

Commission Briefing Paper 4F-01

Military Deployment Support: Evaluation of the System's Ability to Support Future Military Deployment Needs

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Introduction

This paper is part of a series of briefing papers to be prepared for the National Surface Transportation Policy and Revenue Study Commission (the Commission) authorized in Section 1909 of SAFETEA-LU. The papers are intended to synthesize the state-of-the-practice consensus on the issues that are relevant to the Commission's charge outlined in Section 1909, and will serve as background material in developing the analyses to be presented in the final report of the Commission.

This paper presents information on the current state-of-the-practice and issues surrounding key transportation and logistics requirements for providing **Military Deployment Support**. This paper also explores the defense transportation system's interface with the national transportation infrastructure in supporting future deployment needs and constraints impacting transportation of military personnel and equipment. Recent major military actions such as Operations Desert Storm, Enduring Freedom, Iraqi Freedom, and increasing domestic and international disaster relief, have tested the abilities of the National Highway System (NHS) and intermodal transportation operations to support them.

As global demands upon the military increase, the vision of how to efficiently and effectively respond also evolves. One methodology used for moving material and equipment is from "fort to port." Here material is moved from Power Projection Platforms (PPP) and Power Generation Platforms (strategic military bases) along a network of highway and rail systems to intermodal connections. Support for the war efforts has become increasingly nationalized as more Reserve and National Guard Units (and their logistics support) are being called for duty. This, along with the military's "factory to foxhole" concept of increased reliance on commercial outsourcing of transportation, logistics, and maintenance support, also places an increasing burden on the nation's intermodal infrastructure, thus impacting mobility, capacity, and productivity.

The Department of Defense (DoD) addresses defense public highway issues through the Highways for National Defense (HND) Program, which is administered by the Military Surface Deployment and Distribution Command (SDDC) on behalf of DoD and the U.S. Transportation Command. FHWA has partnered effectively with SDDC in executing the HND Program.

Background and Key Findings

Future military deployments will continue the trend toward more rapid movement of critical forces and the requirement for timely provision of logistics support. Reliance upon the national transportation infrastructure to efficiently facilitate these movements is imperative. Support for

Operation Desert Shield/Storm (ODS) required more than 3.5 million tons of material,¹ much of which traveled over NHS connectors resulting in roughly 500 shiploads and 9,000 aircraft loads.² Although the surface and rail infrastructure was generally able to support the movement, the operation did bring to light systemic challenges that were addressed in Operations Enduring Freedom (OEF) and Iraqi Freedom. In early deployment, a small, yet critical amount of cargo moves on military assets. For example, more than 95 percent of the equipment and cargo shipped to ODS moved on commercial carriers;³ however, the pressure for increased efficiencies and decreased excess capacity led to a potential decrease in commercial availability during future deployments. This led to the development of concepts like the Voluntary Intermodal Sealift Agreement (VISA), which pre-plans surface, sealift, and airlift capacity requirements and contractual terms to lessen the burden on the overall transportation system⁴ when the requirement for rapid transportation arises.

The Strategic Highway Network (STRAHNET) and all types of intermodal connectors (rail-road, road-air, road-port) are also vital elements of deployment support, and it is important to have adequate funding support as necessitated by evolving deployment needs and support methodologies. Data pertaining to the physical STRAHNET specifications; limitations; current physical and environmental conditions; planned maintenance; and congestion needs to be readily available. Data regarding incidents and other real-time impacts to vehicle movement also needs to be available through continued advancements in intelligent transportation systems (ITS) and other transportation technologies. This data must be accessible via a secure, interactive format to authorized agencies and personnel to facilitate coordinated route planning, vehicle tracking, and maintain security for in-transit resources.

