

Special Report 302

Federal Funding of Transportation Improvements in BRAC Cases

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Committee on Federal Funding of Transportation Improvements in BRAC Cases

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Transportation Research Board
Washington, D.C.
2011
www.TRB.org

Transportation Research Board Special Report 302

Subscriber Categories:

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This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This study was sponsored by the U.S. Department of Defense.

Library of Congress Cataloging-in-Publication Data

Information will appear in the printed publication.

ISBN 978-0-309-16081-0

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Preface

The amendment to fiscal year 2010 defense appropriations by Senator Mark Warner requested a study by the National Academy of Sciences of federal funding of transportation improvements in Defense Base Closure and Realignment Commission (BRAC) cases. The amendment requires that the study cover the following tasks:

1. Examine case studies of congestion caused on metropolitan road and transit facilities when BRAC requirements cause shifts in personnel to occur faster than facilities can be improved through the usual state and local processes;
2. Review the criteria used by the Defense Access Roads (DAR) program for determining the eligibility of transportation projects and the appropriate Department of Defense (DoD) share of public highway and transit improvements in BRAC cases;
3. Assess the adequacy of current federal surface transportation and DoD programs that fund highway and transit improvements in BRAC cases to mitigate transportation impacts in urban areas with preexisting traffic congestion and saturated roads;
4. Identify promising approaches for funding road and transit improvements and streamlining transportation project approvals in BRAC cases; and
5. Provide recommendations for modifications of current policy for the DAR and Office of Economic Adjustment programs, including funding strategies, road capacity assessments, eligibility criteria, and other government policies and programs the National Academy of Sciences may identify to mitigate the impact of BRAC-related installation growth on preexisting urban congestion.

In response to the congressional request, the Transportation Research Board of the National Academies (TRB) convened a committee chaired by Joseph M. Sussman, JR East professor and professor of civil and environmental engineering and engineering systems, Massachusetts Institute of Technology. The committee has expertise in transportation budgeting and policy, military budgeting and policy, infrastructure planning, state and local infrastructure management, economics, and military facility planning (see Study Committee Biographical Information, p. 87).

To carry out this work, the committee met three times between April and December 2010. In examining case studies and gathering other information, the committee heard presentations from DoD, metropolitan planning organizations, state and local representatives, and base personnel.

In carrying out its investigation of BRAC cases, the committee became aware of underlying issues at military bases that apparently affected BRAC 2005 decisions and continue to affect the ongoing relationships between military bases and their surrounding communities. The BRAC 2005 decisions have been made and, as of this writing, no further BRAC rounds are contemplated. The law authorizing BRAC will expire on September 30, 2011. The committee has recommendations that, if implemented, will ameliorate some of the most adverse transportation impacts of BRAC 2005, but its findings and recommendations about improved communication and collaborative planning between growing bases and surrounding communities will be helpful in the future even after current BRAC legislation expires. Some military bases

will continue to experience growing pains, and those in built-up metropolitan areas will continue to confront transportation constraints in the civil sector. The committee's findings and recommendations set the stage for better transportation outcomes for growing bases and their surrounding communities.

Better information about civil sector transportation constraints in the BRAC 2005 round could have resulted in different decisions. Should there be another round of base consolidations, implementation of the committee's recommendations will help ensure that decisions about military priorities are fully informed about adverse transportation impacts on surrounding communities as well as on the bases.

As required in its charge, the committee makes recommendations to modify the DAR program to make it more effective. The committee finds the DAR criteria most in want with regard to bases in metropolitan areas, and its recommendations to change the criteria are meant to apply only to bases in metropolitan areas. However, the committee does not intend for the changes recommended for the DAR program to apply only in BRAC 2005 cases.

ACKNOWLEDGMENTS

The committee appreciates the contributions of a number of people who provided information that assisted in the preparation of this report: Mark Brunner, Senator Warner's office; Dorothy Robyn, deputy under secretary of defense; Darryl Hampton, director, DoD DAR program; Timothy Canan, Washington Area Council of Governments, Transportation Planning Board; Cord Sterling, member of Virginia's Commonwealth Transportation Board and the Stafford County Board of Supervisors; Andrew Scott, special assistant to the secretary, Maryland Department of Transportation; Colonel Mark Moffatt, deputy garrison commander for BRAC, Fort Belvoir, VA; Jim Turkel, chief, BRAC Integration Office, Mark Center, VA; Al Miller, transportation demand management coordinator, National Geospatial Agency; Bert Rice, BRAC project office, Fort Meade, MD; Jeff Miller, transportation program manager, National Naval Medical Center Bethesda, MD; Dan Penrose, project manager, Office of Economic Adjustment Grants, Economic Development, City of Lakewood, WA; Craig Helmann, technical services manager, Urban Planning Office, Washington Department of Transportation; Steven Perrenot, director of public works, Joint Base Lewis-McChord; Patrick O'Brien, director, DoD Office of Economic Adjustment; Cyrena Eitler, Compatible Use Program lead project manager, DoD Office of Economic Adjustment; and Ronald Kirby, director of transportation planning, Metropolitan Washington Council of Governments.

The report was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

Thanks go to the following individuals for their review of the report: Major General Del Eulberg (ret.), Booz Allen; David H. Morrison, the Boeing Company; Barry Seymour, Delaware Valley Regional Planning Commission; Robert L. Sack, New York Department of Transportation; Martin Wachs, RAND Corporation; Tom Clark, Metro-Denver Economic

Development.

Although these reviewers provided many constructive comments and suggestions, they were not asked to endorse the committee's findings or recommendations, nor did they see the final draft of the report before its release. The review was overseen by National Academy of Engineering members A. Ray Chamberlain, retired, and C. Michael Walton, University of Texas, Austin. Appointed by the National Research Council, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and institution.

Edward Weiner served as a consultant to the committee and prepared the report under the guidance of the committee and supervision of Stephen Godwin, Director of Studies and Special Programs. Weiner also prepared Appendix A. Suzanne Schneider, Associate Executive Director of TRB, managed the report review process. The report was edited by Cay Butler; Rona Briere provided valuable editorial direction for the chapter of case studies; Melanie Wilkins assembled the maps for the case studies; Juanita Green managed production; and Jennifer J. Weeks prepared the manuscript for prepublication web posting under the supervision of Javy Awan, Director of Publications, TRB. Special appreciation is expressed to Amelia Mathis for assistance with meeting arrangements and communications with the committee.

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Executive Summary

The Defense Base Closure and Realignment Commission (BRAC) 2005 round is fundamentally different from previous rounds. It concentrates tens of thousands of additional personnel at a number of bases, some of which are located in metropolitan areas with already congested transportation infrastructure. The time period by which BRAC decisions must be fully implemented (September 2011) is far too short for some bases and surrounding communities to avoid significant added traffic congestion for military personnel and other commuters during peak travel periods. The resulting traffic delays will impose substantial costs on surrounding communities and may even be harmful to the military.

The existing funding mechanisms, through the U.S. Department of Transportation (USDOT) and the Department of Defense (DoD), are incapable of addressing the problems in terms of both the speed with which they can be implemented and the resources they have available. Moreover, base commanders lack incentives, guidance, and resources to address the problems bases cause outside their gates.

In cases documented in this report, base growth due to BRAC and other DoD policies outstrips communities' abilities to respond. This problem is partly due to the controversy and difficulty of expanding capacity in built-up areas in response to growing populations and travel and partly due to severely constrained resources.

- The prescribed planning and decision-making process that metropolitan planning organizations (MPOs) must follow often require more than a decade to complete environmental assessments, follow public participation requirements, and develop political consensus on priorities. MPOs typically have far more projects proposed for their capital plans than can be funded.
- Funding of surface transportation infrastructure depends heavily on motor fuel tax revenues, which are declining in real terms because of an aversion to higher taxes, improved fuel economy, and new automotive fuels. The recent recession has reduced tax revenues far below levels needed to expand, or even maintain, capacity in response to normal demand, much less to address rapid, large-scale increases.

DoD sees its responsibilities for off-base transportation facilities as limited. The only DoD program available to assist in funding transportation infrastructure off the base—the Defense Access Roads (DAR) program—is inadequate for base expansion in built-up areas. Eligibility is determined by the criterion of a doubling of traffic, which is impossible on already congested facilities. Aside from DAR, DoD policy states that local and state authorities are responsible for off-base transportation facilities even if DoD decisions increase congestion; this policy is unrealistic for congested metropolitan transportation networks. Moreover, off-base projects compete poorly in the military construction (MILCON) budget, which also funds the higher priorities of base commanders for on-base facilities. Finally, DAR is limited to road projects, whereas transit is often necessary to serve some travel demand in congested metropolitan areas.

Over the next few years, the specific problems caused by BRAC 2005 can be ameliorated by the committee's recommendations, which are briefly summarized in the following paragraphs and described in detail in Chapter 5.

- DoD should accept more financial responsibility for problems it causes on the transportation facilities serving military bases in much the same way that private developers are assessed impact fees for the costs they impose. The DAR program should be revised to pay for the military's share of road improvements and a separate DoD program should be established to fund the transit services necessary to meet military needs. These changes will require increased funding and segregation of these funds within the MILCON budget.
- Additional traffic in congested areas has a nonlinear effect; each added vehicle causes a disproportionate delay on other users. As a result, strategies to shift modes, change time of travel, and encourage telework and carpools, while modest in appearance, have substantial benefit. Increased funding and segregation of base operating and maintenance accounts, as well as monetary incentives for base commanders to prioritize and implement transportation management measures, will also be needed.
- In some cases, the facilities affected by base expansion are part of a dense network where the bottlenecks caused by increased military-related traffic may occur miles from where the base is located. The military cost responsibility should be based on a detailed analysis of how expanded base traffic affects delay and the cost of improving facilities to accommodate traffic growth attributed to the military.
- Communities that benefit economically from the presence of military bases should pay their share of needed transportation improvements, relying on normal transportation resources. Metropolitan areas may need to shift priorities in their capital plans accordingly.
- Bases and metropolitan areas should greatly improve communication and coordination concerning base demands on the infrastructure of their surrounding communities. DoD should provide base commanders guidance and resources to expand military base master plans to include necessary infrastructure off the base. This should be accomplished by expanding services provided by DoD's Office of Economic Adjustment. Federal surface transportation-planning regulations should be revised to require MPOs to include base officials in their decision-making processes.
- The recommendations made above will not be sufficient to address the immediate impacts of BRAC 2005, which may be severe in some areas. Congress should consider a special appropriation or reallocation of stimulus funds to pay for near-term improvements in the most adversely affected communities. The cost of these improvements should be estimated by the Secretary of Transportation, who should also award funding to projects that will provide the most near-term relief to the most severe problems.

Resolving metropolitan area transportation congestion problems is a complex, expensive, and ongoing effort. The additional travel demand caused by BRAC 2005 on congested routes serving bases cannot be accommodated in a matter of a few months or years. Over time, delays can be eased, but greater DoD funding, realigned metropolitan area priorities, and better communication between base commanders and civilian authorities will be required. Adoption of the committee's recommendations to improve base–community communication and planning will help avoid future problems caused by rapid growth in personnel at military bases.

Introduction

The Defense Base Closure and Realignment Commission (BRAC) was created by Congress to determine whether recommendations for base closure and realignment developed by the Department of Defense (DoD) “provide a fair process that will result in the timely closure and realignment of military installations inside the United States” (Defense Base Closure and Realignment Act of 2000). The independent commission, made up of appointees of the administration who are approved by the Senate, makes recommendations to Congress, which it can approve or reject, but it makes either choice without changing the recommendations.

BRAC 2005 was the fifth round of decisions designed to streamline the nation’s defense infrastructure. Unlike past BRAC rounds, which generally focused on reducing excess physical infrastructure, this round presents military growth challenges for DoD, states, and local governments. Its implementation will increase the number of on-base personnel, military families, and defense-related contractors at or near 18 military bases, several of which are located in major metropolitan areas. Furthermore, because the BRAC realignments must, by law, be completed by September 15, 2011, these community changes will be rapid, as personnel will arrive quickly once the bases are readied. There are 18 bases where BRAC growth will affect neighboring communities, as shown in Figure 1. Other military growth communities exist, but their growth is not a result of BRAC.

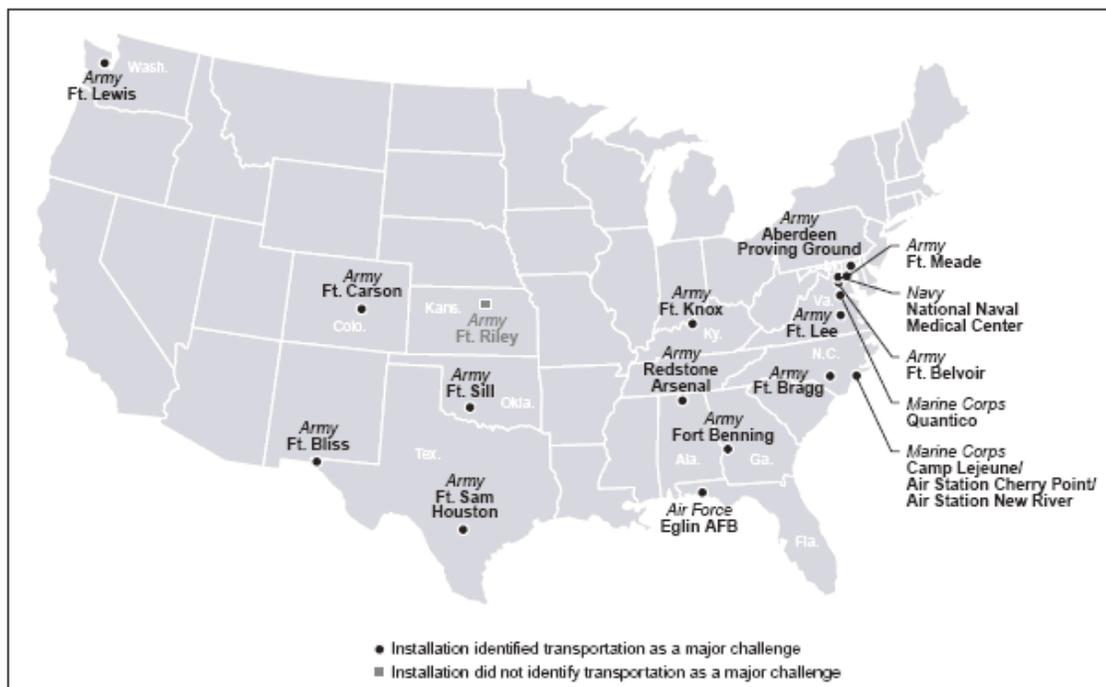


FIGURE 1 Military bases affected by BRAC growth (GAO 2009).

While BRAC 2005 is taking place, other major initiatives will increase growth at or near some BRAC-affected bases. These areas include two major military reorganizations. First, the Global Defense Posture Realignment initiative will move about 70,000 military and civilian personnel from overseas to U.S. bases by 2011 to help support current strategies and address emerging threats. Second, the Army's force modularity effort will restructure the Army from a division-based force to a more readily deployable modular, brigade-based force. Some of these brigade units will relocate to existing bases. A third initiative, Grow the Force, is not a reorganization but will increase the permanent strength of the military to enhance overall U.S. forces. This initiative will add about 74,000 soldiers and about 27,000 marines. Finally, troop drawdowns from Iraq could increase personnel at some BRAC-affected bases. These other military initiatives will be implemented over a longer time frame than BRAC decisions, which must happen by September 2011.

These BRAC movements are occurring at a difficult time. The nation is fighting two wars during the severest economic downturn since the Great Depression. Traditional sources of funding for transportation are under severe strain because of the economic downturn; the federal-aid transportation program has not been reauthorized, in part because of inadequate revenue to fund needed improvements. The forces driving growth at military bases and the surrounding communities are more complex than they would be if they were the result of BRAC decisions alone. During fiscal years 2006 through 2012, the populations of the communities in the vicinity of the 18 BRAC bases are expected to increase by an estimated 181,800 military and civilian personnel plus an estimated 173,200 dependents, for a total increase of about 355,000 persons (Table 1).¹ The total military and civilian workers at these locations in 2005 was about 422,000 (DoD 2009), indicating an increase of 84%.

About 28% of the total population increase, roughly 98,000 people, will occur at bases in metropolitan areas, several of which have transportation facilities serving the bases that are barely able to serve current demand during peak periods. Except in the case of congestion caused by a doubling of traffic, however, DoD views the responsibility for addressing increasing traffic attributable to military expansion to be that of state and local authorities (DoD 2008). The problems for state and local jurisdictions in BRAC cases are attributable to the rapid pace of traffic growth on heavily used facilities, particularly those in urbanized areas that have limited options for expansion; the lengthy process for projects to be evaluated for environmental impact and included in state and regional transportation plans; the intense competition among state and local projects for available federal and state aid for capacity enhancements; and the general shortage of available state and local funds. Moreover, the normal process for developing highway and transit projects, from required planning and environmental processes all the way through construction is, at best, 9 years and usually takes 15 to 20 years (GAO 2003).

Addressing congestion problems around bases in metropolitan areas will require major improvements in the transportation system, including both increased capacity and improved operations. At issue is where the additional funds will come from and who will be responsible for carrying out the improvements.

¹ With limited exceptions, the committee did not have information about secondary, or spin-off, employment growth associated with the increases at military bases.

TABLE 1 Estimated Growth from All DoD Sources at and Near BRAC-Affected Military Bases, Fiscal Years 2006–2012, as of March 2008 (GAO 2009)

<i>Base</i>	<i>Total Change in Military and Civilian DoD Population</i>	<i>Total Change in Population of Military and Civilian DoD Dependents</i>	<i>Total Population Increase</i>	<i>Current Total Regional Population</i>
Aberdeen Proving Ground, Md.	3,400	2,200	5,600	2,512,000
National Naval Medical Center, Md. ^a	2,500	Not available	2,500	4,331,000
Camp Lejeune, Cherry Point, and New River, N.C.	13,400	18,700	32,100	108,000
Eglin Air Force Base, Fla.	3,600	5,900	9,500	190,000
Fort Belvoir, Va.	24,100	12,700	36,800	4,331,000
Fort Benning, Ga.	12,700	6,100	18,800	247,000
Fort Bliss, Tex.	28,000	41,700	69,700	722,000
Fort Bragg, N.C.	18,900	17,100	36,000	301,000
Fort Carson, Colo.	10,400	14,400	24,800	514,000
Fort Knox, Ky.	(2,900)	4,500	1,600	117,000
Fort Lee, Va.	10,200	4,600	14,800	138,000
Fort Lewis, Wash.	13,500	17,400	30,900	3,422,000
Fort Meade, Md.	7,000	4,200	11,200	2,512,000
Fort Sam Houston, Tex.	10,900	6,100	17,000	1,416,000
Fort Sill, Okla.	3,700	(400)	3,300	81,000
Fort Riley, Kans.	10,900	15,000	25,900	109,000
Marine Corps Base, Quantico, Va.	3,600	1,000	4,600	202,000
Redstone Arsenal, Ala.	7,900	2,000	9,900	291,000
Total	181,800	173,200	355,000	

^a Traffic impacts will be compounded by patients and visitors to the hospital, which are not included in this population number.

ORGANIZATION OF THE REPORT

In Chapter 2, the committee describes case studies of BRAC-related personnel increases in Virginia, Maryland, Washington, Texas, and Florida and the efforts of these communities to cope with traffic increases in the surrounding transportation system. In Chapter 3, the normal processes followed in military base planning and metropolitan area transportation planning are

described, while noting the apparent disconnects between these two processes and opportunities to better integrate them. In Chapter 4, the committee reviews the available options for funding off-base transportation improvements and travel demand management efforts through both DoD and non-DoD sources and offers a rationale for assigning cost responsibility for the improvements. Chapter 5 presents the committee's findings and recommendations. Information about committee members is presented in the Study Committee Biographical Information. A background paper prepared for the committee on the subject of impact fees is contained in Appendix A.

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Case Studies

This chapter presents case studies involving six bases where BRAC 2005 decisions and other military actions are affecting or will significantly affect traffic congestion in the surrounding communities. The committee selected these cases because of their diverse circumstances, projected impacts on civil transportation networks, and gaps in funding to address the problems created. Four of them are in metropolitan areas, one is in a medium-sized city, and one is in a more rural setting. The committee did not examine traffic impacts and funding gaps for installations other than these six case studies.

As discussed in the first section of this chapter, personnel increases at three bases in the Washington, D.C., greater metropolitan area will cause substantial traffic congestion for the region's transportation system. The second section describes how personnel growth at Joint Base Lewis–McChord in Washington State is already having considerable impacts on I-5 in the Olympia–Seattle corridor. As detailed in the third section, Eglin Air Force Base in Florida is causing major problems for surrounding development because of military personnel growth and the state's concurrency law, which limits development when infrastructure service levels decline below an acceptable level. In the final section, at Fort Bliss in El Paso, Texas, the state and local communities developed a unique approach to addressing traffic congestion in anticipation of personnel growth at the base.

NATIONAL CAPITAL REGION

Military mission growth at Fort Belvoir (Virginia), National Naval Medical Center (Maryland), and Fort Meade (Maryland) will have significant negative impacts on transportation across the National Capital Region (NCR). The regional transportation system is already strained under existing traffic volumes, with severe congestion and travel delays being experienced during peak hours. NCR is rated as the second worst metropolitan area for travel time delay nationwide (Shrank and Lomax 2009). Adding tens of thousands of commuters to already congested conditions implies that conditions can only worsen.

Fort Belvoir, Virginia

Fort Belvoir is a single base that includes three noncontiguous geographic areas located in Northern Virginia (Figure 2). It is the single largest employer in Fairfax County, and after BRAC consolidations are completed will house more workers than the Pentagon. The Main Post is located in southern Fairfax County close to the Prince William County line a few miles south of where I-95 connects with the Washington, D.C., beltway (I-495). The former Engineer Proving Grounds, renamed Fort Belvoir North, is located about 2 mi northwest of the Main Post, separated from the Main Post by the I-95 corridor. The Mark Center is located about 8 mi due



FIGURE 2 Fort Belvoir, Virginia.

north of the Main Post in Alexandria on I-395 inside the beltway.¹ Although a single base, the components of Fort Belvoir have different transportation issues, which are treated separately below. Published estimates of the number of personnel being added to Fort Belvoir vary; the deputy base commander reported to the committee that BRAC and other military initiatives will increase personnel from about 24,000 to about 43,500 (Moffat 2010). These actions will add about 19,500 workers and travelers to Northern Virginia's crowded transportation facilities. The new hospital on Fort Belvoir's Main Post will add even more workers, visitors, and traffic.

Main Post and Fort Belvoir North

Description The Main Post and Fort Belvoir North are currently home to multiple military units employing about 24,000 military, civilian, and contract workers within an approximately 13.5-mi² area that includes 160 mi of roads and about 1,350 buildings (Fort Belvoir 2009).

Access to the Main Post and Fort Belvoir North is mainly by I-95 via the Fairfax County Parkway and, for the Main Post, U.S. Route 1 (Richmond Highway). Route 1 is a divided, four-lane highway with frequent traffic signals and considerable development along parallel access roads. The Main Post is interlaced with arterial roads, such as Telegraph Road and Beulah Street–Woodlawn Road, that provide access to the Post's seven gates. In contrast, Fort Belvoir North will depend on the Fairfax County Parkway for access once the site is completed. Transit service in the area is limited. The closest Metro station is roughly 7.2 mi from the center of the Main Post (Moffat 2010). Commuter rail stations (for service originating south of Fort Belvoir) range between 7.2 and 4.1 mi from the Main Post. (The Metro and commuter rail station are considerably closer to Fort Belvoir North.)

Projected Impact of BRAC Additions to the Main Post include more than \$2 billion in new facilities that exceed 3 million square feet, one-third of which is for the Dewitt Army Community Hospital on the Main Post that will be about the same size as Walter Reed Army Hospital.² Fort Belvoir North is adding a \$1.8 billion office complex of 2.4 million square feet to house the National Geospatial Intelligence Agency. As a result of the BRAC 2005 recommendation, along with other growth at the installation, employment at Fort Belvoir's Main Post and Fort Belvoir North will grow to 36,000 by 2011, adding roughly 13,000 travelers to Northern Virginia's already congested transportation network. Daily visitors to the Community Hospital on the Main Post will also add to traffic, although not all these trips will occur in the peak period. Many contractors serving Fort Belvoir are expected to locate near the base and contribute to this concentration of activities.

