UNITED STATES TRANSPORTATION COMMAND (USTRANSCOM)

Transportation Infrastructure Criticality & Vulnerability (TRI-CAV) Assessment for Ports and Military Installations in Washington State
January 2001

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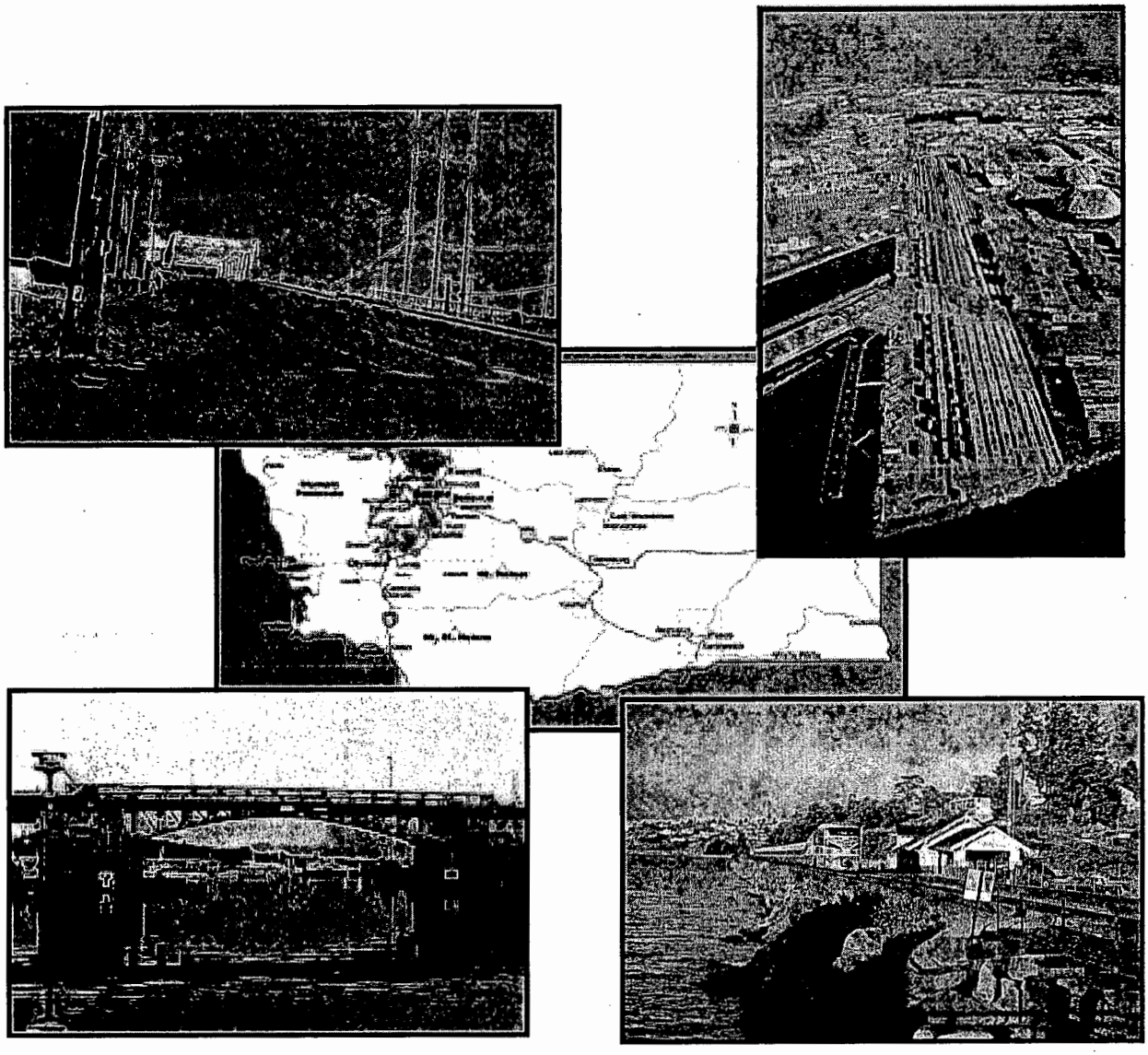
January 2001

TRANSPORTATION INFRASTRUCTURE CRITICALITY AND VULNERABILITY (TRI-CAV) ASSESSMENT FOR PORTS AND MILITARY INSTALLATIONS IN WASHINGTON STATE (U)

(PACNORWEST TRANSPORTATION SECTOR INPUT)



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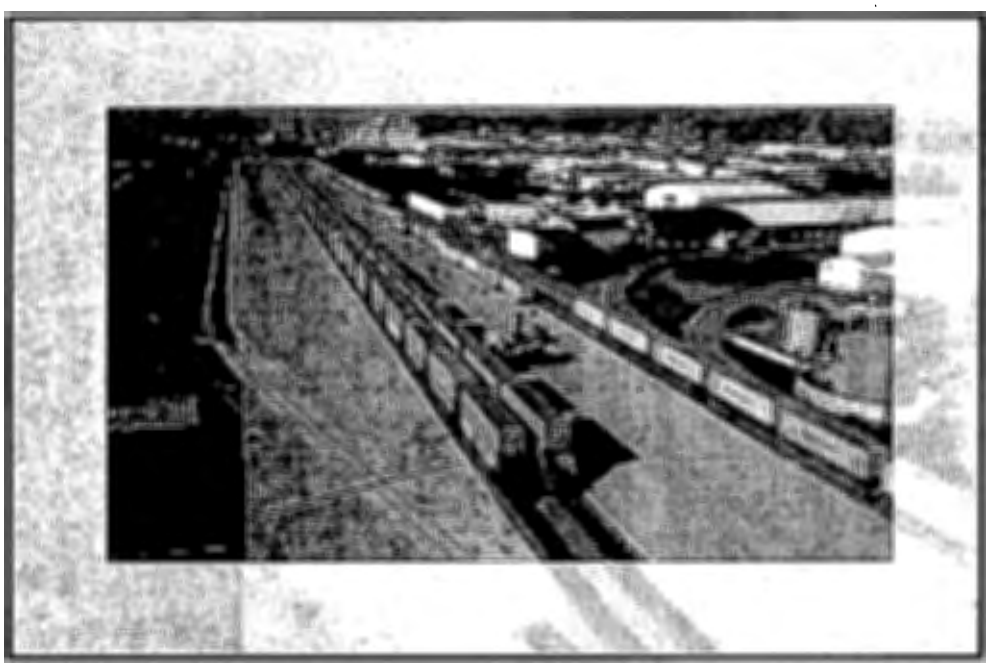

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EXECUTIVE SUMMARY (U)

(U) This analysis is one in a series of CONUS transportation infrastructure studies derived from the Military Traffic Management Command Transportation Engineering Agency's (MTMCTEA) initial analysis[1] of the 17 most important US Army and US Marine Corps installations (the Army power projection platforms and Camps Lejeune and Pendleton); the 8 most important ammunition depots; and the corresponding seaports of embarkation (SPOEs)[2]. Specifically, this analysis assesses the *criticality* and *vulnerability* of Washington military installations and ports and quantifies TPFDD delays occurring as a result of hypothetical interdictions to the CONUS transportation network. Congestion delays are addressed, and the degree of criticality/vulnerability is quantified through tabulated indices to assist decision-makers in the prioritization of key assets when considering potential remediation and mitigation alternatives and/or planning.

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(U)

(b)(1)

(S)

[1] *Strategic Railroad Bypass Analysis* (U), MTMCTEA, Newport News, VA 23606, September 1998

[2] For simplicity we refer to these 17 installations as the power projection platforms in this study.

[3] *Surface Transportation Vulnerability Assessment* -Final Report ,Research and Special Programs Administration and Office of Intelligence and Security, Office of the Secretary, U.S. Department of Transportation, Washington, DC, November, 1998

(U) In the case of Fort Lewis, no *single* section of highway or railroad infrastructure is critical to deployment. Furthermore, even the simultaneous loss of any *two* pieces of railroad or highway infrastructure would not significantly affect a Fort Lewis deployment. The simultaneous loss of up to three railroad bridges, *or* up to five highway bridges, would create a burdensome deployment environment for Fort Lewis units, and for units from other origins that are to deploy through the ports of Tacoma and Seattle. However, various actions to mitigate such losses can be taken to ensure actual effects on OPLAN execution are manageable.

TABLE 1
TRANSPORTATION CRITICALITY AND VULNERABILITY SUMMARY (U)

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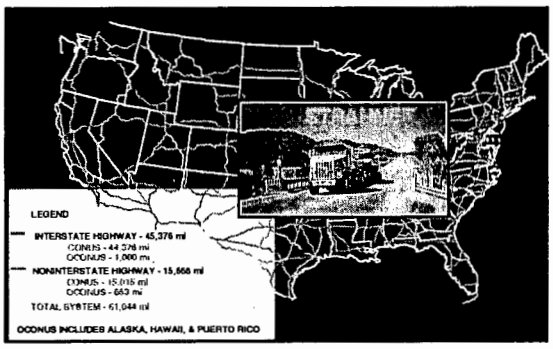
I. INTRODUCTION (U)

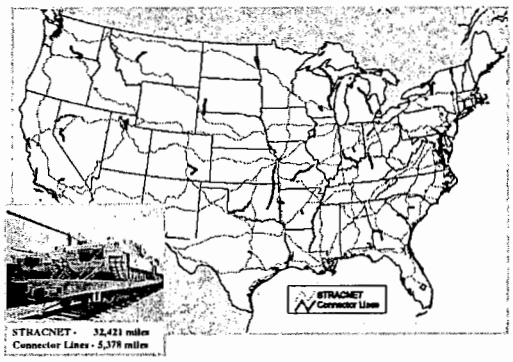
(U) The Critical Infrastructure Protection (CIP) program was established based on recommendations from the President's Commission on Critical Infrastructure and Presidential Decision Directive 63 (PDD 63). A major goal of the CIP program is to

> *"achieve and maintain the ability to protect critical infrastructure that would significantly diminish the abilities of: the Federal government to perform essential national security missions, and the private sector to ensure the orderly functioning of the economy and the delivery of essential ... transportation services."*

As a result of this duality in missions, the CIP program is divided into a national level and DOD level program. However, there are many common infrastructures of interest to both programs. The United States Department of Transportation (USDOT) is the overall coordinator for the Transportation Sector within the national CIP program. The United States Transportation Command (USTRANSCOM) is the designated lead agency for the Transportation Sector within DOD. USTRANSCOM and USDOT are working jointly to resolve CIP issues involving the Defense Transportation System (DTS) within CONUS. The Joint Program Office for Special Technology Countermeasures (JPO-STC) is the technical director for the DOD's CIP program. Thus, this study supports USTRANSCOM in its Defense Infrastructure Sector role by providing Transportation Sector input to JPO-STC while also providing USDOT with information valuable to the national CIP program.

(U) This Transportation Infrastructure Criticality and Vulnerability (TRI-CAV) study for military installations and the ports in Washington is one in a series of follow-on analyses designed to expand upon the findings documented in the ***Strategic Railroad Bypass Analysis (SRBA).***[4] The SRBA laid the groundwork by identifying critical rail infrastructure necessary for supporting national defense objectives consistent with the Railroads for National Defense (RND) Program. TRI-CAV goes a step further, adding highway systems and quantifying the potential *effects* that disruptions to CONUS highways and railroads could have on time-critical military deployments.

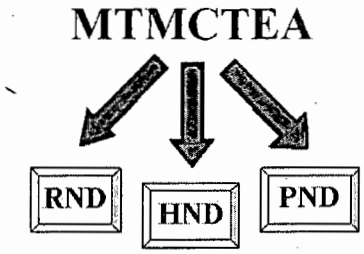




(U) Therefore, based on assumed threats, the primary objective of the TRI-CAV study series is to evaluate and prioritize the vulnerability of the CONUS highway and rail infrastructure necessary to meet DOD's power projection requirements to better posture DOD to manage the changing threat environment.

[4] ***Strategic Railroad Bypass Analysis*** (U), MTMCTEA, Newport News, VA 23606, September 1998

(U) As DOD's implementing authority for the Highways for National Defense (HND), Railroads for National Defense (RND), and Ports for National Defense (PND) Programs, MTMCTEA is strategically poised to translate this TRI-CAV objective into remediation and mitigation activities via input to future Defense Transportation System (DTS) policy; agreements and negotiations with Federal and State DOTs; commercial railroads and ports; and extensive input to the deliberate planning process. In fact, MTMCTEA has already accomplished some remediation successes under HND and RND, based on the SRBA findings.



(U) This study is also designed to furnish transportation input to JPO, to support the JPO ongoing study of critical infrastructure in the Pacific Northwest ***(PACNORWEST/P2).*** Table 2 shows the supporting relationship between the Washington TRI-CAV study and JPO's study.

TABLE 2
PACNORWEST AND WASHINGTON TRI-CAV RELATIONSHIP (U)

UNCLASSIFIED	
PACNORWEST/P2	**Washington TRI-CAV**
Identify single points of service that may impact the day-to-day mission objectives of the DOD Installations / sites and their tenant organizations, the participating Defense Infrastructure (DI) Sectors, and selected supporting commercial sites in the Pacific Northwest area.	This study identifies single points of failure for highway and rail access to these installations and ports.
Build on and enhance the analysis and assessment process developed in the previous P1 (Prototype) effort, and tailor it for the analysis and assessment of Day-to-Day Operations scenarios.	This study focuses on deployment in support of OPLANs. Peacetime day-to-day operations are not addressed in detail.
Further the DI Sectors' identification of assets, intra-sector dependencies and interdependencies on the other DI Sectors.	Highway and railroad assets are identified.
Identify DI Sector, installations, and commercial assets in the PACNORWEST Study area that are critical to the successful execution of the deployment phase of the OPLAN used in P1.	Highway and railroad assets are identified whose loss would impact deployment or re-supply in support of OPLANs.

(U) Beyond PACNORWEST/P2, MTMCTEA's ongoing transportation research and development initiatives continue to evolve, and as the Critical Infrastructure Protection (CIP) program matures, MTMCTEA is prepared to extend the TRI-CAV methodology even further. Inclusion of ports via the Ports for National Defense Program would extend the same methodology to port infrastructure, effectively closing the loop on CONUS surface transportation infrastructure. With the CONUS TRI-CAV study series complete, MTMCTEA could explore ways to efficiently translate the effects of documented CONUS deployment delays into force closure decrements and subsequent simulated combat model outcomes. Our ultimate goal is to be able to make HND, PND, and RND decisions based on the ultimate set of metrics – desired combat outcomes.

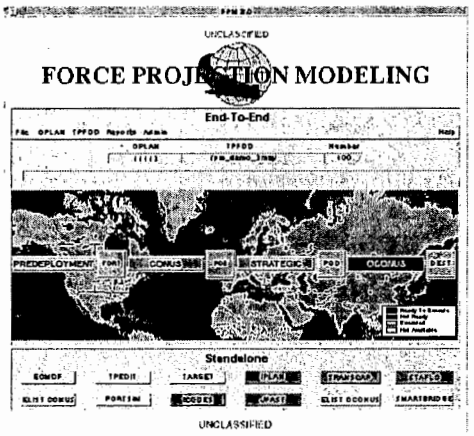
II. METHODOLOGY (U)

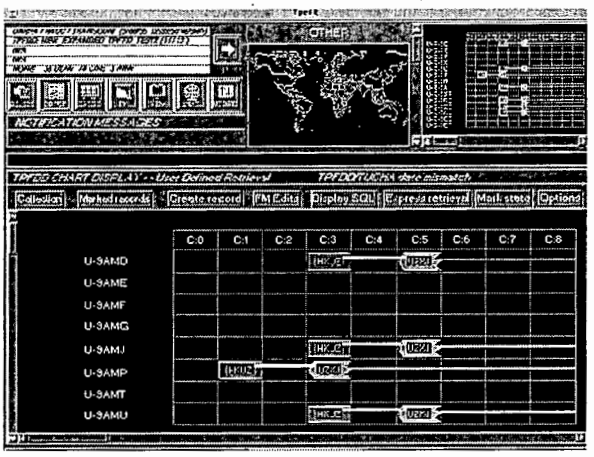
(U) The first step in the TRI-CAV assessment process is the identification of various threat scenarios that are *assumed* to be realistic and relevant based on historical evidence and current geopolitical trends. These scenarios are not intended to be all-inclusive nor are they assumed to be *exclusive* of documented intelligence data. Rather, they simply provide a framework from which corresponding interdictions and associated effects may be attached. For example, a threat scenario *may* include terrorist activity. Within the framework of that *activity*, a bridge may be damaged, and the subsequent *effect* of that interdiction can then be applied to the deployment timeline in the analysis phase (i.e., adding a time delay to the available to load date (ALD) field in the TPFDD).

(U) Next, a threat-based criticality assessment is done for the highway and rail networks supporting the installation/port, keying in on links with fewer than five bypass alternatives available. And, unlike the SRBA, TRI-CAV considers both *highway and rail* network service/connectivity. However, the highway network tends to be more robust, and is rarely as susceptible to complete interdiction when compared with the relatively sparse rail network. The result of the criticality assessment is a tabulated list of interdiction events and their corresponding effects. In other words, the criticality assessment identifies specific problem areas that warrant further analysis.

(U) Once the criticality assessment is complete, the actual interdiction *analysis* takes place. This analysis takes a closer look at the problem areas and provides detailed vulnerability and impact assessments for each. The vulnerability assessment quantifies the *likelihood of loss given attack* using a weighted numerical vulnerability index that considers *accessibility*, *effort*, *degree of control over outcome*, and *security measures* associated with the infrastructure in question. For example, a remote, unguarded signal wire requiring a simple cut to cause immediate termination of rail service would likely receive a high vulnerability rating.

(U) Once the vulnerability index has been tabulated, the corresponding impact assessment begins. The impact assessment is broken into two parts: a TPFDD-based *deployment impact* analysis and a TPFDD-independent *commercial impact* analysis.





(U) Several factors are considered in determining the overall deployment impact, but the predominant metric is *time*. Specifically, we focus on the impact on the ALD from the OPLAN and TPFDDs. The ALD is the date in the OPLAN when the unit must be at the port of embarkation (POE) and available to load on the ship. The logical translation to the deployment process is that units not meeting their respective ALDs will arrive later in the theater, subsequently degrading the warfighting effort. Therefore, interdictions causing significant delays to the ALDs will score high on the deployment impact index. (b)(2)

(U) The commercial impact, on the other hand, is included as a balance to capture *deployment-independent* collateral effects of the interdictions on the private sector. While the commercial impact may not have any operational implications relative to OPLANs and , it may have significant bearing on the decision making process, and it dovetails nicely with the , United States Department of Transportation (DOT)[5] methodology to facilitate coordination of DOT and DOD infrastructure assurance efforts and decision/policy making. In essence, by mirroring DOT's analytical approach, we have attempted to bridge the analytical gap between DOD and DOT via the proverbial "same sheet of music." In doing so, we will have a better overall view of the transportation sector at the national level. (b)(2)

(U) Finally, the vulnerability, deployment impact, and commercial impact indexes for each problem area are consolidated and evaluated to generate appropriate conclusions and recommendations for either remediation or mitigation actions. And, although this particular study focuses only on selected military installations and ports in Washington, to include Fort Lewis and Tacoma, MTMCTEA plans to conduct similar studies of the remaining power projection platforms and other selected military installations.

(U) NOTE: The general sensitivity of this analysis is "days" vice "hours." While this is commensurate with the deployment timelines associated with today's *Legacy Force*, future analyses in support of Army Transformation will demand greater sensitivity as we move to the *Objective Force* deployment requirements to "...place a combat capable brigade anywhere in the world in 96 hours; put a division on the ground in 120 hours; and five divisions on the ground in theater in 30 days[6]." With Fort Lewis as a likely candidate to receive at least one initial Brigade Combat Team (BCT), these future requirements may be upon us in the not too distant future. This Interim Force will bridge the gap between the Legacy Force of today and the Objective Force. The TRI-CAV analysis methodology will adapt as necessary to provide infrastructure assurance throughout the Army's Transformation process to ensure asymmetric threats to the Nation's infrastructure receives appropriate consideration when rendering decisions on future infrastructure protection and funding.

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[5] ***Surface Transportation Vulnerability Assessment*** -Final Report ,Research and Special Programs Administration and Office of Intelligence and Security, Office of the Secretary, U.S. Department of Transportation, Washington, DC, November, 1998.

[6] These timelines are goals set by the Chief of Staff of the Army, GEN Eric K. Shinseki, in his vision statement, The Army Vision: Soldiers on Point for the Nation...Persuasive in Peace, Invincible in War, released at Association of the United Sates Army convention, October 1999.

III. SCOPE AND ASSUMPTIONS (U)

(U) **Nature of Study.** The TRI-CAV effort assesses the likelihood of loss for a given interdiction scenario; the impact of that loss; and recommendations that will decrease the risk and/or reduce the impact of interdiction to the DTS problem area. However, the probability of an interdiction being made is not addressed. Instead, the likelihood of loss assumes that the threat is realized, and the impact of loss assumes that the interdiction was successful.

(U) **Modes and Infrastructure Under Study.** Current TRI-CAV studies only address CONUS highway and rail infrastructure. This includes associated bridges, tunnels, and other structures susceptible to interdiction.

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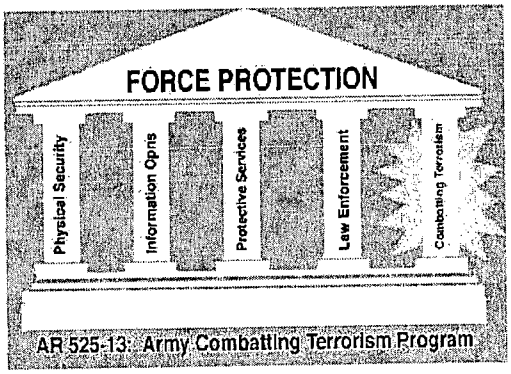
(U) **Threats.** This report focuses on vulnerabilities to a fixed set of postulated threats and is not based on actual threat intelligence. It deals with acts of terrorism, including sabotage, and acts of extreme violence as part of a terrorist agenda. It does not include problems such as natural disasters and accidents. The corresponding threat *effects* establish the potential to impact, to varying degrees, the operation of the transportation system and to degrade our power projection capability.



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(U) **Threat Effects.** The following paragraphs describe several threat effects that could disrupt and/or terminate highway and/or rail service between installations and ports. These effects include derailments, damage to signals and switches, bridge/tunnel damage, etc. Where appropriate, these effects are correlated to time delays, which are later applied to deployment timelines in subsequent impact analyses.

(U) One of the most common threats to rail movement is a derailment. Derailments have numerous causes that include deliberate acts of sabotage, natural disasters, or simple accidents, and they can occur virtually anywhere along the rail line. Obstructions and debris placed anywhere on the tracks could easily cause a derailment.

(U) Likewise, rail switches can be tampered with at numerous locations. In fact, there are more than 20 switches between Fort Lewis and the Port of Tacoma, just 17 miles away. Since it is not practical to continuously guard every mile of militarily important railroad track, most of these switches are easy targets for antagonists. However, damage resulting from a derailment at a switch, or otherwise featureless stretch of railroad is not considered difficult to repair, and work crews can usually put the line back in service within one day.

