SECTION 4.0
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Sections 4.2 through 4.13 contain descriptions of the baseline (November 2005) affected resource areas on Fort Belvoir, followed by the findings of the impact analyses for implementing the BRAC activities under each alternative. Section 4.14 summarizes mitigation measures applicable to each of the resource areas. Section 4.15 and Sections 5.14 and 5.15 contain information required by CEQ regulations for EISs: Unavoidable Adverse Environmental Impacts (Section 4.15), Irreversible or Irretrievable Commitments of Resources (Section 5.14), and Short-Term Uses of Man's Environment and Maintenance and Enhancement of Long-Term Productivity (Section 5.15). A summary of the cumulative effects associated with implementing the Preferred Alternative is presented in Section 5.

For impact analysis purposes in this EIS, the footprints for each BRAC project were estimated based on the building size, parking requirements, and area of additional disturbance. The footprints used for the major BRAC projects were shown in Figure 2-6. Impacts to resources were quantified where possible and are presented in the sections below.

4.2 LAND USE

This section describes the physical use of land in and around Fort Belvoir and the spatial relationships between the installation and surrounding community. The discussion summarizes existing conditions and foreseeable future land use consequences of future development in the context of BRAC planning at Fort Belvoir, Fairfax County, and northern Virginia.

In its Comprehensive Plan published in 2003, Fairfax County describes a detailed land use and site plan for the Engineer Proving Ground (EPG) that is discussed in Section 4.2.1.2.6 below. The county's plan, developed in the mid-1990s, is based on a previous public-private partnership proposal for development of EPG; the Army has since determined its need to retain EPG and implement its own development plans for the site as discussed in Section 2.0. For comparison purposes, some conceptual elements of the county plan are presented below because they are similar to EPG development under the proposed action. .

4.2.1 AFFECTED ENVIRONMENT

The affected environment encompasses Fort Belvoir and the interface (installation boundary area) between Fort Belvoir and the surrounding community. The surrounding community includes natural resources and the human environment that may be enhanced or adversely affected by actions at Fort Belvoir.

4.2.1.1 Regional Geographic Setting and Location

Fort Belvoir is in Fairfax County, Virginia, one of the largest and most populous jurisdictions in the Washington, DC area. The county covers approximately 400 square miles and is home to about one million people. It is a mostly urban jurisdiction that combines residential developments of various densities with major employment and commercial centers. It is bordered by several

other counties that are intensely developed (Arlington and the City of Alexandria) or that have portions that have become more developed over the last several decades as the Washington, DC metropolitan area has expanded (Prince William and Loudoun Counties in Virginia and Montgomery and Prince George's Counties in Maryland).

Fort Belvoir occupies approximately 13.5 square miles in southeastern Fairfax County, approximately 15 miles south of Washington, DC. Fort Belvoir employs approximately 22,000 workers, and has 2,070 homes in on-post residential developments. The post consists of five general areas: North Post, South Post, Southwest Area, and Davison Army Airfield (collectively referred to as Main Post) and the EPG. A sixth location is the off-post GSA Parcel. Figure 1-2 showed these principal areas.

The approximately 2,720-acre South Post, south of U.S. Route 1, occupies a peninsula extending into the Potomac River between Gunston Cove and Accotink Bay to the west and Dogue Creek to the east. The South Post is the most developed portion of the installation, and is the location for the garrison headquarters and associated functions, numerous administrative facilities, warehouses, 11 housing areas, and a nine-hole golf course. The North Post occupies about 2,400 acres in most of the area between U.S. Route 1 and Telegraph Road from its intersection with Route 1 westward towards Fairfax County Parkway and northward toward Telegraph Road at the northernmost corner of the 579-acre Humphreys Engineer Center (HEC). The HEC, however, is not considered to be part of Fort Belvoir and is not addressed in this EIS. The North Post is somewhat developed with administrative facilities for larger tenant agencies, two housing areas, and a two 18-hole golf courses. The Southwest Area is a generally undeveloped, approximately 1,900-acre area that extends west of Accotink Creek and south of U.S. Route 1 and the Davison Army Airfield to Pohick Bay. It is separated from the South Post by Accotink Bay and Accotink Creek. To the west, the Southwest Area is bounded by Pohick Creek and Old Colchester Road. Accotink Village, at the intersection of U.S. Route 1 and Backlick Road, is an enclave of privately owned land within Fort Belvoir. Accotink Village is under the jurisdiction of Fairfax County. Davison Army Airfield occupies about 740 acres (the developed areas for the runways and nearby buildings occupy about 400 acres) in the portion of the installation west of Fairfax County Parkway and north of U.S. Route 1, and provides the airfield and associated functions for Fort Belvoir. These four areas—South Post, North Post, Southwest Area, and Davison Army Airfield—comprise Fort Belvoir's Main Post of a little more than 7,700 acres.

The fifth area of Fort Belvoir, EPG, is a former military training and testing area on an 807-acre noncontiguous portion of the installation approximately 1.5 miles northwest of the Main Post. EPG is bounded by I-95 to the east and by commercial and residential properties to the north, west, and south. EPG is further inland and on higher ground than the Main Post. Accotink Creek traverses EPG from north to south, dividing it into two nearly equal parts. Broad level terraces are present on each half of the site. The Army acquired EPG in the early 1940s for the testing of a wide range of engineering equipment and supplies, including methods and equipment for the deployment, detection, and neutralization of landmines. The Army used EPG for these purposes from the 1940s through the mid-1950s. Section 4.2.1.2.6 provides additional information on the history of EPG.

A sixth area under consideration in the EIS is the GSA Parcel. The 70-acre parcel is not managed as part of Fort Belvoir, although the site is being evaluated for use in the BRAC realignment process. The parcel is developed and has over 1 million square feet of warehouse space used for storage. The parcel location relative to Fort Belvoir, shown in Figure 1-2, is approximately 4 miles north of the Main Post in the southeast corner of the intersection of U.S. I-95 and the Franconia-Springfield Parkway.

4.2.1.2 Land Use on Fort Belvoir

The 1993 land use plan, as amended in 2002, is the guiding document for Army planners to assure that incremental improvements and new additions to installation facilities fully serve the primary and support functions of the Fort Belvoir mission. Figure 2-1 presented the current land use designations at Fort Belvoir.

Approximately 70 percent of Fort Belvoir is undeveloped. The installation includes extensive forested areas, particularly in the Southwest Area. Developed areas are found primarily in the South and North Posts.

4.2.1.2.1 Existing Land Use Designations

Land utilization at Fort Belvoir conforms fairly closely to the existing designations. However, areas shown on a land use designation map as being under a given land use generally also include associated open areas and supporting facilities (e.g., utility services, access roads, parking areas). Therefore, the map does not reflect actual densities of development. The land use designations currently in use are Administration & Education; Airfield; Community Facilities; Family Housing; Industrial; Medical; Outdoor Recreation; Research & Development; Supply, Storage, & Maintenance; Training Range; Troop Housing; and Environmentally Sensitive.

4.2.1.2.2 North Post

The North Post is generally divided in two sections by Abbott Road into an upper portion and lower portion. The 2,100-acre upper portion of the North Post (corresponding to the Upper North Post planning district) is characterized primarily by Administration & Education, Research & Development, Environmentally Sensitive, and Outdoor Recreation uses. Outdoor Recreation includes the 36-hole North Post Golf Course, north of John J. Kingman Road. The principal Environmentally Sensitive features on the North Post are the Forest and Wildlife Corridor connecting Huntley Meadows to the northeast of the Main Post with the Accotink Bay Wildlife Refuge in the Southwest Area and the Jackson Miles Abbott Wetland Refuge on the eastern edge of the installation. The latter Refuge separates Woodlawn Village—one of two Family Housing areas on the North Post—from the rest of the installation. The Administration & Education and Research & Development categories reflect the presence of large tenant organizations that occupy fenced and secured compounds on the North Post, including the Defense Logistics Agency (DLA), Defense Threat Reduction Agency (DTRA), U.S. Army Intelligence and Security Command (INSCOM), and Defense Communications Electronics Evaluation and Testing Agency (DCEETA).

Development in the upper portion of the North Post is clustered and of moderate to low density. This is consistent with the installation's 1993 land use plan. The plan, noting the presence of numerous environmental constraints and that Upper North Post developable areas are not contiguous, provides that these areas be developed individually as cohesive units, both functionally and visually, with shared support facilities and parking structures.

The lower portion of the North Post consists of about 300 acres and is more densely developed and predominantly characterized by Community Facilities as well as Supply, Storage, & Maintenance; Troop Housing (McRee Barracks); and Family Housing (Lewis Heights, the second of two Family Housing areas on the North Post). Community facilities are concentrated in an area designated as the Regional Community Support Center (north of Abbott Road). This area was the subject of the 2002 amendment to the 1993 land use plan, which re-designated a portion of it for

medical use, to allow for construction of a future Army Community Hospital planned at Fort Belvoir. Existing uses in this area include the Commissary and Post Exchange (PX). Supply, Storage, & Maintenance uses in the Lower North Post consist mostly of five motor pools and six maintenance shops between Meade and Goethals Roads, just north of Route 1.

The more densely developed nature of the Lower North Post is consistent with the 1993 land use plan. Because of the relatively unconstrained nature of the area, the 1993 plan noted that the Lower North Post provided the opportunity to create a successful transition between the Upper North Post and the South Post. Structures in the Lower North Post were to relate visually to the South Post, but could be larger.

