ENVIRONMENTAL ASSESSMENT

Construction and Operation of a new Access Control Point at Lewis North, Joint Base Lewis-McChord, Washington

Recommended for Approval by:

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Approved by:

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Colonel, US Army
Commanding

National Environmental Policy Act (NEPA)
Documentation prepared by the Environmental Division
Public Works, Joint Base Lewis-McChord

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Acronyms

ACP	Access Control Point
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
DPW	Department of Public Works
EA	Environmental Assessment
FONSI	Finding of No Significant Impact
INRMP	Integrated Natural Resources Management Plan
I-5	Interstate-5
JBLM	Joint Base Lewis-McChord
LF	Linear feet
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination Permit
SF	Square feet
SWPPP	Stormwater Pollution Prevention Plan

INTRODUCTION

Due to the Grow the Army Initiative, Joint Base Lewis-McChord (JBLM) has been in a period of growth from 2002 when the troop population was just over 20,000 and is currently approximately 32,000. A historical maximum troop population occurred at JBLM in 1987, reaching nearly 26,000. Due to the recent increase in population, the infrastructure systems at JBLM have been and will continue to be strained in areas such as traffic and transportation, housing, and utilities, among others.

With the addition of the new personnel, vehicle traffic will increase proportionally and the existing road network will be strained. New and revised Access Control Points (ACPs) [1] (ingress and egress gates) will be required at key locations to facilitate traffic flow, and reduce congestion. An ACP is a corridor at an installation entrance through which all vehicles and pedestrians must pass when entering or exiting the installation. The perimeter of the ACP consists of both passive and active barriers arranged to form a contiguous barrier to pedestrians and vehicles. ACP guards control the active barriers to deny or permit entry into the installation. Recent traffic surveys have found that JBLM – Lewis North (Lewis North) does not have the access capacities to support the soldier population (approximately 40% of the total military population) stationed there and has become the focus point for development of a new access control point to JBLM.

Location and Background

Lewis North is located in the northern section of JBLM and is geographically separated from the main portion of the installation by Interstate 5 (I-5). Lewis North is located in Pierce County and neighbors the Cities of Dupont to the west, and Steilacoom and Lakewood to the north and east respectively.
There are presently only two operating ACPs to Lewis North (see Figure 1), as well as a single-guard access point that is open in the mornings only for morning commuters.

- Lewis North Gate: serves travelers from I-5, Exit 120. This interchange is the main ingress and egress location for soldiers, family members, and civilian employees entering and exiting Lewis North.
- "D" Street Gate: is on the north side of Lewis North and allows motorists from Steilacoom and Lakewood to enter JBLM without travelling on I-5. This is the only authorized truck accessible ACP onto Lewis North.
- "I" Street: (located in the vicinity of the new ACP) is a swing gate which operates from 0500 to 0900 for inbound traffic only. This gate is not to Army standard for gate security.

In addition to the primary access point, vehicles can also get to Lewis North from Lewis Main by taking side streets through the installation. Drivers can enter JBLM through the Main (Liberty) Gate or Dupont Gate. Once on Lewis Main, drivers can connect with Pendleton Avenue and then travel under I-5 at its western end. Motorists then connect with Flora Road which serpentines north into Lewis North cantonment area. This route essentially back-tracks you to the vicinity of the Lewis North Gate, but currently serves those traveling within the installation and north bound commuters.

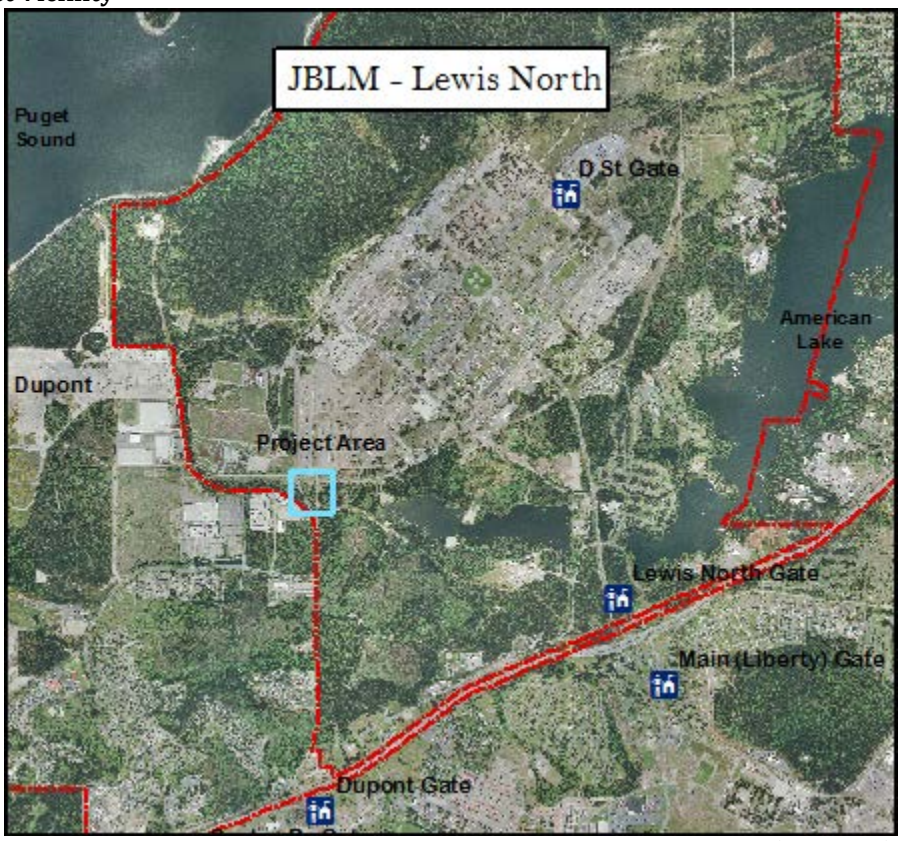
Purpose and Need

The purpose of the Proposed Action is to construct an additional ACP entrance to serve Lewis North. The need for the proposed action is:

- To reduce traffic flows at or near the existing access control points.
- Allow for truck traffic to have another alternative for accessing Lewis North.
- Allow for more alternatives for drivers to avoid delays during road and ACP maintenance interruptions.

[1] **ARMY ACCESS CONTROL POINTS STANDARD DESIGN/CRITERIA, Army Corps of Engineers, 2009.**

Figure 1: Project Vicinity



(JBLM, 2012)

Scope of the Analysis

The scope of this document is to analyze the potential environmental effects of the proposed construction and operation of a new APC located at JBLM - Lewis North. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA); the regulations issued by the Council on Environmental Quality (CEQ), 40 Code of Federal Regulation (CFR) Part 1500-1508; and the Army's implementing procedures published in 32 CFR 651, *Environmental Analysis of Army Actions*.

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Department of the Army proposes to construct a new access control point (ACP) off the Steilacoom-Dupont Road into Lewis North. The proposed ACP will comply with Army ACP design criteria, focusing on safety and efficiency through the gates. Construction will impact less than 20 acres and is proposed to include the following features:

New Access Control Point
Search Building (650 SF)
Search Area Canopy for Trucks (4,240 SF)
4 Guard booths (50sf/ea)
Search Area Canopy for Cars (1,950 SF)
ID Check Area Canopy (7,475 SF)
Gatehouse (840 SF)
Overwatch Position
Active Vehicle Barriers
Passive Vehicle Barricade (5,822 LF)
ACP Traffic Lanes (254,997 SF)
Earthwork (238,302 SF)
Sidewalk (1,953 SF)
Fencing (200 LF)

Figure 2: Example of an ACP located at Fort Benning, Georgia

(US Army, Dictorate of Emergency Services, (http://www.army.mil/media/162819/))

Development of the Project Alternatives

Section 102(2)(E) of NEPA states that Agencies shall study, develop, and describe appropriate alternatives for any proposal which involves conflicts concerning alternative uses of available resources. Alternatives include the proposed action, the no action alternative, and any reasonable alternatives to the proposed action that can be realistically accomplished.

To be considered a reasonable alternative, the action must meet the projects purpose and need. In addition, the proposed action and/or alternatives must be located within the installation boundaries and at a distance far enough away to facilitate the queuing of vehicles without creating an off-post traffic problem. The project also must consider the impact to natural resources and surrounding land uses.

Proposed Action

The proposed action and the preferred alternative for this action, would construct a new ACP at the intersection of Wharf Road and Steilacoom-DuPont Road. This location was identified because of its direct access to North Fort and its location off the roadway to ensure traffic is facilitated away from thoroughfares. In addition to access, this project location has minimal impacts or conflicting land use (existing structures) and natural resources (trees, wetlands) which excluded other potential project locations along Dupont-Steilacoom Road. The ACP will include improvements to Steilacoom-DuPont road such as a traffic signal light, northbound right turn lane, southbound left turn lane, and new signage appropriate for the new intersection.

No Action Alternative

No Action Alternative serves as the baseline from which to compare all other reasonable alternatives and is not analyzed as a viable option with which to accomplish the proposed action. The JBLM would continue to use the existing two access control points, the "I" Street swing gate, and the Pendleton Avenue route when needed to access Lewis North.

Alternatives Ruled Out From Detailed Analysis

Several alternative project locations and/or project options were developed and reviewed in development of this project. The following alternatives did not sufficiently meet the screening criteria to achieve the purpose and need for this action and have therefore been ruled out for further detailed analysis.

Adding another ACP at Main (Liberty) Gate

This alternative is very similar to the "No Action". While adding an ACP would reduce the queue at the Main Gate; this alternative does not provide direct access to those traveling to Lewis North. Vehicles would still have to detour through Lewis Main by traveling on Pendleton Avenue, to Main Street, then Flora Road and continue into the Lewis North cantonment area. This alternative would impact on-installation traffic and congestion on these side streets, while also not providing a direct access to Lewis North.

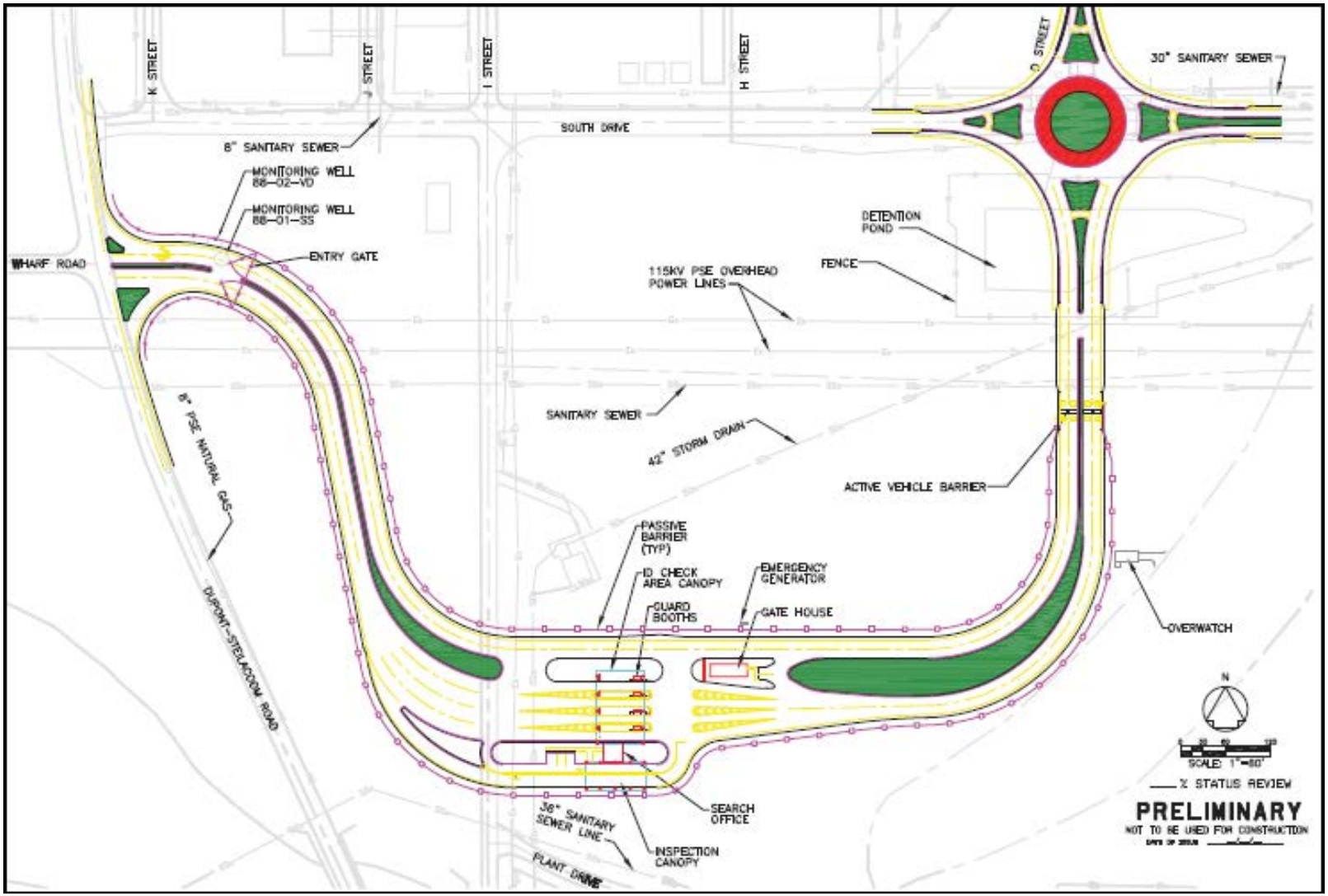
Adding another ACP at the Intersection of Steilacoom-DuPont Road and 7th Street

This alternative was excluded as a reasonable option because of vehicle safety concerns. 7th Street is located too close to the bend in the Dupont-Steilacoom Road that occurs just north of this intersection. Should a gate closure or turning gate traffic cause congestion in the roadway, the curvature of the road would reduce the line of site of traffic coming down from Steilacoom, and subsequently reduce the time drivers have to identify and react to a problem or traffic hazard.

Adding another ACP further to the north of 7th Street

Any alternative further north of 7th Street places the ACP too far away from the freeway and would not serve the traffic and commuters traveling on I-5 and would be located too close to the "D" Street ACP. It does not satisfactorily meet the projects purpose and need because it would not reduce traffic flows at or near the existing ACPs.

Figure 3: Proposed Action Project Plan



(Black & Veatch, 7 Sep 11)

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AFFECTED ENVIRONMENT

The affected environment reviews the environmental setting or general environmental conditions of the proposed project area. It describes the environmental baseline against which the environmental effects can be evaluated. Throughout scoping of this project, specific resource areas were identified that may be affected by the proposed action. These included: transportation and traffic, biological resources, and water quality.

Several resource areas are not expected to be impacted by the proposed action or alternatives and have been eliminated from further analysis in this environmental assessment (EA). The rationale for their exclusion is outlined in the table below.

Table 1: Resources Excluded from Further Analysis

Resource Area	Reason for Dismissal
Land Use	Surrounding land use in the vicinity of the proposed action and alternatives are zoned for industrial activity, manufacturing, office, and some non-manufacturing activities such as wholesaling and distribution, per the City of Dupont's Comprehensive Land Use Plan. The implementation of the proposed action or alternatives is consistent with designated land use and would not impact future development within the project area, and therefore is not further considered within this document.
Soil Erosion	Short term construction activities and the removal of trees have the potential to increase soil erosion. The impacts of this project to soils was considered, but has been determined to be insignificant because of the relatively flat project area (there is very minimal amount of elevation change throughout the project area) and the erosion control measures that will be in place along the disturbed areas to prevent any sedimentation from entering water channels or creeks. Due to the acreage of the project area, the contractor will also be required to obtain a National Pollutant Discharge Elimination Permit (NPDES) permit, submit applicable construction drawings and a Stormwater Pollution Prevention Plan (SWPPP) to ensure preventative measures for soil erosion are put in place as part of project activities. Due to these actions and the topography of the project site, loss of soils due to erosion were considered discountable
Air Quality	The potential for impacts to air quality resulting from construction, as well as long-term ACP operations were identified during scoping of this project. JBLM's air quality is classified as good and is in attainment with the National Ambient Air Quality Standards (Fort Lewis DPW, 2010). Short-term, minor air quality impacts from construction of the proposed projects is considered negligible. This projects association to vehicle emissions was specifically considered against JBLM's sustainability goal to reduce air emissions by 85% by 2025 (2003 baseline). This project will have no measureable impact to emissions since it will neither add nor remove vehicles from the roadways. The implementation of this project may reduce emissions from vehicles idling in queue at current Lewis North gate entrances, but the effects of this would not be measurable, and were determined to be insignificant.

Cultural Resources	The Sequalitchew watershed is used by local treaty tribes for usual and accustomed fishing. Although located within the vicinity of the project; these waterbodies are outside of the project footprint and will not be impacted by the proposed action or alternatives. No other archeological, tribal, or historic resources have are known to occur on the site, and the implementation of the proposed action or alternatives is not expected to impact any cultural resources.
Socioeconomic Resources and Environmental Justice	Implementation of the proposed action would have no effect to socioeconomic conditions, including off-installation minority and low-income populations. All project alternatives, including the proposed action occur within JBLM property boundaries and would not result in any negative effects to neighboring areas outside of the installation.
Hazardous Materials and Waste	No hazardous wastes or materials will be removed or introduced as part of the proposed action or alternatives and therefore will have no impact to the project area.
Noise	Short-term noise associated with construction and demolition are considered insignificant because activities are temporary in nature and would not generate peak noise levels. Surrounding commercial land use and openspace also contribute to impacts from noise being considered discountable for this proposed project.

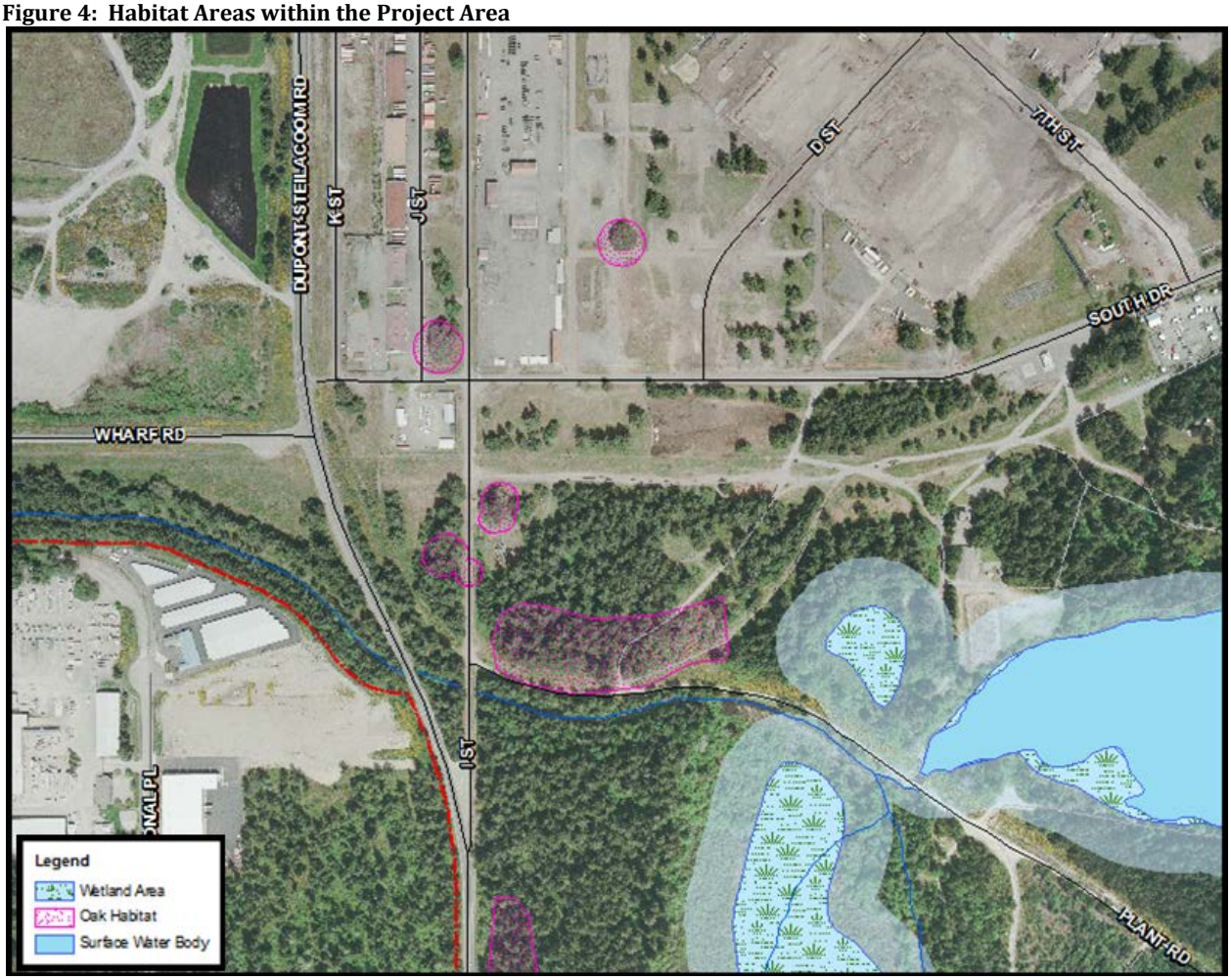
(JBLM, 2012)

The proposed project site is located in an area of varied development intensity where housing developments, industrial hubs, and developed military areas are adjacent to undeveloped Puget Sound lowland forests. Land use adjacent to the proposed project site is designated for manufacturing research and industry by the City of Dupont Comprehensive Land Use Plan (2001). In addition to serving access to Lewis North and manufacturing/industry, the Dupont-Steilacoom Roadway also serves as thoroughfare between Steilacoom and Dupont, with access to I-5.

Forested openspace within the project area is largely dominated by dense coniferous species such as Douglas fir, western red cedar, and western hemlock. In addition to the evergreen species, stands of Oregon white oak habitat may be present within the project area intermixed within the evergreen tree species. White oaks have been identified for protection within JBLM because of the habitat that it provides to many state listed wildlife species, including the western gray squirrel. In addition to squirrels, these forested habitats provide habitat to many local species such as rodents, raccoons, black tailed deer, and black bear. Bird species including bald and golden eagles and several species of migratory birds also populate these forests habitats. No federal threatened or endangered species are known to occur within the project area.

Sequalitchew Lake is located east of the project area; Sequalitchew Creek which serves as the lakes drainage to the Puget Sound, runs just south of the proposed project area, parallel to the proposed location of the new ACP checkpoint. Sequalitchew Creek provides habitat for several fish species, including Coho salmon which is a federal species of concern. Several wetland areas are adjacent to these Sequalitchew waterways, but are also not included as part of the proposed action area. The water quality of surface water bodies are considered good. An Environmental Survey (Appendix A) that was completed as part of this action found that the project was within land use controls for ground water due to its proximity to a former landfill that is in the projects vicinity.

Figure 4: Habitat Areas within the Project Area



(S. Sparks, 2010 Aerial JBLM GIS Database, January 10, 2012)

ENVIRONMENTAL CONSEQUENCES

Environmental consequences are those impacts that directly or indirectly affect the environment as a result of the proposed action. The degree to which environmental resources are affected is based on significance criteria specific to each resource, as well as the time (long-term or short-term) and place (local or regional) that the proposed action would occur. The spatial parameters defined for individual activities are also known as the region of influence.