As the military provides both national defense and response to domestic natural disasters, the DoD, with its Reserve and National Guard Unit components and national support structure, will continue to rely heavily on national surface transportation infrastructure to fulfill those support requirements. FHWA will continue to provide policy guidance and oversight in coordination with SDDC to mitigate the increased pressures on mobility, safety, and productivity. Key findings derived from the DoD interviews identify the following perceived needs:⁵

- Continued USDOT support to ensure an effective and timely response to requirements for both military power projection and domestic emergency response.
- Continued and enhanced USDOT support for a flexible STRAHNET system; for providing rapid and efficient upgrades to existing roadways; and for placing new, strategic roadways where required, to minimize delay when completed.

¹ FHWA Website, last accessed January 2, 2007:

<http://ops.fhwa.dot.gov/freight/freight_analysis/nhs_connectors/role_nhs_conn/role_sys_conn_3.htm>.

² “Defense Logistics: From DoD Stovepipes to ‘Focused Logistics,’” Michael Wolfe, The North River Consulting Group, under FHWA Contract DTFH61-97-C-00010, BAT-99-020, with Battelle (1999).

³ TRB Millennium Study: “U.S. Military Transportation,” Sarah Brown, Henry M. Bennett, and Robert B. Honea (Washington, D.C.: 2000).

⁴ “The Role of the National Highway System Connectors: Industry Context and Issues,” U.S. Department of Transportation, Federal Highway Administration. Prepared by A. Strauss-Wieder, Inc. (February 1999).

⁵ In addition to these key findings, the DoD’s objective is to streamline approvals for operational and project development requirements, and add emphasis on mitigating activities such as providing special lanes, truck-only routes and toll roads procedures.

- Continued development and funding of “last mile” connectors to the intermodal nodes, specifically seaports and airports.
- Provide a national, standardized secure transportation information management database for civil and military use in route planning and in-transit visibility to the extent inasmuch as it is supported by technology.

Commission Staff Comments

This paper provides a good overall discussion of this topic. However, it may give too little emphasis to the fact that the Operation Desert Shield/Storm 1990-1991 deployments resulted in few transportation problems except at ports and that subsequent deployments have resulted in few of any kind of problems. It has been suggested that given the expected trend towards lighter, more compact military equipment, future deployments are not likely to be significantly more difficult than these recent ones.

Existing STRAHNET in the NHS Context

The NHS is nearly 160,000 miles of roadway important to the nation's economy, defense, and mobility. The NHS was developed by the USDOT in cooperation with the States, local officials, and metropolitan planning organizations (MPOs)⁶ and DoD. Because of its national importance, STRAHNET was incorporated into the NHS. The NHS is a system of routes comprised of greatly varying standards that are eligible for Federal assistance,⁷ and includes five elements:

1. The Eisenhower Interstate System of highways, a separate identity retained within NHS.
2. Other principal arterials, including highways in rural and urban areas that provide access between an arterial and a major port, airport, public transportation facility, or other intermodal transportation facility.
3. The STRAHNET, comprising 61,044 miles, including the 45,376-mile Interstate System and 15,668 miles of other important public highways⁸ critical to the United States' strategic defense policy. The STRAHNET provides defense access, continuity, and emergency capabilities for defense purposes. Over time, the STRAHNET concept has evolved from the need for a paved heavy load-bearing system that accessed domestic military facilities and ports, to the rapid deployment needs of the Iraq wars, stressing high-volume movements between bases, equipment and munitions manufacturers, ports and airports. The most recent evolution is the importance being placed on military needs in the definition of intermodal connectors on the NHS.⁹ Figure 1 presents the STRAHNET system.
4. Intermodal connector routes that provide access between major intermodal facilities and the other four NHS elements.
5. Major strategic highway network connectors used to provide access between major military installations and ports to the STRAHNET. In December 1991, the Intermodal

⁶ FHWA Website, last accessed January 2, 2007: <<http://www.fhwa.dot.gov/hep10/nhs/>>.

⁷ NCHRP 20-24(52), The Economic Impact of the Interstate Highway System, June 13, 2006, p. 20.

⁸ DoD Website last accessed on January 2, 2007: <<https://www.tea.army.mil/pubs/res/dod/pmd/STRAHNET.htm>>.