(C)

(b)(1)

Figure 1. Train wreck in Alabama (U)

(C)

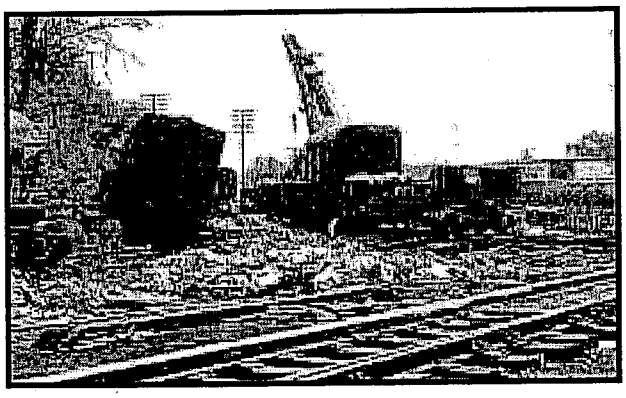
(b)(1)

(U) For instance, in 1957, a derailment in Virginia caused a spectacular bridge collapse that was estimated to require three weeks to repair. In this particular case, repairs went smoothly, and the line was returned to service in just two weeks[7]. This historical account, coupled with improved repair procedures, implies that a worst-case delay of two weeks is an appropriate assumption for this study.

(C)

(b)(1)

(U) For this study, we assume that highways, like railroads, can only be disrupted for long periods via destruction of major structures such as bridges or tunnels. The deliberate destruction of open stretches of roadway is impractical for achieving significant delays to deployment, and congestion due to traffic tampering, while inconvenient, is not likely to produce deployment delays of more than 12 hours. Therefore, for the highway analysis, threat effects are only applied to major structures on a given route that, if destroyed, could disconnect that link for days or weeks.



[7] ***The Virginian Railway***, H. Reid, Kalmbach Publishing Co., Milwaukee, WI 53233, 1961

(U) Vulnerability/Impact Assessment Assumptions. Having established a reasonable means of bounding the threat and threat effects, the next step is to determine how vulnerable the infrastructure is to that threat and the potential impact of the threat effect once applied. In order to do this effectively, we have chosen a methodology that closely mirrors that employed in DOT's Surface Transportation Vulnerability Assessment. And, while MTMCTEA has adapted this methodology to fit DOD-specific applications, many of the fundamental assumptions remain the same. Likewise, the same disclaimer used by DOT applies here:

> *"This analysis does not evaluate the probability of a particular threat occurring (which requires intelligence information). Therefore, this is not a risk analysis, which would incorporate both the impact of an attack and the probability of the attack being launched. The focus here is on the vulnerabilities of the infrastructure elements to threats and the impact of these attacks."*

(U) The vulnerability and impact assessment assumptions are paraphrased as follows:

(U) **Vulnerability Assessment.** Once a threat scenario has been postulated, a determination is made regarding the vulnerability of the asset to the given attack. Vulnerabilities are physical, technical, administrative, procedural, or human-related characteristics of an asset which make it difficult (or easy) for a specific attack to be successful. The numerical vulnerability rating is the algebraic sum of several vulnerability factors - the higher the rating, the more vulnerable the asset. The factors considered in the determination of asset vulnerability are illustrated in table 3 and include:

(U) ***Accessibility*** **(scale of 0-5).** This assesses the difficulty of getting the "weapon" to the target. For example, a highway bridge is easily accessible by a truck bomb. However, a railroad tunnel is much less accessible for placing a charge in the tunnel itself. Remote sites that offer undetected access typically score highly on the accessibility scale.

(U) ***Effort*** **(scale of 0-5).** This incorporates two elements – the sophistication of the attack, and the natural physical resistance of the target. Exploding a device in a truck parked adjacent to a target requires little sophistication, but destroying a bridge with a manageable amount of strategically placed explosives would be more complex, thus scoring lower on the scale.

(U) ***Degree of Control Over Outcome*** **(scale of 0-5).** This addresses the control a perpetrator has over the sequence of events *after* the attack is initiated. This is a measure of how often this sort of attack would tend to cause the desired outcome. For example, detonating an explosive device is fairly predictable and would score highly on this scale; however, dispersal of a biological weapon would be highly dependent on wind and other factors outside an antagonist's direct control, and would tend to score lower. Also, a perpetrator has more control over the outcome of a *single* disruption than over a series of disruptions. For example, a site served by a single link would score much higher than one served by multiple links.

(U) *Security Measures* **(scale of 0-10).** This addresses how well protected the asset is. Designated protection may be accomplished by a guard force, surveillance cameras, anti-intrusion devices, and/or other methods. In addition, assets that are readily visible from populous areas have a certain level of natural protection, since suspicious activity is likely to be observed and reported.

(U) Once each of the sub-elements of the vulnerability rating have been scored, they must be summed to determine the total score. At that point, we have to determine the relevance of that score, and we do this by assigning a qualifier for each given range of scores. Using the example in table 3, adding each of the sub-element scores yields a total vulnerability score of "23." Once this score is tabulated for a postulated scenario, it is assigned a "likelihood of loss" *category*. These categories range from *improbable* to *certain,* and each category covers a range of scores as shown in table 3. In general, a score of "15" or higher is likely to qualify an asset for serious consideration when conducting the ensuing impact analysis. Vulnerability assessment tables for different scenarios affecting military installations and ports in Washington are in Appendix A.

TABLE 3
SAMPLE VULNERABILITY TABLE (U)

UNCLASSIFIED		
Description of sample incident.		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to reach asset; asset is in the open	4	4
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	4
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or coordination to destroy or damage the asset	2	
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	5
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	
Device is complex; attack quite susceptible to outside factors	2	
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures - security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	10
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**23**
Likelihood of Loss Given Attack Rating		
Certain 20-25		**23**
Highly Probable 15-19		
Moderately Probable 10-14		
Improbable 4-9		

NOTES:

This table has a 25 point total scale and a 10-point security measures range. The USDOT vulnerability table has a 20-point total scale and a 5-point security measures range. In other respects, this table is identical to the USDOT vulnerability assessment.

(U) **Impact Assessments.** Once the vulnerability rating has been established and the appropriate category assigned, the threat effect is applied to the postulated scenario, and the subsequent commercial *and* deployment impacts are separately assessed. Although TRI-CAV emphasizes military deployment timelines and infrastructure, we also assess commercial impacts to help correlate collateral impacts on the community resulting from attacks to transportation infrastructure supporting the CONUS power projection platforms. In many cases, assets scoring low on the commercial impact scale will score highly on the deployment impact scale, and vice versa. Conversely, assets scoring highly on both scales will certainly receive appropriate priority during remediation planning. Documenting *both* the commercial *and* deployment impact scores provides the best visibility over the entire transportation sector at the national level.

(U) **Deployment Impact Assessment.** Any credible impact assessment must be metric-driven, and TRI-CAV is no different. While many different metrics could be addressed, the metric driving the current TRI-CAV impact assessment is the available to load date (ALD), or *time*. The ALD is the date in the OPLAN when the unit has to be at the port and available to load onto the ship. If the ALD is met, the effect on the warfight is assumed to be minimal. In some disruption scenarios, ALDs can still be met, but doing so will require extraordinary efforts by the commercial transportation industry, the deploying unit, or both. We have considered the ALD to be "met" if the unit arrives at the port on the correct day. We have not considered the time that the unit arrives on that day to be critical. Therefore, and as previously discussed, this study *does not* evaluate congestion-related delays of a few hours. We assume that such delays will not measurably impact the *overall* surface deployment process, although it will certainly be burdensome to the units that are deploying, and to civilian traffic using that same transportation infrastructure. However, as the Army transforms to the Objective Force, such delays could have *significant relative impacts* on the much more sensitive timelines associated with deploying the Objective Force (brigade in 96 hours; division in 120 hours; 5 divisions in 30 days).

(U) For this study, the TPFDD ALDs are not just the metric, they also establish the baseline. All delays are measured relative to those original TPFDD dates. The threat effect is applied (i.e., time delay to the baseline ALD), and the deployability impact/recoverability rating is scored relative to that baseline ALD. Unlike the vulnerability rating, the deployment score is not based on sub-element ratings. Instead, it is based on a scale of 0-20 that considers such things as the relative scope of impact; military units impacted; ease of replacement; and time to repair. An example of this scale appears in table 4. As with the vulnerability score, a qualifier is used to attach some relevance to the impact score. Once the deployment impact/recoverability score has been determined, it is assigned an "impact of loss" *category*. These categories range from *not serious* to *catastrophic,* and each category covers the range of scores shown in table 4. In general, deployment impact scores above "10" are likely to qualify an asset for serious consideration when evaluating remediation/mitigation actions.

TABLE 4
SAMPLE DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Description of sample incident.		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	10
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of preferred deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of preferred deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	
No significant deployment impact	0	
	Total	**10**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		**10**
Not Serious 0-5		

(U) **Commercial Impact Assessment.** Once the deployment impact score has been tabulated and categorized, we shift our focus to the commercial sector to complete the picture at the national level. Once again, metrics drive the impact analysis, but the military TPFDD does not apply here, so we have to quantify the impacts using a different set of metrics. Successful attacks on militarily significant transportation infrastructure can create a commercial impact in two significant ways. First, there is the *human loss* in terms of fatalities and injuries; and second, there are the direct *costs* of the property which has been destroyed, repair *costs*, clean-up *costs*, and the *cost* of disruptions in service. This boils down to *people* and *money*. Rather than innovate a new, and possibly less effective methodology, we have adopted DOT's Surface Transportation Vulnerability Assessment protocol, focusing only on the losses from property damage, disruption of service, and estimated death and injury[8]. We assume that DOT is the renowned expert in this area and thus have chosen to integrate their efforts into the TRI-CAV studies. In doing this, both DOD and DOT can work from the proverbial "same sheet of music" to produce integrated studies at the National level based on an identical set of assumptions.

(U) The two sub-elements that assess the commercial impact of loss are:

(U) **Economic Impact/Recoverability (scale of 0-10).** This focuses on the total economic impacts of a successful attack (scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations; etc.). Fortunately, most of the highly vulnerable military targets are located away from heavily populated areas that would produce high scores here.

(U) **Human Loss (scale of 0-10).** The two types of human loss considered are loss of life and injury. The actual estimates are based on similar threat scenarios conducted by DOT. We have simply adopted their assumptions and applied them to DOD-specific scenarios.

(U) Once assigned, the scores for human loss and economic impact are combined, and the total score is assigned an "impact of loss" *category* to qualify its relevance. These categories range from *not serious* to *catastrophic,* and each category covers the range of scores shown in table 5. In general, scores above "10" are likely to qualify an asset for serious consideration when evaluating remediation/mitigation alternatives.

[8] ***Surface Transportation Vulnerability Assessment*** -Final Report ,Research and Special Programs Administration and Office of Intelligence and Security, Office of the Secretary, U.S. Department of Transportation, Washington, DC, November, 1998

TABLE 5
SAMPLE COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Description of sample incident.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss – Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**8**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		**8**
Not Serious 0-5		
NOTES: This table is identical to the USDOT impact assessment.		

(U) **Asset Prioritization: "The Red Zone Chart."** Once the vulnerability and impact (deployment and commercial) scores have been tabulated and categorized, a "Red Zone Chart" is developed to integrate these scores and present them in a way that provides insight into which scenarios are of the greatest concern. In a sense, this chart presents the *bottom line* and establishes the *criticality* of an asset based on its vulnerability and the projected impact of its loss. The matrix positions are color coded and qualified as follows:

(U) **RED ZONE:** High priority items; definitely consider remediation action to move the item out of this zone; prepare mitigation and consequence management plans;

(U) **YELLOW ZONE:** Medium Priority items that warrant careful consideration for remediation action; consider planning for mitigation and consequence management;

(U) **WHITE ZONE:** Low priority items; do not require immediate action.

(U) **Reading the "Red Zone" Chart.** In the example shown in table 6, the scores from tables 2, 3, and 4 are transferred as numerical pairs into their corresponding categorical blocks. The vulnerability score is listed first, running up and down, while the impact score is listed second and runs across the chart. In this example, the vulnerability score is "23," which falls in the "certain" category on the vulnerability scale. It would only take a "moderately serious" impact to move this item into the "Red Zone" on either the commercial or deployment impact zones. In this example, the deployment impact score was "10," which falls into the "moderately serious" category on the deployment impact scale. Therefore, the paired score, "(23,10)," falls into the red zone on the deployment side as shown. Likewise, the commercial impact score of "8" falls into the "moderately serious" category, placing the paired score "(23,8)" into the red zone on the commercial side. In this example, remediation recommendations would focus on actions that could move the item down on the vulnerability scale or to the right on the impact scale; either would move the item out of the red and into either the yellow or white area on the chart.

TABLE 6
SAMPLE "RED ZONE" SUMMARY CHART(U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain			23, 10				23, 8	
Highly Probable								
Moderately Probable								
Improbable								

(U) **Remediation Considerations.** Items appearing in the "Red Zone" are assumed to be automatic candidates for remediation action. Items with *"catastrophic impact"* that are *"certain"* or *"highly probable"* and items that are *"very serious"* and *"certain"* receive the highest priority. For TRI-CAV, remediation recommendations are focused on moving such items out of the "Red Zone." That means moving items to the right on the impact scales and/or down on the vulnerability scale, or any plausible combination of "right and down." However, it is typically more practical and feasible to move items down on the vulnerability scale. For example, table 7 illustrates how increased security measures would affect the values presented in table 6, reducing the likelihood of loss given attack score from 23 to 12 (certain to moderately probable). Notice that the net effect is a movement *down* on the Red Zone Chart that pulls this location out of the red zone and into the yellow zone. Other remediation options could be used to effect similar reductions. Remediation considerations may include physical modification, police and security deployment and staffing alternatives, security technology, environmental design and review, security materials selection and analysis, administrative and operational procedural changes, education/training, or any other reasonable measure that will reduce the vulnerability and/or impact into an acceptable range.

TABLE 7
SAMPLE "RED ZONE" CHART WITH REMEDIATION (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain			23, 10(a)				23, 8(a)	
Highly Probable								
Moderately Probable			12, 10(b)				12, 8(b)	
Improbable								

a. Score reflects vulnerability of Fort Sample rail line under current (unguarded) conditions.
b. Score reflects vulnerability of Fort Sample rail line with cameras and/or guards at the Red Creek bridge.

(U) Locations that are in the commercial "Red Zone", but not the deployment "Red Zone" are identified as candidates for remediation by civil authorities. However, the military is not likely to provide special protection at such locations; therefore, TRI-CAV studies do not include *detailed* remediation options for locations that are unlikely to suffer significant deployment impacts.

(U) **Mitigation Considerations.** In many instances, whether remediation is feasible or not, it is prudent to establish mitigation options "just in case." This is especially true for items appearing in the upper left block in the "Red Zone Chart" because it may be very difficult to move such an item entirely out of the red zone. Therefore, plans should be in place to "work around" the problem should it develop. For example, in the case of a port being isolated from rail or highway service, *one* mitigation option might be to detour to an alternate port, which could also be augmented with a complementary remediation action to negotiate contingency and/or expanded port planning orders at that alternate port. Similarly, if rail access to an installation is interdicted, a convoy option could be used to help mitigate the loss of rail service, and a complementary remediation action might be to have pre-approved contingency routes and permits in place. For this study, the deployment and commercial impact scores already reflect mitigation actions being taken after an incident.

(U) **General.** It is critical that readers understand the TRI-CAV Methodology and the Scope and Assumptions sections before attempting to proceed into the formal Interdiction Analysis section of each TRI-CAV study. Only then can the results be accurately interpreted and placed in the proper perspective relative to the overall Transportation Sector, and also to the overarching Critical Infrastructure Protection (CIP) program. Furthermore, to preserve continuity in the body of the report, Red Zone Charts, vulnerability scoresheets, and impact scoresheets (commercial and deployment) for different scenarios appear in the appendix. However, the Red Zone Charts presented in the appendix are also included with the text in the analysis section of the report. This allows the reader to get the "bottom line" from either the appendix or the main body of the report.

IV. INTERDICTION ANALYSIS (U)

A. WASHINGTON TRANSPORTATION SYSTEMS OVERVIEW (U)

(U) In general, this analysis seeks to identify locations that could be considered single or dual points of failure during periods of potential rapid deployments. Most often, the areas identified are locations where relatively limited disruption activity could cause significant delays to force deployment and sustainment, resulting in delays to military cargo movements of several days or more (i.e., where the antagonist can literally get the most "bang for the buck"). Therefore, we begin the assessment process by identifying and postulating scenarios that are most likely to expose critical infrastructure whose combined vulnerability and impact scores could place them in the "RED ZONE."

(C) (b)(1)

(U) When considering these criteria, we concede that rail is the normal deployment mode for tracked vehicles and other non-roadable equipment as well as for units required to travel over 400 miles to reach their respective ports. On the other hand, wheeled vehicles *within* 400 miles of the port will travel by highway as their normal deployment mode. In order to determine which rail and highway routes are required, we have to extract the origin-destination pairs from the specified OPLAN (OPLANS and are used in this study). (b)(2)

(U) Table 8 lists Washington military installations and commercial seaports and airports that may handle military traffic in a contingency. JPO analyzes these sites further in the main body of the ***PACNORWEST/P2*** study. Table 8 also shows which of these sites are used to deploy significant amounts of re-supply cargo and/or military units in OPLANS or , thereby providing a quick prioritization for more detailed analysis. Table 8 groups these installations together geographically since each region shares certain commercial rail and highway infrastructure, and figure 2 graphically depicts the military installations and railroads in Washington. (b)(2)

(U) Isolating sites that do not deploy forces or re-supply cargo will not significantly affect OPLAN execution. Sites that do not need rail access, and have five or more highway access routes, are not at risk for being isolated. Therefore, a process must be in place to ensure that only the most critical locations receive consideration for analysis; otherwise, the task would become unwieldy and lead to consistently trivial results. The flowchart shown in figure 3 illustrates this process and helps ensure that only the most significant sites are analyzed in detail.

TABLE 8
WASHINGTON PORTS AND MILITARY INSTALLATIONS (U)

SECRET

(b)(1)

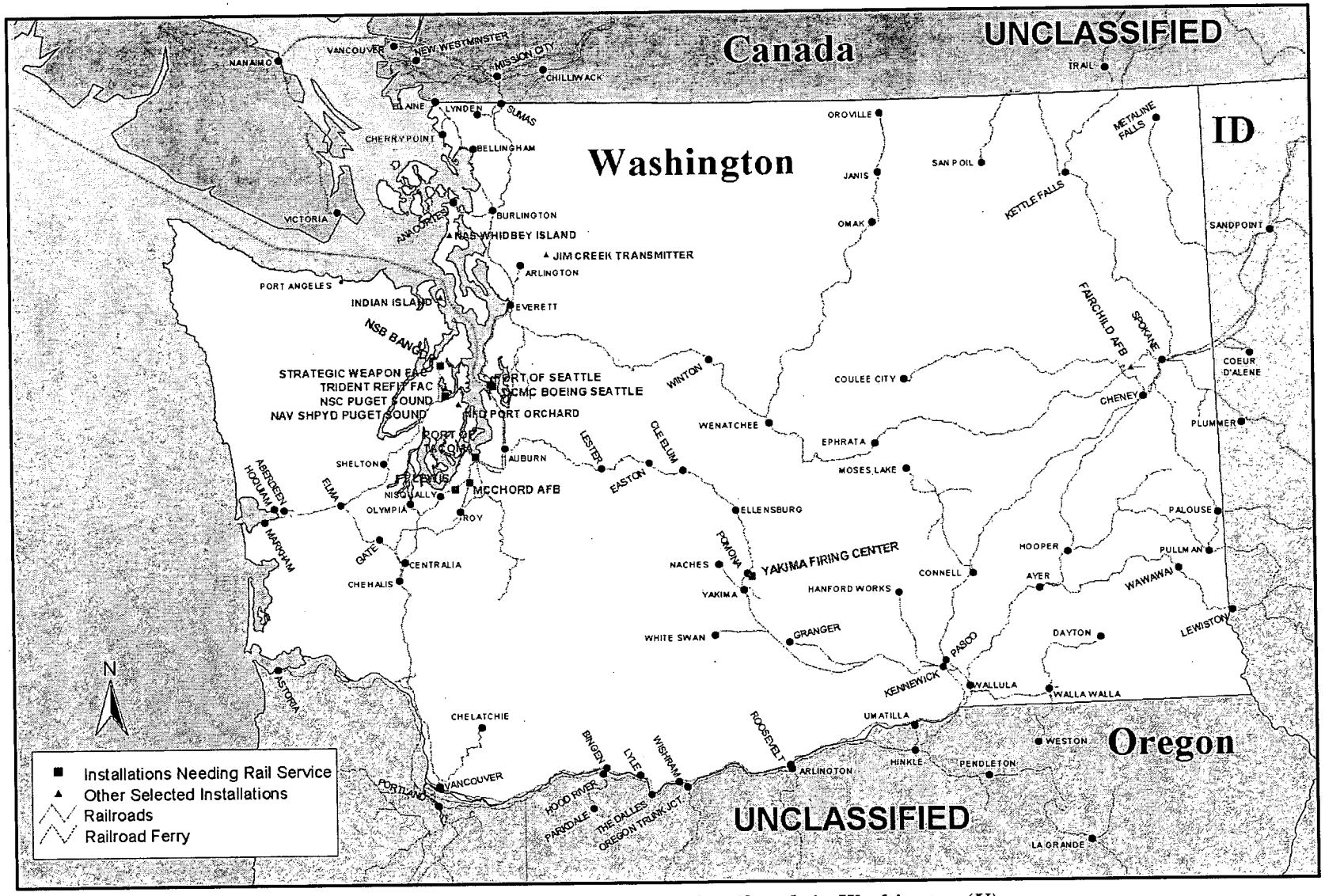


Figure 2. Military Installations and Railroads in Washington (U)

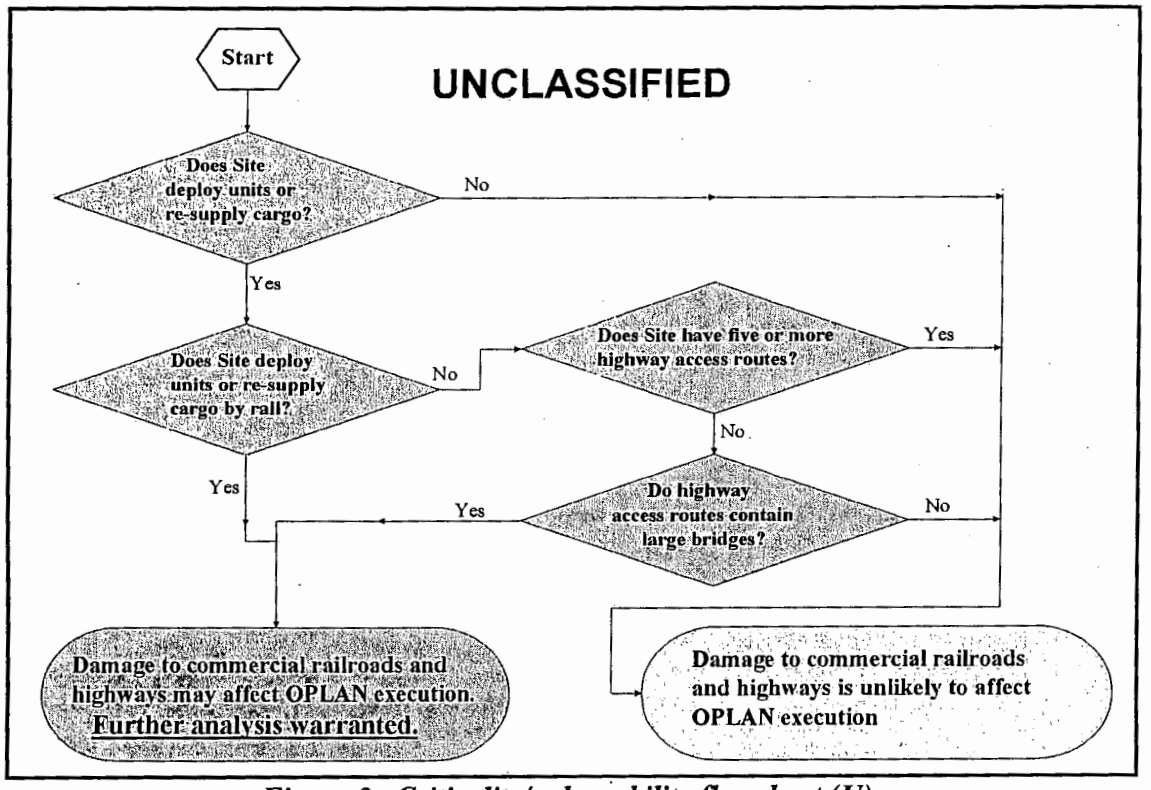


Figure 3. Criticality/vulnerability flowchart (U)

B. THREAT SCENARIOS (U)

(C)

Upon answering these questions, events are selected and scenarios are postulated for each site of interest.