Transportation and Traffic

Proposed Action

Implementation of the proposed action will impact traffic on the Dupont-Steilacoom Road by encouraging some of Lewis North's commuting traffic to divert from the North Gate and Dupont Gate to access JBLM at the new ACP location, increasing vehicles on this roadway. This impact is not expected to be significant because the increase in cars is not expected to be substantially more than the vehicles already utilizing the I Street Gate and would not cause traffic or a back-up to occur along this roadway as vehicles would quickly turn off of the shared road, and onto JBLM property through the new ACP.

The implementation of the proposed action would add an intersection at the crossing of Dupont-Steilacoom Road and Wharf Road. Although the addition of an intersection would interrupt vehicles using this roadway as a thoroughfare, the effects of its implementation are expected to have long term beneficial effects for public safety and vehicle access to surrounding land use within the City of Dupont. A traffic signal would slow down speeding traffic traveling down the roadway and also create a safer outlet for the industrial and manufacturing community turning and off of Wharf Road onto Dupont Steilacoom Road.

No Action Alternative
The No Action Alternative serves as the status quo. Under this alternative traffic will continue to be strained at existing installation ingress and egress gates. Moderate, long-term adverse impacts are expected from this alternative as JBLM would not be addressing traffic concerns at installation gates due to increases in population.

Biological Resources

Proposed Action
Substantial tree removal will be required as part of the proposed project (approximately 18 acres). While evergreen trees are common, Oregon white oak are considered a priority habitat with Washington State and also have special management status within the JBLM Integrated Natural Resources Management Plan (INRMP). All white oaks that are removed as part of the implementation of the proposed action would be mitigated and replaced at a ratio of 5:1.

Implementation of the proposed project would not have significant impacts to biological resources including fish and wildlife and their associated habitats. Species that may utilize the forested area within the proposed project area are common throughout the Puget Sound lowlands. Species may be displaced due to the implementation of the proposed project, but the proposed action would not result in decreases of populations. No state or federal listed species are known to occur in the area.

No Action Alternative
The No Action Alternative serves as the status quo. Under this alternative there would be no change to the biological resources in the area.

Water Quality

Proposed Action
Ground disturbing construction and excavation activities associated with the proposed action have the potential to impact water resources due to sediment run-off which can flow into nearby streams and surface water bodies. In addition to ground disturbing construction activities, the proposed action would increase impervious surface from the construction of new roadways and building structures. Impervious surfaces have been attributed to challenges associated with groundwater recharge, increased flow and turbidity during storm events, and the input of pollutants from roadway run-off. These activities have the potential to have short-term, negligible impacts on Sequalitchew Creek (Sequalitchew Lake and associated wetlands are outside of the impact area for this project).

The proposed project would obtain a NPDES permit and a SWPPP which imposes construction best management practices (BMPs) such as sediment fencing around disturbed areas to prevent erosion (turbidity) to waterways. BMPs including the use of flumes and swales will allow stormwater to

infiltrate onsite. Because of the implementation of these BMPs and the erosion control measures utilized throughout construction, the impacts of the proposed action will not significantly impact water quality within the project vicinity. Implementation of the proposed action would mimic this baseline due to the mandatory BMPs that would be implemented to maintain or restore the hydrology of the project area to predevelopment conditions.

No Action Alternative
The no action alternative serves as the baseline for this project and would have no impact to water quality.

CUMULATIVE EFFECTS DISCUSSION

Cumulative effects address the incremental environment impacts of the proposed action, together with impacts of past, present, and reasonably foreseeable future actions. The cumulative effects address the impacts from projects that may be individually minor, but result in collectively significant impacts when taking into account actions occurring over a period of time.

The proposed action is not expected to have any significant cumulative impacts. Approximately 18 acres of forested vegetation will be cleared as part of this project. Vegetation and wildlife habitat on JBLM North have been impacted in the past, and continue to be impacted due to construction and military training activities. As JBLM grows, mimicking the general growth of the south Puget Sound; lowland forested habitat have been and will continue to be converted into developed lands which impact native flora and fauna communities. Past development, as well foreseeable future industrial and manufacturing uses in the area will also contribute to this changing landscape. The Department of Army also has several projects occurring in Lewis North vicinity, including the construction of Battalion and Company Operation Facilities, road alignments projects, and new water treatment plant with an associated water reclamation system. There are no known local or state projects planned in the project vicinity. The City of Dupont has zoned the area next to this project for commercial and industrial uses, and new facilities for such purposes could be developed in the future, which would also contribute to the projects cumulative impacts.

The proposed action is not expected to cause significant cumulative impacts to biological resources including forested habitats and wildlife because of retained openspace within JBLM, near Puget Sound and Sequalitchew Lake. The proposed action area is adjacent to land that has already been subject to development and is consistent with past uses and future planning. The location of this site protects the highest quality wildlife habitats from development, and still maintains large natural openspace areas for habitat.

Mitigation Measures

In addition to those BMPs that were described as part of the proposed action, mitigation measures will be required to offset the projects potential impacts to Oregon white oak species. Although not a factor in reaching insignificance levels, implementation of the project will replace oaks impacted by the proposed action at a ratio of 5:1, where five Oregon white oak trees will be replanted for every white oak impacted by the implantation of the project. Trees will be replanted in clumps, mimicking the growth patterns and habitats that they grow naturally, and scheduled watering will be included in the monitoring plan until roots have been established to ensure survival.

CONCLUSION

Through evaluation of the direct, indirect, and cumulative impacts that could reasonably be expected to occur as a result of the implementation of the proposed action; it has been found that the development of a new "I" Street ACP would not result in significant effects to the environment, including traffic and transportation, biological resources, and water quality; therefore, an Environmental Impact Statement is not needed. A Finding of No Significant Impact (FNSI) is warranted for this project and a draft FNSI was prepared in support of this finding.

PREPARERS

Stephanie Sparks[2]
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Versar Incorporated
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Joint Base Lewis-McChord
14 years experience

Dave Clouse
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Joint Base Lewis-McChord
20 years experience

REFERENCES

40 CFR § 1500 et seq. Council on Environmental Quality. 1978

AR 200-1 Environmental Protection and Enhancement

32 CFR Part 651 Environmental Analysis of Army Actions

City of Dupont, Comprehensive Land Use Plan. Ordinance No. 01-698. November 13, 2001. http://www.ci.dupont.wa.us/files/library/75f93a8137572a85_o.pdf

Final Environmental Impact Statement for the Fort Lewis Army Growth and Force Structure Realignment. Fort Lewis, Washington. July, 2010.

[2] Disclosure statement on file. Contractor has no direct/indirect financial or other interest in the outcome of this project.

DISTRIBUTION LIST

Federal Agencies

Federal Highway Administration
Western Federal Lands Highway Division
Defense Access Road Program
610 East Fifth Street
Vancouver, WA 98661

State Agencies

Washington Department of Ecology
Environmental Review
PO Box 47703
Olympia, WA 98504

Washington Department of Transportation
Transportation Planning
PO Box 47370
Olympia, WA 98504

Counties and Regional Agencies

Pierce County Planning and Land Services
2401 S. 35th Street
Tacoma, WA 98504

Pierce County Public Works & Utilities
2401 S. 35th Street
Tacoma, WA 98504

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Steilacoom, WA, 98388

City of Dupont
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Lakewood, WA 98499

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Steilacoom, WA 98388

The Honorable Cynthia Iyall
Chair, Nisqually Indian Tribe
4820 She-Nah-Num Drive SE
Olympia, WA 98513

The Honorable Herman Dillon, Sr.
Chair, Puyallup Tribal Council
3009 East Portland Avenue
Tacoma, WA 98404

The Honorable James Peters
Chair, Squaxin Island Tribe
SE 10 Squaxin Lane
Shelton, WA 98584

Libraries

Pierce County Library System
Processing and Administrative Center
3005 112th Street East
Tacoma, WA 98446

Local Businesses

Cal Portland
Dupont RM Plant & Pioneer Aggregates Plant
4301 Pioneer Way
Dupont, WA 98327

Intel Corporation
2800 Center Drive
Dupont, WA 98327

Pier 1 Imports Distribution Center
4175 Pioneer Avenue
Dupont, WA 98327

APPENDIX A

ENVIRONMENTAL SURVEY

Environmental Survey (ES) Lewis North Access Control Point	NEPA #: 11-PWE-034/SLS Planning Project: G. Stedman PN# 66206

1. Proposed Action

The Department of Army proposes to construct a new Access Control Point (ACP) at Joint Base Lewis McChord (JBLM) – Lewis North. The new ACP will address the increase population at Lewis North and facilitate traffic flow and reduce congestion at existing installation entrance gates. The proposed construction would include:

- New Access Control Point
- Search Building (650 SF)
- Search Area Canopy for Trucks (4,240 SF)
- 4 Guard booths (50sf/ea)
- Search Area Canopy for Cars (1,950 SF)
- ID Check Area Canopy (7,475 SF)
- Gatehouse (840 SF)
- Overwatch Position
- Active Vehicle Barriers
- Passive Vehicle Barricade (5,822 LF)
- ACP Traffic Lanes (254,997 SF)
- Earthwork (238,302 SF)
- Sidewalk (1,953 SF)
- Fencing (200 LF)

An Environmental Assessment is being prepared for this action.

2. Dates of the Action	This is a FY12 project.

3. Contamination Assessment Information Sources:

a. Review of the Environmental Baseline Survey (EBS) for Fort Lewis[1] produced by ENSR, February 2001.
b. Review of the Fort Lewis Environmental Restoration Program/Compliance Clean-up (ERP/CC) Overview Map produced by Public Works GIS team, July 2008.
c. Review of the GIS database for any environmental conflicts/concerns.

4. Statement of Findings

a. The EBS showed that the former Landfill #5 is in the proposed projects vicinity.
b. The ERP/CC Map confirmed the location of the former Landfill #5 and disclosed Groundwater Use Planning Installation controls that are a result of that landfill location. The ERP/CC Map also showed that the project is adjacent to Lewis North's Former B-Range which has the potential for finding UXO during ground disturbing activities.
c. The GIS database showed the proposed project location has an environmental monitoring well and a stormwater outfall point within the project area.

5. Summary of Findings

Two environmental restoration sites (Landfill #5 and Former B-Range) are located in the proposed projects vicinity, but are largely outside of the project areas footprint. An environmental monitoring well and a stormwater outfall point are in the project area boundaries and will need to be addressed during project planning.

6. List of Permits/Clearances Required	Dig Permit

[1] This document contains references to "Fort Lewis" which are legacy references and will not change over time. Others are temporary and will change to Joint Base Lewis-McChord as revisions and updates occur to those references.

7. Construction Site Categorization: *AR 200-1, Chapter 15-6 (3)(b)*

a. *The garrison commander is responsible for the environmental survey including an unexploded ordnance survey, and associated documentation of a proposed MILCON or NAF construction site before site selection. The IMA region director is responsible for certifying the site categorization.*

b. Sites are classified into the three following categories:
   1. Category I: There is no reason to suspect contamination will be encountered during construction.
   2. Category II: There is no known contamination; there remains some potential that contamination may be encountered during construction.
   3. Category III: The site is known to be contaminated or there is a strong suspicion contamination will be encountered during construction.

Project location(s)	Category code	Reason for code
On the corner of South Drive and D Street, JBLM - Lewis North.	III	The site is known to be contaminated or there is a strong suspicion contamination will be encountered during construction.

8. Survey assessment concurrence

a. Prepared by Stephanie Sparks, NEPA Specialist

b. Reviewed and concurred on by:

6 MAR 2012

Paul T. Steucke, Jr. *date*

Chief, Environmental Division

c. Reviewed and concurred on by:

6 MAR 2012

Randall W. Hanna *date*

Deputy Director, Public Works

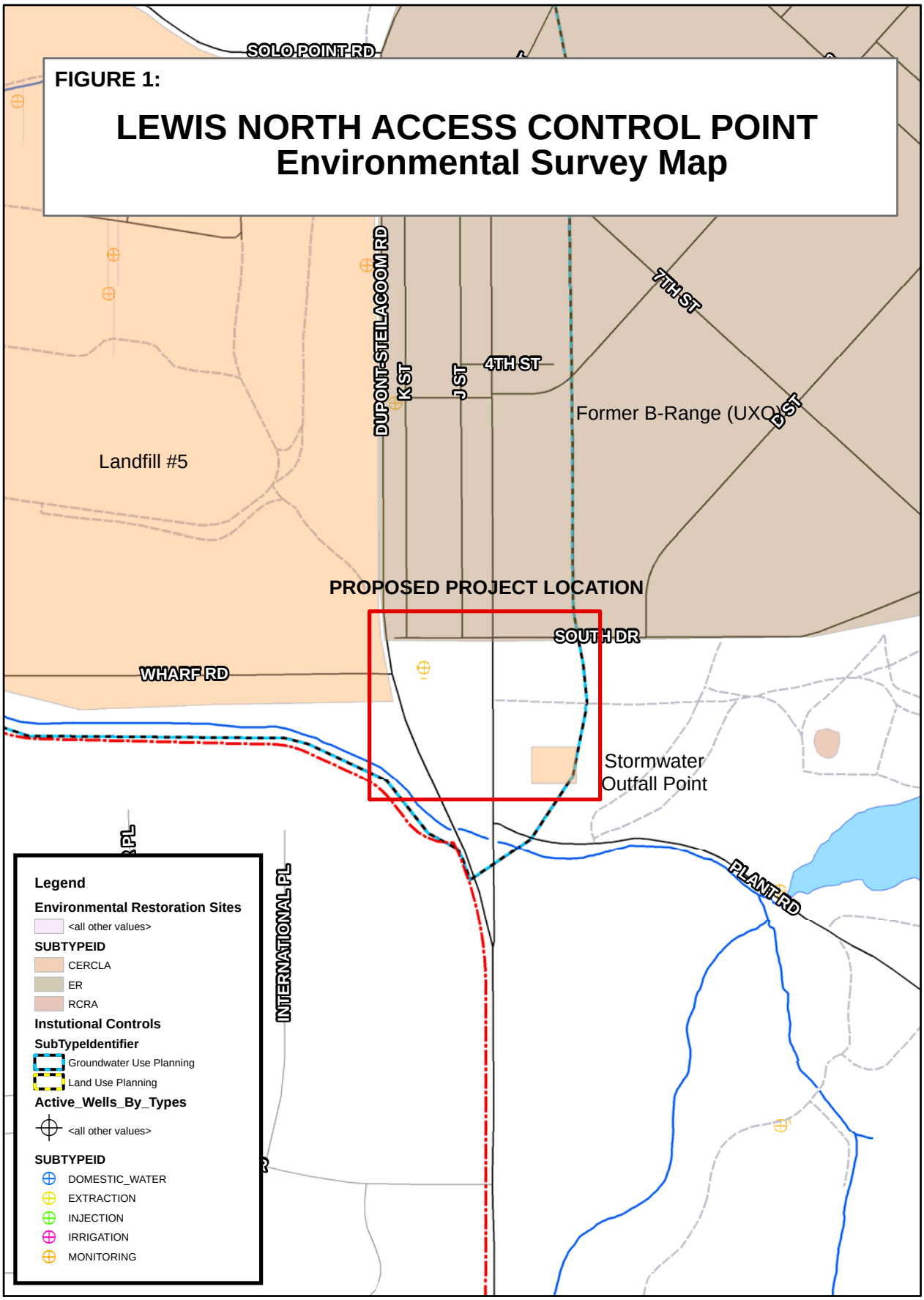
FIGURE 1:
LEWIS NORTH ACCESS CONTROL POINT
Environmental Survey Map
SOLO POINT RD
DUPONT-STEILACOOM RD
K ST
J ST
4TH ST
7TH ST
B ST
Landfill #5
Former B-Range (UXO)
PROPOSED PROJECT LOCATION
SOUTH DR
WHARF RD
Stormwater
Outfall Point
INTERNATIONAL PL
PLANT RD
Legend
Environmental Restoration Sites
<all other values>
SUBTYPEID
CERCLA
ER
RCRA
Instutional Controls
SubTypeIdentifier
Groundwater Use Planning
Land Use Planning
Active_Wells_By_Types
<all other values>
SUBTYPEID
DOMESTIC_WATER
EXTRACTION
INJECTION
IRRIGATION
MONITORING

JBLM, 2012

APPENDIX B

PUBLIC COMMENT AND AGENCY RESPONSE

Agency Response to Comments: Environmental Assessment for the Construction and Operation of a New Access Control Point at Lewis North, Joint Base Lewis-McChord

Pierce County	
It is recommended that the EA include: Current traffic volumes entering/existing the North and DuPont Gates.	A Traffic Report was completed for the proposed Lewis North ACP (Appendix C) which assessed the peak hour demand (0530 – 0630) for the North Fort Gate, D Street Gate and I Street Gate. The report shows existing peak hour demand for North Fort Gate is 1451 vehicles/hour. Traffic volume counts for the DuPont Gate were not included in the analysis because it does not provide direct access to Lewis North which was the focal point of the study.
Anticipated levels of diversion from the above two gates to the proposed entrance at Steilacoom-DuPont Road SW and Wharf Road.	The Lewis North ACP Traffic Report also included anticipated levels of diversion for the three gates that enter into Lewis North (North Fort Gate, D Street Gate, and I Street Gate). Based on an origin destination analysis, it was determined that 50% of vehicles (135) traveling north on I-5 and 20% of the vehicles (129) traveling south on I-5 would use the new ACP rather than the North Fort Gate. Diversion levels for the DuPont Gate were not included in the analysis because it does not provide direct access to Lewis North which was the focal point of the study.
Current and future (with the new ACP) levels of service at the intersection at Steilacoom-DuPont Road SW and Wharf Road.	The current level of service (LOS) for the intersection of DuPont-Steilacoom Road and Wharf Road was found to be operating at a service level A. Future levels of service at the DuPont-Steilacoom Road and the Wharf Road intersection was analyzed to determine lane configuration and turn storage requirements (Appendix D). The analysis included designs with and without a north bound right turn (NBRT) only lane. For AM peak hour, it was found that the Wharf Road and DuPont-Steilacoom Road intersection would have a LOS A (9^{i}) with a NBRT lane, and a LOS E (65) without. The PM peak hour analysis found that the subject intersection would have a LOS C (25) with the NBRT lane, and a LOS F (126) without the NBRT lane.

A determination of whether warrants for signalization are met at the Steilacoom-DuPont Road SW and Wharf Road intersection.	A Traffic Signal Warrant Analysis for the DuPont-Steilacoom Road/Wharf Road Intersection was prepared (Appendix E) using Warrant 3 Manual on Uniform Traffic Control Devices (MUTCD). This analysis indicated that a full traffic signal is warranted at this intersection based upon the projected traffic volumes associated with the proposed Lewis North ACP which would replace the existing I Street Gate.
An analysis quantifying likely diverted and/or re-assigned trips from the existing gates to the proposed gate has been provided to the City (comments for which are provided below), although it is somewhat unclear to what level potential traffic impacts away from the new gate have been reviewed. While it is probable that there may be a decrease in volumes on some intersection movements, others would likely increase and could result in potentially significant increases in delay at the I-5 ramps or intersections along Steilacoom-DuPont Road during the peak hours depending on the movements that are impacted. Pending additional technical analysis of the subject intersections, it is difficult to make any kind of conclusion with respect to these impacts at the present time [within the EA].	JBLM believes that it has conducted all the technical analysis needed to make an appropriate significance determination for this project. In efforts to reduce paperwork and the accumulation of extraneous background data (40 CFR 1500.2(a)), supporting data that was used to help make significance determinations was not included within the EA. This information includes, but is not limited to: wetland delineations, species surveys, traffic studies, air quality conformity reports, cultural surveys, noise attenuation calculations, etc. Nevertheless, this information remains a part of the project's administrative record, and is an important part of ensuring that environmental consequences are considered during decision making.
The analysis completed peak hour turning movement counts at key locations and origin-destination surveys in order to determine likely use of the new ACP. This is a reasonable methodology for trying to determine the anticipated use of the new ACP.	Comment noted.
The analysis reviewed two morning peak periods and used the higher one for estimating the necessary number of lanes for the new ACP, also a reasonable methodology. It was determined that four lanes would be needed (for single processing) at the new ACP.	Comment noted.
The I Street gate, which currently has limited operation during the morning peak, will be closed in the future and those currently using it are expected to use the new ACP.	Comment noted.
Some vehicles currently using the D Street and North Fort Gates are expected to divert to the new ACP. Some of these diversions would add new traffic to the Barksdale interchange and DuPont Steilacoom Road.	Comment noted.

It should be noted that traffic analysis is focused on determining the number of inbound lanes that would be required for the proposed new ACP. While the information provides some analysis and quantifying of diverted and/or re-assigned trips from the existing games to the proposed new access gate, the study provides limited analysis of potential impacts from these redistributions to Steilacoom-DuPont Road or Barksdale Avenue interchange.	Redistributions from the North Fort Gate and the D Street Gate were included when calculating the potential impacts to the DuPont-Steilacoom Road. Impacts to the Barksdale Avenue interchange were analyzed and have been provided (Appendix F).
Page 3-2; Appendix A is referenced- it would be good to have this included with the document and available for review.	Comment noted. Appendices to the Traffic Analysis Summary have been provided (Appendix C).
Page 3-2; the City concurs that the 0530-0630 spike should be used for determining the ACP demand; however, the 0800-0900 peak should be used to evaluate off-site impacts at intersections.	JBLM agrees with this conclusion. The 0800-0900 peak time was used to evaluate impacts at intersections off-site (Appendix F).
Page 3-3; the SDDCTEA Pamphlet 55-15 is referenced as the basis for design of the ACP and notes a processing rate of 350 vehicles per hour per lane for a single ID checker which equates to roughly 10 seconds per vehicle, a very efficient number.	Comment noted.
Page 4-1; Appendix A2 is referenced and should be included with document for review.	Comment noted. Appendices to the Traffic Analysis Summary have been provided (Appendix C).
Page 4-2; Table 2 notes the existing number of gates, demand, and required number of lanes per the SDDCTEA. The I Street gate, which will be closed, currently has just one lane, but needs three for single processing according to this methodology.	Comment noted.
Page 5-3; Section 5.0 notes the need for future growth in volumes as a result of deployment; this was a minimal amount. This section also references Appendix A3 for future lane requirements- this should be included for review.	Comment noted. Appendices to the Traffic Analysis Summary have been provided (Appendix C).
Page 5-3; Section 5.1 refers to Appendix A4 for the calculations of the redistribution of the gate for the future conditions. This should be included for review.	Comment noted. Appendices to the Traffic Analysis Summary have been provided (Appendix C).
Page 5-4; Figure 2 notes the redistribution of traffic from the D Street gate; it is estimated the 195 vehicles would be diverted to the new ACP from the D Street gate, 187 of which would be turning left from Steilacoom-DuPont Road into the new gate access.	Comment noted.