⁹ Ibid., NCHRP 20-24(52), p. 26.

Surface Transportation Efficiency Act of 1991 (Public Law 102-240) incorporated a “strategic highway network” and “major strategic highway network connectors” as an integral part of the NHS.¹⁰

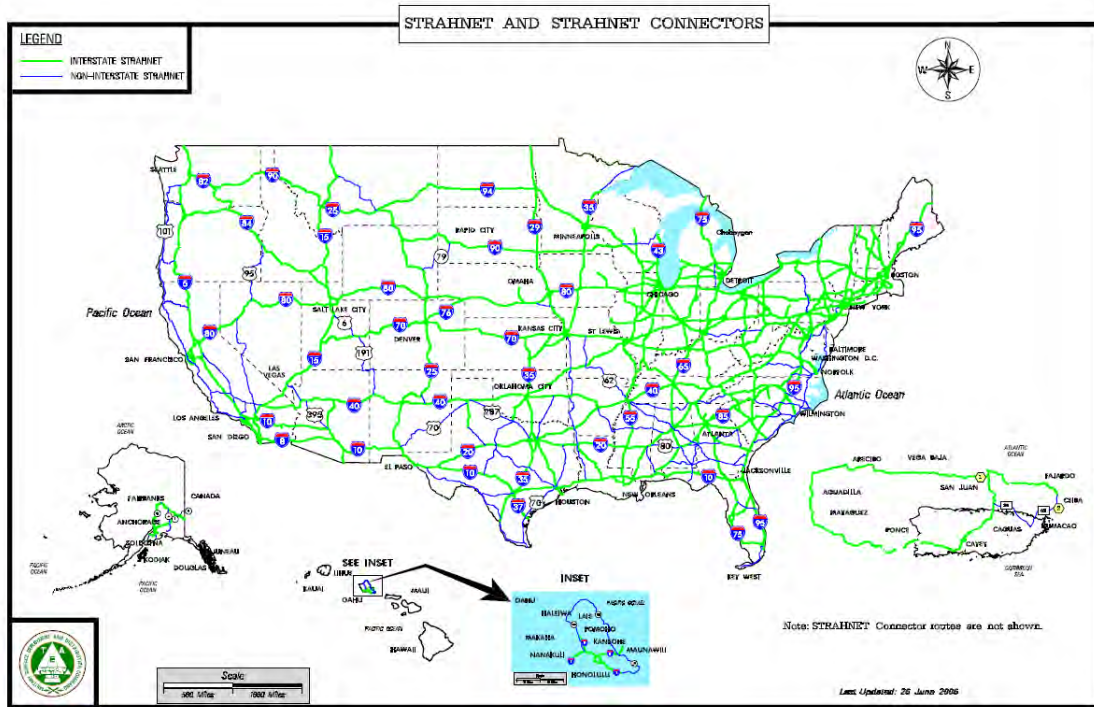


Figure 1. STRAHNET System.

Factors Influencing Current and Emerging Military Deployment Needs

The DoD’s future needs will emphasize speed, precision, accuracy, visibility, and centralized management, yet minimize the need to stockpile large amounts of material waiting to support an operation, and ensure the flow of material directly from “factory to foxhole.” Our Armed Forces will be a rapid-deploying, downsized, precision force with critical need for swift movement, efficient and timely data from Information Technology (IT) tools, and effective logistics support. All will depend upon the Nation’s infrastructure and technological developments to support rapid and unencumbered movement and provide in-transit visibility of resources and logistics during all operational phases. The transportation system infrastructure and technology must be robust to handle the physical demands and to provide data-rich and accessible information to manage movements and facilitate real-time planning and tracking. For example, moving one mechanized division from fort to port would require 1,722 89-foot flatcars; 214 heavy-duty flatcars; and 524 20-foot containers. Military strategists desire the deployment of up to five of these divisions in support of worldwide operations.¹¹ Movements of this magnitude require a continued focus on infrastructure design; maintenance; information systems, including IT tools for real-time route condition; congestion and traveler information; transportation planning tools; and integrated

¹⁰ FHWA Website last accessed on January 2, 2007: <http://www.fhwa.dot.gov/hep10/nhs/review/nhsreviewmemo.html>.