Problems Identified to Date Growth at the Main Post and Fort Belvoir North poses a challenge for Fairfax County because the base is located in an area of concentrated development in southern Fairfax County (DoD 2009). Fairfax County, a fast-growing region, has added more than 13,000 business establishments and 227,000 jobs since 1990, and its 1,000,000 residents make it the most populous NCR jurisdiction. It is home to half of the metropolitan area's Fortune 500 companies. Fairfax County, along with other Northern Virginia jurisdictions, relies on the

¹ A driving distance, including on roads accessing I-95 and I-395, of 13.4 mi.

² BRAC 2005 closes the Walter Reed Army Medical Center. Many patients who would have been treated at Walter Reed will be treated at the new Community Hospital at Fort Belvoir.

Commonwealth to fund capital improvements on state routes, but over the last 2 decades it has been unable to keep up with the growth in travel demand.³

The National Geospatial Intelligence Agency (NGIA) will become the sole occupant of Fort Belvoir North, and, in doing so, will consolidate about 8,500 personnel currently working in Bethesda, Maryland (a distance of about 29 mi that would require about 1 h and 20 min in traffic); Reston, Virginia (a distance of about 29 mi that would require about 1 h in traffic); and the Navy Yard in Washington, D.C. (a distance of about 21 mi that would require 44 min in traffic). Workers residing in Maryland and now working at the Bethesda or Reston site will face significantly longer commutes, with limited transit options. Shuttles will be provided on a frequent cycle between the new NGIA location and the nearest Metro station and adjacent commuter rail station.

Road and transit access to the Main Post and Fort Belvoir North is poor in peak periods. The main routes serving the base—I-95, I-395, and I-495—are among the busiest and most congested in the country (DoD 2009). According to the Office of Economic Adjustment (OEA)

The Fort Belvoir BRAC action will have significant adverse impacts on the region's transportation system, but especially Fairfax County's primary and secondary road network. ... These adverse impacts are especially significant along Richmond Highway (U.S. Route 1), as it bisects the Main Post. ... Additionally, Fairfax County's secondary roads surrounding [the Main Post and Fort Belvoir North] will experience severe congestion, particularly during peak periods. This includes increases to delay times, queuing lengths, volume/capacity ratios (V/C) and overall degradation of the level of service (LOS) at numerous intersections. (DoD 2009, p. 50)

Deputy Garrison Commander Mark Moffatt reported to the committee that it can take 45 min to travel 1 mi in and around the Main Post during peak periods. Shuttles to the transit station 7.2 mi from the Main Post require 18 to 20 min in the peak and considerably longer in the off peak.

Actions Taken to Date to Address Identified Problems The environmental impact statement (EIS) for Fort Belvoir focused on facilities on the base and on improving access to the base (Army Corp of Engineers 2007). It recommended construction of an access control point with a vehicle inspection station, vehicle turnarounds, security lighting, a backup generator, a two-lane access road with sidewalks and bike paths, street lighting, drainage, a traffic signal, and Richmond Highway (U.S. Route 1) left and right turns. (As of this writing, the project is on hold, awaiting funding.) If this project is not carried out, the level of service on Route 1 will be such

³ Like some states, the Commonwealth of Virginia is responsible for most roads (other than residential streets) within its borders. Northern Virginia has long struggled with the Commonwealth to receive funding for the area commensurate with its contributions in motor fuel and other transportation taxes. It previously won approval from the state legislature to tax itself for transportation improvements, but the law was later struck down as in violation of the state constitution. On December 14, 2010, Governor McDonnell announced a wide-ranging and complex set of statewide transportation initiatives, including greater reliance on bond financing and tolling of Interstates, but provided few details about specific projects. Projects serving NCR bases were not among the top priorities identified, but high-occupancy toll (HOT) lane projects were supported on I-95, I-395, and the Virginia portion of I-495. (Such projects could improve access to Fort Belvoir, but earlier litigation initiated by Arlington County has complicated the Virginia HOT-lane initiative.) Northern Virginia would also receive a greater share of sales tax revenues dedicated to transportation.

that there will be a breakdown in traffic flow, resulting in extreme congestion during peak periods (Moffat 2010). (This EIS was completed as an initial step in updating the base's long-range master plan. The update occurred without consultation with the metropolitan planning organization and state and local agencies.)

Fairfax County has obtained some financial assistance for BRAC: more than \$4 million for BRAC-related spot transportation improvements; U.S. Department of Defense (DoD) grants to support BRAC-related studies and several planning positions; and \$60 million in American Recovery and Reinvestment Act of 2009 funds provided for the Fairfax County Parkway, which will give direct access to Fort Belvoir North from I-95.⁴ The Commonwealth has provided approximately \$280 million in transportation-related funding (DoD 2009). Several road improvement projects in and around the Main Post and Fort Belvoir North will ease congestion on arterial and secondary roads. For security reasons, a road that formerly bisected Fort Belvoir North was closed and alternate routes were improved for traffic rerouted around the facility.⁵

In recognition that capital improvements to roads and transit services off the base would not be commensurate with projected needs, the Main Post and Fort Belvoir North are instituting aggressive transportation demand management programs. Although the Main Post has ample parking, Fort Belvoir North will provide parking for only 60% of the new employees. The base has proposed running shuttles from the gates to commuter rail and Metro stations and operating an internal shuttle within the base perimeter. Carpools and vanpools will be organized, up to 35% of workers will work on alternate schedules, and the Main Post will exercise some form of parking management (Moffatt 2010).

Remaining Problems Efforts to alleviate the negative impacts of BRAC on transportation facilities are being planned for implementation at the Main Post and Fort Belvoir North. However, the individual efforts vary widely with regard to the level of success (or anticipated success) of their implementation.

Traffic As noted, Fort Belvoir has developed a traffic management plan to reduce single-occupancy vehicle (SOV) trips to the Main Post and Fort Belvoir North. Whereas such plans can make valuable contributions in a congested setting, this plan appears to be unrealistic, with the implication that more driving will occur than was projected. Even if SOV goals are achieved, significant additional trips are projected to occur.

The goal of reducing SOV trips to a 60% mode share at Fort Belvoir North is ambitious. For metropolitan areas, in general, SOVs account for 75% of work trips, a figure that declines to 67.5% only in central cities with good transit access (Pisarski 2006). Suburbs within metro areas have an 80% SOV share of work trips, and 90% or more would be more typical of the outlying area where the Main Post and Fort Belvoir North are located.

Transit A major complication in making public transit work for military bases is the requirement that patrons undergo a security check at the base entrance. For practical reasons, this requirement means that transit patrons would be dropped at one of the base gates and would need to take a military shuttle bus to reach their destination within the base perimeter. Requiring transfers of this nature diminishes the prospects for transit's gaining mode share, particularly given

⁴ The \$190 million project combines funds from the American Recovery and Reinvestment Act, Fairfax County, and the Commonwealth of Virginia.

⁵ Funding was provided through the Defense Access Roads program.

congested conditions that autos and bus transit share in and around the Main Post. If both automobile and transit users suffer the same delays, the relative advantages of using transit are reduced, particularly when a transit rider must wait for a shuttle after passing through the gate. The base is proposing running frequent shuttles both to the Main Post gates and within the base, but funding for this service has not been secured.

Costs At least 30 major highway or transit projects have been identified as necessary to serve Fort Belvoir (including the Mark Center discussed next), only 10 of which have some funding and only four of which are fully funded (DoD 2009, p. 53). The estimated capital costs of unfunded BRAC-related transportation projects for the three Fort Belvoir facilities range from \$626 million estimated by the Army to \$1.9 billion estimated by Fairfax County and the Virginia Department of Transportation (VDOT) (DoD 2009). The latter estimate includes approximately \$600 million to extend Metro to Fort Belvoir as well as road improvements not included in the Army's estimate.

The implication of these remaining unresolved problems is that an already heavily congested area will become even more so when 13,000 additional employees, as well as hospital patients and contractors, are added to the traffic mix.

The Mark Center

Description An office complex is being developed at the Mark Center for 6,400 DoD personnel (Figure 3) (VDOT 2010). The complex consists of two multistory office towers—a 15-story building and a 17-story building—two parking garages, a public transportation center, and ancillary support facilities. It is being constructed as a result of the Fort Belvoir EIS, which found that planned personnel were too numerous for Fort Belvoir North to accommodate (Army Corps of Engineers 2007). The Army purchased the 15.9-acre site in early December 2008. Two other locations included in the review had Metro access, whereas the Mark Center has none (NCPC 2009); the committee was informed that the Army chose the Mark Center, despite the dismay expressed by local and Virginia officials, because it could complete the transaction and move personnel within the BRAC 2005 deadline of September 2011.

The Mark Center abuts I-395 at Seminary Road in Alexandria, which connects with I-395. North Beauregard Street also provides access to the site via Mark Center Drive. In the vicinity of the Mark Center, Seminary Road is mostly a six-lane divided arterial with a posted speed limit of 35 mph (Hangen Brustlin, Inc. 2009). The King Street Metro station, located about 4 mi west of the Mark Center on Seminary Road, has infrequent existing bus service to the Mark Center. Shuttles are proposed to and from the Pentagon and the King Street Metro station operating two to four times per hour (Vanasse Hangen Brustlin, Inc. 2009).

Projected Impact of BRAC The Mark Center development will add 6,400 travelers to the most congested corridor in the NCR. DoD personnel will be relocated to the Mark Center from leased space in Northern Virginia, where employees have access to Metro service within easy walking distance of the site. Increased auto trips are forecast to significantly degrade service on Seminary Road and I-395, despite traffic mitigation and intersection improvement measures required of the developer as part of the site plan approval process.



FIGURE 3 Mark Center, Alexandria, Virginia.

Problems Identified to Date A number of traffic studies have been prepared to evaluate the traffic impacts of the Mark Center. A review by PB for VDOT of previous studies prepared for the City of Alexandria and the project developer reports that conditions will be worse than was projected in these earlier studies. PB finds that five of the seven existing signalized intersections on Seminary Road operate currently at level-of-service (LOS) D or better and two operate at LOS E (PB 2009).⁶ PB projects that for the p.m. peak hour in 2011 when the center opens, four intersections will operate at LOS D or better, two will operate at LOS F, and one will operate at LOS E. PB's 2011 traffic simulations estimate that queues for northbound and southbound morning traffic exiting I-395 at Seminary Road will back up onto I-395, which already operates in stop-and-go conditions during the peak period (VDOT 2010). During the p.m. peak, traffic exiting the Mark Center and headed for I-395 will cause significant delays on Seminary Road. A subsequent traffic simulation for the year 2013 prepared for Alexandria of a larger number of intersections serving the Mark Center projects a similar decline in LOS on Seminary Road and North Beauregard Street (Hangen Brustlin, Inc. 2009).

Actions Taken to Date to Address Identified Problems After the U.S. Army decided to purchase the Mark Center site, the master plan for the center was revised to reduce traffic impacts. Allowed parking spaces were reduced by 30% below what the City had approved. The Army also proposes traffic management measures that reduce trips by 12% more than required.

DoD is planning programs to promote the use of public transportation and ridesharing and carpooling. In addition, telecommuting is expected to continue to grow in popularity and usage, which will further reduce vehicle trips. Frequent shuttle services will be provided at the Mark Center that will connect to the nearest Metro station and the Pentagon. Studies for Fort Belvoir of existing traffic patterns indicate that these services could achieve vehicle trip reductions of nearly 30%.⁷ The Mark Center project has the goal of reducing SOV trip counts by 40%. To accomplish this reduction, mode splits are projected of 60% SOV; 12% carpooling and ridesharing; 5% transit; 20% shuttle bus; and 3% walk, bike, and other. PB's analysis of the Transportation Improvement and Management Program concludes that it is "very aggressive" for its suburban location (PB 2009).

Remaining Problems In recognition of potentially significant consequences at Seminary Road and I-395, an off-ramp from I-395 to the Mark Center was considered, but environmental concerns scuttled initial proposals (Spivak 2010). Congestion on Seminary Road will apparently worsen, significantly so at the ramps connecting to I-395, and the committee is unaware of planned improvements.

Although the Mark Center is adding fewer travelers than the Main Post of Fort Belvoir North, they are being added into an Interstate corridor that is already saturated with traffic during the peak period. Queues of traffic from the Seminary Road ramps will back up onto I-395 and compound delays for military workers as well as other travelers.

The traffic management plan for the Mark Center assumes non-auto trips beyond what would be normal for its location. The Army will restrict parking to 60% of employees and

⁶ LOS definitions of the flow rate of traffic vary across jurisdictions. Many definitions are based on the *Highway Capacity Manual* (TRB 2000) or *The Geometric Design of Highways and Streets* (AASHTO), which list the following levels of service: A = free flow, B = reasonably free flow, C = stable flow, D = approaching unstable flow, E = unstable flow, and F = forced or breakdown flow.

⁷ [http://www.belvoirnewvision.com/files/FINAL_BRAC133_Website_Collateral\[1\].pdf](http://www.belvoirnewvision.com/files/FINAL_BRAC133_Website_Collateral[1].pdf).

proposes extensive shuttle service to the nearest Metro station and to the Pentagon. Even if this aggressive strategy is successful, however, as many as 3,800 drivers will be added to a heavily congested corridor with the potential to create severe congestion on I-395 and Seminary Road.

Conclusions

While the committee has done no independent analysis of the complex transportation issues being created at and around Fort Belvoir, it has examined several studies of these issues performed by competent engineering organizations for the several concerned public authorities. It is clear that many thousands of employees, both military and civilian, are being moved from employment centers located nearer the center of the region, with well developed highway and transit networks, to more remote locations further from the center where road and transit service is comparatively poor, where long experience has shown that competitive transit service is virtually impossible to achieve, and most people do and will travel in individual cars. Existing transportation facilities serving the Fort Belvoir area are already overloaded and suffer severe congestion even before the new employees arrive. As discussed in Chapter 4, these changes are occurring when funds available for transportation improvements are inadequate and large backlogs of unfunded projects lie dormant on extended waiting lists. Even if funding were available, the time required to achieve planning and environmental clearances and public participation associated with new transportation facilities is outside the 2011 deadline locked into the BRAC legislation.

Both military and local authorities charged with planning for these changes have been working diligently to solve these problems and have put in place some road expansions, planned new transit and shuttle services, and prepared aggressive traffic management plans. While they have found some new funds and reprioritized others, it is also clear that they have added to the long lists of unfunded transportation projects in the region. They have sounded warnings about possible dire conditions that may be on the horizon.

It is not possible to accurately predict how the situation will play out during 2011 as the additional employees arrive. But it seems likely that conditions may be severe enough, especially around the Mark Center, that not only will commuters be subject to substantial new delays but also that mission accomplishment of some military units may be compromised and economic competitiveness of local businesses negatively affected.

National Naval Medical Center, Bethesda, Maryland

Description

BRAC 2005 recommended the consolidation of Walter Reed Army Medical Center and National Naval Medical Center (NNMC) by 2011 into the new Walter Reed National Military Medical Center at Bethesda (Figure 4).⁸ Patients requiring complex care who would have been treated at Walter Reed, which is being closed, will be treated at new facilities in Bethesda. Other patients will be treated at the new hospital at Fort Belvoir. Medical and other specialists from the

⁸ http://www.bethesda.med.navy.mil/professional/public_affairs/brac/Overview_Stats.aspx. Aug. 15, 2010.



FIGURE 4 National Naval Medical Center, Bethesda, Maryland.

Navy, Army, and Air Force will provide medical care and technical and administrative support to military medical activities worldwide.⁹ NNMC, located on about 245 acres, will grow from about 8,000 employees and personnel to about 10,200, and the approximately half million annual visits to the hospital are expected to double (DoD 2009, NCPC 2010).

NNMC is located in Bethesda, Maryland, a densely populated unincorporated area of Montgomery County that houses roughly 70,000 workers during the day, including 18,000 at the adjacent National Institutes of Health (NIH) (USDOT 2009). NNMC and NIH are separated by Rockville Pike, a heavily congested arterial that also serves downtown Bethesda's thriving business district. Regional transportation access to the NNMC campus and NIH is provided primarily by the Capital Beltway (I-495) and I-270 freeway systems and arterial facilities including Rockville Pike, Connecticut Avenue, Old Georgetown Road, Jones Bridge Road, and Cedar Lane. Direct access to the NNMC campus is provided by Rockville Pike, Connecticut Avenue, and Jones Bridge Road. Metro access to NNMC and NIH is provided at the Medical Center Station, which is located at the eastern edge of the NIH campus, across Rockville Pike from NNMC.

Projected Impact of BRAC

Specific changes at the realigned Bethesda campus will include construction and renovation of approximately 2.4 million square feet of clinical and administrative space to support BRAC-mandated actions.¹⁰ These facilities will accommodate an estimated additional 1,800 to 1,900 patients and visitors daily. Approximately 2,200 additional peak-period trips to and from the site will come from additional medical and administrative personnel from the Army and Air Force.

Problems Identified to Date

The NNMC EIS indicated excessive existing peak-hour and directional congestion and delay along the Interstates and arterial roadways serving NNMC. Notably, traffic congestion occurs along Rockville Pike, Old Georgetown Road, and Connecticut Avenue in the southbound direction during the morning peak period and in the northbound direction during the afternoon peak. There is also excessive traffic congestion in the eastbound direction along the Capital Beltway during the afternoon peak (NNMC 2008).

The intersections serving NNMC and NIH are already among the 10 most congested in Montgomery County (Montgomery County 2009). As noted in the OEA compilation of community profiles, "the intersections that serve the NNMC are already at maximum capacity and are considered failing" (DoD 2009, p. 193).¹¹

⁹http://www.bethesda.med.navy.mil/Professional/Public_Affairs/BRAC/Master_Plan/01_Executive%20Summary.pdf. 2008.

¹⁰ Additional alterations and construction will involve support facilities, such as a traumatic brain injury and posttraumatic stress center, gymnasium improvements, lodging expansion (bachelor enlisted quarters), and two Fisher Houses. Construction of these facilities is under way.

¹¹ The mission statement of OEA: "The Office of Economic Adjustment (OEA) is the Department of Defense's (DoD) primary source for assisting communities that are adversely impacted by Defense program changes, including base closures or realignments, base expansions, and contract or program cancellations. Within OEA, the primary tool for DoD's economic adjustment projects is the Defense Economic Adjustment program for base realignment and closure (BRAC)."

NNMC BRAC staff received many comments during the EIS scoping period, most of them related to traffic issues. Local residents were concerned about the impact of additional traffic on Rockville Pike, Jones Bridge Road, and Cedar Lane once the BRAC expansion is complete. Community members also expressed concern about pedestrian safety and impacts in local neighborhoods. The number of pedestrians crossing Rockville Pike at the Medical Center Metro Station daily is projected to increase from 3,000 to 7,000. Rockville Pike is challenged to accommodate existing heavy vehicular traffic and the pedestrians who must cross its six lanes to access NNMC.

Actions Taken to Date to Address Identified Problems

A comprehensive traffic study was included in the NNMC EIS process to identify potential problem areas. The EIS and traffic study, however, focused on the streets and intersections immediately adjacent to NNMC (Department of the Navy 2008). The Department of the Navy has a limited scope of authority for developing and financing traffic and pedestrian safety measures off the base but worked with local and state transportation and planning authorities and supported efforts to obtain congressional appropriation for a \$20 million project to improve pedestrian access to the Medical Center transit station (DoD 2009).¹²

With limited resources to improve roads and pedestrian access before consolidation at the NNMC is complete, BRAC staff focused on traffic demand management. The projected results of the traffic management plan for the NNMC are shown in Table 2. The State of Maryland has been revising its plans and priorities to assist with improvements to roads and intersections serving the NNMC campus. As described in the next section, however, available funding is far short of what is needed.

Remaining Problems

The proposed traffic management plan has set ambitious, but probably unrealistic, goals for reducing the number of commuting by SOV drivers. The drive-alone mode split shown in Table 2 would be highly unusual for a facility more than 2 mi from a suburban downtown even with a Metro station nearby. Moreover, the many specialists being transferred to the NNMC site, many of whom presumably provide primary care and work irregular hours, would not be good candidates for carpools or vanpools. The military has chosen to limit the construction of new parking on the site, which will sharply reduce the option to drive to the base. Those for whom

TABLE 2 Traffic Management Plan

<i>Travel Mode</i>	<i>2007 (%)</i>	<i>2011 Projected (%)</i>
Drive alone	72.4	28.0
Carpool	8.8	15.0
Vanpool	4.7	9.0
Transit	11.3	30.0
Walk, bike, or drop off	2.3	10.0
Flextime or telework	N/A	8.0

NOTE: N/A = not applicable.

¹² This project was included in the President's 2010 fiscal year budget as a place holder, but funding was not appropriated.

transit is not a realistic option, however, may choose to drive but park in downtown Bethesda and ride buses or shuttles to the base. These drivers, along with the doubling of daily visitors to the bases' medical facilities, will worsen existing congestion.

Maryland state and local funds for transportation improvements needed for NNMC are far from adequate because of heavy demand for these funds and constrained transportation budgets. The Maryland and Virginia congressional delegations inserted a \$300 million amendment in the fiscal year 2010 Defense Appropriations bill to fund projects aimed at accommodating traffic growth at both Fort Belvoir and NNMC, but the funds were not included in the bill because of a technical problem.¹³ The funds would have supported two projects in Maryland. The first would have improved mobility at four major intersections around NNMC. The state initiated the \$110,000 projects with \$110,000 million to improve three intersections nearest to the NNMC with \$38 million of state and federal funds, but reports that it does not have the funds to complete them.¹⁴ The second project would have improved pedestrian access from the Metro station. In 2009, OEA estimated a funding gap of \$225 million to improve pedestrian access to Metro and address the most significantly affected intersections serving NNMC and NIH. The Maryland BRAC coordinator was quoted as saying, "If we don't do these things, it's going to be a nightmare. The traffic already is failing" (Defense Communities 360 2010).

Conclusions

The BRAC effects at NNMC may appear modest compared with those at Fort Belvoir. Total workers will increase by about 2,200 and daily hospital visits will increase by 1,800 to 1,900, though presumably not all in the peak period. However, the consequences for the saturated roads serving NNMC and other commuters using these roads could be severe. Increasing the throughput of the major arteries serving NNMC is out of the question because of cost and environmental impact, but even improving critical intersections with additional turn-lane capacity is unfunded. An enhancement to the nearby Metro station that would deflect thousands of new transit users from further congesting a major artery serving NIH and NNMC when they cross is unfunded. Overly ambitious plans for mode shift are unlikely to work. Though smaller in regional impact than Fort Belvoir and Fort Meade, discussed next, these results could be severe locally.

Fort Meade, Maryland

Description

Fort George G. Meade, a 5,500-acre Army base that provides installation support activities for bases worldwide, is home of the National Security Agency (NSA) (DoD 2009). More than 40,000 military and civilian employees and private contractors work at the site, which contributes \$4 billion annually to the Maryland economy.

¹³ Maryland and Virginia congressional delegations were able to have \$300 million added to the 2010 Pentagon budget during a Senate–House conference. The funds, however, were added to the Defense Health Affairs account, which lacks authority to spend such funds on transportation infrastructure (Tiron 2010). The problem was apparently not resolved before the end of the fiscal year and the funding apparently lapsed.

¹⁴ The state has decided to proceed with the projects in phases, even though doing so is less efficient, in order to provide some congestion relief with available funds. Even so, the last phase of the first stage of work will not be completed until late 2014 (Gantz 2010).

Fort Meade is located in Anne Arundel County approximately equidistant between Baltimore, Maryland, and Washington, D.C., in a geographic area characterized by suburban development west of the base and exurban development to the east (Figure 5). Primary highway access is provided by the north–south I-95 (via the Patuxent Freeway–SR 32, a four-lane east–west divided highway that bisects the northern part of the base), and the north–south Baltimore–Washington Parkway, a four-lane highway connecting the east side of Washington with the south side of Baltimore (DoD 2009, p. 133). Roughly 30% of the current workforce arrives at Fort Meade from the west via SR-32 and 20% arrives from the east. Roughly 35% arrives from the north on the Baltimore–Washington Parkway. From these primary routes, Fort Meade commuters access the base gates via several state and county two-lane roads that intersect with the northern part of the base.