Page 5-5; Figure 3 shows the redistribution of the North Fort Gate traffic which would be diverted to the new ACP via the Barksdale interchange. 264 vehicles would be diverted to the interchange- 135 from the north and 129 from the south and then proceed north on DuPont Steilacoom Road. This is a fairly large impact to the interchange.	Comment noted.
Page 5-1; Section 5.2 notes the future gate design demand. Based on the information presented, the City would concur with the volume noted for the new ACP.	Comment noted.
Based on information provided to the City, the proposed ACP is planned to serve 1294 vehicles in the AM peak. The future turning movement volumes for the Wharf Road intersection will need to be derived for use with the proposed future signal design to determine lane configuration and turn storage requirements necessary to accommodate the proposed ACP.	A peak hour (AM and PM) intersection operation analysis was completed for the intersection of Wharf Road and DuPont-Steilacoom Road to determine lane configuration and turn storage requirements. For AM peak hour, it was found that the Wharf Road and DuPont-Steilacoom Road intersection would have a LOS A (9[ii]) with a NBRT, and a LOS E (65) without. The PM peak hour analysis found that the subject intersection would have a LOS C (25) with the NBRT, and a LOS F (126) without the NBRT.
It is also important to design the proposed signal to address the needs of current and future stakeholders along Wharf Road in addition to meeting the needs presented by the new ACP.	Current and future use of the Wharf Road intersection by stakeholders (including industrial and commercial uses) was not quantified as part of this project, but was nevertheless considered during initial project scoping. Current use was not quantified because Wharf Road is not currently used by JBLM traffic (the intersection to the installation does not exist). JBLM's analysis did consider a 1% growth rate a year for background traffic and future traffic (including that along Wharf Road). Although companies along Wharf Road were contacted, the installation remains unaware of any projects that are reasonably foreseeable to occur, that would change the current traffic projections. Even without quantified data regarding stakeholder use of Wharf Road, JBLM believes that the proposed project, including the proposed traffic signal, will provide a beneficial impact to stakeholders (businesses) along this roadway. Currently commercial trucks/trailers must yield to speeding thru traffic along DuPont-Steilacoom Road for access to the freeway. The proposed traffic signal will activate by motion detector, and will stop traffic so commercial vehicles can safely turn on to DuPont-Steilacoom Road. This was considered a safety improvement for vehicles turning from Wharf Road, as well as those traveling down DuPont-Steilacoom Road.

The additional trips that would be diverted from North Gate to the Barksdale interchange should be evaluated at the I-5 ramps (exit 119), at the Barksdale/DuPont Steilacoom Road and Center Drive/DuPont Steilacoom Road intersections for level of service adequacy for both the AM and PM peak hours, as was requested in our May 2, 2012 meeting.	Impacts to the Barksdale Avenue and DuPont-Steilacoom Road intersection, as well as the Center Drive and DuPont-Steilacoom Road intersection were evaluated (Appendix F). At the Center Drive and DuPont-Steilacoom Road intersection, the projected 2014 (baseline) is service level C (AM/PM). With the proposed ACP, it is projected that this intersection will be at a service level D (AM/PM). At the Barksdale Avenue and DuPont-Steilacoom Road intersection, base line is projected to be a LOS C (AM/PM). The intersection is projected to be a LOS E (AM/PM) with the proposed ACP. Although JBLM does not own, or have management authority over the Barksdale Avenue interchange, studies to improve traffic operation at this intersection were completed. A free westbound right turn on Barksdale Avenue and two receiving lanes at the north leg of DuPont-Steilacoom Road are recommended to alleviate traffic. It is projected that these recommendations will provide a LOS C (AM/PM) at the Barksdale Avenue and DuPont-Steilacoom Road intersection.
Property owners, developers, and contractors are encouraged to recycle all possible leftover construction, demolition, and land clearing (CDL) materials and reduce waste generated.	Comment noted. Since 2011, JBLM has been part of a Zero Net Waste Installation pilot program with goals of zero waste by 2020. The installation tracks and reports progress including diversion reporting for construction and demolition debris. As of March 2012 the base has achieved over 68% waste diversion and continues to be aggressive in meeting goals. The installation works closely with WDOE's Waste 2 Resources and Pierce County's Solid Waste Management Staff to mirror and implement programs to continually improve diversion opportunities on and off base.

JBLM, 2012

[i] Delay in Seconds

Pierce County

Public Works and Utilities

Transportation Services
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Brian J. Ziegler, P.E.
Director

Brian.Ziegler@co.pierce.wa.us

May 24, 2012

Christa Poisson
Public Works Environmental
Department of the Army
2012 Ligget Avenue
JBLM, WA 98433-9500

Re: Finding of No Significant Impact- Environmental Assessment of the Construction and Operation of a new Access Control Point at Lewis North, Joint Base Lewis-McChord

Dear Ms. Poisson:

Thank you for the opportunity to review and comment on the Environmental Assessment (EA) for the Construction of a new Access Control Point at the intersection of Wharf Road and DuPont-Steilacoom Road in order to access Lewis North. JBLM has issued a Finding of No Significant Impact (FONSI) based on the EA.

It is noted that the Environmental Assessment for the ACP states that:

Implementation of the proposed action will impact traffic on the DuPont-Steilacoom Road by encouraging some of Lewis North's commuting traffic to divert from the North Gate and DuPont Gate to access JBLM at the new ACP location, increasing vehicles on this roadway. This impact is not expected to be significant because the increase in cars is not expected to be substantially more than the vehicles already utilizing the I Street Gate and would not cause traffic or a back-up to occur along this roadway as vehicles would quickly turn off of the shared road, and onto JBLM property through the new ACP.

(page 9, Environmental Assessment – Construction and Operation of a new Access Control Point at Lewis North, Joint Base Lewis-McChord, WA)

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While the EA provides a textual description of the traffic impacts on the nearby roadway network, it is recommended that the EA also offer the following:

1. Current traffic volumes entering/exiting the North and DuPont Gates.
2. Anticipated levels of diversion from the above two gates to the proposed entrance at Steilacoom-DuPont Road SW and Wharf Road.
3. Current and future (with the new ACP) levels of service at the intersection at Steilacoom-DuPont Road SW and Wharf Road.
4. A determination of whether warrants for signalization are met at the Steilacoom-DuPont Road SW and Wharf Road intersection.

We appreciate the opportunity to comment on the subject environmental assessment and would be happy to discuss this letter with you at your convenience.

Sincerely,

Toby D. Rickman, P.E.
Deputy Director

TDR:JH:ljc

cc: Brian Ziegler, Director
Brian Stacy, County Engineer
Rory Grindley, Traffic Engineer
Jesse Hamashima, Planner 4

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May 30, 2012

Department of the Army
Public Works Environmental
ATTN – Christa Poisson
2012 Ligget Avenue
Joint Base Lewis-McChord 98433-9500

SUBJECT: Environmental Assessment - Proposed Lewis North Access Control Point

Thank you for the opportunity to provide comments on the Environmental Assessment (EA) for the proposed new Access Control Point (ACP) to the northern section of Joint Base Lewis McChord (JBLM) also referred to as Lewis North. Our comments on the proposed new ACP accessing Lewis North are organized below into two primary groupings – the first pertaining to the EA information and documents that were provided for review and comment on the JBLM website, and the second pertaining to the traffic analysis summary information provided to the City at our meeting with project representatives on May 2nd, 2012 here at DuPont City Hall.

The City has reviewed the Environmental Assessment (EA) documents that were made available for comment on the JBLM website. The stated need for the proposal to construct an additional ACP entrance to serve Lewis North is: to reduce traffic flows at or near the existing access control points, allow for truck traffic to have another alternative for accessing Lewis North, allow for more alternatives for drivers to avoid delays during road and ACP maintenance interruptions. The proposal seeks to address traffic flows into and out of the base, although the information provided in the EA pertaining specifically to traffic and transportation is fairly qualitative in nature, i.e., the document simply states that the impact is not expected to be significant because the increase in cars is not expected to be substantially more than the current volumes. An analysis quantifying likely diverted and/or re-assigned trips from the existing gates to the proposed gate has been provided to the City (comments for which are provided below), although it is somewhat unclear to what level potential traffic impacts away from the new gate have been reviewed. While it is probable that there may be a decrease in volumes on some intersection movements, others would likely increase and could result in potentially significant increases in delay at the I-5 ramps or intersections along Steilacoom-DuPont Road during the peak hours depending on the movements that are impacted. Pending additional technical analysis of the subject intersections, it is difficult to make any kind of conclusion with respect to these impacts at the present time.

The City of DuPont has also reviewed information from the traffic analysis summary that was provided to the City at our May 2nd meeting with project representatives here at DuPont City Hall. It is our understanding that this information was developed as part of the basis for developing the

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EA document posted on the JBLM web-page for the proposed new ACP to Lewis North. Our comments with respect this summary are provided below, with specific comments from noted by page number for ease in review. (*Note: the appendices referenced in the summary were not provided with this document, which support most of the technical analysis presented. As such, the City's comments are limited to review of only the summary document which was provided.*)

General Comments on the Traffic Analysis Summary:

- The analysis completed peak hour turning movement counts at key locations and origin-destination surveys in order to determine likely use of the new ACP. This is a reasonable methodology for trying to determine the anticipated use of the new ACP.

- The analysis reviewed two morning peak periods and used the higher one for estimating the necessary number of lanes for the new ACP, also a reasonable methodology. It was determined that four lanes would be needed (for single processing) at the new ACP.

- The I Street gate, which currently has limited operation during the morning peak, will be closed in the future, and those currently using it are expected to use the new ACP.

- Some vehicles currently using the D Street and North Fort Gates are expected to divert to the new ACP. Some of these diversions would add new traffic to the Barksdale interchange and DuPont Steilacoom Road.

- It should be noted that traffic analysis is focused on determining the number of inbound lanes that would be required for the proposed new ACP. While the information provides some analysis and quantifying of diverted and/or re-assigned trips from the existing gates to the proposed new access gate, the study provides limited analysis of potential impacts from these redistributions to Steilacoom-DuPont Road or Barksdale Avenue interchange.

Specific Comments on the Traffic Analysis Summary:

- Page 3-2 – Appendix A1 is referenced – it would be good to have this included with the document and available for review.
- Page 3-2 – the City concurs that the 0530-0630 spike should be used for determining the ACP demand; however, the 0800-0900 peak should be used to evaluate off-site impacts at intersections.
- Page 3-3 – the SDDCTEA Pamphlet 55-15 is referenced as the basis for design of the ACP and notes a processing rate of 350 vehicles per hour per lane for a single ID checker which equates to roughly 10 seconds per vehicle, a very efficient number.
- Page 4-1 – Appendix A2 is referenced and should be included with document for review.
- Page 4-2 – Table 2 notes the existing number of gates, demand, and required numbers of lanes per the SDDCTEA. The I Street gate, which will be closed, currently has just one lane, but needs three for single processing according to this methodology.
- Page 5-3 – Section 5.0 notes the need for future growth in volumes as a result of deployment; this was a minimal amount. This section also references Appendix A3 for future lane requirements – this should be included as part of the document for review.
- Page 5-3 – Section 5.1 refers to Appendix A4 for the calculations of the redistribution of the gate traffic for the future conditions. This should be included for review.
- Page 5-4 – Figure 2 notes the redistribution of traffic from the D Street gate; it is estimated the 195 vehicles would be diverted to the new ACP from the D Street gate, 187 of which would be turning left from Steilacoom-DuPont Road into the new gate access.

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- Page 5-5 – Figure 3 shows the redistribution of the North Fort Gate traffic which would be diverted to the new ACP via the Barksdale interchange. 264 vehicles would be diverted to the interchange – 135 from the north and 129 from the south and then proceed north on DuPont-Steilacoom Road. This is a fairly large impact to the interchange.
- Page 5-1 – Section 5.2 notes the future gate design demand. Based on the information presented, the City would concur with the volume noted for the new ACP.

Based on information provided to the City, the proposed ACP is planned to serve 1294 vehicles in the AM peak. The future turning movement volumes for the Wharf Road/DuPont-Steilacoom Road intersection will need to be derived for use with the proposed future signal design to determine lane configuration and turn storage requirements necessary to accommodate the proposed ACP. It is also important to design of the proposed signal addresses needs of current and future stakeholders along Wharf Road in addition to meeting the needs presented by the new ACP. The additional trips that would be diverted from North Gate to the Barksdale interchange should be evaluated at the I-5 ramps (Exit 119), at the Barksdale/DuPont-Steilacoom Road and Center Drive/DuPont-Steilacoom Road intersections for level of service adequacy for both the AM and PM peak hours, as was requested in our May 2nd, 2012 meeting with project representatives.

I appreciate your efforts to receive comments regarding the Environmental Assessment and draft Finding of No Significant Impact for the proposed Lewis North ACP. Should you have any questions regarding this matter, please do not hesitate to contact me at (253) 912-5380.

Sincerely,

Peter L. Zahn
Public Works Director

Cc: Dawn Masko - City Administrator
Tamara Nack, P.E. – Gray & Osborne, Inc.
Geri Reinart, P.E.

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May 31, 2012

Mr. Paul Steucke
Department of the Army
Directorate of Public Works
2012 Ligget Avenue, Box 339500 NS 17
Joint Base Lewis-McChord, WA 98433-9500

Dear Mr. Steucke:

Thank you for the opportunity to comment on the draft FONSI/EA for the Construction & Operation of A New Access Control Point project located in Pierce County. The Department of Ecology (Ecology) reviewed the information provided and has the following comment(s):

WASTE 2 RESOURCES: Mike Drumright (360) 407-6397

Property owners, developers, and contractors are encouraged to recycle all possible leftover construction, demolition, and land clearing (CDL) materials and reduce waste generated. Recycling construction debris is often less expensive than landfill disposal. Please visit Ecology's 1 800 Recycle Hotline database at: http://1800recycle.wa.gov or call the 1-800-RECYCLE hotline to find facilities that that will accept your CDL materials for reuse or recycling.

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

If you have any questions or would like to respond to these comments, please contact the appropriate reviewing staff listed above.

Department of Ecology
Southwest Regional Office

(SM:12-2042)

cc: Mike Drumright, W2R

APPENDIX C

JBLM LEWIS NORTH ACCESS CONTROL FACILITY TRAFFIC STUDY

JBLM Lewis North Access Control Facility Traffic Study

Joint Base Lewis-McChord, Washington

Prepared by:
Black & Veatch
6601 College Blvd., Overland Park, Kansas

Prepared for:
US Army Engineer District, Seattle
Corps of Engineers
Seattle, Washington

September 7, 2011

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Seattle District

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Table of Contents

1.0 Executive Summary

1.1 Summary

This traffic study establishes the required number of inbound lanes that will be required at a new Access Control Point (ACP) which is located at the intersection of Wharf Road and Dupont-Steilacoom Road at Joint Base Lewis McChord (JBLM), Washington. The analyisis consists of collecting existing traffic volume data and performing an origin destination (OD) study to re-assign peak hour inbound vehicle volume accordingly to the Lewis North area of JBLM. Growth and deployment factors are also taken into consideration to account for any future changes that would impact usage of the facility.

It was determined that four (4) lanes would be required for the new ACP to accommodate the demand volume during the early morning peak hour.

2.0 Introduction

2.1 Purpose

The purpose of this study is to determine the number of lanes that would be required for a new ACP located at Lewis North in JBLM.

2.2 Location

The project site is the Lewis North area which is part of JBLM located near Dupont, Washington. See Figure 1 for a location map. The new ACP is located near the area of Wharf Road and Dupont-Steilacoom Road.

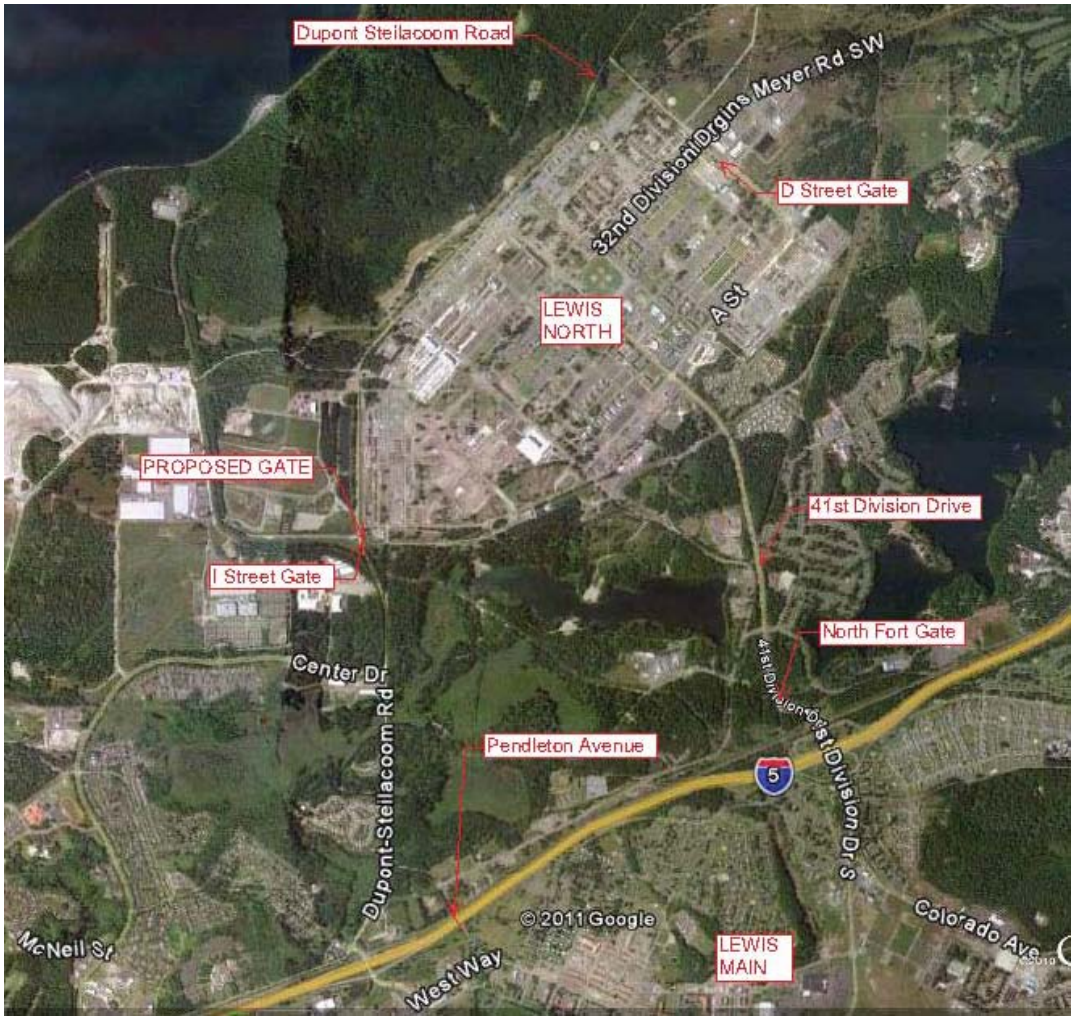


Figure 1 Location Map

3.0 Traffic Data and Lane Requirements

3.1 Data Collection

Traffic data for this study was collected on June 21st and June 23rd, 2011. Manual turning movement counts were performed to assess the preliminary distribution of traffic entering Lewis North during the peak morning period. Counts were obtained at the intersection of Dupont-Steilacoom and East Drive, East Drive and North Gate Drive and the I-5 and 41st Division Drive exit ramps. The counts were tabulated every 15 minutes by approach and turning movement for each intersection. Manual counts were also conducted at D Street Gate and North Fort Gate to record inbound volumes and the number of vehicles in queue at 15 minutes intervals, which together derive the total demand at each of these gates. Supplementing this contractor obtained field data are manual counts conducted by guard personnel at the I Street Gate. The guard count information was collected in half-hour or hour intervals depending on the time of day. See Appendix A1 for intersection and gate count information.

The traffic data illustrates two distinct spikes for inbound morning traffic at Lewis North. The first spike occurs between 0530 and 0630 as military personnel arrive for PT. The second spike is from approximately 0800 to 0900 as people arrive for regular duty hours (both military and civilian). Although these two spikes yield comparible volumes of traffic, the actual peak hour of inbound morning traffic occurs from 0530 to 0630. Table 1 summarizes the inbound peak hour volume of traffic processed, in queue, and total demand at each gate.

Table 1 Existing Peak Hour Demand for Each Gate

Location	Traffic Processed	Traffic Queued	Existing Demand
North Fort Gate	1300	151	1451
D Street Gate	1157	23	1180
I Street Gate	773	40	813

3.2 Access Control Point Lane Requirements

The number of inbound lanes required at the ACP is based on the volume of traffic at the gate and the ID checking procedures. The methodology for this analysis is from the Traffic and Safety Engineering for Better Entry Control Facilities (SDDCTEA Pamphlet 55-15) dated 2009 by the military Surface Deployment and Distribution Command Transportation Engineering Agency. The SDDCTEA Pamphlet 55-15 has established lane processing rates for various force protection conditions (FPCON) and ID checking procedures (single guard, two guards working in tandem in a single lane, and automated processing). It is recommended in the phamplet to design the ACP based on the FPCON Bravo Plus condition, which consists of a vehicle and identification of all occupants processing technique. This equates to average processing rates of 350 vehicles per hour per lane (vphpl) for a single ID checker or automated entry system set up and for 500 vphpl for tandem ID checkers.

4.0 Existing Conditions

Lewis North has a base population of 15,000 that increases by approximetely 1,500 ROTC and 1,000 ROTC Cadre during the summer months. The population that is not housed on JBLM gains access to Lewis North through three ACPs: North Fort Gate, D Street Gate and I Street Gate. Prevously vetted personnel can also access Lewis North through the Pendelton Drive underpass from Fort Lewis Main. See Figure 1 for Gate locations. It was determined that the inbound morning peak hour occurs from 0530 to 0630 as a result of personnel entering the facility for PT. Refer to Appendix A1 for existing traffic volume data and Appendix A2 for existing traffic demand and lane requirement worksheets.

4.1 North Fort Gate

The North Fort Gate ACP is located on 41st Division Drive, just north of the I-5 interchange with 41st Division Drive. The ACP has a gatehouse, canopy and two inbound lanes with a bump out on the right lane after the ACP which is used as a search area. During the peak hour this gate experiences significant backup with vehicle queues extending up the off ramps of I-5. Guards working in tandem process personnel in two inbound during the morning peak hour. The North Fort Gate ACP is one of the busiest gates at JBLM and due to its location receives most of the visitors to Lewis North. See Table 2 for existing North Fort Gate ACP traffic volume and lane determination information.

4.2 D Street Gate

The D Street Gate has many facilities such as a gatehouse, guard booth, canopy and truck inspection area. Although there are two lanes at the ID check area, due to current site conditions D Street Gate only functions with one inbound lane. This significantly limits the number of vehicles that can be processed at this location.

The intersection of East Drive and North Gate Road is located immediately west of D Street Gate and is typically a three way stop controlled intersection. However, it transforms into a four leg intersection when a side entry gate called 55V is opened and used to supplement D Street Gate during the morning peak period of traffic. A guard is stationed at the intersection to control traffic when 55V Gate is open. Therefore, vehicles on East Drive turn right and enter Lewis North through 55V Gate without stopping and traffic on North Gate Road turns left without stopping and enters the facility through D Street Gate. See Table 2 for existing traffic demand and lane requirements for D Street Gate.

4.3 I Street Gate

The I Street Gate is a secondary ACP which operates from 0500. to 0900 and has direct access to Dupont-Steilacoom Road. The swing gate along the perimeter fence is opened and inbound vehicles are allowed access into Lewis North. There are minimal facilities at this location with no canopy and no median. However there is a temporary mobile building which functions as a gatehouse. Guard counts were used for inbound traffic data at I Street Gate and during the Charrette meeting in August of 2011 some additional traffic counts were conducted and observations were noted. The more stringent checking of ID's during the August site visit versus the June site visit resulted in larger queues and the guards stated that traffic at I Street Gate decreased substantially due to the procedural change. See Table 2 for existing traffic demand and lane requirement information.

