255	422	21	260	544	80	66	725	240	92	291	67
RTOR Reduction (vph)	0	3	0	0	10	0	0	0	136	0	0	48
Lane Group Flow (vph)	255	440	0	260	614	0	66	725	104	92	291	19
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	18.4	24.1		19.2	24.9		6.8	27.4	27.4	8.1	28.7	28.7
Effective Green, g (s)	18.4	24.1		19.2	24.9		6.8	27.4	27.4	8.1	28.7	28.7
Actuated g/C Ratio	0.19	0.24		0.19	0.25		0.07	0.28	0.28	0.08	0.29	0.29
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	330	857		347	884		123	991	443	142	1008	451
v/s Ratio Prot	0.14	0.13		c0.15	c0.18		0.04	c0.20		c0.05	0.08	
v/s Ratio Perm									0.07			0.01
v/c Ratio	0.77	0.51		0.75	0.69		0.54	0.73	0.24	0.65	0.29	0.04
Uniform Delay, d1	38.2	32.3		37.5	33.5		44.5	32.4	27.6	44.0	27.1	25.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.7	0.7		8.6	2.6		4.4	2.8	0.3	9.8	0.2	0.0
Delay (s)	48.9	33.0		46.1	36.1		48.9	35.2	27.9	53.7	27.3	25.2
Level of Service	D	C		D	D		D	D	C	D	C	C
Approach Delay (s)		38.8			39.0			34.4			32.4	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM Average Control Delay			36.4				HCM Level of Service			D		
HCM Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			98.8				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			66.1%				ICU Level of Service		C			
Analysis Period (min)			15									

c Critical Lane Group

Alt 1 PM

3: I-5 NB Off-Ramp & Barksdale Ave

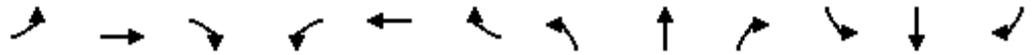
HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	303	2	131	0	0	0	0	709	148	354	172	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	0.98	
Satd. Flow (prot)		1792	1599					1900	1615	1681	1739	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	0.98	
Satd. Flow (perm)		1792	1599					1900	1615	1681	1739	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	337	2	146	0	0	0	0	788	164	393	191	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	70	0	0	0
Lane Group Flow (vph)	0	339	146	0	0	0	0	788	94	287	297	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	0%	0%	0%	2%	2%	2%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free							2		
Actuated Green, G (s)		25.4	120.0					52.0	52.0	30.6	30.6	
Effective Green, g (s)		25.4	120.0					52.0	52.0	30.6	30.6	
Actuated g/C Ratio		0.21	1.00					0.43	0.43	0.26	0.26	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		379	1599					823	700	429	443	
v/s Ratio Prot		c0.19						c0.41		0.17	c0.17	
v/s Ratio Perm			0.09					0.06				
v/c Ratio		0.89	0.09					0.96	0.13	0.67	0.67	
Uniform Delay, d1		46.0	0.0					32.9	20.5	40.2	40.2	
Progression Factor		1.00	1.00					1.00	1.00	1.08	1.08	
Incremental Delay, d2		22.5	0.1					21.4	0.1	7.9	7.7	
Delay (s)		68.5	0.1					54.3	20.5	51.5	51.2	
Level of Service		E	A					D	C	D	D	
Approach Delay (s)		47.9			0.0			48.5			51.3	
Approach LOS		D			A			D			D	
Intersection Summary												
HCM Average Control Delay			49.2					HCM Level of Service		D		
HCM Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			120.0					Sum of lost time (s)		12.0		
Intersection Capacity Utilization			78.5%					ICU Level of Service		D		
Analysis Period (min)			15									
c Critical Lane Group												

Alt 1 PM

4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	31	1	206	511	512	0	0	497	434
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.95	1.00		0.98			1.00	1.00
Satd. Flow (prot)					1726	1538		1817			3539	1583
Flt Permitted					0.95	1.00		0.54			1.00	1.00
Satd. Flow (perm)					1726	1538		1014			3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	33	1	222	549	551	0	0	534	467
RTOR Reduction (vph)	0	0	0	0	0	205	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	34	17	0	1100	0	0	534	467
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					9.3	9.3		97.7			71.2	120.0
Effective Green, g (s)					9.3	9.3		97.7			71.2	120.0
Actuated g/C Ratio					0.08	0.08		0.81			0.59	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					134	119		1003			2100	1583
v/s Ratio Prot					0.02			c0.24			0.15	
v/s Ratio Perm						0.01		c0.65				c0.29
v/c Ratio					0.25	0.14		1.10			0.25	0.30
Uniform Delay, d1					52.1	51.6		11.1			11.7	0.0
Progression Factor					1.00	1.00		4.26			0.51	1.00
Incremental Delay, d2					1.2	0.7		50.5			0.3	0.5
Delay (s)					53.3	52.3		98.0			6.3	0.5
Level of Service					D	D		F			A	A
Approach Delay (s)		0.0			52.4			98.0			3.6	
Approach LOS		A			D			F			A	

Intersection Summary			
HCM Average Control Delay	52.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	91	164	511	40	57	131	107	519	26	77	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1799	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1799	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	96	173	538	42	60	138	113	546	27	81	24
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	6	0
Lane Group Flow (vph)	21	96	173	323	309	0	138	113	546	27	99	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	11.5	11.5	120.0	29.0	29.0		14.2	58.9	120.0	4.6	49.3	
Effective Green, g (s)	11.5	11.5	120.0	29.0	29.0		14.2	58.9	120.0	4.6	49.3	
Actuated g/C Ratio	0.10	0.10	1.00	0.24	0.24		0.12	0.49	1.00	0.04	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	170	179	1583	406	402		209	914	1583	68	739	
v/s Ratio Prot	0.01	c0.05		c0.19	0.19		c0.08	0.06		0.02	0.05	
v/s Ratio Perm			0.11						c0.34			
v/c Ratio	0.12	0.54	0.11	0.80	0.77		0.66	0.12	0.34	0.40	0.13	
Uniform Delay, d1	49.6	51.7	0.0	42.7	42.4		50.6	16.6	0.0	56.3	22.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.01	0.99	1.00	1.00	1.00	
Incremental Delay, d2	0.3	3.1	0.1	10.3	8.5		3.1	0.1	0.2	3.8	0.4	
Delay (s)	50.0	54.8	0.1	53.0	50.9		54.1	16.5	0.2	60.1	22.4	
Level of Service	D	D	A	D	D		D	B	A	E	C	
Approach Delay (s)		21.8			52.0			11.9			30.1	
Approach LOS		C			D			B			C	

Intersection Summary

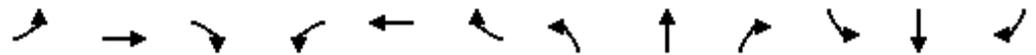
HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	556	241	26	409	257	205
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	573	248	27	422	265	211
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			573		1048	573
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			573		1048	573
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		0	59
cM capacity (veh/h)			1000		245	519

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	573	248	27	422	476
Volume Left	0	0	27	0	265
Volume Right	0	248	0	0	211
cSH	1700	1700	1000	1700	320
Volume to Capacity	0.34	0.15	0.03	0.25	1.49
Queue Length 95th (ft)	0	0	2	0	657
Control Delay (s)	0.0	0.0	8.7	0.0	265.6
Lane LOS	A			F	
Approach Delay (s)	0.0		0.5		265.6
Approach LOS				F	

Intersection Summary					
Average Delay			72.6		
Intersection Capacity Utilization			62.7%	ICU Level of Service	B
Analysis Period (min)			15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	82	0	178	0	283	394	210	58	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	90	0	196	0	311	433	231	64	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	286	744	295
Volume Left (vph)	0	90	0	231
Volume Right (vph)	0	196	433	0
Hadj (s)	0.00	-0.31	-0.32	0.19
Departure Headway (s)	7.3	6.1	5.1	6.0
Degree Utilization, x	0.00	0.48	1.04	0.49
Capacity (veh/h)	449	573	721	586
Control Delay (s)	10.3	14.6	67.5	14.7
Approach Delay (s)	0.0	14.6	67.5	14.7
Approach LOS	A	B	F	B

Intersection Summary			
Delay		44.4	
HCM Level of Service		E	
Intersection Capacity Utilization	79.2%		ICU Level of Service D
Analysis Period (min)		15	

Alt 1 PM

8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	24	128	22	517	71	27	24	73	428	28	227	20	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5		
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00		
Frt		1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.99		
Flt Protected		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00		
Satd. Flow (prot)		1830	1568	1698	1706			1822	1568	1770	1840		
Flt Permitted		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00		
Satd. Flow (perm)		1830	1568	1698	1706			1822	1568	1770	1840		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	
Adj. Flow (vph)	29	152	26	615	85	32	29	87	510	33	270	24	
RTOR Reduction (vph)	0	0	22	0	4	0	0	0	435	0	3	0	
Lane Group Flow (vph)	0	181	4	369	359	0	0	116	75	33	291	0	
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	3%	3%	3%	2%	2%	2%	
Turn Type	Split		Perm	Split			Split		Perm	Split			
Protected Phases	3	3		4	4		2	2		1	1		
Permitted Phases			3						2				
Actuated Green, G (s)		14.2	14.2	23.1	23.1			12.4	12.4	16.9	16.9		
Effective Green, g (s)		14.2	14.2	23.1	23.1			12.4	12.4	16.9	16.9		
Actuated g/C Ratio		0.17	0.17	0.27	0.27			0.15	0.15	0.20	0.20		
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5		
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0		
Lane Grp Cap (vph)		307	263	464	466			267	230	354	368		
v/s Ratio Prot		c0.10		c0.22	0.21			c0.06		0.02	c0.16		
v/s Ratio Perm			0.00						0.05				
v/c Ratio		0.59	0.02	0.80	0.77			0.43	0.33	0.09	0.79		
Uniform Delay, d1		32.5	29.4	28.6	28.3			32.9	32.3	27.6	32.2		
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00		
Incremental Delay, d2		3.4	0.0	9.4	8.0			1.3	1.0	0.0	10.3		
Delay (s)		35.9	29.4	37.9	36.3			34.2	33.3	27.6	42.5		
Level of Service		D	C	D	D			C	C	C	D		
Approach Delay (s)		35.1			37.1			33.5			41.0		
Approach LOS		D			D			C			D		
Intersection Summary													
HCM Average Control Delay			36.4									HCM Level of Service	D
HCM Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			84.6									Sum of lost time (s)	18.0
Intersection Capacity Utilization			59.9%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