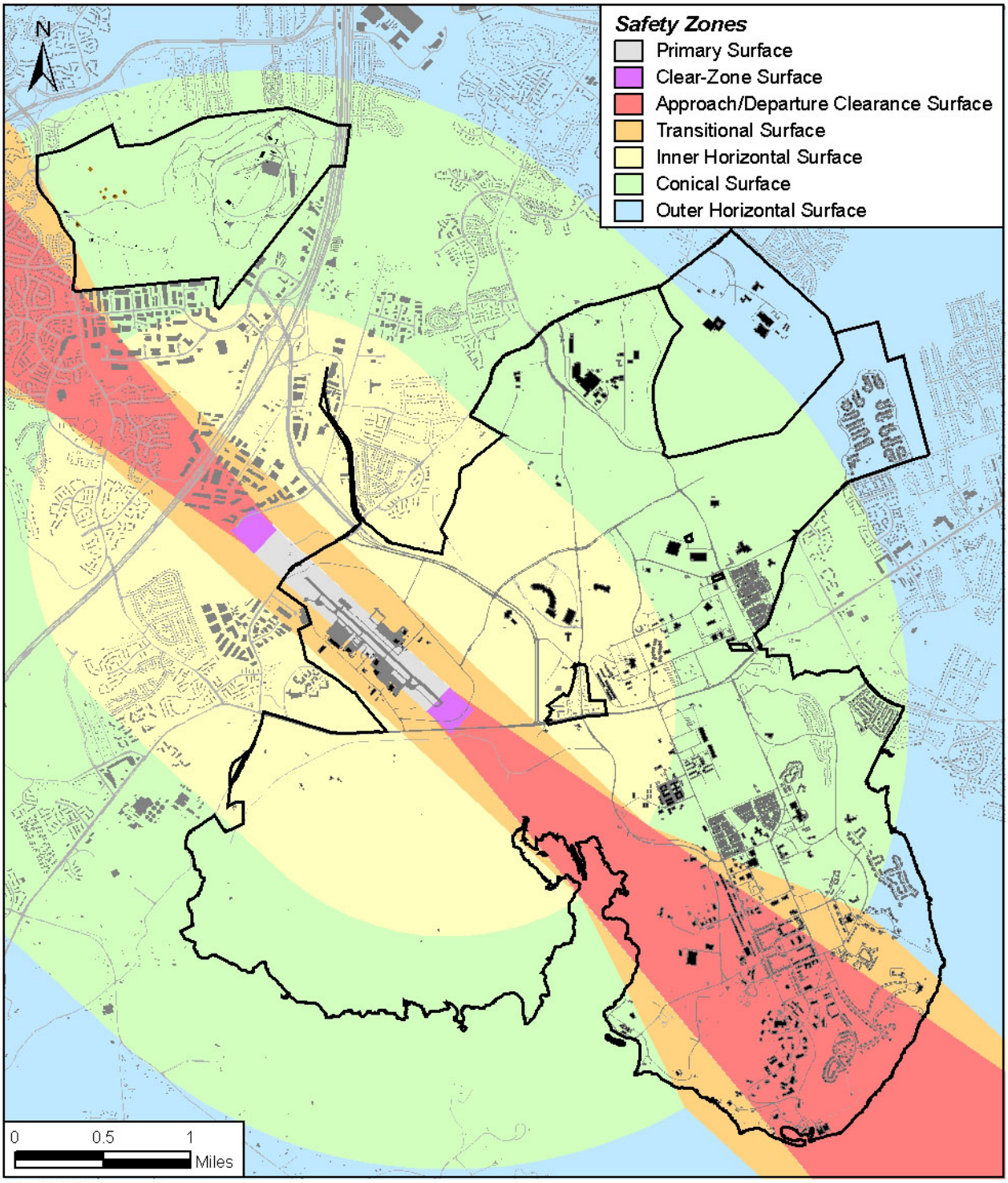
4.2.1.2.3 Davison Army Airfield

Davison Army Airfield (DAAF) occupies about 400 developed acres of land west of Fairfax County Parkway. The mission of the Davison Army Airfield is to transport passengers and freight for the Army and DoD to, from, and within the National Capital Region (NCR). The airfield fulfills this mission with an average of 20 missions per day (takeoffs and landings) (Fort Belvoir, 2005b). There are 36 buildings surrounding the airfield, and the facility employs over 400 people. It has a 450-by-40-foot helipad and a 5,500-by-80-foot paved runway with a parallel 4,900-foot taxiway. Davison Army Airfield serves five tenant flight units and is home to two Army aviation commands: the Army's fixed-wing Operational Support Airlift Agency (OSAA), a Department of the Army field-operating agency under the Army National Guard with its co-located Operational Support Airlift Command (OSACOM) headquarters; and the rotary wing 12th Aviation Battalion, under the administration of the Military District of Washington (MDW).

Two- and three-dimensional safety zones are defined around all runways and taxiways, including those at Davison Airfield, to minimize the potential for accidents during take-off and landing operations. These zones are to remain clear of objects, such as buildings, that could cause or be affected by an accident. Figure 4.2-1 illustrates airspace restrictions at the DAAF. The footprint of the safety zones associated with the airfield extends well beyond the airfield itself. The safety zones constrain the presence and height of potential developments in parts of the surrounding land, including the North Post, Southwest Area, and EPG. Building height restrictions are governed by guidelines and regulations relating to the identification and construction of obstructions within airspace are established in the Federal Aviation Regulations (FAR Part 77, *Objects Affecting Navigable Airspace*). Another constraint associated with the airfield results from aircraft-generated noise, as described in Section 4.5 of this EIS.

Building restrictions within the conical surface begin at the 150 feet level above the runway at the boundary with the inner horizontal surface and extend outward at a slope of 20:1 (horizontal: vertical) for a distance of 7,000 feet to an elevation of 500 feet above the airfield. The majority of the remaining portion of the Main Post (with the exception of the extreme northeast and southeast sections) and EPG fall within the 150- to 500-foot building height restriction within the conical surface. Portions of the Mount Vernon, Rose Hill, Springfield, Pohick, and Lower Potomac planning districts also fall within portions of the conical surface height restriction boundary.

The 1993 land use plan noted that because of its remote location and function, the Davison Army Airfield planning district did not have a close relationship with the other areas of the post and recommended that future development strive for consistent future renovations, additions, and rehabilitation projects for functions of Davison Army Airfield itself.



Davison Army Airfield Safety Zones

Fort Belvoir, Virginia

Sources: Fort Belvoir GIS, 2006; Fairfax County GIS, 2006.

Figure 4.2-1

4.2.1.2.4 South Post

Land uses on the South Post are more diverse than on the North Post. With the exception of Airfield, all land use categories are represented on the South Post, which includes the most densely developed areas of Fort Belvoir. It has as its core a densely built quadrangle of land comprising approximately 400 acres. This core area, bounded approximately by 9th and 21st Streets and Gunston and Belvoir Roads, is the heart of Fort Belvoir and its historic character.

This area has a coherent architectural style and includes the Fort Belvoir Historic District (see Section 4.9). Land uses found there include the following:

- Administration and Education—with Fort Belvoir's headquarters, the NGA College, the Army Management Staff College, and Defense Acquisition University)
- Family Housing—Gerber, Fairfax, and Belvoir villages
- Community Facilities—South Post Community Center, service station, home and garden center, shopette and video rental store, laundromat, fitness center, Belvoir Chapel, Mount Vernon Chapel, library, bowling center, sports fields, outdoor running track, skate park, Barden Education Center, and Army Community Services
- Medical—DeWitt Army Community Hospital

Outside the core area, the South Post is characterized by a range of more widely spaced facilities. Family Housing is concentrated east of Belvoir Road (River Village, George Washington Village, Colyer Village, Dogue Creek Village, Park Village, Jadwin Loop), giving that part of the Post a marked residential character. Research & Development uses are represented by an access-controlled compound at the southern end of the peninsula, which includes the Center for Night Vision, Army Knowledge Online (AKO) center, and other functions for which access must be controlled. West of this area, the Tompkins Basin recreation area represents Outdoor Recreation uses. Another substantial area of Outdoor Recreation use is the nine-hole South Post golf course south of U.S. Route 1 and north of 9th Street, between Gunston and Belvoir Roads. Between the South Post and the Southwest Area, just south of U.S. Route 1, at the Tulley Gate entrance to the Main Post, the Eleanor U. Kennedy Homeless Shelter draws homeless persons seeking assistance to the area. The shelter is on the installation but is leased to Fairfax County. Supply, Storage, & Maintenance uses are concentrated in warehouses west of Gunston Road. These warehouses abut a large area of environmentally sensitive lands that extend to Accotink Bay and include about a quarter of the Accotink Bay Wildlife Refuge. An area of Administration & Education use west of the South Post golf course includes the Army Materiel Command (AMC) temporary facilities, the Criminal Investigation Division Command (CIDC), and various other administrative activities.

The 1993 land use plan, recognizing the special character of the South Post, and particularly the South Post Core Area, recommended that development take place within the historic context of this Core Area. Because much of the future development in these districts would be redevelopment or infill, compatibility was considered very important. The plan recommended that activities remain the same and that new development be scaled and sited to relate directly to existing land use patterns in the immediate area.

4.2.1.2.5 Southwest Area

The Southwest Area is largely undeveloped and wooded. Although a substantial amount of land was designated for Administration & Education use under the 1993 land use plan, this land has remained undeveloped. A portion of the Southwest Area is reserved for outdoor training with

little infrastructure or land development appurtenances. Former landfills are found in the northern portion of the Southwest Area. The north-central portion of the area formerly served as an open burning/open detonation (OB/OD) area. Most of the Accotink Bay Wildlife Refuge and a portion of Fort Belvoir's Forest and Wildlife Corridor are in the Southwest Area (Environmentally Sensitive category). Overall, the Southwest Area bears little functional and visual relationship to the rest of the Main Post.

The 1993 plan noted that the Southwest Area is severely constrained and recommended a pattern of development similar to what it proposed for the Upper North Post planning district: high-density clusters with shared support facilities and structured parking that work around constrained areas.

4.2.1.2.6 EPG

EPG is an 807-acre parcel that is 1.5 miles northwest of the Main Post. It is roughly bounded on the east by I-95, by commercial properties to the south, and by residential properties on the west and north sides.

The Army acquired EPG in the early 1940s and used it to support the installation's Research, Development, and Engineering Center. EPG was established early in World War II for testing of a wide range of engineering equipment and supplies. The highest level of activity at EPG occurred during the 1940s to the mid-1950s. Commercial and residential encroachment in the vicinity of EPG in the 1960s and 1970s contributed to the reduction of testing activities at the facility.

The historical testing and training activities on the eastern portion of EPG included the following:

- Construction, material handling, maintenance, railway, power generation, air compression, and bridging equipment
- Fuels and fuel handling and storage equipment, mobile water purification equipment, and waste and sewage structures
- Climatic effects on paints, tactical sensors, and anti-mine systems and techniques.

Activities on the western portion of EPG included the following:

- Methods and equipment for the deployment, detection, and neutralization of land mines
- Anti-intrusion and counter-barrier systems and techniques
- Tactical sensors and anti-mine systems and techniques.

In 1989, the Research, Development, and Engineering Center turned the property back over to Fort Belvoir. Most of EPG is currently inactive with the exception of the administrative offices of the U.S. Army Nuclear and Chemical Agency (USANCA), which currently occupies Building 5073. Additional activities at the site include those associated with ongoing environmental and geophysical work at several of the range areas in the west. A 170-acre tract of land along the western and southern boundaries is reserved as the right-of-way for completion of the Fairfax County Parkway.

4.2.1.2.7 GSA Parcel

The 70.6-acre GSA Parcel, controlled by the GSA, is not part of Fort Belvoir. Therefore, it is not categorized by the land use designations that apply to Fort Belvoir. The area consists of 1 million square feet of warehouse and office space and paved parking, which would correspond to the Army's Administration & Education and Supply, Storage & Maintenance land use categories.

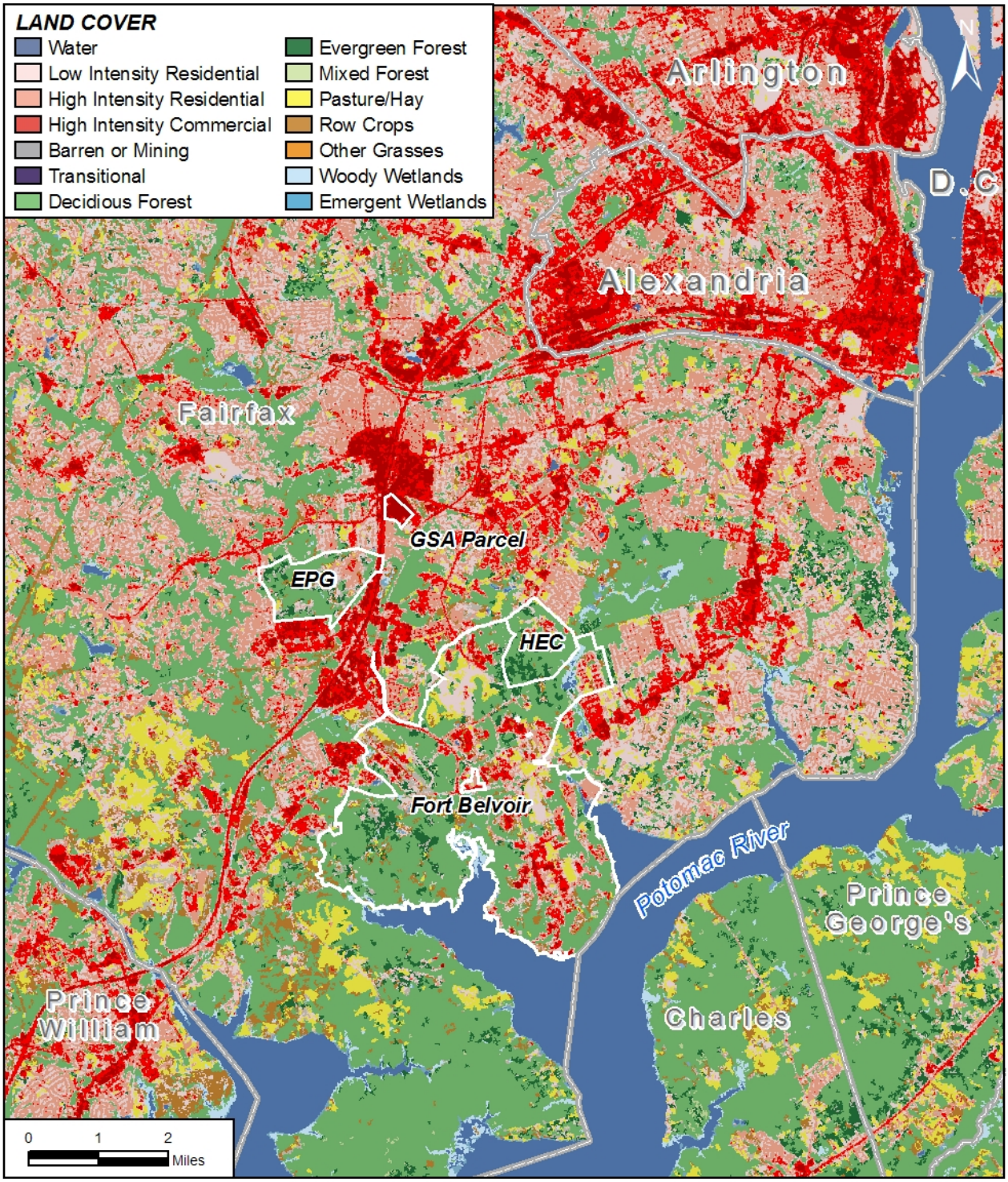
4.2.1.3 Antiterrorism and Force Protection