¹¹ “Defense Logistics: From DoD Stovepipes to ‘Focused Logistics,’” Michael Wolfe, (1999).

coordination using traffic management centers, as well as data about the infrastructure itself (i.e., bridges).

A recent American Association of State Highway and Transportation Officials (AASHTO) recommendation stated that "...the U.S. Congress should adopt a national Vision for the continued expansion, maintenance, and operation of an effective and efficient Interstate Highway System...funded at an appropriate level, maintained and preserved in accordance with sound asset management principles, efficiently operated using the latest available technology and expanded" that includes support for national defense and homeland security."¹²

In planning for the future of our Nation's security for the next 50 years, Congress should consider and take measures to assess the adequacy of the Interstate System and the NHS to meet both military and domestic surface transportation needs. These needs range from improved immediate transport and rapid deployment capabilities, as well as increased system stress due to prolonged engagements, and the evolving logistics support methods that increasingly rely on defense and commercial supply chains. AASHTO recommends that an assessment needs to be adequately funded to be conducted by the SDDC Transportation Engineering Agency (SDDCTEA) and completed by 2008.¹³ Regardless of the era, success depends upon the Nation's transportation infrastructure's ability to be flexible and to move rapidly in response to changing needs.

Current Force Deployment Needs

When the country is at war, military strategists anticipate that the military's focus will be on faster response times, lighter equipment, increased agility in logistics support, and multi-theater conflicts, which all impact the modes, nodes, and connectors of the deployments on the nation's transportation system.¹⁴ For the 1- to 5- year time frame, the vision for military deployments is evolving to rely on concepts like "factory to foxhole," while continuing to use intermodal operations for rapid deployments from "fort to port."

The impact of the pending redeployment of Army Divisions from Europe and the resulting increased return of equipment at North American ports of entry to handle repositioned material at military locations and civilian repair facilities across the Nation also must be considered. Massive and rapid movement of supplies and material between coasts and distribution organizations will become more common, resulting in increased communications to facilitate efficient route planning, including congestion/construction avoidance, incident reporting, passive vehicle/load tracking, etc. There also will be an ever-increasing critical need for enhanced security to rapidly assess developing situations over the route, and real-time monitoring of key strategic infrastructure nodes (i.e., bridges, tunnels, etc.).

¹² AASHTO Interstate Highway System Recommended Actions, October 3, 2006.

¹³ Ibid.

¹⁴ Note: The military planning horizon is typically seen in budget reports, such as the Future Years Defense Plan (FYDP), which details the 5- to 6-year budget plan. There are Joint Vision Studies, such as the Army Vision 2010, and the Joint Vision 2020 study released on May 30, 2000, and the Training and Doctrine Command (TRACDOC) Pamphlet: *The Army's Future Force Concept 2015-2024, v 2.0* released in April 2005, which offer "blueprints" for the DoD to follow in the future.

Over the 6- to 20-year time horizon, the need for flexibility to support rapid world-wide deployment on extremely short notice is anticipated as the norm. Integrating the military deployments and logistics support system with commercial transportation operations can become seamless with increased reliance upon civil sector support. Since the National Guard and Reserve forces are being used more and more frequently in power projection, they are significantly empowered with planning and transportation roles, requiring closely integrated databases and constant communication with all levels of civil and military authorities. Because of its flexibility and responsiveness, this joint civil and military team will remain the key to operational success in the future. Integrating core competencies provided by the individual Services is essential to the joint team, and the employment of the capabilities of the “Total Force” (Active, Reserve, Guard, and civilian members) increases the options for the commander.¹⁵