ALTERNATIVE 2
2015 AM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 2 AM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	112	72	17	95	106	28	17	435	62	72	559	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1709		1770	1804		1719	3374		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1709		1770	1804		1719	3374		1752	3505	1568
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	130	84	20	110	123	33	20	506	72	84	650	292
RTOR Reduction (vph)	0	12	0	0	14	0	0	10	0	0	0	0
Lane Group Flow (vph)	130	92	0	110	142	0	20	568	0	84	650	292
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	7.6	9.1		6.7	8.2		0.8	23.9		6.0	29.1	63.7
Effective Green, g (s)	7.6	9.1		6.7	8.2		0.8	23.9		6.0	29.1	63.7
Actuated g/C Ratio	0.12	0.14		0.11	0.13		0.01	0.38		0.09	0.46	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	199	244		186	232		22	1266		165	1601	1568
v/s Ratio Prot	c0.08	0.05		0.06	c0.08		0.01	c0.17		c0.05	0.19	
v/s Ratio Perm												c0.19
v/c Ratio	0.65	0.38		0.59	0.61		0.91	0.45		0.51	0.41	0.19
Uniform Delay, d1	26.8	24.7		27.2	26.2		31.4	15.0		27.4	11.5	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.5	1.0		5.0	4.7		148.5	0.3		2.5	0.2	0.3
Delay (s)	34.3	25.7		32.2	31.0		179.9	15.2		29.9	11.7	0.3
Level of Service	C	C		C	C		F	B		C	B	A
Approach Delay (s)		30.5			31.5			20.7			9.9	
Approach LOS		C			C			C			A	

Intersection Summary

HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	381	16	229	363	45	46	365	234	114	520	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	3450		1719	3381		1770	3539	1583	1787	3574	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	3450		1719	3381		1770	3539	1583	1787	3574	1599
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	109	448	19	269	427	53	54	429	275	134	612	187
RTOR Reduction (vph)	0	2	0	0	8	0	0	0	216	0	0	136
Lane Group Flow (vph)	109	465	0	269	472	0	54	429	59	134	612	51
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	8.7	20.7		19.4	31.4		6.9	19.7	19.7	12.4	25.2	25.2
Effective Green, g (s)	8.7	20.7		19.4	31.4		6.9	19.7	19.7	12.4	25.2	25.2
Actuated g/C Ratio	0.09	0.22		0.21	0.34		0.07	0.21	0.21	0.13	0.27	0.27
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	164	775		362	1151		132	756	338	240	977	437
v/s Ratio Prot	0.06	c0.13		c0.16	0.14		0.03	0.12		c0.07	c0.17	
v/s Ratio Perm									0.04			0.03
v/c Ratio	0.66	0.60		0.74	0.41		0.41	0.57	0.17	0.56	0.63	0.12
Uniform Delay, d1	40.3	32.0		34.1	23.3		40.7	32.4	29.6	37.3	29.4	25.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.7	1.5		8.0	0.3		2.1	1.0	0.2	2.8	1.3	0.1
Delay (s)	50.1	33.5		42.1	23.6		42.8	33.4	29.9	40.1	30.6	25.3
Level of Service	D	C		D	C		D	C	C	D	C	C
Approach Delay (s)		36.6			30.3			32.8			30.9	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM Average Control Delay			32.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			92.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			58.1%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

Alt 2 AM

3: I-5 NB Off-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

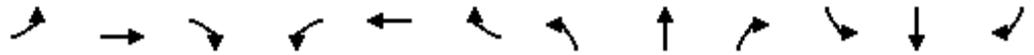
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	338	0	572	0	0	0	0	182	118	214	345	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1583					1845	1568	1531	1607	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1583					1845	1568	1531	1607	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	412	0	698	0	0	0	0	222	144	261	421	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	122	0	0	0
Lane Group Flow (vph)	0	412	698	0	0	0	0	222	22	235	447	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	3%	3%	3%	12%	12%	12%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free							2		
Actuated Green, G (s)		33.0	120.0					18.7	18.7	56.3	56.3	
Effective Green, g (s)		33.0	120.0					18.7	18.7	56.3	56.3	
Actuated g/C Ratio		0.28	1.00					0.16	0.16	0.47	0.47	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		487	1583					288	244	718	754	
v/s Ratio Prot		c0.23						c0.12		0.15	c0.28	
v/s Ratio Perm			0.44					0.01				
v/c Ratio		0.85	0.44					0.77	0.09	0.33	0.59	
Uniform Delay, d1		41.1	0.0					48.6	43.4	20.0	23.4	
Progression Factor		1.00	1.00					1.00	1.00	0.40	0.45	
Incremental Delay, d2		12.8	0.9					12.0	0.2	1.2	3.3	
Delay (s)		53.9	0.9					60.6	43.5	9.1	14.0	
Level of Service		D	A					E	D	A	B	
Approach Delay (s)		20.6			0.0			53.9			12.3	
Approach LOS		C			A			D			B	
Intersection Summary												
HCM Average Control Delay		23.6			HCM Level of Service			C				
HCM Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		56.5%			ICU Level of Service			B				
Analysis Period (min)		15										

c Critical Lane Group

Alt 2 AM

4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

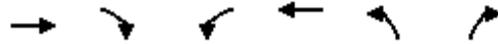


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	172	4	427	52	488	0	0	379	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)					1742	1553		1854			3438	1538
Flt Permitted					0.95	1.00		0.94			1.00	1.00
Satd. Flow (perm)					1742	1553		1755			3438	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	179	4	445	54	508	0	0	395	262
RTOR Reduction (vph)	0	0	0	0	0	228	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	183	217	0	562	0	0	395	262
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	2%	2%	2%	5%	5%	5%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					13.1	13.1		33.9			26.4	60.0
Effective Green, g (s)					13.1	13.1		33.9			26.4	60.0
Actuated g/C Ratio					0.22	0.22		0.56			0.44	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					380	339		1004			1513	1538
v/s Ratio Prot					0.11			c0.07			0.11	
v/s Ratio Perm						c0.14		c0.25				0.17
v/c Ratio					0.48	0.64		0.56			0.26	0.17
Uniform Delay, d1					20.5	21.3		8.3			10.6	0.0
Progression Factor					1.00	1.00		1.10			0.93	1.00
Incremental Delay, d2					1.1	4.1		0.5			0.3	0.2
Delay (s)					21.6	25.4		9.6			10.3	0.2
Level of Service					C	C		A			B	A
Approach Delay (s)		0.0			24.3			9.6			6.3	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	32	66	477	54	42	219	88	670	30	35	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1784	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1784	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	19	35	73	524	59	46	241	97	736	33	38	15
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	9	0
Lane Group Flow (vph)	19	35	73	314	310	0	241	97	736	33	44	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	6.7	6.7	120.0	27.0	27.0		21.5	65.2	120.0	5.1	48.8	
Effective Green, g (s)	6.7	6.7	120.0	27.0	27.0		21.5	65.2	120.0	5.1	48.8	
Actuated g/C Ratio	0.06	0.06	1.00	0.22	0.22		0.18	0.54	1.00	0.04	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	99	104	1583	378	377		317	1012	1583	75	725	
v/s Ratio Prot	0.01	0.02		c0.19	0.18		c0.14	0.05		0.02	0.02	
v/s Ratio Perm			0.05						c0.46			
v/c Ratio	0.19	0.34	0.05	0.83	0.82		0.76	0.10	0.46	0.44	0.06	
Uniform Delay, d1	54.1	54.5	0.0	44.3	44.2		46.8	13.2	0.0	56.1	21.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.95	1.04	1.00	1.00	1.00	
Incremental Delay, d2	0.9	1.9	0.1	14.3	13.4		8.8	0.2	0.8	4.1	0.2	
Delay (s)	55.0	56.4	0.1	58.6	57.6		53.3	13.9	0.8	60.1	21.8	
Level of Service	E	E	A	E	E		D	B	A	E	C	
Approach Delay (s)		23.8			58.1			13.8			36.5	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			30.0			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			48.0%			ICU Level of Service			A			
Analysis Period (min)			15									
c	Critical Lane Group											



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	397	189	145	464	118	62
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	436	208	159	510	130	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			436	1265		436
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			436	1265		436
tC, single (s)			4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			86	19		89
cM capacity (veh/h)			1123	160		620

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	436	208	159	510	198
Volume Left	0	0	159	0	130
Volume Right	0	208	0	0	68
cSH	1700	1700	1123	1700	215
Volume to Capacity	0.26	0.12	0.14	0.30	0.92
Queue Length 95th (ft)	0	0	12	0	190
Control Delay (s)	0.0	0.0	8.7	0.0	88.5
Lane LOS	A			F	
Approach Delay (s)	0.0	2.1		88.5	
Approach LOS				F	

Intersection Summary						
Average Delay			12.5			
Intersection Capacity Utilization			49.3%	ICU Level of Service		A
Analysis Period (min)			15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	114	0	73	0	119	203	150	185	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	124	0	79	0	129	221	163	201	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	0	203	350	364								
Volume Left (vph)	0	124	0	163								
Volume Right (vph)	0	79	221	0								
Hadj (s)	0.00	-0.08	-0.34	0.12								
Departure Headway (s)	6.1	5.5	4.7	5.1								
Degree Utilization, x	0.00	0.31	0.45	0.51								
Capacity (veh/h)	492	591	741	684								
Control Delay (s)	9.1	11.0	11.4	13.3								
Approach Delay (s)	0.0	11.0	11.4	13.3								
Approach LOS	A	B	B	B								
Intersection Summary												
Delay			12.1									
HCM Level of Service			B									
Intersection Capacity Utilization			57.5%	ICU Level of Service	B							
Analysis Period (min)			15									