The proposed land use plan update has been developed in full awareness of force protection requirements for military facilities (DoD, 2003). Force protection is one of the primary drivers for realignment at Fort Belvoir in that agencies would be relocated from non-secure locations to Fort Belvoir in order to meet DoD security requirements. Fort Belvoir is one of the premier military garrisons in the Army, providing a broad variety of critical intelligence, training, and Headquarters services throughout the Department of the Army. Antiterrorism and Force Protection (AT/FP) is considered mission-critical and is considered inviolable. AT/FP involves strictly defined measures to protect these vital services and resources, including personnel, information, and infrastructure from any terrorist attack. AT/FP encompasses four principles: physical security, command and control security, personal security, and law enforcement operations (Rokosz and Hash, 1998). AT/FP involves public safety, access control, visitor/delivery centers, line of sight, mandatory setback minimum distances, and compatibility with adjacent uses/operations, particularly as they relate to transportation and infrastructure. Army regulations establish setback and construction requirements on the basis of risk and vulnerabilities of resources/operations in question. The installation has developed a security and force protection plan and program designed to meet regulatory guidance. Measures implemented under the plan include barrier plans, enhancements at access control points, visitor in-processing, and changes in parking layout (BNVP, 2006).

In terms of land use, AT/FP is addressed by considering the siting of facilities or agencies in relation to their particular needs. The most effective and least disruptive approach to implementing AT/FP measures will be to consider them from the beginning of the planning process.

4.2.1.4 Surrounding Land Use

The Region of Influence (ROI) for the purposes of consideration of land use generally describes a rough semicircle (excluding the Potomac River) extending 3 miles in all directions from Fort Belvoir. Figure 4.2-2 shows the general ROI for land use (Fairfax County), as well as surrounding counties. Fort Belvoir is in a predominantly residential part of Fairfax County, which is rich in natural and cultural resources. Adjacent to or near the installation to the southwest are Pohick Bay Regional Park, Mason Neck State Park, and Mason Neck National Wildlife Refuge, and, to the northeast, Huntley Meadows County Park. Fort Belvoir's Forest and Wildlife Corridor (consisting of approximately 742 acres) provides a connection for all these natural areas. Cultural features adjacent to or near Fort Belvoir include Woodlawn Plantation, Society of Friends Meeting House, Pohick Church, and Mount Vernon. Figure 4.2-2 also shows the land cover for the greater Fort Belvoir community.



Fort Belvoir Land Cover

Fort Belvoir, Virginia

Sources: Fort Belvoir GIS, 2006; Fairfax County GIS, 2006; NLCD 2001.

Figure 4.2-2

Counties in the Fort Belvoir region include Fairfax, Prince William, Arlington, and Loudoun Counties and the City of Alexandria in Virginia; Montgomery, Prince George's, and Charles Counties in Maryland; and Washington, DC. Outside of Fairfax County, Prince William County is the nearest county jurisdiction about three miles to the south of Fort Belvoir. The City of Alexandria is about four miles northwest of Fort Belvoir, and Arlington County is north of Alexandria. These counties were shown on Figure 1-3. As Fort Belvoir is entirely surrounded by Fairfax County land, a detailed description of land use planning in the vicinity of Fort Belvoir is generally limited to Fairfax County.

4.2.1.4.1 Fairfax County Comprehensive Plan

The Fairfax County Comprehensive Plan consists of the Policy Plan, four Area Plans, the Plan map, and the Transportation Plan map. The Policy Plan contains goals, objectives, and policies relating to eight functional elements: Land Use, Transportation, Housing, the Environment, Heritage Resources, Public Facilities, Human Services, and Parks and Recreation. The goals, objectives, and policies guide planning and development review by describing future development patterns in Fairfax County and protecting natural and cultural resources for present and future generations (Fairfax County, 2003).

The countywide element, contained in the Policy Plan, offers a broad statement of county policy to guide decisions toward enhancing the built and natural environment. The Area Plans give more site-specific guidance, from the Planning District down to the Community Planning Sector level. As a federal facility, Fort Belvoir is not bound by the plan. However, to the greatest extent possible, the Army strives to ensure that its actions are compatible with county planning. Although the county's plan is based on a previous public-private partnership proposal for development of EPG, the Army has since determined that it must retain EPG and implement its own development plans for the site. For comparison purposes, some conceptual elements of the county plan are presented below because they are similar to EPG development under the proposed action.

With respect to the land use functional element, the county has adopted both a specific land use countywide goal and related goals to provide land use development guidance, as follows:

- *Land Use.* Maintain quality of life, coordinate public and private development, provide adequate public services and facilities, implement sound environmental practices, follow growth criteria and standards, and achieve economic goals.

- *Transportation.* Balance land use with transportation infrastructure by developing rapid rail, commuter rail, expanded bus service, sidewalks and trails, and reduced dependency on automobiles.

- *Open Space.* Support conservation of plants, animals, and natural land areas, including small open spaces within already-developed areas.

- *Revitalization.* Encourage and facilitate commercial and residential revitalization to prevent or eliminate deterioration.

- *Private Sector Facilities.* Develop commercial and industrial facilities to meet needs for goods, services, and employment, with special attention to small and minority businesses.

- *Employment Opportunities*. Maintain a strong economy and varied employment opportunities.

The Lower Potomac Planning District, which contains the Main Post of Fort Belvoir, is addressed in Area Plan IV. The Main Post is within, and is the namesake of, Community Planning Sector Lower Potomac 4 (LP4). Recommendations for the Fort Belvoir planning sector that are relevant to the proposed action assessed in this EIS include the following:

- *Land use*. Proposed development or redevelopment on Fort Belvoir should be undertaken in cooperation with the county. Development or redevelopment plans should be supported only if they are consistent with the county goals and Comprehensive Plan. Consideration should be given to the construction of on-post housing to meet the needs of military families in southern Fairfax County. On-post housing for military families reduces the competition for affordable housing in the county. The Village of Accotink should generally maintain its current uses and densities/intensities.

- *Heritage Resources*. The remains of the Belvoir site continue to reflect an important element of local heritage and should be protected. Pohick Church, Mount Air, and Woodlawn Historic Districts abut Fort Belvoir. Protection of these historic resources should be considered in any redevelopment of the Fort Belvoir property.

- *Public Facilities*. Construct a new elementary school on Fort Belvoir to replace the existing Fort Belvoir school (this school has been built).

EPG and the GSA Parcel are within the Springfield Planning District in Area Plan IV, with EPG situated within the Fort Belvoir Community Planning Sector (S5) and the GSA Parcel within the Springfield East Community Planning Sector (S7). However, both areas are part of the Springfield-Franconia Planning Area. The countywide goals that serve as land use guidance for the Springfield-Franconia area are the same as discussed above. The county's recommendations relevant to the proposed action assessed in this EIS as they relate to these two parcels are slightly different and include the following:

- *Land Use (EPG)*. Development is limited to an overall density of 0.17 Floor Area Ratio (FAR) to reflect a total of no more than 4.5 million gross square feet of nonresidential development and 1,500 multifamily and 85 patio-style, single-family dwelling units.

- *Environment (EPG)*. The principal environmental feature of EPG is the Accotink Stream Valley Environmental Quality Corridor (EQC). The EQC includes some wetlands outside the stream valley that should be preserved and protected from development.

- *Land Use (GSA Parcel)*. Recognize existing industrial uses and minimize traffic generation in an area with limited transportation capacity. The federal government and the county should work together to facilitate the implementation of the county's Comprehensive Plan, which calls for mixed-use development. Development could include light industrial/research and development use, a conference center, and office and support retail use.

Generally, it is the county's intent to comprehensively plan future land uses and protect natural and cultural assets. The county further is eager to see development of on-post housing for military

families to reduce pressure on affordable off-post housing in the county. Housing should be well-designed, buffered, and located well away from U.S. Route 1.

The county wishes to see development of a 107-acre parcel west of Davison Army Airfield and north of U.S. Route 1 for elderly housing, a nursing care facility, and low-rise office buildings. The county would like Accotink Village to maintain current densities.

Urban design objectives for the U.S. Route 1 corridor near Fort Belvoir include the following:

- Establishing visual continuity along right-of-way and highway edges
- Providing user orientation within the corridor
- Establishing a clear corridor image
- Improving access and functional amenities for both pedestrian and vehicular traffic
- Reducing effects on adjacent residential communities, such as glare, noise, and incompatible building forms