Transit access to the base is provided by Maryland commuter rail service operating between Baltimore and Washington with stations in three towns from 5 to 7 mi away. Baltimore’s light rail service ends about 8 mi to the north. Local vendors provide local bus service (Rice 2010). Less than 1% of the current workforce uses transit.

Projected Impact of BRAC

As a result of BRAC 2005, three defense agencies will be relocated to Fort Meade by September 2011:

- The Defense Information Systems Agency (DISA),
- The Collocation of Defense/Military Adjudication Activities, and
- The Defense Media Activity.

Relocation of these agencies will add 5,700 military, DoD civilian, and contractor employees to Fort Meade (Rice 2010).

In addition to the BRAC actions, growth at NSA is anticipated to add 14,000 workers. The Fort Meade area is also attracting interest from contractors associated with BRAC and NSA growth. Space for up to 10,000 contractor employees will be provided on the base using DoD enhanced use leasing provisions, which allow bases to lease military land to private developers (Rice 2010, Sernovitz 2010).¹⁵ Fort Meade could receive as many as 22,000 new military, civilian, and contractor employees between 2009 and 2015, a roughly 50% increase over current employment at the base (DoD 2009, p. 130).

Problems Identified to Date

About 89% of the pre-BRAC workforce arrives at Fort Meade by SOV. Projected traffic volumes from new employees would swamp the capacity of the state and county roads serving the base, which are characterized as operating at or near capacity (DoD 2009, p. 137). A regional planning effort funded through OEA identified six intersection improvements as “critical and

¹⁵ Enhanced use leases enable military bases to lease land on the base to private or public entities. The lease must promote national defense or be in the public interest. They allow the use of installation property for commercial purposes in exchange for cash or in-kind services. Revenues from the lease are available to the base commander to use for other base purposes.

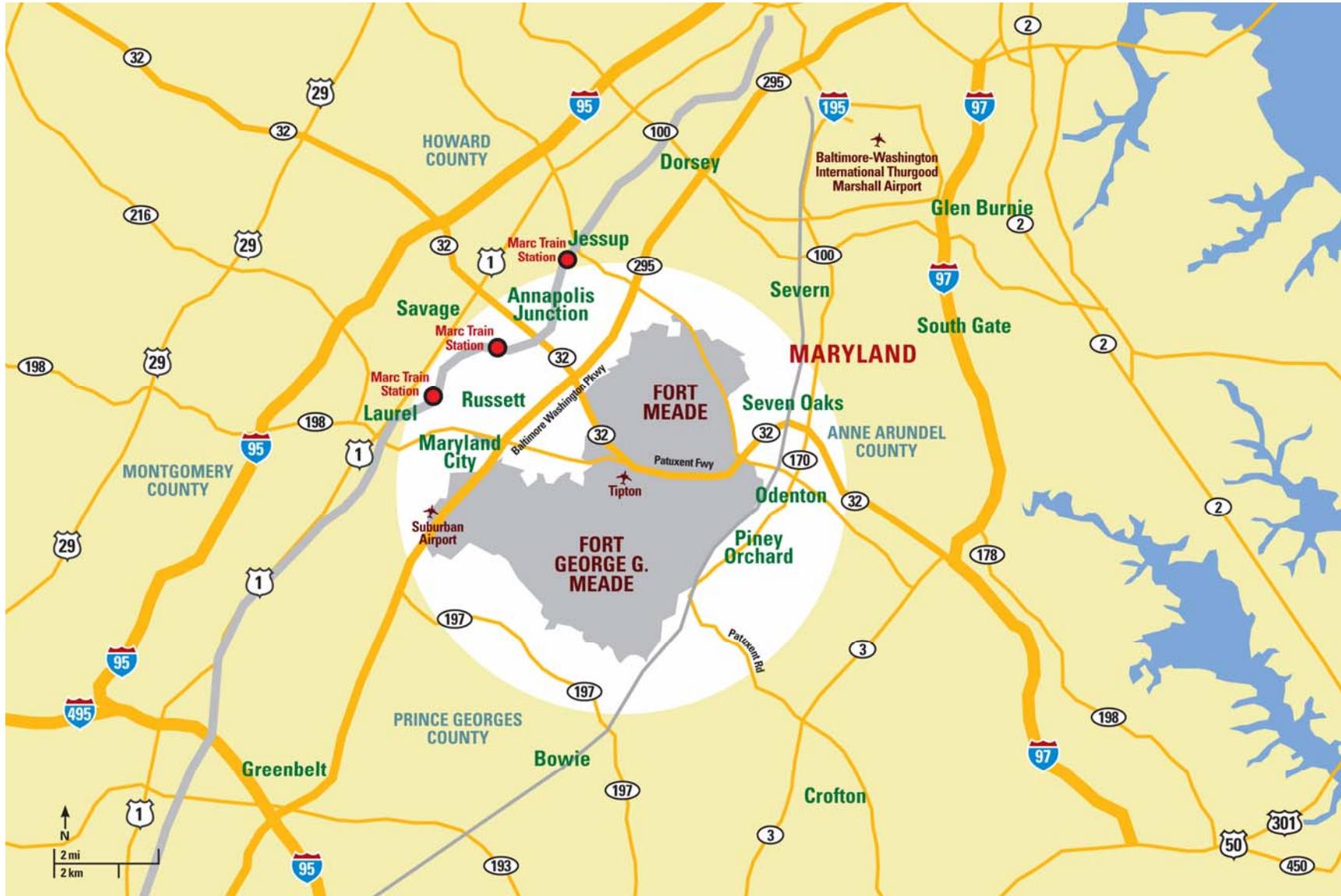


FIGURE 5 Fort George G. Meade, Anne Arundel County, Maryland.

immediate” needs with a total estimated cost of \$671 million, for which only \$48 million in funding is available.

To avoid gridlock at the Baltimore–Washington Parkway interchange and access road to NSA, traffic plans for the base would route new employees to different gates than those used by NSA. The new employees would enter the base from SR-175, but for this strategy to work as intended, 1 mi of SR-175 requires widening and three interchanges need to be improved—at a total cost of \$65 million. As of mid-2010, funding for only one intersection has been provided (from Maryland’s State Highway Agency) (Rice 2010).

SR-32, the route via which 50% of existing traffic reaches the base, requires widening to handle projected growth. Negotiations are under way between the base and the Maryland State Highway Agency regarding the military land that would be required to widen the roughly 4 mi of SR-32 that bisects the base. Funding for design and construction, however, is not anticipated for 5 to 10 years or more (Rice 2010).

Traffic from base growth will also have regional consequences. For example, DISA, the largest of the three defense agencies moving to Fort Meade, completed a survey in July 2010 to determine how its workforce will move with the agency in 2011 from its Arlington, Virginia, location. Nearly 65% of those surveyed said they plan to stay in their current residence and commute to Fort Meade. A large majority of DISA employees live in Northern Virginia (Flanagan 2010). These commuters to Fort Meade will need to travel around the Washington Beltway (I-495), which operates in stop-and-go conditions in peak periods.

Actions Taken to Date to Address Identified Problems

As described above, the Fort Meade region is actively examining road and highway improvements and providing those few projects that can be funded. In recognition that few highway improvement projects on the critical list will be funded and completed by September 2011, a transportation demand management (TDM) plan was developed that addresses on-post internal shuttle bus service, off-post shuttle service to and from local commuter rail stations and the light rail station, ridesharing (carpool and vanpool), local bus service (with several providers), and other measures. Plans are to use TDM to shift the travel behavior of employees surveyed in 2009 to projected travel behavior in 2012 by cutting SOV use from 89% to 70%, increasing carpools and vanpools from 8.6% to 12%, increasing transit from 0.6% to 9%, and increasing teleworking from 2% to 7%. If these goals could be achieved, SOV use at Fort Meade would increase modestly, about 4,000 trips would be avoided, about 6,500 trips would arrive by carpool or vanpool, and 5,000 would arrive by transit.

Remaining Problems

Roughly \$786 million in needed highway improvements have been identified for which funding has not been secured (DoD 2009). A minimum of 5,700 additional workers will arrive at the base by September 2011 because of BRAC, with up to 13,300 others arriving because of growth at NSA and increased contractor presence on the base. Extreme congestion could occur on state and county roads in and around Fort Meade as new employees arrive at the base over the next few years. Moreover, the addition of 22,000 commuters—many relying on the congested Interstates, freeways, and parkways in the region—suggests that these routes, which already perform poorly in peak periods, will become even more clogged with traffic, with adverse effects on the regional

economy and excess delays to military and other commuters. TDM goals to reduce the percentage of SOV use would require large shifts in mode choice in a location not favorable for transit, though carpools and vanpools, telework options, and staggered work schedules may be more effective.

Conclusions

Fort Meade is similar to Fort Belvoir North and the Mark Center in that significant numbers of office workers are being moved from locations near the center of the region with comparatively good transit service to more remote locations where transit service is virtually nonexistent and rarely used. The majority of workers, existing and future, will come by private car and clog existing roads already straining under commuter traffic. Planners have identified a host of road improvements needed to alleviate some of these problems, but they remain mostly unfunded. They are also projecting aggressive demand management programs that, while an important element of a congestion management strategy, have overly ambitious goals that experience has shown would be very difficult to achieve given Fort Meade's location. It is not possible to accurately predict the outcome, but it appears likely that this case is another example in which social and economic costs will be high, and military effectiveness and national intelligence services could be negatively affected.

Summary

NCR is a large, complex metropolitan area with millions of inhabitants. It has a dense and extensive network of Interstates, arterial roads, and transit systems serving its more than 3 million commuters. Shifting the work locations and commuting patterns of about 44,000 commuters in short order, about 1.5% of the total, might seem manageable on a regional scale. For the affected highways, however, the problems could be acute. Many travelers are being moved from locations closer to the center of the region where transit is an option to outlying locations where it cannot function as effectively. Very little new road or highway capacity is being added. It is impossible to know how these tens of thousands of commuters will behave when faced with their new circumstances, but, according to past experience, most will probably opt to drive alone. TDM efforts to shift travel times, encourage carpooling and vanpooling, and allow working from home or at telework centers will help on the margin. Bases, unlike most businesses, can impose strict limits on parking, which makes parking management a more effective TDM measure than usual. Nonetheless, because of the new trips resulting from base expansion major already heavily congested highways like I-95 around Fort Belvoir and I-395 at the Mark Center could become even more so. Local roads serving Fort Belvoir, NNMC, and Fort Meade could approach, if not experience, lengthy queues of stalled traffic. The added delay would impose significant time penalties on highway users and the military.

JOINT BASE LEWIS–McCHORD, WASHINGTON STATE

Description

BRAC 2005 designated the adjacent Fort Lewis and McChord Air Force Base as a joint base renamed Joint Base Lewis–McChord (JBLM), one of 12 such DoD bases. JBLM, located on

Washington's south Puget Sound (Figure 6) houses more than 30 units from the Army, Air Force, Navy, Marine Corps, Reserve and National Guard, and DoD agencies.¹⁶ It supports a population on base and in neighboring communities of more than 130,000, including military personnel, families, civilian and contract employees, and their families.¹⁷

JBLM occupies 86,176 acres in south Puget Sound; the total acreage grows to more than 415,000 when the Yakima Training Center in central Washington is included.¹⁸ The Madigan Army Medical Center at Fort Lewis "occupies more than 120 acres and serves approximately 160,000 soldiers, family members, and military retirees, making it one of the busiest hospitals in the Pacific Northwest" (DoD 2009, p. 124). JBLM is the third largest employer (after Boeing and state government) in the state of Washington with a net economic impact of about \$2.2 billion annually (DoD 2009, p. 126). The regional population affected by the base totals about 1 million and is growing. The counties immediately adjacent to JBLM grew by 17% (adding 155,000 residents) between 2000 and 2009 (DoD 2009, p. 125).

JBLM is bisected by the I-5 corridor, which has several interchanges that access the base. Transit access to the base exists, but service is infrequent and it is very lightly used. Park-and-ride lots are available and are filled by civilian workers who park and carpool to the base.

Projected Impact of BRAC

The effects of BRAC on JBLM are modest because BRAC mainly streamlines the administration of the formerly independent bases by establishing a single administrative authority for the joint base. Pronounced personnel growth at JBLM is attributable to other military initiatives (Grow the Army, Army Modular Force, and Global Defense Posture Review). OEA projects growth on Fort Lewis of about 23,300 soldiers and dependents by 2015 from the 2005 level of 58,100, an increase of 48% (DoD 2009, p. 123). This projected military population increase reflects a 70% increase since 1990. The thousands of new soldiers and military dependents traveling to and from the base daily combine with about 16,000 civilian workers who commute to the base from surrounding communities.¹⁹ In addition, the passing through of thousands troops deployed in war zones abroad, as occurred in mid-2010, causes large transient spikes in traffic demand. A regional planning process, administered by the city of Lakewood and funded by OEA, is under way and includes all the major jurisdictions and stakeholders in the study area. The planning process includes an assessment of the transportation system; results are described in the next section.

Problems Identified to Date

I-5 is the most heavily traveled north-south freight corridor in the state of Washington, carrying 145,000 vehicles per day in the vicinity of the base. It was described to the committee as operating at capacity every day; when incidents occur, it can take hours to recover. No parallel arterials connect neighboring cities in the vicinity of JBLM, forcing local travelers to use I-5 as an arterial. Nearly 80% of traffic to and from the base relies on I-5. There is little to no high-occupancy vehicle or transit service to and from JBLM (WSDOT 2010). Traffic on the

¹⁶ www.lewis-mcchord.army.mil. 2010.

¹⁷ <http://www.jblm-growth.com/coordination-plan>, JBLM Growth Coordination Plan, Aug. 20, 2010, p. 3.

¹⁸ <http://www.jblm-growth.com/coordination-plan>, JBLM Growth Coordination Plan, Aug. 20, 2010.

¹⁹ <http://www.jblm-growth.com/coordination-plan>, JBLM Growth Coordination Plan, Aug. 20, 2010, p. 11.



FIGURE 6 Joint Base Lewis-McChord, Washington State.

northbound lanes of I-5 in the DuPont area has increased significantly, with morning commute volumes swelling because of population growth and the return of thousands of troops from Iraq. It is not unusual for a formerly 40-min commute between Tacoma and Olympia to take 90 min or more. Backups on I-5 of 3 to 9 mi or more starting at 6 a.m. have become the rule (Batcheldor 2010a, 2010b; *The Olympian* 2010; *The News Tribune* 2010; Pierce County 2010).

For training, personnel from JBLM have to travel 163 mi on I-5 and I-90 to Yakima Training Center. I-90 is also a heavily traveled (east–west) freight corridor for Washington State. Traveling to Yakima for military maneuvers occurs at night to avoid traffic congestion.

The I-5 JBLM transportation analysis conducted as part of the ongoing planning process identified a number of significant problems with the transportation network adjacent to the base. I-5 interchanges are structurally obsolete and have insufficient capacity to accommodate traffic, the incidence of rear-end and sideswipe collisions is high, and freeway capacity is reduced from four to three lanes southbound at Thorne Lane. The transportation analysis evaluated improvement options for the I-5 mainline and for Exits 119, 120, 122, and 123. Implementing all these improvements would cost \$960 million to \$1.1 billion in 2010 dollars. Regional and state transportation plans were recommended to be updated to include the improvements to position them for funding if it becomes available.

Actions Taken to Date to Address Identified Problems

The Washington State DOT announced a series of actions to assist in relieving the growing congestion described above, including improving the timing of traffic signals at several interchanges and boosting incident response crews from two to five so disabled vehicles can be cleared away more quickly. Longer-term solutions under consideration by state transportation officials include installing metered on-ramps (traffic signals that allow only one car at a time to enter the freeway), more traffic cameras, and electronic signs displaying real-time traffic information so motorists will know whether the roadway is clogged (Batcheldor 2010a, 2010b; *The Olympian* 2010; *The News Tribune* 2010; Pierce County 2010).

JBLM is seeking priority in federal transportation funding programs. It is also seeking to streamline the federal transportation project development processes to implement solutions in light of military growth at JBLM (Penrose 2010).

Remaining Problems

Attempts to find alternatives to SOV commuting have been difficult in the military environment. Military personnel at JBLM have unique work schedules. Soldiers create two morning travel peaks because they participate in morning exercises and training, return home for cleanup, and then return to the base for duty. It would be difficult for transit to gain modal share in this context.²⁰ Security concerns have prohibited priority access treatments for public transportation.²¹ Fixed bus routes are able to serve only the gates of the installation. No funding is available for transit improvements. Carpools are difficult to arrange among soldiers because of

²⁰ Construction of showers on the base could reduce peak demand on the roads serving the base, albeit it would add one more to the 130 construction projects the base public works director reported to the committee were needed from DoD's military construction budget.

²¹ One option for making transit work is for the public authority to drop passengers off at the gate and for a military shuttle to operate within the base (as at Fort Belvoir; see above). Another option is for the military to contract with the public authority to operate buses serving the base that would carry only military personnel.

the unpredictability of their schedules. Extensive parking is available for personal vehicles, a disincentive to using public transportation.

There are significant demands on military construction funds at JBLM. The base has plans and funds to implement construction projects designed to upgrade its infrastructure to match military growth. It spent \$1.8 billion over the last 3 years and anticipates having \$2 billion approved for spending in the next 5 years. Twenty of the bases' 38 intersections operate at LOS E in the peak period. Steven Perrenot, Director of Public Works at JBLM, stated to the committee that off-base transportation requirements have low priority compared with base construction needs that include barracks, headquarters, operations facilities, tactical equipment maintenance facilities, range and training facilities, mobilization facilities, medical facilities, community service, communications, water infrastructure, electrical needs, wastewater, and roads. With limited funds, the base's priority is to have adequate facilities for base personnel and for mission readiness (Perrenot 2010). Moreover, DoD's only program for off-base transportation capital funds competes for on-base projects in DoD's military construction budget, which further diminishes the appeal of applying for such funds.

Conclusion

JBLM differs from other cases discussed in this report in that BRAC impacts are modest compared with the other causes of pronounced growth in military personnel at the base. The military presence has been growing since the 1990s, as have the surrounding economy and population. The highway network serving the base, heavily dependent on I-5, operates at capacity; alternatives for expanding I-5 in the base corridor—in the range of \$1 billion—are not funded. The economic costs to the state and region of congestion on I-5 result from growth in military and civilian demand, albeit these two trends are surely driven by the large and rapid expansion of JBLM. Demand management measures are already in use for the civilian workforce at JBLM, for which carpooling is common. Demand management measures implemented by the military may help, although the committee has not investigated the feasibility of such measures for an operating base of the size and complexity of JBLM. In any event, I-5, a critical link in the transportation network upon which JBLM is almost totally dependent appears to be at the brink of expanded hours of stop-and-go operations that will compound delays and safety problems because of backups and loss of lane capacity on the Interstate.

EGLIN AIR FORCE BASE, FLORIDA

Description

Eglin Air Force Base (AFB) is the largest AFB in the world (Figure 7). It encompasses three military installations, collectively known as the Eglin Complex: Eglin AFB, the host unit for the 96th Air Base Wing; Hurlburt Field, headquarters to Air Force Special Operations Command; and Duke Field, which houses the 919th Special Operations Wing, the only special operations unit in the Air Force Reserve.²²

Eglin AFB, Hurlburt Field, and Duke Field are located in Okaloosa County. The total land area reserved for the Eglin complex represents nearly half of Okaloosa County and takes up

²² <http://www.florida-edc.org/defense.htm>.

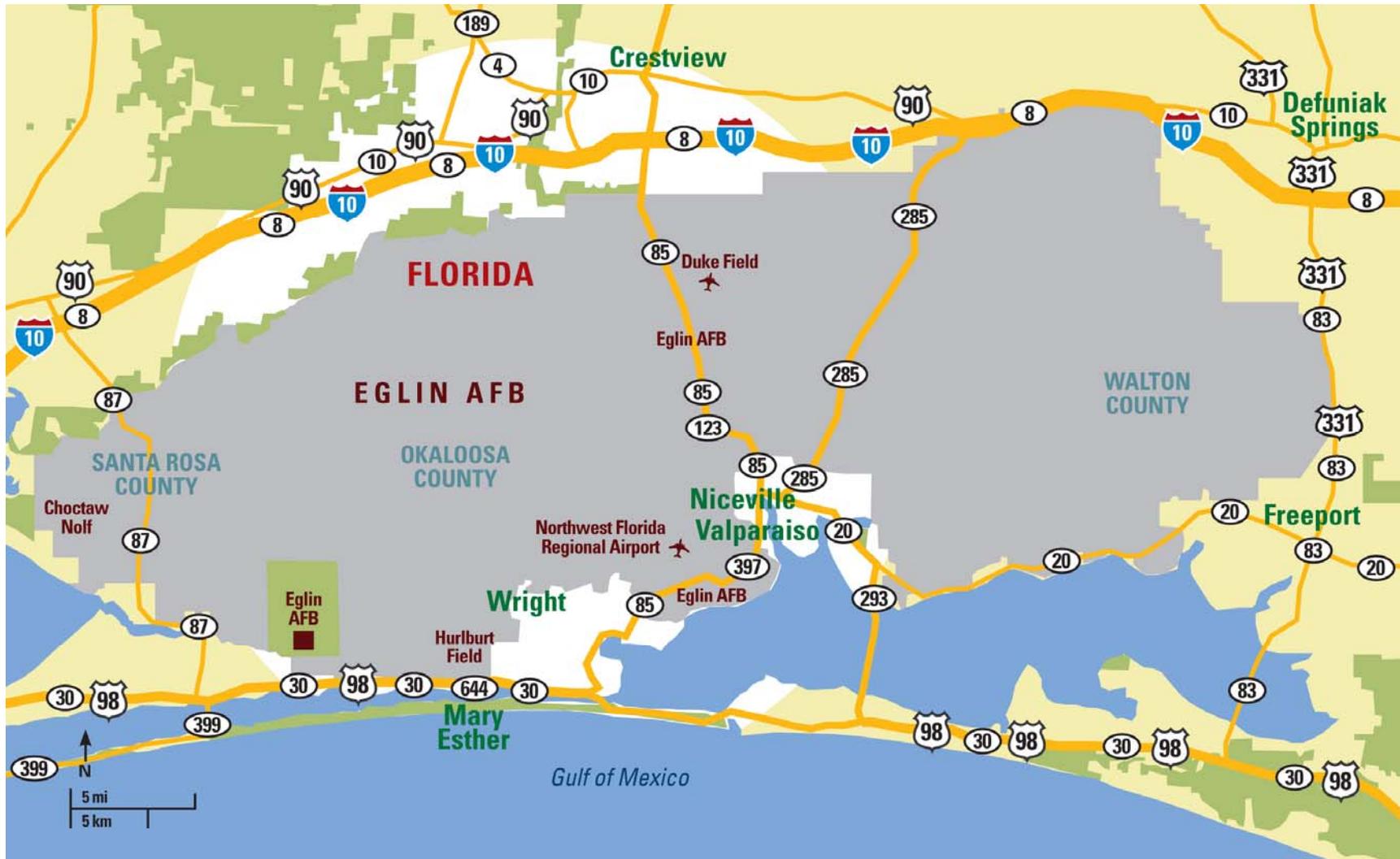


FIGURE 7 Eglin Air Force Base, Okaloosa County, Florida.

significant parts of the adjacent Santa Rosa and Walton Counties. Eglin AFB and Hurlburt Field are staffed by about 16,500 military personnel. Eglin also has 4,500 civilian workers.

The three surrounding counties of the Eglin complex have a combined population of about 353,000 (DoD 2009). The Eglin complex accounts for more than 34% of the economy in northwest Florida and more than 70% of the economy in Okaloosa County.²³ Eglin AFB and Duke Field are accessed primarily by SR-85, a four-lane road that is Okaloosa County's only north-south corridor (Figure 7). SR-85 connects to the north of the base with I-10, which traverses the northern border of the land area reserved for the base. Eglin AFB can also be accessed from the east via SR-397-SR-20. Hurlburt Field is accessed by US-98, which traverses the southern end of Okaloosa, Santa Rosa, and Walton Counties.