Alt 2 AM

8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	26	62	5	378	106	42	59	126	301	46	150	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5		
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00		
Frt		1.00	0.85	1.00	0.98			1.00	0.85	1.00	0.97		
Flt Protected		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00		
Satd. Flow (prot)		1800	1553	1649	1658			1852	1599	1752	1787		
Flt Permitted		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00		
Satd. Flow (perm)		1800	1553	1649	1658			1852	1599	1752	1787		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
Adj. Flow (vph)	33	79	6	485	136	54	76	162	386	59	192	51	
RTOR Reduction (vph)	0	0	5	0	7	0	0	0	305	0	10	0	
Lane Group Flow (vph)	0	112	1	339	329	0	0	238	81	59	233	0	
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	1%	1%	1%	3%	3%	3%	
Turn Type	Split		Perm	Split			Split		Perm	Split			
Protected Phases	3	3		4	4		2	2		1	1		
Permitted Phases			3						2				
Actuated Green, G (s)		9.4	9.4	22.2	22.2			17.1	17.1	14.8	14.8		
Effective Green, g (s)		9.4	9.4	22.2	22.2			17.1	17.1	14.8	14.8		
Actuated g/C Ratio		0.12	0.12	0.27	0.27			0.21	0.21	0.18	0.18		
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5		
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0		
Lane Grp Cap (vph)		208	179	449	452			389	335	318	325		
v/s Ratio Prot		c0.06		c0.21	0.20			c0.13		0.03	c0.13		
v/s Ratio Perm			0.00						0.05				
v/c Ratio		0.54	0.00	0.76	0.73			0.61	0.24	0.19	0.72		
Uniform Delay, d1		34.0	31.9	27.2	26.9			29.2	26.8	28.2	31.4		
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00		
Incremental Delay, d2		3.4	0.0	7.3	6.0			3.0	0.4	0.1	6.2		
Delay (s)		37.4	31.9	34.5	32.9			32.2	27.2	28.3	37.6		
Level of Service		D	C	C	C			C	C	C	D		
Approach Delay (s)		37.1			33.7			29.1			35.8		
Approach LOS		D			C			C			D		
Intersection Summary													
HCM Average Control Delay			32.6									HCM Level of Service	C
HCM Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			81.5									Sum of lost time (s)	18.0
Intersection Capacity Utilization			54.5%									ICU Level of Service	A
Analysis Period (min)			15										

c Critical Lane Group

ALTERNATIVE 2
2015 PM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 2 PM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	408	117	22	62	184	89	50	855	62	11	346	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1718		1770	1772		1719	3403		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1718		1770	1772		1719	3403		1752	3505	1568
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	486	139	26	74	219	106	60	1018	74	13	412	239
RTOR Reduction (vph)	0	7	0	0	19	0	0	5	0	0	0	0
Lane Group Flow (vph)	486	158	0	74	306	0	60	1087	0	13	412	239
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	26.8	40.3		7.3	20.8		6.3	26.5		1.0	21.2	93.1
Effective Green, g (s)	26.8	40.3		7.3	20.8		6.3	26.5		1.0	21.2	93.1
Actuated g/C Ratio	0.29	0.43		0.08	0.22		0.07	0.28		0.01	0.23	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	481	744		139	396		116	969		19	798	1568
v/s Ratio Prot	c0.29	0.09		0.04	c0.17		c0.03	c0.32		0.01	0.12	
v/s Ratio Perm												0.15
v/c Ratio	1.01	0.21		0.53	0.77		0.52	1.12		0.68	0.52	0.15
Uniform Delay, d1	33.1	16.5		41.3	33.9		41.9	33.3		45.9	31.5	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	43.7	0.1		3.9	9.1		3.9	68.5		69.9	0.6	0.2
Delay (s)	76.8	16.6		45.1	43.0		45.8	101.8		115.8	32.0	0.2
Level of Service	E	B		D	D		D	F		F	C	A
Approach Delay (s)		61.6			43.4			98.9			22.2	
Approach LOS		E			D			F			C	

Intersection Summary

HCM Average Control Delay	64.9	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	93.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Alt 2 PM

2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	236	391	19	241	503	75	61	672	222	85	269	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3514		1787	3505		1787	3574	1599	1736	3471	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3514		1787	3505		1787	3574	1599	1736	3471	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	271	449	22	277	578	86	70	772	255	98	309	71
RTOR Reduction (vph)	0	3	0	0	10	0	0	0	135	0	0	50
Lane Group Flow (vph)	271	468	0	277	654	0	70	772	120	98	309	21
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	18.7	25.0		20.3	26.6		7.0	29.2	29.2	8.3	30.5	30.5
Effective Green, g (s)	18.7	25.0		20.3	26.6		7.0	29.2	29.2	8.3	30.5	30.5
Actuated g/C Ratio	0.18	0.24		0.20	0.26		0.07	0.28	0.28	0.08	0.30	0.30
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	322	855		353	907		122	1015	454	140	1030	461
v/s Ratio Prot	0.15	0.13		c0.15	c0.19		0.04	c0.22		c0.06	0.09	
v/s Ratio Perm									0.08			0.01
v/c Ratio	0.84	0.55		0.78	0.72		0.57	0.76	0.27	0.70	0.30	0.05
Uniform Delay, d1	40.6	34.0		39.2	34.7		46.5	33.6	28.5	46.0	27.9	25.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.7	0.9		10.9	3.0		6.4	3.4	0.3	14.2	0.2	0.0
Delay (s)	58.3	34.9		50.1	37.8		52.8	37.0	28.8	60.3	28.1	25.8
Level of Service	E	C		D	D		D	D	C	E	C	C
Approach Delay (s)		43.4			41.4			36.1			34.3	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	39.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	102.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Alt 2 PM

3: I-5 NB Off-Ramp & Barksdale Ave

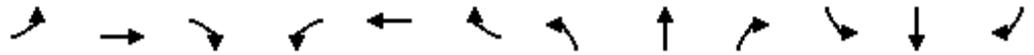
HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	323	2	139	0	0	0	0	755	158	377	183	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	0.98	
Satd. Flow (prot)		1792	1599					1900	1615	1681	1739	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	0.98	
Satd. Flow (perm)		1792	1599					1900	1615	1681	1739	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	359	2	154	0	0	0	0	839	176	419	203	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	69	0	0	0
Lane Group Flow (vph)	0	361	154	0	0	0	0	839	107	306	316	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	0%	0%	0%	2%	2%	2%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free						2			
Actuated Green, G (s)		26.1	120.0					53.0	53.0	28.9	28.9	
Effective Green, g (s)		26.1	120.0					53.0	53.0	28.9	28.9	
Actuated g/C Ratio		0.22	1.00					0.44	0.44	0.24	0.24	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		390	1599					839	713	405	419	
v/s Ratio Prot		c0.20						c0.44		c0.18		0.18
v/s Ratio Perm			0.10					0.07				
v/c Ratio		0.93	0.10					1.00	0.15	0.76	0.75	
Uniform Delay, d1		46.0	0.0					33.5	20.0	42.3	42.3	
Progression Factor		1.00	1.00					1.00	1.00	1.08	1.08	
Incremental Delay, d2		27.5	0.1					31.1	0.1	12.1	11.7	
Delay (s)		73.5	0.1					64.6	20.1	57.9	57.5	
Level of Service		E	A					E	C	E	E	
Approach Delay (s)		51.6			0.0			56.9			57.7	
Approach LOS		D			A			E			E	
Intersection Summary												
HCM Average Control Delay		55.8		HCM Level of Service				E				
HCM Volume to Capacity ratio		0.92										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				12.0				
Intersection Capacity Utilization		83.0%		ICU Level of Service				E				
Analysis Period (min)		15										
c Critical Lane Group												

Alt 2 PM

4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	33	1	219	544	545	0	0	529	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.95	1.00		0.98			1.00	1.00
Satd. Flow (prot)					1726	1538		1817			3539	1583
Flt Permitted					0.95	1.00		0.53			1.00	1.00
Satd. Flow (perm)					1726	1538		980			3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	35	1	235	585	586	0	0	569	497
RTOR Reduction (vph)	0	0	0	0	0	217	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	36	18	0	1171	0	0	569	497
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					9.4	9.4		97.6			72.1	120.0
Effective Green, g (s)					9.4	9.4		97.6			72.1	120.0
Actuated g/C Ratio					0.08	0.08		0.81			0.60	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					135	120		975			2126	1583
v/s Ratio Prot					0.02			c0.26			0.16	
v/s Ratio Perm						0.01		c0.72				c0.31
v/c Ratio					0.27	0.15		1.20			0.27	0.31
Uniform Delay, d1					52.1	51.6		11.2			11.4	0.0
Progression Factor					1.00	1.00		4.07			0.50	1.00
Incremental Delay, d2					1.3	0.7		93.5			0.3	0.5
Delay (s)					53.3	52.3		139.1			6.0	0.5
Level of Service					D	D		F			A	A
Approach Delay (s)		0.0			52.4			139.1			3.4	
Approach LOS		A			D			F			A	

Intersection Summary			
HCM Average Control Delay	72.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	97	175	544	43	61	139	114	552	28	82	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1800	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1800	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	22	102	184	573	45	64	146	120	581	29	86	25
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	7	0
Lane Group Flow (vph)	22	102	184	344	330	0	146	120	581	29	104	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	11.9	11.9	120.0	30.4	30.4		14.6	57.0	120.0	4.7	47.1	
Effective Green, g (s)	11.9	11.9	120.0	30.4	30.4		14.6	57.0	120.0	4.7	47.1	
Actuated g/C Ratio	0.10	0.10	1.00	0.25	0.25		0.12	0.48	1.00	0.04	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	176	185	1583	426	421		215	885	1583	69	707	
v/s Ratio Prot	0.01	c0.05		c0.20	0.20		c0.08	0.06		0.02	0.06	
v/s Ratio Perm			0.12						c0.37			
v/c Ratio	0.12	0.55	0.12	0.81	0.78		0.68	0.14	0.37	0.42	0.15	
Uniform Delay, d1	49.3	51.5	0.0	42.1	41.7		50.5	17.7	0.0	56.3	23.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.01	0.97	1.00	1.00	1.00	
Incremental Delay, d2	0.3	3.5	0.1	10.7	9.2		2.2	0.1	0.2	4.1	0.4	
Delay (s)	49.6	55.0	0.1	52.8	50.9		53.0	17.3	0.2	60.4	23.9	
Level of Service	D	E	A	D	D		D	B	A	E	C	
Approach Delay (s)		21.9			51.9			11.7			31.5	
Approach LOS		C			D			B			C	
Intersection Summary												
HCM Average Control Delay			28.5			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			45.8%			ICU Level of Service			A			
Analysis Period (min)			15									
c	Critical Lane Group											



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↘	↑	↘	
Volume (veh/h)	592	257	28	435	274	218
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	610	265	29	448	282	225
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			610		1116	610
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			610		1116	610
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		0	55
cM capacity (veh/h)			968		223	494

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	610	265	29	448	507
Volume Left	0	0	29	0	282
Volume Right	0	265	0	0	225
cSH	1700	1700	968	1700	294
Volume to Capacity	0.36	0.16	0.03	0.26	1.72
Queue Length 95th (ft)	0	0	2	0	812
Control Delay (s)	0.0	0.0	8.8	0.0	369.5
Lane LOS	A			F	
Approach Delay (s)	0.0		0.5		369.5
Approach LOS				F	