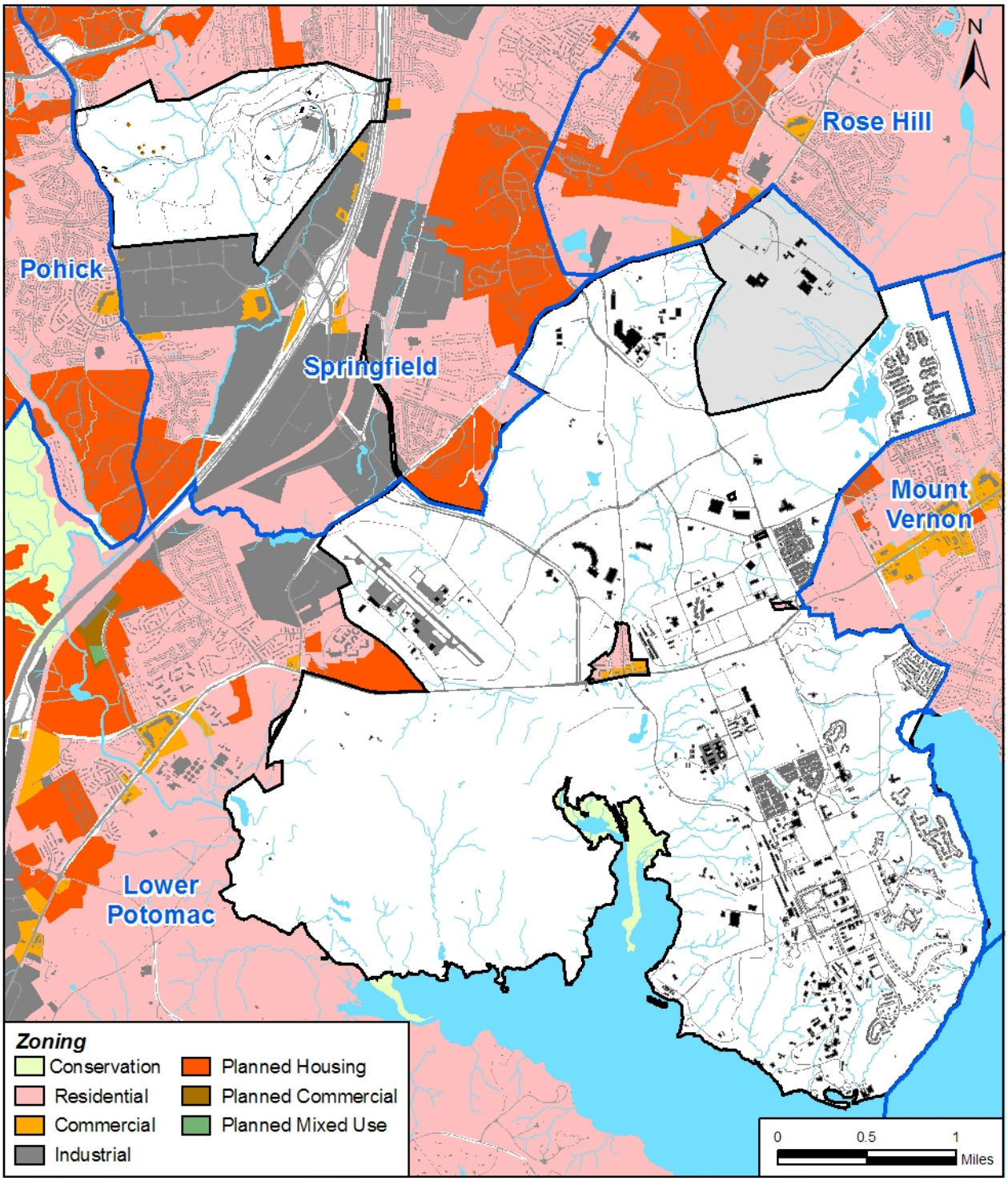
4.2.1.4.2 Adjacent Fairfax County Planning Districts

For the purposes of land use planning, Fairfax County has been subdivided into 14 planning districts. The Main Post falls within the Lower Potomac Planning District, of which it occupies the northeastern corner as shown in Figure 4.2-3. Planning districts are further subdivided into community planning sectors. The Fort Belvoir Community Planning Sector is bounded by Fort Belvoir, Rolling Road, and I-95. Developed land around Fort Belvoir is primarily residential, with commercial uses along major roadways. Adjacent planning districts to the installation are the Springfield, Rosehill, Pohick, and Mount Vernon Districts.

There are two major issues that must be addressed before undertaking future development in any of the districts nearby or abutting Fort Belvoir, particularly in light of the substantial realignment mandated by BRAC. They are transportation and environmental stewardship. Both these fundamental issues are addressed in detail in other sections of this EIS. The planning districts that are closest to Fort Belvoir are highlighted below (Fairfax County, 2003).

Lower Potomac Planning District. Of the 14 planning districts in the county, the Lower Potomac is the fourth largest, with 23,611 acres. The Lower Potomac Planning District contains a variety of land uses (Fairfax County, 2003). Particularly noticeable are two large institutional land areas—Fort Belvoir and the former District of Columbia Department of Corrections site at Lorton. The former Lorton prison property (approximately 3,000 acres) was transferred from the DC Department of Corrections to Fairfax County in July 2002 (116 acres of the property, designated for a high school and a middle school, were transferred in May 2002) and is slated for redevelopment under the name of Laurel Hill. Master planning for the adaptive reuse of Laurel Hill is underway. Future uses may include parkland and housing (Fairfax County, 2004a).

Farther south, across Gunston Cove from Fort Belvoir, the Mason Neck area is characterized by parkland, open space, and very-low-density residential uses (Fairfax County, 2003). Protected areas in Mason Neck include Pohick Bay Regional Park, Mason Neck National Wildlife Refuge, and Mason Neck State Park. Many prehistoric and historic archaeological sites exist within this sector, including Gunston Hall and Pohick Church, which are listed on the National Register of Historic Places. Industrial uses are along portions of the Richmond, Fredericksburg, and Potomac



LEGEND

Installation Boundary

Planning District Boundary

County Zoning and Planning Districts

Fort Belvoir, Virginia

Sources: Fort Belvoir GIS, 2006; Fairfax County GIS, 2006.

Figure 4.2-3

Railroad tracks, Lockport Place, and U.S. Route 1 south of Gunston and Gunston Cove Roads. Townhouses; garden apartments; single-family, detached homes; and community-serving retail uses are found along U.S. Route 1 between Telegraph and Gunston Roads (Fairfax County, 2003). Fairfax County's Noman M. Cole, Jr. Pollution Control Plant is on the eastern bank of Pohick Creek between the Main Post boundary and U.S. Route 1.

North of U.S. Route 1 along Backlick Road, Accotink Village is a mostly single-family-home residential area entirely surrounded by Fort Belvoir. There are some commercial uses (e.g., gas station, fast food restaurant, convenience store, and various shops) at the intersection of U.S. Route 1 and Backlick Road. A large communication tower dominates the eastern edge of Accotink Village.

Mount Vernon Planning District. Low-density, single-family residences are the predominant land use in this planning district, which is adjacent to the eastern edge of Fort Belvoir. Higher-density residential and commercial uses (local-serving retail and strip malls) are found along U.S. Route 1, between Alexandria and Woodlawn Plantation, a National Register-listed site east of Fort Belvoir's North Post (Fairfax County, 2003). Woodlawn Plantation, The Alexandria Society of Friends Meeting House and Woodlawn Baptist Church are historic resources included in the Woodlawn Historic Overlay District, an approximately 1-square-mile buffer that is one of 13 such districts in Fairfax County (Fairfax County, 2002; 2003). The Woodlawn Community Business Center on U.S. Route 1 is the closest commercial area to the east of Fort Belvoir. The area along Mount Vernon Memorial Highway, across Dogue Creek from Fort Belvoir, is characterized by low-density residential and recreational uses (Mount Vernon Country Club, Grist Mill Park).

Rose Hill Planning District. The Rose Hill Planning District extends northeast of Fort Belvoir to the boundary line with the city of Alexandria. It is substantially developed with stable residential neighborhoods, mostly characterized by single-family, detached dwellings at a density of 2–4 dwelling units per acre. A relatively large portion of the district is public parkland, including Huntley Meadows. Another major feature in the district is Kingstowne, a very large planned community characterized by a wide range of mixed residential development at 3–4 dwelling units per acre, with a mixed-use Community Business Center (CBC) as its focal point. Depending on the housing market and attendant lending industry attitudes, Kingstowne is expected to burgeon over the next 4 years.

Springfield Planning District. This planning district is the most intensively developed area in the ROI. It extends north from Fort Belvoir to the Capital Beltway. It includes the I-95 corridor, the Fairfax County Parkway, the Franconia-Springfield Parkway, and CSX Railroad lines (Fort Belvoir, 2005b). The presence of these major transportation corridors has favored commercial and industrial development in the district. Examples are the Newington Commerce Center and Industrial Park, and, farther north, the Springfield Industrial Center and the Springfield Mall. The Franconia-Springfield Area, in the central portion of the Springfield Planning District, generally extends along I-95 from Commerce Street to the I-95/Newington interchange. The EPG and GSA Parcels are within the Franconia-Springfield Area.

EPG is bordered by low-density, residential uses to the north and west and industrial development to the south and east. The residential development in the immediate area is predominantly single-family detached in nature. The typical residential density is 3–4 dwelling units per acre. The industrial development to the south and east of EPG is mostly warehousing and distribution. The GSA Parcel is bordered by commercial and industrial land uses, including the Metro Springfield

Center Business Park to the south and the Franconia-Springfield Metro Station to the east. The Springfield Mall is north of the GSA Parcel, across the Franconia-Springfield Parkway.

Pohick Planning District. The Pohick Planning District is in southwest Fairfax County, which is west of Springfield and northwest of the Lower Potomac Planning District. The development character is suburban, comprising mainly residential neighborhoods and supporting commercial and institutional uses. The district is bisected by the Fairfax County Parkway (Route 7100) and is served by a network of secondary roads, including Braddock Road, Ox Road, Old Keene Mill Road, Rolling Road, Pohick Road, and Clifton Road. It includes the Occoquan Reservoir, which is a major source of drinking water for the region. It is also a major wildlife habitat. Development in the Occoquan watershed is low density. The Fairfax County Comprehensive Plan designates the Occoquan Reservoir as a major water quality preservation resource.

4.2.1.4.3 Zoning in Areas Surrounding Fort Belvoir

Zoning imposed by local entities does not apply to federal property. Therefore, Fort Belvoir is not bound by Fairfax County zoning regulations.

For areas surrounding Fort Belvoir, Fairfax County has defined several zones within the broad categories of residential (R), commercial (C), industrial (I), and planned development. Additionally, the county has designated overlay and commercial revitalization districts. The overlay districts include historic, natural resources, airport noise impacts, sign control, highway corridor, and water supply protection overlay districts.

Accotink Village, an enclave within Fort Belvoir, includes two residential zones (R-3, Residential District, 3 dwelling units/acre, and R-20, Residential District, 20 dwelling units/acre) and three commercial zones (C-5, Neighborhood Retail Commercial District; C-6, Community Retail Commercial District; and C-8, Highway Commercial District). The area surrounding Fort Belvoir is zoned primarily low- to mid-density residential (from R-1, Residential District, 1 dwelling unit/acre, to R-8, Residential District, 8 dwelling units/acre), although there are several small areas zoned for R-20, Residential District, 20 dwelling units/acre. The higher-density residential zones can generally be found near U.S. Route 1 and I-95. Small areas of Planned Development Housing (PDH) zones exist throughout the area around Fort Belvoir. Much of the former Lorton correctional facility area is zoned PDH as well. The area south of Fort Belvoir (mostly the Mason Neck area) is zoned R-E, Residential Estate District. Commercial zones are scattered in small areas throughout the area around Fort Belvoir. Industrial zones are concentrated along the I-95 corridor and range in density from I-3, Light Intensity Industrial District, to I-6, Heavy Industrial District. Figure 4.2-3 presents a zoning map in the vicinity of Fort Belvoir.

4.2.1.5 Current and Future Development in the Region of Influence

The ROI for land use for Fort Belvoir is defined in Section 4.2.1.4 above. Notable new developments are principally sited north of Fort Belvoir along the Franconia-Springfield Parkway. Specific projects include the following:

- *Metro Park.* This project includes six office buildings, five of which are complete as of late spring 2006. Four of the five are leased out. One of the buildings is being marketed to large tenants.
- *Kingstowne Center.* This project is a four-building, mixed use development with 2 million square feet of capacity for office space and 6,300 residential units and associated retail space.

- *Midtown Springfield.* This project is a proposed mixed use complex to include 800 apartments and condominiums, a 160-room hotel, 40,000 square feet of office space, and nearly 100,000 square feet of retail.
- *Springfield Mall.* Vornado Realty Trust has plans to redevelop the Springfield Mall complex and add a hotel, residential units, and office space.

Other long-term Fairfax County projects that might affect future land use in the ROI include increased housing, office, retail, hotel and smaller developments for industrial and institutional uses.