(C)

(b)(1)

(U) Each of these generic events could have multiple causes and are addressed in the following pages. For example, a "highway disruption scenario" could result from single or multiple events that might include caving in a tunnel, destroying a bridge, etc. Therefore, for each of the following scenarios, we have chosen events deemed realistic and applicable to the specific infrastructure in question with the understanding that numerous other events could have similar effects. After all, once we have established that a location is vulnerable, it is the "effect" that we are most interested in, not the hypothetical event.

C. SEATTLE-TACOMA REGIONAL ANALYSIS (U)

1. Multiple Highway Disruptions (U)

(U) **General.** All military installations in the Seattle-Tacoma region require highway access to accomplish their missions. In this section we examine the effect of damaging up to five highway bridges relative to force deployment. The effort and skill required to significantly interdict more than five structures makes such an attack highly unlikely; therefore, in cases where more than five bypass alternatives exist, the system is considered to be highly robust, and a detailed analysis is not required. Particular attention is placed on Fort Lewis, the installation most likely to deploy large forces by highway, but all sites in the region are considered.

(U) **Vulnerability Assessment.** The Seattle-Tacoma region is characterized by a robust highway network, supplemented by a dense network of local streets. Seattle and Tacoma are joined by I-5, and Washington Routes 167, 99, and 509 (figure 4). Furthermore, I-5 and Route 167 are multiple-lane divided highways. Therefore, damage to only one I-5 or Route 167 bridge would allow a detour to be set up using the remaining parallel bridge for two way traffic while repairs are in progress. Within the region, Everett, Renton, and Kent are all connected to Seattle by well over five roads. I-5 continues south from Tacoma, providing access to Fort Lewis, Camp Murray, and McChord AFB. Numerous local streets provide additional access to these installations, and also to MSO Puget Sound, and SEATAC International Airport.

(U) Most of these roads lack significant structures. Fort Lewis, McChord AFB, and Camp Murray are ***slightly*** more vulnerable than the other sites in the Seattle-Tacoma region in this regard, since their highway traffic must cross the Puyallup River to reach port facilities in Tacoma or Seattle. Therefore, antagonists could impede force deployment more by damaging five Puyallup River bridges than by damaging any other group of five roads within the Seattle-Tacoma region.

(U) Any single highway structure will be relatively vulnerable to attack. However, a near-simultaneous attack on five different highway structures would be a complex undertaking requiring a synchronized and coordinated effort by multiple antagonists. Furthermore, highway bridges are typically visible to the general public. Antagonists seeking to damage a highway bridge risk detection by passing motorists and/or pedestrians. While their risk may be moderate at one location, it becomes much more elevated as the number of locations, and subsequent opportunities for detection, increase. A coordinated attempt to sequentially destroy five highway bridges would be even riskier. Once the first bridge was destroyed, security awareness would increase, as would the risk of detection at other locations. Therefore, the likelihood of loss given attack for this "5-cut" scenario is only considered to be moderately probable.

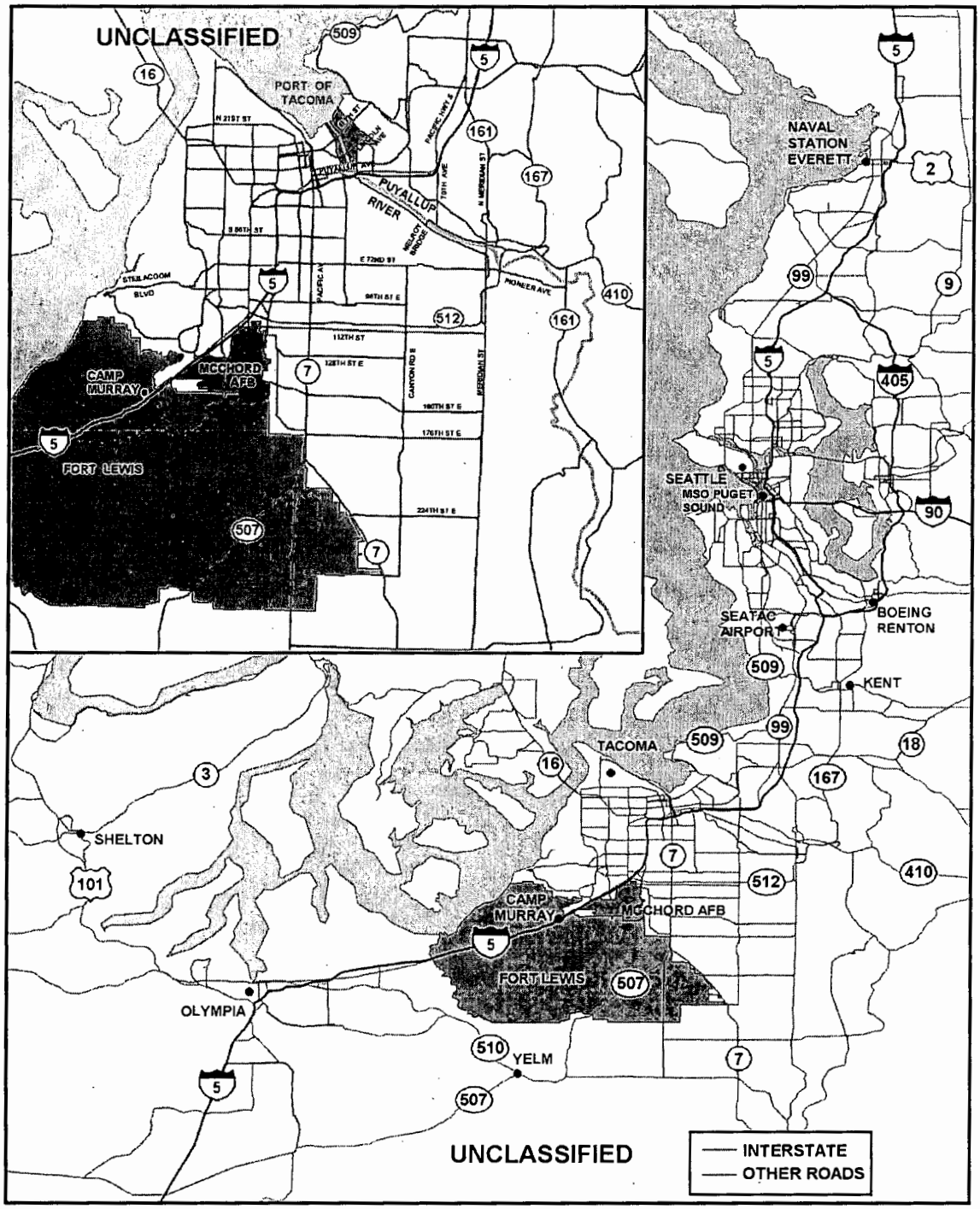


Figure 4. Seattle-Tacoma Region Highways (U)

(U) **Deployment Impact Assessment.** Empirical evidence suggests that damage to portions of a highway system will increase congestion on available bypass routes. However, congestion delays will rarely exceed several hours, and they are unlikely to be a serious threat to a unit's ability to meet its required TPFDD ALDs.

(U) Only if highway access were totally lost, would the deployment impact be significant. However, a five-cut scenario, even at Puyallup River crossings, would not significantly affect OPLAN execution. Table 9 shows seven reasonably direct Puyallup River crossings between Fort Lewis and Tacoma; other more circuitous detours are also possible. Therefore, the actual impact of loss on the OPLAN and TPFDD timelines is "not serious" due to the availability of alternate highway routes. (b)(2)

TABLE 9
PUYALLUP RIVER HIGHWAY BRIDGES (U)

UNCLASSIFIED	
Highway Route Number or Name	**Remarks**
11th Street (Route 509)	
Lincoln Avenue	
Puyallup Avenue	
I-5	Multi-lane bridge; all lanes unlikely to be closed if this bridge is damaged
Melroy Bridge	
Meridian Street	
Route 512	

(U) If some Puyallup River crossings were damaged, traffic congestion would certainly occur on the remaining intact bridges. However, congestion delays will rarely exceed several hours, and they are unlikely to be a serious threat to a unit's ability to meet its required TPFDD ALDs. In a recent example (September 1999), numerous highways in southeastern Virginia were temporarily closed due to flooding in the aftermath of Hurricane Floyd. Within this region, the cities of Newport News and Williamsburg are joined by three highways with 10 or more travel lanes. Due to the floods, only two to four lanes were open in several places. The resulting congestion-related delays only averaged about two hours. Even if Fort Lewis convoys experienced delays three times as lengthy (6 hours), they could still deploy on the correct day, and TPFDD ALDs would be met.

(U) **Commercial Impact Assessment.** Destruction of five highway structures in the Seattle-Tacoma area would certainly cause great inconvenience to civilian drivers. In addition, there would be economic loss to commerce and the expense of repairing the highways. Also, the destruction of the highways would probably produce injuries and/or casualties. Assuming that each incident produced up to four casualties, the resulting loss of human life could reach twenty. Therefore the overall commercial impact of this scenario is "catastrophic".

(U) **RED ZONE Rating.** Table 10 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for damage to highways within the Seattle-Tacoma area based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to five highways is "moderately probable". However, the actual impact of loss on the OPLAN and TPFDD timelines will be minimal due to the presence of numerous alternate highway routes. Therefore, the highway network falls in the deployment white zone on the summary chart as shown in table 10 and does not require remediation action. On the commercial side, the impact of loss could be catastrophic. Therefore, additional precautions by the civil sector may be warranted. (b)(2)

TABLE 10
SEATTLE-TACOMA AREA HIGHWAY ASSESSMENT SUMMARY* (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				11, 2	11, 20			
Improbable								

*Scores relate specifically to five highway cuts near Fort Lewis. Scores for other installations in the Seattle-Tacoma area would be no higher, and in many cases would be lower.

(U) Remediation Options. No remediation action is required by DOD. However, it is marginally within the Red Zone on the commercial side, so added security measures might provide further insurance against disruption.

2. Single Rail Line Cut in the Seattle-Tacoma Area (U)

(U) **General.** All military installations requiring rail service in the Seattle-Tacoma region have at least two rail access routes[9]. Therefore, a single incident would not cause a total loss of rail service. Of all the military installations in the Seattle-Tacoma region, only Fort Lewis requires rail access to support its deployment mission, and most of its units would deploy through Tacoma under either OPLAN or . Therefore, this analysis focuses primarily on the rail routes between Fort Lewis and Tacoma. Camp Murray and McChord AFB are adjacent to Fort Lewis (figure 5) and are served by the same commercial rail lines that serve Fort Lewis. DCMC Boeing, Seattle (in Renton) does not have a deployment mission and has two rail access routes; its access route to the south (Renton to Black River Junction) contains no significant structures. The Port of Seattle has multiple rail access alternatives and is addressed in more detail in a later section. The other installations in the Seattle-Tacoma region have no requirement for rail service. (b)(2)

[9] McChord AFB has no direct on-base rail service, but would use railheads on Fort Lewis, which has multiple rail access routes.

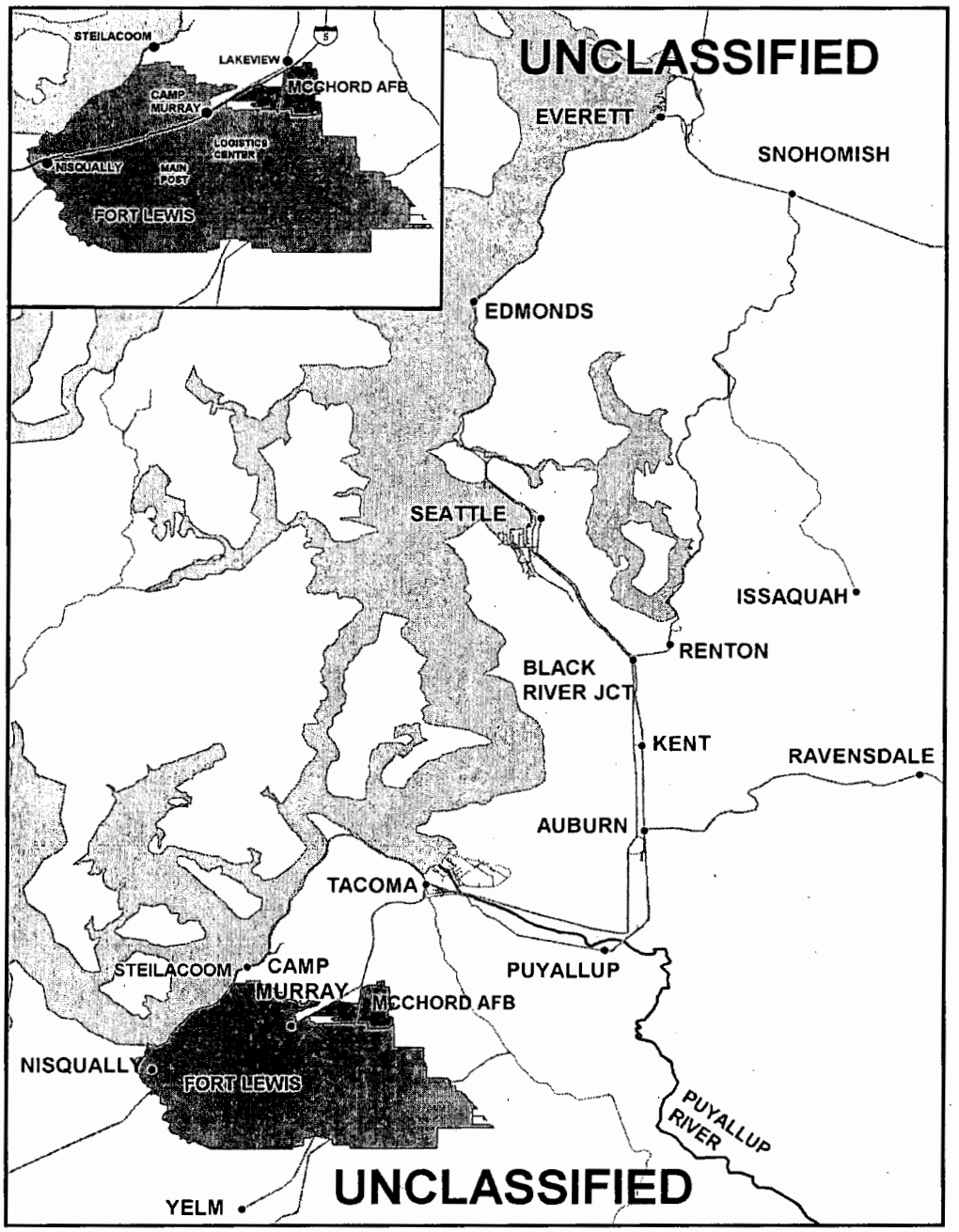


Figure 5. Railroads in the Seattle – Tacoma region (U)

(U) **Vulnerability Assessment.** Fort Lewis has two railheads, one on Main Post, and one in the Logistics Center. A rail line runs north from the Main Post to downtown Tacoma. This line also serves Camp Murray, but it contains no bridges over 100 feet long, making it relatively invulnerable to serious disruption. Other access to Main Post is available from Nisqually and points south. The alternate route from Fort Lewis to Tacoma via Nisqually and Steilacoom is only slightly longer than the direct route through Lakeview, but the line between Fort Lewis and Nisqually crosses I-5 on a pair of bridges that are both about 120 feet long.

(C)

(b)(1)

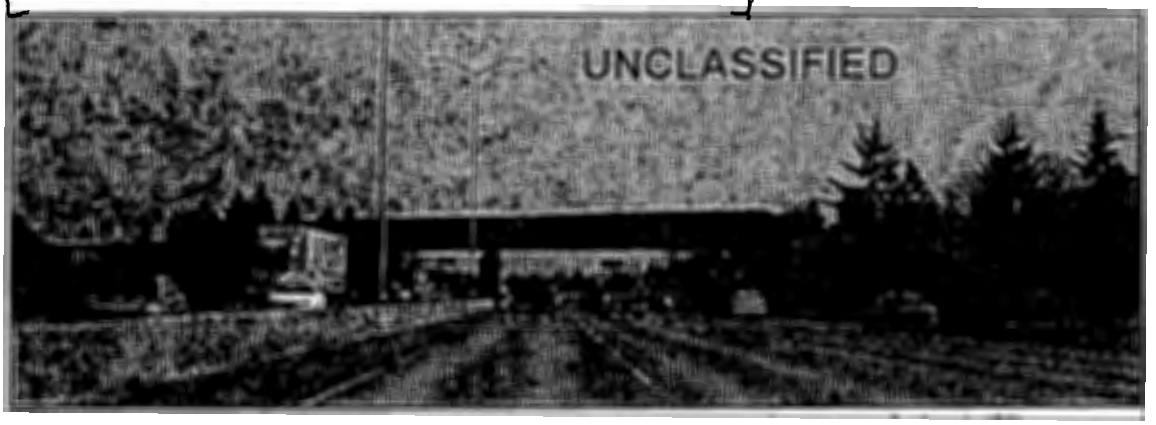


Figure 6. Railroad to Logistics Center at I-5 (northeastward view) (U)

(S)

(b)(1)

(C)

(b)(1)

[10] Fort Lewis units convoying to the port could detour around this section of I-5 and would not be seriously delayed by an incident that damaged a rail bridge over I-5.

TABLE 11
RAIL ROUTES BETWEEN FORT LEWIS AND TACOMA (U)

UNCLASSIFIED			
Via Lakeview		Via Nisqually	
Miles	Location	Miles	Location
0	Fort Lewis (Main Post)	0	Fort Lewis (Main Post)
8	Lakeview	4	Nisqually
11	South Tacoma	13	Steilacoom
17	Tacoma	29	Tacoma

(C)

(b)(1)

(U) Both the Fort Lewis branch to Nisqually *and* the BNSF Tacoma-Portland mainline also cross over I-5 near Nisqually (figures 7 and 8). The Fort Lewis-Nisqually line sees only light freight traffic. However, the Tacoma-Portland mainline sees over 40 MGT per year and is double tracked. If the mainline were cut, high priority trains to Tacoma and Seattle could detour over the single-track line through Fort Lewis; however, to minimize congestion, the railroad would probably have to delay or reroute low priority trains. The commercial impact rating of the destruction of any of these railroad bridges over I-5 is "very serious", primarily due to the resulting highway damage and risk of casualties to nearby motorists.

Figure 7. BNSF Fort Lewis branch at I-5 (southwestward view) (U)

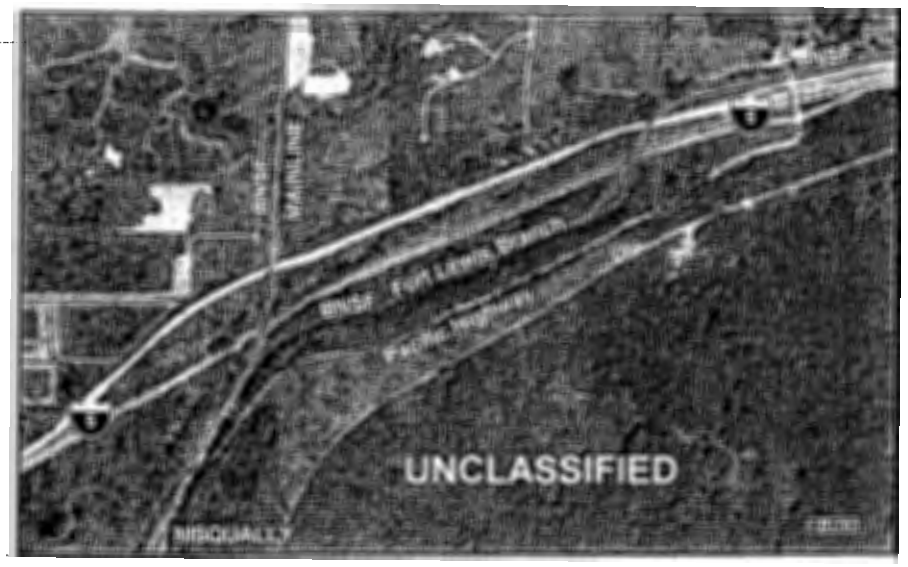


Figure 8. Railroads and highways near Nisqually (U)

(U) **RED ZONE Rating.** Table 12 summarizes the vulnerability, deployment impact, and the commercial impact scores for the Tacoma – Logistics Center line based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this segment are in Appendix A. Based on our findings, the likelihood of loss given attack for this link is "moderately probable," making it relatively invulnerable. However, the actual impact of loss on the OPLAN and TPFDD timelines can be mitigated by using the Fort Lewis Main Post railhead and/or deploying all equipment to the port by highway. Therefore, this location falls in the deployment white zone on the summary chart as shown in table 12 and does not require remediation action by military authorities. No other single rail line cut in the Seattle-Tacoma region results in a higher deployment impact, and at most locations the impact of a single cut would be even lower. On the commercial side, the impact of loss is considered "very serious". This, coupled with the low vulnerability score, places this location in the commercial Yellow Zone in table 12. (b)(2)

TABLE 12
LOGISTICS CENTER I-5 RAIL BRIDGE ASSESSMENT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss – Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				13, 2		13, 14		
Improbable								

(U) **Remediation Options.** Remediation actions are not a priority based on deployment or commercial needs. Also the primary threat, a car bomb attack, is not easily prevented.

3. Rail Line Cut Between Downtown Tacoma and the Port (U)

(U) **General.** As discussed in the previous section, damage at any one location on the Seattle-Tacoma regional rail network is unlikely to seriously impact deployment. We now examine several scenarios involving simultaneous damage to several rail lines. Most port facilities in Tacoma are across the Puyallup River from downtown Tacoma. However, one UP and two BNSF railroad bridges cross the Puyallup River near Tacoma. The Port of Tacoma would have reasonably direct rail access to downtown Tacoma (and thence Fort Lewis) unless at least three bridges longer than 300 feet were damaged. If all the Puyallup River rail crossings were damaged, trains from eastern origins could still reach Tacoma by traveling through Spokane, but direct access from Fort Lewis would be lost.

(U) **Vulnerability Assessment.** The bridges into the port area are in a populated area, so even an antagonist seeking to damage just one Puyallup River rail bridge would risk being observed. A near-simultaneous attack on three different bridges would be a far more complex undertaking requiring a synchronized and coordinated effort by multiple antagonists. A coordinated attempt to *sequentially* destroy three bridges would be even riskier for the antagonists. Once the first bridge was destroyed, security awareness would increase, as would the risk of detection at other locations. Therefore, *the likelihood of loss given attack* for this "3-cut" scenario is only considered to be *moderately probable.*

(U) **Deployment Impact Analysis.** If the three key Puyallup River railroad bridges were damaged, the Port of Tacoma would lose direct rail access from Fort Lewis and other points to the south. Trains from eastern origins could still reach Tacoma by traveling through Spokane, but a detour via Spokane or Yakima would be very circuitous for Fort Lewis units. The deployment impact of this scenario could be mitigated by having Fort Lewis units travel to Tacoma by highway. Even overweight items could go by highway to Tacoma in an emergency. Washington DOT officials have approved a highway route between Fort Lewis and Tacoma for HETs carrying M1 tanks under emergency conditions. A few Fort Lewis units may deploy through Oakland, Charleston, or some other distant port. These units could head south from Fort Lewis and travel through Portland to reach their designated port; they would not need to cross the Puyallup River. The overall deployment impact of loss of three Puyallup River railroad bridges would be "*moderately serious*".