Intersection Summary					
Average Delay			100.9		
Intersection Capacity Utilization			66.4%	ICU Level of Service	C
Analysis Period (min)			15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	87	0	189	0	301	419	224	62	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	96	0	208	0	331	460	246	68	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	303	791	314
Volume Left (vph)	0	96	0	246
Volume Right (vph)	0	208	460	0
Hadj (s)	0.00	-0.31	-0.32	0.19
Departure Headway (s)	7.4	6.1	5.1	6.1
Degree Utilization, x	0.00	0.51	1.13	0.53
Capacity (veh/h)	435	569	704	580
Control Delay (s)	10.4	15.4	96.8	15.7
Approach Delay (s)	0.0	15.4	96.8	15.7
Approach LOS	A	C	F	C

Intersection Summary			
Delay		61.2	
HCM Level of Service		F	
Intersection Capacity Utilization	83.6%		ICU Level of Service E
Analysis Period (min)		15	

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	136	23	550	76	29	26	78	456	30	242	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00	
Satd. Flow (prot)		1830	1568	1698	1705			1822	1568	1770	1840	
Flt Permitted		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00	
Satd. Flow (perm)		1830	1568	1698	1705			1822	1568	1770	1840	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	31	162	27	655	90	35	31	93	543	36	288	25
RTOR Reduction (vph)	0	0	23	0	4	0	0	0	462	0	3	0
Lane Group Flow (vph)	0	193	4	393	383	0	0	124	81	36	310	0
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	3%	3%	3%	2%	2%	2%
Turn Type	Split		Perm	Split			Split		Perm	Split		
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases			3						2			
Actuated Green, G (s)		14.6	14.6	24.4	24.4			13.1	13.1	17.8	17.8	
Effective Green, g (s)		14.6	14.6	24.4	24.4			13.1	13.1	17.8	17.8	
Actuated g/C Ratio		0.17	0.17	0.28	0.28			0.15	0.15	0.20	0.20	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0	
Lane Grp Cap (vph)		304	260	471	473			272	234	358	373	
v/s Ratio Prot		c0.11		c0.23	0.22			c0.07		0.02	c0.17	
v/s Ratio Perm			0.00						0.05			
v/c Ratio		0.63	0.02	0.83	0.81			0.46	0.35	0.10	0.83	
Uniform Delay, d1		34.2	30.7	29.9	29.6			34.1	33.6	28.5	33.6	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		4.8	0.0	12.4	10.4			1.4	1.1	0.0	13.9	
Delay (s)		39.0	30.7	42.2	40.0			35.6	34.6	28.6	47.5	
Level of Service		D	C	D	D			D	C	C	D	
Approach Delay (s)		38.0			41.1			34.8			45.5	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM Average Control Delay			39.4			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			87.9			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			62.4%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

ALTERNATIVE 3
2015 AM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 3 AM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	78	19	102	115	30	18	446	64	74	571	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1708		1770	1805		1719	3374		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1708		1770	1805		1719	3374		1752	3505	1568
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	137	91	22	119	134	35	21	519	74	86	664	298
RTOR Reduction (vph)	0	13	0	0	13	0	0	10	0	0	0	0
Lane Group Flow (vph)	137	100	0	119	156	0	21	583	0	86	664	298
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	7.7	9.5		6.8	8.6		1.7	23.1		6.0	27.4	63.4
Effective Green, g (s)	7.7	9.5		6.8	8.6		1.7	23.1		6.0	27.4	63.4
Actuated g/C Ratio	0.12	0.15		0.11	0.14		0.03	0.36		0.09	0.43	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	256		190	245		46	1229		166	1515	1568
v/s Ratio Prot	c0.08	0.06		0.07	c0.09		0.01	0.17		c0.05	c0.19	
v/s Ratio Perm												c0.19
v/c Ratio	0.67	0.39		0.63	0.64		0.46	0.47		0.52	0.44	0.19
Uniform Delay, d1	26.7	24.3		27.1	25.9		30.4	15.5		27.3	12.6	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	8.6	1.0		6.3	5.3		7.0	0.3		2.7	0.2	0.3
Delay (s)	35.2	25.3		33.4	31.3		37.4	15.8		30.0	12.8	0.3
Level of Service	D	C		C	C		D	B		C	B	A
Approach Delay (s)		30.7			32.1			16.5			10.7	
Approach LOS		C			C			B			B	

Intersection Summary

HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Alt 3 AM

2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	386	18	234	368	50	48	367	239	119	522	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	3448		1719	3376		1770	3539	1583	1787	3574	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	3448		1719	3376		1770	3539	1583	1787	3574	1599
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	112	454	21	275	433	59	56	432	281	140	614	189
RTOR Reduction (vph)	0	3	0	0	10	0	0	0	221	0	0	137
Lane Group Flow (vph)	112	472	0	275	482	0	56	432	60	140	614	52
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	10.8	19.6		19.7	28.5		6.9	19.5	19.5	12.7	25.3	25.3
Effective Green, g (s)	10.8	19.6		19.7	28.5		6.9	19.5	19.5	12.7	25.3	25.3
Actuated g/C Ratio	0.12	0.21		0.22	0.31		0.08	0.21	0.21	0.14	0.28	0.28
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	205	739		370	1052		133	754	337	248	988	442
v/s Ratio Prot	0.06	c0.14		c0.16	0.14		0.03	0.12		c0.08	c0.17	
v/s Ratio Perm									0.04			0.03
v/c Ratio	0.55	0.64		0.74	0.46		0.42	0.57	0.18	0.56	0.62	0.12
Uniform Delay, d1	38.0	32.7		33.5	25.3		40.4	32.3	29.4	36.8	28.9	24.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	2.0		7.9	0.4		2.1	1.1	0.3	2.9	1.2	0.1
Delay (s)	41.0	34.8		41.4	25.7		42.5	33.3	29.7	39.7	30.1	24.9
Level of Service	D	C		D	C		D	C	C	D	C	C
Approach Delay (s)		36.0			31.4			32.7			30.5	
Approach LOS		D			C			C			C	

Intersection Summary

HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Alt 3 AM

3: I-5 NB Off-Ramp & Barksdale Ave

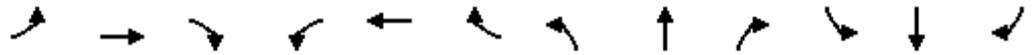
HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	341	0	581	0	0	0	0	191	127	217	354	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1583					1845	1568	1531	1607	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1583					1845	1568	1531	1607	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	416	0	709	0	0	0	0	233	155	265	432	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	130	0	0	0
Lane Group Flow (vph)	0	416	709	0	0	0	0	233	25	238	459	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	3%	3%	3%	12%	12%	12%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free							2		
Actuated Green, G (s)		33.2	120.0					19.1	19.1	55.7	55.7	
Effective Green, g (s)		33.2	120.0					19.1	19.1	55.7	55.7	
Actuated g/C Ratio		0.28	1.00					0.16	0.16	0.46	0.46	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		490	1583					294	250	711	746	
v/s Ratio Prot		c0.24						c0.13		0.16	c0.29	
v/s Ratio Perm			0.45					0.02				
v/c Ratio		0.85	0.45					0.79	0.10	0.33	0.62	
Uniform Delay, d1		41.0	0.0					48.5	43.1	20.4	24.1	
Progression Factor		1.00	1.00					1.00	1.00	0.39	0.45	
Incremental Delay, d2		12.9	0.9					13.6	0.2	1.2	3.7	
Delay (s)		53.9	0.9					62.1	43.3	9.3	14.6	
Level of Service		D	A					E	D	A	B	
Approach Delay (s)		20.5			0.0			54.6			12.7	
Approach LOS		C			A			D			B	
Intersection Summary												
HCM Average Control Delay		24.1		HCM Level of Service				C				
HCM Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				12.0				
Intersection Capacity Utilization		57.6%		ICU Level of Service				B				
Analysis Period (min)		15										
c Critical Lane Group												

Alt 3 AM

4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	187	9	432	57	503	0	0	394	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.95	1.00		0.99			1.00	1.00
Satd. Flow (prot)					1744	1553		1853			3438	1538
Flt Permitted					0.95	1.00		0.94			1.00	1.00
Satd. Flow (perm)					1744	1553		1742			3438	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	195	9	450	59	524	0	0	410	268
RTOR Reduction (vph)	0	0	0	0	0	217	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	204	233	0	583	0	0	410	268
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	2%	2%	2%	5%	5%	5%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					13.5	13.5		33.5			26.0	60.0
Effective Green, g (s)					13.5	13.5		33.5			26.0	60.0
Actuated g/C Ratio					0.22	0.22		0.56			0.43	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					392	349		986			1490	1538
v/s Ratio Prot					0.12			c0.07			0.12	
v/s Ratio Perm						c0.15		c0.26				0.17
v/c Ratio					0.52	0.67		0.59			0.28	0.17
Uniform Delay, d1					20.4	21.2		8.7			10.9	0.0
Progression Factor					1.00	1.00		1.10			0.93	1.00
Incremental Delay, d2					1.4	5.0		0.7			0.4	0.2
Delay (s)					21.8	26.2		10.3			10.5	0.2
Level of Service					C	C		B			B	A
Approach Delay (s)		0.0			24.8			10.3			6.4	
Approach LOS		A			C			B			A	

Intersection Summary		
HCM Average Control Delay	13.9	HCM Level of Service B
HCM Volume to Capacity ratio	0.61	
Actuated Cycle Length (s)	60.0	Sum of lost time (s) 13.0
Intersection Capacity Utilization	63.5%	ICU Level of Service B
Analysis Period (min)	15	

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	35	74	485	57	45	227	96	678	33	43	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1782	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1675		1770	1863	1583	1770	1782	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	22	38	81	533	63	49	249	105	745	36	47	19
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	9	0
Lane Group Flow (vph)	22	38	81	325	315	0	249	105	745	36	57	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	6.8	6.8	120.0	27.5	27.5		22.0	64.5	120.0	5.2	47.7	
Effective Green, g (s)	6.8	6.8	120.0	27.5	27.5		22.0	64.5	120.0	5.2	47.7	
Actuated g/C Ratio	0.06	0.06	1.00	0.23	0.23		0.18	0.54	1.00	0.04	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	100	106	1583	385	384		325	1001	1583	77	708	
v/s Ratio Prot	0.01	0.02		c0.19	0.19		c0.14	0.06		0.02	0.03	
v/s Ratio Perm			0.05						c0.47			
v/c Ratio	0.22	0.36	0.05	0.84	0.82		0.77	0.10	0.47	0.47	0.08	
Uniform Delay, d1	54.1	54.5	0.0	44.2	43.9		46.6	13.6	0.0	56.0	22.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.95	1.03	1.00	1.00	1.00	
Incremental Delay, d2	1.1	2.1	0.1	15.4	12.8		8.7	0.2	0.8	4.4	0.2	
Delay (s)	55.2	56.6	0.1	59.6	56.7		52.8	14.1	0.8	60.5	22.7	
Level of Service	E	E	A	E	E		D	B	A	E	C	
Approach Delay (s)		23.9			58.2			13.9			36.0	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			30.1			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			48.9%			ICU Level of Service			A			
Analysis Period (min)			15									
c	Critical Lane Group											