Looking at needs beyond the 20-year horizon, the Armed Forces will need to be faster, more lethal, and more precise than they are today. DoD will continue to invest in and develop new military technology and capabilities to broaden the focus beyond technology and capture the importance of organizational and conceptual innovations.¹⁶ Rapid projection of an initial battle force will require that its logistics support requirements be substantially smaller than for present forces. Long-term investments in the infrastructure, science, and technology to support and move military contingents will be required.¹⁷ This technology may include self-repairing equipment that reduces the need for a long logistics support tail; integrated, flexible, and seamless systems that provide support from vendor to battlefield; high-speed rail service; smart robotics in rail operations; and the Automated Highway, an ITS initiative for safety and route planning. Even with the developments in rail and other transportation methodologies, the roadways and connectors, particularly the STRAHNET, will continue to be a resource in moving military material and personnel. Accordingly, USDOT must continue to develop policies, guidelines, and construction, as well as in maintenance planning and funding legislation to cultivate technological advances to support rapid deployments and sustainment operations in multiple global locations.

Key Military Transportation Requirements

Strategic mobility and readiness are keys to the military’s ability to project power worldwide. Each of the military services—Army, Navy, Air Force, and Marine Corps, as well as their component Reserve, National Guard, and Coast Guard counterparts—has made great strides in implementing the specific recommendations of the congressionally mandated Mobility Requirements Study, as well as more recent findings from Operations Enduring Freedom, Iraqi Freedom, and the Global War on Terrorism.¹⁸ The ability to deploy equipment and personnel rapidly is an imperative of the national military strategy. That strategy expects the military to defend the homeland, deter aggression in four regions of the world, swiftly defeat adversaries in

¹⁵ Joint Vision 2020, U.S. Government Printing Office (Washington DC: June 2000).

¹⁶ Ibid.

¹⁷ Commission on Engineering and Technical Systems, “Reducing the Logistics Burden for the Army After Next: Doing More with Less,” National Academy Press (1999), p.16.

¹⁸ Coordinating Military Deployments on Roads and Highways: A Guide for State and Local Agencies, FHWA-HOP-05-029 (May 2005), p. 3.

two other conflicts, and conduct a limited number of small operations. Also implied is the requirement to deploy forces both within and from the United States to anywhere in the world.¹⁹

Strategic mobility has three components: *Deployment*, at the “front end”; *sustainment*, to establish and maintain sufficient and timely flows of all commodities needed by the deployed forces to operate in the field; and *re-deployment*, which usually occurs as operations are scaled down, concerns either return to peacetime stations or relocation to another theater of operations. Deployment and sustainability are the most salient features of strategic mobility from the perspective of the total freight transportation system.²⁰ To meet deployment goals, it is critical that the units move rapidly from their installations to embark from land, sea, and aerial ports or to designated locations within the United States.²¹ Therefore, it is imperative that DoD requirements continue to be an integral part of Federal transportation policy development and execution.

Meeting key military transportation requirements has resulted from the successful and effective relationship developed between the USDOT and DoD personnel over the years. Such collaborative relationships should be encouraged, continued, and expanded wherever possible, as they will help to ensure interconnectivity, and continued excellent working relationships among Federal, State, Local Transportation Agencies, and the DoD.

Intermodal Operations

Surface: The STRAHNET surface connectors are additional highway routes linking over 200 important military installations and ports to the STRAHNET. These routes are used when moving military personnel and equipment during a mobilization or deployment, and end at the port boundary or installation gate. While installations may have multiple access/egress routes, the STRAHNET connector is generally the most direct and highest functional class roadway.²² Currently, many connectors are in local systems and some local routes not previously contained within the Federal-Aid Program have since been added for Federal funding assistance. Given competing highway needs throughout the State, STRAHNET “last mile” connectors may not receive priority funding. As a result, Local and State officials face a dilemma when attempting to raise the importance of STRAHNET connectors without a specific funding category dedicated to these important intermodal connectors.

Rail: The Railroads for National Defense (RND) Program was designed to ensure that the commercial rail infrastructure in the United States meets DoD requirements for force deployment. As the RND Program has evolved over time, SDDCTEA has worked closely with the Federal Railroad Administration to monitor, examine, and improve the access tracks to the 17 Power Projection Platforms (PPP) installations.