Projected Impact of BRAC

BRAC recommended relocating the Army 7th Special Forces Group (airborne) and the joint strike fighter (JSF) initial training center to Okaloosa County. As a result, Eglin will grow by an estimated 6,100 relocating people associated with the 7th Special Forces Group (2,200 military, 1,500 spouses, and 2,400 children) and an estimated 4,900 relocating people associated with the JSF (2,300 JSF personnel and contractors, 1,200 spouses, and 1,400 children). Most of these personnel will be stationed at facilities accessed by SR-85.

Problems Identified to Date

Eglin AFB will take on additional missions and personnel because of BRAC decisions. As a result, traffic on the primary artery serving the base, SR-85, will become significantly more congested. Additional personnel associated with BRAC will cause a fall from LOS C to LOS F. The lead consultant team assisting the region's growth management process concluded that SR-85 would require another lane to serve the new demand.²⁴ Growth in demand on US-98 is also a concern. US-98 is the primary artery for access to Hurlburt Field from Santa Rosa. Usage levels are such that "any traffic incident on US-98 has the ability to tie up traffic for miles, taking hours to clear" (DoD 2009, p. 40).

Florida law requires every comprehensive growth management plan to contain a capital improvement element addressing the need for and location of public facilities, principles for their construction, any needed extension or increase in their capacity, and standards to ensure their availability and acceptable LOS.²⁵ The concurrency provisions of Florida's Growth Management Act require adequate public facilities before new development can occur. All comprehensive plans across the state must include concurrency for roads, sewer and solid waste service, drainage, potable water, parks and recreation, and mass transit, where applicable. The basis for adequate public facilities, the concurrency requirement, is LOS standards. As long as SR-85 is inadequate, because corrections are not made as a result of the base expansion, additional development affecting SR-85 in Okaloosa County to serve Eglin AFB is prohibited.

²³ <http://www.florida-edc.org/defense.htm>.

²⁴ www.co.okaloosa.fl.us. 2010.

²⁵ www.law.ufl.edu. 2010.

Actions Taken to Date to Address Identified Problems

To address the anticipated problems with SR-85, a Transportation Investment Generating Economic Recovery (TIGER) grant application (funded through the American Recovery and Reinvestment Act of 2009) was submitted for funding for road, interchange, and park-and-ride improvements (Okaloosa County 2009). The total cost of these improvements would be \$420 million, with the TIGER grant covering \$298 million and the County and Mid-Bay Bridge Authority covering the balance.

Remaining Problems

At the time of this writing, a TIGER grant had not been awarded to Okaloosa County, implying that significant congestion will occur on SR-85 as new personnel arrive, which will put a damper on future economic development in the corridor associated with the base.

Conclusion

The expansion of Eglin AFB will significantly congest the only north–south state road in Okaloosa County and may further disrupt travel on an east–west U.S. route that is important to the tricounty area’s tourist economy. The base is certainly important to the region and the expansion will make it even more important, although the state’s concurrency law will impede further economic development until the highway is improved. This effect could well be harmful to the military’s mission because additional off-base housing and new business development to support base expansion cannot be approved until SR-85 is expanded. Expansion of Eglin AFB is the immediate cause of the congestion problem on SR-85.

Unlike the NCR capacity problems, expansion of SR-85 is possible. Okaloosa County is relatively sparsely populated compared with denser development in metropolitan areas, the needed right-of-way presumably could be acquired from the military, and capacity expansion would not face significant public opposition. Funding appears to be the main problem.

FORT BLISS, TEXAS

Description

Fort Bliss in northeast El Paso is the fastest-growing U.S. Army installation in the United States (Figure 8). It is home to diverse organizations, such as the 1st Armored Division, the 32nd Army Air and Missile Defense Command, the Future Force Integration Directorate, the William Beaumont Army Medical Center, the U.S. Army Sergeants Major Academy, and the German Air Force Command Air Defense Center. The base has grown by 2,000 to 3,000 soldiers annually since 2006, for a 2009 total of roughly 19,000 soldiers, 29,000 dependents, 3,000 civilian workers, and 2,000 private contractors.

The Fort Bliss cantonment area is in west Texas in the city limits of El Paso. The remainder of its contiguous acreage sprawls across portions of Texas and New Mexico. Fort Bliss’s 1.12 million acres is larger than the state of Rhode Island. The base is a primary economic engine for greater El Paso and its 730,000 residents.



FIGURE 8 Fort Bliss, Texas.

Located in the western tip of Texas near the Mexico border, Fort Bliss is served east–west by I-10, US-180, and US-62; north–south by US-54 and Purple Heart Boulevard–SR-375; and by several city and base roads that intersect with these major routes.

Before base expansion, greater El Paso experienced net outmigration of adult population due to the decline in the garment industry in the 1990s, losing as many as 8,900 people in some years (DoD 2009, p. 69).

Projected Impact of BRAC

BRAC 2005 adds about 11,000 troops to Fort Bliss. Because of BRAC and other Army initiatives under way (Grow the Army, Army Campaign Plan, and Army Modularity Force) Fort Bliss will continue to grow through 2012. By then, about 33,500 soldiers and 48,000 family members will reside at Fort Bliss, and 6,000 civilian staff and 3,000 contractors will work there (DoD 2009, p. 69). The military population will have tripled between 2005 and 2012.

Problems Identified to Date

In anticipation of BRAC 2005, then post commander Major General Stan Green worked with a variety of elected officials, local governments, and other groups to complete a capacity study that would allow the post to determine possible areas of concern if new troops were stationed in El Paso.²⁶ Although multifamily housing was identified as the primary concern, transportation also was identified as an issue (DoD 2009). About \$667 million in local interchange and highway improvements were identified as needed to serve the projected influx of soldiers, dependents, and civilian workers. With regard to passenger delay caused by traffic congestion, El Paso is ranked 62nd of 90 urban areas in the Texas Transportation Institute’s urban mobility rating, which implies a serious problem but not the kind of peak-period traffic congestion observed in larger metropolitan areas.²⁷

Actions Taken to Date to Address Identified Problems

In March 2007, the El Paso City Council created the Camino Real Regional Mobility Authority (CRRMA). Through CRRMA, the Texas Department of Transportation (TxDOT), the El Paso Metropolitan Planning Organization, and the city of El Paso identified transportation projects to be pursued in the coming years.

In addition to the typical bond financing initiatives, the city and elected officials worked with TxDOT on a unique funding approach in constructing Spur 601 (known as the Inner Loop), a \$367 million highway project that will ease access to the post and relieve congestion in east and northeast El Paso (Figure 8). The 7.4-mi project will connect westward to US-54 (Patriot Freeway) at Fred Wilson Avenue and eastward to the Purple Heart Memorial Highway.

TxDOT entered into an agreement with a private firm to develop the state’s first private-sector “pass-through” financing agreement. The firm will finance, design, and build Spur 601 at a cost of \$367 million. In pass-through tolling, motorists pay nothing. Vehicles are counted and the state reimburses the private firm over several years according to that number.²⁸ Construction

²⁶ www.bliss.army.mil.

²⁷ http://mobility.tamu.edu/ums/congestion_data/national_congestion_tables.stm. Accessed Dec. 14, 2010.

²⁸ <http://www.jdabrams.com/>. Aug. 17, 2010.

of the interchange between Fort Bliss and Biggs Army Airfield at Fred Wilson Avenue and Airport Road will help relieve congestion that has plagued the area for years; \$10 million in local funds is being used to improve connections between local roads and improved base gates (DoD 2009, p. 75).

Remaining Problems

Although many of El Paso's most serious transportation issues are addressed with the Spur 601 project, the city also lists roughly \$300 million in additional needed highway improvements to serve the base, for which it is seeking alternative sources of funding (DoD 2009, p. 75).

Conclusion

Although needed transportation improvements remain in and around El Paso, Fort Bliss provides a counterexample to other cases examined in this chapter. A significant new segment of highway needed to support base expansion was identified early in the BRAC 2005 round, and the state and community found a way to fund the project, complete environmental reviews, and begin construction before all new soldiers and dependents arrive in 2012. The project is slated to be completed in winter 2011.

The committee does not have complete information about how this new project came about, but clearly El Paso recognized the importance of the base to its economy. The proactive efforts of a former base commander helped bring the community together to focus on winning military growth in the BRAC 2005 round. The fact that El Paso is a relatively small city developed with a relatively low population density and an economy dependent on the base certainly made it easier to add highway capacity than it is for densely developed metropolitan areas, where plans for new roads are often contentious. Moreover, in this case some of the land needed is actually base property, further facilitating the highway project's success given the base's support for it. The state also committed major resources for a new project without asking for new sources of federal aid. Through the financing mechanism chosen by the state, however, future-year revenue streams provided through traditional federal transportation funding mechanisms have been committed to this project, which will diminish the state's ability to address future capital needs in other areas of the state. Most states rely exclusively on "pay-as-you go" funding instead of bonding because it usually has a lower cost to taxpayers. Even so, the case shows what can happen to accommodate base expansion when a community and state are committed to support it.

CONCLUSIONS

While the committee examined only six base expansions, it is clear that a combination of BRAC consolidations, other sources of military growth at these bases, and personnel returning from two wars is causing severe transportation problems at these locations. In large metropolitan regions, the military's objective of improving security by moving personnel to remote locations directly conflicts with regional objectives of reducing congestion and improving air quality by increasing densities in central areas where transit service can be competitive. The September 2011 deadline for completing all BRAC moves required in the BRAC 2005 legislation is difficult to reconcile

with the much longer time period needed to plan for and implement large transportation improvements in major regions (discussed in Chapter 3).

As described in Chapter 4, the gap between transportation needs and funding has been growing for decades and most large areas have long lists of unfunded projects. This problem has been exacerbated during the current economic slowdown as tax revenues plummeted and few funds are available for unanticipated needs.

DoD's legislation, funding sources, and practice tend to focus primarily on problems within bases and less on surrounding areas. As described in Chapter 4, DAR funds available for off-base transportation cannot be used for transit services or demand management activities, which can help mitigate short-term problems.

The combination of these factors has led to a near perfect storm of problems that will play out in a number of areas over the next few years, as illustrated in the cases reviewed here. Although the committee cannot predict the consequences, congestion could be sufficiently severe to negatively affect military efficiency and business competitiveness as personnel cannot get to work within acceptable commute times.

In contrast, one case review showed that in smaller jurisdictions where transportation improvement plans are less controversial and where individuals on the military and civilian sides have effectively worked together to anticipate and address capacity problems, it is possible to find ways to accommodate anticipated growth.

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Planning and Decision-Making Processes

The decision-making process about BRAC, and, to a degree, other major military force relocations occurring at the same time, appears to be misaligned with the existing planning and decision-making processes for providing the civil transportation infrastructure that would serve the military in the intended locations. This misalignment has particularly severe implications when military activity is concentrated at bases in metropolitan areas. This chapter begins with a brief overview of how planning for transportation is normally carried out in metropolitan areas. The next section describes how military bases normally plan for their internal infrastructure. As indicated in those sections, communication and coordination between bases and their surrounding communities concerning military expectations for civil transportation infrastructure is insufficient. Perhaps as a result of this misalignment, the BRAC 2005 decisions appear to have substantially underestimated the transportation impacts these relocations would have on their surrounding communities and the military. The third section discusses the implications of the BRAC decisions and the lack of consideration of transportation impacts off the bases when environmental assessments were conducted as part of the BRAC 2005 process. The final section includes the committee's assessment of the current state of affairs along with recommendations for actions to mitigate current impacts and observations about how the process might be improved in the future.

METROPOLITAN TRANSPORTATION PLANNING PROCESS

Since 1962, metropolitan areas have had to carry out a continuing, comprehensive planning process in a cooperative manner with affected parties. Each urbanized area must have a metropolitan planning organization (MPO) consisting of elected officials who represent the constituent areas. There are more than 380 MPOs serving communities of 50,000 or greater (TRB 2007). In these communities, the MPO must develop a long-range transportation plan and a shorter-term transportation program. These plans and programs must be financially realistic and include only projects for which funding will be available. These plans and programs must conform to a number of laws and regulations concerning social and environmental impacts, air quality, citizen participation, civil rights, and so forth (GAO 2003).

MPOs carry out extensive demand and network analyses to find the most effective and efficient way to serve travel demand and meet other goals and objectives for the area. In doing so, MPOs develop multimodal transportation plans consisting of a range of transportation strategies and services, which can include new and expanded highway capacity; increased transit lines and services; expanded use of vanpools, carpools, and bus shuttles; promotion of telework and telecenters; variable work hours and schedules; and application of various intelligent transportation system technologies and strategies. Although highway transportation is the dominant mode of transportation in all MPOs, larger areas rely on transit as an essential component of meeting peak-period demand. Expansion of highway capacity in built-up areas can be particularly difficult in terms of the cost of land acquisition, compliance with the Clean Air

Act, and citizen acceptance (TRB 1995). Often, particularly in larger metropolitan areas with limited options to expand their transportation networks and issues of compliance with the Clean Air Act, these plans and programs include various pricing and other travel demand management measures. They may also include land use and economic plans to better integrate development with transportation systems, thereby reducing travel demand.

The process of adding capacity is arduous and expensive. It is not uncommon for major arterial roads and transit systems serving major metropolitan areas to be congested during peak periods, with some of them extremely congested beyond the peak period. The case study examples of I-395 near the Mark Center in Virginia and I-5 near Joint Base Lewis–McChord in Washington indicate sections of Interstates that operate in stop-and-go conditions during the peak and that have peaks lasting several hours. The MPOs in the relevant regions are well aware of the problems, but the options for adding capacity are often untenable because of cost, environmental impact, and public acceptability.

Even with application of all the above transportation options, however, it is not always possible to develop plans and programs that serve a metropolitan area with a satisfactory level of service while meeting the national ambient air-quality standards and other requirements. Moreover, in the current climate of limited fiscal resources (described in the next chapter), funds are often insufficient to carry out all the transportation projects that are desired by the various jurisdictions within metropolitan areas. Even in less fiscally constrained times than at present, proposed major projects often require years of analysis and environmental review before they can be added to the long-range capital plan of an MPO. Addition of projects is an analytic and negotiation process among regional leaders. For these reasons, the standard MPO process is ill prepared to accept the relatively sudden travel demands caused in some BRAC 2005 concentrations of personnel. The case study examples suggest particularly difficult problems on major corridors serving bases in the National Capital Region, Joint Base Lewis–McChord in Washington, and Eglin Air Force Base in Florida.

MILITARY BASE PLANNING AND BUDGETING PROCESS

Military bases in metropolitan areas are functionally small cities, in many respects similar to the jurisdictions with an MPO. By all appearances, however, military base planning is typically done independent of the surrounding communities. Military bases are required to develop long-range plans for their bases (DoD 2005). These plans are to be a continuous analytic process that involves evaluating factors that affect the present and future physical development of an installation. This evaluation forms the basis for determining development objectives and planning proposals to solve current problems and meet future needs on the base. The process includes the assessment of existing operational and environmental conditions at the installation and the planning rationale used to determine the installation's long-range goals and objectives. The primary products are master plan reports that accommodate an installation's existing and long-range operational requirements. This process involves data collection and analysis, which lead to development of concept plans and finally to definition of long-range plans for the physical development of the installation.

During planning, an installation's facility requirements are derived from the installation's mission. The need to acquire additional facilities is determined by an assessment of how existing facilities meet the installation's facility requirements. If additional facilities are needed,

construction projects may be undertaken to build new facilities or to upgrade existing, substandard facilities to accommodate new missions, accept technological changes, and improve operational efficiency. This planning process focuses primarily on the capital facility requirements at the base and not on the expectations the bases have of the infrastructure and of the surrounding communities. And, as a result, most planning is directed at identifying military construction (MILCON) and operations and maintenance budgets for physical infrastructure, rather than other funding sources to mitigate ongoing traffic congestion impacts through measures such as mass transit subsidies and flextime policies.

Each base submits annual construction requirements, which are a summary for correcting facility deficiencies, to headquarters as part of the military construction budgeting process (DoD 1996). This summary provides a 6-year construction program for the base. The facility requirements are reflected in an installation master plan. This document is the installation's long-range strategy for development. It prescribes overall facility quality standards and architectural themes and addresses areas such as land use, utility systems, roads, and parking. It also identifies unprogrammed requirements that can be reasonably deferred. The bases' main requirements are given a priority ranking and placed in competition with other projects for available resources within the MILCON budget. The project definition effort begins at the installation level and moves through the chain of command until the project ultimately is included in the budget submittal.

To the extent that this planning and budgeting process is carried out at each facility, it is apparently done with little coordination and cooperation from surrounding communities (GAO 2007). (The Fort Bliss example cited in the case study chapter stands out as a counterexample.) Communities are generally left in the dark about the military base actions that affect them. They receive little information and, to the extent that they do receive information, it is generally too little or too late to allow adequate planning and programming on their part. They are often left with addressing problems after they occur. This lack of coordination between military bases and surrounding communities has been a long-term problem and continues to this day (GAO 2007). To the extent the base public works directors are not engaged in the MPO process, presumably they are not fully aware of the carrying capacity of regional transportation infrastructure and its potential (or lack thereof) for expansion.

IMPLICATIONS FOR BRAC 2005 DECISIONS

The legislation that established the BRAC 2005 round defined the criteria that the Commission was required to consider with regard to base closures and realignments.¹ The first four criteria cover the value to the military the Commission must evaluate. Four other criteria relevant for this report are also considered, which include "potential costs and savings," "economic impact on communities," capability of receiving infrastructure, and environmental impact. Criterion 7 states, "The ability of the infrastructure of both the existing and potential receiving communities to support forces, missions, and personnel." The BRAC analysis and decision-making process takes place largely behind closed doors. Given the intense political interest in the outcome of these decisions, the process presumably could not work any other way. In the case of considering BRAC consequences for civil transportation infrastructure, however, it appears that the lack of

¹ http://www.brac.gov/docs/criteria_final_jan4_05.pdf. Accessed Dec. 30, 2010.

communication between military bases and MPOs may have hindered flows of information that could have influenced the outcome of the decisions.

The committee's understanding is that information is gathered about infrastructure around bases for BRAC determinations by "data calls," which come from Department of Defense (DoD) staff supporting the Commission; these calls are directed to the bases to ask for basic information about infrastructure carrying capacity. Information about these data calls is closely held during the analysis and decision-making process because of political sensitivity. This required level of secrecy may compound the problem of getting reliable information about transportation capacity back to the Commission. Given that bases typically are not involved in the MPO process, they may be unaware of the true status of the major corridors upon which the bases rely or the difficulty of expanding them in response to concentrations of military personnel. The difficulty of meeting transportation demand on routes serving Fort Belvoir and Joint Base Lewis–McChord, for example, suggests that the Commission either lacked good information or, if it was aware of the limited and constrained transportation capacity, was unaware of how difficult and expensive it would be to expand the capacity to avoid creating gridlocked conditions.

Of concern to the committee are the implications of the lack of information about transportation and environmental consequences of BRAC and similar fast-paced military realignments of personnel. Decisions to locate in a metropolitan area may be inadequately informed about the carrying capacity of civil transportation infrastructure and the consequences the military's decision would have on the surrounding community and, potentially, on the military.

CONCLUSIONS AND LOOKING FORWARD

Although the MPO process is the institutional mechanism through which regional transportation planning is conducted, by all appearances the military bases in metropolitan areas are not typically engaged in this process. The bases have master planning requirements, but they apply only to the bases and not to their connections to and reliance on surrounding civil transportation infrastructure. This lack of engagement by the military in MPO processes may have contributed to the lack of information about the carrying capacity of transportation infrastructure expected by the military to support bases with large influxes of personnel over a short time. Even though the military conducted environmental assessments at BRAC 2005 bases, those assessments reviewed by the committee stopped at or near the gate, thereby underestimating the transportation and environmental consequences of BRAC 2005.

Although it is too late for the BRAC 2005 round, future decisions about base realignments could be enhanced by improved communication and planning among bases and MPOs. Improved communication and planning would allow regions to better appreciate the capital plans and expectations of military bases and work the base needs into their long-range plans. The new process needs to be cooperative and collaborative, taking into account the requirements of military missions and the goals and objectives of the surrounding communities.

Because MPOs are legally responsible for planning and developing a metropolitan area's transportation system, they are the logical point of contact for the bases and the surrounding communities. The master planning for the military base and that of the MPO could be coordinated to create consistent long-range plans and shorter-term capital improvement

programs. The planning process needs to be carried out continuously and updated regularly. One special issue that may come up is the secret nature of some base operations and the need for MPOs to have staff certified to be privy to secret information and to have processes in place to protect sensitive information.

Accomplishing this shift in the planning paradigm may require new regulations and new guidance on the part of the U.S. Department of Transportation (USDOT) and DoD. USDOT needs to revise FHWA–FTA joint planning regulations to explicitly require MPOs to include the transportation requirements of military bases in their planning process and to add military representatives to those consulted in the planning process. DoD needs to change its guidance to require military bases to work directly with MPOs in developing and implementing bases' transportation access needs. It is important for bases to provide complete and timely information about changes in base personnel to MPOs to allow them to develop transportation plans and programs.

Analyses of the impacts of base transportation requirements need to recognize that impacts to a specific node in a transportation network can occur over a wide area. Transportation system analysis takes into account the ripple effects of these impacts. To the extent that base personnel live substantial distances from the bases and that military activities occur away from the bases, there will be some impact on the metropolitan area. These wide-ranging impacts need to be recognized in the analyses carried out by the MPO and in the environmental assessments of military base expansions. These analyses should also consider physical infrastructure capacity improvements funded through MILCON and other capital programs and ongoing access and congestion management programs that may be funded from sources such as operations and maintenance or employee compensation accounts.

This cooperative planning process would likely require that base personnel responsible for planning be updated and trained in this approach and in developing guidance to base commanders. DoD's Office of Economic Adjustment has the capabilities to assist bases and communities in this area, and its role could be expanded in this regard, as also recommended recently by the National Academy of Public Administration (NAPA 2009).² Moreover, it may well require the development of planning manuals, website resources, and training to move this process forward. Some materials could be adapted from existing USDOT materials. Training courses could be developed in concert with USDOT and some military personnel could benefit from courses provided by FHWA and FTA. Direct technical assistance to base personnel will likely be necessary as this process takes shape.

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Funding Options

The fundamental question posed in the committee’s statement of task concerns the responsibility of the Department of Defense (DoD) to pay for off-base transportation impacts. The first section of this chapter reviews existing DoD programs for assisting communities whose transportation facilities are affected by military base growth. The second section reviews traditional non-DoD government programs to fund surface transportation infrastructure. These programs include those administered by the U.S. Department of Transportation (USDOT), for which national defense is an eligibility criterion. State and local government transportation sources are also reviewed in this section, including how local governments normally work with private developers who propose major projects that will affect the localities’ transportation networks. Alternatives to construction funding for capital improvement to increase infrastructure capacity, such as operations and maintenance (O&M) funding for ongoing congestion management, are also discussed.

The committee is also charged with assessing current federal programs that could be of assistance in BRAC cases. The committee’s treatment of traditional federal, state, and local programs for funding transportation is influenced by the current fiscal context. In the aftermath of the “great recession,” governments are under the most demanding fiscal pressure experienced in recent decades and face a public unsympathetic to tax increases to fund transportation. Even as the military budget has grown dramatically to wage wars in Iraq and Afghanistan, governments have seen their revenues decline because of the recent recession, particularly tax revenues they typically rely on for transportation.

DEPARTMENT OF DEFENSE PROGRAMS

The official policy of DoD is that, with limited exceptions, the impact of bases on local government infrastructure is the responsibility of those governments (DoD 2008) (see also Box 1). The principal argument is that DoD employees pay taxes into the state and local coffers that fund infrastructure, and those sources should be tapped for making improvements to meet the demands placed on the infrastructure by soldiers and DoD civilian employees. DoD policy, however, also allows for special circumstances in which DoD provides funds for transportation improvements.

Defense Access Roads Program

Under the Defense Access Roads (DAR) program, administered by the military Surface Deployment and Distribution Command (SDDC), DoD may pay for public highway improvements to address the impact on traffic of sudden or unusual defense-related actions (see Box 2). DAR enables DoD to help pay indirectly for improvements to highways DoD designates as important to the national defense. Under DAR, DoD can use funds provided in military construction (MILCON) appropriations to pay for all or part of the cost of constructing and

maintaining roads designated as “defense access roads.”