(U) Military trains would normally switch off the BNSF mainline near the Tacoma Amtrak station and take a BNSF branch line into the Port of Tacoma. This BNSF branchline includes a 350-foot bridge over the Puyallup River (figure 9). If the BNSF branchline bridge were damaged, trains could follow the UP mainline over its Puyallup River bridge and reach the port from the UP yard on the north side of the Puyallup River. The BNSF Tacoma-Seattle mainline crosses the Puyallup River further east than the BNSF port branch line. If both the UP bridge and the BNSF branchline bridge were damaged, trains could follow the BNSF mainline to the Seattle area, and then use the UP mainline to reach the Port of Tacoma from the north. The distance between Fort Lewis and the Port of Tacoma via a Seattle-area detour is less than 100 miles. Thus, damage to

less than three Puyallup River bridges would not sever all reasonably direct rail access from Fort Lewis, and would have no significant effect on OPLAN execution.

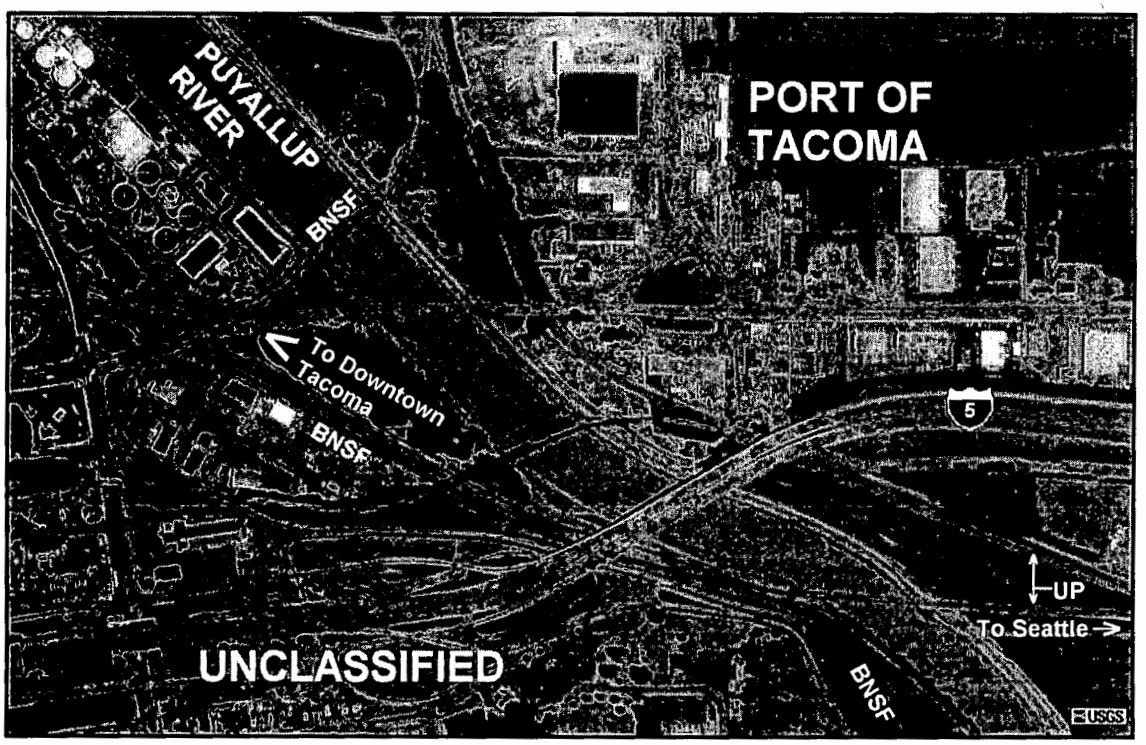


Figure 9. Rail access to Port of Tacoma (U)

(U) **Commercial Impact Assessment.** The commercial impact of loss of Puyallup River railroad bridges would probably be "*very serious*" and in an unlikely worst-case scenario, could be "*catastrophic*". The loss of the Puyallup River railroad bridges would cut the main north-south rail route along the West Coast, thereby severing southern rail access to the Port of Tacoma. The Seattle-Tacoma-Portland mainline sees over 40 MGT of freight traffic and several daily passenger trains. Therefore, this scenario would cause significant train delays and/or cancellations. Trains from Seattle to the south could be rerouted through Yakima, but this would be a circuitous detour, and furthermore, the Seattle-Yakima line has less capacity than the Seattle-Tacoma-Portland mainline, so congestion would be likely. If a Puyallup River bridge were damaged with a passenger train en route, over 50 lives could be lost. A similar incident involving a freight train would only result in two fatalities. The most likely scenario is that damage to the bridges would be discovered before a train arrived, and if a train did arrive and derail, it would probably be a freight train (most of the trains on the Seattle-Tacoma-Portland line are freight trains). Assuming a low human loss, the purely economic effects of this scenario would create a "*very serious*" commercial impact.

(U) **RED ZONE Rating.** Table 13 summarizes the vulnerability, deployment impact, and the commercial impact scores for the loss of the Puyallup River railroad bridges based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this segment are in

Appendix A. Based on our findings, the likelihood of loss given attack for this scenario is "moderately probable," making these three bridges relatively invulnerable. However, the actual impact of loss on the OPLAN and TPFDD timelines would only be "*moderately serious*" since the effects can be mitigated by convoying Fort Lewis equipment to the Port of Tacoma by highway, and by using rail detour routes for other origin-port pairs. Therefore, this location falls in the deployment yellow zone on the summary chart as shown in table 13 and does not require remediation action by military authorities. On the commercial side, the impact of loss is considered "very serious". This, coupled with the low vulnerability score, places this location in the commercial Yellow Zone in table 13. (b)(2)

TABLE 13
LOCAL PORT OF TACOMA RAIL ACCESS ASSESSMENT SUMMARY (U)
CONFIDENTIAL

(b)(1)

(U) Remediation Options. None required.

4. Total Loss of Fort Lewis Local Rail Access (U)

(S)

(b)(1)

(U) **Vulnerability Assessment.** The rail line from the Fort Lewis Main Post to downtown Tacoma contains no bridges over 100 feet long, making it relatively invulnerable to serious disruption. Therefore, for Fort Lewis to lose local rail service entirely, three Puyallup River rail bridges would have to be damaged, as well as the Nisqually River Bridge (figure 10) or some other rail bridge between Fort Lewis and Portland. Thus, this scenario requires a near-simultaneous attack on four different bridges and would be even more challenging for antagonists than isolating Fort Lewis from the Port of Tacoma, as discussed in the previous section. Therefore, *the likelihood of loss given attack* for this "4-cut" scenario is considered to be "*improbable*".

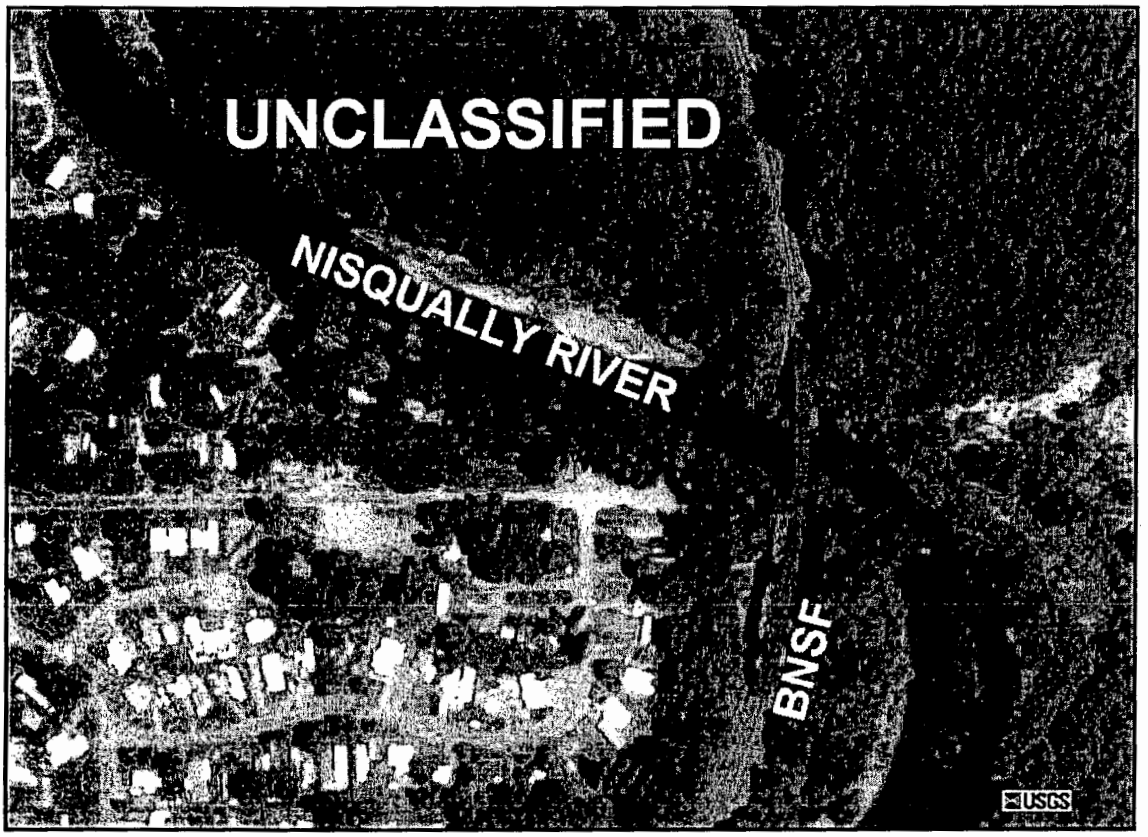


Figure 10. Nisqually River (U)

(S)

(b)(1)

(U) Fort Lewis could mitigate a loss of rail service by transporting its overweight equipment to the Port of Tacoma by highway. In response to a request by the Highways for National Defense Program (HND), Washington State transportation officials have approved a highway route for emergency use of the M1/M1000/M1070 combination from Fort Lewis to the Port of Tacoma. Thus, all Fort Lewis equipment that is shipped through Tacoma can deploy on schedule even if rail service is lost. This is one example of a remediation action that has already been taken, and it illustrates the synergy between the CIP and the Highways for National Defense program that is realized through TRI-CAV study findings and recommendations.

(U) Fort Lewis units bound for distant ports could convoy to Yakima Firing Center, the Port of Tacoma, or some other nearby off-post railhead to be loaded on trains for the rest of the journey to Charleston or other distant ports. Use of an alternate railhead would be somewhat burdensome for the deploying units, but it should enable all units to arrive at the port on schedule.

(S)

(b)(1)

(U) **Commercial Impact Assessment.** The commercial impact of loss of rail access to Fort Lewis would be about the same as the commercial impact of the loss of the Puyallup River railroad bridges, as discussed in the previous section. Both of these scenarios include disruptions to the high traffic north-south rail line along the West Coast. Therefore, the commercial impact would probably be "very serious" and in an unlikely worst-case scenario, could be "catastrophic", if a passenger train was wrecked.

(U)

(b)(2)

TABLE 14
FORT LEWIS LOCAL RAIL ACCESS ASSESSMENT SUMMARY (U)

CONFIDENTIAL

(b)(1)

(U) **Remediation Options.** None required.

5. Total Loss of Rail Access to The Seattle-Tacoma Region (U)

(U) **General.** Under this scenario, all rail access to Fort Lewis and the rest of the Seattle-Tacoma region would be cut. Local rail service within the region might still be possible, but the entire region would be disconnected from the rest of the nation's rail network.

(C)

(b)(1)

(U) **Deployment Impact.** Loss of regional rail access would not prevent Fort Lewis units from deploying through Tacoma by highway. Furthermore, it would still be possible for Fort Lewis units to convoy to Yakima Firing Center and proceed by train from Yakima to Charleston, Oakland, or any other distant port.

(S)

(b)(1)

(S)

(b)(1)

(U) First, the military typically has agreements with civil port authorities to use a certain amount of a commercial port during a contingency, while the rest remains in normal commercial use. These agreements between the military and commercial ports are called port planning orders (PPOs). It would be physically possible to divert all military traffic scheduled for Seattle and Tacoma into another port (possibly Oakland), but the military could not be limited by the port planning orders, and commercial activity might have to be greatly curtailed or even entirely eliminated at the alternate ports. In such a case, expanded PPOs might be acceptable remediation options to complement the mitigation activity of diverting to an alternate port. The restriction on such PPOs would likely be tied to specific events that deny access to planned destination ports.

(U) Another concern when using alternate ports is the effect on ship cycle times. Changing from one port to another on the same coast does not alter the overall distance significantly, but diverting to a port on a different coast can drastically affect ship travel distance and time. As an example, ships travelling to Pusan at 20 knots would require 11 days to complete the trip from either Seattle, Tacoma, or Oakland, and 12 days from San Diego. However, vessels departing from either Jacksonville or a Gulf Coast port would experience a transit time to Pusan of 22 days. Table 15 lists the distances between several CONUS and OCONUS ports. These distances are based on the Panama Canal being open. With the Panama Canal closed, these distances and times would increase significantly for ships departing from Gulf and East Coast ports and heading to Asia.

TABLE 15
PORT TO PORT DISTANCES (U)

UNCLASSIFIED

	Distances to Foreign Ports in Nautical Miles (NM) and Miles (a)								
	Kuwait			Korea (Pusan)			Spain (Rota)		
American Ports	NM	Miles	Days (b)	NM	Miles	Days (b)	NM	Miles	Days (b)
West Coast									
Seattle	10,976	12,631	23	4,919	5,661	11	8,352	9,611	18
Oakland	11,258	12,955	24	5,201	5,985	11	7,577	8,719	16
San Diego	11,645	13,400	25	5,512	6,343	12	7,175	8,257	15
Gulf Coast									
Beaumont	9,903	11,396	21	10,492	12,074	22	4,772	5,491	10
Mobile	9,676	11,135	21	10,284	11,834	22	4,475	5,150	10
East Coast									
Jacksonville	8,921	10,266	19	10,430	12,002	22	3,740	4,304	8
Norfolk	8,520	9,804	18	10,693	12,305	23	3,339	3,842	7

a. Distances are from the ***Logistics Handbook for Strategic Mobility Planning*** [11].
b. Travel time in days at an average speed of 20 knots.

[11] ***Logistics Handbook for Strategic Mobility Planning,*** MTMCTEA Reference 97-700-2, Newport News, VA, August 1997.

(U) It might also be possible to mitigate the loss of American rail access to Tacoma and Seattle by detouring trains through Canada. Under best-case conditions, this action could be almost seamless, with military trains arriving on time, or only a couple days late[12]. However, there is no guarantee that American military trains would be permitted to operate through Canada, and it is also possible that antagonists would cut the rail line between Seattle and Canada as well as its American rail access.

(U) **Commercial Impact Assessment.** The commercial impact of loss of all rail access to the Seattle-Tacoma region would probably be "*very serious,*" and in an unlikely worst-case scenario, it could be "*catastrophic*". It would cut the main north-south rail route along the West Coast while severing east-west rail access to Tacoma and Seattle as well. The Seattle-Tacoma-Portland mainline sees over 40 MGT of freight traffic and several daily passenger trains. Therefore, this scenario would cause significant train delays and/or cancellations. If a bridge were damaged with a passenger train en route, over 50 lives could be lost. A similar incident involving a freight train would only result in two fatalities. The most likely scenario is that damage to the bridges would be discovered before a train arrived, and if a train did arrive and derail, it would probably be a freight train (most of the trains on lines serving the Seattle-Tacoma region are freight trains). Assuming a low human loss, the purely economic effects of this scenario would create a "*very serious*" commercial impact, but this could be far worse if a passenger train were involved.

(C)

(b)(1)

[12] From Fort Bliss a detour through Canada would add about 800 miles (less than 2 days travel-time) to the distance to Tacoma. From more northerly origins the added distance and travel time would be even less.

TABLE 16
SEATTLE-TACOMA REGIONAL RAIL ACCESS ASSESSMENT SUMMARY (U)

CONFIDENTIAL

(b)(1)

(U) **Remediation Options.** Remediation action is not needed on the deployment side. On the civil side, the length of the lines and number of vulnerable locations indicate that significantly reducing the vulnerability would be very resource intensive. Since service interruptions on all three lines to the Seattle-Tacoma region are not likely, it might be more cost-effective for the commercial sector to accept a certain level of risk to these lines. Alternatively, security might be increased at locations that would be especially costly to repair.

6. Port of Seattle Rail Access Disruption (U)

(U) General. The Port of Seattle consists of several port terminals. Under this scenario, rail access to all terminals within the Port of Seattle is cut locally, but the entire Seattle region is not isolated. Thus, under this scenario, some locations in Seattle would have rail service, but the Port of Seattle would not.

(U) Vulnerability Assessment. It would be even more difficult for antagonists to cut local rail access to the Port of Seattle than to cut all rail access to the entire Seattle-Tacoma region. There are no bridges over 100 feet long between Black River Junction and the Port of Seattle[13]. Moreover, four rail lines[14] provide local rail access to the Port of Seattle. The four rail lines serving Seattle (figure 11) pass through populated areas, increasing the likelihood that suspicious activity would be noticed and reported, especially since antagonists would have to strike four sites nearly simultaneously.

[13] Some port terminals are accessed by single bridges, but the entire port has no single point of rail access. If only an individual terminal lost rail access, military shipments could be directed to other, fully functional, terminals in the Port of Seattle.

[14] The four lines are: Seattle-Everett, Black River Junction-Bellevue, and two parallel Seattle-Auburn-Tacoma lines.

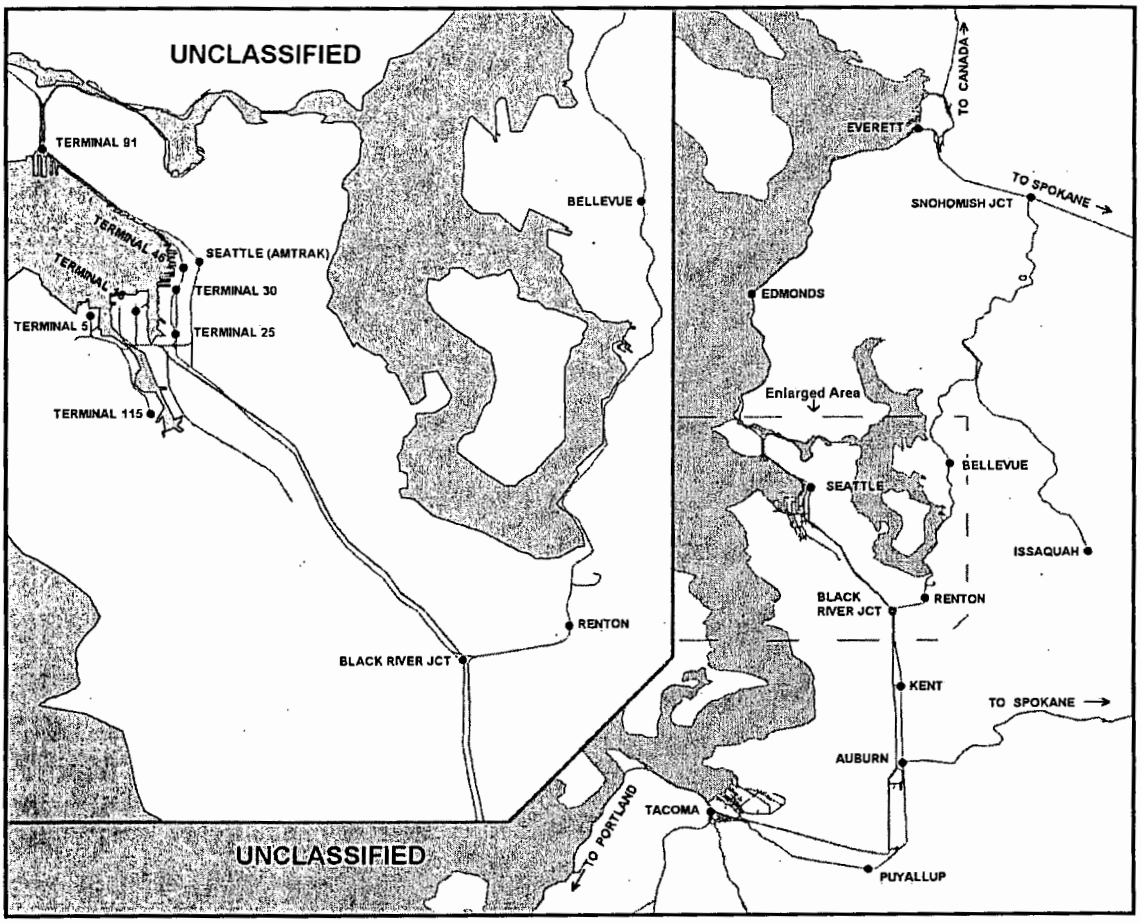


Figure 11 Seattle rail access (U)

(S)

(b)(1)

(C)

(b)(1)

(U) **RED ZONE Rating.** Table 17 summarizes the vulnerability, deployment impact, and commercial impact scores resulting from the loss of rail access to Seattle based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss of local rail access to the Port of Seattle is "*improbable*". The deployment impact of loss on the OPLAN and TPFDD timelines will be "moderately serious" due to the possibility of using alternate ports. Therefore, this location falls in the deployment white zone on the summary chart as shown in table 17. On the commercial side, the impact of loss is considered moderately serious; therefore, the loss of rail access to the Port of Seattle would also fall in the commercial white zone. (b)(2)

TABLE 17
SEATTLE RAIL ACCESS ASSESSMENT SUMMARY (U)

CONFIDENTIAL

(b)(1)

(U) **Remediation Options.** None required.

7. Rail Signal System or Dispatching Center Damaged (U)

(U) **General.** Antagonists might affect rail traffic without damaging major structures if they damaged railroad dispatching centers or signal systems. This would certainly reduce capacity and slow rail traffic, but it would not make it physically impossible for military units to deploy. Military trains receiving priority from the railroads could depart on schedule, and any unit train that is delayed is unlikely to be more than one or two days late. Table 132[15] in the USDOT report, reproduced here as table 18, provides a good summary of railroad signal systems and potential disruptions. As shown in table 18, numerous dispatching and signaling failures are possible, but none are likely to result in a total loss of rail service, and priority trains will still operate. Also, repair times for most of these incidents are likely to be much shorter than 2 weeks. In the specific example discussed herein, we take a look at the BNSF Network Operations Center at Fort Worth, TX; however, this example is typical of virtually any dispatching center and/or signal system. BNSF owns most of the rail lines in Washington, and if its dispatching center

[15] *Surface Transportation Vulnerability Assessment* -Final Report ,Research and Special Programs Administration and Office of Intelligence and Security, Office of the Secretary, U.S. Department of Transportation, Washington, DC, November, 1998

was damaged, trains to NSB Bangor, Bremerton, and Yakima would be affected, as would trains to Fort Lewis, Tacoma, and Seattle.

(U) **Vulnerability Assessment.** In an effort to address a worst-case scenario, we assume that antagonists are seeking to damage all, or a substantial portion of, BNSF's dispatching or signaling systems. While individual signals are clearly more vulnerable, the loss of an individual signal has minimal impact on overall system performance. Most of the BNSF rail dispatching operations are performed at the BNSF Network Operations Center (NOC) at Fort Worth, TX. Railroad dispatching centers such as this are typically built with redundancies, back-up systems, and enough physical strength to protect against disasters - natural or manmade, and this is no exception. The BNSF NOC employs moderate security measures and would require significant effort and skills to interdict, making it significantly less vulnerable than a remote bridge structure. Therefore, the likelihood of losing the BNSF Network Operations Center, given attack, is considered to be only "*moderately probable*".