¹⁹ Ibid.

²⁰ “Defense Logistics: From DoD Stovepipes to ‘Focused Logistics’,” Michael Wolfe of The North River Consulting Group FHWA Website last accessed January 2, 2007:
<http://www.ops.fhwa.dot.gov/freight/theme_papers/theme_paper_index.htm>.

²¹ Ibid., Coordinating Military Deployments on Roads and Highways, p. 3.

²² STRAHNET Guide compiled from the SDDCTEA Website, July 2005, last accessed January 2, 2007:
<<http://www.tea.army.mil/cdrom/Readmes/index.htm>>.

The rail portion of the intermodal deployment support picture is important in the movement of very heavy or oversized equipment that may not move so easily over the highways. When the commercial rail network was put to the test during Operations Desert Shield and Desert Storm, no significant problems were noted. This network proved to be a crucial link in transporting combat power, and its successful use helped to ensure a swift end to the war, which was a real testament to how well the RND Program supports strategic rail mobility.²³ Although the rail network's current overall performance is satisfactory, due to its capacity, it is anticipated that oversized and high-weight equipment will continue to be used by the Army. This is anticipated since the rail network offers ease of loading, unloading, and transport to the ports of entry/ports of destination. The rail network also offers critical in-transit visibility which assures the right equipment at the right location at the right time. It is anticipated that even if there is an increase in military usage, the need for the surface mode as a backup method will exist and will be the primary mode for installations that are in close proximity to the ports.

Ports: Ports play an integral role in the intermodal nature of military deployments. The following typical key lessons learned were compiled as a result of Operation Enduring Freedom:

- Many infrastructure improvements and process changes made by DoD since ODS increased DoD's ability to accelerate the speed and amount of surge equipment moved from the forts to the commercial ports.
- During OEF, the increased cargo flow to the ports via rail and commercial truck provided a big operational challenge to the ports and Transportation Terminal Brigades/Battalions. The high flow was not anticipated and never evaluated or discussed during training or port readiness exercises.
- In some ports, the port-rail capacities were quickly exceeded, forcing rail cars to be staged outside the port in non-secure areas. This posed security challenges to the military and civilian agencies supporting the operation. In two ports, the accelerated cargo flow highlighted the need for additional tracks and staging area improvements at the port.
- The increased flow dramatized the need for additional equipment and manpower to unload trains and trucks, and to load vessels (portable ramps, rail car spanners, Commercial Driver License qualified drivers, and longshore labor).
- This accelerated cargo flow also highlighted the need for accurate and timely communications (data and verbal) among/between the fort, rail carriers, truck carriers, and the ports concerning the contents of trains/trucks and their estimated arrival times.²⁴

Additional Areas of Challenge

Due to the increasingly intermodal nature of wartime support, including increased integration of defense and commercial supply chains, the impact on the Nation's infrastructure could become acute. Federal, State, and Local Transportation Agencies need to continue to work together to address infrastructure and road improvements as they relate to installation, maintenance, and port priorities. Minimally, improvement priority needs to be given to Power Projection Platforms, Power Support Platforms, Power Generation Platforms, and Power Generation Support Platform facilities.

²³ STRAHNET Guide compiled from the SDDCTEA Website, July 2005.

²⁴ U.S. Maritime Administration, Operation Enduring Freedom Lessons Learned Report (September 2003), p.3.

One area that has an impact on the movement of material over the STRAHNET system is intermodal connectors. A recent review of those connectors revealed the generally poor physical and operational condition on the connectors as well as a variety of impediments to improvements as documented in the Report to Congress titled, *NHS Intermodal Freight Connectors*. One of the major problems identified by the States and MPOs in the field inventory for the report was that NHS freight connectors do not get priority, given the pressing needs on the mainline system, including STRAHNET connectors, into the PPP facilities as noted above. Connectors are often viewed as primarily serving private interests and that the community benefits little in improving them. The efficiency of equipment and material deployment throughout the NHS from those locations relies on the ability of the connectors to smoothly link with the STRAHNET with associated intermodal nodes.