The DAR program began decades ago when many bases were located, or being located, in relatively undeveloped regions. The program appears to have been designed to pay for access roads used principally by the military or to improve roads that would be harmed by heavy

BOX 1

Policy Basis for Defense Access Roads Criteria
(Quotation from DoD, *Defense Access Road Criteria*, October 2008)

It is the responsibility of state and local highway agencies to provide and maintain adequate highways to serve public needs. These needs include those of DoD. The needs of defense were one of the original justifications for the Federal-Aid Highway Program that includes the Dwight D. Eisenhower National System of Interstate and Defense Highways. Defense traffic generates the same road-user revenues for state roadways as does other traffic. Therefore, DoD expects state and local highway authorities to develop and maintain adequate highways to serve defense installations just as they do for other traffic generators. It is DoD policy to not provide funds for the maintenance of non-DoD roads (except for maintaining the structural section of county gravel roads that support the Department of the Air Force’s Intercontinental Ballistic Missile Sites).

DoD recognizes that situations occur where defense traffic places an unexpected burden on state and local highway programs. These situations may include a dynamic increase in mission-related activities that result in a significant and sudden increase in defense traffic. The DAR program may then be able to be used to help fund highway improvements necessary to accommodate the sudden and unusual defense impacts.

BOX 2

Statutory Basis for Defense Access Roads Criteria
(Quotation from DoD, *Defense Access Road Criteria*, October 2008)

The DAR program has its basis in and is authorized by Title 23, U.S.C., “Highways,” Section 210:

23 U.S.C. 210a The Secretary [of Transportation] is authorized, out of funds appropriated for defense access roads, to provide for the construction and maintenance of defense access roads (including bridges, tubes, and tunnels thereon) to military reservations, to defense industries and defense industry sites, and to the sources of raw materials when such roads are certified to the Secretary by the Secretary of Defense or such other official as the President may designate, and for replacing existing highways and highway connections that are shut off from the general public use by necessary closures or restrictions at military reservations and defense industry sites.

military equipment. The program has funded road projects that access missile installations and other military facilities that were off the federal-aid primary highway system. These facilities were generally in isolated areas and not served by access roads.

Funds appropriated for DAR projects are transferred from DoD to FHWA to administer. The provisions of U.S. Federal Code, Title 23, which includes requirements of federal laws applying to federal-aid highways, apply to all DAR projects. Allocations are project specific; therefore, underruns cannot be used on other projects and unused DAR funds may be reallocated by the Washington Headquarters office of FHWA or returned to the military. Funds must be obligated within 5 years of approval. Unobligated balances lapse after the period of availability. Unexpended funds are canceled 10 years after the last year of obligation.

As federal transportation programs go, the DAR program is quite modest. From 2001 to 2010, it certified as eligible 19 projects, 15 of which have been funded. Since 2005, the program has provided about \$22.5 million annually for transportation improvements, including projects that are not BRAC related. By way of comparison, federal aid for highway transportation funded through USDOT exceeded \$30 billion annually from 2006 to 2010.

Eligibility Criteria

Projects are eligible for DAR funding if they meet one of the following criteria (GAO 2009):

1. The installation needs a new access road to accommodate a defense action.
2. A defense action causes traffic to double.
3. The installation needs a new or improved access road to accommodate a temporary surge in traffic to or from the installation due to a defense action.
4. The installation needs a new or improved access road to accommodate special military vehicles such as heavy equipment transport vehicles.
5. The installation needs a road to replace one closed because of military necessity.

Criterion 2 is of most concern in metropolitan areas. Unlike the rural and less developed areas for which the DAR program was designed, bases in metropolitan areas already have access roads, so Criterion 1 is not likely to come into play; nor is Criterion 3, because an expanded access road for a temporary surge would be impractical to try to implement in a metropolitan area given the difficulty of adding capacity on short notice. Criterion 4 was intended to improve formerly rural, often unpaved roads, to handle heavy vehicles. Criterion 5 comes into play only in the rare instance when a road must be closed (the DAR program funded such a project at Fort Belvoir North). Criterion 2 is most problematic because, in congested metropolitan areas, a doubling of traffic is extremely unlikely to occur because of a BRAC action. Many of the highways surrounding the bases reviewed in Chapter 2 carry such high levels of traffic that it would not be possible for traffic to double because of the nonlinear impact that additional traffic has in congested conditions (Figure 9).

As shown in Figure 9, the impact of additional traffic on congested highways is not linear. Travel speeds fall off dramatically at high volumes when new traffic is added. With these congestion levels in place, a traffic increase of only 5% or 10% could cause a highway facility to transition from relatively free-flow conditions to stop-and-go conditions, thereby limiting the maximum number of users. Adding several thousand new commuters to the few highways serving these bases during the peak period could have this effect. In some cases reviewed in

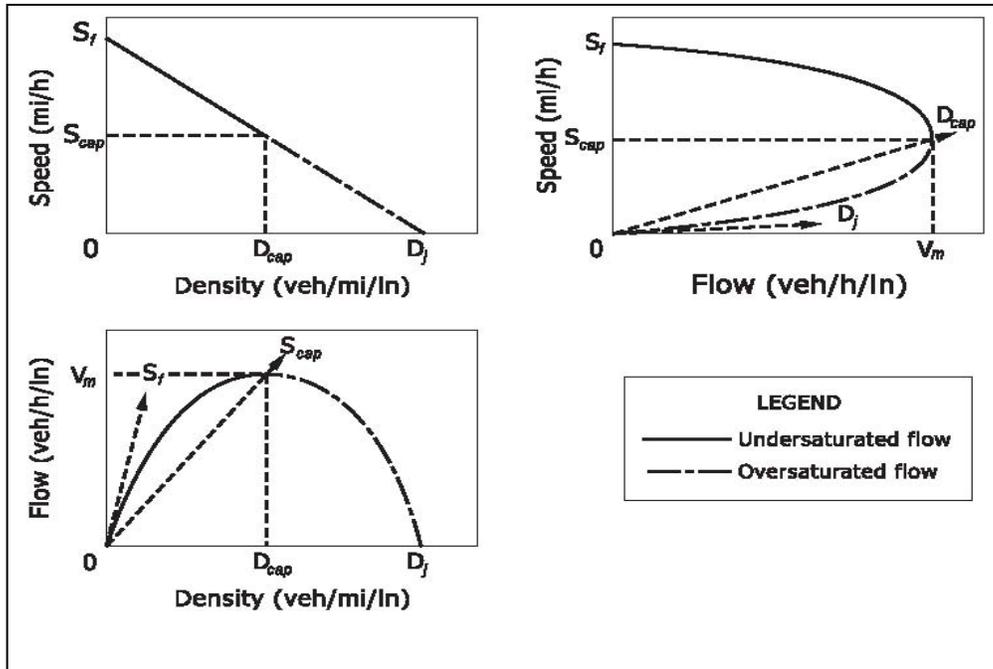


FIGURE 9 Generalized relationships among speed, density, and flow rate.
(SOURCE: *Highway Capacity Manual 2010*, Exhibit 4-3.)

Chapter 2, major highways are operating at low-speed conditions, and adding several thousand users during peak hours on these facilities could result in near gridlock. Thus, it appears that the doubling criterion is not appropriate for determining DAR eligibility for funding transportation improvements in congested metropolitan areas.

When considering travel demand management programs to relieve congestion, the nonlinearity of a few vehicles having a disproportionate effect can work in reverse. A small reduction in urban peak traffic volume can result in a proportionally larger reduction in delay. For example, a 5% reduction in traffic volumes on a congested highway (e.g., from 2,000 to 1,900 vehicles per hour) may cause a 10% to 30% increase in average vehicle speeds (e.g., increasing traffic speeds from 35 to 45 mph). As a result, even relatively small changes in traffic volume or capacity on congested roads can provide relatively large reductions in traffic delay. The timing, location, and type of travel changes will have different effects on reducing congestion.

DoD-Funded Study of DAR Criteria

In 2010, DoD released a report on DAR criteria (Gannett Fleming 2010). DoD requested that SDDC undertake this study to evaluate the merits of safety as a potential criterion. SDDC identified that safety and congestion should be investigated as a potential criterion. The study reported the following:

According to the Institute of Transportation Engineers, traffic access and impact studies are conducted to assess the transportation impacts of proposed developments and other land use changes. This may include new facilities or changes in land use resulting from the redevelopment of an existing area. When considering installation growth related to mission change, BRAC, or other factors, ultimately the traffic impacts experienced are a result of the activity associated with new or modified facilities. In that way installation impacts are almost identical in nature to that of the construction of a new office building or shopping center by a land developer. Therefore, it makes sense to use the same policies and procedures in identifying the transportation impacts of a military installation that apply to land development. (Gannett Fleming 2010)

The recommended approach in the Gannett Fleming report for DoD would consider the following factors to determine eligibility of projects in highly urbanized areas where military growth causes sudden or unusual traffic impacts:

- Military installation is within an urbanized area with population greater than 200,000.
- Proposed project area must be within a mile of the military facility perimeter.
- Proposed project area has a minimum increase of 100 peak-hour DoD trips.
- Project area must operate below level-of-service D after the military impact.

Upon determination that a project is eligible for DAR funding, a DoD-share analysis would be conducted to identify the installation's potential contribution to the roadway improvements necessary to maintain acceptable or current operating conditions.

The recommended project will, at a minimum, restore the level of service or delay time to levels which existed prior to the military action. For all DAR projects, SDDC conducts an analysis to determine the fair-share that should be funded by DoD. This analysis considers the military impact to traffic on the subject roadway segment and mitigation required to address the impact. The appropriate military funding share is then determined based on the installation's proportion of the total traffic which utilizes the subject roadway segment. For large, complex projects involving military and non-military impacts, other factors (such as overall project scope, total project cost, and funding available from other sources) are taken into consideration. A similar fair-share analysis shall be conducted for projects found eligible for DAR funding using the criteria recommended in this study. (Gannett Fleming 2010)

There are limitations to the DoD share approach recommended in the Gannett Fleming study. First, calculation of the military's impact on congestion using the impact fee model should not be based merely on the military's share of total traffic. Impact fees charged to new developments assess costs on new development if the new use causes an infrastructure's level of

service to fall below an established standard. Moreover, the additional military traffic load could have a disproportionate effect on traffic flow as illustrated in Figure 9. Therefore, it makes more sense for the military share to be based on the increased delay caused by additional military traffic (the increased traffic may not all be attributed to the military, as many routes are experiencing traffic growth over time from all sources). Second, the impact of military traffic could affect traffic flow well beyond the arbitrary 1-mi limit. Metropolitan areas have fairly dense, interconnected networks of roads and highways. The source of congestion is not necessarily at the location of the traffic generator; it may be located at a bottleneck miles away or it may affect congestion on a major access route for miles beyond the 1-mi perimeter.

DAR Eligibility for Nonhighway Transportation Improvements

Most BRAC bases that were studied have adopted a multimodal approach in the development of their traffic management plans. They recognize the need to limit single-occupancy vehicle traffic onto bases and provide travel alternatives for base personnel. According to presentations made to the committee, they are motivated by the need to meet air-quality standards, reduce their carbon footprints, and minimize energy usage (President Obama 2009). Included in many base traffic management plans are strategies to improve bus transit; provide shuttles to rail and commuter rail stations; increase use of bus pools, carpools, and vanpools; expand the use of telework, variable work hours, and schedules; and other travel management measures. Many bases are working with surrounding jurisdictions and service providers to carry out these plans. However, limited funds are available for these purposes. By statute, DAR can fund only road improvements. DAR limitations illustrate the need for other funding sources in addition to MILCON, such as O&M or other accounts over which commanders have some discretion, to be identified and used for multimodal and ongoing congestion management and improved access programs.

Competition for MILCON Funds

The DAR program funds projects relatively infrequently (15 projects over the last 10 years) in part because of the strict criteria used to approve projects and in part because of competition for funds with other MILCON projects. If a project is approved, funding is not guaranteed; projects must compete through the normal DoD MILCON appropriations process. In that context, the DAR project must compete with every other MILCON project being considered by DoD.

Even before entering the competition, a DAR project must be supported by the garrison commander. Bases preparing for a large influx of personnel have myriad needs for MILCON funds for essential items such as barracks, training facilities, and on-base infrastructure. The individual responsible for public works at Joint Base Lewis–McChord explained to the committee that improving off-base access was a low priority for the base commander compared with these more immediate needs (see Chapter 2).

Office of Economic Adjustment

The Office of Economic Adjustment (OEA) is DoD's primary source for assisting communities that are adversely affected by DoD program changes, including base closures and realignments, base expansions, and contract and program cancelations. OEA offers technical and financial

assistance to adversely affected communities and coordinates the involvement of other federal agencies through the Defense Economic Adjustment Program and the President's Economic Adjustment Committee.

Economic adjustment assistance provides a community-based context for assessing economic hardships caused by DoD program changes by identifying and evaluating alternative courses of action, identifying resource requirements, and assisting in the preparation of an adjustment strategy or action plan to help communities help themselves.

OEA has funded studies, such as traffic studies, which help states and local communities define the impact of military growth on transportation. In BRAC 2005, for example, OEA provided transportation-planning grants to Maryland and Virginia. According to local officials, OEA also funded transportation studies for communities near several of the bases the Government Accountability Office visited in its assessment, including those near Eglin Air Force Base, Florida, and Fort Knox, Kentucky (GAO 2009). These studies can provide communities with more detailed, precise information about the transportation impact of military growth than the initial environmental studies performed by DoD. The funds used in these studies cannot be used to build infrastructure.

OEA has funded local coordinator positions to assist in coordinating local activities responding to BRAC, including transportation-related activities. For example, Harford County, Maryland, established a BRAC planning commission for Aberdeen Proving Ground. This commission, with OEA funding, helped establish the Chesapeake Science and Security Corridor Consortium, which includes eight jurisdictions in Delaware, Maryland, and Pennsylvania. With Harford County as the lead agency, the Chesapeake Science and Security Corridor Regional BRAC Office administers grants and coordinates regional BRAC responses.

OEA's efforts occur after DoD has decided to make changes to military bases. Its function is to help communities cope with military decisions that have already been made.

Transit Benefit Program

Executive Order 13150 created the transit benefit program. The provision of these incentives is authorized by the Federal Employees Clean Air Incentives Act of 1993. This program is designed to improve air quality, reduce traffic congestion, and conserve energy by encouraging employees to commute to work on a daily basis by means other than single-occupancy motor vehicles. This program provides a financial incentive to federal employees in the National Capital Region in the form of a subsidy for using transit services or qualified vanpools (Kepplinger 2008). DoD launched its transit benefit program with an effective date of October 1, 2000. Personnel eligible to receive transit benefits must be a civilian, military, or nonappropriated fund employee paid and employed by DoD and permanently stationed and working in the National Capital Region.

The Army established a policy implementing 5 U.S.C. 7905, which permits agency heads to reimburse federal employees, including members of a uniformed service, for certain commuting expenses. The policy allows army bases outside the National Capital Region to provide transit benefit payments. Funds for the transit benefit program are included in the budget of the individual DoD commands or their components (Chu 2008).

Under this program, participating employees receive, in addition to their current compensation, transit passes in amounts equal to their personal commuting costs, not to exceed \$230/month. Parking costs are not used in establishing commuter costs. This benefit applies to

both mass transit and qualified vanpool participants. Employees with subsidized parking must relinquish their parking permits to receive the transit pass.

American Recovery and Reinvestment Act of 2009

The American Recovery and Reinvestment Act of 2009 (ARRA) was passed by Congress and signed into law by President Obama on February 17, 2009. The purpose of the \$787 billion recovery package was to jump-start the economy to create and save jobs. The Act specifies appropriations for a wide range of federal programs. Twenty-eight agencies, including DoD, were allocated a portion of the \$787 billion in recovery funds. Each agency develops specific plans for how it will spend its ARRA funds. The agencies then award grants and contracts to state governments or directly to contractors or other organizations. Some of these funds were used to expand the Fairfax County parkway near Fort Belvoir.

Enhanced Use Leases

Title 10 U.S.C. Section 2667 allows military installations to lease land and facilities to a private or public entity (<http://www.ftmeade.army.mil/pages/eul/eul.html> 2010). Specifically, installations can, among other things, accomplish the following:

1. Grant the use of land and facilities for mission-oriented functions.
2. Enter into long-term or short-term leases, providing greater flexibility for facility reuse.
3. Receive no less than fair market rental, in cash or in-kind, as consideration for the leased property.

The process supplements underfunded and unfunded capital improvements and operations and maintenance expenses. By statute, the lease must promote the national defense or be in the public interest. The property must not be excess to military department needs as defined by 40 U.S.C. 102 and determined to be available. This DoD leasing program allows a multiyear lease of installation property for commercial use in exchange for cash or in-kind services to the installation. Limited DoD maintenance funding and recent changes to the program have made it a popular tool for installations to address maintenance needs. Importantly, the revenues earned from enhanced use leases (EULs) remain under the control of the garrison commander rather than being returned to the DoD.

This program essentially allows installations to become developers; however, there is no requirement that these commercial projects follow local and state processes to mitigate for impacts. In some cases, such as Fort Meade, the growth from EUL activities may exceed the BRAC-related growth and create more demand on access roads around the base than the BRAC movements. Communities sometimes oppose EULs because the program also potentially captures contracting activities that would follow the BRAC consolidations but would have been located outside the gate, where they would be taxable and would have to follow state and local processes. Nevertheless, the EUL process provides an opportunity for military bases that have developable excess land to raise revenues that could be used to improve transportation access services to that base. Because of base commanders' many competing demands, however, these

funds would need to be dedicated to transportation uses if revenues from EULs were to relieve the traffic impacts of bases.

Base Operating and Maintenance Accounts

Military construction funding is only one source to address traffic congestion caused by base activities. Capital expenditure programs, such as DAR, can provide site-specific traffic fixes but are not sufficient alone to address ongoing, variable, fluid, and non-site-specific impacts of traffic congestion. For example, transient base activities can temporarily overload existing road capacities, but planning for such peaks through capital improvements may be unduly expensive, resulting in underutilized capacity if a peak is a one-time effect. Further, defining the contracting requirement for a military construction project may be difficult if the capital expenditure is off base, may benefit others besides the military, and may depend on complementary funding from nonmilitary sources, such as state and local transportation agencies, and regulatory approvals from nonmilitary entities, such as local planning agencies.

Use of noncapital funding, such as O&M accounts or employee compensation accounts, may provide more flexible funding to meet variable traffic management needs. O&M funding, for example, could be made available to pay for dedicated bus service, commuter assistance programs, access to telework centers, mass transit subsidies, and other services that improve access to the base or reduce congestion delays for those accessing the base. O&M funding is particularly useful for ongoing or continual needs, particularly as traffic congestion is characterized as an ongoing base access issue and traffic mitigation is characterized as a service rather than a one-time military construction need.

O&M funding, like military construction, is subject to many competing priorities that must be addressed by a base commander. Several solutions should be considered to preserve a higher priority for traffic congestion management, such as dedicated or “fenced” funding, both MILCON and O&M, or incentives that allow a base commander to retain identified cost savings from reduced traffic congestion. For example, demonstrable fuel savings, reduced overtime or absentee costs, and reduced military operation costs, such as more efficient logistics programs, could be retained by base commanders for other on-base priorities rather than resulting in reduced total budget authority. Other indirect savings, such as improved employee retention, reduced employee replacement and training expenses, and lower rates of sick leave, may be more difficult to link to reduced traffic congestion but may nonetheless be real and could further result in monetary incentives for base commanders if identified, quantified, validated, and retained or could be factors in their overall performance evaluations. Alternatively, base commanders could be afforded more flexibility to utilize accounts such as fuel, employee compensation, and training to pay for improved traffic management activities. As with EULs, however, if these O&M funds are to be provided for off-base improvements, they would need to be dedicated for that purpose.

NON-DoD TRANSPORTATION PROGRAMS

More than \$200 billion is spent annually by all levels of government and special authorities to build, maintain, and operate the nation’s highway and transit systems (USDOT 2008, Exhibit ES 10-11). Federal aid distributed through USDOT accounts for only about 22% of the total

expenditures, but federal aid accounts for a much larger share—40%—of capital expenditures (USDOT 2008, Exhibit ES 10-11). Although total annual government expenditures for surface transportation are quite substantial, so too are the highway networks and transit systems that these funds must support. The nation has 4 million miles of roads and highways to maintain, along with more than 160,000 route miles of transit services that together accommodate 13 billion passenger miles daily (Bureau of Transportation Statistics 2010, Tables 1-1 and 4-3).

In the most rigorous analysis available regarding surface transportation investment, USDOT estimates that the nation as a whole is underinvesting in its transportation assets on the order of about \$30 billion annually simply to maintain the existing physical condition and system performance (USDOT 2008, pp. iii, vii). The physical condition of the transportation infrastructure is actually improving over time, but highway system performance is declining as an ever-increasing percentage of roads, particularly in major metropolitan areas, become congested. Whereas transit system condition is actually improving because of investment in new systems around the country, in the nation's seven largest rail systems, which account for the vast bulk of rail ridership, 35% of assets are classified as being in poor or marginal condition (FTA 2009). To keep transportation infrastructure condition and performance from declining, the nation would need to boost capital expenditures by 27% over current levels (USDOT 2010). Various estimates for what it would cost to improve the performance of the system have been developed; these estimates suggest that improving investment on facilities that are cost beneficial would require increased investment of 45% to 70% (National Surface Transportation Infrastructure Finance Commission 2009, Exhibit ES-1).

Federal aid for transportation is provided to states and transit authorities through surface transportation legislation. The current authorizing legislation has lapsed and is being temporarily extended. The requests of states and transit authorities for additional capital assistance have been reflected in proposed legislation that would authorize higher spending levels, but Congress has not found a way to fund the increase due to resistance to higher fuel taxes and any other tax increase in the current economic climate.

Federal and state capital programs depend heavily on the motor fuels tax to fund capital improvements. The federal tax rate has not been increased since 1993. The federal tax of 18.3 cents per gallon of gasoline (24.3 cents per gallon of diesel) is deposited into the highway trust fund along with other user fees; revenues from that fund support federal capital assistance for roads and transit. The purchasing power of the federal gasoline tax revenue has declined 33% since the last fuel tax increase because of inflation (National Surface Transportation Infrastructure Finance Commission 2009, Exhibit 4-2). Even as purchasing power has declined, demand on the highway system has increased by 27% (National Surface Transportation Infrastructure Finance Commission 2009, Exhibit 2-2). Moreover, as vehicles become more fuel efficient, they contribute less to the highway trust fund in taxes per mile traveled. All these forces combine to create declining real revenues to serve demand. As a result, the demand for capital funds is highly contested.

USDOT Programs

National security is an explicit goal of USDOT; however, USDOT does not have specific programs to deal with military growth. Nevertheless, many federal transportation grant programs provide state and local governments with funding they can use to help address BRAC-related transportation challenges. Surface transportation legislative provisions allow states to transfer

funds between core programs and also to eligible transit projects. Federal capital transit programs include formula grants to transit agencies and states. Additionally, transit capital investment grants provide discretionary funds for the construction and extension of fixed guideway systems, such as rail and bus rapid transit lines. Federal transportation programs also require states to set their own priorities for addressing transportation needs. Federal funds cover only a portion of the projects' costs. State and local agencies must match the federal funds with their own funds. Funds under these programs are highly contested because of the many transportation needs in metropolitan areas.

FHWA Programs

FHWA has several programs that, in principle, could provide funds for transportation improvements to assist with access to military installations. Most notably, FHWA's Surface Transportation Program (STP) funds are apportioned to the states to be used for construction, reconstruction, rehabilitation, resurfacing, restoration, and operational improvements for highways and bridges, including any such construction or reconstruction necessary to accommodate other transportation modes. Funds can be used for capital costs for transit including vehicles and facilities, whether publicly or privately owned, that are used to provide intercity passenger service by bus. The funds can also be used for carpool projects, fringe and corridor parking facilities and programs, and bicycle transportation and pedestrian walkways as well as highway and transit safety infrastructure improvements and programs and hazard elimination. The funds can also be used for the capital and operating costs for traffic monitoring, management, and control facilities and programs and surface transportation-planning programs. STP was authorized at \$32.5 billion for fiscal years 2005 through 2009. The federal funding share for most of these projects is up to 80%.