TABLE 18
SIGNALING/CONTROL SYSTEM THREAT CONSEQUENCE SUMMARY (U)

UNCLASSIFIED – FOR OFFICIAL USE ONLY

(b)(1)

TABLE 18 (continued)

UNCLASSIFIED – FOR OFFICIAL USE ONLY

(b)(1)

TABLE 18 (continued)

UNCLASSIFIED – FOR OFFICIAL USE ONLY

(b)(1)

(U) **Deployment Impact Assessment.** BNSF operates most of the rail lines in Washington, so degraded BNSF operations would affect shipments to NSB Bangor, Bremerton, and Yakima, as well as Fort Lewis, Tacoma, and Seattle. However, these effects could be mitigated by giving military trains priority and operating them primarily over other railroads (mostly UP). Therefore, the deployment impact of damage to the BNSF Network Operations Center is "*not serious* ".

(U)

(b)(2)

(U)

(b)(2)

7(b)(2)

(S)

(b)(1)

(U) Historically, dispatching shut downs have occurred. However, the duration of these shut downs has varied from a few hours, in the case of communications glitches, to a few days due to hurricane damage. Nonetheless, the railroads typically deliver priority trains to their destinations with delays of only several hours. Rarely will a disruption to a signal center delay priority trains by a day or more. Therefore, military trains receiving priority during such an incident will not encounter serious delays, and all units are likely to reach ports by the scheduled ALD.

[16] 22 mph is a standard planning figure for military unit train speed. ***Logistics Handbook for Strategic Mobility Planning,*** MTMCTEA Reference 97-700-2, Newport News, VA, August 1997..

TABLE 19
FORT LEWIS - CHARLESTON RAIL TRAVEL TIME (U)

UNCLASSIFIED

Location	Miles	RR	Normal Deployment Elapsed Time (a)				Elapsed Time with No Signals on BNSF (b)			
			Days	Day	Hour	Min	Days	Day	Hour	Min
Lv Fort Lewis	0	BNSF	0.00	0	0	0	0.00	0	0	0
Centralia	33	BNSF	0.06	0	1	30	0.06	0	1	22
Ar Portland	118	BNSF	0.22	0	5	21	0.49	0	11	46
Lv Portland	118	UP	0.22	0	5	22	0.53	0	12	46
Nampa	591	UP	1.12	1	2	52	1.43	1	10	16
Cheyenne	1384	UP	2.62	2	14	55	2.93	2	22	19
North Platte	1609	UP	3.05	3	1	7	3.35	3	8	31
Kansas City	2009	UP	3.80	3	19	19	4.11	4	2	43
St. Louis	2288	UP	4.33	4	7	60	4.64	4	15	24
Evansville	2490	CSXT	4.72	4	17	11	5.02	5	0	35
Nashville	2649	CSXT	5.02	5	0	25	5.33	5	7	48
Atlanta	2934	CSXT	5.56	5	13	22	5.86	5	20	46
Augusta	3105	CSXT	5.88	5	21	8	6.19	6	4	32
Ar Charleston	**3258**	**CSXT**	**6.17**	**6**	**4**	**5**	**6.48**	**6**	**11**	**29**

a. Based on overall average speed of 22 mph.
b. Based on 10 mph speed over BNSF to Portland, 1 hour added at Portland to account for additional unforeseen delays, and normal 22 mph operation over UP and CSXT between Portland and Charleston.

(C)

(b)(1)

(U) **RED ZONE Rating.** Table 20 summarizes the vulnerability, deployment impact, and the commercial impact scores for the BNSF dispatching center based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on these findings, the likelihood of loss given attack for this link is "moderate". However, the actual impact of loss on the OPLAN and TPFDD timelines will be minimal, provided military trains receive priority. Therefore, this location falls in the white zone on the deployment summary and does not require military remediation action. On the commercial side, the impact of loss could be catastrophic, but the likelihood of loss given attack is only moderately probable. That puts this just inside the red zone, and although the dispatch center is already protected, additional precautions by the commercial sector may be warranted.

(b)(2)

TABLE 20
DISPATCHING/SIGNAL SYSTEM ASSESSMENT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss – Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				12, 2	12, 20			
Improbable								

(U) **Remediation Options.** The railroad dispatching/signal system does not require remediation action by DOD. On the commercial side, although dispatching centers are already very robust, additional protection from car bombs may be warranted.

D. KITSAP COUNTY ANALYSIS (U)

1. Multiple Highway Disruptions (U)

(U) **General.** Kitsap County is on the west side of Puget Sound and includes Naval Submarine Base (NSB) Bangor, Naval Fuel Depot (NFD) Port Orchard, Puget Sound Naval Ship Yard, Naval Station Bremerton, and various tenant activities. All military installations in Kitsap County require highway access to accomplish their missions. In this section we examine the effect of damage to multiple highway bridges on deployment.

(U) **Vulnerability Assessment.** Four highway routes provide access to Kitsap County (figure 12). Route 16 connects Kitsap County with Tacoma. Route 104 connects Kitsap County with the Olympic Peninsula. Route 3 connects Kitsap County with southern Washington via Shelton. Routes 106 and 302 provide an alternate route to the Shelton area. In addition, ferries cross Puget Sound from Bremerton to Seattle; and from Kingston to Edmonds and a few other crossing points. Routes 16 and 104 both contain major structures across the Tacoma Narrows and Hood Canal, respectively. However, Routes 3, 106, and 302 do not contain major structures, and are therefore relatively invulnerable to extended interdiction. Furthermore, local roads provide additional route alternatives at most locations between Bremerton and Shelton.

(U) Any single highway structure will be relatively vulnerable to attack. However, a near-simultaneous attack on four different highway structures would be a complex undertaking requiring a synchronized and coordinated effort by multiple antagonists. Furthermore, highway bridges are typically visible to the general public. Antagonists seeking to damage a highway bridge risk detection by passing motorists and/or pedestrians. While their risk may be moderate at one location, it becomes much more elevated as the number of locations, and subsequent opportunities for detection, increase. A coordinated attempt to sequentially destroy four highway bridges would be even riskier. Once the first bridge

was destroyed, security awareness would increase, as would the risk of detection at other locations. Furthermore, the two highway routes connecting Kitsap County with Shelton lack major structures, making them difficult to damage. Therefore, the likelihood of loss given attack for this "4-cut" scenario is only considered to be "*moderately probable*". Even if antagonists damaged *five major highway structures* in and around Kitsap County, at least one highway route between Bremerton and Shelton would remain passable.

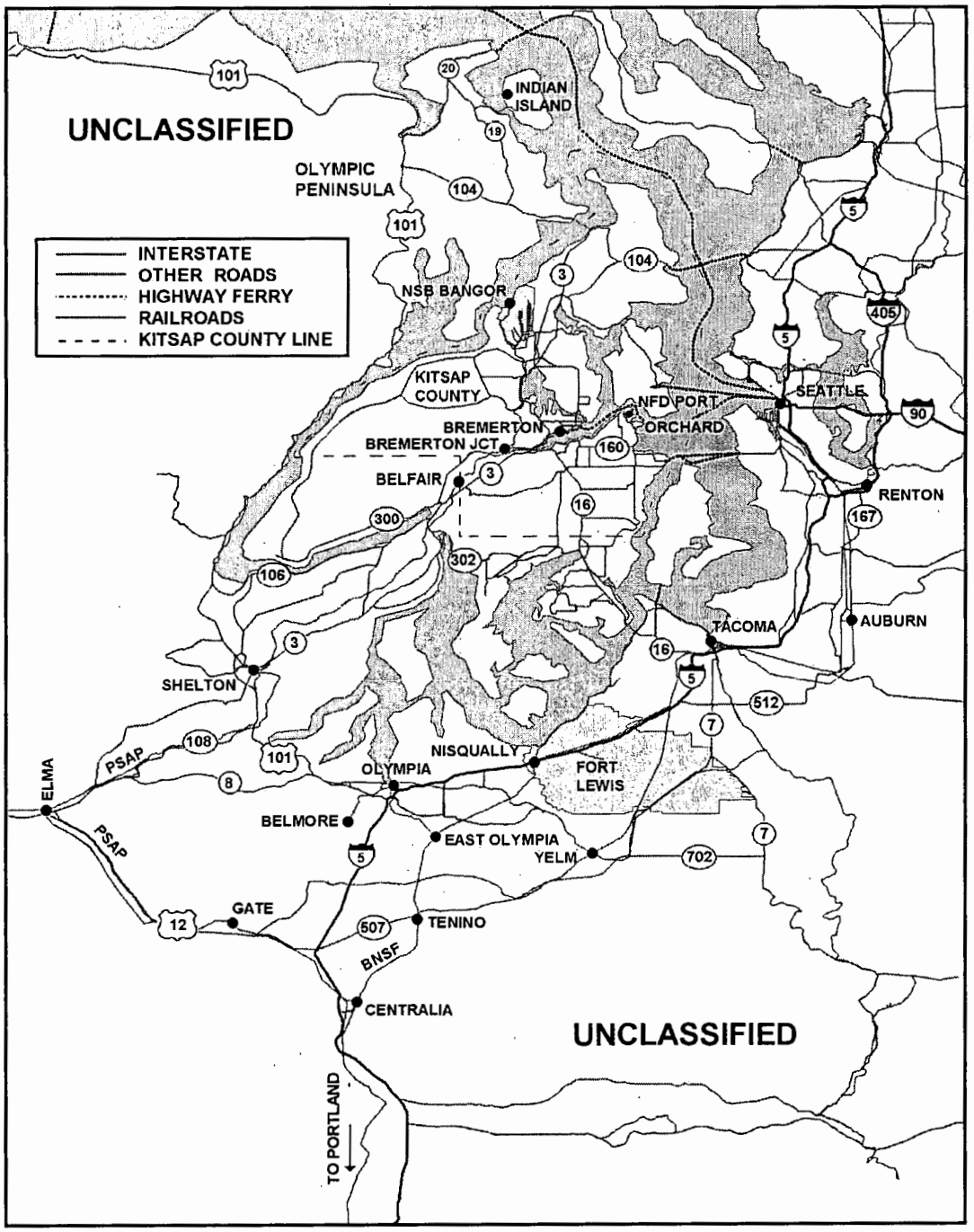


Figure 12. Kitsap County (U)

(C)

(C)

(b)(1)

(b)(1)

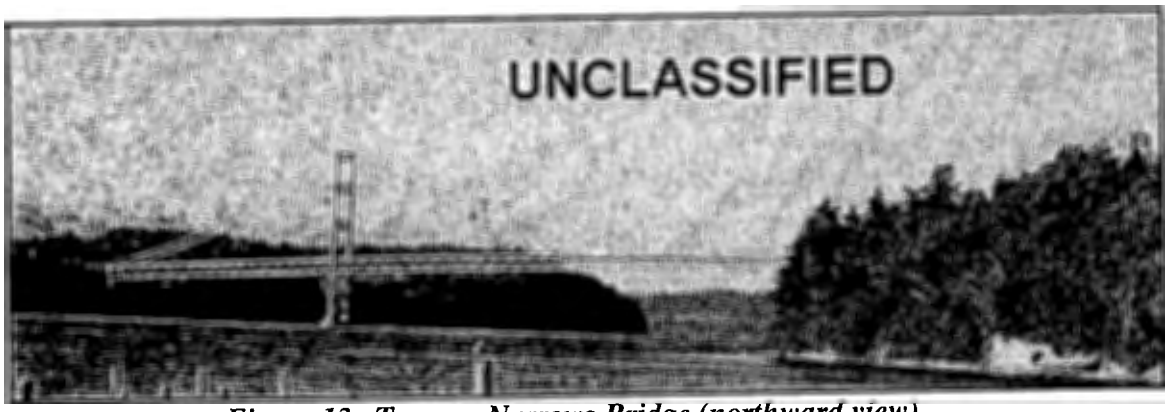


Figure 13. Tacoma Narrows Bridge (northward view)

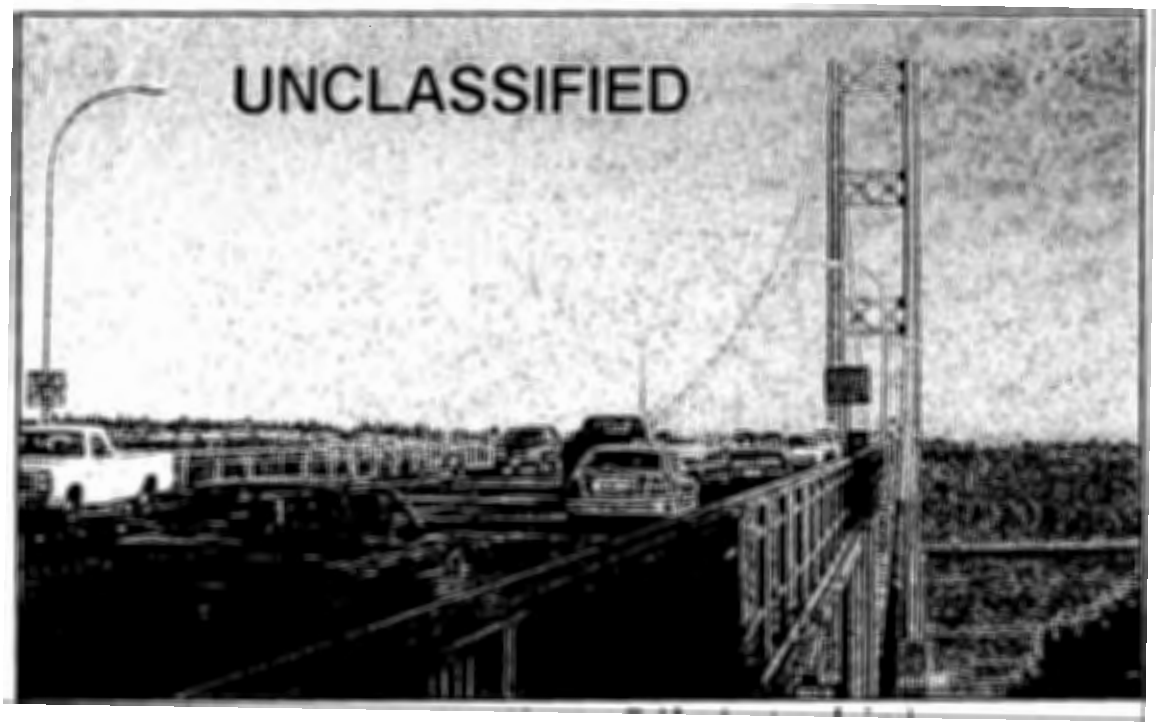


Figure 14. Tacoma Narrows Bridge (eastward view)

(U) **Commercial Impact Assessment.** Loss of four highway structures in the Kitsap County area would certainly cause great inconvenience to civilian drivers. In addition, there would be economic loss to commerce and the expense of repairing the highways. The four-lane Tacoma Narrows Bridge carries much of the traffic heading to Kitsap County. Destruction of the mile-long Tacoma Narrows Bridge[17] would likely cause over 50 casualties. Additional casualties would be likely at other sites of highway damage. The Tacoma-Narrows Bridge (Route 16) and the Hood Canal Bridge (Route 104) would be especially costly to replace, and would likely take over a year to rebuild. Therefore the overall commercial impact of this scenario would be "*catastrophic*".

(U) **RED ZONE Rating.** Table 21 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for damage to highways in the Kitsap County area based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to four highways is "moderately probable". However, the actual impact of loss on the OPLAN 1003 and 5027 TPFDD timelines for units in Kitsap County will be minimal since the effects can be mitigated by highway detours or using highway ferries to cross Puget Sound. Therefore, the highway network falls in the deployment white zone on the summary chart as shown in table 21. On the commercial side, the impact of loss could be catastrophic. Therefore, additional precautions by the civil sector may be warranted.

[17] The original Tacoma Narrows Bridge collapsed in a windstorm in 1940, shortly after it was built. This collapse is one of the most famous bridge disasters. The opportunity to "copy Mother Nature" and generate a huge amount of publicity might motivate terrorists to target the current Tacoma Narrows Bridge.

TABLE 21
KITSAP COUNTY HIGHWAY ASSESSMENT SUMMARY* (U)

UNCLASSIFIED								
	Impact of Loss – Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				11, 2*	11, 20			
Improbable								

*This deployment impact score only reflects the impact on Kitsap County military installations.

(U) Remediation Options. No remediation action is required by Kitsap County military installations. However, this scenario falls within the Red Zone on the commercial side, so added security measures, especially at the Tacoma Narrows Bridge and Hood Canal Bridge, are warranted. Military support for security on the Hood Canal Bridge may be justified by ammunition deployment from Indian Island on the Olympic Peninsula. The military effects of losing the Tacoma Narrows Bridge would be minor in comparison to the effects on the civil sector, so DOD may not be able to justify contributions directed to improved Tacoma Narrows Bridge security measures.

2. Disruption to Kitsap County Rail Service (U)

(U) **General.** All rail access for Kitsap County is provided by a 100-mile rail line from Centralia to NSB Bangor, and a 5-mile branchline runs from this line to Bremerton. NFD Port Orchard does not have, or require, rail service. Puget Sound Naval Ship Yard and Naval Station Bremerton require occasional rail service for their peacetime missions, but they would not need to deploy units or supplies by rail in wartime. However, NSB Bangor serves as the railhead for Indian Island, a key ammunition port in the Pacific Northwest. Therefore, NSB Bangor requires rail service to support the wartime deployment of ammunition. The main focus of our analysis will be on NSB Bangor, which is the only Kitsap County installation with a rail deployment mission. If NSB Bangor lost rail service, Puget Sound Naval Shipyard and Naval Station Bremerton would probably lose service as well.

(C)

(b)(1)

(C)

(b)(1)

TABLE 22
BANGOR - CENTRALIA RAILROAD LINE (U)

CONFIDENTIAL

(b)(1)

(U) Centralia is on the BNSF Portland-Tacoma mainline, but even if the Centralia-Bangor line is open, NSB Bangor is at risk of losing rail service due to simultaneous disruptions on the main line north and south of Centralia. At Nisqually, 29 miles north of Centralia, two rail lines diverge to Tacoma and points north and east. And, at Vancouver, Washington, 82 miles south of Centralia, two rail lines diverge to points south and east (figure 2). However, NSB Bangor would still be at some risk for losing rail access if simultaneous cuts were made between Centralia and Nisqually and Centralia and Vancouver. Since Centralia is closer to Nisqually, fewer resources are needed to improve security there than on the line south of Centralia. Table 23 lists the bridges between Centralia and Nisqually that are candidates for improved security. All are unprotected, and many are easily accessible and somewhat remote, making the main line through Centralia highly vulnerable to disruption. However, antagonists would require more resources and coordination to make two cuts on the Portland- Tacoma main line than they would to make a single cut on the Bangor - Centralia branch line.

TABLE 23
CENTRALIA - NISQUALLY RAILROAD LINE (U)

CONFIDENTIAL

(b)(1)

(S)

(S)

(C)

(U) Puget Sound Naval Ship Yard, Naval Station Bremerton, and some of their tenant activities require rail service for peacetime operations. However, they would not need to deploy any time critical items by rail in wartime.

(U) **Commercial Impact Assessment.** Most of the Bangor - Centralia line is also needed to access Bremerton. Naval Station Bremerton and its tenants do not have any time-critical rail requirements, but a temporary loss of rail access may increase their transport costs and cause operating inefficiencies. The Bangor - Centralia line also serves some commercial customers, but overall, it sees less than 5 MGT of freight traffic per year. This line has no scheduled passenger service, so if a bridge is damaged, deaths are unlikely, except for the crew (usually two people) of any train that happens to be on a bridge when it is damaged. Therefore, the overall commercial impact of damage to the Bangor - Centralia rail line is "*not serious*". However, the impact upon the shortline PSAP railroad company would be very severe; the PSAP might require assistance to resume operations.

(S)

(b)(1)

TABLE 24
BANGOR - CENTRALIA RAIL LINE DAMAGE SUMMARY (U)

CONFIDENTIAL

(C)

(C)

(b)(1)(9)

TABLE 25
PROTECTION AND VULNERABILITY OF BANGOR RAIL ACCESS (U)

CONFIDENTIAL

(b)(1)

TABLE 26
NSB BANGOR RAIL ACCESS REMEDIATION SUMMARY (U)

SECRET

(b)(1)

E. OLYMPIC PENINSULA ANALYSIS (U)

1. Highway Isolation of the Olympic Peninsula (U)

(U) **General.** The Olympic Peninsula is in the northwest corner of Washington. It includes Indian Island, site of the Naval Weapons Station (NWS) Seal Beach Detachment Port Hadlock. In this transportation analysis we use the term Indian Island to refer to the island and to NWS Seal Beach Detachment Port Hadlock. The town of Port Angeles is on the north shore of the Olympic Peninsula.

(U) **Vulnerability Assessment.** Three main highways connect the Olympic Peninsula (figure 15) with the rest of the country. US 101 runs down the west side of the Olympic Peninsula to Aberdeen where it connects with US 12. US 101 also runs down the east side of the Olympic Peninsula to Olympia where it connects with I-5. Route 104 provides direct access between the Olympic Peninsula and Kitsap County. Route 104 crosses the Hood Canal on a 1-1/2 mile bridge. However, the other two routes do not contain major structures. Also, in many locations, local roads provide additional detour options.

(U) Any single highway structure will be relatively vulnerable to attack. However, a near-simultaneous attack on three different highway structures would be a more complex undertaking requiring a synchronized and coordinated effort by multiple antagonists. Furthermore, highway bridges are typically visible to the general public. Antagonists seeking to damage a highway bridge risk detection by passing motorists and/or pedestrians. While the detection risk may be moderate at one location, it becomes much more elevated as the number of locations, and subsequent opportunities for detection, increase. A coordinated attempt to sequentially destroy three highway bridges would be even riskier. Once the first bridge was destroyed, security awareness would increase, as would the risk of detection at other locations. Furthermore, since the two highway routes connecting the Olympic Peninsula with Aberdeen and Olympia do not contain major structures, they would be difficult to cut. Therefore, the likelihood of loss given attack for

this "3-cut" scenario is only considered to be "*moderately probable*". The single-cut scenario involving just the Hood Canal Bridge is covered in a later section.

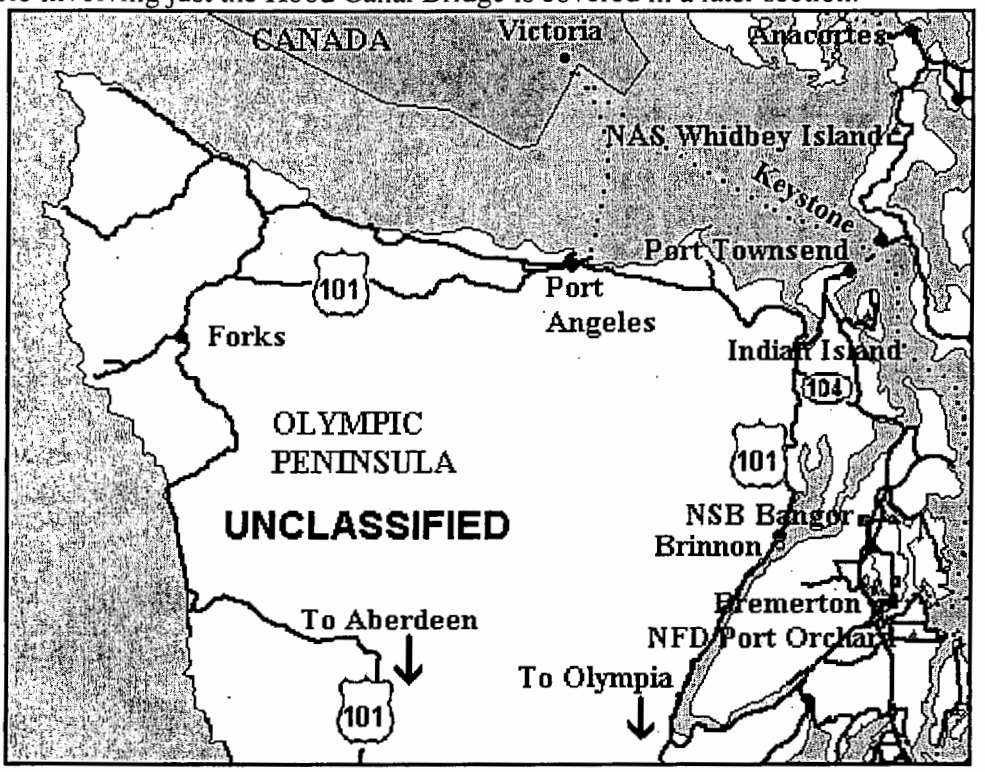


Figure 15. Olympic Peninsula (U)

(C)

(b)(1)

(U) **Commercial Impact Assessment.** Loss of three highway structures serving the Olympic Peninsula would certainly cause great inconvenience to civilian drivers. The disruption could be somewhat mitigated by use of ferries. One ferry connects Port Townsend with Keystone; another connects Port Angeles with Canada. However, loss of Olympic Peninsula land highway access would cause extreme ferry congestion. In addition, there would be economic loss to commerce and the expense of repairing the highways. The Hood Canal Bridge (Route 104) would be especially costly to replace, and would likely take over a year to rebuild. Destruction of three moderately traveled highway bridges could easily result in 20 or more deaths. Therefore the overall commercial impact of this scenario would be "*very serious*".