Table 2 Existing Inbound Lane Analysis for Each Gate

Location	Existing Demand	Existing Number of Lanes	Required Number of Lanes	
			Single Processing	Dual Processing
North Fort Gate	1451	2	5	3
D Street Gate	1180	1	4	3
I Street Gate	813	1	3	2

5.0 Future Conditions

The future conditions at Lewis North include a new ACP located in the vicinity of the existing I Street Gate. The current I Street Gate will be closed. In order to calculate future demand several factors need to be determined including percent deployed at the time of collecting existing traffic data, future growth on Lewis North and local growth. Reference Appendix A3 for lane requirements based on future conditions. During the week of June 20, 2011, there were 700 personnel (864th Brigade) deployed, which results in 1% escalation factor to account for the Percent Deployed. JBLM personnel stated that they anticipate very little growth in Lewis North and thus a future growth factor of a 1% was used in the future lane requirement analysis. The growth rate for Pierce County is expected to be over 1% annualy, but because the local growth should have little affect on the peak hour demand that results from PT a value of 2% was used.

Furthermore, since the proposed gate will have far more functionality than the existing I Street Gate it would not be appropriate to simply use vehicle counts from the current I Street Gate to determine future demand for the proposed gate. Also, while manual counts were being performed in August several motorists at I Street Gate mentioned to the guards that they didn't even know that I Street Gate existed, meaning there could be more motorists that would use I Street Gate if they knew about it.

5.1 Origin and Destination Analysis

NOTE to Reviewer: This is how we've developed the future distribution of traffic at the gates at this point in time. This section will be revised once data is collected from the OD on-line survey.

An origin destination analysis was completed in order to better understand what the traffic demand would be once the new ACP is constructed. The on-line survey for Lewis North personnel will be available from August 31st through September 23rd and consists of six (6) questions designed to better understand traffic patterns now as well as in the future. The results of the origin and destination survey are shown in Appendix A5.

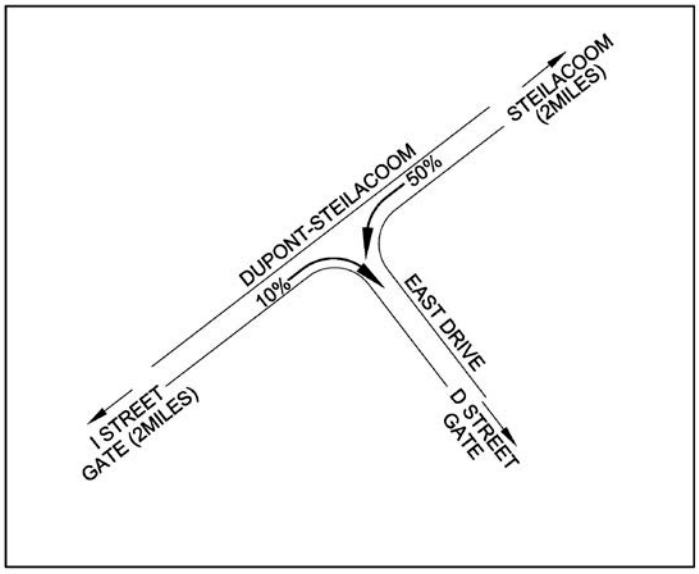
Turning movements at the intersection of Dupont Steilacoom Road and East Drive and at the I-5 interchange near the North Fort Gate ACP provide one with a general indication of the origin of drivers. These turning movements were analyzed and a determination was made as to what percentage of drivers would be better served by using the new ACP. Appendix A4 contains the calculations for the redistribution of gate traffic for the future condition.

See Figure 2 for a schematic of the redistribution of the traffic volume for

Dupont- Steilicoom Road and East Drive intersection. It was estimated that 10% of vehicles currently traveling north on Dupont-Steilacoom Road and turning right onto East Drive would use the new ACP. A driver heading north on Dupont-Steilacoom Road already passed I Street Gate so there must be a good reason for them to use D Street Gate such as proximity to their final destination within Lewis North. Vehicles traveling south on Dupont-Steilacoom may be reluctant to continue the extra two miles south to the new ACP. However, JBLM has stated the 55V Gate will be closed after the new ACP is opened. Therefore, without the use of the 55V Gate to supplement D Street Gate functionality, it is assumed that considerable queuing of vehicles would prompt 50% of vehicles currently turning left to continue south to the new ACP.

There was also a small number of vehicles that entered East Drive from Dupont-Steilacomm that did not enter Lewis North, but turned left at North Gate Road. This volume was subtracted from vehicles that turned right from Dupont-Steilacoom because vehicles that come from the north would most likley take a different path to reach any destination accessed from North Gate Road.

<u>D Street Gate Redistribution Calculations:</u>
Vehicles entering D Street Gate via left turn = 373
Vehicles that will use new Gate: 373 * 0.50 = 187
Vehicles entering D Street Gate via right turn = 103
Vehicles that later do not enter Lewis North = 30
Vehicles that will use new Gate: (103 – 30)* 0.10 = 8 vehicles
Total Vehicles that will use new Gate: 187+8 = **195**



<u>Figure 2 Traffic Volume Redistribution at Dupont-Steilacoom Road and East Drive</u>

Furthermore, vehicles that currently access North Fort Gate via I-5 may also chose to use the new ACP as an alternative. See Figure 3 for traffic volume redistribution for North Fort Gate. It was determined that 50% of vehicles traveling north on I-5 would simply exit two miles earlier and use the new ACP. A smaller percentage, 20%, of vehicles traveling south on I-5 are assumed to continue to the next exit and enter through the new ACP.

North Fort Gate Redistribution Calculations:
Vehicles entering North Fort Gate via I-5 North = 270
Vehicles that will use new Gate: 270 * 0.50 =135
Vehicles entering North Fort Gate via I-5 South = 642
Vehicles that will use new Gate: 642* 0.20 = 129
Total Vehicles that will us new Gate: 135+1298 = **264**

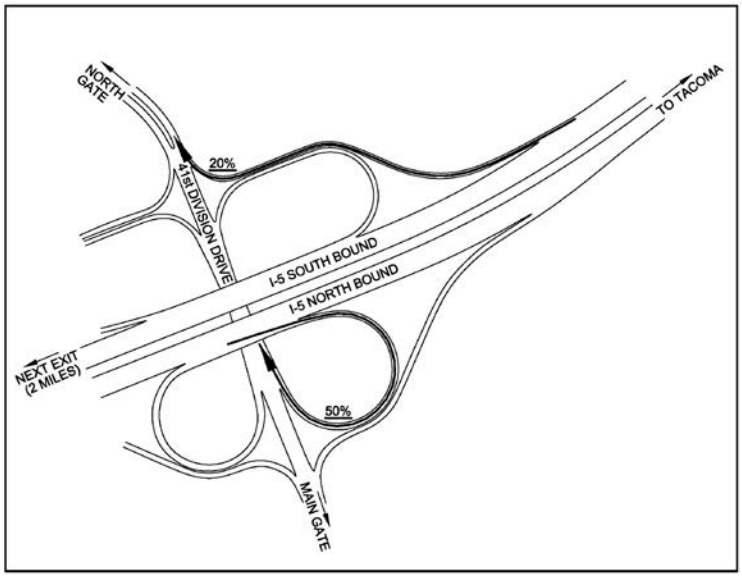


Figure 3 Traffic Volume Redistribution at I-5 and North Fort Gate

5.2 Future Gate Design Demand

After redistributing the demand according to the origin–destination analysis and appying deployment and growth factors, it has been determined that the future ACP would require 4 lanes to accommodate the morning peak hour traffic. This redistibution of traffic would also result in a slightly reduced peak hour demand for the other two gates. See Table 3 below for the future inbound lane requirments.. Refer to Appendix A3 for each gate's lane requirement worksheet.

Table 3 Future Inbound Lane Analysis for Each Gate

Location	Future Demand	Required Number of Lanes	
		Single Processing	Dual Processing
North Fort Gate	1267	4	3
D Street Gate	1022	3	3
Future Gate	**1294**	**4**	**3**

Appendix A1
Traffic Count Data

Tuesday, June 21, 2011

East Drive — **Eastbound**

	Left Turn					Thru					Right Turn					Total				
	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle
5:15 - 5:30 AM	6					31			3		21					58	0	0	3	0
5:30 - 5:45 AM	8					6					80					94	0	0	0	0
5:45 - 6:00 AM	5										145					150	0	0	0	0
6:00 - 6:15 AM	5										147					152	0	0	0	0
6:15 - 6:30 AM	12					33	1				26					71	1	0	0	0
6:30 - 6:45 AM	26			1		21	2									47	2	0	1	0
6:45 - 7:00 AM	18					22	1		1							40	1	0	1	0
7:00 - 7:15 AM	33					29	1									62	1	0	0	0
7:15 - 7:30 AM	30					27	7		3							57	7	0	3	0
7:30 - 7:45 AM	23					28	6		3							51	6	0	3	0
7:45 - 8:00 AM	23		1			37		1								60	0	2	0	0
8:00 - 8:15 AM	20		1			28	2									48	2	1	0	0
8:15 - 8:30 AM	16					35	1									51	1	0	0	0
8:30 - 8:45 AM	22			1		54	3	4								76	3	4	1	0
8:45 - 9:00 AM	13					41	1									54	1	0	0	0
9:00 - 9:15 AM	10					54	1	1								64	1	1	0	0
4 HOUR TOTAL																1135	18	2	11	0
AM Peak Hour																				
5:30 - 6:30 AM	30	0	0	0	0	39	1	0	0	0	398	0	0	0	0	467	1	0	0	0

East Drive — **Westbound**

	Left Turn					Thru					Right Turn					Total				
	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle
5:15 - 5:30 AM						1										1	0	0	0	0
5:30 - 5:45 AM						3					1					4	0	0	0	0
5:45 - 6:00 AM						5					4					9	0	0	0	0
6:00 - 6:15 AM						6					7					13	0	0	0	0
6:15 - 6:30 AM						22					5					27	0	0	0	0
6:30 - 6:45 AM						52					66			1		118	0	0	1	0
6:45 - 7:00 AM						42	2	3			66			4		108	2	3	4	0
7:00 - 7:15 AM						14	3		3		43	1		1		57	4	0	4	0
7:15 - 7:30 AM						29	1				24					53	1	0	0	0
7:30 - 7:45 AM						44					79					123	0	0	0	0
7:45 - 8:00 AM						35	2	1			57			4		92	2	1	4	0
8:00 - 8:15 AM						40					64	1		2		104	1	0	2	0
8:15 - 8:30 AM						19	1				28					47	1	0	0	0
8:30 - 8:45 AM						16	1	2			18					34	1	2	0	0
8:45 - 9:00 AM						14	1				11					25	1	0	0	0
9:00 - 9:15 AM						8					14					22	0	0	0	0
4 HOUR TOTAL																837	13	6	15	0
AM Peak Hour																				
5:30 - 6:30 AM	0	0	0	0	0	36	0	0	0	0	17	0	0	0	0	53	0	0	0	0

55V and North Gate — **Northbound**

	Left Turn					Thru					Right Turn					Total				
	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle
5:15 - 5:30 AM																0	0	0	0	0
5:30 - 5:45 AM																0	0	0	0	0
5:45 - 6:00 AM																0	0	0	0	0
6:00 - 6:15 AM																0	0	0	0	0
6:15 - 6:30 AM																0	0	0	0	0
6:30 - 6:45 AM																0	0	0	0	0
6:45 - 7:00 AM																0	0	0	0	0
7:00 - 7:15 AM																0	0	0	0	0
7:15 - 7:30 AM																0	0	0	0	0
7:30 - 7:45 AM																0	0	0	0	0
7:45 - 8:00 AM																0	0	0	0	0
8:00 - 8:15 AM																0	0	0	0	0
8:15 - 8:30 AM																0	0	0	0	0
8:30 - 8:45 AM																0	0	0	0	0
8:45 - 9:00 AM																0	0	0	0	0
9:00 - 9:15 AM																0	0	0	0	0
4 HOUR TOTAL																0	0	0	0	0
AM Peak Hour																				
5:30 - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

55V and North Gate — **Southbound**

	Left Turn					Thru					Right Turn					Total						
	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Intersection Total 15 minute intervals	Consecutive 4 - 15 minute intervals
5:15 - 5:30 AM	40					21					2					63	0	0	0	0	125	
5:30 - 5:45 AM	139					22					7					168	0	0	0	0	266	
5:45 - 6:00 AM	232					20					2					254	0	0	0	0	413	
6:00 - 6:15 AM	169					13					15					197	0	0	0	0	362	1166
6:15 - 6:30 AM	39					16					14			1		69	0	0	1	0	169	1210
6:30 - 6:45 AM	27			1							16			1		43	0	0	2	0	214	1158
6:45 - 7:00 AM	36			2							14					50	0	0	2	0	211	956
7:00 - 7:15 AM	42			6							22					64	0	0	6	0	198	792
7:15 - 7:30 AM	36			2							29					65	0	0	2	0	188	811
7:30 - 7:45 AM	25										17					42	0	0	0	0	225	822
7:45 - 8:00 AM	33	1									12					45	1	0	0	0	207	818
8:00 - 8:15 AM	40	3									9					49	3	0	0	0	210	830
8:15 - 8:30 AM	65										11		1			76	0	1	0	0	177	819
8:30 - 8:45 AM	134	1	1								23					157	1	1	0	0	280	874
8:45 - 9:00 AM	62			1							7					69	0	0	1	0	151	818
9:00 - 9:15 AM	73										13					86	0	0	0	0	174	782
4 HOUR TOTAL																1497	5	2	14	0	3555	
AM Peak Hour																						
5:30 - 6:30 AM	579	0	0	0	0	71	0	0	0	0	38	0	0	1	0	688	0	0	1	0	1210	2376

Guard Counts

GATE	DATE	0301-0400	0401-0500	0501-0530	0531-0600	0601-0630	0631-0700	0701-0800	0801-0900	0901-1000	1001-1100	1101-1200	TOTALS
I Street	Sunday, June 19, 2011												0
I Street	Monday, June 20, 2011			149	256	75	75	96	106				757
I Street	Tuesday, June 21, 2011			79	496	277	58	52	116				1078
I Street	Wednesday, June 22, 2011			100	334	275	60	106	127				1002
I Street	Thursday, June 23, 2011			118	297	234	81	145	155				1030
I Street	Friday, June 24, 2011			51	190	151	48	93	111				644
I Street	Saturday, June 25, 2011												0
I Street	Sunday, June 26, 2011												0
		0	0	497	1573	1012	322	492	615	0	0	0	4511

Tuesday, June 21, 2011

	East Drive															Dupont-Steilacoom Rd																										
	Westbound															Northbound											Southbound															
	Left Turn					Right Turn					Total					Thru					Right Turn					Total					Left Turn					Thru					Total						
	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Intersection Total 15 minute intervals	Consecutive 4 - 15 minute intervals
5:15 - 5:30 AM	5					3					8	0	0	0	0	10					7					17	0	0	0	0	61					32					93	0	0	0	0	118	
5:30 - 5:45 AM	4					1					5	0	0	0	0	13					16					29	0	0	0	0	99					65					164	0	0	0	0	198	
5:45 - 6:00 AM	5					3					8	0	0	0	0	15					24					39	0	0	0	0	136					54					190	0	0	0	0	237	
6:00 - 6:15 AM	3					5					8	0	0	0	0	21					31					52	0	0	0	0	112					51					163	0	0	0	0	223	776
6:15 - 6:30 AM	11					18					29	0	0	0	0	42					32					74	0	0	0	0	26					50					76	0	0	0	0	179	837
6:30 - 6:45 AM	23					29					52	0	0	0	0	46					33					79	0	0	0	0	18					70					88	0	0	0	0	219	858
6:45 - 7:00 AM	19					24					43	0	0	0	0	51					25					76	0	0	0	0	21					81					102	0	0	0	0	221	842
7:00 - 7:15 AM	25					5					30	0	0	0	0	50					32					82	0	0	0	0	19					86					105	0	0	0	0	217	836
7:15 - 7:30 AM	36					8					44	0	0	0	0	66					36					102	0	0	0	0	20					91					111	0	0	0	0	257	914
7:30 - 7:45 AM	28					26					54	0	0	0	0	49					37					86	0	0	0	0	14					76					90	0	0	0	0	230	925
7:45 - 8:00 AM	25					20					45	0	0	0	0	48					39					87	0	0	0	0	28					66					94	0	0	0	0	226	930
8:00 - 8:15 AM	27					19					46	0	0	0	0	38					26					64	0	0	0	0	29					74					103	0	0	0	0	213	926
8:15 - 8:30 AM	18					12					30	0	0	0	0	43					27					70	0	0	0	0	28					61					89	0	0	0	0	189	858
8:30 - 8:45 AM	18					6					24	0	0	0	0	44					30					74	0	0	0	0	32					53					85	0	0	0	0	183	811
8:45 - 9:00 AM	18					8					26	0	0	0	0	33					26					59	0	0	0	0	43					66					109	0	0	0	0	194	779
9:00 - 9:15 AM	15					6					21	0	0	0	0	26					31					57	0	0	0	0	46					49					95	0	0	0	0	173	739
4 HOUR TOTAL	280					193					473	0	0	0	0	595					452					1047	0	0	0	0	732					1025					1757	0	0	0	0	3277	
AM Peak Hour																																														
7:00 - 8:00 AM	114	0	0	0	0	59	0	0	0	0	173	0	0	0	0	213	0	0	0	0	144	0	0	0	0	357	0	0	0	0	81	0	0	0	0	319	0	0	0	0	400	0	0	0	0		930

Tuesday, June 21, 2011

	From SB I-5																				From NB I-5																					
	From SB I-5 Off Ramp										From 41st Div. Drive at SB ramp										From NB I-5 Off Ramp										From 41st Div. Drive at NB ramp									
	Thru					Total					Thru					Total					Thru					Total					Thru					Total						
	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Passenger Car	Single Unit	Semi-Trailer	Bus	Motorcycle	Intersection Total 15 minute intervals	Consecutive 4 - 15 minute intervals
5:15 - 5:30 AM	157					157	0	0	0	0	103					103	0	0	0	0	58					58	0	0	0	0	110					110	0	0	0	0	428	
5:30 - 5:45 AM	182					182	0	0	0	0	198					198	0	0	0	0	85				2	85	0	0	0	2	91			2	2	91	0	0	2	2	562	
5:45 - 6:00 AM	149					149	0	0	0	0	170					170	0	0	0	0	81				1	81	0	0	0	1	114			4	1	114	0	0	4	1	520	
6:00 - 6:15 AM	154					154	0	0	0	0	187					187	0	0	0	0	46					46	0	0	0	0	68			1	1	68	0	0	1	1	457	1967
6:15 - 6:30 AM	111					111	0	0	0	0	53					53	0	0	0	0	28				1	28	0	0	0	1	36		2	1	1	36	0	2	1	1	233	1772
6:30 - 6:45 AM	70					70	0	0	0	0	71					71	0	0	0	0	27			1	1	27	0	0	1	1	59	2	1	1		59	2	1	1	0	233	1443
6:45 - 7:00 AM	82					82	0	0	0	0	118					118	0	0	0	0	43					43	0	0	0	0	90	3	4	7	1	90	3	4	7	1	348	1271
7:00 - 7:15 AM	75					75	0	0	0	0	97					97	0	0	0	0	26				1	26	0	0	0	1	95		1	1		95	0	1	1	0	296	1110
7:15 - 7:30 AM	72					72	0	0	0	0	81					81	0	0	0	0	35					35	0	0	0	0	68	1		1	1	68	1	0	1	1	259	1136
7:30 - 7:45 AM	79					79	0	0	0	0	125					125	0	0	0	0	45					45	0	0	0	0	131	3			1	131	3	0	0	1	384	1287
7:45 - 8:00 AM	75					75	0	0	0	0	102					102	0	0	0	0	39					39	0	0	0	0	91	1	2		1	91	1	2	0	1	311	1250
8:00 - 8:15 AM	75					75	0	0	0	0	120					120	0	0	0	0	26					26	0	0	0	0	133	2	1		1	133	2	1	0	1	358	1312
8:15 - 8:30 AM	103					103	0	0	0	0	129					129	0	0	0	0	35				1	35	0	0	0	1	105	2	5		3	105	2	5	0	3	383	1436
8:30 - 8:45 AM	93					93	0	0	0	0	145					145	0	0	0	0	33	2			1	33	2	0	0	1	133	5	2	2	3	133	5	2	2	3	419	1471
8:45 - 9:00 AM	97					97	0	0	0	0	165					165	0	0	0	0	37					37	0	0	0	0	111	1	2		1	111	1	2	0	1	414	1574
3.75 HOUR TOTAL	1574					1574	0	0	0	0	1864					1864	0	0	0	0	644					644	0	0	0	0	1435	20	20	20	17	1435	20	20	20	17	5594	
AM Peak Hour																																										
6:00 - 6:15 AM	154					154	0	0	0	0	187					187	0	0	0	0	46					46	0	0	0	0	68					68	0	0	0	0	455	6049

Manual Counts

	6/21/2011			6/22/2011			6/23/2011		
Time	North Gate	D Street	Cumulative	North Gate	D Street	Cumulative	North Gate	D Street	Cumulative
04:15 to 04:30				No Counts Taken					
04:30 to 04:45									
04:45 to 05:00									
05:00 to 05:15							295		295
05:15 to 05:30	260	124	384				355		355
05:30 to 05:45	380	262	642				349	97	446
05:45 to 06:00	319	404	723				284	204	488
06:00 to 06:15	341	349	690				209	72	281
06:15 to 06:30	164	142	306				150	99	249
06:30 to 06:45	141	95	236				191	74	265
06:45 to 07:00	200	94	294				167	80	247
07:00 to 07:15	172	133	305				129	54	183
07:15 to 07:30	153	134	287				211	77	288
07:30 to 07:45	204	102	306				265	74	339
07:45 to 08:00	177	108	285				91	65	156
08:00 to 08:15	195	103	298				183	76	259
08:15 to 08:30	232	129	361				190	73	263
08:30 to 08:45	238	243	481				214	127	341
08:45 to 09:00	262	125	387						

Appendix A2
Existing Traffic Volume Worksheets

I Street Lane Requirements Worksheet			
Line	**Field**	**Calculation**	**Value**
1	Number of Vehicles Process in Peak Hour (**section 2.3.2.4**)		773
2	Number of Queued Vehicles at end of Peak Hour (**section 2.3.2.4**)		40
3	TOTAL EXISTING DEMAND	Line1 + Line2	813
4	Deployment Adjustment [DA] (**section 2.3.2.3**) *Percent of Total Base Population Deployed*	100%/(100% -DA%)	*0% Deployment* = 1.00
5	TOTAL ADJUSTED EXISTING DEMAND	Line3 X Line4	813
6	Local Growth at ECF [LG] (**section 2.3.2.2**) *Percent of Estimated Local Growth*	(100% + LG%)/100%	*0% Local Growth* = 1
7	Future Growth [FG] (**section 2.3.2.1**) *Percent of Estimated Future Growth*	(100% + FG%)/100%	*0% Future Growth* = 1
8	DESIGN DEMAND	Line5 X Line6 X Line7	813
9	Design Processing Rate (**Exhibit 2.5**) *Single - Default 350 veh per hour per lane*		350
10	CALCULATED LANE REQUIREMENTS	Line8 / Line9	2.3
11	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**3 Lanes**
12	Design Processing Rate (**Exhibit 2.5**) *Tandem - Default 500 veh per hour per lane*		500
13	CALCULATED LANE REQUIREMENTS	Line8 / Line12	1.6
14	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**2 Lanes**

Refer to Traffic and Safety Engineering for Better Entry Control Facilities SDDCTEA Pamphlet 55-15