In addition, there are a number of federal highway programs that, under specific circumstances, could provide federal assistance for military base access, including the Congestion Mitigation and Air Quality Improvement Program, the National Highway System Highway Program, the Safety Improvement Program, and the Interstate Maintenance Program.

FTA Programs

FTA also has several programs that could provide funds for improvements to assist in access to military installations. The Urbanized Area Formula Program provides federal funds available to urbanized areas and to governors for transit capital and operating assistance in urbanized areas and for transportation-related planning. Eligible purposes include planning, engineering design and evaluation of transit projects, and other technical transportation-related studies; capital investments in bus and bus-related activities such as replacement of buses, overhaul of buses, rebuilding of buses, and construction of maintenance and passenger facilities; and capital investments in new and existing fixed guideway systems, including rolling stock, overhaul and rebuilding of vehicles, track, signals, communications, and computer hardware and software. All preventive maintenance and some Americans with Disabilities Act complementary paratransit service costs are considered capital costs. The Capital Investment Program provides discretionary grants for capital assistance for new and replacement buses and facilities, modernization of existing rail systems, and new fixed guideway systems.

FHWA and FTA Grant Requirements

All the FHWA and FTA programs mentioned have specific planning and environmental requirements. All projects must be part of an approved long-range transportation plan and a shorter-term transportation improvement program developed by the responsible metropolitan planning organization (MPO). These long-range plans and shorter programs must meet the requirements of the National Environmental Policy Act and be consistent with the Clean Air Act amendments in addition to other federal requirements. Federal transportation funds are limited and projects to improve access to military installations must compete for funds with all other projects in a region to improve transportation service.

ARRA Funding for Transportation

Title XII of ARRA appropriated \$1.5 billion, available through September 30, 2011, for supplementary discretionary grants for a national surface transportation system. USDOT calls them Transportation Investment Generating Economic Recovery (TIGER) discretionary grants. USDOT has \$600 million in fiscal 2010 appropriations for the second round of grants. Neither the first nor the second round of TIGER grants supported base access projects for the 18 bases affected by BRAC 2005.

These grants are awarded on a competitive basis for capital investments in surface transportation projects. The projects must have a significant impact on the nation, a region, or a metropolitan area—and they must create jobs. TIGER II applicants must contribute at least 20% of a project's cost. (No nonfederal matching funds were required in the first TIGER round, although ARRA gave priority to projects for which the federal money would “complete an overall financial package.”) These project proposals will undergo an evaluation of expected project costs and benefits: USDOT believes that benefit–cost analysis is an important discipline for surface transportation investment, and applicants are generally required to identify, quantify, and compare the project's expected benefits and costs. In the selection of projects in the first and second TIGER rounds, no base access projects for BRAC bases were selected for funding. This is perhaps explained by the requirement that projects be “shovel ready,” which means that they have cleared National Environmental Policy Act review, acquired right-of-way, and met other federal eligibility requirements. Nevertheless, in future rounds of TIGER grants, base access projects may be selected.

The TIGER grant program has considerably more demand than it can accommodate. In the first round of TIGER grants, USDOT received applications for 32 times the available funds. Nearly 1,000 transportation grant applications were submitted for more than \$19 billion worth of projects, far exceeding the \$600 million available from the program (USDOT 2010).

Environmental Streamlining

The development of transportation projects depends as much on meeting state and federal environmental requirements as it does on funding. The Safe, Accountable, Flexible Efficient, Transportation Equity Act of 2005 includes a number of provisions designed to expedite the environmental review of transportation projects mandated by the National Environmental Policy Act (NEPA) of 1969.¹ These provisions are designed to improve interagency communication and

¹ <http://www.environment.fhwa.dot.gov/strmlng/es2safetealu.asp>. Accessed Jan. 12, 2011

analysis in order to meet NEPA requirements in a more timely way than they have been met in the past. Executive Order 13274 (September 18, 2002), among other things, empowered the Secretary of Transportation to identify high-priority projects that deserve special attention by resource agencies required to conduct NEPA reviews and analyses in order to expedite their review. Streamlining does not bypass NEPA or other federal requirements; instead, it attempts to resolve complex interagency reviews and enhance communication so that determinations can be made regarding compliance with NEPA and other requirements. FHWA maintains a website with extensive information about environmental stewardship and streamlining, including case examples, guidance, and performance reports.²

State and Local Governments

Along with funding some capital improvements, state and local governments fund transportation infrastructure operational and maintenance expenses, which account for most transportation spending. From a state and local finance perspective, the BRAC 2005 round could hardly have come at a more difficult time. The year-over-year growth rate in state tax revenues began to slow in late 2005, well before the recent recession, but then went sharply negative in late 2008 (Rockefeller Institute 2010, Figure 2). Although state revenues have begun to rebound, 2010 revenues are forecast to be 14.9% lower in 2010 than in 2008.

Federal aid through USDOT programs discussed above almost exclusively fund capital improvements. Most states have a highway trust fund that is funded through motor fuels and other user fees, while local governments rely on a wide variety of taxes to support their transportation assets, particularly property and sales taxes. The states rely on their trust funds for both highway capital and operating expenses. The sales tax on motor fuels provides an index of motor fuel tax revenues; the year-over-year growth rate in this tax went negative in 2006 and has remained so in 15 of the last 16 quarters (Rockefeller Institute 2010, Table 5), which caused many states to suspend or cancel proposed capital spending.

Local property taxes have been less severely affected by the economic downturn in the near term because they depend on reevaluations that lag swings in market values. Many jurisdictions will experience less revenue from this source over the next 3 to 5 years as jurisdictions reevaluate. Sales taxes, which many jurisdictions use to support transit, are still well below 2008 levels (Rockefeller Institute 2010, Figure 3.)

State and local agencies, particularly in the current economy, are experiencing demand for available transportation funds that far exceeds supply. Trends affecting the federal trust fund are also affecting sources of state and local transportation funds. In addition, many states are facing large budget deficits, which have forced state and local agencies to reprioritize their transportation projects and eliminate many of them (AASHTO 2010, NCSL 2010, Ybarra 2008).

State Infrastructure Banks

Many of the states with BRAC actions have state infrastructure banks that could be a source of upfront capital to improve transportation facilities at low or no interest if a revenue source could be found to repay the loan. In the case of Fort Bliss, the state is dedicating a share of future federal surface transportation revenues to pay a developer who financed the project. Another possibility is for a local jurisdiction or state to dedicate some portion of existing tax revenues, or

² <http://www.environment.fhwa.dot.gov/strmlng/index.asp#history>.

raise taxes, to repay a loan from a state infrastructure bank. Some complexities with this approach are obvious. Most of the facilities adversely affected by base expansion are state highways, and local property or business taxes would not apply. The state could dedicate a share of future highway user taxes to repay the loan, but, as indicated above, most state transportation trust funds are inadequate to meet current needs. Given the current status of state and local finances, the concept of diverting existing tax revenues to a new purpose, or raising taxes, would be politically unpopular, but such an approach might be possible in the future for some projects.

Impact Fees

The situation of a sharp increase in base personnel being transferred to new or expanded facilities is analogous to an unanticipated new, large private development occurring within a metropolitan region. Typically, regional leaders would negotiate with the developer and require that certain conditions be met to ameliorate the negative impacts of the development, and they often impose fees to offset capital improvement needs as a result of the development. If developers in such instances are unwilling to pay the impact fees, local governments can refuse to allow the development.

Exactions, the on-site construction of public facilities or dedication of land, have been used for decades.³ Impact fees, a form of exaction, were instituted in the 1920s as a local financing tool. Where no appropriate land was available for a traditional exaction, off-site land or a fee-in-lieu could be substituted for a dedication. Over time, these fees came to include capital costs for on- and off-site improvements brought about by new development. Rooted in the idea that new development should pay its own way, impact fees increasingly have been used to pay for improvements traditionally paid for by property taxes. According to the California State Controller's Office, fees and service charges account for almost 20% of annual local government revenues. They are generally a one-time charge on new development by local government as a condition of approval for a building permit to pay the development's proportional share of capital improvements.

New development requires improvements such as roads, utilities, parks, and schools as well as police, fire, and solid waste disposal services. Historically, such improvements were financed with bonds and local property taxes supplemented by state and federal grants along with subdivision dedications and fees. These public expenditures were seen as a spur to private investment. However, a combination of more complex (and costly) improvements, environmental considerations, a dramatic decline in federal expenditures on local infrastructure in the 1980s, and the property tax revolt epitomized by Proposition 13 in California led local governments to search for other methods of financing needed infrastructure. Consequently, California has been one of the leaders in the development of impact fees. Impact fees have grown increasingly popular with local governments as a supplementary financing source⁴ Altshuler and Gómez-Ibáñez (1993) found that approximately 60% of local governments used impact fees along with in-kind levies by the mid-1980s.

The legal basis for government intervention in the development process is its police power to protect the public health, safety, and welfare of its citizens. Through a series of court

³ See Appendix A, from which this chapter is derived, for a more extended discussion of impact fees.

⁴ Impact fees on new development have been imposed to make improvements to transportation facilities and corridors, examples of which would be informative in developing an approach that would work for base expansions (Cooper 2000; Nelson/Nygaard 2004; Newport Partners and Virginia Polytechnic Institute 2008).

cases, a set of standards have been established on the application of impact fees. These standards apply to both legislatively imposed and ad hoc fees.

A government entity imposing an impact fee on development projects must meet several standards (Powell et al. 2006):

- Establish the purpose of the fee.
- Establish the use of the fee, including public facilities to be financed.
- Show a reasonable nexus between the purpose of the fee and the type of development.
- Show a reasonable relationship between the public facility to be constructed and the type of development.
 - Show a reasonable relationship between the specific amount of the fee and the cost of public facilities attributable to the project.
 - Account for and spend collected fees only for the purposes intended, with a provision for returning unexpended funds.

Consequently, in most states, impact fees must meet the rational nexus and rough proportionality tests. First, there must be a reasonable connection between the need for additional facilities and new development. Second, it must be shown that the fee payer will benefit in some way from the use of the fee proceeds. Third, calculation of the fee must be based on a proportionate fair-share formula.

A number of elements of the impact fee model can be applied to BRAC cases. However, the process would require some analytical rigor to ensure equity among all parties. Moreover, to date, impact fees have been assessed only at the community level and not at the state level. Nevertheless, the principles that have been used to structure impact fees at the local level can be a useful basis for allocating costs resulting from personnel increases at military bases. To avoid confusion about impact fees, it should be understood that impact fees are associated with the costs imposed by new developments; they are not based on the economic benefits new developments might provide to communities.

Application of the impact fee model requires a traffic impact study. Following the impact fee model, the first step in the application is to assess the deficiencies in the existing transportation system before the personnel increases in the military bases occurred. The cost to alleviate these deficiencies needs to be estimated. The cost would not be assessed to the military. Next is an assessment of the system improvements requirement to accommodate the additional travel demand resulting from the increases in military base personnel. The cost to meet these requirements needs to be estimated. Since the new development contributes some taxes and fees that could be used to offset some of the cost of needed infrastructure, these financial payments need to be estimated as well. Finally, the costs of meeting the additional travel demand due to the new development can be attributed to the new development based on its share of delay caused by the new traffic it generates.

Allocating costs of the marginal user in these cases can require a sophisticated analysis because of the nonlinear impact of added traffic to a congested route serving a new facility. There may well be network effects that must be accounted for. In addition, the decision about how to assign costs is not completely straightforward. The marginal user added to a traffic stream that causes speed to fall and flow per hour to actually decline imposes a disproportionate cost on all other users. In the case of BRAC projects, if the military is the only source of new demand, then it would be subject to all the costs of improvement. Typically, however, even

congested facilities are experiencing growth from other sources; even in this situation, there is still a decision to be made about how to assign costs across classes of new users.

Whatever analytic process is used to assign costs, it should be consistent with the principles listed below.

- The application of impact fees should be nondiscriminatory. The military should make the same contributions that a developer would have to make, if any, including whatever concessions are routinely provided. Thus, any required fee should be modeled on how impact fees are imposed on the private sector. If a region welcomes private development without charging fees or receiving exactions, then DoD should not be expected to provide support for transportation improvements for base expansion.
- The military responsibility should extend only to restoring the level of service to what it was before the new traffic was added. The cost assigned to the military would be designed to alleviate the delays its action imposes on other highways, not to improve traffic flow beyond what it was previously.
- The geographic area of responsibility should be defined by commute sheds rather than some predefined distance from the base perimeter. Commuters going to and from a military base in a metropolitan area travel across a dense network of roads, and delays could be imposed at intersections or along routes that are more than 1 mi from the base perimeter. Determining these impacts requires some form of traffic simulation modeling.
- Military cost responsibility should be conditioned on the civil sector contributing its share. In estimating future delays in a network as a result of a base expansion, the analysis would need to factor in future growth resulting from the military base, along with growth associated with the long-term trend on the existing network. This future growth in civilian traffic, if any, would need to be included in assigning cost responsibility. It is not expected that a DoD impact fee would cover the whole cost of needed improvements unless it was the only source of future growth. Future economic expansion along major corridors as an indirect consequence of base expansion should also be assessed impact fees.
- Nonlinearities of impacts and costs should be accounted for and reflected in the impact fee. In allocating costs imposed on traffic flow, the impact of the last marginal user tends to be the most disproportionate; thus, assigning the responsibility for this impact imposes a disproportionate cost. Assigning this cost is a nontrivial matter because, in theory, the last marginal user before traffic flow in a congested corridor reverses imposes a very large cost. The committee's recommended resolution of this matter is as follows: in cases in which expected traffic growth from the civil sector will complement the incremental growth attributable to base expansion, the military and the civil sector cost should be shared based on the projected share of growth on the civil side and the projected traffic added because of the military.

Assuming that impact fees were paid by the military in BRAC cases, the process would require careful accounting to ensure that the proper payments are made and that the funds are used to improve the transportation facilities in a timely manner. It needs to be understood that the funds from impact fees would pay for a portion of the cost for the needed transportation improvement if the military is not the only source of increased demand.

CONCLUSIONS

DoD Programs

The official DoD policy is that, aside from the DAR program, when bases impose new transportation demand on surrounding communities, state and local governments should look to their own and traditional federal-aid transportation programs for capital and operating funds. The DAR program is the only capital program for meeting road access needs outside the base; however, it is too limited to meet the needs of metropolitan areas experiencing rapid base expansion. The eligibility criterion of a doubling of traffic, which simply cannot happen on highly congested facilities, is not appropriate in the metropolitan context. DAR, by statute, is limited to funding road improvements, even though transit is essential for meeting demand in some urban locations. Moreover, DAR applicants, once certified, must compete for funds. Base commanders experiencing rapid increases in personnel indicate that they have higher priorities for essential facilities on the base, such as barracks. Even when a base commander supports a DAR application, it must compete against every other capital item in the MILCON budget. Finally, once a DAR project is awarded funding, it is available for only 5 years. For localities wishing to use DAR funding as a component of a larger capital improvement, this time window is simply too short for local agencies to complete environmental and public participation requirements and secure funding.

Other possible sources of DoD funds to tap for ongoing transportation expenses, such as transit services, transit subsidies to travelers, and travel demand management programs include EULs and base O&M and employee compensation accounts. Military construction and operating and maintenance funding are authorized and appropriated for specific purposes and typically must be used or contractually obligated within specific time periods. Generally, base commanders are subject to use-it-or-lose-it restrictions that limit their discretionary use of funding made available to them.

In addition, the priorities established for use of existing authorized and appropriated budgets may change during a fiscal year, as emergencies and other contingencies arise. MILCON and O&M funding for base operating expenses may be delayed or canceled and the funds reallocated and, in effect, often become the bill payers for such contingencies, particularly when military missions change or direct military operation or war-fighting expenses increase.

For a revised DAR or O&M to be relied upon for transportation management expenditures, it needs to be better insulated or fenced from competing military priorities and use-it-or-lose-it restrictions, particularly when (a) military funding complements nonmilitary or nonfederal funding, such as state and local transportation funds, and such outside funding is subject to planning and other regulatory approval processes that may exceed the time frame within which the military funding must be used; (b) outside funding has been committed but projects cannot proceed if the military complementary funding is rescinded; and (c) long lead times are necessary to coordinate related and required regulatory and planning approvals and stability of funding is a necessary prerequisite for such approvals.

Options to improve fencing of military funding could include specific authorization or appropriations language included in the relevant statutes or accompanying congressional reports, DoD policy statements creating priority for such funding or increasing flexibility for use by base commanders, and transfers of DoD funding to other federal entities such as USDOT, which may have longer time frames for use or obligation of such funding.

Non-DoD Funding Sources

Funding transportation improvements in the current constrained fiscal environment is challenging. In the slow-growth aftermath of the most severe recession since the Great Depression, states and metropolitan areas are finding that they have, and expect, insufficient funds to make needed and anticipated transportation improvements. Limited federal transportation funds, and uncertain prospects for a new multiyear authorization of highway and transit programs, have put greater pressure on states and metropolitan areas. The current lack of public support to fund tax increases or increase gasoline user fees has made this problem even more difficult. Consequently, states, MPOs, and local governments have had to prioritize their transportation projects and fund only those with the highest priority and those for which they can find funding. Whereas states and regions that benefit economically from the presence of military bases should contribute to the cost of improving facilities that the military requires, and may need to reconsider their priorities in order to do so, the demands of BRAC 2005 could hardly have come at a more difficult time.

The impact fee model is one approach for sharing costs between DoD and state and local agencies. Although not a perfect analogy, it is appropriate to consider DoD in a manner akin to any private developer who wishes to locate a large new development in a metropolitan area. In most areas, the developer is charged a fee to cover the costs of improvements needed to serve the transportation demand the new project engenders. The developer pays these fees upfront, in addition to the stream of future revenues it pays in the form of property taxes and that its users pay in motor fuel and other taxes that directly fund transportation. Impact fees typically do not charge the full cost of the improvement to the developer unless the traffic growth attributed to the development is the sole source of new demand. Typically, growth from the civil sector is occurring, even on congested facilities. In such cases, state and local governments that benefit economically from the location of bases in their regions bear some responsibility for providing funds for base access improvement projects. Principles for assigning cost responsibility are provided in the previous section of this chapter.

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Findings and Recommendations

NATURE OF THE PROBLEM

The BRAC 2005 round differed fundamentally from previous base realignments. Unlike previous BRAC rounds, which primarily dealt with base closures, BRAC 2005 concentrated tens of thousands of additional personnel at a number of bases located in metropolitan areas with already inadequate transportation infrastructure and experiencing substantial congestion. The date when BRAC decisions must be fully implemented (September 2011) is far too soon for the bases and surrounding communities to avoid significant added traffic congestion for military personnel and other commuters during peak travel periods. The resulting traffic delays will impose substantial new costs on surrounding communities and the military.

The BRAC 2005 round is being implemented under an extraordinary set of circumstances. The nation is fighting wars in Iraq and Afghanistan. Even as it maintains a substantial troop presence in Iraq, major redeployments are causing sharp spikes of increased personnel at domestic bases, including those affected by BRAC 2005. In the post-9/11 environment, the federal government, particularly the military, is imposing security requirements on its facilities to protect them from domestic terrorist acts. Security imperatives are resulting in a concentration of civilian and military personnel in more secure locations within metropolitan areas but away from downtowns and other areas of concentrated commercial activity where transit is an option.

In the last three years, the nation has experienced the worst economic downturn since the Great Depression, which has had direct consequences for federal, state, and local transportation budgets. The BRAC 2005 consequences for communities located near military bases are occurring when these governments are unusually strapped for funds. Moreover, the civilian transportation programs the Department of Defense (DoD) expects to help support transportation improvements, particularly the federal surface transportation program, is more than a year past due for reauthorization, in part because sufficient funding cannot be found to meet the needs of states, metropolitan areas, and transit authorities. A near-term resolution of this problem is not at all likely.

Federal, state, and local civilian authorities would have struggled to respond to the BRAC 2005 impacts on transportation networks under normal circumstances. In the current context, existing programs and processes are unable to cope with these new and unexpected demands, particularly within the constrained time frame. Many of the bases affected are located in built-up areas within metropolitan regions that already experience heavy congestion in peak periods, which will worsened with additional travelers. The processes required under federal law for environmental review, citizen participation, and long-range planning often require a decade or more before funding can be committed and construction initiated. At several bases, the required facilities and services will not be in place when personnel are relocated, which may result in severe congestion on facilities serving these bases.

The necessarily and largely secret process used in BRAC determinations and troop redeployments has compounded demands on civil infrastructure. By all appearances, the

Commission did not have a full accounting of the transportation impacts or costs that would be imposed on communities. Once the decisions became known, the affected communities did not have time, especially under current economic circumstances, to locate funds or rearrange long-planned and agreed upon capital plans to support the new demands on their transportation networks.

Addressing traffic congestion in dense metropolitan areas is a challenging and complex process. With the addition of military traffic, it becomes even more difficult. The requirements of the military mission and the needs of the surrounding communities must be taken into account when developing strategies to improve the transportation system.

Finding 1

Increased highway traffic generated by base growth due to BRAC 2005, policies to grow the size of the military services, and rapid redeployments have worsened or will worsen traffic congestion in some metropolitan areas. The potential problems are quite serious for civilian and military users of transport systems in these areas. Even before military redeployments of large numbers of personnel, major metropolitan areas were facing increased traffic congestion, greater traffic delays, and declining trip-time reliability. These areas have been struggling to manage their traffic congestion, improve reliability, and increase safety using a range of transportation options. Personnel increases at a number of bases located in these major metropolitan areas have exacerbated this congestion and threaten to make the situation unmanageable in some locations. As transportation networks reach their saturation points, any additional traffic has a disproportionate, nonlinear impact on delay and can degrade facilities from reduced speed to stop-and-go conditions.

The consequences are somewhat different from relocations of civilian workers to more secure military locations. Fort Belvoir North, the Mark Center, and much of Fort Meade are office complexes without military operations, whereas Joint Base Lewis–McChord, Fort Bliss, and Eglin Air Force Base are operating bases made up largely of military personnel. In these cases, civilian workers, many of whom were previously able to rely on transit to get to work, are having their jobs relocated to areas where this option is limited. Surveys of Defense Information Systems Agency employees being moved to Fort Meade in Maryland show that most of them plan to continue commuting from their current residences in Virginia. In other cases, the congestion is caused by the concentration of military personnel and their families, many of whom will be living in housing off the base, often far off the base where housing affordability matches military incomes. These men and women will become new commuters on already congested facilities, often commuting long distances. In either the case of relocated civilian workers living in the region or of military people moving into the region, the impacts on traffic may be significant but have different options for responding.

Finding 2

Military personnel and civilians working for the military are adversely affected by growing congestion. Longer and more arduous commutes risk loss of retention of senior, highly skilled civilian workers. Military personnel face severe congestion accessing Joint Base Lewis–McChord every day. Military training plans are disrupted by the inability to carry out exercises during periods of heavy traffic congestion. Joint Base Lewis–McChord must carry out troop

movements to the training facility at night to avoid congestion. Personnel and visitors to the National Naval Medical Center face severe congestion on Rockville Pike (the major state route connecting the base to downtown and I-495 and I-270). Personnel traveling to and from the Mark Center will encounter extreme congestion and lengthened trip times. The cost of this congestion is not accounted for in the BRAC 2005 assessment of the impacts of military personnel relocations.

INSTITUTIONAL MISALIGNMENT

The BRAC 2005 process has illuminated a significant misalignment between military decision processes and expectations and civilian transportation-planning and funding allocation processes in BRAC cases and more generally.