The general county objectives for development in Springfield Planning District include the following:

- Revitalizing and redeveloping the Springfield CBC
- Establishing land use and urban patterns in the Springfield area that support mass transit
- Developing the Franconia-Springfield Transit Station Area
- Providing affordable housing near mass-transit facilities and transportation corridors
- Ensuring that future development of EPG does not result in adverse effects on surrounding neighborhoods and transportation service
- Protecting stable residential neighborhoods and environmental resources from development effects

The general county objectives for development in the Lower Potomac Planning District include the following:

- Create a town center in the Lorton-South Route 1 area; preserve stable residential areas through compatible infill development
- Limit commercial encroachment into residential areas
- Encourage the creation of new parks, open space and recreation areas, and increase the acreage of the EQC program
- Provide screening, buffering, and transitional land uses between residential and nonresidential areas
- Preserve significant heritage resources

Fairfax County reports that about 390 acres of long-term, mixed-use developments are planned within three miles of Fort Belvoir, including about 18 acres under development at Midtown Springfield and redevelopment of the Springfield Mall as mentioned above. About 372 acres of long-term development projects are in the Area Plan Review process and are expected to be approved (Fairfax County Department of Planning and Zoning, 2006).

There are much smaller-scale, short-term developments occurring eastward from Fort Belvoir along the Route 1 corridor. The Southeast Fairfax Development Corporation (SFDC) has identified 32 projects of significance in the Mount Vernon Planning District, stretching from Fort Belvoir to the west and ending at the Capital Beltway to the east. These are mostly small renovation and building addition sites that, in some cases, are confined to façade beautification and signage. Some are typical construction of small buildings like banks and a variety of

commercial and light industrial land uses. These projects require only simple building permits. They do not involve rezoning or special exception rulings.

By contrast, the Fairfax County Department of Planning and Zoning has a long list of short-term projects that will require rezoning, zoning appeals (because their rezoning bids failed), and other procedural techniques before they can apply for construction permits. There is almost no overlap between the SFDC project roster along Route 1 and the county's long- and short-term lists.

Fairfax County and the SFDC report a total of 2,380 acres in short-term development projects that are under construction or approved for construction. Nearly all are single-story with the exception of a planned hotel. The breakdown by land use is presented in Table 4.2-1.

Table 4.2-1
Land use summary for proposed off-post development projects

Land use	Acreage
Professional/Institutional	546
Residential	1,150
Commercial/Light Industry	291
Public/Community	394
TOTAL	**2,380**

The National Capital Planning Commission (NCPC) provides overall planning guidance for federal land and buildings in the National Capital Region (NCR), including Fort Belvoir. Through its planning policies and review of development proposals, the Commission seeks to protect and enhance the extraordinary historical, cultural, and natural resources of the nation's capital.

Additional details about off-post projects, as well as a map of their locations, are provided in Section 5, Cumulative Effects.

4.2.1.6 Coastal Zone Management Program

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. Section 1451, et seq., as amended) provides assistance to the states, in cooperation with federal and local agencies, for developing land and water use programs in coastal zones. Section 307(c)(1) of the Coastal Zone Management Act Reauthorization Amendment (CZMARA) stipulates that federal projects that affect land uses, water uses, or coastal resources of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of that state's federally approved coastal management plan.

The Commonwealth of Virginia has developed and implemented a federally approved Coastal Resources Management Program (CRMP). The program brings together a series of laws and policies pertaining to the protection of the Commonwealth's coastal zone. These laws and policies regulate the following areas: tidal and non-tidal wetlands, fisheries, sub aqueous lands, dunes, point source air pollution, point source water pollution, non-point source water pollution, shoreline sanitation, and coastal lands management.

The Commonwealth of Virginia coastal zone includes all of Fairfax County, including Fort Belvoir's Main Post, EPG, and the GSA Parcel. Therefore, federal actions at Fort Belvoir are subject to federal consistency requirements. The Virginia Department of Environmental Quality

(VDEQ) serves as the lead agency for Virginia's CRMP. Coastal consistency review may be coordinated with the NEPA review process (VDEQ, 2005a). Through coordination with VDEQ, this EIS contains the draft coastal zone management consistency determination at Appendix C. Additional information about the CZMA is provided in Section 4.7.1.5.1.

4.2.2 ENVIRONMENTAL CONSEQUENCES OF THE PREFERRED ALTERNATIVE

With respect to adoption of an update land use plan, the environmental consequences to land use relate to the relative acreage allocation and proximity (compatibility) of land use categories. For implementation of BRAC, environmental consequences to land use relate to adherence to land use categorization and preservation of flexibility to meet future mission requirements. For Fort Belvoir, these parameters drive the evaluation of land use.

4.2.2.1 Land Use Plan Update

Long-term minor beneficial effects would be expected. The Preferred Alternative land use plan would aggregate land use categories in a way that reflects and supports the evolution in Fort Belvoir's mission. The expanded land use categories—chiefly, Professional/Institutional and Community—support Fort Belvoir's mission within the region as an administrative, logistics, and operations center; military support center; classroom center; housing center; military community support center; and a leader in environmental stewardship.

The Preferred Alternative land use plan provides for the orderly development of EPG. It also allows for the consolidation of current Professional/Institutional uses on North Post with new Professional/Institutional uses along the south side of Abbott Road. As this occurs, the Troop area would relocate to South Post to an area near several community services, creating convenience for personnel permanently assigned to the installation. Re-designation of the South Post golf course from Outdoor Recreation to Professional/Institutional would allow siting of the new hospital; its easy accessibility would benefit numerous outpatients and visitors. While the Environmentally Sensitive land use category would not be carried forth to the revised land use plan, the regulatory requirements protecting high-value resources would remain in effect.

The proposed land use designations simplify and consolidate the existing (1993) land use categories in that they recognize broader actual compatibility between adjacent land uses on the installation. The more broadly defined categories provide Army planners at Fort Belvoir with greater flexibility for future development without having to grapple with compatibility.

The Preferred Alternative land use plan would result in more than 2,000 acres of the post's 8,300 acres available for Professional/Institutional uses. This amount of acreage would allow for development densities that would be consistent with the post's current landscape. Lands designated for Airfield use would nearly double, with land to the east of the flight line being added to that category. Similarly, lands allocated to Residential uses would nearly double in acreage. The Preferred Alternative land use plan increases the post's available acreage for development by approximately 800 acres.

Designation of the northwest corner of EPG as Professional/Institutional would mean that the Army intends to retain this parcel in lieu of transferring it to Fairfax County.

Off-post effects of the Preferred Alternative land use plan would be negligible. The proposed plan would not contravene local planning efforts. In the event access to EPG were to be made possible by creation of a transportation corridor along Neuman Street, approximately 19

residences and one former commercial property (now used as a church) would be changed from their current designations. This would be an indirect effect of adopting the Preferred Alternative land use plan.

4.2.2.2 BRAC Implementation and Facilities Projects

Long-term minor beneficial and adverse effects would be expected. Construction to support BRAC realignment actions would create moderately dense development chiefly in two locations, EPG and South Post. The development of EPG would be new, occurring in an area that historically has not been developed to any substantial degree. Despite the density of development at EPG, in light of the set-back provisions and buffering, the new land uses at EPG would be compatible with adjacent uses (residential to the north and west and industrial and commercial to the east and south). Development of South Post would occur in areas that are already moderately developed. The density of development on South Post would rise, creating noticeable zones for administrative facilities, community facilities, and residential neighborhoods. The separation of these land uses would be sufficient to avoid incompatibilities between adjacent uses.

Implementation of BRAC would hold two major consequences with respect to land use. First, total existing development, new construction, and renovated floor area on Fort Belvoir would grow from nearly 11 million square feet to approximately 16 million square feet. New parking space would add another 7 million square feet, primarily in structured parking. About two-thirds of the new development would occur at EPG for NGA and WHS. Second, development density on South Post would rise. At both EPG and South Post, new development and renovations would, with minor exception (e.g. minor wetlands), take into consideration areas currently identified for environmental preservation and conservation.

Within the inner horizontal surface safety zone around Davison Army Airfield, building heights would remain restricted to a height of 150 feet above the elevation of the runway (approximately 50 feet). Therefore, within a 7,500-foot oval from the edge of the runway, building elevations would be restricted to less than 200 feet above mean sea level (msl). Portions of both the Main Post and EPG lie within the 150-foot height building restriction. If the airfield continues normal, fixed-wing and rotary flight operations as would be expected with the Preferred Alternative, the height and proximity restrictions may not be diminished with the incoming construction program.

Table 4.2-2 summarizes the potential land use consequences associated with build-out of the Preferred Alternative for the largest BRAC facilities projects. The remaining BRAC projects would not result in effects to land use because they are very small projects that would occur within areas that are compatible with neighboring land uses, or they involve modest renovations to existing structures.

4.2.2.3 BMPs/Mitigation

No specific land use BMPs or mitigation measures would be required under the Preferred Alternative.

Use of EPG as the principal location for siting of BRAC-related facilities would alleviate traffic problems and relieve some of the operational land use and environmental constraint pressures on the Main Post (e.g., those possibly arising in connection with DAAF building height restrictions). This, however, is true only if the Fairfax County Parkway extension is built prior to implementation of the Preferred Alternative (see Section 4.3, Transportation).

Table 4.2-2
Land use effects of the largest BRAC projects under the Preferred Alternative

Project/ location	Gross square feet (gsf)	Land use	On-site personnel	Potential effects
NGA EPG	2,419,000	Professional/ Institutional	8,500	– Separation from garrison security forces (potential effects to AT/FP)) – Compatible with adjacent land uses – Reduction of open space – Addition of 5,100 structured parking spaces – Supports key realignment mission
WHS EPG	2,219,000	Professional/ Institutional	9,263	– Separation from garrison security forces (potential effects to AT/FP) – Compatible with adjacent land uses – Reduction of open space – Addition of 5,600 structured parking spaces – Supports key realignment mission
Hospital South Post golf course	868,800	Professional/ Institutional	2,069	– Moderate loss of open space – Location accessible to users – Supports key realignment mission – Loss of recreational facility and reduction of NAF generated revenues
PEO EIS South Post	447,400	Professional/ Institutional	849	– Moderate loss of open space – Supports key realignment mission
Army Lease South Post (AMC site)	230,000	Professional/ Institutional	~1,300	– No changes to land use – Beneficial renovation and use of existing offices
Army Lease South Post (Buildings in 200 Area)	133,000	Professional/ Institutional	~750	– No effects to land use – Beneficial use of existing office space
MDA South Post	107,000	Professional/ Institutional	290	– Minor loss of open space – Loss of recreational area (ball fields) – Supports key realignment mission

4.2.3 ENVIRONMENTAL CONSEQUENCES OF THE TOWN CENTER ALTERNATIVE

The Town Center Alternative would provide for areas that would enable development just north and south of Route 1. The total acreage gained (about 800 acres) in the Professional/Institutional land use category would be identical to that of the Preferred Alternative land use plan, with very little difference in areas for other land use categories.

4.2.3.1 Land Use Plan Update

Long-term minor beneficial effects would be expected. As in the case of the Preferred Alternative land use plan, the Town Center Alternative land use plan aggregates land use categories in a way that reflects and supports the evolution in Fort Belvoir's mission.

The Town Center Alternative land use plan would designate 1,811 acres for Professional/ Institutional uses. While this is the least amount of acreage for Professional/Institutional uses

among the four land use plan alternatives, it represents an increase of 650 acres over what the current land use plan provides for similar types of uses.

The Town Center Alternative land use plan would highly centralize the post's administrative facilities. This would provide advantages for both current and future requirements in that Professional/Institutional uses would be collocated in a core area of the post, leaving other land uses at the post's periphery. As a result, residential and community uses would be physically separated, reducing the potential for potentially incompatible adjacent uses.

Off-post effects of the Town Center Alternative land use plan would be negligible. The proposed plan would not contravene local planning efforts.

4.2.3.2 BRAC Implementation and Facilities Projects

Long-term minor beneficial and adverse effects would be expected. Implementation of the Town Center Alternative would result in loss of community areas and open space in the heart of the North Post. The Town Center Alternative would cluster most major BRAC construction projects on the North and South Posts just north and south of Route 1 (see Figure 3-2). Under present land use planning, 11 of the 24 BRAC and other facilities projects would be on about 88 acres of what is now recreational and open space. The Town Center Alternative would convert the Outdoor Recreation (e.g., South Post golf course) and open space areas to Community and Professional/Institutional uses.