North Gate Lane Requirements Worksheet			
Line	**Field**	**Calculation**	**Value**
1	Number of Vehicles Process in Peak Hour (**section 2.3.2.4**)		1300
2	Number of Queued Vehicles at end of Peak Hour (**section 2.3.2.4**)		151
3	TOTAL EXISTING DEMAND	Line1 + Line2	1451
4	Deployment Adjustment [DA] (**section 2.3.2.3**) *Percent of Total Base Population Deployed*	100%/(100% -DA%)	*0% Deployment* = 1.00
5	TOTAL ADJUSTED EXISTING DEMAND	Line3 X Line4	1451
6	Local Growth at ECF [LG] (**section 2.3.2.2**) *Percent of Estimated Local Growth*	(100% + LG%)/100%	*0% Local Growth* = 1
7	Future Growth [FG] (**section 2.3.2.1**) *Percent of Estimated Future Growth*	(100% + FG%)/100%	*0% Future Growth* = 1
8	DESIGN DEMAND	Line5 X Line6 X Line7	1451
9	Design Processing Rate (**Exhibit 2.5**) *Single - Default 350 veh per hour per lane*		350
10	CALCULATED LANE REQUIREMENTS	Line8 / Line9	4.1
11	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**5 Lanes**
12	Design Processing Rate (**Exhibit 2.5**) *Tandem - Default 500 veh per hour per lane*		500
13	CALCULATED LANE REQUIREMENTS	Line8 / Line12	2.9
14	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**3 Lanes**

Refer to Traffic and Safety Engineering for Better Entry Control Facilities SDDCTEA Pamphlet 55-15

D Street Lane Requirements Worksheet			
Line	**Field**	**Calculation**	**Value**
1	Number of Vehicles Process in Peak Hour (**section 2.3.2.4**)		1157
2	Number of Queued Vehicles at end of Peak Hour (**section 2.3.2.4**)		23
3	TOTAL EXISTING DEMAND	Line1 + Line2	1180
4	Deployment Adjustment [DA] (**section 2.3.2.3**) *Percent of Total Base Population Deployed*	100%/(100% -DA%)	*0% Deployment* = 1.00
5	TOTAL ADJUSTED EXISTING DEMAND	Line3 X Line4	1180
6	Local Growth at ECF [LG] (**section 2.3.2.2**) *Percent of Estimated Local Growth*	(100% + LG%)/100%	*0% Local Growth* = 1
7	Future Growth [FG] (**section 2.3.2.1**) *Percent of Estimated Future Growth*	(100% + FG%)/100%	*0% Future Growth* = 1
8	DESIGN DEMAND	Line5 X Line6 X Line7	1180
9	Design Processing Rate (**Exhibit 2.5**) *Single - Default 350 veh per hour per lane*		350
10	CALCULATED LANE REQUIREMENTS	Line8 / Line9	3.4
11	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**4 Lanes**
12	Design Processing Rate (**Exhibit 2.5**) *Tandem - Default 500 veh per hour per lane*		500
13	CALCULATED LANE REQUIREMENTS	Line8 / Line12	2.4
14	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**3 Lanes**

Refer to Traffic and Safety Engineering for Better Entry Control Facilities SDDCTEA Pamphlet 55-15

Appendix A3
Future Traffic Volume Worksheets

Future Gate Requirements Worksheet			
Line	**Field**	**Calculation**	**Value**
1	Number of Vehicles Process in Peak Hour (**section 2.3.2.4**)		1204
2	Number of Queued Vehicles at end of Peak Hour (**section 2.3.2.4**)		40
3	TOTAL EXISTING DEMAND	Line1 + Line2	1244
4	Deployment Adjustment [DA] (**section 2.3.2.3**) *Percent of Total Base Population Deployed*	100%/(100% -DA%)	*1% Deployment* = 1.01
5	TOTAL ADJUSTED EXISTING DEMAND	Line3 X Line4	1256
6	Local Growth at ECF [LG] (**section 2.3.2.2**) *Percent of Estimated Local Growth*	(100% + LG%)/100%	*2% Local Growth* = 1.02
7	Future Growth [FG] (**section 2.3.2.1**) *Percent of Estimated Future Growth*	(100% + FG%)/100%	*1% Future Growth* = 1.01
8	DESIGN DEMAND	Line5 X Line6 X Line7	1294
9	Design Processing Rate (**Exhibit 2.5**) *Single - Default 350 veh per hour per lane*		350
10	CALCULATED LANE REQUIREMENTS	Line8 / Line9	3.7
11	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**4 Lanes**
12	Design Processing Rate (**Exhibit 2.5**) *Tandem - Default 500 veh per hour per lane*		500
13	CALCULATED LANE REQUIREMENTS	Line8 / Line12	2.6
14	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**3 Lanes**

Refer to Traffic and Safety Engineering for Better Entry Control Facilities SDDCTEA Pamphlet 55-15**F**

North Fort Gate Lane Requirements Worksheet			
Line	**Field**	**Calculation**	**Value**
1	Number of Vehicles Process in Peak Hour (**section 2.3.2.4**)		1067
2	Number of Queued Vehicles at end of Peak Hour (**section 2.3.2.4**)		151
3	TOTAL EXISTING DEMAND	Line1 + Line2	1218
4	Deployment Adjustment [DA] (**section 2.3.2.3**) *Percent of Total Base Population Deployed*	100%/(100% -DA%)	*1% Deployment* = 1.01
5	TOTAL ADJUSTED EXISTING DEMAND	Line3 X Line4	1230
6	Local Growth at ECF [LG] (**section 2.3.2.2**) *Percent of Estimated Local Growth*	(100% + LG%)/100%	*2% Local Growth* = 1.02
7	Future Growth [FG] (**section 2.3.2.1**) *Percent of Estimated Future Growth*	(100% + FG%)/100%	*1% Future Growth* = 1.01
8	DESIGN DEMAND	Line5 X Line6 X Line7	1267
9	Design Processing Rate (**Exhibit 2.5**) *Single - Default 350 veh per hour per lane*		350
10	CALCULATED LANE REQUIREMENTS	Line8 / Line9	3.6
11	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**4 Lanes**
12	Design Processing Rate (**Exhibit 2.5**) *Tandem - Default 500 veh per hour per lane*		500
13	CALCULATED LANE REQUIREMENTS	Line8 / Line12	2.5
14	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**3 Lanes**

Refer to Traffic and Safety Engineering for Better Entry Control Facilities SDDCTEA Pamphlet 55-15

D Street Gate Lane Requirements Worksheet			
Line	**Field**	**Calculation**	**Value**
1	Number of Vehicles Process in Peak Hour (**section 2.3.2.4**)		959
2	Number of Queued Vehicles at end of Peak Hour (**section 2.3.2.4**)		23
3	TOTAL EXISTING DEMAND	Line1 + Line2	982
4	Deployment Adjustment [DA] (**section 2.3.2.3**) *Percent of Total Base Population Deployed*	100%/(100% -DA%)	*1% Deployment* = 1.01
5	TOTAL ADJUSTED EXISTING DEMAND	Line3 X Line4	992
6	Local Growth at ECF [LG] (**section 2.3.2.2**) *Percent of Estimated Local Growth*	(100% + LG%)/100%	*2% Local Growth* = 1.02
7	Future Growth [FG] (**section 2.3.2.1**) *Percent of Estimated Future Growth*	(100% + FG%)/100%	*1% Future Growth* = 1.01
8	DESIGN DEMAND	Line5 X Line6 X Line7	1022
9	Design Processing Rate (**Exhibit 2.5**) *Single - Default 350 veh per hour per lane*		350
10	CALCULATED LANE REQUIREMENTS	Line8 / Line9	2.9
11	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**3 Lanes**
12	Design Processing Rate (**Exhibit 2.5**) *Tandem - Default 500 veh per hour per lane*		500
13	CALCULATED LANE REQUIREMENTS	Line8 / Line12	2.0
14	ROUNDED LANE REQUIREMENTS *Round to Next Highest Whole Number*		**3 Lanes**

Refer to Traffic and Safety Engineering for Better Entry Control Facilities SDDCTEA Pamphlet 55-15

Appendix A4
Origin-Destination Calculation

Volume of vehicles turning left @ Dupont-Steillacoom and East Drive = 373

Percentage of vehicles that will use new gate = 50%

Total volume that will use new gate: 373 * 0.50 = 187 vehicles

Volume of vehicles turning right @ Dupont-Steillacoom and East Drive = 103

Volume of vehicles turning left @ North Gate Drive and East Drive = 30

Percentage of vehicles that will use new gate= 10%

Total volume that will use new gate: (103-30)*0.10 = 8 vehicles

Total Vehicles from D Street Gate: 187+8 = 195 vehicles

Volume of vehicles from the South at I-5 interchange = 270

Percentage of vehicles that will use new gate = 50%

Total Volume that will use new gate: 270 * 0.50 = 135

Volume of vehicles from the North at I-5 interchange = 642

Percentage of vehicles that will use new gate = 20%

Total Volume that will use new gate: 642 * 0.20 = 129

Total Vehicles from North Fort Gate: 135+129 = 264 vehicles

Total redistributed vehicles: 195+264 = **459** vehicles

Appendix A5
Origin-Destination Survey

Lewis North Access Survey Edit

Design Survey | Collect Responses | Analyze Results

Edit Survey

Preview Survey | Send Survey »

To change the **look** of your survey, select a theme below.

Aqua Create Custom Theme

+ Add Page

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+ Add Question ▼

Q1 Edit Question ▼ | Add Question Logic | Move | Copy | Delete

*** 1. Which gate do you use to enter Lewis North in the morning?**

- North Fort Gate (41st Division Dr Gate) via I-5 from the north
- North Fort Gate (41st Division Dr Gate) via I-5 from the south
- Live on Lewis Main and use North Fort Gate via 41st Division Drive
- DuPont Gate then Pendleton Avenue Underpass
- Live on Lewis Main and use Pendleton Avenue Underpass
- D Street Gate via North Gate Road
- D Street Gate via DuPont-Steilacoom Road from the south
- D Street Gate via DuPont-Steilacoom Road from the north
- I Street Gate via DuPont-Steilacoom Road from the south
- I Street Gate via DuPont-Steilacoom Road from the north

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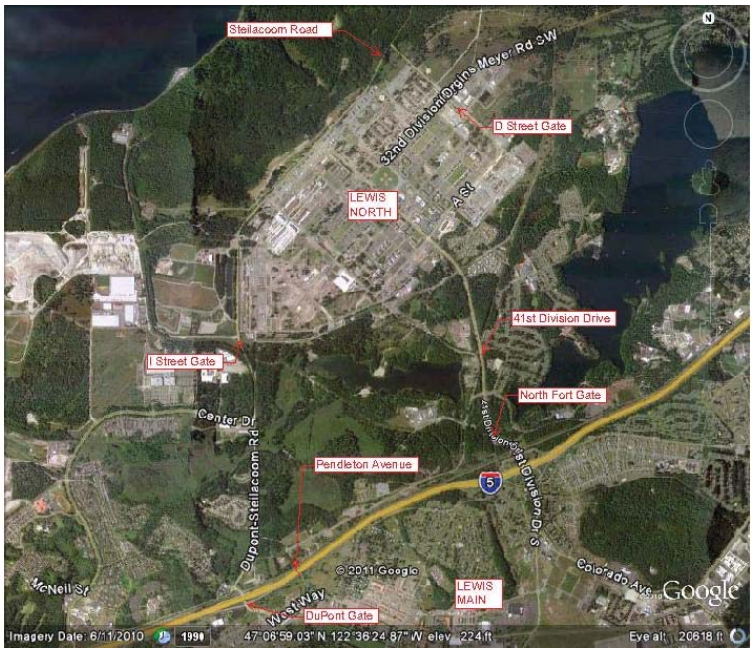

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+ Add Question ▼

Q2 Edit Question ▼ | Add Question Logic | Move | Copy | Delete

*** 2. What time do you typically enter Lewis North (check more than one if you enter multiple times)?**

- ☐ 0500 - 0530
- ☐ 0530 - 0600
- ☐ 0600 - 0630
- ☐ 0630 - 0700
- ☐ 0700 - 0730
- ☐ 0730 - 0800
- ☐ 0800 - 0830
- ☐ 0830 - 0900
- ☐ 0900 - 0930

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Q3 Edit Question ▼ Add Question Logic Move Copy Delete

*** 3. When the I Street Gate is closed and the new DuPont-Steilacoom Road Gate is opened near the location shown, would you use it as your primary gate for:**

- Entering Lewis North
- Exiting Lewis North
- Both entering and exiting Lewis North
- Neither entering nor exiting Lewis North

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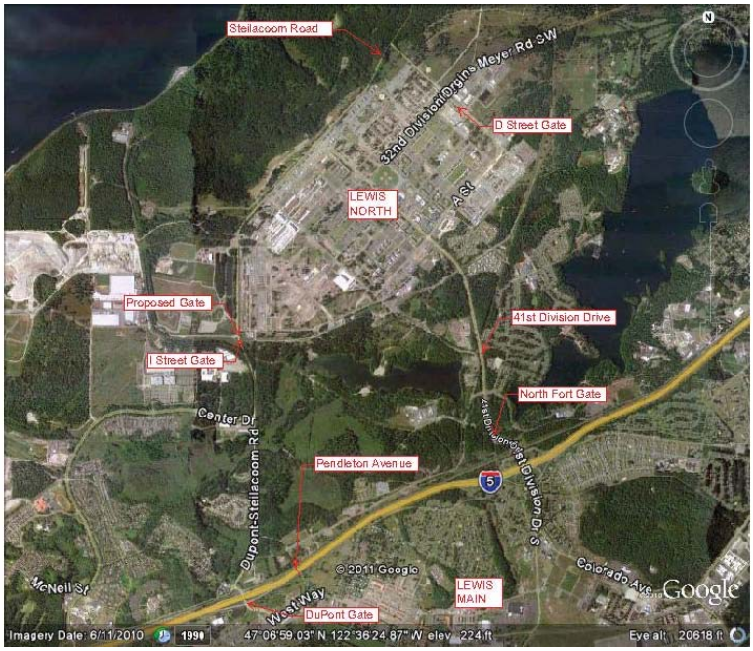

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Q4 Edit Question ▼ Add Question Logic Move Copy Delete

* 4. Are you:

- Military
- Civilian

+ Add Question ▼

+ Add Page

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Q5 Edit Question ▼ Add Question Logic Move Copy Delete

* 5. Which gate do you use to exit Lewis North in the afternoon?

- North Fort Gate (41st Division Dr Gate)
- Pendleton Avenue Underpass to DuPont Gate
- Pendleton Avenue Underpass to Lewis Main
- D Street Gate

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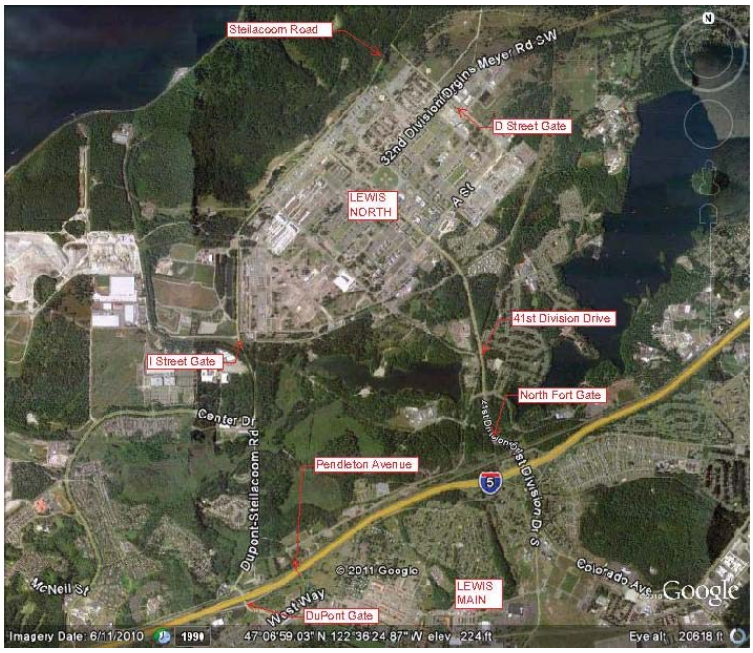

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Q6 Edit Question ▼ | Add Question Logic | Move | Copy | Delete

*** 6. What time do you typically exit Lewis North?**

- 1530 - 1600
- 1600 - 1630
- 1630 - 1700
- 1700 - 1730
- 1730 - 1800
- 1800 - 1830
- 1830 - 1900

+ Add Question ▼

Appendix B

ACP Threat Calculations

Summary			
	Time to Reach AVB (sec)	Time Allowed (sec)	Pass?
Threat Scenerio #1			
Enter through inbound lane	9.67	9	Pass
Enter through outbound lane	9.06	9	Pass
Threat Scenerio #2	NA	9	NA
Threat Scenerio #3	14.25	9	Pass
Threat Scnerio #4			
Enter through inbound lane	10.63	7	Pass
Enter through outbound lane	9.84	7	Pass

Threat Scenerio 1: Enter through inbound lane

Maximum Acceleration = 11.3 ft/s^2
Maximum Deceleration = -24.1 ft/s^2
point of detection (x) = 1047.35
Starting Speed (V_0) = 51 **mph**
Starting Speed (V_0) = 75 **ft/s**
Time to AVB = 9.67 **sec**
Method of Detection = Security Guard at Guard Booth

Feature	Start Station	Length	End Station	Entrance Velocity	Curve Calculations			Exit Velocity	Time to Traverse Feature	Cumm. Time to Reach Detection	Cumm. Time to Reach AVB	Max Possible Velocity	Max Feature Exit Velocity	Min Feature Exit Velocity	Acceleration				Constant			Deceleration		
					R	Super-elevation	Vs Spin-out Speed								Logic	Distance	Time	Peak Velocity	Logic	Distance	Time	Logic	Distance	Time
	(ft)	(ft)	(ft)	(ft/s)	(ft)	(ft/ft)	(f/s)	(ft/s)	(sec)	(sec)	(sec)	(f/t)	(ft/s)	(ft/s)	-	(ft)	(sec)	(ft/s)	-	(ft)	(sec)	-	(ft)	(sec)
T1	0	52.13	52.13	75				75	0.68	0.68	0.00	205	82	55	some	35.53	0.46	80	none	0.00	0.00	some	16.60	0.22
C1	52.13	310.02	362.15	75	225	0.02	75	75	4.15	4.83	0.00	75	75	0	none	0.00	0.00	75	some	310.02	4.15	none	0.00	0.00
T2	362.15	120.77	482.92	75				91	1.46	6.29	0.00	205	91	0	all	120.77	1.46	91	none	0.00	0.00	none	0.00	0.00
C2	482.92	551.14	1034.06	91	400	-0.02	97	97	5.70	11.99	0.00	97	97	0	some	48.44	0.52	97	some	502.70	5.19	none	0.00	0.00
T3	1034.06	13.29	1047.35	97				98	0.14	12.12	0.00	147	98	94	all	13.29	0.14	98	none	0.00	0.00	none	0.00	0.00
T4	1047.35	357.15	1404.5	98				83	3.38	0.00	3.38	205	133	0	some	204.22	1.87	120	none	0.00	0.00	some	152.93	1.51
C3	1404.5	425.39	1829.89	83	295	-0.02	83	83	5.11	0.00	8.49	83	83	0	none	0.00	0.00	83	some	425.39	5.11	none	0.00	0.00
T5	1829.89	106.35	1936.24	83				97	1.18	0.00	9.67	205	97	43	all	106.35	1.18	97	none	0.00	0.00	none	0.00	0.00

Threat Scenerio 1: Enter through outbound lane

Maximum Acceleration = 11.3 ft/s^2
Maximum Deceleration = -24.1 ft/s^2
point of detection (x) = 1006.93
Starting Speed (V_0) = 52 **mph**
Starting Speed (V_0) = 77 **ft/s**
Time to AVB = 9.06 **sec**
Method of Detection = Security Guard at Guard Booth

Feature	Start Station	Length	End Station	Entrance Velocity	Curve Calculations			Exit Velocity	Time to Traverse Feature	Cumm. Time to Reach Detection	Cumm. Time to Reach AVB	Max Possible Velocity	Max Feature Exit Velocity	Min Feature Exit Velocity	Acceleration				Constant			Deceleration		
					R	Super-elevation	Vs Spin-out Speed								Logic	Distance	Time	Peak Velocity	Logic	Distance	Time	Logic	Distance	Time
	(ft)	(ft)	(ft)	(ft/s)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sec)	(sec)	(sec)	(ft/s)	(ft/s)	(ft/s)	-	(ft)	(sec)	(ft/s)	-	(ft)	(sec)	-	(ft)	(sec)
T1	0	63.29	63.29	77				77	0.79	0.79	0.00	205	85	53	some	43.12	0.54	83	none	0.00	0.00	some	20.17	0.25
C1	63.29	344.46	407.75	77	250	-0.02	77	77	4.50	5.29	0.00	77	77	0	none	0.00	0.00	77	some	344.46	4.50	none	0.00	0.00
T2	407.75	112.20	519.95	77				82	1.35	6.64	0.00	205	92	21	some	88.63	1.07	89	none	0.00	0.00	some	23.57	0.28
C2	519.95	374.78	894.73	82	272	0.02	82	82	4.57	11.21	0.00	82	82	0	none	0.00	0.00	82	some	374.78	4.57	none	0.00	0.00
T3	894.73	112.20	1006.93	82				96	1.26	12.46	0.00	147	96	36	all	112.20	1.26	96	none	0.00	0.00	none	0.00	0.00
T4	1006.93	326.20	1333.13	96				79	3.21	0.00	3.21	205	129	0	some	178.61	1.69	115	none	0.00	0.00	some	147.59	1.52
C3	1333.13	392.7	1725.83	79	250	0.02	79	79	4.99	0.00	8.20	79	79	0	none	0.00	0.00	79	some	392.70	4.99	none	0.00	0.00
T5	1725.83	71.94	1797.77	79				88	0.86	0.00	9.06	205	88	52	all	71.94	0.86	88	none	0.00	0.00	none	0.00	0.00

Threat Scenerio 3:

Maximum Acceleration = 11.3 ft/s^2
Maximum Deceleration = -24.1 ft/s^2
point of detection (x) = 0
Starting Speed (V_0) = 0 **mph**
Starting Speed (V_0) = 0 **ft/s**
Time to AVB = 14.25 **sec**
Method of Detection = Security Guard at Guard Booth

Feature	Start Station	Length	End Station	Entrance Velocity	Curve Calculations			Exit Velocity	Time to Traverse Feature	Cumm. Time to Reach Detection	Cumm. Time to Reach AVB	Max Possible Velocity	Max Feature Exit Velocity	Min Feature Exit Velocity	Acceleration				Constant			Deceleration		
					R	Super-elevation	Vs Spin-out Speed								Logic	Distance	Time	Peak Velocity	Logic	Distance	Time	Logic	Distance	Time
	(ft)	(ft)	(ft)	(ft/s)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sec)	(sec)	(sec)	(ft/s)	(ft/s)	(ft/s)	-	(ft)	(sec)	(ft/s)	-	(ft)	(sec)	-	(ft)	(sec)
L1	0	323.65	323.65	0				83	7.57	0.00	7.57	205	86	0	some	318.24	7.50	85	none	0.00	0.00	some	5.41	0.06
C1	323.65	457.01	780.66	83	295	-0.02	83	83	5.49	0.00	13.06	83	83	0	none	0.00	0.00	83	some	457.01	5.49	none	0.00	0.00
L2	780.66	107.02	887.68	83				97	1.19	0.00	14.25	205	97	42	all	107.02	1.19	97	none	0.00	0.00	none	0.00	0.00