Finding 3

There is a substantial institutional misalignment between base planning by the military and planning by civilian authorities responsible for regional transportation infrastructure that the military depends on. Bases are counting on civilian resources to address their off-base transportation needs, but no process is in place to ensure that those needs will be met. There is also not an adequate process in place for funneling the right kind of information (such as information on congestion and subsequent costs to the military) up the chain when BRAC and other military base decisions are made. These difficulties are compounded by several other issues:

- DoD policies and guidance regarding base–community collaboration and regional planning are inadequate. The required base master plans do not regularly relate to the regional plans of the surrounding communities, nor do they anticipate large-scale troop relocations.
- Base commanders do not regularly communicate or work with surrounding communities to resolve transportation problems. In some cases, base commanders are engaged, depending on the perspectives of the commander, but that engagement is not ensured once a commander is reassigned.
- Post-9/11, the government is relocating some facilities to remote and more secure locations. In metropolitan areas, this relocation results in moving people to places accessible primarily by automobile and difficult to serve by transit. This policy direction is the opposite of what many metropolitan agencies are trying to accomplish to reduce energy consumption and attain or maintain Clean Air Act requirements. In some metropolitan areas, planners are seeking to increase the density of development to reduce vehicle trips and service costs.
- The role of DoD’s Office of Economic Adjustment (OEA) is useful but reactive. OEA provides technical assistance and funding for impact studies only after the decision has been made to relocate personnel. The OEA staff have expertise and familiarity with DoD and community-planning processes that would be useful to apply much earlier in the process.

Recommendation 1

Military base master plans should be developed in cooperation with the metropolitan planning organization (MPO) transportation-planning process to ensure that (a) military transportation needs are integrated into the overall regional transportation context, (b) the bases' impacts on surrounding communities are accounted for in civilian plans, and (c) military base expansion plans are consistent with civilian plans. Every base has a master plan and capital budget that is consistent with the military budgeting cycle. These plans focus on military construction needs on the base. In the future, these master plans should be developed in cooperation with the MPO planning process so that projects to improve base transportation access can be included in MPO's long-range plans and shorter-term transportation improvement programs. Base master plans should include not only capital costs but also operating costs for transit service and travel demand measures. Master plans should be updated on a reasonable time schedule. Funds should be allocated to the bases to cover an adequate master planning process.

Recommendation 2

DoD should require base commanders to address off-base access congestion problems and should provide them with guidance, expertise, and resources. It should allow commanders who do good planning and save money in energy and other base operating accounts to keep such funds and apply them to base and off-base transportation needs. DoD should also require base commanders to collaborate with communities to address base impacts on these communities. Currently, base commanders make decisions about the extent of cooperation and collaboration with surrounding communities. Base commanders should work toward resolving traffic congestion caused in part by base expansion. At present, there is little policy guidance for them to accomplish this activity. Moreover, there is little economic incentive for them to address off-base issues. However, enhanced use leasing revenues and operating and maintenance and employee compensation accounts provide funds that could be used to improve base access if dedicated for that purpose. DoD should develop guidance and procedures to help base commanders collaborate and cooperate with surrounding communities to address issues resulting from base activities. In many communities, the military is the largest single employer. Large private sector firms that dominate employment in a region play a significant role in public sector plans. The military has a similar role to play.

Recommendation 3

The U.S. Department of Transportation (USDOT) should direct MPOs to include military base transportation needs in their planning processes. To assist in accomplishing this activity, USDOT should require MPOs to include military representatives on an ongoing basis as liaisons on decision-making boards of MPOs with other major stakeholders. MPOs are responsible for developing plans to address the transportation needs in their metropolitan regions. MPOs' plans should account for the travel needs of military bases in their areas. Projects that are required to meet these needs should be placed on the long-range plan and transportation improvement programs. These projects would be required to meet the same legal, environmental, and regulatory requirements of any project in the plan and program. In developing better

communication, the public sector will have to respect military needs for security and be able to protect sensitive information. Security clearances for some MPO staff may be necessary.

Recommendation 4

The role of the OEA should be increased; the agency should provide ongoing support to military and civilian planning agencies and not be brought in simply to help fix problems after decisions are made. Resources should be provided to enable this expanded role. OEA staff could develop the guidance to base commanders called for in Recommendation 2 and assist MPOs in understanding military transportation needs and processes. Ongoing assistance of this nature could help reduce the current mismatches between military planning and expectations and civilian planning and funding capability. OEA should develop technical procedures, manuals, training courses, and website resources as well as provide technical assistance to military bases on transportation planning.

Finding 4

There is an additional disconnect within the military between planning and budgeting processes. Agencies and staff in DoD are not developing and sharing information or facilitating processes that would identify all the direct and indirect costs of traffic congestion and the range of related funding sources available to give base commanders resources that could help address base impacts. The only available funding source to address off-base impacts, the Defense Access Roads (DAR) program, is a small capital-only program limited to road projects. No segregated resources are available to pay ongoing operating costs, such as transit subsidies and travel demand measures, which is necessary for addressing traffic congestion in metropolitan areas. Funds available to commanders are not aligned with their needs or obligations under Recommendation 2 to help resolve congestion caused by base expansion. For the DAR program, the time limitation on obligating funds is inadequate to provide local and state agencies time to find funds and make their financial commitments. (See Recommendations 7 to 13 below for recommendations on funding.)

Finding 5

The outcome of decisions made to relocate civilian workers and troops suggests that insufficient attention was paid to off-base impacts. To the extent to which BRAC 2005 relied on information collected on surrounding community transportation capacity during the BRAC information-gathering phase, it may have been misinformed. The information calls made to inform the BRAC analysis process do not reach individuals at the metropolitan level aware of potential off-base impacts and constraints, which can result in suboptimal outcomes. In the BRAC process, information is sought from personnel on bases who are not necessarily aware of metropolitan area traffic, constraints on capacity expansion, and long-range improvement plans. This situation can result in a lack of appreciation of the carrying capacity of regional infrastructure and the difficulty of expanding it to meet military needs.

Recommendation 5

When considering moving personnel into congested metropolitan areas, DoD should take into account regional congestion impacts and mitigation costs at a greater level of detail than in the past. DoD should greatly improve the quality of information considered when deciding whether to move military and civilian personnel into congested metropolitan areas. Infrastructure receiving capacity is considered now, but the sources turned to for information are not as knowledgeable as needed. The information should account for the capabilities of surrounding communities to absorb additional traffic and the costs imposed. These costs should be considered whenever DoD analyzes the costs and benefits of relocating personnel and assets to bases in metropolitan areas. This kind of information should be required in any future BRAC rounds that consolidate base personnel in metropolitan areas.

NATURE OF REQUIRED SOLUTIONS

The expansion plans of bases in metropolitan areas create the same set of issues that new private developments create and require the same set of strategies. Some strategies to be employed may affect only a small percentage of travelers, but such shifts can be important for network performance. Facilities in metropolitan areas are congested for complex reasons, including inadequate funding and the difficulty and cost of expanding facilities. Institutional realignments, such as those recommended above, will also be necessary along with improved funding described in the funding section.

Finding 6

Transportation programs to reduce congestion that may appear to be small can have large benefits. The disproportionate, nonlinear impact of increased traffic in congested networks also works in reverse. Programs and policies that adjust the travel behavior of a small percentage of travelers in congested settings have a disproportionate benefit for traffic flow, which means that travel demand management programs that allow workers to shift the time of travel, shift mode, change route, or work from home can have important effects on regional congestion and delay levels.

Finding 7

A broad range of transportation strategies are required to address metropolitan area congestion and access needs. Metropolitan planning agencies across the nation recognize that automobile access alone cannot meet all travel demand needs in built-up areas. Highway networks in densely developed metropolitan areas are critical for the economic vitality of these regions, but once development occurs around these facilities they become extremely difficult and expensive to expand to meet rising demand. Moreover, requirements of the Clean Air Act have shifted many areas' priorities toward transit and travel demand management. In areas with saturated networks in peak periods, travel demand must be managed to motivate travelers to shift travel times and change modes to avoid peak congestion.

Recommendation 6

A wide range of options should be used to ameliorate traffic congestion and travel time delay caused by base expansions. Transportation demand management measures should be used, including high-occupancy vehicle and high-occupancy toll lanes, ramp metering, parking management and pricing, carpooling and vanpooling, transit benefit programs, bus shuttles, telework and telework centers, and variable work hours and schedules. Expanded transit services will be necessary in some cases. Infrastructure-intensive alternatives should be included, although they may be difficult to deploy and will take years to implement in all but the simplest cases.

Finding 8

Short- and long-term strategies will be needed to address traffic congestion problems. In the short term, transit services can be expanded and travel demand measures implemented in affected communities. Within a few years, marginal capacity enhancements can be made by adding ramps, access lanes, and additional gates as well as access roads serving them.

Finding 9

Looking toward the future, changes in institutional processes and improved communication and planning could avoid the severity of congestion impacts expected and being experienced because of BRAC 2005 and other military policies and decisions. Recommendations 1–7 above are intended to provide longer-term solutions to military expansion plans in metropolitan areas.

FUNDING

A variety of existing and new funding sources will need to be tapped to better serve military transportation access needs in the future and to avoid imposing large costs on surrounding communities. Immediate needs will require extraordinary responses.

Finding 10

A variety of funds are available to improve transportation facilities and services; these funds are always highly contested but are unusually so in the current budget environment. The DAR program has provided about \$20 million annually in recent years, but the program is funded through the military construction (MILCON) budget, which is being pressed to provide barracks, training facilities, and other military base necessities that are of more immediate importance to base commanders than off-base traffic congestion. Enhanced use leases, which permit bases to retain lease income from private developments on base land that serve the military, and base operating and maintenance budgets could provide partial sources of funding for transportation improvements. Employee compensation accounts could also assist in areas such as transit subsidies. About \$200 billion is spent annually by all levels of government for highway and transit capacity, maintenance, and operations, but these funds are not adequate to

meet the demands placed on them, particularly in this period of constrained government budgets. Multiple demands on existing federal-aid funds make it difficult for some states and regions to apply such funds to problems caused by military growth.

Finding 11

Other than the DAR program, the military traditionally accepts no responsibility for transportation congestion and transportation-related environmental impacts outside the gates of its bases. As indicated above, in some cases military personnel are adversely affected through the potential consequences for retention of valued workers and disruption of training for soldiers.

The normal way to address the impact of large-scale private developments in communities is to require them to pay some form of an impact fee in addition to the fuel and other taxes they pay. Communities have increasingly required new private developments to pay their share of the public infrastructure required to serve them. These fees are assessed over and above the user fees that fund transportation programs and other taxes businesses are required to pay. Absent these payments, communities can prevent the development from being built (which is not an option when DoD is the developer). As the cost of new infrastructure and the difficulties and delay associated with building new infrastructure have increased, many communities have become less willing to ask existing residents to fund the costs of transportation improvements necessitated by major new developments.

Recommendation 7

DoD should pay its share of base access transportation needs in a region, regardless of where they occur, on par with costs imposed on private developers. DoD should pay its share of the cost to improve transportation networks to handle the increased travel demand of military bases in metropolitan areas.

To determine the military share, a transportation impact study would be required to determine the transportation improvements needed to meet the increased travel demand resulting from increased personnel at military bases. It would ascertain the share of that demand resulting from military travel and from other traffic. The cost of those transportation improvements would then be allocated to the military and other users based on their share of increased travel. In practice, the allocation of cost responsibility is complex and requires careful analysis and modeling in some cases. In addition, there is no single, established methodology for carrying out the analysis. Whatever analytic process is used, it should be consistent with the principles listed below.

The following principles should apply in defining cost responsibility:

- The military should make the same contributions that a developer would have to make, if any, including whatever concessions are routinely provided. Thus, any required fee should be modeled on how impact fees are imposed on the private sector. If a region welcomes private developments without charging fees or receiving exactions, then they should not expect DoD to provide support for transportation improvements for base expansion. The principle is that DoD should face the same consequences as a private developer.
- The military responsibility should extend only to restoring the level of service to what

it was before the new traffic was added.

- The geographic area of responsibility should be defined by commute sheds rather than some predefined distance from the base perimeter.
- Military cost responsibility should be conditioned on the civil sector contributing its share. (Projected growth in civilian traffic would need to be included in assigning cost responsibility. It is not expected that a DoD impact fee would cover the whole cost of needed improvements if it is not the only source of future traffic growth.)
- Nonlinearities of impacts and costs should be accounted for and reflected in the impact fee. In allocating costs imposed on traffic flow, the impact of the last marginal user tends to be the most disproportionate; thus, assigning the responsibility for this impact imposes a disproportionate cost. Given projected traffic growth from the civil sector, the incremental growth between the military and the civil sector should be shared based on projected growth on the civil side and the new traffic added because of the military.

Finding 12

The DAR program is inadequate for addressing military base transportation impacts in metropolitan areas. The DAR program eligibility criterion of a doubling of traffic due to military demand is not appropriate in metropolitan areas with already congested facilities. Moreover, as the only DoD transportation capital program to address off-base impacts, the limitation of funding to road improvements does not reflect metropolitan areas' dependence on transit for serving a proportion of work trips in peak periods.

Recommendation 8

The DAR criteria should be updated to respond to base transportation needs in dense metropolitan areas. The doubling-of-traffic criterion should be eliminated for projects in metropolitan areas and replaced by the principles for determining cost responsibility listed in Recommendation 7.

Recommendation 9

DAR funds should be fenced within MILCON so that once funds have been committed for a transportation project they cannot be pulled back to serve some other purpose, short of an emergency. In addition, the 5-year constraint on obligation of funds should be extended parallel to USDOT funding. The required "fencing" of funds can be done by DoD as policy or it can be specified by Congress. Funds for base access requirements should be increased and segregated in a separate fund so that they do not have to compete with other MILCON projects. The current 5-year limit on expenditures should also be eased to allow states and regions to develop plans, complete environmental reviews, allow for citizen participation, and commit other funds for the projects.

Recommendation 10

A new DoD capital and operating assistance program should be created for nonhighway capital improvement projects to mitigate base transportation impacts in a MILCON

account dedicated to this purpose. As with the DAR program, this funding should be fenced. A number of bases have developed traffic management plans that include more transit and shuttles, telecommuting, variable work hours and schedules, and other traffic demand management techniques. These projects, however, are not eligible for DAR funding. The recommended funding program might be administered by USDOT with funds provided by DoD, in parallel with administration of the DAR program by FHWA. As with the recommended changes to enhance the DAR program, funds for this program should be fenced from other military purposes.

Finding 13

Personnel increases at military bases benefit surrounding communities. Increases in base personnel provide an economic stimulus for surrounding communities. Many base personnel live off base where they shop and engage in other activities. Further, these expenditures contribute tax revenues. In practice, few communities would resist the relocation of military personnel to their area despite the traffic disruptions they might cause.

Recommendation 11

State and local agencies should pay their share of base access transportation needs. Military travel demands on metropolitan transportation networks are only part of the travel requirements of these networks. State and local agencies are responsible for serving these other demands. State and local agencies should also pay their share of transportation improvements to serve the military travel demand in their region. State and local agencies may have to change their transportation priorities and reallocate funds from other projects in their capital plans to meet the new demands.

Recommendation 12

Military bases should work through states and MPOs to seek regular local, state, and federal transportation funds. Although severely constrained in the near term to address immediate needs, federal, state, and local transportation funds should continue to be sought for military base transportation access projects. If base–community planning processes are better aligned in the future, as recommended above, military transportation projects will have a better chance of being incorporated into long-range transportation plans and being funded through traditional civil transportation funding mechanisms. For the near term, funds should also be sought from USDOT’s Transportation Investment Generating Economic Recovery grants.

Finding 14

There is substantial evidence that in an unusually short period an extraordinary amount of new traffic will be added to already congested facilities serving some military bases around the country. These problems cannot be addressed with current funding and processes, nor would they be addressed by the recommendations made above. Some corridors, such as the section of I-395 serving the Mark Center, cannot be expanded with new lanes, but problems can be eased with expanded transit, improved exit and egress lanes, and travel demand measures. I-5

serves Lewis–McChord as well as being the main freight artery for the state of Washington. Its capacity constraints are significant and expansion would be extremely expensive. Similarly, I-395 and I-95 in Northern Virginia are already heavily congested in peak periods and will be overwhelmed by the additional traffic from personnel increases at Fort Belvoir and the Mark Center. Waiting for projects to address these problems to be funded through the normal transportation cycle, given continued delays in reauthorizing federal surface transportation programs and the much diminished size of state transportation budgets, means that severe congestion problems around growing military bases could go unaddressed for years.

The committee cannot estimate the amount of financial assistance needed in affected areas and recognizes that virtually no amount of money will result in free-flow traffic conditions; however, some improvements are possible. The committee examined only a few case studies and did not have the resources to conduct detailed analyses of options in the cases it examined. It is convinced, however, of the potential exceptional severity of the impacts in these locations and presumes the same could be true in other locations.

Recommendation 13

Congress should consider either (a) a one-time, out-of-budget cycle, special appropriation or (b) a reprogramming of uncommitted stimulus act funds to address the transportation problems caused by BRAC 2005 relocations. The intent of these funds would be to initiate projects as soon as possible that would reduce the severity of congestion impacts within 3 years. Both operating and capital funds for construction of facilities as well as support for increased transit services and travel demand measures should be included. Thus, the projects to be funded should be those that:

- Are capable of being initiated within 1 year and can be completed within 3 years,
- Will have demonstrable benefits on reducing traffic congestion in adversely affected corridors regardless of mode, and
- Are partially funded from local or state funds.

Congress should charge the Secretary of Transportation with developing an estimate of needed funds, in consultation with affected communities, and making a recommendation to Congress for funding. The estimate should be developed within 45 days. To ensure that the highest-priority projects are supported with these funds, the projects should be selected by the Secretary based on those that best meet the criteria listed above. To expedite the environmental review of these projects, the Secretary should include them on his list of priority projects for environmental streamlining.

Background Paper on Impact Fees

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The situation of a sharp increase in base personnel being transferred to new or expanded facilities is somewhat analogous to an unanticipated new, large private development occurring within a metropolitan region. In such instances, the metropolitan planning organization may need to redo its long-range plan and shorter-term transportation improvement program. Typically, regional leaders negotiate with the developer and require that certain conditions be met to ameliorate the negative impacts of the development, and they often impose fees to offset any capital improvement needs as a result of the development. If the developers in such instances are unwilling to pay the impact fees, the local governments can refuse to allow the development. There are a number of aspects to creating and implementing impact fees for new developments.

DEFINITIONS (Powell et al. 2006)

Exactions, the on-site construction of public facilities or dedication of land, have been used for decades. Impact fees, also called exactions, were instituted in the 1920s as a local financing tool. Where no appropriate land was available for a traditional exaction, off-site land or a fee in lieu could be substituted for a dedication. Over time, these fees came to include capital costs for on- and off-site improvements brought about by new development. Rooted in the idea that new development should pay its way, impact fees have been increasingly used to pay for improvements traditionally paid for by property taxes. They are generally a one-time charge on new development by local government to pay the development's proportional share of capital improvements as a condition of approval for a building permit.

New development requires improvements such as roads, utilities, parks, and schools as well as police, fire, and solid-waste disposal services. Historically, such improvements were financed with bonds and local property taxes supplemented by state and federal grants along with subdivision dedications and fees. These public expenditures were seen as a spur to private investment. However, a combination of more complex (and costly) improvements, environmental considerations, a dramatic decline in federal expenditures on local infrastructure in the 1980s, and the property tax revolt epitomized by Proposition 13 in California led local governments to search for other methods of financing needed infrastructure. Consequently, California has been a leader in developing impact fees. Exactions and impact fees have grown increasingly popular with local governments as a supplementary financing source. Altshuler et al. (1993) found that, by the mid-1980s, approximately 60% of local governments used impact fees along with in-kind levies.

Under California law, a fee is defined as a monetary exaction other than a tax or special assessment. Fees share two characteristics with taxes. First, they are levied on developers as a monetary charge. Second, they are often assessed on a proportional basis; localities cannot tax

without specific legislative authority from the state. This distinction between taxes and fees is important in the evolution of impact fees. Impact fees, exactions, in lieu fees, and compulsory dedications are often treated as synonymous as they all are established as conditions for obtaining final development approvals. However, dedications are sometimes treated differently than impact and in-lieu fees. The courts have reviewed these exactions through a series of cases in an attempt to more clearly define their appropriate use and proper legal role.

LEGAL ISSUES

The legal basis for government intervention in the development process is derived from its police power to protect the public health, safety, and welfare of its citizens. Through a series of court cases, mostly based on California cases, a set of standards have been established on the application of impact fees. They apply to both legislatively imposed and ad hoc fees.

A government entity imposing an impact fee on development projects must meet several standards. It must do the following (Powell et al. 2006):

- Establish the purpose of the fee;
- Establish the use of the fee, including public facilities to be financed;
- Show a reasonable nexus between the purpose of the fee and the type of development;
- Show a reasonable relationship between the public facility to be constructed and the type of development;
- Show a reasonable relationship between the specific amount of the fee and the cost of public facilities attributable to the project; and
- Account for and spend collected fees only for the purposes intended with provision for the return of unexpended funds.

Consequently, in most states, impact fees must meet the rational nexus and rough proportionality tests. First, there must be a reasonable connection between the need for additional facilities and new development. Second, it must be shown that the fee payer will benefit in some way from the use of the fee proceeds. Third, calculation of the fee must be based on a proportionate fair-share formula.

ADVANTAGES AND DISADVANTAGES OF IMPACT FEES (Opp 2007)

Advantages

There are several advantages to the use of impact fees by local communities.

Reduced Borrowing by Local Governments

For a local government entity struggling to pay for infrastructure necessitated by new growth, impact fees can work to alleviate some of the fiscal burden associated with the expansion of growth-related infrastructure and services. The most obvious benefit of impact fees is the revenue-raising capability. Rather than relying heavily on property taxes, which may already be

high or capped by the state government, a local government is able to diversify its revenue stream through this alternative source. In addition to the general diversification of revenue sources, the fee-imposing entity is able to receive the revenue associated with impact fees in one lump sum, as opposed to waiting an extended time, which is the case with many of the standard taxes collected at the local level. This, in effect, enables a more concurrent or synchronized development of infrastructure. Thus, the funds to pay for the infrastructure are readily available when the development is required and installed, instead of having to finance the cost over time with debt-servicing costs associated with the usual forms of revenue.

Politically Popular

Impact fees are popular with elected officials who are aware of the general population's discontent with the perceived inequity associated with paying the costs for new development. Furthermore, impact fees are imposed upon future voters—not current ones—something of interest to many policymakers looking at reelection prospects.

User Equity

Some people believe that new residential development generally does not generate enough tax revenue to cover the costs it incurs in local municipalities to provide new infrastructure and public services (Opp 2007). Impact fees make new development pay its fair share of infrastructure costs and allow new development to cover something closer to its fair share of the infrastructure that is required. Impact fees ensure that the infrastructure can be provided in a timely fashion.

To Slow Growth

Some people argue that impact fees have the possibility and potential to curb sprawl. As developers are faced with additional fees for developing green space, it is possible that they will either opt not to develop at all or will look inward at a redevelopment opportunity, both of which work to counter the problem of sprawl. Although impact fees have been linked with curbing sprawl, their effectiveness varies from state to state. If one locality imposes an impact fee on a developer that the developer does not wish to pay, it is possible for that developer to simply develop in a neighboring jurisdiction to avoid the fee, potentially eliminating the sprawl-curbing benefit altogether.

Promotion of Community Planning

The development of impact fees requires communities to assess the costs of infrastructure deficiencies as well as the costs imposed by new development. As such, impact fees are a logical and worthwhile planning tool for local governments. The process promotes local land use and economic and community planning.

Disadvantages

Impact fees come with several disadvantages.

Increases in New Home Prices

A major issue associated with impact fees is the supposition that they are passed along to the consumer through higher housing costs. An increase in new home prices can be especially significant for communities trying to expand their inventory of low- and moderate-priced houses. If residential developments are inflating home prices as a result of the use of impact fees in a community, then the potential for affordable housing may be in jeopardy. Also, some studies have indicated that certain types of impact fees reduce the prevalence of multifamily housing developments.

Difficulties in Establishing and Administering Impact Fees (Adams et al. 1999)

The establishment and administration of impact fees requires a number of complex accounting procedures. There is a need to establish level-of-service standards for the various infrastructure elements. The costs of meeting these standards before and after development need to be estimated. These costs must be fairly apportioned between new users and existing development. Fees need to be earmarked for the infrastructure imperilments and applied in a timely manner. Cost-accounting procedures need to be established and administered to track all the steps.