(U) **RED ZONE Rating.** Table 27 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for loss of all highway access to the Olympic

Peninsula based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to three highways is only "moderately probable". This, coupled with the "very serious" deployment and commercial impacts puts highway access to the Olympic Peninsula firmly in the Yellow Zone.

TABLE 27
OLYMPIC PENINSULA HIGHWAY ISOLATION SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable		12, 14				12, 14		
Improbable								

(U) Remediation Options. No remediation action is required regarding highway access to the Olympic Peninsula over US 101. However, the Route 104 bridge over the Hood Canal would be extraordinarily time-consuming and expensive to repair. In addition, most ammunition shipments to Indian Island would probably use Route 104. Therefore additional precautions for the Hood Canal Bridge should be considered by both civil and military authorities. Because of its significance, a separate section of this report provides addition analysis of the Hood Canal Bridge.

2. Flagler Road Bridge Damage (U)

(C)

(b)(1)

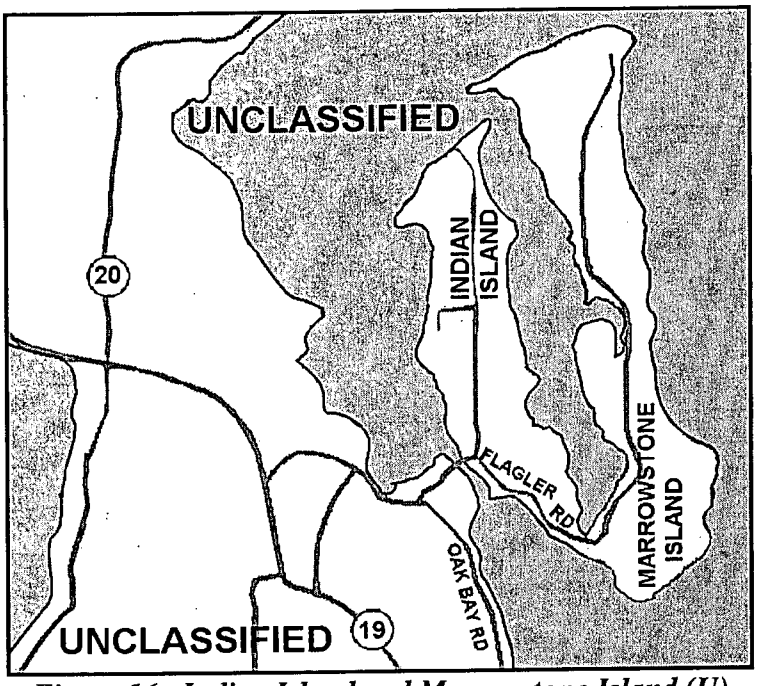


Figure 16. Indian Island and Marrowstone Island (U)

(C)

(b)(1)

(S)

(b)(1)

(C)

(b)(1)

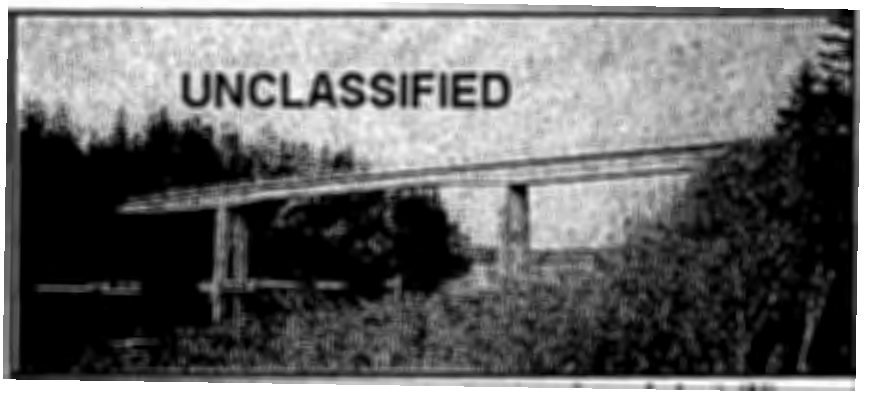


Figure 17. Flagler Road bridge (northward view) (U)

Figure 18. Flagler Road bridge (westward view) (U)

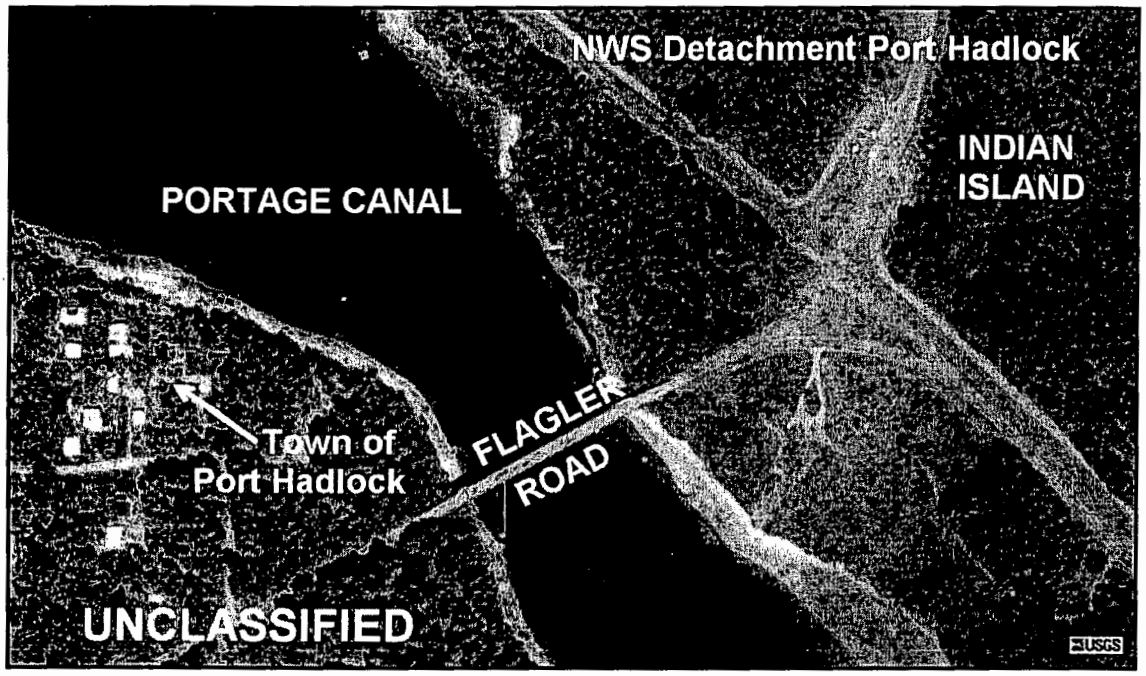


Figure 19. Aerial photograph of Indian Island (U)

(U) **Commercial Impact Assessment.** Destruction of the Flagler Road Bridge would cut highway access to Marrowstone Island, a lightly populated area that includes a park. While there would be some repair costs, the economic cost due to loss of access to Marrowstone Island would be light. Since Flagler Road is lightly traveled, damage would be unlikely to cause more than four casualties. Therefore, the commercial impact of damage to the Flagler Road Bridge is "*not serious*".

(C)

(1)(c)(9)

TABLE 28
FLAGLER ROAD BRIDGE DAMAGE SUMMARY (U)

CONFIDENTIAL

(b)(1)

(U) **Remediation Options.** Increased security is warranted at the Flagler Road Bridge during contingencies, even without specific indications and warnings of antagonistic intent. Surveillance cameras could be installed and monitored by personnel in the Indian Island gatehouse to provide a comprehensive view of the Flagler Road Bridge. Funding for the security cameras should probably be provided by DOD. Security monitoring would pull the vulnerability score down, effectively moving this location out of the Red Zone as shown in tables 29 and 30.

TABLE 29
FLAGLER ROAD BRIDGE REMEDIATION ASSESSMENT (U)

CONFIDENTIAL

(b)(1)

TABLE 30
PROTECTION AND VULNERABILITY OF FLAGLER ROAD BRIDGE (U)

CONFIDENTIAL

(U) (b)

3. Hood Canal Bridge Damage (U)

(C)

(C)

(S)

(C)

(b) (1)

(U) **Commercial Impact Assessment.** Damage to the Hood Canal Bridge is likely to be expensive and time-consuming to repair. Civilian drivers will be forced to make a lengthy detour until repairs are completed. Route 104 sees moderate traffic volumes, and casualties in this scenario are estimated to be moderate. Therefore the overall commercial impact of this scenario would be "*very serious*".

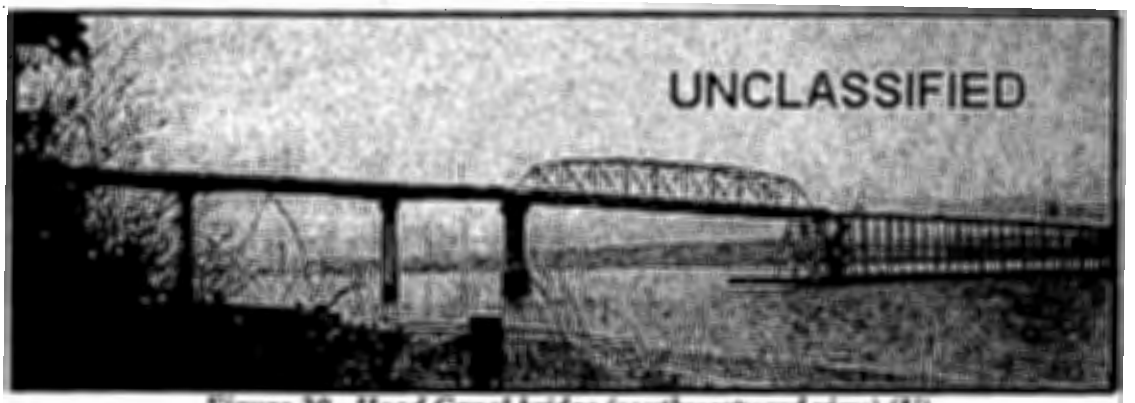


Figure 20. Hood Canal bridge (southwestward view) (U)

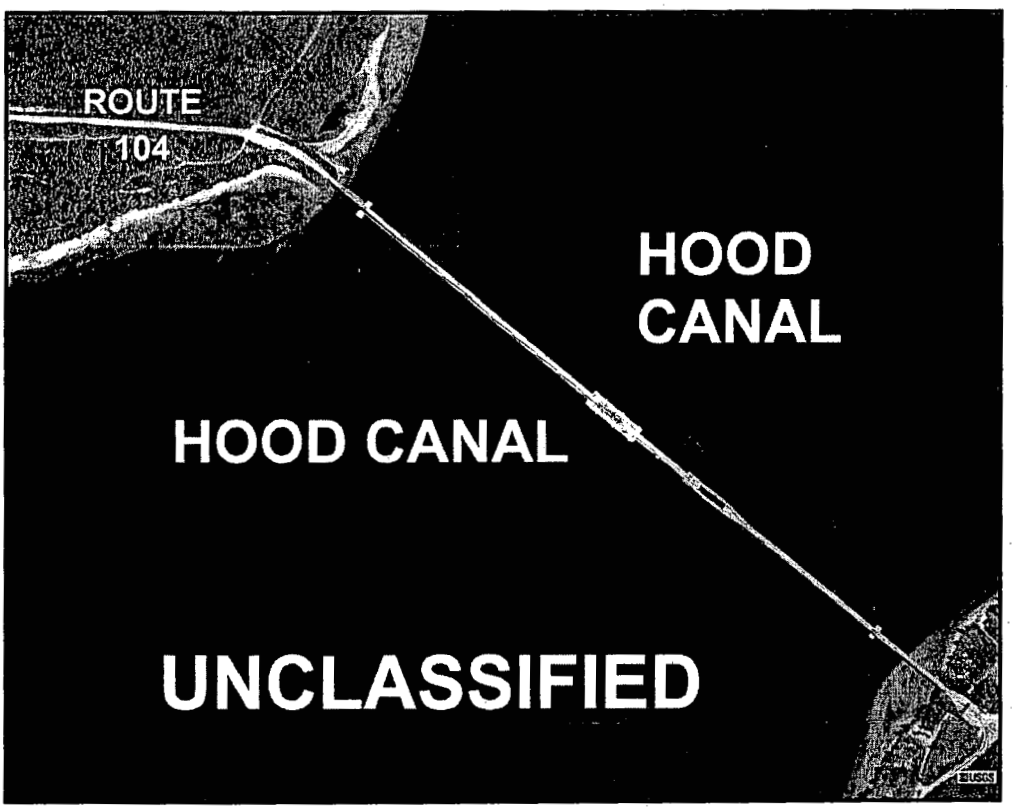


Figure 21. Hood Canal and Washington Route 104 (U)

(C)

(b)(1)

TABLE 31
HOOD CANAL BRIDGE DAMAGE SUMMARY (U)

CONFIDENTIAL

(b)(1)

(U) Remediation Options. Car bomb attacks are more difficult to prevent than most other types of sabotage. Nevertheless, installation of surveillance cameras may be warranted. If a perpetrator used a car bomb and escaped in a second vehicle, a film record could help in identification and capture. The presence of security cameras also might deter an attack. Another alternative would be to install checkpoints on each end of the bridge during peak deployment demands. This would provide additional security to reduce vulnerability when the impact of loss could be the most devastating. Checkpoints would be more effective for remediating a car bomb threat than simply installing security cameras, but local, State, and Federal officials would have to establish agreements on jurisdiction and other issues to make this happen.

F. WHIDBEY ISLAND ANALYSIS

(U) **General.** Naval Air Station (NAS) Whidbey Island is on Whidbey Island, about 50 air-miles north of Seattle. NAS Whidbey Island does not require rail access to perform its mission, and there are no railroads on Whidbey Island; primary access is by highway.

(U) **Vulnerability Assessment.** Whidbey Island is connected to the Washington mainland only by Washington Route 20. Route 20 crosses Deception Pass on a long bridge north of Whidbey Island (figures 22 and 23). It is unprotected, easily accessible, and somewhat remote, making it *highly vulnerable* to antagonists, requiring little skill and/or experience to damage this link. The Deception Pass Bridge is in a lightly populated area, and antagonists seeking to damage it would face only a moderate risk of detection by passing motorists and/or pedestrians. Therefore, the likelihood of loss given attack upon the Deception Pass Bridge is considered to be "*certain*".

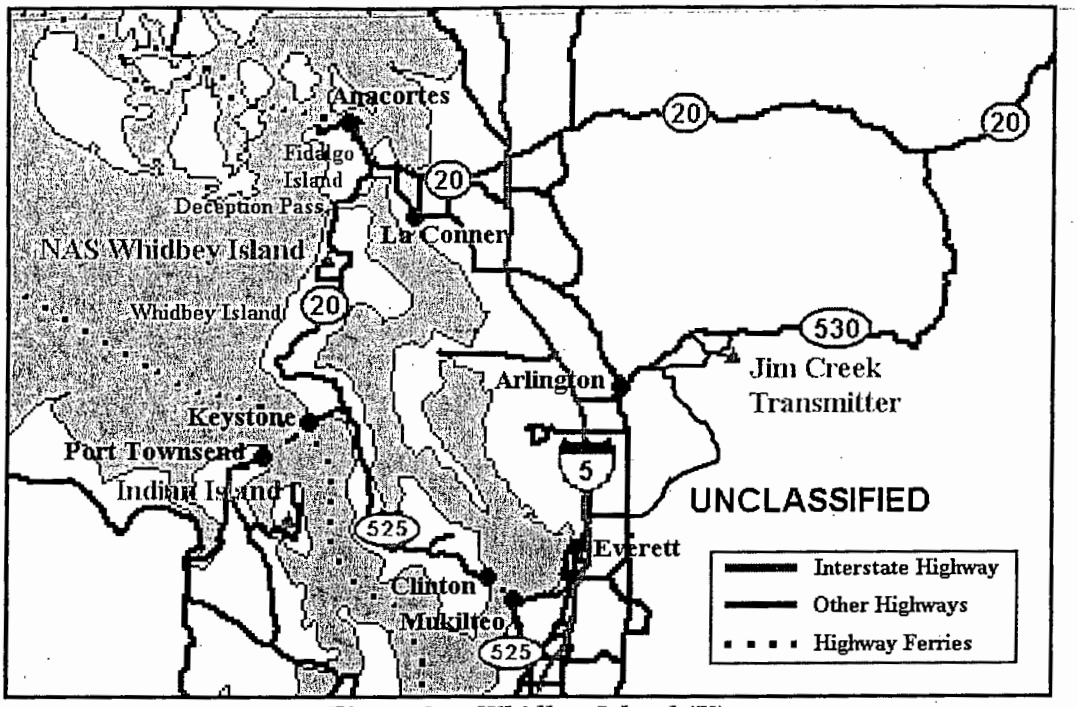


Figure 22. Whidbey Island (U).

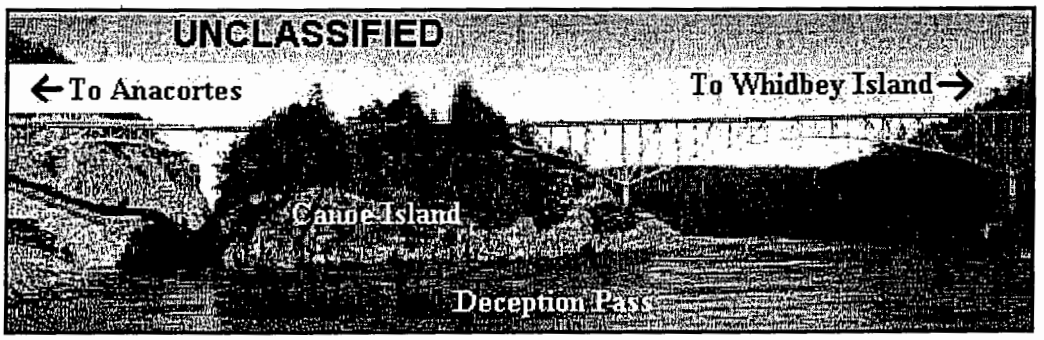


Figure 23. Route 20 at Deception Pass (U)

(U)

(b(2)

TABLE 32
NAS WHIDBEY ISLAND UNITS USING MCCHORD AFB* (U)

SECRET

(b)(1)

(U) **Commercial Impact Assessment.** Damage to the Deception Pass Bridge could be expensive to repair, and would greatly inconvenience some civilian motorists. The Clinton - Mukilteo ferries would be very congested. Route 20 sees moderate traffic volumes, and casualties in this scenario are estimated to be moderate. Therefore the overall commercial impact of cutting highway access to Whidbey Island is "*very serious*".

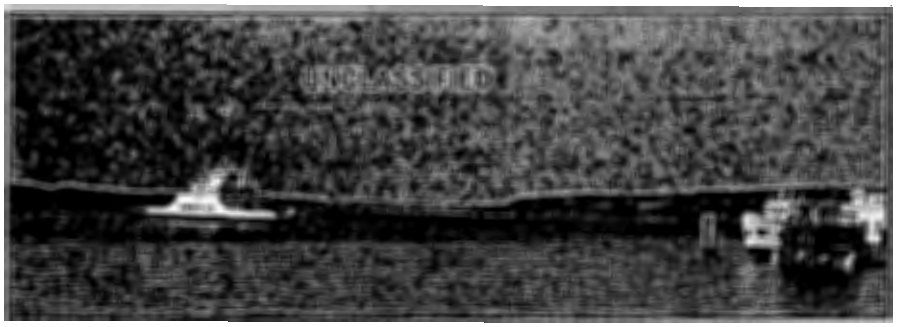


Figure 24. Ferry in Puget Sound (U)

(U) **RED ZONE Rating.** Table 33 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for damage to Whidbey Island highway access based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to the Deception Pass bridge is "certain". However, the actual impact of loss on the OPLAN TPFDD timelines for NAS Whidbey Island units will be "*not serious*" since the effects can be

mitigated by using highway ferries to reach the aerial port of embarkation. Therefore, the highway network falls in the deployment white zone on the summary chart as shown in table 33. On the commercial side, the impact of loss would be "*very serious*" which places the Deception Pass Bridge in the commercial red zone. Therefore, additional precautions by the civil sector may be warranted.

TABLE 33
NAS WHIDBEY ISLAND HIGHWAY ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain				22, 2		22, 12		
Highly Probable								
Moderately Probable								
Improbable								

(U) Remediation Options. No remediation actions are required by DOD. However, this scenario falls within the Red Zone on the commercial side, so added security measures at the Deception Pass Bridge may be warranted. However, because the Deception Pass bridge provides the only conventional highway access to NAS Whidbey Island, antagonists might ***think*** they could reduce America's combat power by attacking it. Therefore, the Deception Pass Bridge may be at above average risk for an incident in wartime. Consideration should be given to installing surveillance cameras at the Deception Pass bridge with provisions for monitoring them by the base police at NAS Whidbey Island as well as by civilian law enforcement personnel.

G. PORT OF ANACORTES ANALYSIS

(U) General. The Port of Anacortes is on Fidalgo Island (figure 21). It is connected to the Washington mainland by Washington Route 20 and by Pioneer Parkway, which crosses Swinomish Channel in La Conner. Anacortes is served by a railroad line, but it has no military mission requiring rail service. Therefore, highway is the primary means of ingress/egress.

(U) Vulnerability Assessment. Route 20 is a four-lane divided highway east of Anacortes, so if one Route 20 bridge is damaged, a detour can be set up using the remaining parallel bridge for two way traffic until repairs are completed. If both bridges at a location on Route 20 are damaged, traffic could detour through La Conner to reach Anacortes. Therefore, terrorists would have to damage three bridges to cut all land highway access to Anacortes.

(U) Any single highway structure will be relatively vulnerable to attack. However, a near-simultaneous attack on three different highway structures would be a more complex undertaking requiring a synchronized and coordinated effort by multiple antagonists. Furthermore, highway bridges are typically visible to the general public. Antagonists seeking to damage a highway bridge risk detection by passing motorists and/or pedestrians. While the detection risk may be moderate at one location, it becomes much more elevated as the number of locations, and subsequent opportunities for detection, increase. A coordinated attempt to sequentially destroy three highway bridges would be even riskier. Once the first bridge was destroyed, security awareness would increase, as would the risk of detection at other locations. Therefore, the likelihood of loss given attack for this "3-cut" scenario is only considered to be "*moderately probable*".

(U) **Deployment Impact Assessment.** Anacortes contains both a fuel depot and a port. It does not deploy units by land transportation, so even if it did lose all highway access, deployment timelines are unlikely to suffer. Anacortes supports OPLANs as both a fuel storage point and fuel port. Loss of highway access would not prevent Anacortes from shipping its existing petroleum stocks by ship. Prolonged loss of highway access could impede Anacortes from replenishing its fuel supplies, but this should not affect OPLAN execution in theater since fuel could be obtained from other sources.