The Town Center Alternative provides for the relocation of the Troop Area on North Post to what is now an industrial and supply/storage area on South Post along Gunston Road. The present North Post barracks can house 1,200 Soldiers. The South Post location would be re-designated as a Troop Area land use. The proposed plan would change the Troop Area on North Post to Professional/Institutional uses. In both areas, the relocation would be compatible with existing surrounding land uses.

EPG, Davison Army Airfield, and the North Post golf course would remain undeveloped and available for future growth after 2011.

Table 4.2-3 summarizes the potential land use consequences associated with build-out of the Preferred Alternative for the largest BRAC facilities projects. The remaining BRAC projects would not result in effects to land use because they are very small projects that would occur within areas that are compatible with neighboring land uses, or they involve modest renovations to existing structures.

4.2.3.3 BMPs/Mitigation

No specific BMPs or mitigation measures would be required under the Town Center Alternative.

4.2.4 ENVIRONMENTAL CONSEQUENCES OF THE CITY CENTER ALTERNATIVE

The City Center Alternative would provide designate EPG and the GSA site for Professional/ Institutional uses. Nearly all BRAC-related development would occur at those two locations. Only renovations, additions, and minor new construction would occur on the Main Post.

Table 4.2-3
Land use effects of the largest BRAC projects under the Town Center Alternative

Project/ location	Gross square feet (gsf)	Land use	On-site personnel	Potential effects
NGA South Post	2,419,000	Professional/ Institutional	8,500	– Compatible with adjacent land uses – Addition of 5,100 structured parking spaces – Supports key realignment mission
WHS/ South Post	2,219,000	Professional/ Institutional	9,263	– Compatible with proposed adjacent land uses – Density pressures on child care and and adjacent residential areas (Troop Area) – Addition of 5,500 structured parking spaces – Supports key realignment mission
Hospital North Post	868,800	Professional/ Institutional	2,069	– Loss of open space – Supports key realignment mission – Location reduces ease of visitor access
PEO EIS North Post	447,800	Professional/ Institutional	849	– Compatible with adjacent land uses – Minor loss of open space – Supports key realignment mission
Army Lease South Post (AMC site)	230,000	Professional/ Institutional	~1,300	– No effects – Beneficial renovation and use of existing office space
Army Lease South Post Buildings in 200 Area)	133,000	Professional/ Institutional	~ 750	– No effects – Beneficial renovation and use of existing office space
MDA North Post	107,000	Professional/ Institutional	290	– Exposed location for a high-security facility – Minor loss of open space – Supports key realignment mission

4.2.4.1 Land Use Plan Update

Long-term minor beneficial effects would be expected. The City Center Alternative land use plan would designate EPG and the GSA Parcel for Professional/Institutional uses, resulting in there being more than 2,100 acres available in this category. This allocation would enable ample support for current and future requirements for administrative space. This alternative would also more than double the amount of land designated for residential use, inviting future residential development on-post, thereby potentially reducing commuting by Soldiers.

Off-post effects of the City Center Alternative land use plan could be moderate. The county's Comprehensive Plan calls for mixed-use development of the GSA Parcel. Army development of the site for Professional/Institutional uses would not meet this goal directly, but neither would it contravene local planning efforts. Subsequent high density development of EPG and the GSA Parcel might lead the county to limit or reduce the density of other development projects in the vicinity of those locations. Also, in the event access to EPG were to be made possible by creation of a transportation corridor along Neuman Street, approximately 19 residences and one former

commercial property (now used as a church) would be changed from their current designations. This would be an indirect effect of adopting the City Center Alternative land use plan.

4.2.4.2 BRAC Implementation and Facilities Projects

Long-term minor adverse effects would be expected. Development of the EPG and GSA site for all but a small portion of the inbound units, agencies, and activities would result in unusually high floor area ratios at both locations. As with other EPG development scenarios, the amount of acreage at EPG available for development would be reduced by land set aside for completion of the Fairfax County Parkway, protection of Accotink Creek, other protected resources (e.g., scattered wetlands), and perimeter buffers. Footprints for parking structures, access roads, and utilities corridors and infrastructure would further reduce the amount of usable land, possibly resulting in a floor area ratio in excess of 0.50.

The City Center Alternative would co-locate NGA, a portion of Army Lease, MEDCOM, PEO EIS, MDA, and associated parking structures at EPG. While all of these activities qualify for placement within the Professional/Institutional land use category, the propriety of their proximity to one another is not optimal. Security requirements for NGA and MDA require considerable building setback distances and buffering from adjacent uses. Moreover, traffic in the vicinity of NGA and MDA should be kept to a minimum to thwart observation of the agency's personnel and activities. Siting of Army Lease, PEO EIS, and the hospital on EPG with NGA and MDA could produce incompatibilities among the tenants.

Development of the 70-acre GSA Parcel for more than 9,200 personnel would result in a densely-built site. Six-story parking structures for 6,000 vehicles would require not less than 8 acres. Notionally, three buildings each having 9 stories, with each floor being 100,000 square feet, could be furnished while ensuring adequate set-back distance for AT/FP purposes. The floor area ratio at the GSA site would likely exceed 0.70. As at the EPG site, however, this would be a development density out of proportion with surrounding uses.

Locating more than 9,200 WHS personnel at the GSA Parcel on Loisdale Road would pose substantial indirect impacts to the transportation system, as access to the site is very limited. Although seemingly close to the Springfield-Franconia Metro station, WHS employees and visitors would have to walk at least half a mile to reach the GSA Parcel. In the event only a portion of WHS were to be located at the GSA Parcel, the remainder would be assigned to facilities either at EPG or Main Post. The additional WHS personnel at EPG would only exacerbate the "mixture" of functions at EPG.

In the short- to mid-term, use of the GSA Parcel would be delayed while GSA arranged for closure and turnover of the site. The GSA would have to locate and obtain use of a new parcel of approximately the same size, build new facilities, relocate functions, and demolish its existing facilities prior to acceptance by the Army of control of the property. These actions likely could not be taken in time for the Army to meet its statutory deadline of September 2011 for completion of BRAC realignment actions. Delays by GSA in vacating its site would delay all Army planning for the site, likely resulting in units, agencies, and activities slated to move from leased space in Northern Virginia having to remain in place for indeterminate periods. This would produce turmoil for landlords, since they would find it difficult to implement capital improvements prior to leasing to new tenants.

Despite the expected increased use of mass transit, it is anticipated that there would be an increase in traffic congestion due to limited access points. For both the EPG and GSA Parcel, the

major drawback would be the concentration of vehicular traffic and the significant effects on the transportation system. In this regard, traffic congestion would be a direct effect of development under the City Center Alternative.

Table 4.2-4 summarizes the potential land use consequences associated with build-out of the City Center Alternative, with the clear majority of the BRAC actions on EPG and the GSA Parcel. The other on-post BRAC projects would not contribute to adverse land use consequences because they are small projects that are compatible with neighboring land uses, or they involve renovations to existing structures.

Table 4.2-4
Land use effects of the largest BRAC projects under the City Center Alternative

Project/ location	Gross square feet (gsf)	Land use	On-site personnel	Potential consequences
NGA EPG	2,419,000	Professional/ Institutional	8,500	– Separation from garrison security forces (potential effects to AT/FP) – Likely incompatibilities with adjacent tenants – Reduction of open space at EPG – Addition of 5,100 structured parking spaces – Supports key realignment mission
WHS GSA Parcel	2,219,000	Professional/ Institutional	9,263	– Use would required additional legislation – Potential AT/FP security risk (access point limitations) – Disproportionate development density to adjacent uses – Poor site access – Required parking difficult to accommodate on site – Not responsive to key realignment mission – Land use compatible with adjacent properties
Hospital EPG	868,800	Professional/ Institutional	2,069	– Major community benefits (access) – Reduction of open space at EPG – Supports key realignment mission
PEO EIS EPG	447,800	Professional/ Institutional	849	– Supports key realignment mission
Army Lease South Post (AMC site)	230,000	Professional/ Institutional	~1,300	– No changes to land use – Beneficial renovation and use of existing office space
Army Lease South Post (Buildings in 200 Area)	133,000	Professional/ Institutional	~750	– No effects – Beneficial renovation and use of existing office space
MDA EPG	107,000	Professional/ Institutional	290	– Loss of open space – Supports key realignment mission

4.2.4.3 BMPs/Mitigation

No specific BMPs or mitigation measures would be required under the City Center Alternative.

4.2.5 ENVIRONMENTAL CONSEQUENCES OF THE SATELLITE CAMPUSES ALTERNATIVE

This Alternative would maximize designation of the post's lands for Professional/Institutional and Community uses. The airfield would no longer be operational. The Satellite Campuses Alternative land use plan differs from the Preferred Alternative land use plan in that it would convert Airfield land to Professional/Institutional and provide a larger area designated Professional/Institutional on the North Post.

4.2.5.1 Land Use Plan Update

Long-term minor beneficial and adverse effects would be expected. The Satellite Campuses land use plan would convert Davidson Army Airfield to Professional/Institutional uses. This change would result in the elimination of an active airfield from the Army's inventory. Aviation activities at DAAF would have to be relocated, resulting in higher operational tempos and noise levels at the receiving location(s).

Closure and decommissioning of DAAF would affect on and off-post development by removing current building height restrictions that might otherwise constrain future property development. Other off-post effects of the Satellite Campuses land use plan would be negligible. The proposed plan would not contravene local planning efforts.

4.2.5.2 BRAC Implementation and Facilities Projects

Long-term significant adverse effects would be expected. Conversion of DAAF to Professional/Institutional uses would require the relocation of aviation activities from Fort Belvoir. Potential receiving sites have not been examined. Replication of an Army airfield would be expensive. The lack of suitable undeveloped lands in northern Virginia would force any new air facility to be farther away from the Pentagon that DAAF is.

Implementation of the Satellite Campuses Alternative would result in loss of open space on the North Post. One of the two North Post golf courses would be displaced by the Army Medical Command complex. The proposed location of the new hospital, in an area designated for Community use, would be compatible with surrounding uses. The proposed location of the PEO EIS administrative complex would also result in the loss of open space, a public amenity.

The Satellite Campuses Alternative provides for the relocation of the North Post Troop Area to an industrial and supply/storage area on South Post along Gunston Road. The present North Post barracks can house 1,200 Soldiers. The South Post location would be re-designated for Troop use. The proposed plan would change the Troop Area on North Post to Professional/Institutional uses. This relocation would be compatible with existing surrounding land uses.

Table 4.2-5 summarizes the potential land use consequences associated with build-out of the major projects of the Satellite Campuses plan. The remaining BRAC projects are typically smaller in scale and would be compatible with neighboring land uses or involve modest renovations to existing structures.

4.2.5.3 BMPs/Mitigation

No specific BMPs or mitigation measures would be required under the Satellite Campuses Alternative.