Other Equity Issues

The counter equity argument is that existing residents never had to pay impact fees, so new residents and businesses should not be obligated to do so. Traditionally, provision of public services has been a major function of government. Impact fees require capital payments at the beginning of a facility's life. Thus, they create problems of intergenerational equity when current users are required to pay for facilities used for a long time into the future. There can also be equity concerns when the fees cover improvements over too large an area, which benefit existing developments beyond the impact area.

LEVEL OF IMPACT FEES

In the context of transportation facilities, these requirements can be difficult to satisfy and can impose significant administrative costs. For example, additional traffic studies might be required to demonstrate how much residents of a new development will benefit from transportation facilities financed with impact fees. The rational nexus and proportionality requirements limit the ultimate revenue potential of impact fees.

Current practices, however, may fail to maximize the revenue potential. Since fees traditionally have been imposed at the local, not state, level impact fee analyses often do not account for the effect of new development on state-administered roads as well as local roads and other transportation facilities. If state as well as local transportation needs were included to a greater extent in impact fee analyses, more revenues might be dedicated to transportation uses.

Facilities eligible for impact fees include roads, water, sewer, storm water, parks, fire, police, library, solid waste, and schools. Roads are the only facility eligible in every state that has impact fee enabling acts.

The following table provides data on impact fees for roads by type of land (Aecom Consult 2007).

	<i>Single-Family Unit</i>	<i>Multi-Family Unit</i>	<i>Retail per 1,000 ft²</i>	<i>Office per 1,000 ft²</i>	<i>Industrial per 1,000 ft²</i>
National average	\$2,305	\$1,568	\$4,562	\$2,654	\$1,587
Sample size	213	212	203	204	203
National average without California	\$1,930	\$1,322	\$3,774	\$2,177	\$1,348
Sample size without California	178	177	167	168	168

Source: 2006 National Impact Fee Survey, Duncan Associates.

The impact fees for the single-family unit are based on a typical three-bedroom house of 2,000 square feet. For the multifamily unit, the impact fee is on a per unit basis for a typical two-bedroom unit of 1,000 square feet. Impact fees for retail, office, and industrial are per 1,000 square feet for a typical 100,000-square-foot shopping center, commercial building, and industrial building, respectively. The data on impact fees are shown with and without inclusion of California, as impact fees for roads in California for a single-family unit top out at \$17,754. The high for the remainder of the county is \$6,527.

For the most part, communities use average cost pricing rather than marginal cost pricing. Average cost pricing occurs when the government charges everyone equally for the same service, regardless of the real cost to provide that service to a particular user. For example, transportation fees set on an average basis would charge all homes on half-acre lots the same regardless of the number of occupants, cars, or commuting mode.

A key question is why marginal cost pricing is not being used more frequently. One reason is that the costs of developing and implementing a more accurate pricing system are high. It is a much more difficult technical task to determine marginal versus average-cost pricing systems. In a perfect situation, the marginal costs of serving each development and the extent of facility use by each household would be calibrated and assessed. In practice, this is beyond the technical capacities of most local governments. Even calculating marginal costs by area, such as for neighborhoods, is difficult to understand and explain, which makes adoption and implementation unlikely.

Another reason is that political costs are high. Communities may choose not to use marginal cost pricing because they do not want to discriminate among members of the community, especially if the community is homogeneous in many respects. Such policy may seem fair; all residents have equal use of the highways and are free to travel as they choose. To such communities, it does not matter that some may travel more or less than others. It also is the situation that, in most communities, taxes on commercial and industrial enterprises subsidize residential public services. Marginal pricing would mean sharing this subsidy with new residents and thereby reducing the welfare of existing residents.

CALCULATING IMPACT FEES

To assess impact fees, communities must demonstrate the need for additional facilities as a result of the new development and not because of existing facility deficiencies. The standard to which an impact fee will be held is that the fee does not exceed a proportionate share of the costs that the local government incurred or will incur to accommodate the new development.

A valid fee-setting process or nexus report should include the following:

1. Projections of the future residential and nonresidential population to be served by the proposed facilities;
2. Identification of current and future service levels for each public facility needed;
3. Determination of additional facilities or additional capacity needed in each facility category to serve the projected population at the desired level of service;
4. Estimates of the projected costs of additional facilities or service capacity;
5. Estimates of the other fees and taxes paid by the new development;
6. Apportionment of the costs of additional facilities or capacity between the existing population and new residents and businesses proportional to their contribution to the need for the facility and adjusted so that costs of upgrading current deficiencies or improving existing service levels are not levied on new development and taking account of other fees and taxes they pay.

This process requires a transportation impact study to develop the needed information and make accurate estimates of the various costs to equitably divide the cost among the various parties.

FAIR-SHARE MITIGATION

Background

Another option similar to the impact fee model is fair-share mitigation. State transportation agencies and local governments may have the authority to require developers to mitigate the transportation impacts of their development projects through a traffic impact assessment (TIA) process. This process is similar to the impact fee model but operates at the state level under the authority to maintain safety or level of service.

For state transportation agencies, development review and fair-share assessment are generally triggered by a request for an access connection permit to a state highway. The goal is to maintain a desired level of service and safety on a roadway by ensuring that new development contributes its fair share for those improvements that are made necessary by the added traffic attributable to the developments. Information from a traffic impact study (TIS) is needed to establish that the required mitigation is roughly proportional to the proposed development's impact, as required by law. The required contribution may be in the form of land for right-of-way, money (or fees), construction of an improvement, or some combination. In addition to fair-share mitigation of development impacts, the agency may negotiate with a developer for other infrastructure improvements aimed at overcoming existing deficiencies. State transportation agencies and local governments have varying authority to require developer mitigation. For

example, most states may require mitigation for clear safety reasons, whereas state authority to require mitigation of capacity impacts varies.

Procedure

Fair-share mitigation can be determined in many ways, depending on guidelines or mandates issued by the state transportation agency. Generally, the applicant is first required to conduct a TIS according to a methodology established in coordination with the state transportation agency. The TIS assesses the effects of a proposed development on the surrounding transportation network, the ability to get traffic on and off the site, and the need for off-site mitigation. General components of a TIS include the following:

1. A description of the proposed development and its access routes,
2. Details of existing and probable future traffic conditions,
3. An estimation of the traffic likely to be generated by the development as proposed,
4. Traffic impact and capacity analysis, and
5. Recommendations on improvements to mitigate the impact.

The TIS process involves identifying a traffic impact area based on some threshold of magnitude by assigning new development trips to the transportation network. In Florida, for example, developments of regional impact must include in their impact analysis any location where their trips would consume 5% or more of the maximum level-of-service capacity. Any deficiency caused by development trips within that impact area must be mitigated, with the amount of mitigation most fairly determined based only on that proportion of new trips that trigger the deficiency.

Most states rely on TIA guidelines and case-by-case negotiations, which makes consistent treatment a challenge—particularly when administration is decentralized into district or regional offices. Others have systematic programs with standardized requirements and procedures that are applied uniformly. The latter group tends to provide a more consistent and equitable process for the applicant. However, the complexity of the TIA process and the potential for manipulation on both sides makes fair-share exactions sometimes inequitable and generally cumbersome to administer.

Advantages and Disadvantages

Advantages

There are several advantages to the fair-share mitigation process:

- It provides a process for ensuring that new development pays its fair share of improvement needs that are necessary to accommodate the added traffic from the development.
- Systematic guidelines and administrative procedures help to standardize administration, improve equity of contributions, and reduce miscalculation. This also provides predictability for developers.
- Isolating only that development traffic that exceeds level of service helps to increase fairness and proportionality of contribution.

Disadvantages

There are also some disadvantages to this approach:

- It is inequitable. Some consume “free capacity” or pay less on roads that others have invested in, while others must pay to mitigate.
- It can be disproportionate, depending on the timing and size of development; later developments pay more as more trips are likely to trigger a deficiency, and larger developments will trigger a larger number of deficiencies on more links.
- It is complex and data intensive; TIS can be easily manipulated to show more or less impact, which increases administrative costs for the agency and consultant costs for the applicant.
- It requires highly trained staff to produce and to administer.
- There is a potential to double-charge for cross traffic between two developments on deficient segments, if not accounted for in the calculations.
- It requires clear statutory authority and systematic procedures and requirements; case-by-case negotiations produce inconsistent and inequitable results.

APPLICATION TO BRAC CASES

A number of elements of the impact fee model can be applied to BRAC cases. However, the process would require some analytical rigor to ensure equity among all parties. Moreover, to date, impact fees have been assessed only at the community level and not at the state level. Nevertheless, the principles that have been used to structure impact fees at the local level can be a useful basis for allocating costs resulting from personnel increases in military bases.

Application of the impact fee model requires a TIS. Following the impact fee model, the first step in the application would be to assess the deficiencies in the existing transportation system before the personnel increases in the military bases occurred. The costs to alleviate these deficiencies would need to be estimated. These costs would not be assessed to the military.

Next would be an assessment of the system improvements requirement to accommodate the additional travel demand resulting from the increases in military base personnel. The costs to meet these requirements would then need to be estimated.

Since the new development contributes some taxes and fees that could be used to offset some of the cost of needed infrastructure, these financial payments need to be estimated.

Finally, the costs of meeting the additional travel demand due to the new development can be attributed to the new development based on its share of traffic on the facilities needing improvement. In estimating the cost attributed to the new development, the taxes and fees credited to it need to be subtracted.

The process requires careful accounting to ensure that the proper payments are made and that the funds are used to improve the transportation facilities in a timely manner.

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Illustrative Example of Impact Fee Calculation for Expansion of Military Bases

Calculating impact fees for increases in military base personnel requires a number of steps that are similar to calculating impact fees for any new development. The process requires using a travel forecasting model to analyze the current and future volume of traffic on the area's roads.

Estimating the traffic effects of any proposed development can produce considerable technical debate. Most cities and all major metropolitan planning organizations in the country maintain a regional travel demand model that is certified by the U.S. Environmental Protection Agency for estimating the effect on air quality and other impacts. These models are based on what is known as the four-step process involving trip generation, trip distribution, mode share, and assignment.

In most urban areas, some roads are congested. As growth occurs, more roads become congested. A common measure of congestion is the ratio of traffic volume to the capacity of the roads (the V/C ratio). The volume is the number of trips on the road, and the capacity is the number of trips the road is designed to accommodate.

The design capacity corresponds to a specific service standard. When the volume is significantly less than the capacity, traffic flows freely, and the V/C ratio is low. When a road becomes congested, the volume is close to (or exceeds) the capacity and the V/C ratio is high. A ratio of 0.75 is considered moderate; a ratio of 1.0 is the threshold at which the road "fails." Each urban area can establish threshold criteria for when a V/C ratio is unacceptable.

To identify the need for additional road capacity to serve military growth, trips are assigned to the road network, with a detailed list of current and future V/C ratios for significant arterial and collector roads in the urban area. The current ratios form a baseline to identify existing deficiencies (these existing deficiencies cannot be corrected by new impact fees). The future ratios identify which roads will become congested as a result of future growth and are therefore eligible to be funded by impact fees.

There are four possible combinations of current and future V/C ratios for trips on existing roads, as shown in the four outcomes listed in Table C-1. Any road segments that have Outcome 1 or 3 were excluded from consideration for impact fees. Any road segments with Outcome 2 were included in the list of roads eligible for impact fees. Any road segments with Outcome 4 were further analyzed to determine the portion of their costs that are attributable to existing deficiencies (not eligible for impact fees) and the portion of their costs that are attributable to future growth and therefore eligible for impact fees.

TABLE C-1 Road Congestion Analysis Outcomes

<i>Current and Future Traffic</i>	<i>Eligibility for Impact Fees</i>
1. Current <i>V/C</i> is acceptable, and future <i>V/C</i> will be acceptable.	No improvement is needed; therefore, no costs are eligible for impact fees.
2. Current <i>V/C</i> is acceptable, but future <i>V/C</i> will be congested.	Improvement is needed only because of traffic growth due to the base; therefore, the entire improvement is eligible for impact fees.
3. Current <i>V/C</i> is congested, but future <i>V/C</i> will be acceptable.	Improvement is needed for current deficiency, or future traffic uses other roads; therefore, no costs are eligible for impact fees.
4. Current <i>V/C</i> is congested, and future <i>V/C</i> will be more congested.	Improvement is needed for both current deficiency (the road is already congested) and future growth due to the base; therefore, only the growth portion of the project is eligible for impact fees.

The cost of a project is calculated based on the need to upgrade the various facilities to the desired level of service, whether for roads or transit.

The projects are analyzed to identify capital costs attributable to the military base expansion versus those attributable to traffic growth due to existing development. The project costs are apportioned between existing development and new base development. The costs are adjusted to reflect other sources of revenue paid by the military base.

The total fee to be paid by the military base is the sum of its share of the various transportation projects needed to return the transportation system to the desired level of service.

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Study Committee Biographical Information

Joseph M. Sussman (Committee Chair) is JR East Professor (endowed by the East Japan Railway Company) in the Department of Civil and Environmental Engineering and the Engineering Systems Division at the Massachusetts Institute of Technology (MIT), where he has served as a faculty member for 40 years. He is the author of *Introduction to Transportation Systems*, a graduate text published in 2000, in use at a number of universities in the United States and abroad. It has been translated into Greek, Chinese, and Spanish. His book *Perspectives on Intelligent Transportation Systems* (ITS) was published in 2005. Sussman received the Roy W. Crum Distinguished Service Award from TRB, its highest honor, “for significant contributions to research” in 2001, and the Council of University Transportation Centers Award for Distinguished Contribution to University Transportation Education and Research in 2003. In 2002, ITS Massachusetts named its annual “Joseph M. Sussman Leadership Award” in his honor. He became a fellow of the American Association for the Advancement of Science in 2007. The Engineering School alumni of the City College of New York gave him their 2008 Career Achievement Award.

Thera Black is a senior planner with the Thurston Regional Planning Council (TRPC), the metropolitan planning organization and state-designated regional transportation-planning organization for Thurston County, Washington. Her focus is on integrating transportation and land use decision making, engaging diverse interests in the public and private sectors to achieve adopted growth management objectives. She represents TRPC on the I-5 Transportation Alternatives and Operational Traffic Model Study, an evaluation of the impacts of military installation growth on the I-5 corridor between SR-512 and Mounts Road funded by the Office of Economic Adjustment. Ms. Black is a member of the transportation expert panel for the Joint Base Lewis–McChord growth-planning effort responsible for reviewing data and reports, assisting in establishment of level-of-service standards, and reviewing and commenting on needs assessments and various alternatives under consideration. She is a member of the growth coordination committee for the Joint Base Lewis–McChord, advising on the growth plan, integrating recommendations of the 10 expert panels, and prioritizing overall recommendations. In addition to metropolitan planning, Ms. Black oversees the region’s surface transportation program and congestion mitigation and air-quality funding programs, and she facilitates improved communications among modelers, planners, and traffic engineers. She chairs the TRB Metropolitan Policy, Planning, and Processes Committee. Ms. Black has BA with an emphasis in urban planning from the Evergreen State College.

Thomas B. Deen is a transportation consultant. Until September 1994, he was executive director of TRB, a private nonprofit unit of the United States’ National Academy of Sciences and the National Academy of Engineering. Mr. Deen initiated the TRB studies that recommended the \$150 million Strategic Highway Research Program and the continuing Transit Cooperative Research Program. He served as chairman of the planning committee for ITS-America and guided the effort to develop the first national strategic plan for intelligent transportation systems. Before 1980, Mr. Deen was president of Alan M. Voorhees and Associates, a major transportation-planning and engineering firm. During that time, he directed major metropolitan transportation studies involving highways, airports, and mass transit in the United States and

abroad. Earlier, he was director of planning for the Washington, D.C., rail transit system during the period when this \$12 billion system was in the initial planning stages. In 1998, he was elected to the National Academy of Engineering. In 1999, Mr. Deen was appointed by the governor of Maryland as chairman of the Transportation Solutions Group, a committee to recommend solutions to problems in the growing Washington, D.C., region, with a focus on the intercounty connector. More recently, he was appointed cochairman of a task force established by the Maryland legislature to evaluate the proposed magnetic levitation transit system between Baltimore, Maryland, and Washington, D.C. In 2003, he was appointed vice chairman of a study committee of the National Research Council making recommendations on the transportation of highly radioactive spent nuclear fuel to the repository at Yucca Mountain, Nevada. In 2004–2005, he served as chairman of a task force examining the deck failure of the Chesapeake Bay Bridge. Mr. Deen was educated at the University of Kentucky, University of Chicago, and Yale University. He is a civil engineer registered in six states. A winner of several awards, he is a frequent speaker at symposia directed toward solving major transportation problems.

James R. Gosnell is executive director of the West Coast Corridor Coalition. He previously served as deputy executive director of the Southern California Association of Governments until he retired in 2008. Before that time, for more than 20 years Mr. Gosnell was director of planning and policy for the Southern California Association of Governments. In that position, he was directly responsible for planning, policy development, and studies on regional issues done by the association. He assisted with transportation planning for the 1984 Olympics and with assessing the transportation programs' effectiveness after the Olympics. He has served as chief operating officer of the Southern California Hazardous Waste Management Authority and was an ex officio member of the Southern California Regional Rail Authority Board and the Alameda Corridor Joint Powers Authority. Currently, he is on the board of directors of the Southern California Leadership Program. The program provides professionals in the midlevel of their career training to expose them to key policy issues in the region, to meet with leaders addressing these issues, and to develop their leadership skills. He also serves on several TRB committees. He has given lectures and presentations in several countries on urban and transport planning. Mr. Gosnell received a BA in geography from the University of California, Los Angeles, and a master's degree in urban and regional planning from the University of Southern California.

Max Inman has been a senior advisor for project finance and program management for Mercator Advisors since 2007. Before that, Mr. Inman worked for FHWA for 33 years. He served for 12 years as chief of the Federal-Aid Financial Management Division, where he was responsible for developing and administering financial policies for the \$30 billion Federal-Aid Highway Program. Mr. Inman also served in an interim capacity as director of the Office of Fiscal Services with overall responsibility for FHWA's budgeting, accounting, and financial management activities; as chief of the Transportation Infrastructure Finance and Innovation Act Joint Program Office; and as FHWA's budget officer. At FHWA, he directed the development and implementation of various innovation finance initiatives and was responsible for evaluating proposals and executing agreements involving public–private partnerships. Mr. Inman has extensive knowledge of federal requirements relating to grants for state and local governments. He was responsible for FHWA's policies concerning cost eligibility, audit requirements, and financial oversight. He has worked closely with the various transportation disciplines, providing advice on the financial aspects of state transportation improvement programs, major project finance plans, contract requirements, and right-of-way acquisition. Before his Washington office

assignment, Mr. Inman served in FHWA field offices in North Carolina, South Carolina, Washington State, and Missouri. Mr. Inman graduated from the University of North Carolina in Chapel Hill in 1973 with a BS in business administration.

Ashby Johnson is deputy metropolitan planning organization director at the Houston–Galveston Area Council, which is the metropolitan planning agency for the eight-county Houston–Galveston–Brazoria region, and has served in that position for the past 7 years. He is current chair of the policy committee for the Association of Metropolitan Planning Organizations and deputy executive director of the Texas Association of Metropolitan Planning Organizations. He was a transportation planner with the U.S. Department of Transportation for 8 years and served in numerous capacities, including building partnerships with the U.S. Environmental Protection Agency, U.S. Department of Housing and Urban Development, and others to promote the benefits of linking transportation and land use, transit new starts, and developing and instructing courses on public involvement, environmental justice, and metropolitan transportation planning. Before joining FHWA, Mr. Johnson was with the Texas Department of Transportation for 5 years, where he served as liaison to the Texas State Legislature and as a historic preservation planner. Mr. Johnson holds a bachelor's degree in government and a master's in community and regional planning, with a concentration in transportation engineering. He received both degrees from the University of Texas at Austin.

Fred Meurer joined the City of Monterey in 1986, initially as the special projects manager in the city manager's office and then as the city's public works director for the next 5 years. In July 1991, the city council appointed Mr. Meurer to the position of city manager. Since his appointment, Mr. Meurer has been actively involved in reuniting City Hall with its business and residential neighborhoods. Mr. Meurer is involved in developing cooperative relationships between the city and Department of Defense (DoD) activities in Monterey in an effort to further increase DoD mission effectiveness while reducing its operating costs. His goal is to provide the same high-quality municipal services to DoD activities and personnel as the city provides its civilian neighborhoods, while saving the city money by spreading its overhead across a larger base. Similar cooperative service agreements have been negotiated with other cities in the region. Mr. Meurer graduated from the Military Academy at West Point in 1966. He received graduate degrees from Stanford University in water resources planning and civil engineering in 1971. He served overseas assignments in Germany, Viet Nam, and South Korea. His final active duty tour was as director of public works and housing at Fort Ord in California. He retired as a colonel in the Army in 1986.

Kevin Neels directs the transportation practice at The Brattle Group. He has more than 30 years experience as a consultant and expert witness in the rail, trucking, courier, postal, aviation, and automotive industries. He has led many significant engagements relating to competition, market structure, pricing, revenue management, distribution strategy, regulation, and public policy. Before joining The Brattle Group, Dr. Neels served as vice president and leader of the transportation practice at Charles River Associates. He has also served as a researcher in the urban policy program at the Rand Corporation and the transportation studies program at the Urban Institute; as a director in transportation practice at the consulting firm of Putnam, Hayes & Bartlett; as a management consultant in transportation practice of the firm now known as KPMG. Dr. Neels is chairman of the Committee on Freight Transportation Economics and Regulation of TRB, an arm of the National Academy of Sciences. He is also a member of the TRB Committee

on Airline Economics and Forecasting. Dr. Neels has authored numerous research reports, monographs, and articles for peer-reviewed journals. He has often been asked to offer expert testimony in legal and regulatory proceedings. He regularly serves as an invited speaker at conferences and industry forums, and his opinions and observations on industry developments are frequently quoted in the popular and trade press. Dr. Neels earned his PhD from Cornell University.

George E. Schoener is executive director of the I-95 Corridor Coalition, where he is responsible for coordinating multimodal transportation programs in the nation's most heavily traveled corridor. Before that, he spent 33 years with the U.S. Department of Transportation. While serving as deputy assistant secretary of transportation, Mr. Schoener was responsible for managing and directing a multibillion dollar highway and transit program. He also directed the development of national transportation policy, including the Administration's reauthorization legislation for surface transportation and the national freight policy framework. In FHWA, Mr. Schoener served in several positions, including as director of planning, where he was responsible for managing the \$200 million national metropolitan planning program for more than 300 metropolitan planning organizations. As a staff member of the U.S. Senate Committee on Environment and Public Works, Mr. Schoener worked with congressional members in designing the landmark surface transportation legislation, the Intermodal Surface Transportation Efficiency Act of 1991, which provided more than \$156 billion in funding over 6 years to state departments of transportation. Mr. Schoener has received numerous awards, including twice receiving the Presidential Rank Award for meritorious achievement in the Senior Executive Service. Mr. Schoener holds a master's degree in engineering from Pennsylvania State University and a bachelor's of civil engineering from the University of Minnesota.

Randall Yim consults on a variety of homeland security, infrastructure management, and other national public policy matters. As deputy under secretary of defense (installations), he supervised DoD military base closure initiatives, including programs of the Office of Economic Adjustment that provide assistance to affected local communities. In this position, he was responsible for oversight and policy guidance for managing the department's military installations worldwide, covering more than 46,000 square miles, with 600,000 structures valued at more than \$600 billion and an annual budget in excess of \$30 billion. Before his appointment with DoD, Mr. Yim was appointed by the governor of California to serve on the California Military Base Reuse Task Force, was deputy director for Sacramento County's Department of Military Base Reuse, and represented military base reuse communities in his private legal practice. Mr. Yim has also served as director of the Homeland Security Institute, a federally funded research and development center established in 2004 pursuant to Section 312 of the Homeland Security Act of 2002. Before joining the Homeland Security Institute, Mr. Yim was a managing director at the U.S. Government Accountability Office headquarters in Washington, D.C. Mr. Yim received a bachelor of arts degree in human biology from Stanford University in 1974 and a doctoral degree in law from the University of Pennsylvania in 1977. He also received a graduate certificate in hazardous materials management from the University of California at Davis.



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