Threat Scenerio 4:Through Inbound Lane

Maximum Acceleration = 11.3 ft/s^2
Maximum Deceleration = -24.1 ft/s^2
point of detection (x) = 0
Starting Speed (V_0) = 25 **mph**
Starting Speed (V_0) = 37 **ft/s**
Time to AVB = 10.63 **sec**
Method of Detection = Security Guard at Gate House

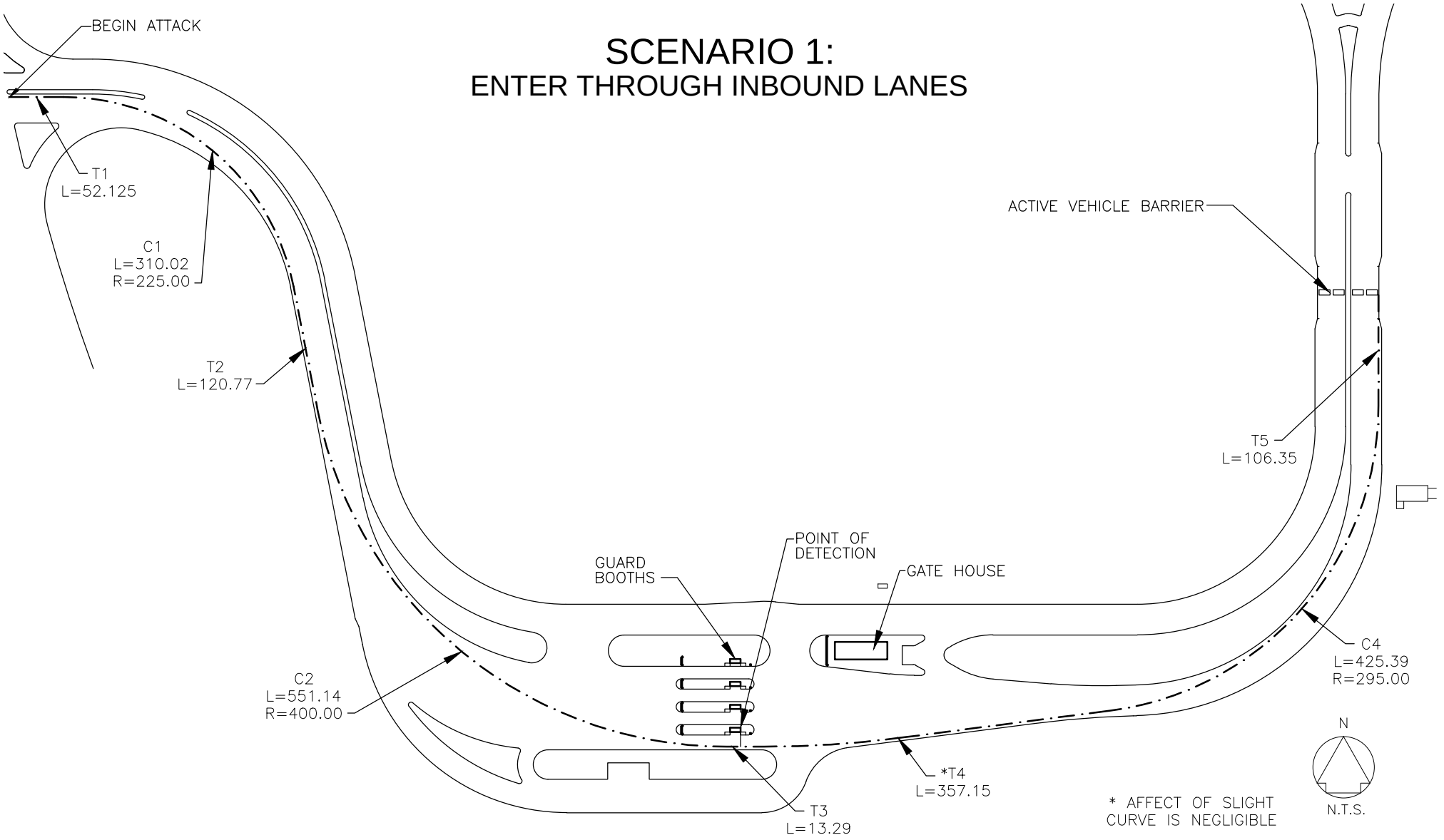
Feature	Start Station	Length	End Station	Entrance Velocity	Curve Calculations			Exit Velocity	Time to Traverse Feature	Cumm. Time to Reach Detection	Cumm. Time to Reach AVB	Max Possible Velocity	Max Feature Exit Velocity	Min Feature Exit Velocity	Acceleration				Constant			Deceleration		
					R	Super-elevation	Vs Spin-out Speed								Logic	Distance	Time	Peak Velocity	Logic	Distance	Time	Logic	Distance	Time
	(ft)	(ft)	(ft)	(ft/s)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sec)	(sec)	(sec)	(ft/s)	(ft/s)	(ft/s)	-	(ft)	(sec)	(ft/s)	-	(ft)	(sec)	-	(ft)	(sec)
L1	0	233.16	233.16	37				81	3.95	0.00	3.95	147	81	0	all	233.16	3.95	81	none	0.00	0.00	none	0.00	0.00
C1	233.16	457.01	690.17	81	295	-0.02	83	83	5.49	0.00	9.44	83	83	0	some	14.04	0.17	83	some	442.97	5.32	none	0.00	0.00
L2	690.17	107.02	797.19	83				97	1.19	0.00	10.63	205	97	42	all	107.02	1.19	97	none	0.00	0.00	none	0.00	0.00

Threat Scenerio 4: Through Outbound Lane

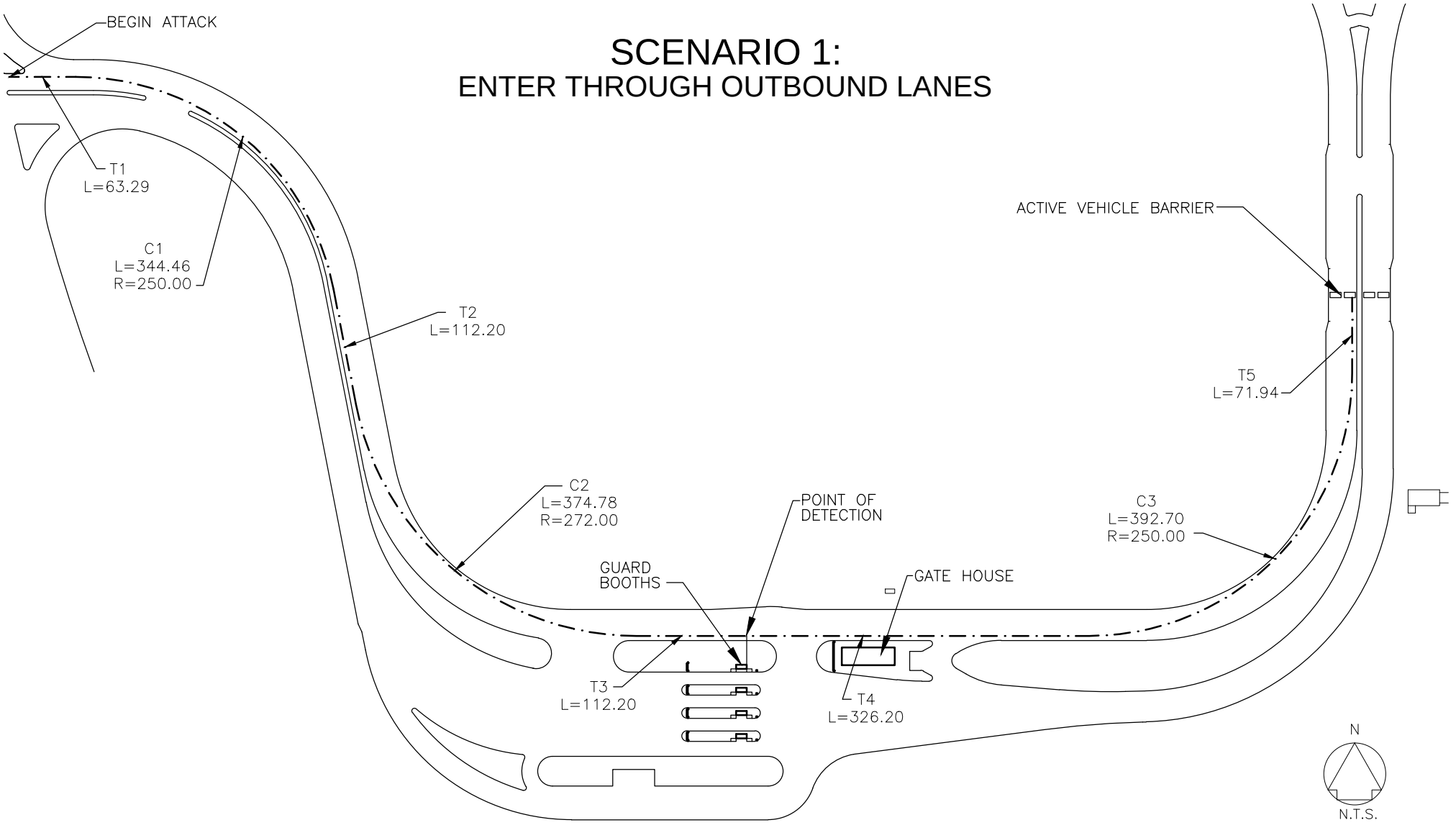
Maximum Acceleration = 11.3 ft/s^2
Maximum Deceleration = -24.1 ft/s^2
point of detection (x) = 0
Starting Speed (V_0) = 25 **mph**
Starting Speed (V_0) = 37 **ft/s**
Time to AVB = 9.84 **sec**
Method of Detection = Security Guard at Gate House

Feature	Start Station	Length	End Station	Entrance Velocity	Curve Calculations			Exit Velocity	Time to Traverse Feature	Cumm. Time to Reach Detection	Cumm. Time to Reach AVB	Max Possible Velocity	Max Feature Exit Velocity	Min Feature Exit Velocity	Acceleration				Constant			Deceleration		
					R	Super-elevation	Vs Spin-out Speed								Logic	Distance	Time	Peak Velocity	Logic	Distance	Time	Logic	Distance	Time
	(ft)	(ft)	(ft)	(ft/s)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sec)	(sec)	(sec)	(ft/s)	(ft/s)	(ft/s)	-	(ft)	(sec)	(ft/s)	-	(ft)	(sec)	-	(ft)	(sec)
L1	0	235.73	235.73	37				79	3.99	0.00	3.99	147	82	0	some	228.98	3.90	81	none	0.00	0.00	some	6.75	0.08
C1	235.73	392.70	628.43	79	250	0.02	79	79	4.99	0.00	8.97	79	79	0	none	0.00	0.00	79	some	392.70	4.99	none	0.00	0.00
L5	628.43	71.94	700.37	79				88	0.86	0.00	9.84	205	88	52	all	71.94	0.86	88	none	0.00	0.00	none	0.00	0.00

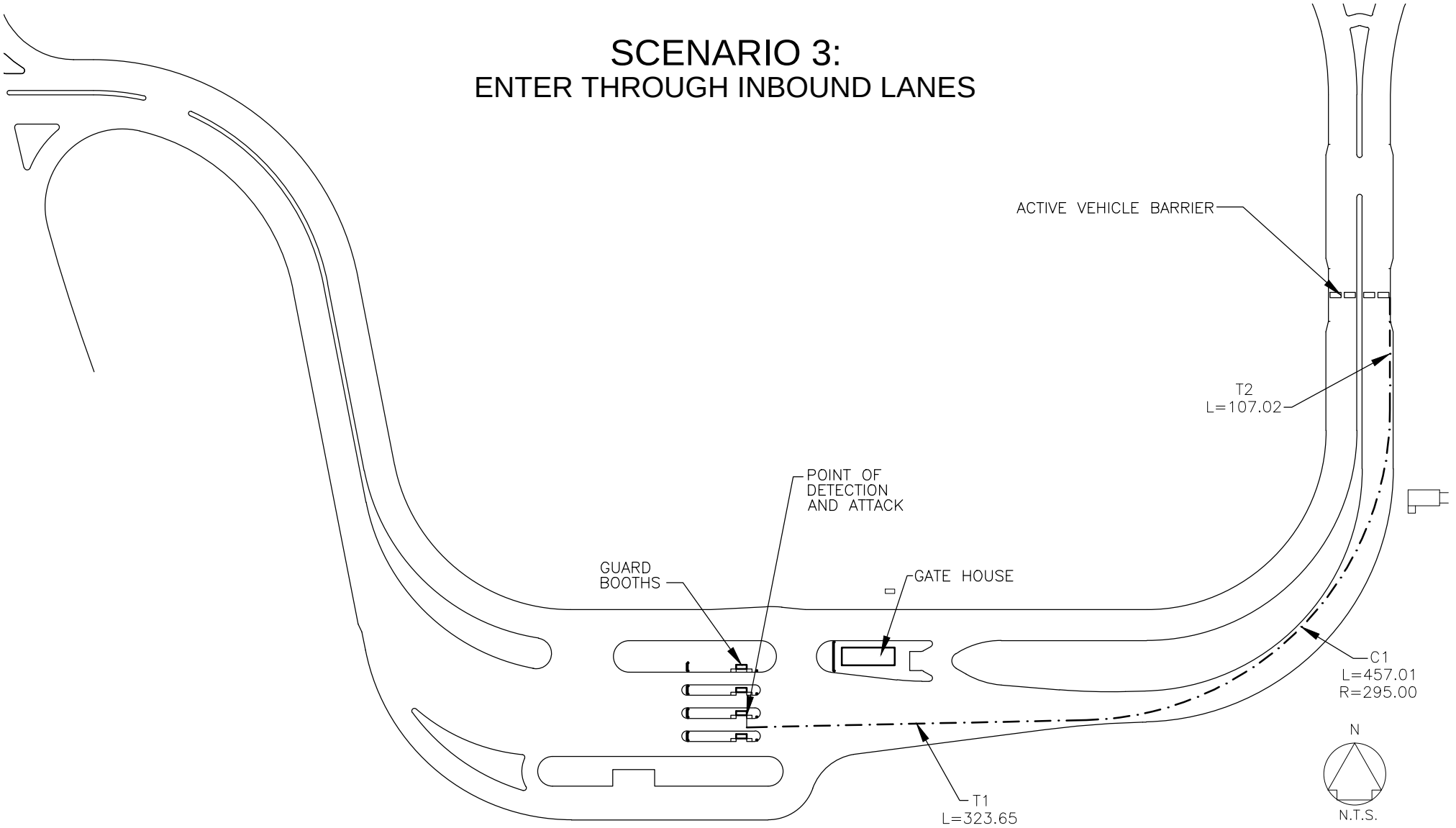
SCENARIO 1:
ENTER THROUGH INBOUND LANES



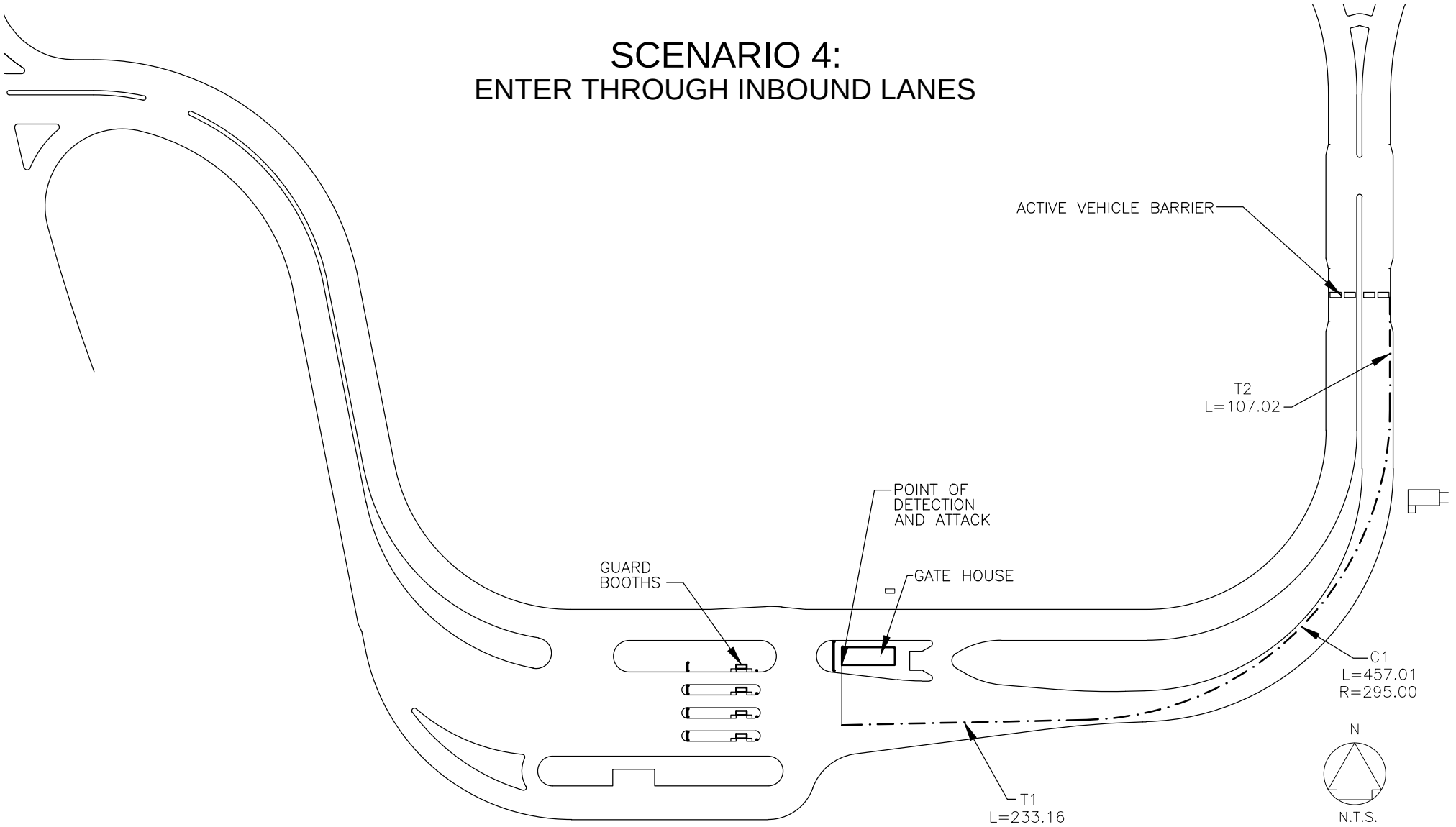
SCENARIO 1:
ENTER THROUGH OUTBOUND LANES



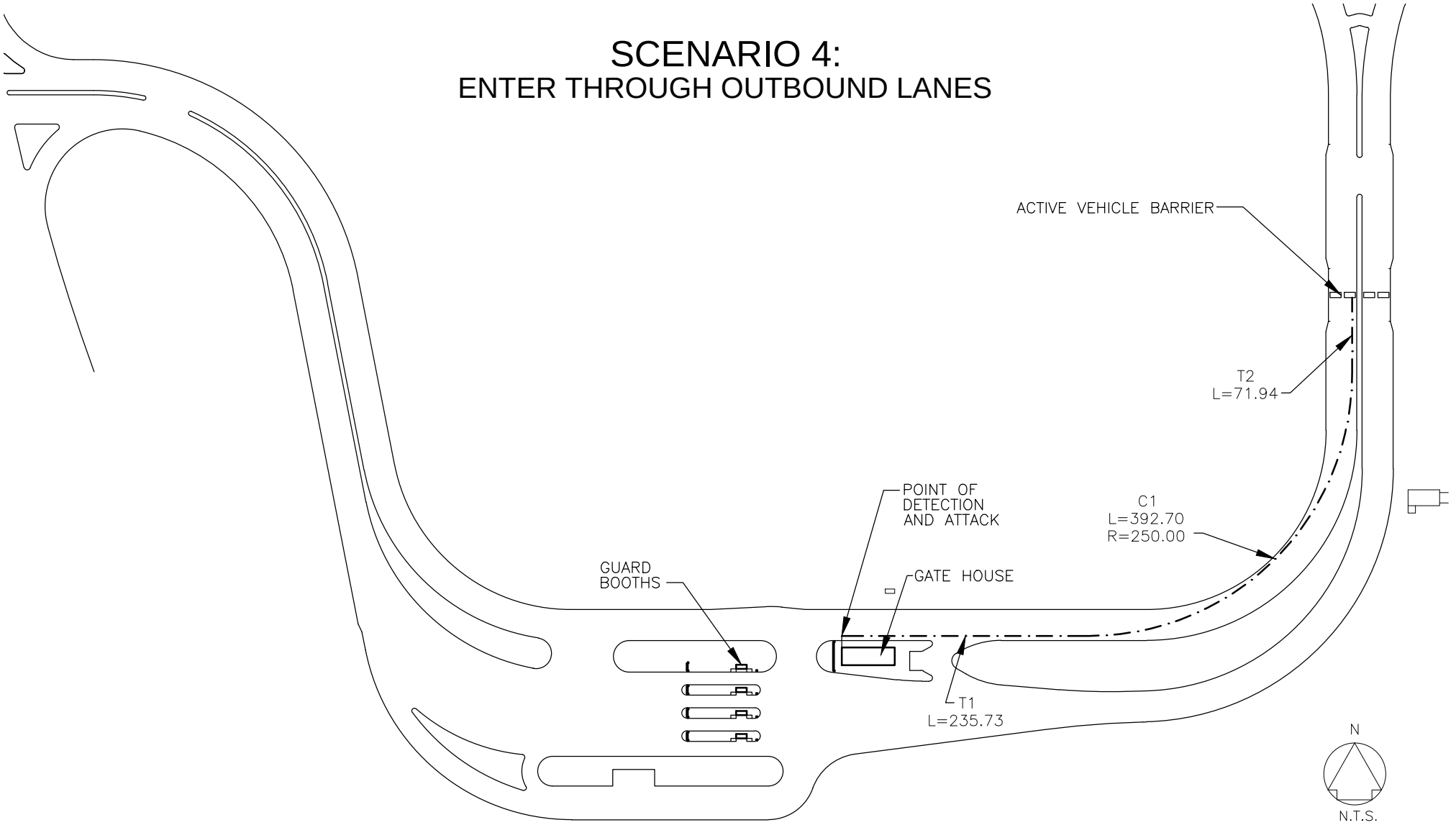
SCENARIO 3:
ENTER THROUGH INBOUND LANES



SCENARIO 4:
ENTER THROUGH INBOUND LANES



SCENARIO 4:
ENTER THROUGH OUTBOUND LANES



Appendix C

Cost Estimate

CONSTRUCTION MANAGEMENT RESOURCES, LLC
ESTIMATING • SCHEDULING • PROJECT MANAGEMENT • CONSULTING
5201 JOHNSON DRIVE, SUITE 330, MISSION, KANSAS 66205 (913) 262-0715 • FAX (913) 262-1360

CONSTRUCTION COST ESTIMATE

DATE PREPARED: 9/9/2011

Black & Veatch

BASIS FOR ESTIMATE:

PROJECT: JBLM-Lewis North ACP

LOCATION: FORT LEWIS, WASHINGTON

_____ Code A (No design)
__X__ Code B (Preliminary Design)
_____ Code C (Final Design)
_____ Other (Specify)

ESTIMATOR: CMR CHECKED:

NO.	ITEM DESCRIPTION	QUANTITY NO.	UNITS	UNIT MEAS	COST PER UNIT	COST ITEM TOTAL	TOTAL COST
	CIVIL						
	Demolition						$ 37,033.04
	Demo Paving	25,972		SF	0.33	8,571	
	Demo Curb	1,317		LF	2.00	2,635	
	Demo Curb (New FMTV Parking)	96		LF	2.00	192	
	Demo Chain Link Fence (H St. to I St.)	341		LF	3.50	1,193	
	Demo Chain Link Fence (I St. Gate)	1,000		LF	3.50	3,500	
	Haul Off	1,047		CY	20.00	20,943	
	Earthwork						$ 424,389.22
	Clear & Grub Site	11		AC	7,500.00	79,838	
	Site Cut/Fill Allow	31,848		CY	7.50	238,862	
	Grade Concrete Paving	289,775		SF	0.20	57,955	
	Backfill Curb & Gutter	6,056		LF	1.50	9,083	
	Finish Grade Site	19,325		SY	2.00	38,650	
	Bridge Structure						$ 471,692.00
	CONTECH Arch Span (costs by others)	1		LS	471,692.00	471,692	
	Concrete Paving						$ 2,870,533.45
	Curb @ Raised Median	6,427		LF	11.00	70,700	
	Raised Median	14,770		SF	5.00	73,851	
	Curb @ Paving	6,056		LF	12.00	72,666	
	Walks	5,912		SF	5.00	29,559	
	Main Entry Lane Paving	65,356		SF	10.00	653,565	
	Main Exit Lane Paving	101,195		SF	10.00	1,011,949	
	POV Inspection Paving	57,081		SF	12.00	684,975	
	New Shoulder	44,069		SF	4.00	176,276	
	Bike Lane	9,762		SF	5.00	48,811	
	Overwatch Paving	1,391		SF	10.00	13,910	
	Arrows	14		EA	105.00	1,470	
	Striping	7,100		LF	2.00	14,200	
	Reinforced Barrier Walls at Islands	144		SF	25.00	3,600	
	Bollards ALLOW	20		EA	750.00	15,000	
	Gravel Paving						$ 3,000.00
	Gravel Parking/Grading ALLOW	300		SY	10.00	3,000	
	Landscaping						$ 96,889.81
	Seed Disturbed	15,304		SY	2.00	30,609	
	Xeriscape at Medians ALLOW	36,187		SF	1.50	54,281	
	Trees ALLOW	1		LS	12,000.00	12,000	
	Fencing and Passive Barriers						$ 543,622.22
	Guardrail	704		LF	50.00	35,203	
	Passive Barrier	4,102		LF	100.00	410,215	
	Cable Reinforced Entry Gate	1		PR	6,500.00	6,500	
	New Chain Link Fence (Wharf Road Entrance)	399		LF	30.00	11,981	
	New Double Gate (Wharf Road Entrance)	1		PR	3,500.00	3,500	
	New Chain Link Fence (H St. to I St. + 200')	541		LF	30.00	16,224	
	New Chain Link Fence (I St. Gate)	1,000		LF	30.00	30,000	
	Guardrail @ Bridge	300		LF	100.00	30,000	
	Active Vehicle Barrier						$ 500,000.00
	AVB	4		EA	125,000.00	500,000	
		SUBTOTAL			**CIVIL**		**$ 4,947,160**

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CONSTRUCTION COST ESTIMATE

DATE PREPARED: 9/9/2011

Black & Veatch

BASIS FOR ESTIMATE:

PROJECT: JBLM-Lewis North ACP

LOCATION: FORT LEWIS, WASHINGTON

_____ Code A (No design)
__X__ Code B (Preliminary Design)
_____ Code C (Final Design)
_____ Other (Specify)

ESTIMATOR: CMR CHECKED:

ITEM NO.	ITEM DESCRIPTION	QUANTITY NO.	QUANTITY UNITS	UNIT MEAS	COST PER UNIT	COST ITEM TOTAL	TOTAL COST
	UTILITIES						
	Sanitary Sewerage						$ 27,147.86
	Sanitary Line ALLOW	395	LF		65.00	25,648	
	Connect to Existing	1	LS		1,500.00	1,500	
	Storm Drainage						$ 173,025.00
	Storm Drainage	1	LS		150,000.00	150,000	
	Relocate Inlet Structure and ecology block wall	1	LS		15,000.00	15,000	
	Rip Rap	15	SY		35.00	525	
	Dewater Detention Basin	1	LS		7,500.00	7,500	
	Monitoring Well						$ 30,000.00
	Monitoring Well ALLOW	1	LS		30,000.00	30,000	
	Water Distribution						$ 36,750.00
	Water Service	750	LF		45.00	33,750	
	Connect to existing	1	LS		3,000.00	3,000	
	Site Electrical						$ 1,058,750.00
	UG Service ALLOW	1,000	LF		75.00	75,000	
	Connect to Existing	1	LS		5,000.00	5,000	
	Relocate OH Power Poles	3	EA		1,500.00	4,500	
	24 pair Copper	2,500	LF		7.50	18,750	
	12 Strand Fiber Optic	2,500	LF		20.00	50,000	
	UG Communications Ductbank ALLOW (no cable)	1,000	LF		65.00	65,000	
	4'x4' Hand Holes	2	EA		1,500.00	3,000	
	Relocate Switch Box (4 Position J-Box, Two 5" DB, 600A, 15kV Cable) ALLOW	1	LS		35,000.00	35,000	
	New 30' Light Poles - LED Fixtures	40	EA		6,000.00	240,000	
	Conduit/Wire/ Trench	3,000	LF		15.00	45,000	
	150 KVA Transformer w/ 7'x7'x6' Vault	1	EA		50,000.00	50,000	
	100KW Generator Set Allow	1	EA		65,000.00	65,000	
	Remove Communications Ductbank Manhole	2	EA		750.00	1,500	
	Concrete Encased Ductbank (6 4" PVC)	1,000	LF		85.00	85,000	
	Concrete Encased Ductbank (12 4" PVC)	400	LF		150.00	60,000	
	Concrete Encased Ductbank (6 4" PVC with inner duct)	1,500	LF		100.00	150,000	
	48 Strand Single Mode Fiber Optic	2,500	LF		40.00	100,000	
	Fiber Optic Splice Cases	4	EA		1,500.00	6,000	
						0	
						0	
		SUBTOTAL			**UTILITIES**		**$ 1,325,673**

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CONSTRUCTION COST ESTIMATE

DATE PREPARED: 9/9/2011

Black & Veatch

BASIS FOR ESTIMATE:

_____ Code A (No design)
__X__ Code B (Preliminary Design)
_____ Code C (Final Design)
_____ Other (Specify)

PROJECT: JBLM-Lewis North ACP

LOCATION: FORT LEWIS, WASHINGTON

ESTIMATOR: CMR CHECKED:

ITEM NO.	ITEM DESCRIPTION	QUANTITY NO.	QUANTITY UNITS	UNIT MEAS	COST PER UNIT	COST ITEM TOTAL	TOTAL COST
	ARCHITECTURAL						
	Visitor Control Center	N/A				0	
	Gatehouse						$ 197,576
	Foundation Excavation	30		CY	25.00	744	
	Grade Building	839		SF	2.00	1,678	
	Termite Control	839		SF	0.50	420	
	Perimeter Grade Beams	134		LF	150.00	20,100	
	SOG	839		SF	5.00	4,195	
	Interior CMU Walls	370		SF	15.00	5,550	
	Exterior CMU Walls	1,340		SF	18.00	24,120	
	Face Brick w/ Rigid Insulation	1,340		SF	25.00	33,500	
	Roof Structure/Deck Sloped	1,188		SF	22.00	26,139	
	Misc Blocking	600		BM	6.00	3,600	
	Counter	15		LF	150.00	2,250	
	Insulation @ Metal Roofing	1,188		SF	3.00	3,564	
	Metal Roofing	1,188		SF	18.00	21,386	
	Ridge Joint	32		LF	12.00	384	
	Hip Joint	64		LF	18.00	1,152	
	Pre-Finished Metal Panel Soffit	300		SF	15.00	4,500	
	Metal Fascia	150		LF	15.00	2,250	
	Metal Gutter	150		LF	11.00	1,650	
	Metal Downspouts	40		LF	15.00	600	
	Misc Caulking	402		LF	2.00	804	
	Caulk HM Frames	7		EA	35.00	245	
	HM Frames Ballistic Rated	2		EA	500.00	1,000	
	HM Frames	5		EA	300.00	1,500	
	HM Doors Ballistic Rated	2		EA	1,000.00	2,000	
	HM Doors	5		EA	500.00	2,500	
	Ballistic Rated Window Frame and Glazing	111		SF	100.00	11,100	
	Door Hardware	7		EA	900.00	6,300	
	Int MS Walls	450		SF	10.00	4,500	
	Gyp Ceiling	120		SF	15.00	1,800	
	ACT Ceiling	210		SF	3.00	630	
	VCT Floor	330		SF	2.25	743	
	Floor Mat/ Frame - 3'x5'	2		EA	500.00	1,000	
	Rubber Base	261		LF	2.00	522	
	Paint Gyp Walls	900		SF	1.00	900	
	Paint CMU Walls	2,080		SF	1.50	3,120	
	Paint HM Frames/Doors	7		EA	100.00	700	
	Soap Dispenser	1		EA	45.00	45	
	Grab Bars	2		EA	75.00	150	
	TP Holder	1		EA	35.00	35	
	Mirror	1		EA	200.00	200	
						0	

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_____ Other (Specify)

PROJECT: JBLM-Lewis North ACP

LOCATION: FORT LEWIS, WASHINGTON

ESTIMATOR: CMR CHECKED:

ITEM NO.	ITEM DESCRIPTION	QUANTITY NO.	QUANTITY UNITS	QUANTITY UNIT MEAS	COST PER UNIT	COST ITEM TOTAL	TOTAL COST
	Guard booth						$ 100,000
	Pre-Fab Ballistic Rated Guard Booth 4x8	4		EA	25,000.00	100,000	
	Overwatch						$ -
	Pavement only - No Structure					0	
	Search Office						$ 155,326
	Foundation Excavation	23		CY	25.00	570	
	Grade Building	659		SF	2.00	1,317	
	Termite Control	659		SF	0.50	329	
	Perimeter Grade Beams	103		LF	150.00	15,399	
	SOG	659		SF	5.00	3,293	
	Exterior CMU Walls	1,095		SF	18.00	19,717	
	Face Brick w/ Rigid Insulation	1,095		SF	25.00	27,385	
	Roof Structure/Deck Sloped	931		SF	22.00	20,481	
	Misc Blocking	475		BM	6.00	2,848	
	Counter	5		LF	150.00	750	
	Insulation @ Metal Roofing	931		SF	3.00	2,793	
	Metal Roofing	931		SF	18.00	16,757	
	Ridge Joint	20		LF	12.00	240	
	Hip Joint	20		LF	18.00	360	
	Pre-Finished Metal Panel Soffit	237		SF	15.00	3,560	
	Metal Fascia	119		LF	15.00	1,780	
	Metal Gutter	119		LF	11.00	1,305	
	Metal Downspouts	22		LF	15.00	330	
	Misc Caulking	308		LF	2.00	616	
	Caulk HM Frames	8		EA	35.00	280	
	HM Frames Ballistic Rated	0		EA	500.00	0	
	HM Frames	8		EA	300.00	2,400	
	HM Doors Ballistic Rated	0		EA	1,000.00	0	
	HM Doors	8		EA	500.00	4,000	
	Window Frame and Glazing	40		SF	35.00	1,400	
	Door Hardware	8		EA	900.00	7,200	
	Int MS Walls	843		SF	10.00	8,429	
	Gyp Ceiling	70		SF	15.00	1,050	
	Gyp Bulkhead	8		LF	45.00	360	
	ACT Ceiling	589		SF	3.00	1,766	
	VCT Floor	659		SF	2.25	1,482	
	Floor Mat/ Frame - 3'x5'	2		EA	500.00	1,000	
	Rubber Base	261		LF	2.00	521	
	Paint Gyp Walls	1,686		SF	1.00	1,686	
	Paint CMU Walls	1,095		SF	1.50	1,643	
	Paint HM Frames/Doors	8		EA	100.00	800	
	Soap Dispenser	1		EA	45.00	45	
	Grab Bars	2		EA	75.00	150	
	TP Holder	1		EA	35.00	35	
	Mirror	1		EA	200.00	200	
	Metal Lockers	7		EA	150.00	1,050	
	ID Check Area Canopy						$ 429,624
	New Canopy Complete	6,610		SF	65.00	429,624	
	Pedestrian Guard Booth/Access						$ -
	N/A					0	
	Inspection Canopy						$ 137,894
	New Canopy Complete	1,970		SF	70.00	137,894	
						0	
		SUBTOTAL			**ARCHITECTURAL**		**$ 1,020,421**

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CONSTRUCTION COST ESTIMATE

DATE PREPARED: 9/9/2011

Black & Veatch

BASIS FOR ESTIMATE:

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__X__ Code B (Preliminary Design)
_____ Code C (Final Design)
_____ Other (Specify)

PROJECT: JBLM-Lewis North ACP

LOCATION: FORT LEWIS, WASHINGTON

ESTIMATOR: CMR CHECKED:

ITEM NO.	DESCRIPTION	QUANTITY NO.	UNITS	UNIT MEAS	COST PER UNIT	COST ITEM TOTAL	TOTAL COST
	MECHANICAL						
	Visitor Control Center						$ -
						0	
	Gatehouse						$ 38,820
	ADA Water Closet	1	EA		3,500.00	3,500	
	Urinal	1	EA		3,900.00	3,900	
	Lavatory - Wall Mntd.	1	EA		2,750.00	2,750	
	Hot Water System	1	LS		3,500.00	3,500	
	New HVAC	839	SF		30.00	25,170	
	Guard booth						$ -
	Add Pre-Fab Ballistic Rated Guard Booth 4x8	4	EA		in prefab #	0	
	Overwatch						$ -
	N/A					0	
	Search Office						$ 32,757
	ADA Water Closet	1	EA		3,500.00	3,500	
	Electric Water Cooler	1	EA		3,250.00	3,250	
	Lavatory - Wall Mntd.	1	EA		2,750.00	2,750	
	Hot Water System	1	LS		3,500.00	3,500	
	New HVAC	659	SF		30.00	19,757	
	ID Check Area Canopy						$ -
	New Canopy Complete Roof Drains	6,610	SF		in canopy #	0	
	Inspection Canopy						$ -
	New Canopy Complete Roof Drains	1,970	SF		in canopy #	0	
		SUBTOTAL			**MECHANICAL**		**$ 71,577**

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CONSTRUCTION COST ESTIMATE	DATE PREPARED: 9/9/2011
Black & Veatch	BASIS FOR ESTIMATE:
PROJECT: JBLM-Lewis North ACP	_____ Code A (No design)
LOCATION: FORT LEWIS, WASHINGTON	__X__ Code B (Preliminary Design)
	_____ Code C (Final Design)
	_____ Other (Specify)
	ESTIMATOR: CMR CHECKED:

ITEM		QUANTITY			COST		TOTAL
NO.	DESCRIPTION	NO. UNITS		UNIT MEAS	PER UNIT	ITEM TOTAL	COST
	ELECTRICAL						
	Visitor Control Center						$ -
						0	
	Gatehouse						$ 31,043
	Power	839	SF		6.00	5,034	
	Lights	839	SF		10.00	8,390	
	Distribution	839	SF		6.00	5,034	
	Fire Alarm	839	SF		5.00	4,195	
	Security Rough-in	839	SF		4.00	3,356	
	Telecommunications	839	SF		6.00	5,034	
	Search Office						$ 24,367
	Power	659	SF		6.00	3,951	
	Lights	659	SF		10.00	6,586	
	Distribution	659	SF		6.00	3,951	
	Fire Alarm	659	SF		5.00	3,293	
	Security Rough-in	659	SF		4.00	2,634	
	Telecommunications	659	SF		6.00	3,951	
	Guard booth						$ -
	Add Pre-Fab Ballistic Rated Guard Booth 4x8	4	EA		in prefab #	0	
	Overwatch						$ 8,500
	CCTV Hookup	1	EA		3,500.00	3,500	
	Electrical Hookup	1	LS		5,000.00	5,000	
	Intersection Traffic Control						$ 350,000
	Signalize Intersection	1	LS		350,000.00	350,000	
	ID Check Area Canopy						$ 66,096
	New Canopy Lighting/Power	6,610	SF		10.00	66,096	
	Inspection Canopy						$ 19,699
	New Canopy Lighting/Power	1,970	SF		10.00	19,699	
	AIE Infrastructure						$ 50,000
	AIE Infrastructure Allowance	1	LS		50,000.00	50,000	
						0	
		SUBTOTAL			**ELECTRICAL**		**$ 549,706**

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CONSTRUCTION COST ESTIMATE

DATE PREPARED: 9/9/2011

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PROJECT: JBLM-Lewis North ACP

LOCATION: FORT LEWIS, WASHINGTON

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_____ Code C (Final Design)
_____ Other (Specify)

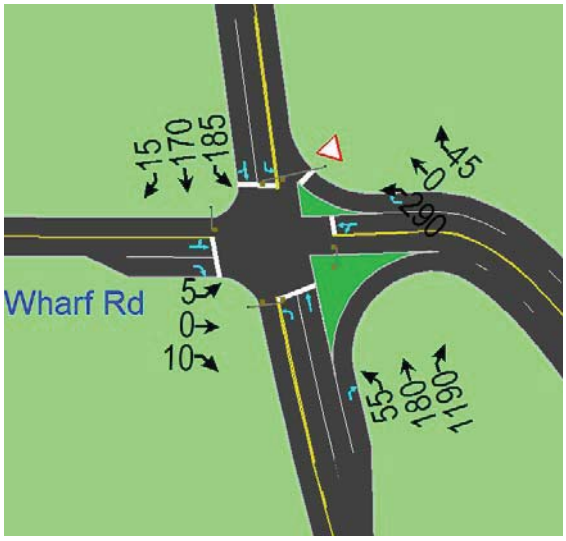
ESTIMATOR: CMR CHECKED:

ITEM NO.	ITEM DESCRIPTION	QUANTITY NO.	QUANTITY UNITS	QUANTITY UNIT MEAS	COST PER UNIT	COST ITEM TOTAL	TOTAL COST
	SUBTOTAL						**$ 7,914,537**
20.00%	Design/Estimate Contingency						$ 1,582,907
	SUBTOTAL						$ 9,497,444
14.00%	General Contractor Overhead						$ 1,329,642
	SUBTOTAL						$ 10,827,086
2.50%	Home Office Expense						$ 270,677
	SUBTOTAL						$ 11,097,763
5.75%	Contractor Profit						$ 638,121
	SUBTOTAL						$ 11,735,885
4.15%	Escalation to Midpoint Of Construction December 2012						$ 486,700
	SUBTOTAL						$ 12,222,585
5.00%	Construction Contingency						$ 611,129
	SUBTOTAL						$ 12,833,714
5.70%	Supervision, Inspection & Overhead						$ 731,522
	TOTAL						**$ 13,565,235**

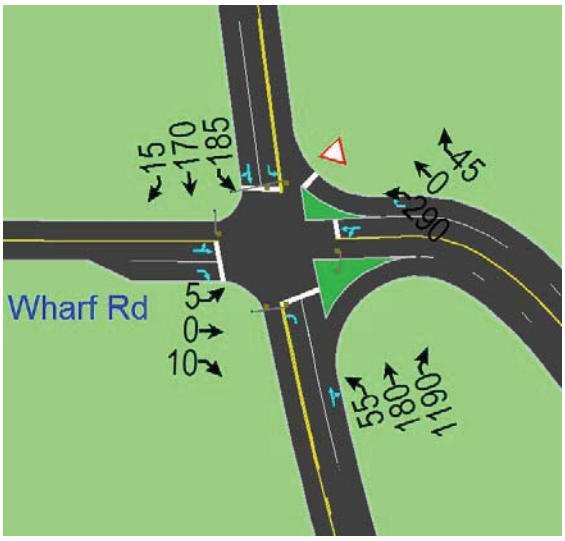
APPENDIX D

DRAFT WHARF ROAD INTERSECTION OPERATION

AM Intersection Operation



2015 AM with NBRT pocket



2015 AM without NBRT pocket

Proposed Intersection Configuration and AM Forecast Traffic Volume

AM Peak Hour Intersection Operation

	Intersection	Approach			
		Eastbound	Westbound	Northbound	Southbound
With NBRT Pocket	A (9)	B (11)	B (15)	A (7)	B (11)
Without NBRT Pocket	E (65)	B (11)	E (65)	E (73)	C (35)

Level of Service (Delay in Second)

PM Intersection Operation

2015 PM with NBRT pocket

2015 PM without NBRT pocket

Proposed Intersection Configuration and PM Forecast Traffic Volume

PM Peak Hour Intersection Operation

	Intersection	Approach			
		Eastbound	Westbound	Northbound	Southbound
With NBRT Pocket	C (25)	C (27)	D (52)	C (23)	B (15)
Without NBRT Pocket	F (126)	D (43)	F (156)	F (176)	B (16)

Level of Service (Delay in Second)

Draft Traffic Signal Warrant Analysis
Dupont-Steilacoom Road/Wharf Road Intersection

Prepared for: BergerABAM

Prepared by: DKS Associates

Date: May 16, 2012

Summary

Intersection	Meets MUTCD Peak Hour Signal Warrant?
DUPONT-STEILACOOM ROAD/WHARF ROAD	YES

This memorandum summarizes the traffic signal warrant analysis completed for the Dupont-Steilacoom Road/Wharf Road intersection.

The analysis was performed by DKS Associates (DKS) and was conducted using Warrant 3 (Peak Hour) in Chapter 4 of the 2009 Edition of Manual on Uniform Traffic Control Devices (MUTCD). The results of this analysis indicate that a full traffic signal is warranted at Dupont-Steilacoom Road/Wharf Road intersection based upon projected 2015 traffic volumes with a new Access Control Point (ACP) to replace the existing I Street gate.

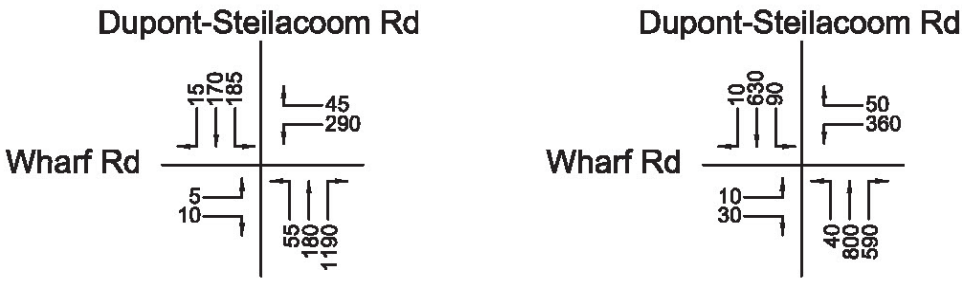
Traffic Volume Development and Assumptions

For purposes of this evaluation, the future intersection configuration and projected traffic volumes are examined. The intent of this study is to provide design direction with regard to the anticipated need for a traffic signal at Dupont-Steilacoom Road/Wharf Road intersection. The primary sources of data used for this analysis are from the following sources:

- 2012 Hourly Counts
- 2011 AM/PM Peak Hour Intersection Counts

Since the JBLM Lewis North Access Control Facility Project is making some physical changes to the intersection configurations, the future traffic volumes in year 2015 were forecasted based upon 1% growth rate a year for background traffic and future traffic distributed from other gates to use the new gate facility presented in JBLM Lewis North Access Control Facility Traffic Study, PN: 66206 (January 31, 2011).