(U) Complete loss of highway access to Fidalgo Island would also cause overland highway access to NAS Whidbey Island to be lost. As discussed in the previous section, loss of overland highway access to NAS Whidbey Island can be mitigated either by having the affected units deploy by air direct from NAS Whidbey Island or by using the highway ferry between Clinton and Mukilteo. Therefore, even considering NAS Whidbey Island units, the deployment impact of this scenario is "*not serious*".

(U) **Commercial Impact Assessment.** Loss of three highway bridges to Fidalgo Island would certainly cause great inconvenience to civilian drivers. Vehicles can also reach Anacortes by traveling on ferries, allowing this disruption to be somewhat mitigated. However, loss of Fidalgo Island's conventional highway access would cause ferry congestion. In addition, there would be economic loss to commerce and the expense of repairing the highways. Destruction of three moderately traveled highway bridges could easily result in 20 or more deaths. Therefore the overall commercial impact of this scenario would be "*very serious*".

(U) **RED ZONE Rating.** Table 34 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for loss of all highway access to Anacortes based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to three highways is only "moderately probable". This, coupled with the "not serious" deployment impact puts this scenario in the deployment White Zone. The commercial impact would be "very serious" which puts highway access to Anacortes in the commercial Yellow Zone.

TABLE 34
ANACORTES HIGHWAY ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				14, 2		14, 12		
Improbable								

(U) Remediation Options. No remediation action is required.

H. YAKIMA FIRING CENTER ANALYSIS (U)

1. Yakima Highway Disruption Scenario (U)

(U) **General.** Yakima Firing Center is in central Washington, about 10 miles northeast of the city of Yakima. It is close to I-82 and Washington route 821 and is also served by local roads. To evaluate highway capability, this scenario postulates damage to five highway structures in the Yakima area.

(U) **Vulnerability Assessment.** The Yakima area is characterized by a robust highway network, supplemented by many local roads. More than five roads provide access to Yakima Firing Center. Furthermore, I-82 is a multiple-lane divided highway. Therefore, damage to only one I-82 bridge would allow a detour to be set up using the remaining parallel bridge for two way traffic while repairs are in progress. The effort and skill required to significantly interdict more than five structures makes such an attack highly unlikely; therefore, in cases where more than five bypass alternatives exist, the system is considered to be highly robust, and detailed analysis is not required.

(U) **Deployment Impact Assessment.** Provided at least one road is open, convoying units can meet their required TPFDD ALDs. Only if highway access were totally lost would the deployment impact be significant. However, a five-cut scenario would not cut *all* Yakima Firing Center accesses. Therefore, the actual impact of five Yakima-area highway cuts on the OPLAN [redacted] and [redacted] TPFDD timelines will be "*not serious*" due to the availability of alternate highway routes. (b)(2)

(U) **Commercial Impact Assessment.** Destruction of five highway structures in the Yakima area would certainly cause great inconvenience to civilian drivers. In addition, there would be economic loss to commerce and the expense of repairing the highways. Also, the destruction of the highways would probably produce injuries and/or casualties. Assuming that each incident produced up to four casualties, the resulting loss of human

life could reach twenty. Therefore the overall commercial impact of this scenario would be "*catastrophic*".

(U) **RED ZONE Rating.** Table 35 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for damage to roads serving Yakima Firing Center based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to five highways is "moderately probable". However, the actual impact of loss on the OPLAN, and TPFDD timelines will be minimal due to the presence of numerous alternate highway routes. Therefore, the highway network falls in the deployment white zone on the summary chart as shown in table 35 and does not require remediation action. On the commercial side, the impact of loss could be catastrophic. Therefore, additional precautions by the civil sector may be warranted, although there is no specific highway target in the Yakima area that clearly needs increased security. (b)(2)

TABLE 35
YAKIMA-AREA HIGHWAY FIVE CUT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				**11, 2**	**11, 20**			
Improbable								

(U) **Remediation Options.** No remediation actions are required by DOD. Local law enforcement patrols and/or increased security awareness would likely reduce the vulnerability score to "improbable," effectively moving this out of the commercial Red Zone.

2. Yakima Rail Isolation Scenario (U)

(U) General. Yakima is on the railroad line that runs east from Auburn to Pasco and Spokane (figure 2). In 1983 a portion of this rail line between Yakima and Auburn was abandoned, but it was re-opened as a through route in 1996. Military equipment from Yakima Firing Center is loaded onto railcars at the railhead in Pomona. Pomona is just west of the installation and a few miles north of the city of Yakima. The same BNSF rail line serves both Pomona and Yakima.

(U) **Vulnerability Assessment** The Auburn – Yakima – Pasco line contains many bridges, with a few over 300 feet long. All are unprotected, and many are easily accessible and somewhat remote. Antagonists would not require great skill and/or experience to disrupt the Auburn – Yakima – Pasco line. The existence of numerous options for antagonists adds to the vulnerability of this line. To totally isolate the Yakima area (including Pomona) from the rest of the nation's rail network, antagonists must make two cuts - one to the east, and one to the west, which reduces vulnerability somewhat. Still, *the likelihood of loss given attack* for this "2-cut" scenario is considered to be "*certain*".

(U) **Deployment Impact Assessment.** If Yakima Firing Center lost rail service, all of its equipment, except heavy-tracked vehicles, could deploy by highway to the destination ports. In OPLAN , no heavy tracked vehicles are scheduled to depart from Yakima Firing Center for overseas locations early in the plan. Therefore, a 2-week interruption of rail access to Yakima would not significantly affect overseas deployment of units, and the overall deployment impact of loss of Yakima rail service would be "*not serious*". However, this could change later in the timeline. (b)(2)

(U) **Commercial Impact Assessment.** The Auburn – Yakima – Pasco line now sees over 10 MGT of freight traffic per year and has no scheduled passenger service. If damage occurs at one of its bridges, deaths are unlikely, except for the crew (usually two people) of any train that happens to be on the bridge. Therefore, the overall commercial impact of losing this line would be "*moderately serious*". However, BNSF functioned with this line closed for several years, so a 2-week closure would be manageable, albeit undesirable. The principal effect, besides repair cost, would be increased congestion on the Spokane - Everett - Seattle line. Congestion on the Spokane - Everett - Seattle line was the main reason that the line through Yakima was restored as a through route.

(U) **RED ZONE Rating.** Table 36 summarizes the vulnerability, deployment impact, and the commercial impact scores for the Auburn – Yakima – Pasco line based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this segment are in Appendix A. Based on our findings, the likelihood of loss given attack for this link is "certain," making it highly vulnerable. However, the actual impact of loss on the OPLAN TPFDD timelines will be minor, since Yakima Firing Center originates no oversize cargo that must rapidly deploy overseas. Therefore, this line falls in the white zone on the deployment impact summary chart as shown in table 36 and does not require DOD remediation action. Although this line marginally falls into the commercial Red Zone, remediation by the commercial sector may not be necessary either, since it was commercially acceptable to close this line for several years.

TABLE 36
YAKIMA RAIL ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain				20, 2			20, 8	
Highly Probable								
Moderately Probable								
Improbable								

(U) Remediation Options. No remediation actions are required by DOD.

I. SPOKANE AREA ANALYSIS (U)

(U) **General.** Spokane International Airport and Fairchild AFB are in eastern Washington, a few miles west of the city of Spokane. The military missions of Spokane International Airport and Fairchild AFB do not require rail service, but both require highway access to accomplish their missions. In this section we examine the effect of damage to up to five highway bridges relative to force deployment timelines. The effort and skill required to significantly interdict more than five structures makes such an attack highly unlikely; therefore, in cases where more than five bypass alternatives exist, the system is considered to be highly robust, and a detailed analysis is not required

(U) **Vulnerability Assessment.** The Spokane area is characterized by a robust highway network, supplemented by many local streets and roads. More than five highway bridges would have to be damaged to isolate the Spokane area from the rest of the country. Also, neither Spokane International Airport nor Fairchild AFB has a major bridge in close proximity to it, and neither could be isolated with five or fewer cuts. Furthermore, I-90 is a multiple-lane divided highway that connects Seattle to Spokane. Damage to only one I-90 bridge would still allow a detour to be set up using the remaining parallel bridge.

(U) Any single highway structure will be relatively vulnerable to attack. However, a near-simultaneous attack on five different highway structures would be a complex undertaking requiring a synchronized and coordinated effort by multiple antagonists. Furthermore, highway bridges are typically visible to the general public. Antagonists seeking to damage a highway bridge risk detection by passing motorists and/or pedestrians. While their risk may be moderate at one location, it becomes much more elevated as the number of locations, and subsequent opportunities for detection, increase. A coordinated attempt to sequentially destroy five highway bridges would be even riskier. Once the first bridge was destroyed, security awareness would increase, as would the risk of detection at other locations. Therefore, the likelihood of loss given attack for this "5-cut" scenario is only considered to be moderately probable.

(U) **Deployment Impact Assessment.** Both Spokane International Airport and Fairchild AFB are used as aerial ports of embarkation in OPLAN . Also, many units originate at Fairchild AFB under OPLANs and , though many of these deploy directly from the base and would not need to use the public highway network to deploy. However, if five highways in Spokane are cut, detour routes will still be available to both sites. Therefore, all units using either facility should still be able to meet their OPLAN ALDs, and the subsequent deployment impact of loss for this scenario will be "*not serious*". (b)(2)

(U) **Commercial Impact Assessment.** Destruction of five highway structures in the Spokane area would certainly cause great inconvenience to civilian drivers. In addition, there would be economic loss to commerce and the expense of repairing the highways. Also, the destruction of the highways would probably produce injuries and/or casualties. Assuming that each incident produced up to four casualties, the resulting loss of human life could reach twenty. Therefore the overall commercial impact of this scenario would be catastrophic.

(U) **RED ZONE Rating.** Table 37 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for damage to five highways in Spokane area based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to five highways is "moderately probable". However, the actual impact of loss on the OPLAN and TPFDD timelines will be minimal due to the presence of numerous alternate highway routes. Therefore, the highway network falls in the deployment white zone on the summary chart as shown in table 37 and does not require remediation action. On the commercial side, the impact of loss could be catastrophic. Therefore, additional precautions by the civil sector may be warranted. (b)(2)

TABLE 37
SPOKANE-AREA HIGHWAY FIVE CUT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				**11, 2**	11, 20			
Improbable								

(U) **Remediation Options.** No Remediation action is required by DOD. However, it is marginally within the Red Zone on the commercial side, so added security measures by civil authorities might provide further insurance against disruption.

J. JIM CREEK ANALYSIS

(U) **General.** Jim Creek Transmitter Site is a few miles northeast of Arlington (figure 21). Jim Creek does not have rail access, so highways provide primary ingress/egress.

(U) **Vulnerability Assessment.** The road in the immediate vicinity of the Jim Creek main gate does not cross any significant structures. Within one mile of the main gate, the road splits, presenting alternative route options. At least three highway bridges would have to be damaged to cut all highway access to Jim Creek. The roads leading to Jim Creek do not contain any extremely large bridges, and they see relatively low traffic volumes.

(U) Any single highway structure will be relatively vulnerable to attack. However, a near-simultaneous attack on three different highway structures would be a more complex undertaking requiring a synchronized and coordinated effort by multiple antagonists. Furthermore, highway bridges are typically visible to the general public. Antagonists seeking to damage a highway risk detection by passing motorists and/or pedestrians. While the detection risk may be moderate at one location, it becomes much more elevated as the number of locations, and subsequent opportunities for detection, increase. A coordinated attempt to sequentially destroy three highway bridges would be even riskier. Once the first bridge was destroyed, security awareness would increase, as would the risk of detection at other locations. Therefore, the likelihood of loss given attack for this "3-cut" scenario is only considered to be "*moderately probable*".

(U) **Deployment Impact Assessment.** Jim Creek Transmitter Site does not serve as an origin or a port for any units in either OPLAN 5027 or OPLAN 1003. Therefore, the deployment impact of cutting all highway access to Jim Creek is "*not serious*".

(U) **Commercial Impact Assessment.** The commercial impact of damage to Jim Creek roads would be less than the commercial impact of damage to a major public highway. Loss of three highway bridges near Jim Creek would certainly inconvenience some civilian drivers. In addition, there would be minor economic loss to commerce and the expense of repairing the highways; however, bridges near Jim Creek are not large, and the repair cost would be much lower than if a major structure were involved. Damage to three lightly traveled roads would probably result in fewer than 10 casualties. Therefore the overall commercial impact of this scenario would be " *moderately serious*".

(U) **RED ZONE Rating.** Table 38 shows the vulnerability assessment, the deployment impact, and the commercial impact scores for loss of all highway access to Jim Creek based on the assumptions applied by the USDOT and our preceding analysis. Separate vulnerability, deployment impact, and commercial impact tables for this scenario are in Appendix A. Based on our findings, the likelihood of loss given attack to three highways is only "moderately probable". This, coupled with the "not serious" deployment impact puts this scenario in the deployment White Zone. The commercial impact would be " moderately serious" which puts highway access to Jim Creek in the commercial Yellow Zone.

TABLE 38
JIM CREEK HIGHWAY ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				Impact of Loss - Commercial			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				**13, 0**			**13, 10**	
Improbable								

(U) **Remediation Options.** None required.

V. MITIGATION AND REMEDIATION (U)

A. CRITICALITY AND VULNERABILITY INDEX (U)

(S)

(b)(1)

TABLE 39
CRITICALITY AND VULNERABILITY SUMMARY (U)

SECRET

(b)(1)

B. POTENTIAL MITIGATION ACTIONS (U)

(C)

(S)

(C)

(b) (1)

(C)

(b)(1)

(U) For some disruptions, a possible mitigation action is to use alternate commercial seaports – provided adequate throughput capability exists. MTMC and the Military Sealift Command (MSC) would have to change the ship schedules to accomplish this, but adequate advanced planning could make this alternative less painful. Also, the cooperation of the affected port authorities would be necessary. Significantly more assets in fully functional ports might have to be used by the military if access to other ports was interdicted. Changing one port for another port on the same coast should have little impact on *overall* ship's schedules. However, this could get complicated when ammunition is concerned due to the unique problems (NEW, MHE, safety, etc.) associated with handling these shipments. Again, the best alternative then becomes an investment in ammunition port throughput improvements if the asymmetric threat and subsequent impact of antagonistic activity is to be effectively mitigated. Current infrastructure studies, however, do not factor-in a cushion "just in case," and many political scrutinizers label such efforts to provide insurance against terrorist activity on CONUS soil as "gold plating." This archaic philosophy must be overcome if significant headway is to be made in the fight against terrorist and other antagonistic activity – to include the much less dramatic effects of other interdiction sources – i.e., natural disasters. As the Army transforms, deployment timelines will become increasingly shorter with much greater sensitivity to disruption. Even after the initial surge, follow-on sustainment will be provided "just in time" as we attempt to reduce stockpiles in theater. This scenario produces a target-rich environment for antagonists, and the asymmetric threat becomes an even more grave concern. Forward thinkers must take action as critical infrastructure is identified. This means building a robustness into our power projection platforms that can survive interdictions, even at the risk of being labeled "gold plating," because in reality, it is *armor plating*.

TABLE 40
POTENTIAL MITIGATION ACTIONS (U)

SECRET

(b)(1)

C. POTENTIAL REMEDIATION ACTIONS (U)

(S)

(S)

(S)

(S)

(S)

(S)

(b) (1)

TABLE 41
CAMERAS AND THE VULNERABILITY OF BANGOR RAIL ACCESS (U)

CONFIDENTIAL

(b)(1)

TABLE 42
NSB BANGOR RAIL ACCESS WITH REMEDIATION (U)

SECRET

(S)

(b)(1)

(C)

TABLE 43
CAMERAS AND FLAGLER ROAD BRIDGE VULNERABILITY (U)

CONFIDENTIAL

(b)(1)

TABLE 44
FLAGLER ROAD BRIDGE REMEDIATION ASSESSMENT (U)

CONFIDENTIAL

(b)(1)

TABLE 45
HOOD CANAL BRIDGE VULNERABILITY (U)

CONFIDENTIAL

(b)(1)

(U) Damage to the Deception Pass Bridge would have no effect on the deployment schedule or actual warfight. However, because it provides the only conventional highway access to NAS Whidbey Island, terrorists might ***think*** they could reduce America's combat power by attacking it. Since damage to this bridge would be costly to repair and would likely cause civilian casualties, preventive measures may be warranted, though they should primarily be the responsibility of civil authorities. Consideration should be given to installing surveillance cameras at the Deception Pass Bridge with provisions for monitoring them by the base police at NAS Whidbey Island as well as by civilian law enforcement personnel.

(U) Overall, massive damage to the highway networks in the Seattle, Spokane, Bremerton, and Yakima metropolitan areas appears in the "Red Zone" from a commercial perspective, although it is extremely unlikely that terrorists could damage these highways enough to seriously affect military deployment. Civil authorities may want to improve highway security, particularly at large structures such as the mile-long Tacoma Narrows Bridge. Since the deployment impact of most highway damage would be inconsequential, the primary responsibility in this area should remain with civilian law enforcement authorities. Table 46 lists the most important highway bridges to protect.

TABLE 46
SIGNIFICANT HIGHWAY BRIDGES (U)

CONFIDENTIAL

(U)(G)

VI. CONCLUSIONS AND RECOMMENDATIONS (U)

Conclusions and recommendations stemming from this analysis are as follows:

1. (S)

2. (C)

3. (C)

4. (C)

5. (U) PSAP is a shortline railroad with limited resources. If it experiences a service interruption, it should quickly receive outside assistance to restore rail service. It may need outside material assistance from a major railroad such as BNSF or UP, and financial assistance from the Government may be necessary to quickly make repairs.

6. (U) The Route 20 bridge over Deception Pass provides the only all-highway access to NAS Whidbey Island. However, automobile ferries also provide access to Whidbey Island. If the Deception Pass Bridge was damaged, NAS Whidbey Island units could deploy on schedule, either by departing by air directly from origin, or by using the highway ferries to reach mainland ports. Therefore, it is not vital to military deployment to increase security at the Deception Pass Bridge during contingencies.

7. (U) Terrorists may ***mistakenly*** believe they can reduce America's warfighting capability by destroying the Deception Pass Bridge. Therefore, it may be desirable to increase security at this bridge to prevent or deter a terrorist attack. Civil authorities should have the primary responsibility for this security.

8. (U) None of the other installations in this study has a single point of failure for highway access. It is not militarily necessary to specifically guard Washington highways (other than the two bridges mentioned above), unless warning is received that terrorists plan to damage them. However, civil authorities may desire to increase security at some key bridges to deter/prevent terrorist attacks and reduce the risk of casualties and property damage.

9. (C)

(b)(1)

10. (U) Commercial ports generally have several different rail access routes. However, if a commercial port does lose all rail access, it may be necessary for units to divert to an alternate port. Deploying units should be prepared for this alternative.

11. (C)

(b)(1)

12. (U) Only terrorist acts that affect the deployment schedule of military units and supplies can have an effect on the warfight in theater. This study does not evaluate the actual warfight, but it does show that very few potential terrorist attacks on transportation facilities in Washington have a capacity to affect the warfight in theater.

APPENDIX A (U)

VULNERABILITY AND IMPACT ASSESSMENT SCORESHEETS (U)

(U) This appendix contains the vulnerability, deployment impact, and commercial impact tables for each of the scenarios described in the text. The "Red Zone" charts are also reprinted here for ready reference. If a destructive incident occured, steps would likely be taken to mitigate its effects. Thus, these scores assume reasonable mitigation actions are taken to respond to each of the postulated threat scenarios. However, the scores in these tables reflect ***current conditions***, ***without*** remediation actions being taken. This appendix includes tables with scores for the following threat scenarios:

- Seattle-Tacoma Region (Fort Lewis) Highway Vulnerability (Five Cuts)
- Fort Lewis Rail Line Single Cut
- Port of Tacoma Local Rail Access
- Fort Lewis Local Rail Access
- Seattle-Tacoma Regional Rail Access
- Port of Seattle Local Rail Access
- Dispatching Center/Signal System Disruption
- Kitsap County Multiple Highway Cuts
- Bangor Rail Access
- Olympic Peninsula Highway Access
- Indian Island Highway Access
- NAS Whidbey Island Highway Access
- Anacortes Highway Access
- Yakima-Area Highway Access
- Yakima-Area Rail Access
- Spokane-Area Highway Access
- Jim Creek Highway Access

TABLE A-1
FORT LEWIS HIGHWAY SYSTEM VULNERABILITY (U)

UNCLASSIFIED		
Five Puyallup River highway bridges are damaged.*		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	4
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or **coordination** to destroy or damage the asset	2	2
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	
Device is complex; attack quite susceptible to outside factors	2	2
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures – security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	3
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**11**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**11**
Improbable 4-9		

NOTES:
*Similar or lower scores would result from five highway cuts near other military installations in the Seattle – Tacoma region.

TABLE A-2
DEPLOYMENT IMPACT OF DAMAGE TO FIVE HIGHWAY BRIDGES (U)

UNCLASSIFIED		
Five Puyallup River highway bridges are damaged.*		
Impact of Loss Given Attack – Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of preferred deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of preferred deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

NOTES:
*Similar or lower scores would result from five highway cuts near other military installations in the Seattle – Tacoma region.

TABLE A-3
COMMERCIAL IMPACT OF DAMAGE TO FIVE HIGHWAY BRIDGES (U)

UNCLASSIFIED		
Five Puyallup River highway bridges are damaged.*		
Impact of Loss Given Attack – Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	10
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**20**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		**20**
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		
NOTES: *Similar scores would result from five cuts to other highways within the Seattle – Tacoma region.		

TABLE A-4
SEATTLE-TACOMA AREA HIGHWAY ASSESSMENT SUMMARY* (U)

UNCLASSIFIED								
	Impact of Loss – Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				11, 2	11, 20			
Improbable								

*Scores relate specifically to five highway cuts near Fort Lewis. Scores for other installations in the Seattle-Tacoma area would be no higher, and in many cases would be lower.

TABLE A-5
LOGISTICS CENTER I-5 RAIL BRIDGE VULNERABILITY (U)

UNCLASSIFIED		
Rail line cut between Fort Lewis and Lakeview at I-5, no other damage		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	4
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	3
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or coordination to destroy or damage the asset	2	
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	3
Device is complex; attack quite susceptible to outside factors	2	
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures - security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	3
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**13**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**13**
Improbable 4-9		

NOTES:

1. The "Degree of Control Over Outcome" reflects attempted destruction of this railroad bridge using a car bomb; a car bomb detonated under the bridge might or might not destroy the bridge depending upon how the explosion actually propagates.
2. The "Security Measures" is based on the terrorists using a car bomb; there is some risk of detection/apprehension while parking the car bomb since police usually stop at parked vehicles. Since I-5 is a heavily travely road, terrorists would not have a enough time to plant explosives on this bridge by hand without a high likelihood of detection.

TABLE A-6
LOGISTICS CENTER I-5 RAIL BRIDGE DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Rail line cut between Fort Lewis and Lakeview at I-5, no other damage		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of preferred deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of preferred deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

NOTES:

1. Disruption of any other single rail line in the Seattle-Tacoma region would be even less harmful to deployment than the destruction of the rail bridge over I-5 near the Logistics Center.

TABLE A-7
LOGISTICS CENTER I-5 RAIL BRIDGE COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Rail line cut between Fort Lewis and Lakeview at I-5, no other damage		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	8
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	14
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		14
Moderately Serious 6-10		
Not Serious 0-5		

NOTES:
Commercial impact is based upon the effect on highway traffic. The Lakeview – Logistics Center line sees little commercial rail traffic, so the ***rail Economic Impact/Recoverability*** would receive a score of 2, considered alone. The human loss projected in this table reflects casualties among motorists. Commercial impact of damage to the BNSF mainline bridge across I-5 would be greater, but would still not change any of these numerical ratings.