Table 4.2-5
Land use effects of the largest BRAC projects under the Satellite Campuses Alternative

Project/location	Gross square feet (gsf)	Land use	On-site personnel	Potential consequences
NGA DAAF	2,419,000	Professional/ Institutional	8,500	– Loss of air operations capabilities – Supports key realignment mission
WHS North Post	2,219,000	Professional/ Institutional	9,263	– Compatible with adjacent land uses – Supports key realignment mission
Hospital North Post golf course	868,800	Professional/ Institutional	2,069	– Substantial loss of outdoor recreation – Supports key realignment mission – Loss of NAF revenue – Hospital activities compatible with Community land use designation
PEO EIS North Post	447,800	Professional/ Institutional	849	– Compatible with adjacent land uses – Loss of open space – Supports key realignment mission
Army Lease South Post (AMC site)	230,000	Professional/ Institutional	~1,300	– No effects – Beneficial renovation and use of existing office space
Army Lease South Post (Buildings in 200 Area)	133,000	Professional/ Institutional	~750	– No effects – Beneficial renovation and use of existing office space
MDA North Post	107,000	Professional/ Institutional	290	– Compatible land use – Supports key realignment mission

4.2.6 ENVIRONMENTAL CONSEQUENCES OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the current land use plan (1993, as amended in 2002) would remain in effect. There would be no new (i.e., previously unplanned) construction or development on the scale of the proposed BRAC program at Fort Belvoir in either the short- or the long-term and existing land uses would continue unchanged. Therefore, the No Action Alternative would have no effects on land use at Fort Belvoir because there is adequate developable land for incremental facilities expansion or renovation on existing building sites. For the same reason, the No Action Alternative would have no net additional effect on land use in the vicinity of the Post. There are areas on-post designated for development under the 1993 plan as amended that have not yet moved toward implementation phases. Thus, the No Action Alternative does not preclude previously approved additional construction, including certain discretionary relocations not necessitated by BRAC.

4.2.7 SUMMARY OF COMPARISON OF ALTERNATIVES

Table 4.2-6 compares the acreages of land use designations for the 1993 land use plan and the four alternatives. The four alternative land use plans all provide substantially more areas for Professional/Institutional uses than were available for similar uses under the 1993 plan.

Table 4.2-6
Comparison of land use category acreages between the 1993 land use plan and the proposed land use plan

1993 land use plan Designation	Proposed land use plan designation	1993 acreage	Preferred Alternative[a]	Town Center Alternative[a]	City Center Alternative	Satellite Campuses Alternative[a]
Administrative & Education		724	0	0	0	0
Research & Development		340	0	0	0	0
Medical		97	0	0	0	0
	Professional/ Institutional	0	2,132	2,242	2,125	2,874
Airfield		391	0	0	0	0
	Airfield	0	697	690	700	0
Community Facilities		452	0	0	0	0
Outdoor Recreation		1,006	0	0	0	0
Environmentally Sensitive		3,063	0	0	0	0
	Community	0	2,950	2,652	2,806	2,712
Family Housing		576	0	0	0	0
	Residential	0	1,116	1,315	1,316	1,298
Industrial		126	0	0	0	0
Supply, Storage, & Maintenance		378	0	0	0	0
	Industrial	0	213	212	219	257
Training Ranges		462	0	0	0	0
	Training	0	1,287	1,280	1,282	1,282
Troop Housing		72	0	0	0	0
	Troop		101	106	116	73
Total		**7,687**	**8,508**	**8,497**	**8,564**	**8,496**

[a] All proposed land use designation acreages were calculated in GIS, and there are minor differences in the totals due to digitizing.

In all four land use plans, the EPG would be re-designated for Professional/Institutional uses. Under current proposals, development would occur at EPG, however, only under the Preferred Alternative and City Center Alternative. As a result, implementation of BRAC and other facilities projects under the Town Center and Satellite Campuses Alternatives would not distribute new development across all of Fort Belvoir's land resources. In these latter two alternatives, usable land would await future initiatives for development at Fort Belvoir.

Adoption of an updated land use plan and implementation of BRAC would produce a variety of long-term effects, both minor and significant and both beneficial and adverse. Table 4.2-7 summarizes the effects identified in the preceding discussions.

Table 4.2-7
Summary of impacts to land use

Alternative	Land use plan adoption	BRAC implementation
Preferred Alternative	Long-term	Long-term
	Minor	Minor
	Beneficial	Beneficial and adverse
Town Center Alternative	Long-term	Long-term
	Minor	Minor
	Beneficial	Beneficial and adverse
City Center Alternative	Long-term	Long-term
	Minor	Minor
	Beneficial	Adverse
Satellite Campuses Alternative	Long-term	Long-term
	Minor	Significant
	Beneficial and adverse	Adverse

4.3 TRANSPORTATION

This section describes existing transportation systems as they relate to Fort Belvoir, EPG, and the GSA Parcel. Each subsystem is addressed from both a regional and local perspective. Furthermore, this section presents the expected conditions and consequences of transportation under each of the alternatives.

4.3.1 TRANSPORTATION STUDIES

The Congressional Directive regarding the BRAC action and its associated impacts requires that the transportation system be studied to determine the impacts that would be expected due to the BRAC action, to identify projects that would mitigate and off-set those impacts, and to quantify the needs for new transportation infrastructure.

4.3.1.1 Congressional Directive

In the Conference Report on the National Defense Authorization Act for Fiscal Year 2007, the conferees identified the following Items of Special Interest:

> "Impact of 2005 Defense Base Closure and Realignment decisions to the transportation infrastructure in Northern Virginia.
>
> "The conferees note that the decisions of the 2005 Defense Base Closure and Realignment (BRAC) round will have a significant impact on the transportation infrastructure and national highway system in Northern Virginia supporting Fort Belvoir and Marine Corps Base Quantico. These effects, if not studied and addressed through a long-term investment strategy, have the potential to adversely affect timely access to these two critical military installations, as well as the quality of life for military members and their families on the installations and in the local communities.
>
> "The conferees acknowledge that the Department of the Army is currently studying the impact to the environment resulting from relocation of functions and personnel to Fort Belvoir and the former Engineering Proving Grounds in Fairfax County, Virginia.
>
> "The conferees direct the Secretary of the Army to work with appropriate Federal, Commonwealth, and local agencies to ensure the draft and final environmental impact statements address the following factors:
>
> (1)a description of the demographic, population, and other planning assumptions used to determine traffic infrastructure requirements;
>
> (2)an analysis of the direct and indirect impact to the transportation infrastructure resulting from the BRAC decisions;
>
> (3)a description of the standards and methodologies for the traffic impact studies contained in the study; and
>
> (4)an assessment of specific traffic infrastructure improvements and new construction projects identified to mitigate the effects of the increase of personnel, and estimates of the costs to carry out the projects."

The procedures and methodologies for transportation analyses in this EIS conform to the preceding congressional directive. Cost estimates for transportation facilities improvements typically are not available until the 30 percent engineering design stage; however, they are provided even though the 30 percent design stage has not been reached. These estimates will be subject to refinement as the planning process moves forward. At present, the cost estimates are believed to be within an order-of-magnitude of ultimate costs, though caution must be exercised when referring to them. The order-of-magnitude costs (term used for preliminary estimated cost) have been developed from comparisons to similar projects. There have been no quantities take-offs (technical term of developing estimates of the amount of material needed, i.e. *XX tons of asphalt*), no assessments of existing utilities, and no surveys performed, all of which are needed to provide a more reliable cost estimate.

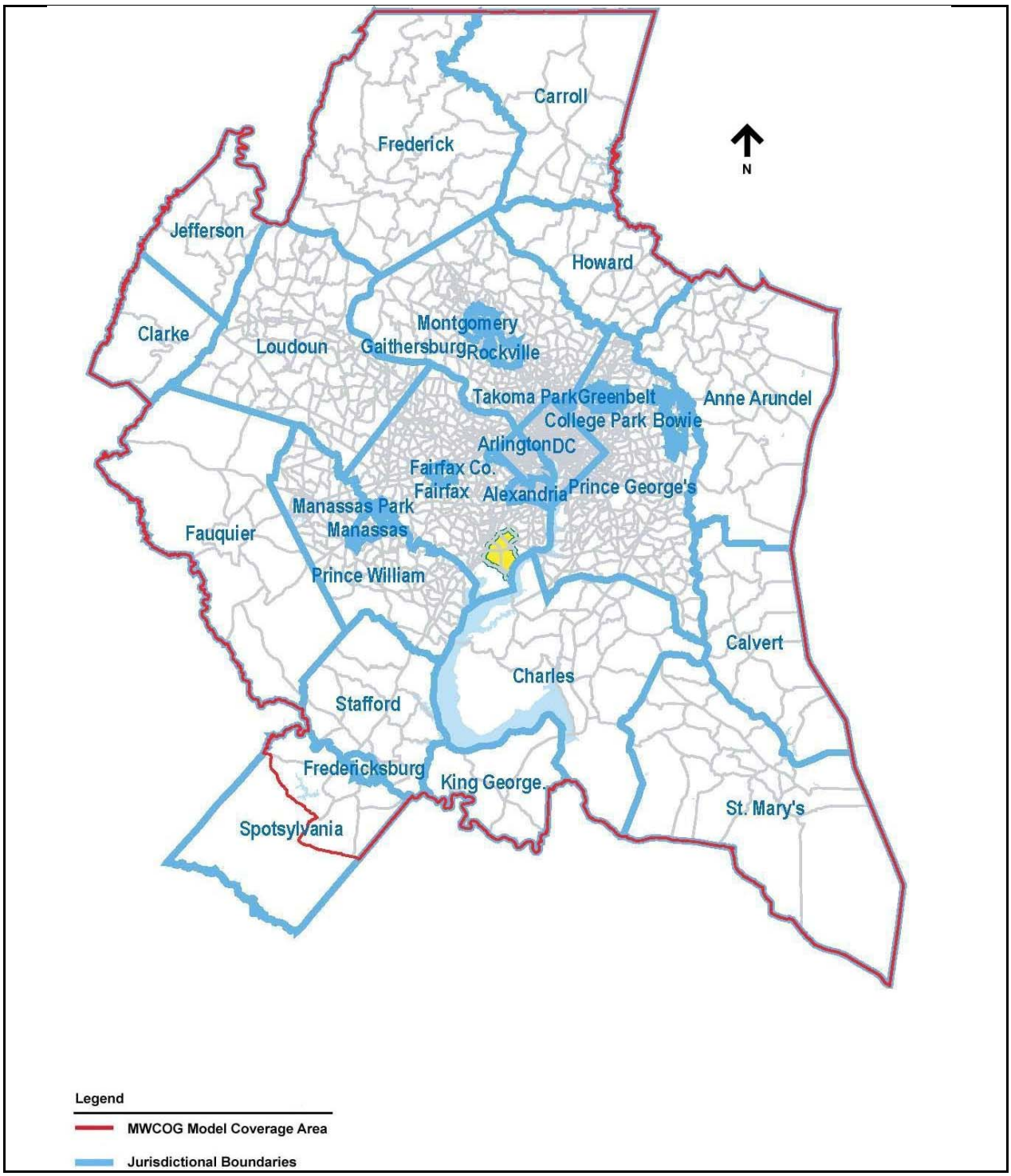
4.3.1.2 Transportation Analyses and Design

As part of the transportation analysis for BRAC implementation, traffic operations studies are ongoing in support of the planning and design of infrastructure (including transportation systems) and facilities. Information from these activities provides the basis for the transportation analysis for this EIS. These studies will continue throughout the planning and design phase; therefore, more detail will become available as they progress. At this point, the studies have been taken to a level of detail sufficient for an EIS, thereby allowing for the assessment of the transportation systems and the identification of potential mitigating actions.

The transportation studies referred to in this EIS used the regional travel demand model maintained by the Metropolitan Washington Council of Governments (MWCOG). The model, encompassing the greater metropolitan Washington area, reaches as far as Fredericksburg and portions of Spotsylvania County to the south; Anne Arundel, Calvert, and St. Mary's Counties to the east; Fauquier, Clarke, and Jefferson Counties to the west; and Frederick, Carroll, and Howard Counties to the north, as was illustrated in Figure 4.3-1. Figure 4.3-2 presents the detail of the model within the study area, showing roadway links, zones, and zone connectors. Post–processing of the travel demand forecasts follows the standard procedures outlined in the National Cooperative Highway Research Program Circular 255 (Pedersen, 1982).