The estimated 2015 peak hour traffic volumes are summarized in Figure 1.



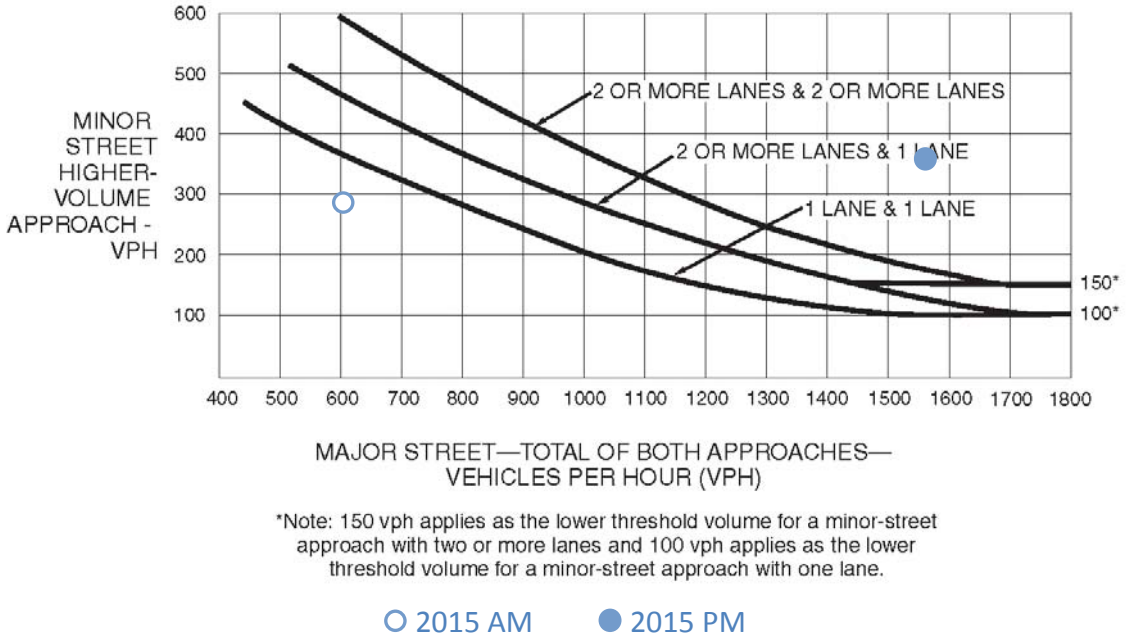
2015 AM 2015 PM

FIGURE 1: 2015 PEAK HOUR TRAFFIC VOLUME

MUTCD Traffic Signal Warrant Analysis: Peak Hour Volume

The MUTCD states "The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street."

The need for a traffic control signal shall be considered if the plotted points representing peak hour traffic volumes of an average day fall above the applicable curve in Figure 2 (150 vehicles per hour applied as the lower threshold volume for a minor-street approach with two or more lanes).



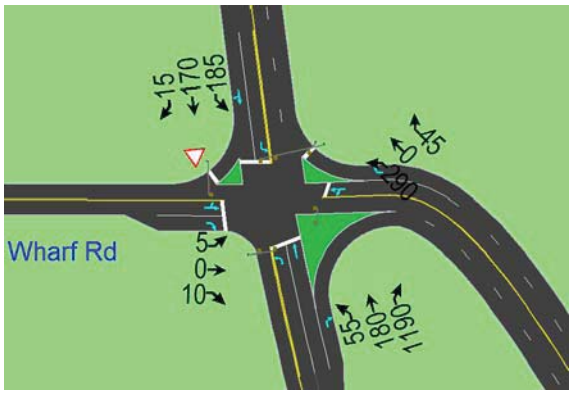
	2015	
	AM	PM
MAJOR STREET VOLUME (BOTH APPROACHES ON DUPONT-STEILACOOM RD)	605	1,570
MINOR STREET VOLUME (HIGHER VOLUME APPROACH ON NEW ACCESS CONTROL POINT)	290	360
Meets MUTCD Peak Hour Signal Warrant?	NO	YES

FIGURE 2: MUTCD TRAFFIC SIGNAL WARRANT ANALYSIS: PEAK HOUR VOLUME

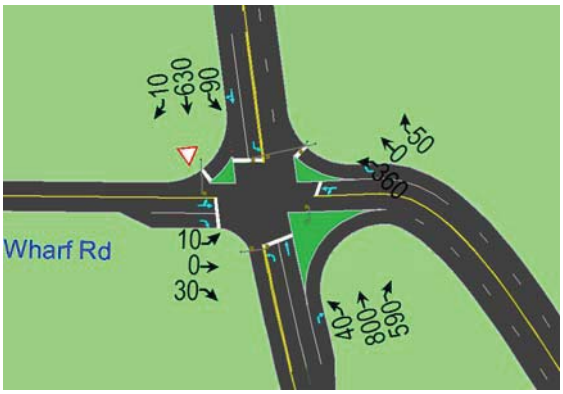
Peak Hour Intersection Operation

To determine the future intersection traffic operation, the Synchro models were developed. Synchro is macroscopic traffic operation software that analyzes the delay and Level of Service (LOS) based upon intersection geometrics, signal timing and phasing and traffic volumes. The future condition analysis was conducted for the studied intersection for both AM and PM peak hour periods.

The proposed intersection configuration and intersection traffic volumes are presented in Figure 3.



2015 AM



2015 PM

FIGURE 3: PROPOSED INTERSECTION CONFIGURATION AND FORECAST TRAFFIC VOLUME

LOS is a general measure of congestion for transportation facilities such as intersections, freeways, and arterials. Table 1 shows standardized LOS criteria and thresholds for signalized intersections, as given in the updated TRB 2000 Highway Capacity Manual.

TABLE 1: LEVEL OF SERVICE CRITERIA

LOS	Signalized Delay	Description
A	≤10	Low delays, virtually free flow, unimpeded
B	> 10 and ≤ 20	Stable flow with minor delays, less freedom to maneuver through the intersection
C	> 20 and ≤ 35	Stable flow with some delays, less freedom to maneuver through the intersection
D	> 35 and ≤ 55	Long delays and high density, but stable flow and operations
E	> 55 and ≤ 80	Operating conditions at or near capacity
F	> 80	Forced operation, breakdown conditions

TABLE 2: PEAK HOUR INTERSECTION OPERATION

	Intersection	Approach			
		Eastbound	Westbound	Northbound	Southbound
AM PEAK HOUR	A (8)	A (6)	B (12)	A (7)	B (11)
PM PEAK HOUR	C (24)	B (13)	D (45)	C (24)	B (13)

Level of Service (Delay in Second)

The peak hour intersection operations are shown in Table 2. Under AM peak-hour condition, the intersection operates at LOS A and all approaches operate at LOS B or better. During the PM peak hour, the intersection operates at LOS C and all approaches operate at LOS D or better.

TABLE 3: MAXIMUM QUEUE LENGTH (FT) AND RECOMMENDED TURN POCKET LENGTH (FT)

	Approach		
	Eastbound	Northbound	Southbound
AM PEAK HOUR	25 FT (EBR)	30 FT (NBL) 30 FT (NBR)	80 FT (SBL)
PM PEAK HOUR	25 FT (EBR)	30 FT (NBL) 25 FT (NBR)	50 FT (SBL)
Recommended Turn Pocket Length	50 FT (EBR)	100 FT (NBL) 100 FT (NBR)	100 FT (SBL)

Table 3 shows maximum queue length of turning movements for each approach during AM and PM peak hours. It recommends 50 feet in length for eastbound right-turn pocket and 100 feet in length for northbound left-turn pocket, northbound right-turn pocket and southbound left-turn pockets.

Intersection Operation Analysis
Dupont-Steilacoom Road/Center Drive Intersection
Dupont-Steilacoom Road/Barksdale Avenue Intersection

Prepared for: BergerABAM

Prepared by: DKS Associates

Date: June 11, 2012

This memorandum summarizes the intersection traffic operation at Dupont-Steilacoom Road/Center Drive intersection and Dupont-Steilacoom Road/Barksdale Avenue intersection based upon projected 2014 intersection traffic volumes with a new Access Control Point (ACP) to replace the existing I Street gate.

Traffic Volume Development and Assumptions

The primary sources of data used for this analysis are from the following sources:

- 2014 AM/PM Base Peak Hour Intersection Volumes (A traffic study by Health & Associates, Inc)
- 2014 AM/PM Projected Peak Hour New ACP Volumes (Traffic signal warrant analysis at Dupont-Steilacoom Road/Wharf Road intersection memorandum by DKS Associates, May 2012) – The key assumptions that used to project the new ACP traffic volume are that the new ACP traffic volumes in year 2014 were forecasted based upon 1% growth rate a year for background traffic and future traffic distributed from other gates to use the new gate facility presented in JBLM Lewis North Access Control Facility Traffic Study, PN: 66206 (January 31, 2011).

Analysis Tools and Methodology

To determine the future intersection traffic operation, the Synchro models were developed. Synchro is macroscopic traffic operation software that analyzes the delay and Level of Service (LOS) based upon intersection geometrics, signal timing and phasing and traffic volumes. The future condition analysis was conducted for the studied intersection for both AM and PM peak hour periods.

LOS is a general measure of congestion for transportation facilities such as intersections, freeways, and arterials. Table 1 shows standardized LOS criteria and thresholds for signalized intersections, as given in the updated TRB 2000 Highway Capacity Manual.

TABLE 1: LEVEL OF SERVICE CRITERIA

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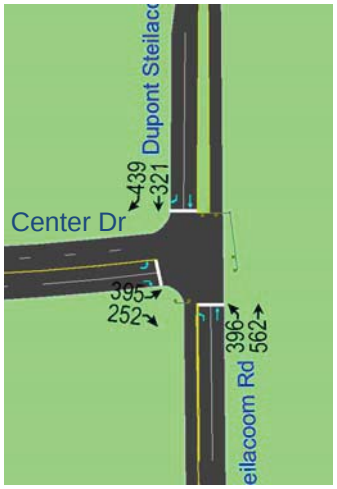
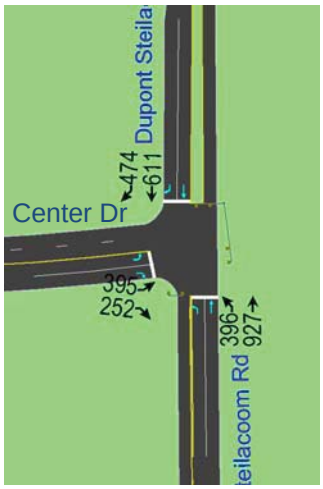
A	≤10	Low delays, virtually free flow, unimpeded
B	> 10 and ≤ 20	Stable flow with minor delays, less freedom to maneuver through the intersection
C	> 20 and ≤ 35	Stable flow with some delays, less freedom to maneuver through the intersection
D	> 35 and ≤ 55	Long delays and high density, but stable flow and operations
E	> 55 and ≤ 80	Operating conditions at or near capacity
F	> 80	Forced operation, breakdown conditions

Dupont-Steilacoom Road/Center Drive Intersection

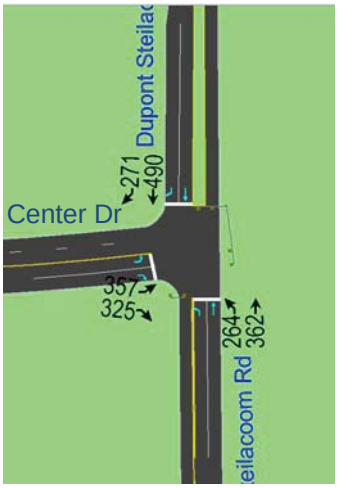
The 2014 base volume and 2014 new access control point volume at Dupont-Steilacoom Road/Center Drive intersection are presented in Figure 2.



2014 Base AM



2014 AM with New ACP Volume



2014 Base PM

2014 PM with New ACP Volume

FIGURE 2: PEAK HOUR TRAFFIC VOLUME AT DUPONT-STEILACOOM ROAD/CENTER DRIVE INTERSECTION

TABLE 3-1: CENTER DRIVE PEAK HOUR INTERSECTION OPERATION (2014 BASE)

	Intersection	Approach		
		Eastbound	Northbound	Southbound
AM PEAK HOUR	C (25)	D (38)	C (23)	B (18)
PM PEAK HOUR	C (26)	C (28)	C (23)	C (27)

Level of Service (Delay in Second)

TABLE 3-2: CENTER DRIVE PEAK HOUR INTERSECTION OPERATION (2014 WITH NEW ACP VOLUME)

	Intersection	Approach		
		Eastbound	Northbound	Southbound
AM PEAK HOUR	D (38)	D (49)	D (36)	C (34)
PM PEAK HOUR	D (49)	E (62)	D (41)	D (50)

Level of Service (Delay in Second)

TABLE 4-1: CENTER DRIVE MAXIMUM QUEUE LENGTH (2014 BASE)

	Approach		
	Eastbound	Northbound	Southbound
AM PEAK HOUR	550 (EBL)	375 (NBL)	70 (SBR)
PM PEAK HOUR	450 (EBL)	265 (NBL)	105 (SBR)

TABLE 4-2: CENTER DRIVE MAXIMUM QUEUE LENGTH (2014 WITH NEW ACP VOLUME)

	Approach		
	Eastbound	Northbound	Southbound
AM PEAK HOUR	435 (EBL)	435 (NBL)	160 (SBR)
PM PEAK HOUR	545 (EBL)	370 (NBL)	110 (SBR)

The peak hour intersection operations are shown in Table 3-1 and 3-2. Table 4-1 and 4-2 shows maximum queue length of turning movements for each approach during AM and PM peak hours. The intersection operates at LOS C during AM and PM peak hours with 2014 base traffic volume and the intersection operates at LOS D during AM and PM peak hours with 2014 new access control point volume. The traffic operation improvement with new access control point volume is not necessary at this intersection.

Dupont-Steilacoom Road/Barksdale Avenue Intersection

The 2014 base volume and 2014 new access control point volume at Dupont-Steilacoom Road/Barksdale intersection are presented in Figure 5.

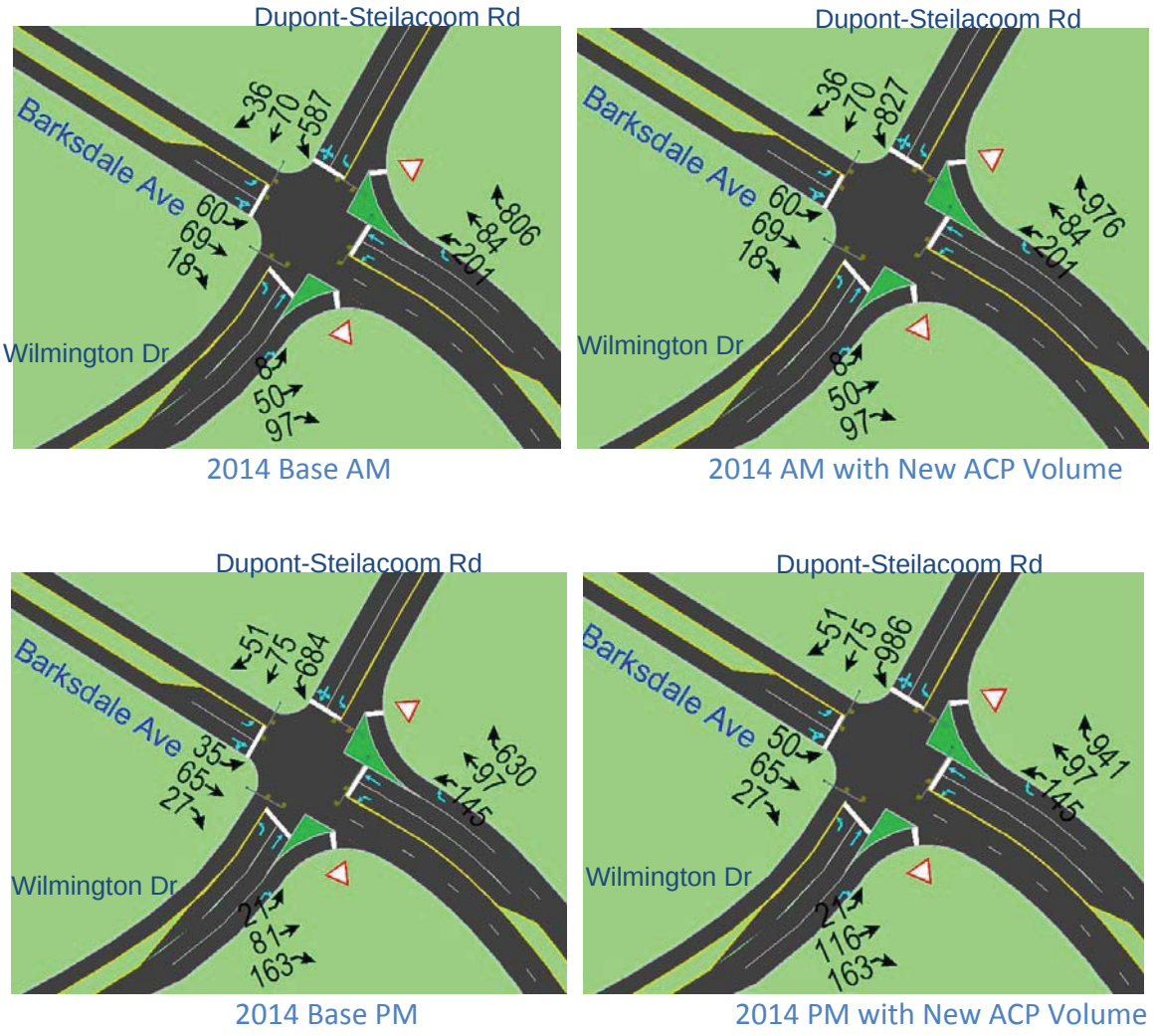


FIGURE 5: PEAK HOUR TRAFFIC VOLUME AT DUPONT-STEILACOOM ROAD/BARKSDALE AVENUE INTERSECTION

TABLE 6-1: BARKSDALE AVENUE PEAK HOUR INTERSECTION OPERATION (2014 BASE)

	Intersection	Approach			
		Eastbound On Barksdale	Westbound From I-5 Ramp	Northbound On Wilmington	Southbound On Dupont-Steilacoom
AM PEAK HOUR	C (32)	D (37)	C (26)	C (24)	D (43)
PM PEAK HOUR	C (26)	C (33)	B (18)	C (21)	C (35)

Level of Service (Delay in Second)

TABLE 6-2: BARKSDALE AVENUE PEAK HOUR INTERSECTION OPERATION (2014 WITH NEW ACP VOLUME)

	Intersection	Approach			
		Eastbound On Barksdale	Westbound From I-5 Ramp	Northbound On Wilmington	Southbound On Dupont-Steilacoom
AM PEAK HOUR	E (62)	E (64)	E (56)	C (31)	E (75)
PM PEAK HOUR	E (56)	D (52)	E (64)	D (40)	D (53)

Level of Service (Delay in Second)

TABLE 7-1: BARKSDALE AVENUE MAXIMUM QUEUE LENGTH (2014 BASE)

	Approach			
	Eastbound On Barksdale	Westbound From I-5 Ramp	Northbound On Wilmington	Southbound On Dupont-Steilacoom
AM PEAK HOUR	90 (EBL)	220 (WBL) 470 (WBR)	25 (NBL)	450 (SBL)
PM PEAK HOUR	60 (EBL)	165 (WBL) 120 (WBR)	35 (NBL)	555 (SBL)

TABLE 7-2: BARKSDALE AVENUE MAXIMUM QUEUE LENGTH (2014 WITH NEW ACP VOLUME)

	Approach			
	Eastbound On Barksdale	Westbound From I-5 Ramp	Northbound On Wilmington	Southbound On Dupont-Steilacoom
AM PEAK HOUR	130 (EBL)	230 (WBL) 865 (WBR)	25 (NBL)	720 (SBL)
PM PEAK HOUR	100 (EBL)	220 (WBL) 780 (WBR)	50 (NBL)	800 (SBL)

The peak hour intersection operations are shown in Table 6-1 and 6-2. Table 7-1 and 7-2 shows maximum queue length of turning movements for each approach during AM and PM peak hours. The intersection operates at LOS C during AM and PM peak hours with 2014 base traffic volume and the intersection operates at LOS E during AM and PM peak hours with 2014 new access control point volume. The westbound right-turn queue length on Barksdale Avenue extends approximately 800 feet during both AM and PM peak hours with new access control point volume. To improve traffic operation at this intersection when the existing I Street gate is replaced by the new Access Control Point, the free westbound right turn on Barksdale Avenue and two receiving lanes at the north leg of Dupont-Steilacoom Road are recommended. The recommended channelization is presented in Figure 8. The peak hour intersection operation and maximum queue length of the intersection with recommended channelization are also presented in Table 9-1 and 9-2 respectively.

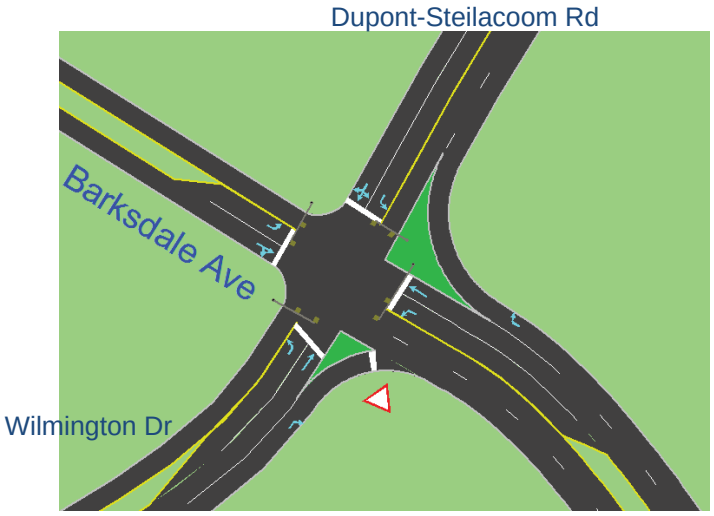


FIGURE 8: RECOMMENDED CHANNELIZATION AT BARKSDALE AVENUE INTERSECTION
NOTE: RECOMMENDED CHANNELIZATION INCLUDES 2 RECEIVING LANES AT THE NORTH LEG OF DUPONT-STEILACOOM ROAD AND FREE WESTBOUND RIGHT TURN ON BARKSDALE AVENUE.

Table 9-1: Barksdale Avenue Peak Hour Intersection Operation (2014 with New ACP Volume and Recommended Channelization)

	Intersection	Approach			
		Eastbound On Barksdale	Westbound From I-5 Ramp	Northbound On Wilmington	Southbound On Dupont-Steilacoom
AM Peak Hour	C (22)	D (47)	B (11)	C (25)	C (32)
PM Peak Hour	C (26)	D (54)	B (12)	C (33)	D (36)

Level of Service (Delay in Second)

Table 9-2: Barksdale Avenue Maximum Queue Length (2014 with New ACP Volume and Recommended Channelization)

	Approach			
	Eastbound On Barksdale	Westbound From I-5 Ramp	Northbound On Wilmington	Southbound On Dupont-Steilacoom
AM Peak Hour	120 (EBL)	235 (WBL) 25 (WBR)	25 (NBL)	650 (SBL)
PM Peak Hour	90 (EBL)	210 (WBL) 25 (WBR)	50 (NBL)	730 (SBL)