TABLE A-8
LOGISTICS CENTER I-5 RAIL BRIDGE ASSESSMENT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				13, 2		13, 14		
Improbable								

TABLE A-9
LOCAL PORT OF TACOMA RAIL ACCESS VULNERABILITY (U)

CONFIDENTIAL

(b)(1)

TABLE A-10
LOCAL PORT OF TACOMA RAIL ACCESS DEPLOYMENT IMPACT (U)

CONFIDENTIAL

(b)(1)

TABLE A-11
LOCAL PORT OF TACOMA RAIL ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Rail access cut between downtown Tacoma and the port; three Puyallup River rail bridges damaged.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	12
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		12
Moderately Serious 6-10		
Not Serious 0-5		
NOTES: This rating is based on the destruction of three bridges across the Puyallup River. There would be no direct rail access between Seattle and the south, or Tacoma and the north until repairs were made.		

TABLE A-12
LOCAL PORT OF TACOMA RAIL ACCESS ASSESSMENT SUMMARY (U)

CONFIDENTIAL

(1) (b)

TABLE A-13
FORT LEWIS LOCAL RAIL VULNERABILITY (U)
CONFIDENTIAL

b)(1)

TABLE A-14
FORT LEWIS LOCAL RAIL ACCESS DEPLOYMENT IMPACT (U)

CONFIDENTIAL

(b)(1)

TABLE A-15
FORT LEWIS LOCAL RAIL ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
All rail access to Fort Lewis cut; some rail lines to Seattle – Tacoma region from Spokane open		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**12**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		**12**
Moderately Serious 6-10		
Not Serious 0-5		

TABLE A-16
FORT LEWIS LOCAL RAIL ACCESS ASSESSMENT SUMMARY (U)

CONFIDENTIAL

(b)(1)

TABLE A-17
SEATTLE-TACOMA REGIONAL RAIL VULNERABILITY (U)

CONFIDENTIAL

(b)(1)

TABLE A-18
SEATTLE-TACOMA REGIONAL RAIL ACCESS DEPLOYMENT IMPACT (U)

CONFIDENTIAL

(b)(1)

TABLE A-19
SEATTLE-TACOMA REGIONAL RAIL ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
All rail access to Seattle – Tacoma region cut.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**12**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		**12**
Moderately Serious 6-10		
Not Serious 0-5		
NOTES: Loss of all rail access to the Seattle-Tacoma region would be economically devastating. Also, there would be economic repercussions if the Port of Oakland was closed to commercial shipping during a contingency. However, human loss would be unlikely unless a train was on the bridge when it was destroyed.		

TABLE A-20
SEATTLE-TACOMA REGIONAL RAIL ACCESS ASSESSMENT SUMMARY (U)

CONFIDENTIAL

(b)(1)

TABLE A-21
SEATTLE RAIL ACCESS VULNERABILITY (U)

CONFIDENTIAL

(U)

TABLE A-22
DEPLOYMENT IMPACT OF LOSING RAIL ACCESS TO SEATTLE (U)

CONFIDENTIAL

(b)(1)

TABLE A-23
COMMERCIAL IMPACT OF LOSING RAIL ACCESS TO SEATTLE (U)

UNCLASSIFIED		
Local rail access to the Port of Seattle lost.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**8**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		**8**
Not Serious 0-5		
NOTES: The economic impact of loss of rail service to the Port of Seattle would primarily be due to delays and disruptions to shipments. Repair costs would be moderate since rail lines leading to the Port of Seattle do not contain large structures.		

TABLE A-24
SEATTLE RAIL ACCESS ASSESSMENT SUMMARY (U)

CONFIDENTIAL

(b)(1)

TABLE A-25
DISPATCHING/SIGNAL SYSTEM VULNERABILITY (U)

UNCLASSIFIED		
Damage to BNSF Dispatch Center and/or Signal System		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	3
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or coordination to destroy or damage the asset	2	2
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	4
Simple sequence of events involved; some susceptibility to outside factors	3	
Device is complex; attack quite susceptible to outside factors	2	
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures - security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	3
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**12**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**12**
Improbable 4-9		

TABLE A-26
DISPATCHING/SIGNAL SYSTEM DAMAGE DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Damage to BNSF Dispatch Center and/or Signal System		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of preferred deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of preferred deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

TABLE A-27
DISPATCHING/SIGNAL SYSTEM DAMAGE COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Damage to BNSF Dispatch Center and/or Signal System		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	10*
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**20***
Impact of Loss Given Attack Rating		
Catastrophic 16-20		**20***
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		

NOTES:
*This score is based on damage by a car bomb. Damage by a computer virus would cause no human loss.

TABLE A-28
DISPATCHING/SIGNAL SYSTEM ASSESSMENT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				12, 2	12, 20			
Improbable								

TABLE A-29
KITSAP COUNTY HIGHWAY ACCESS VULNERABILITY (U)

UNCLASSIFIED		
Four highways leading to Kitsap County are damaged.*		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	4
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or **coordination** to destroy or damage the asset	2	
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	1*
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	3
Device is complex; attack quite susceptible to outside factors	2	
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures – security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	3
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**11**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**11**
Improbable 4-9		

NOTES:

*Highways between Kitsap County and Shelton do not contain major structures so they would be difficult to seriously damage.

TABLE A-30
KITSAP COUNTY HIGHWAY ACCESS DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Four highways leading to Kitsap County are damaged.*		
Impact of Loss Given Attack – Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of preferred deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of preferred deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2 (a) (b)
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

NOTES:

a. In the unlikely event that all overland highway access to Kitsap County was cut, military units could use highway ferries to cross Puget Sound.

b. This deployment impact score only includes the direct effects on Kitsap County military installations. Loss of the Hood Canal Bridge would also adversely affect ammunition shipment to and from Indian Island, which is on the Olympic Peninsula. This effect is discussed in detail in the chapter and tables relating to the Olympic Peninsula.

TABLE A-31
KITSAP COUNTY HIGHWAY ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Four highways leading to Kitsap County are damaged.*		
Impact of Loss Given Attack – Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	10
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**20**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		**20**
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		

NOTES:
Destruction of the Tacoma-Narrows Bridge alone could easily produce over 50 casualties. Also, the Tacoma-Narrows Bridge and the Hood Canal Bridge would be exceedingly costly to replace; it would take over 1 year to completely rebuild them.

TABLE A-32
KITSAP COUNTY HIGHWAY ASSESSMENT SUMMARY* (U)

UNCLASSIFIED								
	Impact of Loss – Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				11, 2*	11, 20			
Improbable								
This deployment impact score only reflects the impact on Kitsap County military installations.								

TABLE A-33
BANGOR - CENTRALIA RAIL VULNERABILITY (U)

CONFIDENTIAL

(b)(1)(9)

TABLE A-34
BANGOR - CENTRALIA RAIL LINE DEPLOYMENT IMPACT (U)

CONFIDENTIAL

(b) (1)

TABLE A-35
BANGOR - CENTRALIA RAIL LINE COMMERCIAL IMPACT (U)

UNCLASSIFIED

Rail line cut between Bangor and Centralia.

Impact of Loss Given Attack - Commercial	Scale	Score
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	2
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**4**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**4***

NOTES:
*Overall impact to the Nation's economy would be "not serious". However, the economic impact on PSAP would be severe; PSAP might require Governmental assistance to remain in business.

TABLE A-36
BANGOR - CENTRALIA RAIL LINE DAMAGE SUMMARY (U)

CONFIDENTIAL

(b)(1)

TABLE A-37
OLYMPIC PENINSULA HIGHWAY VULNERABILITY (U)

CONFIDENTIAL

(U) (G)

TABLE A-38
OLYMPIC PENINSULA HIGHWAY ACCESS DEPLOYMENT IMPACT (U)

CONFIDENTIAL

(U)

TABLE A-39
OLYMPIC PENINSULA HIGHWAY ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Highway routes to Olympic Peninsula cut (requires at least three cuts)		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6 (a)
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	8 (b)
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**14**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		**14**
Moderately Serious 6-10		
Not Serious 0-5		

NOTES:
a. Repair costs likely to be high. Disruption may be somewhat mitigated by use of ferries. However, loss of Olympic Peninsula land highways would cause extreme ferry congestion.
b. Destruction of three moderately traveled highway bridges could easily result in 20 or more deaths.

TABLE A-40
OLYMPIC PENINSULA HIGHWAY ISOLATION SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable		**12, 14**				**12, 14**		
Improbable								

TABLE A-41
FLAGLER ROAD BRIDGE VULNERABILITY (U)

CONFIDENTIAL

(b)(1)

TABLE A-42
FLAGLER ROAD BRIDGE DEPLOYMENT IMPACT (U)

CONFIDENTIAL

(b)(1)

TABLE A-43
FLAGLER ROAD BRIDGE COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Flagler Road bridge damaged cutting access to Indian Island.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	2
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**4**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		4

TABLE A-44
FLAGLER ROAD BRIDGE DAMAGE SUMMARY (U)

CONFIDENTIAL

(U)(G)

TABLE A-45
HOOD CANAL BRIDGE VULNERABILITY (U)

CONFIDENTIAL

(b)(1)

TABLE A-46
HOOD CANAL BRIDGE DEPLOYMENT IMPACT (U)

CONFIDENTIAL

(b)(1)

TABLE A-47
HOOD CANAL BRIDGE COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Hood Canal bridge damaged cutting direct access between Bangor and Indian Island.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	8
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	6
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**14**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		**14**
Moderately Serious 6-10		
Not Serious 0-5		
NOTES: *Commercial traffic would also face a lengthy detour until repairs were made.		

TABLE A-48
HOOD CANAL BRIDGE DAMAGE SUMMARY (U)

CONFIDENTIAL

(b)(1)

TABLE A-49
NAS WHIDBEY ISLAND HIGHWAY ACCESS VULNERABILITY (U)

UNCLASSIFIED		
Deception Pass bridge damaged, cutting highway access to Whidbey Island		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	5
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	4
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or coordination to destroy or damage the asset	2	
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	5
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	
Device is complex; attack quite susceptible to outside factors	2	
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures - security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	8
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	
High security level; 100% active armed security force; asset has electronic surveillance, anti-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**22**
Likelihood of Loss Given Attack Rating		
Certain 20-25		**22**
Highly Probable 15-19		
Moderately Probable 10-14		
Improbable 4-9		

TABLE A-50
NAS WHIDBEY ISLAND HIGHWAY ACCESS DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Deception Pass bridge damaged, cutting highway access to Whidbey Island		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of prefered deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of prefered deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

NOTES:
Loss of the Deception Pass bridge would probably increase congestion on the Mukilteo - Clinton ferry, and it might be necessary to give military units priority.

TABLE A-51
NAS WHIDBEY ISLAND HIGHWAY ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Deception Pass bridge damaged, cutting highway access to Whidbey Island		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	6
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**12**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		**12**
Moderately Serious 6-10		
Not Serious 0-5		
NOTES: *Commercial traffic would be severely disrupted until repairs were made.		

TABLE A-52
NAS WHIDBEY ISLAND HIGHWAY ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain				**22, 2**		**22, 12**		
Highly Probable								
Moderately Probable								
Improbable								

TABLE A-53
ANACORTES HIGHWAY ACCESS VULNERABILITY (U)

UNCLASSIFIED		
Highway routes to Anacortes (Fidalgo Island) cut (requires at least three cuts)		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	3 (a)
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	3 (a)
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or coordination to destroy or damage the asset	2	
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	3 (a)
Device is complex; attack quite susceptible to outside factors	2	
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures - security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	5 (b)
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**14**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**14**
Improbable 4-9		

NOTES:

a. Vulnerability is decreased since the terrorists would have to damage three sites almost simultaneously.

b. Vulnerability is reduced by visibility; terrorists might be spotted by passing motorists.

TABLE A-54
ANACORTES HIGHWAY ACCESS DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Highway routes to Anacortes (Fidalgo Island) cut (requires at least three cuts)		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of prefered deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of prefered deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2*
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

NOTES:
*Score reflects concurrent effect on deployment of units from NAS Whidbey Island.

TABLE A-55
ANACORTES HIGHWAY ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Highway routes to Anacortes (Fidalgo Island) cut (requires at least three cuts)		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	6
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**12**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		**12**
Moderately Serious 6-10		
Not Serious 0-5		
NOTES: *Commercial traffic would be severely disrupted until repairs were made.		

TABLE A-56
ANACORTES HIGHWAY ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				**14, 2**		**14, 12**		
Improbable								

TABLE A-57
YAKIMA AREA HIGHWAY VULNERABILITY (U)

UNCLASSIFIED		
Five highways serving Yakima area cut.		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	4
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or **coordination** to destroy or damage the asset	2	2
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	
Device is complex; attack quite susceptible to outside factors	2	2
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures – security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	3
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**11**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**11**
Improbable 4-9		

TABLE A-58
DEPLOYMENT IMPACT OF DAMAGE TO FIVE YAKIMA HIGHWAYS (U)

UNCLASSIFIED		
Five highways serving Yakima area cut.		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of prefered deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of prefered deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

TABLE A-59
COMMERCIAL IMPACT OF DAMAGE TO FIVE YAKIMA HIGHWAYS (U)

UNCLASSIFIED		
Five highways serving Yakima area cut.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	10
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**20**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		**20**
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		

TABLE A-60
YAKIMA-AREA HIGHWAY FIVE CUT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				**11, 2**	**11, 20**			
Improbable								

TABLE A-61
YAKIMA AREA RAIL VULNERABILITY (U)

UNCLASSIFIED		
Railroads east and west of Yakima damaged (two cuts).		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	4
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	3
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or coordination to destroy or damage the asset	2	
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	3
Device is complex; attack quite susceptible to outside factors	2	
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures - security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	10
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**20**
Likelihood of Loss Given Attack Rating		
Certain 20-25		**20**
Highly Probable 15-19		
Moderately Probable 10-14		
Improbable 4-9		

TABLE A-62
YAKIMA RAIL ACCESS DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Railroads east and west of Yakima damaged (two cuts).		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of prefered deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of prefered deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2*
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**2**

NOTES:
*Units with heavy tracked vehicles could delay departure until the rail line is repaired and still not be late leaving CONUS. Units with roadable vehicles will not be seriously affected.

TABLE A-63
YAKIMA RAIL ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Railroads east and west of Yakima damaged (two cuts).		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	2
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**8**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		**8**
Not Serious 0-5		

TABLE A-64
YAKIMA RAIL ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain				**20, 2**			**20, 8**	
Highly Probable								
Moderately Probable								
Improbable								

TABLE A-65
SPOKANE-AREA HIGHWAY VULNERABILITY (U)

UNCLASSIFIED		
Five highways serving Spokane area cut.		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	4
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or **coordination** to destroy or damage the asset	2	2
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	
Device is complex; attack quite susceptible to outside factors	2	2
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures – security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	3
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**11**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**11**
Improbable 4-9		

TABLE A-65
DEPLOYMENT IMPACT OF DAMAGE TO FIVE SPOKANE HIGHWAYS (U)

UNCLASSIFIED		
Five highways serving Spokane area cut.		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of prefered deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of prefered deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	2
No significant deployment impact	0	
	Total	**2**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		2

TABLE A-67
COMMERCIAL IMPACT OF DAMAGE TO FIVE SPOKANE HIGHWAYS (U)

UNCLASSIFIED		
Five highways serving Spokane area cut.		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	10
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	10
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**20**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		**20**
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		

TABLE A-68
SPOKANE-AREA HIGHWAY FIVE CUT SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				**11, 2**	**11, 20**			
Improbable								

TABLE A-69
JIM CREEK HIGHWAY ACCESS VULNERABILITY (U)

UNCLASSIFIED		
Highway routes to Jim Creek cut (requires at least three cuts).		
Likelihood of Loss Given Attack	**Scale**	**Score**
Accessibility		
Easily accessible (ingress & egress); no obstacles; asset is in the open or near the perimeter; asset is reachable without accessing the site (i.e., can be targeted from a remote site)	5	
Asset is accessible with adequate planning; minimal obstacles to overcome to reach asset; asset is in the open	4	
Asset is accessible; several obstacles; asset somewhat difficult to reach	3	3 (a)
Not readily accessible; requires extensive planning and resources to gain access; numerous obstacles to overcome; asset location is difficult to reach	2	
Extremely difficult to access; numerous obstacles	1	
Effort - natural resistance of asset to attack, sophistication of attack		
Requires little skill; few resources, and minimal time; no precautionary measures exist to prevent intentional damage	5	
Requires limited knowledge, skills, and abilities to neutralize; requires few resources and little time to destroy or damage the asset	4	
Requires some knowledge and training; requires limited resources and time to destroy or damage the asset	3	3 (a)
Hardened to prevent damage; requires extensive knowledge, skills, ability, and/or coordination to destroy or damage the asset	2	
Difficult to damage; hardened site to prevent damage; virtually impenetrable or prone to sabotage; great knowledge, skill, ability, and/or coordination required	1	
Degree of Control Over Outcome - control perpetrator has over sequence of events after attack is initiated		
Attack directly harms target; attack not susceptible to outside factors	5	
Attack harms target almost directly; minor susceptibility to outside factors	4	
Simple sequence of events involved; some susceptibility to outside factors	3	
Device is complex; attack quite susceptible to outside factors	2	2 (a)
Success dependent on complex sequence of events following initiation of attack; attack highly susceptible to outside factors (weather conditions; electrical transmissions; dispersal of materials to intended targets, etc.)	1	
Security Measures - security devices, patrols, visibility		
No security measures for the asset; not visible to the public; remote site	10	
Minimal security (i.e., fence only); remote site	8	
Limited security measures (i.e., lights, patrols, no electronic measures); in remote area	5	5 (b)
Medium level of security (i.e., lights, patrols, early warning and anti-intrusion devices); located in large, built-up area	3	
High security level; 100% active armed security force; asset has electronic surveillance, ant-intrusion, or early warning device; highly visible to public; located in large built-up area	1	
	Total	**13**
Likelihood of Loss Given Attack Rating		
Certain 20-25		
Highly Probable 15-19		
Moderately Probable 10-14		**13**
Improbable 4-9		

NOTES:
a. Vulnerability is decreased since the terrorists would have to damage three sites almost simultaneously.
b. Vulnerability is reduced by visibility; terrorists might be spotted by passing motorists.

TABLE A-70
JIM CREEK HIGHWAY ACCESS DEPLOYMENT IMPACT (U)

UNCLASSIFIED		
Highway routes to Jim Creek cut (requires at least three cuts).		
Impact of Loss Given Attack - Deployment	**Scale**	**Score**
Deployability Impact/Recoverability - scope of impact; military units impacted; ease of replacement; time to repair		
Rerouting or alternate modes not feasible; several units deploy more than 2 weeks late; destruction or damage results in extended operational disruption	20	
Rerouting or alternate modes not feasible; several units deploy more than 1 week late; destruction or damage results in extended operational disruption	18	
Rerouting or alternate modes not feasible; a few (<5) units deploy more than 1 week late; destruction or damage results in extended operational disruption	16	
Rerouting or alternate modes not feasible; several units deploy 2 to 6 days late;	14	
Rerouting or alternate modes not feasible; a few (<5) units deploy 2 to 6 days late;	12	
Deployment by an alternative mode or port possible; no unit over 2 days late at port. However, logistically burdensome and/or results in increased infrastructure degradation	10	
Deployment through an alternate port possible; no unit over 2 days late at port. Causes tolerable burdens on the deploying unit and commercial users of the ports.	8	
Deployment by alternative mode possible, with acceptable burden on deploying units; no unit over 2 days late at port.	6	
Rerouting on detour routes of prefered deployment mode possible; no unit over 2 days late at port.	4	
Rerouting on detour routes of prefered deployment mode possible; all units likely to reach ports by scheduled Available to Load (ALD) dates	2	
No significant deployment impact	0	0
	Total	**0**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		
Not Serious 0-5		**0**

TABLE A-71
JIM CREEK HIGHWAY ACCESS COMMERCIAL IMPACT (U)

UNCLASSIFIED		
Highway routes to Jim Creek cut (requires at least three cuts).		
Impact of Loss Given Attack - Commercial	**Scale**	**Score**
Economic Impact/Recoverability - scope of impact; traffic volumes impacted; industries impacted; high operational costs; supported areas impacted; proximity to populated areas; cargo loss; loss of property or data; ease of replacement; time to repair; evacuations		
High traffic volume; rerouting or alternative modes requires much effort; high operational costs; high clean-up/response costs; significant impacts to multiple modes; destruction or damage results in extended operational disruption	10	
Moderate to high traffic volume; some rerouting or alternative modes required; asset can be repaired or replaced, but recovery is difficult	8	
Moderate traffic volume; moderate delays; moderate operational costs; moderate clean-up/response costs; repairs or replacement are moderately difficult	6	6
Some delays rerouting not required; repairs are relatively easy	4	
Low traffic volume; low delays; alternative routes readily available; low operational costs; no impact on other areas; repairs are not difficult	2	
No significant economic impact	0	
Human Loss - Likelihood of human loss		
High Human Loss (50 or more deaths)	10	
Moderate-High Human Loss (20-49 deaths)	8	
Moderate Human Loss (10-19 deaths)	6	
Low-Moderate Human Loss (5-9 deaths)	4	4
Low Human Loss (1-4 deaths)	2	
Human loss unlikely (no deaths; few, minor injuries at most)	0	
	Total	**10**
Impact of Loss Given Attack Rating		
Catastrophic 16-20		
Very Serious 11-15		
Moderately Serious 6-10		**10**
Not Serious 0-5		

TABLE A-72
JIM CREEK HIGHWAY ACCESS DAMAGE SUMMARY (U)

UNCLASSIFIED								
	Impact of Loss - Deployment				**Impact of Loss - Commercial**			
Vulnerability	Catastrophic	Very Serious	Moderately Serious	Not Serious	Catastrophic	Very Serious	Moderately Serious	Not Serious
Certain								
Highly Probable								
Moderately Probable				**13, 0**			**13, 10**	
Improbable								

APPENDIX B (U)

GLOSSARY (U)

UNCLASSIFIED	
AAP	Army Ammunition Plant
AFB	Air Force Base
ALD	Available to Load Date (at port)
AD	Army Depot
BNSF	Burlington Northern Santa Fe
CINC	Commander in Chief
CN	Canadian National
CPRS	Canadian Pacific Railway/CP Rail
CSXT	CSXT, owner of the former Chessie System and Family Lines Railroads
DCMC	Defense Contract Management Command
DI	Defense Infrastructure Sectors
DOD	Department of Defense
(US) DOT	(US) Department of Transportation
FORSCOM	U.S. Army Forces Command
FAA	Federal Aviation Administration
FRA	Federal Railroad Administration
HET	Heavy equipment transporter (the M1070/M1000 or similar vehicles)
HMMWV	High Mobility Multi-purpose Wheeled Vehicle
MGT	Million Gross Tons (or Million gross ton-miles per mile) per year; a measure of rail freight traffic density
MSC	Military Sealift Command
MTMC	Military Traffic Management Command
MTMCTEA	Military Traffic Management Command Transportation Engineering Agency
NAS	Naval Air Station
NEW	Net explosive weight
NFD	Naval Fuel Depot
NSB	Naval Submarine Base
NWS	Naval Weapons Station
ODS	Operation Desert Shield/Storm
OPLAN	Operation Plan
PSAP	Puget Sound and Pacific
PPP	Power Projection Platform
RND	Railroads for National Defense Program
SPOE	Seaport of embarkation
STRACNET	Strategic Rail Corridor Network (network of rail lines designated important to National Defense)
SWF	Surface Warfare Facility
TPFDD	Time-Phased Force and Deployment Data
UP	Union Pacific
USCG	United States Coast Guard
USG	US Government-owned railroad
USTRANSCOM	United States Transportation Command

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