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	402	203	159	469	132	76
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	442	223	175	515	145	84
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			442		1307	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			442		1307	442
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		2	86
cM capacity (veh/h)			1118		149	616

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	442	223	175	515	229
Volume Left	0	0	175	0	145
Volume Right	0	223	0	0	84
cSH	1700	1700	1118	1700	206
Volume to Capacity	0.26	0.13	0.16	0.30	1.11
Queue Length 95th (ft)	0	0	14	0	270
Control Delay (s)	0.0	0.0	8.8	0.0	144.2
Lane LOS	A			F	
Approach Delay (s)	0.0		2.2		144.2
Approach LOS				F	

Intersection Summary						
Average Delay			21.8			
Intersection Capacity Utilization			51.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Alt 3 AM

7: 32nd Division Dr & East Dr

HCM Unsignalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	123	0	76	0	128	212	153	194	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	134	0	83	0	139	230	166	211	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	0	216	370	377								
Volume Left (vph)	0	134	0	166								
Volume Right (vph)	0	83	230	0								
Hadj (s)	0.00	-0.07	-0.34	0.12								
Departure Headway (s)	6.2	5.6	4.7	5.2								
Degree Utilization, x	0.00	0.34	0.49	0.54								
Capacity (veh/h)	473	581	728	672								
Control Delay (s)	9.2	11.5	12.2	14.0								
Approach Delay (s)	0.0	11.5	12.2	14.0								
Approach LOS	A	B	B	B								
Intersection Summary												
Delay			12.7									
HCM Level of Service			B									
Intersection Capacity Utilization			59.9%	ICU Level of Service	B							
Analysis Period (min)			15									

Alt 3 AM

8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	64	10	383	108	44	64	131	306	48	155	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	0.98			1.00	0.85	1.00	0.97	
Flt Protected		0.98	1.00	0.95	0.98			0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1799	1553	1649	1657			1851	1599	1752	1786	
Flt Permitted		0.98	1.00	0.95	0.98			0.98	1.00	0.95	1.00	
Satd. Flow (perm)		1799	1553	1649	1657			1851	1599	1752	1786	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	36	82	13	491	138	56	82	168	392	62	199	54
RTOR Reduction (vph)	0	0	11	0	7	0	0	0	309	0	10	0
Lane Group Flow (vph)	0	118	2	344	334	0	0	250	83	62	243	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Turn Type	Split		Perm	Split			Split		Perm	Split		
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases			3						2			
Actuated Green, G (s)		9.7	9.7	22.5	22.5			17.6	17.6	15.3	15.3	
Effective Green, g (s)		9.7	9.7	22.5	22.5			17.6	17.6	15.3	15.3	
Actuated g/C Ratio		0.12	0.12	0.27	0.27			0.21	0.21	0.18	0.18	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0	
Lane Grp Cap (vph)		210	181	446	449			392	339	323	329	
v/s Ratio Prot		c0.07		c0.21	0.20			c0.14		0.04	c0.14	
v/s Ratio Perm			0.00						0.05			
v/c Ratio		0.56	0.01	0.77	0.74			0.64	0.24	0.19	0.74	
Uniform Delay, d1		34.7	32.4	27.9	27.7			29.8	27.2	28.7	32.0	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		4.1	0.0	8.3	6.8			3.5	0.4	0.1	7.3	
Delay (s)		38.8	32.5	36.2	34.5			33.4	27.7	28.8	39.3	
Level of Service		D	C	D	C			C	C	C	D	
Approach Delay (s)		38.2			35.4			29.9			37.2	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM Average Control Delay			33.9			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			83.1			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			55.8%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

ALTERNATIVE 3
2015 PM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 3 PM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	412	118	22	63	188	91	50	860	62	11	351	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1718		1770	1772		1719	3403		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1718		1770	1772		1719	3403		1752	3505	1568
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	490	140	26	75	224	108	60	1024	74	13	418	243
RTOR Reduction (vph)	0	7	0	0	19	0	0	5	0	0	0	0
Lane Group Flow (vph)	490	159	0	75	313	0	60	1093	0	13	418	243
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	26.8	40.6		7.3	21.1		6.3	26.7		1.0	21.4	93.6
Effective Green, g (s)	26.8	40.6		7.3	21.1		6.3	26.7		1.0	21.4	93.6
Actuated g/C Ratio	0.29	0.43		0.08	0.23		0.07	0.29		0.01	0.23	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	478	745		138	399		116	971		19	801	1568
v/s Ratio Prot	c0.29	0.09		0.04	c0.18		c0.03	c0.32		0.01	0.12	
v/s Ratio Perm												0.15
v/c Ratio	1.03	0.21		0.54	0.79		0.52	1.13		0.68	0.52	0.15
Uniform Delay, d1	33.4	16.5		41.5	34.1		42.2	33.4		46.1	31.6	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	47.7	0.1		4.3	9.8		3.9	70.0		69.9	0.6	0.2
Delay (s)	81.1	16.7		45.9	43.9		46.0	103.4		116.0	32.2	0.2
Level of Service	F	B		D	D		D	F		F	C	A
Approach Delay (s)		64.8			44.3			100.4			22.3	
Approach LOS		E			D			F			C	

Intersection Summary

HCM Average Control Delay	66.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	93.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Alt 3 PM

2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	237	394	20	244	506	78	62	673	225	88	270	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3514		1787	3502		1787	3574	1599	1736	3471	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3514		1787	3502		1787	3574	1599	1736	3471	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	272	453	23	280	582	90	71	774	259	101	310	72
RTOR Reduction (vph)	0	3	0	0	10	0	0	0	136	0	0	49
Lane Group Flow (vph)	272	473	0	280	662	0	71	774	123	101	310	23
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	18.3	25.0		20.3	27.0		7.2	30.5	30.5	10.3		33.6
Effective Green, g (s)	18.3	25.0		20.3	27.0		7.2	30.5	30.5	10.3		33.6
Actuated g/C Ratio	0.17	0.24		0.19	0.25		0.07	0.29	0.29	0.10		0.32
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0		5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	305	828		342	891		121	1027	460	169		1099
v/s Ratio Prot	0.15	0.13		c0.16	c0.19		0.04	c0.22		c0.06		c0.09
v/s Ratio Perm									0.08			0.01
v/c Ratio	0.89	0.57		0.82	0.74		0.59	0.75	0.27	0.60		0.28
Uniform Delay, d1	42.9	35.8		41.1	36.4		48.0	34.4	29.2	45.9		27.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	26.1	1.1		14.1	3.6		7.1	3.2	0.3	5.6		0.1
Delay (s)	69.0	37.0		55.2	39.9		55.1	37.6	29.5	51.5		27.3
Level of Service	E	D		E	D		E	D	C	D		C
Approach Delay (s)		48.6			44.4			36.8				32.1
Approach LOS		D			D			D				C

Intersection Summary

HCM Average Control Delay	41.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	106.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Alt 3 PM

3: I-5 NB Off-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

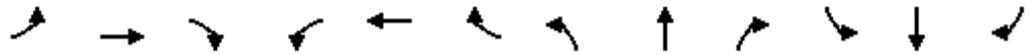
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	325	2	145	0	0	0	0	761	164	379	189	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	0.98	
Satd. Flow (prot)		1792	1599					1900	1615	1681	1740	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	0.98	
Satd. Flow (perm)		1792	1599					1900	1615	1681	1740	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	361	2	161	0	0	0	0	846	182	421	210	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	71	0	0	0
Lane Group Flow (vph)	0	363	161	0	0	0	0	846	111	312	319	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	0%	0%	0%	2%	2%	2%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free							2		
Actuated Green, G (s)		26.2	120.0					53.0	53.0	28.8	28.8	
Effective Green, g (s)		26.2	120.0					53.0	53.0	28.8	28.8	
Actuated g/C Ratio		0.22	1.00					0.44	0.44	0.24	0.24	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		391	1599					839	713	403	418	
v/s Ratio Prot		c0.20						c0.45		c0.19		0.18
v/s Ratio Perm			0.10					0.07				
v/c Ratio		0.93	0.10					1.01	0.16	0.77	0.76	
Uniform Delay, d1		46.0	0.0					33.5	20.1	42.6	42.4	
Progression Factor		1.00	1.00					1.00	1.00	1.04	1.04	
Incremental Delay, d2		27.9	0.1					33.1	0.1	13.2	12.1	
Delay (s)		73.9	0.1					66.6	20.2	57.3	56.1	
Level of Service		E	A					E	C	E	E	
Approach Delay (s)		51.2			0.0			58.4			56.7	
Approach LOS		D			A			E			E	
Intersection Summary												
HCM Average Control Delay		56.2			HCM Level of Service			E				
HCM Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		83.6%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

Alt 3 PM

4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	51	7	225	550	563	0	0	547	468
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Fr _t					1.00	0.85		1.00			1.00	0.85
Fl _t Protected					0.96	1.00		0.98			1.00	1.00
Satd. Flow (prot)					1734	1538		1818			3539	1583
Fl _t Permitted					0.96	1.00		0.52			1.00	1.00
Satd. Flow (perm)					1734	1538		961			3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	55	8	242	591	605	0	0	588	503
RTOR Reduction (vph)	0	0	0	0	0	221	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	63	21	0	1196	0	0	588	503
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					10.5	10.5		96.5			71.0	120.0
Effective Green, g (s)					10.5	10.5		96.5			71.0	120.0
Actuated g/C Ratio					0.09	0.09		0.80			0.59	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					152	135		955			2094	1583
v/s Ratio Prot					0.04			c0.27			0.17	
v/s Ratio Perm						0.01		c0.74				c0.32
v/c Ratio					0.41	0.16		1.25			0.28	0.32
Uniform Delay, d ₁					51.8	50.7		11.8			12.0	0.0
Progression Factor					1.00	1.00		3.72			0.51	1.00
Incremental Delay, d ₂					2.2	0.6		116.0			0.3	0.5
Delay (s)					54.0	51.3		159.8			6.4	0.5
Level of Service					D	D		F			A	A
Approach Delay (s)		0.0			51.9			159.8			3.7	
Approach LOS		A			D			F			A	