As defense-related usage of the transportation system continues to increase, the need for readily available and accurate system condition data over a larger area becomes more acute. Automated asset management programs that provide bridge and pavement locations and condition information become important tools during deployment planning. Updating the existing automated databases becomes paramount in helping to gain efficiencies as new Geographic Information System tools are developed to pinpoint infrastructure assets for convoy movements.

During a recent deployment, shipment volumes of military assets from military installations through the Nation to strategic seaports increased 29 percent, resulting in a 15-percent increase in required truck capacity just for military needs.²⁵ For certain States with destination ports, the increase in truck volume was greater than 15 percent because vehicles were traveling from multiple States to a designated port within a State.²⁶ Solutions to mitigate the impact of the congestion must continue to get visibility and funding as State DOT officials address means to enhance military convoy or DoD commercial movements. Solutions include traffic advisories and information on construction work zone restrictions or closures; traffic-related weather advisories; conditions at public rest areas/rest stop/refueling locations; incidents that may affect convoy timeliness; and the locations and times of recurring traffic congestion.²⁷ This often “manual” data exchange indicates such information exists at various levels. In the future, this information must be accessible in a standardized real-time secure electronic format to authorized users. The following measures would mitigate congestion-related challenges:

- Employing real-time traffic monitoring and management systems using ITS technologies that allow transportation operations to consolidate and provide accurate and timely information about roadway conditions, estimated travel times, congestion conditions, and special events or unscheduled closures.
- Pre-identifying high-traffic congestion areas and their peak periods to allow planners to effectively schedule or route convoys to preclude congestion.
- Developing uniform criteria for convoy vehicles to obtain and use or bypass the EZ-Pass system and other toll facilities.

²⁵ Transportation Research News, March - April 2004, pp. 6-10.

²⁶ Coordinating Military Deployments on Roads and Highways: A Guide for State and Local Agencies; FHWA-HOP-05-029, (May 2005), p. 4.

²⁷ Ibid., p. 9.

Another area that presents a challenge is to develop a means to expedite the oversize/overweight permitting process for military vehicles. Because some vehicles are oversize and overweight by state/local limitations, it is critical that the State DOT (permitting agency) assist in determining which routes (roads and bridges) will be able to support the equipment. The State DOT permit officer must coordinate closely with regional and district State DOT offices to ensure that height and weight clearance information is timely and accurate, and the permitting process moves quickly.

As the military has become more US-based, the remaining U.S. military installations have become more important. These installations serve as critical launching platforms to deploy troops and equipment expeditiously to air and seaports of embarkation and on to world trouble spots. Therefore, military installation roads, in addition to the NHS, play a critical role in the movement of troops and equipment from installation staging areas to the ports.²⁸ Accordingly, safety issues associated with these roads are also critical, and need to be reviewed and addressed to provide the necessary safe and secure passage to support efficient military transport and deployment actions.

CONSOLIDATED COMMENTS FROM MEMBERS OF THE BLUE RIBBON PANEL OF TRANSPORTATION EXPERTS - PAPER 4F-01

Several reviewers combined their comments as follows:

DoD's logistical plan of defense material movement from "factory to foxhole" would appear to carry significant implications on domestic freight movement as compared to the earlier "fort to port" approach.

The existing STRAHNET system must be thoroughly reviewed in the context of the changing logistical approach for modal and system implications.

It appears likely that a more diverse surface transportation system for military needs deployment may be required. However, peak demands on previously key segments may be reduced.

Perhaps these changing dynamics are already being incorporated into the ongoing USDOT and DoD planning process but the paper does not discuss this critical need.

²⁸ Reauthorization Resource Paper Transportation Serving Department of Defense Lands; Military Traffic Management Command Transportation Engineering Agency, (April 2002).