Intersection Summary			
HCM Average Control Delay	81.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	100	185	554	46	64	149	124	562	31	92	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1800	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1663		1770	1863	1583	1770	1800	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	105	195	583	48	67	157	131	592	33	97	28
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	7	0
Lane Group Flow (vph)	25	105	195	350	340	0	157	131	592	33	118	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	12.1	12.1	120.0	30.8	30.8		15.1	56.4	120.0	4.7	46.0	
Effective Green, g (s)	12.1	12.1	120.0	30.8	30.8		15.1	56.4	120.0	4.7	46.0	
Actuated g/C Ratio	0.10	0.10	1.00	0.26	0.26		0.13	0.47	1.00	0.04	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	178	188	1583	431	427		223	876	1583	69	690	
v/s Ratio Prot	0.01	c0.06		c0.21	0.20		c0.09	0.07		0.02	0.07	
v/s Ratio Perm			0.12						c0.37			
v/c Ratio	0.14	0.56	0.12	0.81	0.80		0.70	0.15	0.37	0.48	0.17	
Uniform Delay, d1	49.2	51.4	0.0	41.9	41.7		50.3	18.1	0.0	56.4	24.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	3.6	0.2	11.1	9.9		0.9	0.0	0.1	5.1	0.5	
Delay (s)	49.6	55.0	0.2	53.0	51.5		51.3	18.1	0.1	61.6	25.0	
Level of Service	D	D	A	D	D		D	B	A	E	C	
Approach Delay (s)		21.7			52.3			11.9			32.6	
Approach LOS		C			D			B			C	
Intersection Summary												
HCM Average Control Delay			28.7			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			50.1%			ICU Level of Service			A			
Analysis Period (min)			15									
c	Critical Lane Group											



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	599	279	50	442	296	240
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	618	288	52	456	305	247
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			618		1176	618
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			618		1176	618
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		0	49
cM capacity (veh/h)			963		200	490

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	618	288	52	456	553
Volume Left	0	0	52	0	305
Volume Right	0	288	0	0	247
cSH	1700	1700	963	1700	272
Volume to Capacity	0.36	0.17	0.05	0.27	2.03
Queue Length 95th (ft)	0	0	4	0	1005
Control Delay (s)	0.0	0.0	9.0	0.0	507.0
Lane LOS	A			F	
Approach Delay (s)	0.0		0.9		507.0
Approach LOS				F	

Intersection Summary					
Average Delay			142.8		
Intersection Capacity Utilization			76.0%	ICU Level of Service	D
Analysis Period (min)			15		

Alt 3 PM

7: 32nd Division Dr & East Dr

HCM Unsignalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	104	0	195	0	318	436	230	79	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	114	0	214	0	349	479	253	87	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	329	829	340
Volume Left (vph)	0	114	0	253
Volume Right (vph)	0	214	479	0
Hadj (s)	0.00	-0.29	-0.31	0.18
Departure Headway (s)	7.6	6.2	5.3	6.2
Degree Utilization, x	0.00	0.57	1.22	0.58
Capacity (veh/h)	417	562	687	561
Control Delay (s)	10.6	16.9	132.6	17.5
Approach Delay (s)	0.0	16.9	132.6	17.5
Approach LOS	A	C	F	C

Intersection Summary			
Delay		81.1	
HCM Level of Service		F	
Intersection Capacity Utilization	88.1%		ICU Level of Service E
Analysis Period (min)		15	

Alt 3 PM

8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	140	36	563	80	33	39	91	469	34	255	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00	
Satd. Flow (prot)		1828	1568	1698	1704			1818	1568	1770	1838	
Flt Permitted		0.99	1.00	0.95	0.97			0.99	1.00	0.95	1.00	
Satd. Flow (perm)		1828	1568	1698	1704			1818	1568	1770	1838	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	36	167	43	670	95	39	46	108	558	40	304	30
RTOR Reduction (vph)	0	0	36	0	4	0	0	0	471	0	3	0
Lane Group Flow (vph)	0	203	7	402	398	0	0	154	87	40	331	0
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	3%	3%	3%	2%	2%	2%
Turn Type	Split		Perm	Split			Split		Perm	Split		
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases			3						2			
Actuated Green, G (s)		15.0	15.0	24.9	24.9			14.1	14.1	18.7	18.7	
Effective Green, g (s)		15.0	15.0	24.9	24.9			14.1	14.1	18.7	18.7	
Actuated g/C Ratio		0.17	0.17	0.27	0.27			0.16	0.16	0.21	0.21	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0	
Lane Grp Cap (vph)		302	259	466	468			283	244	365	379	
v/s Ratio Prot		c0.11		c0.24	0.23			c0.08		0.02	c0.18	
v/s Ratio Perm			0.00						0.06			
v/c Ratio		0.67	0.03	0.86	0.85			0.54	0.36	0.11	0.87	
Uniform Delay, d1		35.5	31.7	31.3	31.1			35.3	34.2	29.2	34.8	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		6.3	0.1	15.5	14.2			2.4	1.1	0.0	18.8	
Delay (s)		41.8	31.8	46.7	45.3			37.7	35.3	29.3	53.7	
Level of Service		D	C	D	D			D	D	C	D	
Approach Delay (s)		40.1			46.0			35.8			51.0	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM Average Control Delay			42.8			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			90.7			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			64.6%			ICU Level of Service				C		
Analysis Period (min)			15									

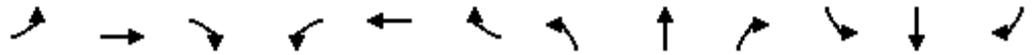
c Critical Lane Group

ALTERNATIVE 4
2015 AM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 4 AM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	104	23	133	151	38	19	511	72	84	655	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.97		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1711		1770	1807		1719	3374		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1711		1770	1807		1719	3374		1752	3505	1568
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	187	121	27	155	176	44	22	594	84	98	762	343
RTOR Reduction (vph)	0	12	0	0	12	0	0	11	0	0	0	0
Lane Group Flow (vph)	187	136	0	155	208	0	22	667	0	98	762	343
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	12.0	12.4		14.5	14.9		1.9	20.3		6.7	25.1	71.9
Effective Green, g (s)	12.0	12.4		14.5	14.9		1.9	20.3		6.7	25.1	71.9
Actuated g/C Ratio	0.17	0.17		0.20	0.21		0.03	0.28		0.09	0.35	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	279	295		357	374		45	953		163	1224	1568
v/s Ratio Prot	c0.11	0.08		0.09	c0.12		0.01	c0.20		c0.06	0.22	
v/s Ratio Perm												c0.22
v/c Ratio	0.67	0.46		0.43	0.56		0.49	0.70		0.60	0.62	0.22
Uniform Delay, d1	28.1	26.8		25.1	25.5		34.5	23.1		31.3	19.5	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.2	1.1		0.8	1.8		8.1	2.3		6.1	1.0	0.3
Delay (s)	34.3	27.9		26.0	27.3		42.7	25.3		37.4	20.5	0.3
Level of Service	C	C		C	C		D	C		D	C	A
Approach Delay (s)		31.5			26.8			25.9			16.1	
Approach LOS		C			C			C			B	

Intersection Summary

HCM Average Control Delay	22.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	71.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Alt 4 AM

2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	396	28	244	378	80	58	397	249	149	552	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	3437		1719	3348		1770	3539	1583	1787	3574	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	3437		1719	3348		1770	3539	1583	1787	3574	1599
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	147	466	33	287	445	94	68	467	293	175	649	225
RTOR Reduction (vph)	0	5	0	0	16	0	0	0	230	0	0	161
Lane Group Flow (vph)	147	494	0	287	523	0	68	467	63	175	649	64
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	12.2	21.0		20.8	29.6		7.4	20.8	20.8	14.3		27.7
Effective Green, g (s)	12.2	21.0		20.8	29.6		7.4	20.8	20.8	14.3		27.7
Actuated g/C Ratio	0.13	0.22		0.21	0.31		0.08	0.21	0.21	0.15		0.29
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0		5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	219	745		369	1023		135	760	340	264		1022
v/s Ratio Prot	0.08	c0.14		c0.17	0.16		0.04	0.13		c0.10		c0.18
v/s Ratio Perm									0.04			0.04
v/c Ratio	0.67	0.66		0.78	0.51		0.50	0.61	0.18	0.66		0.64
Uniform Delay, d1	40.4	34.7		35.9	27.7		43.0	34.4	31.1	39.0		30.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	7.8	2.5		9.9	0.6		2.9	1.5	0.3	6.1		1.3
Delay (s)	48.3	37.2		45.8	28.3		45.9	35.9	31.4	45.2		31.5
Level of Service	D	D		D	C		D	D	C	D		C
Approach Delay (s)		39.7			34.4			35.1				32.6
Approach LOS		D			C			D				C
Intersection Summary												
HCM Average Control Delay			35.0			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			96.9			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			61.3%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

Alt 4 AM

3: I-5 NB Off-Ramp & Barksdale Ave

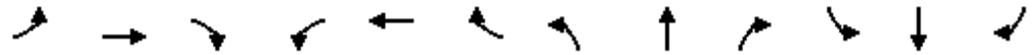
HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	400	0	601	0	0	0	0	250	147	276	413	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1770	1583					1845	1568	1531	1607	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1770	1583					1845	1568	1531	1607	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	488	0	733	0	0	0	0	305	179	337	504	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	147	0	0	0
Lane Group Flow (vph)	0	488	733	0	0	0	0	305	32	303	538	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	3%	3%	3%	12%	12%	12%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free						2			
Actuated Green, G (s)		36.9	120.0					21.5	21.5	49.6	49.6	
Effective Green, g (s)		36.9	120.0					21.5	21.5	49.6	49.6	
Actuated g/C Ratio		0.31	1.00					0.18	0.18	0.41	0.41	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		544	1583					331	281	633	664	
v/s Ratio Prot		c0.28						c0.17		0.20	c0.33	
v/s Ratio Perm			0.46					0.02				
v/c Ratio		0.90	0.46					0.92	0.11	0.48	0.81	
Uniform Delay, d1		39.7	0.0					48.4	41.3	25.7	31.0	
Progression Factor		1.00	1.00					1.00	1.00	0.51	0.57	
Incremental Delay, d2		17.3	1.0					30.1	0.2	2.5	10.1	
Delay (s)		57.0	1.0					78.5	41.5	15.7	27.9	
Level of Service		E	A					E	D	B	C	
Approach Delay (s)		23.4			0.0			64.8			23.5	
Approach LOS		C			A			E			C	
Intersection Summary												
HCM Average Control Delay		31.3		HCM Level of Service				C				
HCM Volume to Capacity ratio		0.86										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				12.0				
Intersection Capacity Utilization		67.1%		ICU Level of Service				C				
Analysis Period (min)		15										
c Critical Lane Group												

Alt 4 AM

4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	195	17	456	65	527	0	0	418	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.96	1.00		0.99			1.00	1.00
Satd. Flow (prot)					1747	1553		1853			3438	1538
Flt Permitted					0.96	1.00		0.92			1.00	1.00
Satd. Flow (perm)					1747	1553		1717			3438	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	203	18	475	68	549	0	0	435	293
RTOR Reduction (vph)	0	0	0	0	0	199	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	221	276	0	617	0	0	435	293
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	2%	2%	2%	5%	5%	5%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					14.5	14.5		32.5			25.0	60.0
Effective Green, g (s)					14.5	14.5		32.5			25.0	60.0
Actuated g/C Ratio					0.24	0.24		0.54			0.42	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					422	375		947			1433	1538
v/s Ratio Prot					0.13			c0.08			0.13	
v/s Ratio Perm						c0.18		c0.27				0.19
v/c Ratio					0.52	0.74		0.65			0.30	0.19
Uniform Delay, d1					19.8	21.0		9.7			11.7	0.0
Progression Factor					1.00	1.00		1.20			0.94	1.00
Incremental Delay, d2					1.3	7.6		0.8			0.5	0.2
Delay (s)					21.1	28.6		12.5			11.4	0.2
Level of Service					C	C		B			B	A
Approach Delay (s)		0.0			26.2			12.5			6.9	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Alt 4 AM

5: Willmington Dr & Barksdale Ave

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	42	77	492	64	52	230	99	685	40	46	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1672		1770	1863	1583	1770	1781	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1672		1770	1863	1583	1770	1781	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	24	46	85	541	70	57	253	109	753	44	51	21
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	0	0	9	0
Lane Group Flow (vph)	24	46	85	335	327	0	253	109	753	44	63	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	7.3	7.3	120.0	28.0	28.0		22.2	62.0	120.0	6.7	46.5	
Effective Green, g (s)	7.3	7.3	120.0	28.0	28.0		22.2	62.0	120.0	6.7	46.5	
Actuated g/C Ratio	0.06	0.06	1.00	0.23	0.23		0.18	0.52	1.00	0.06	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	108	113	1583	392	390		327	963	1583	99	690	
v/s Ratio Prot	0.01	0.02		c0.20	0.20		c0.14	0.06		0.02	0.04	
v/s Ratio Perm			0.05						c0.48			
v/c Ratio	0.22	0.41	0.05	0.85	0.84		0.77	0.11	0.48	0.44	0.09	
Uniform Delay, d1	53.6	54.3	0.0	44.1	43.8		46.5	14.9	0.0	54.8	23.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.92	1.01	1.00	1.00	1.00	
Incremental Delay, d2	1.0	2.4	0.1	16.4	14.5		8.5	0.2	0.8	3.2	0.3	
Delay (s)	54.7	56.7	0.1	60.5	58.3		51.3	15.3	0.8	58.0	23.6	
Level of Service	D	E	A	E	E		D	B	A	E	C	
Approach Delay (s)		25.3			59.4			13.7			36.6	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			30.7			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			49.6%			ICU Level of Service			A			
Analysis Period (min)			15									
c	Critical Lane Group											



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	402	203	159	469	132	76
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	442	223	175	515	145	84
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			442		1307	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			442		1307	442
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		2	86
cM capacity (veh/h)			1118		149	616

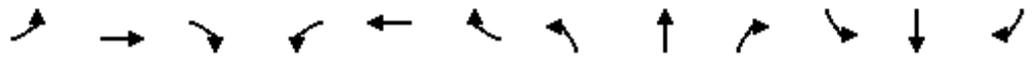
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	442	223	175	515	229
Volume Left	0	0	175	0	145
Volume Right	0	223	0	0	84
cSH	1700	1700	1118	1700	206
Volume to Capacity	0.26	0.13	0.16	0.30	1.11
Queue Length 95th (ft)	0	0	14	0	270
Control Delay (s)	0.0	0.0	8.8	0.0	144.2
Lane LOS	A			F	
Approach Delay (s)	0.0		2.2		144.2
Approach LOS				F	

Intersection Summary					
Average Delay			21.8		
Intersection Capacity Utilization			51.9%	ICU Level of Service	A
Analysis Period (min)			15		

Alt 3 AM

7: 32nd Division Dr & East Dr

HCM Unsignalized Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	123	0	76	0	128	212	153	194	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	134	0	83	0	139	230	166	211	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	216	370	377
Volume Left (vph)	0	134	0	166
Volume Right (vph)	0	83	230	0
Hadj (s)	0.00	-0.07	-0.34	0.12
Departure Headway (s)	6.2	5.6	4.7	5.2
Degree Utilization, x	0.00	0.34	0.49	0.54
Capacity (veh/h)	473	581	728	672
Control Delay (s)	9.2	11.5	12.2	14.0
Approach Delay (s)	0.0	11.5	12.2	14.0
Approach LOS	A	B	B	B

Intersection Summary			
Delay		12.7	
HCM Level of Service		B	
Intersection Capacity Utilization	59.9%		ICU Level of Service B
Analysis Period (min)		15	

Alt 4 AM

8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	79	15	398	123	59	69	136	321	63	160	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	0.97			1.00	0.85	1.00	0.97	
Flt Protected		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1800	1553	1649	1652			1850	1599	1752	1782	
Flt Permitted		0.99	1.00	0.95	0.98			0.98	1.00	0.95	1.00	
Satd. Flow (perm)		1800	1553	1649	1652			1850	1599	1752	1782	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	42	101	19	510	158	76	88	174	412	81	205	60
RTOR Reduction (vph)	0	0	16	0	9	0	0	0	327	0	11	0
Lane Group Flow (vph)	0	143	3	372	363	0	0	262	85	81	254	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Turn Type	Split		Perm	Split			Split		Perm	Split		
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases			3						2			
Actuated Green, G (s)		13.1	13.1	23.4	23.4			18.1	18.1	15.6	15.6	
Effective Green, g (s)		13.1	13.1	23.4	23.4			18.1	18.1	15.6	15.6	
Actuated g/C Ratio		0.15	0.15	0.27	0.27			0.21	0.21	0.18	0.18	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0	
Lane Grp Cap (vph)		267	231	437	438			380	328	310	315	
v/s Ratio Prot		c0.08		c0.23	0.22			c0.14		0.05	c0.14	
v/s Ratio Perm			0.00						0.05			
v/c Ratio		0.54	0.01	0.85	0.83			0.69	0.26	0.26	0.81	
Uniform Delay, d1		34.7	32.0	30.7	30.5			32.4	29.4	31.3	34.9	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.6	0.0	15.0	12.6			5.3	0.5	0.2	13.3	
Delay (s)		37.4	32.1	45.8	43.1			37.8	29.9	31.5	48.1	
Level of Service		D	C	D	D			D	C	C	D	
Approach Delay (s)		36.7			44.4			33.0			44.2	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM Average Control Delay			39.7			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			88.2			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			59.3%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

ALTERNATIVE 4
2015 PM PEAK HOUR
LOS CALCULATION WORKSHEETS

Alt 4 PM

1: Nevada Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	463	132	25	75	227	109	54	921	66	13	427	248
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1671	1717		1770	1772		1719	3403		1752	3505	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1671	1717		1770	1772		1719	3403		1752	3505	1568
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	551	157	30	89	270	130	64	1096	79	15	508	295
RTOR Reduction (vph)	0	7	0	0	18	0	0	5	0	0	0	0
Lane Group Flow (vph)	551	180	0	89	382	0	64	1170	0	15	508	295
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot			Prot			Prot			Prot		Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												Free
Actuated Green, G (s)	26.7	43.5		7.6	24.4		6.4	26.4		2.1	22.1	97.6
Effective Green, g (s)	26.7	43.5		7.6	24.4		6.4	26.4		2.1	22.1	97.6
Actuated g/C Ratio	0.27	0.45		0.08	0.25		0.07	0.27		0.02	0.23	1.00
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	457	765		138	443		113	920		38	794	1568
v/s Ratio Prot	c0.33	0.11		0.05	c0.22		c0.04	c0.34		0.01	0.14	
v/s Ratio Perm												0.19
v/c Ratio	1.21	0.24		0.64	0.86		0.57	1.27		0.39	0.64	0.19
Uniform Delay, d1	35.4	16.8		43.7	35.0		44.3	35.6		47.1	34.1	0.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	111.7	0.2		9.9	15.7		6.4	130.8		6.6	1.7	0.3
Delay (s)	147.1	16.9		53.6	50.7		50.6	166.4		53.8	35.9	0.3
Level of Service	F	B		D	D		D	F		D	D	A
Approach Delay (s)		114.1			51.3			160.4			23.3	
Approach LOS		F			D			F			C	
Intersection Summary												
HCM Average Control Delay			99.6									F
HCM Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			97.6							18.0		
Intersection Capacity Utilization			90.1%									E
Analysis Period (min)			15									

c Critical Lane Group

Alt 4 PM

2: Pendleton Ave & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	281	409	35	259	521	122	77	717	240	132	314	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3498		1787	3473		1787	3574	1599	1736	3471	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3498		1787	3473		1787	3574	1599	1736	3471	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	323	470	40	298	599	140	89	824	276	152	361	123
RTOR Reduction (vph)	0	5	0	0	18	0	0	0	136	0	0	83
Lane Group Flow (vph)	323	505	0	298	721	0	89	824	140	152	361	40
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases									2			6
Actuated Green, G (s)	18.2	26.1		21.4	29.3		7.5	32.2	32.2	11.9		36.6
Effective Green, g (s)	18.2	26.1		21.4	29.3		7.5	32.2	32.2	11.9		36.6
Actuated g/C Ratio	0.16	0.23		0.19	0.26		0.07	0.29	0.29	0.11		0.33
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0		5.0
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	289	818		343	912		120	1031	461	185	1138	509
v/s Ratio Prot	c0.18	0.14		0.17	c0.21		0.05	c0.23		c0.09		c0.10
v/s Ratio Perm									0.09			0.03
v/c Ratio	1.12	0.62		0.87	0.79		0.74	0.80	0.30	0.82		0.32
Uniform Delay, d1	46.7	38.3		43.7	38.3		51.1	36.7	31.0	48.8		28.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	88.4	1.6		20.1	5.0		21.6	4.4	0.4	24.5		0.2
Delay (s)	135.1	39.9		63.9	43.3		72.7	41.1	31.3	73.3		28.3
Level of Service	F	D		E	D		E	D	C	E		C
Approach Delay (s)		76.8			49.2			41.2				38.6
Approach LOS		E			D			D				D

Intersection Summary

HCM Average Control Delay	51.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	111.6	Sum of lost time (s)	25.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Alt 4 PM

3: I-5 NB Off-Ramp & Barksdale Ave

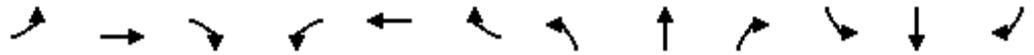
HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	383	2	164	0	0	0	0	818	183	437	246	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00					1.00	1.00	0.95	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	0.99	
Satd. Flow (prot)		1792	1599					1900	1615	1681	1744	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	0.99	
Satd. Flow (perm)		1792	1599					1900	1615	1681	1744	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	426	2	182	0	0	0	0	909	203	486	273	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	74	0	0	0
Lane Group Flow (vph)	0	428	182	0	0	0	0	909	129	374	385	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	0%	0%	0%	2%	2%	2%
Turn Type	Split		Free					Perm		Split		
Protected Phases	4	4						2		1	1	
Permitted Phases			Free						2			
Actuated Green, G (s)		27.0	120.0					53.0	53.0	28.0	28.0	
Effective Green, g (s)		27.0	120.0					53.0	53.0	28.0	28.0	
Actuated g/C Ratio		0.22	1.00					0.44	0.44	0.23	0.23	
Clearance Time (s)		4.0						4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		403	1599					839	713	392	407	
v/s Ratio Prot		c0.24						c0.48		c0.22		0.22
v/s Ratio Perm			0.11					0.08				
v/c Ratio		1.06	0.11					1.08	0.18	0.95	0.95	
Uniform Delay, d1		46.5	0.0					33.5	20.3	45.4	45.3	
Progression Factor		1.00	1.00					1.00	1.00	1.01	1.01	
Incremental Delay, d2		62.2	0.1					56.2	0.1	34.6	32.3	
Delay (s)		108.7	0.1					89.7	20.5	80.2	77.8	
Level of Service		F	A					F	C	F	E	
Approach Delay (s)		76.3			0.0			77.0			79.0	
Approach LOS		E			A			E			E	
Intersection Summary												
HCM Average Control Delay		77.5			HCM Level of Service			E				
HCM Volume to Capacity ratio		1.04										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		92.9%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Alt 4 PM

4: I-5 SB On-Ramp & Barksdale Ave

HCM Signalized Intersection Capacity Analysis



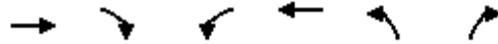
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↗		↕			↕↕	↗
Volume (vph)	0	0	0	66	22	269	565	607	0	0	591	512
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.5			4.5	4.0
Lane Util. Factor					1.00	1.00		1.00			0.95	1.00
Frt					1.00	0.85		1.00			1.00	0.85
Flt Protected					0.96	1.00		0.98			1.00	1.00
Satd. Flow (prot)					1744	1538		1819			3539	1583
Flt Permitted					0.96	1.00		0.49			1.00	1.00
Satd. Flow (perm)					1744	1538		916			3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	71	24	289	608	653	0	0	635	551
RTOR Reduction (vph)	0	0	0	0	0	259	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	95	30	0	1261	0	0	635	551
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type				Split		Perm	custom					Free
Protected Phases				4	4		2	1 2			1	
Permitted Phases						4	2					Free
Actuated Green, G (s)					12.3	12.3		94.7			69.2	120.0
Effective Green, g (s)					12.3	12.3		94.7			69.2	120.0
Actuated g/C Ratio					0.10	0.10		0.79			0.58	1.00
Clearance Time (s)					4.0	4.0					4.5	
Vehicle Extension (s)					3.5	3.5					4.0	
Lane Grp Cap (vph)					179	158		915			2041	1583
v/s Ratio Prot					c0.05			c0.29			0.18	
v/s Ratio Perm						0.02		c0.80				0.35
v/c Ratio					0.53	0.19		1.38			0.31	0.35
Uniform Delay, d1					51.1	49.3		12.6			13.1	0.0
Progression Factor					1.00	1.00		3.06			0.53	1.00
Incremental Delay, d2					3.4	0.7		170.8			0.4	0.6
Delay (s)					54.5	50.0		209.5			7.3	0.6
Level of Service					D	D		F			A	A
Approach Delay (s)		0.0			51.1			209.5			4.2	
Approach LOS		A			D			F			A	

Intersection Summary

HCM Average Control Delay	102.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	109	188	563	55	73	152	127	571	40	95	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1681	1661		1770	1863	1583	1770	1795	
Flt Permitted	0.95	1.00	1.00	0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1681	1661		1770	1863	1583	1770	1795	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	28	115	198	593	58	77	160	134	601	42	100	32
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	8	0
Lane Group Flow (vph)	28	115	198	368	351	0	160	134	601	42	124	0
Turn Type	Split		Free	Split			Prot		Free	Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			Free						Free			
Actuated Green, G (s)	12.7	12.7	120.0	32.0	32.0		15.2	53.1	120.0	6.2	44.1	
Effective Green, g (s)	12.7	12.7	120.0	32.0	32.0		15.2	53.1	120.0	6.2	44.1	
Actuated g/C Ratio	0.11	0.11	1.00	0.27	0.27		0.13	0.44	1.00	0.05	0.37	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	187	197	1583	448	443		224	824	1583	91	660	
v/s Ratio Prot	0.02	c0.06		c0.22	0.21		c0.09	0.07		0.02	0.07	
v/s Ratio Perm			0.13						c0.38			
v/c Ratio	0.15	0.58	0.13	0.82	0.79		0.71	0.16	0.38	0.46	0.19	
Uniform Delay, d1	48.7	51.1	0.0	41.3	40.9		50.3	20.1	0.0	55.3	25.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.03	1.00	1.00	1.00	
Incremental Delay, d2	0.4	4.4	0.2	11.5	9.4		1.0	0.0	0.1	3.7	0.6	
Delay (s)	49.1	55.5	0.2	52.8	50.3		51.5	20.8	0.1	59.0	26.4	
Level of Service	D	E	A	D	D		D	C	A	E	C	
Approach Delay (s)		22.8			51.6			12.4			34.3	
Approach LOS		C			D			B			C	
Intersection Summary												
HCM Average Control Delay			29.2			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			51.2%			ICU Level of Service		A				
Analysis Period (min)			15									
c	Critical Lane Group											



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (veh/h)	605	295	66	448	312	256
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	624	304	68	462	322	264
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			624		1222	624
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			624		1222	624
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		0	46
cM capacity (veh/h)			957		184	486

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	624	304	68	462	586
Volume Left	0	0	68	0	322
Volume Right	0	304	0	0	264
cSH	1700	1700	957	1700	256
Volume to Capacity	0.37	0.18	0.07	0.27	2.29
Queue Length 95th (ft)	0	0	6	0	1150
Control Delay (s)	0.0	0.0	9.0	0.0	622.9
Lane LOS	A			F	
Approach Delay (s)	0.0		1.2		622.9
Approach LOS				F	

Intersection Summary					
Average Delay			178.8		
Intersection Capacity Utilization			78.5%	ICU Level of Service	D
Analysis Period (min)			15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	109	0	210	0	333	441	245	94	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	120	0	231	0	366	485	269	103	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	351	851	373
Volume Left (vph)	0	120	0	269
Volume Right (vph)	0	231	485	0
Hadj (s)	0.00	-0.29	-0.31	0.18
Departure Headway (s)	7.8	6.3	5.5	6.3
Degree Utilization, x	0.00	0.61	1.30	0.65
Capacity (veh/h)	397	556	668	556
Control Delay (s)	10.8	18.6	163.5	20.2
Approach Delay (s)	0.0	18.6	163.5	20.2
Approach LOS	A	C	F	C

Intersection Summary			
Delay		97.3	
HCM Level of Service		F	
Intersection Capacity Utilization	92.0%		ICU Level of Service F
Analysis Period (min)		15	

Alt 4 PM

8: A St & 41st Division Dr

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	149	39	572	89	42	42	94	478	43	258	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	0.95	0.95			1.00	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	0.98			1.00	0.85	1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.97			0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1828	1568	1698	1702			1817	1568	1770	1836	
Flt Permitted		0.99	1.00	0.95	0.97			0.98	1.00	0.95	1.00	
Satd. Flow (perm)		1828	1568	1698	1702			1817	1568	1770	1836	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	39	177	46	681	106	50	50	112	569	51	307	33
RTOR Reduction (vph)	0	0	38	0	5	0	0	0	480	0	4	0
Lane Group Flow (vph)	0	216	8	422	410	0	0	162	89	51	336	0
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	3%	3%	3%	2%	2%	2%
Turn Type	Split		Perm	Split			Split		Perm	Split		
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases			3						2			
Actuated Green, G (s)		15.5	15.5	25.6	25.6			14.5	14.5	18.9	18.9	
Effective Green, g (s)		15.5	15.5	25.6	25.6			14.5	14.5	18.9	18.9	
Actuated g/C Ratio		0.17	0.17	0.28	0.28			0.16	0.16	0.20	0.20	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5	4.5	4.5	
Vehicle Extension (s)		4.0	4.0	3.5	3.5			3.5	3.5	2.0	2.0	
Lane Grp Cap (vph)		306	263	470	471			285	246	362	375	
v/s Ratio Prot		c0.12		c0.25	0.24			c0.09		0.03	c0.18	
v/s Ratio Perm			0.00						0.06			
v/c Ratio		0.71	0.03	0.90	0.87			0.57	0.36	0.14	0.90	
Uniform Delay, d1		36.3	32.2	32.2	31.9			36.1	34.9	30.1	35.8	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		7.7	0.1	19.8	16.3			2.8	1.1	0.1	22.4	
Delay (s)		44.1	32.3	52.0	48.2			38.9	35.9	30.2	58.3	
Level of Service		D	C	D	D			D	D	C	E	
Approach Delay (s)		42.0		50.1				36.6			54.6	
Approach LOS		D		D				D			D	
Intersection Summary												
HCM Average Control Delay			45.5			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			92.5			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			66.7%			ICU Level of Service				C		
Analysis Period (min)			15									

c Critical Lane Group