Smaller, routine traffic impact studies use traffic forecasts that are derived by simply adding the trips to and from a site to existing traffic and then allowing for annual traffic growth. This approach tends to overestimate the effect on streets in the immediate area and underestimate the effect on the transportation system as a whole. Larger projects such as the BRAC action require the more sophisticated approach of travel demand models, as these models are more appropriate to assess larger projects that have greater and more far-reaching effects. When significant numbers of new jobs or housing are placed in an area, a complex series of changes occurs, including the relocation of households, changes in work locations, and changes in travel routes to and from current destinations. A travel demand model accounts for all these relationships and forecasts the net change in traffic on each facility.

The traffic forecasts developed using the regional travel demand model are used to support the current planning level of analysis. In addition, as design progresses, these forecasts will be used to conduct operational analyses according to the procedures outlined in the Highway Capacity Manual (TRB, 2000) and through the use of traffic simulation models. Detailed operational analyses of any proposed mitigating actions will be conducted as design development permits to support studies required by VDOT and FHWA. Typically, these studies are completed following the completion of an EIS; however, because of the project timelines, some of the studies are being



MWCOG Regional Model Coverage Area

Fort Belvoir, Virginia

Figure 4.3-1

LEGEND

- Zone Boundaries
- Roadway Links
- Study Area
- Zone Connections
- Zone Centroid

MWCOG Model Roadway Network within the Study Area

Fort Belvoir, Virginia
Figure 4.3-2

overlapped with the EIS. The results of the more detailed analyses for many of the key mitigation projects will be provided to the public as part of the on-going outreach program. The Army will cooperate with participating agencies to develop designs.

To assess the effects on the transportation systems and identify mitigating actions, travel demand has been projected and performance has been evaluated for the following land use scenarios:

- Existing Conditions
- No Action Alternative
- Preferred Land Use Alternative
- Town Center Land Use Alternative
- City Center Land Use Alternative
- Satellite Campuses Land Use Alternative

The analyses completed for the No Action Alternative and the four Land Use Alternatives use the year 2011 as the baseline analysis year, as that is the requirement of the reviewing transportation agencies. Further subsections of this Transportation section will document the existing conditions, the conditions in 2011 if the BRAC action did not occur (the No Action Alternative), and the 2011 conditions for each of the four Land Use Alternatives. The BRAC action would require mitigation strategies to ensure that the impacts due to the BRAC action are mitigated, so that the roadway improvements would provide at least the same level of operation, if not better, than the conditions expected if the BRAC action did not occur.

Analysis in this section uses multiple perspectives—it begins with the broader regional context, moves to narrower views of the sub regional area around Fort Belvoir, and then it ends with conditions in the immediate vicinity of the Main Post and EPG. That is, for each land use alternative, the effects on local and regional travel patterns is examined through the use of screen lines (natural or man-made barriers and/or imaginary lines used to divide a study area into large sections; examples of barriers include a river, a stream, or a railroad track) and cordons (imaginary closed loop defined within a study area, used to tally total inbound and outbound trips) to determine the change in travel demand from one area to another. Representative locations along major traffic routes have been identified throughout the study area to measure the effect of the proposed action on traffic volumes. Finally, key intersections (intersections of secondary and primary roads that are approaching capacity) surrounding both the Main Post and EPG have been analyzed under each scenario. In areas such as Northern Virginia where traffic congestion typically lasts for several hours, it is necessary to examine additional criteria at key locations, such as hours of congestion, delay, and travel times to gain a complete understanding of the effect. For the four action alternatives, potential mitigating actions have been considered as well.

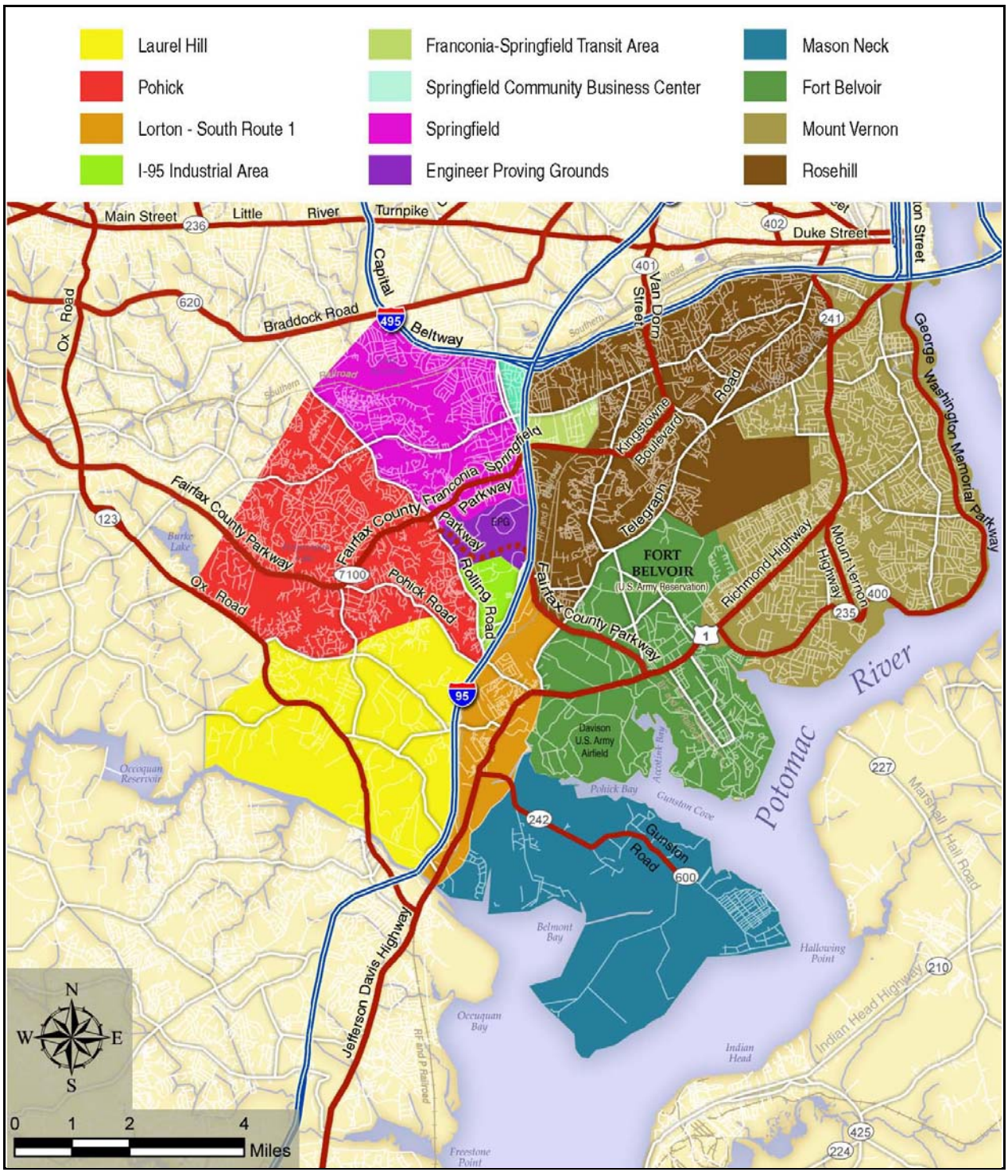
4.3.1.3 Travel Demand Modeling Approach

Scoping in connection with this EIS exposed concerns regarding the travel demand modeling approach and the assumptions that would be used during the modeling process. In response to these concerns, the analytical approach and assumptions were developed in conjunction with Fairfax County and VDOT staff. The interpretation and use of the modeling results is solely the responsibility of the EIS preparers. The basic procedures and assumptions were as follows:

- Used MWCOG regional travel demand model and Round 7 Cooperative Land Use Forecast (revised).
- Figure 4.3-3 shows the study area and the 12 reporting districts within the study area used for the ongoing traffic studies. Within the Main Post and east of I-95, the zone structure as defined by MWCOG was used. For EPG, one zone was used. Entry links and zone connectors to EPG and the Main Post were modified so that only trips originating from or destined to those locations could use the links. Roadway links within the study area were reviewed, and adjustments were made to the number of lanes or roadway capacities so that model assumptions reflected actual conditions.
- Trip generation rates were developed for EPG and the Main Post using data provided by the various agencies. Off-post, MWCOG's trip generation rates were used unless alternate data were provided by Fairfax County or adjustments (based on professional judgment and the use of the Institute of Transportation Engineers (ITE) Trip Generation Manual as a reference) were required to achieve a reasonable validation.
- Trip distribution was developed using the available survey and employee data combined with MWCOG distributions. For 2011, it was assumed that 50 percent of the civilian employee population would maintain its current residential locations and 50 percent would relocate in a pattern typical of the current Fort Belvoir distribution. Military employees would be expected to continue their bias toward the I-95 corridor to the south. These distributions were developed in consensus with VDOT and Fairfax County, realizing that through attrition and new hires, that the distribution of incoming employees would follow the existing distribution that favors the south.
- The sensitivity of road improvements and access design to changes in employee distribution was tested by manually applying a plus-or-minus 15 percent range to forecast volumes.
- Model runs (described further within this section) were completed for existing conditions, the 2011 No Action Alternative and the Preferred, Town Center, City Center, and Satellite Campuses Land Use Alternatives.

The need for additional transportation system improvements can be assessed based on the model runs using the above procedures and assumptions. The study area (see Figure 4.3-3) was defined such that it captured the area around the Main Post, EPG, and GSA Parcel to assess traffic flows to and from the sites and to allow for the assessment of effects on adjacent facilities. To delineate an area in which the influence could be distinctly measured across roadways, screen lines were set on physical boundaries that had limited roadways crossing them. To the west, a screen line was set just west of Route 123, as limited roadways cross this area. The Capital Beltway (I-495) and the rail line forms a physical barrier to the north, because there are limited crossing points over those facilities. To the south, the Occoquan River forms a natural barrier to the study area, because access from that direction is limited to four bridge crossings. The Potomac River forms the eastern boundary to the study area.

Estimating traffic effects of any proposed development could produce considerable technical debate and strong opinion within the transportation planners' professional community. Most cities and all the country's major Metropolitan Planning Organizations (MPO) maintain a regional travel demand model that is certified by EPA for estimating the effect on air quality, and so on. These models are based on what is known as the four-step process involving Trip Generation, Trip Distribution, Mode Share, and Assignment. These four steps are described further below.



LEGEND

- Interstate Highway
- Highway
- River/ Water

Reporting Districts within the Study Area

Fort Belvoir, Virginia

Figure 4.3-3

- *Trip Generation.* Trip generation accounts for movements between origins and destinations. The MWCOG model has more than 2,100 traffic analysis zones (TAZ) and includes the major roadway network in the region. Each TAZ is assigned population and employment in several categories. Population is described in terms of households (e.g., single family, multifamily). Employment is described by employment type (e.g. office, retail, industrial). Within each zone, productions and attractions are generated based on typical behavior; population creates productions and employment creates attractions. Each trip requires a production and an attraction.
- *Trip Distribution.* Productions and attractions are balanced (matched) based on distribution patterns that have been observed in the region (ZIP Code surveys and other travel data) and other factors such as travel times, average trip length, income, and so on. This information is based on periodic surveys conducted by MWCOG and 2000 census data from the Census Transportation Planning Package, and the data is uploaded into the model and maintained by MWCOG (MWCOG, 2004a). For large developments, focused surveys such as the ZIP Code information provided were used to adjust the distribution. The model has a *control total* for population and employment for each year modeled (normally 5-year increments) because the total population and employment for the region is much more predictable than individual TAZs. Control totals are also established for each jurisdiction. These control totals must be maintained; otherwise, results for projects throughout the region would not be consistent and would overestimate or underestimate effects.
- *Mode Share.* Mode share, also referred to as mode split, is a person's choice of mode of travel. A person can travel by automobile or by transit, or can walk or bike. The automobile trip is carried out in one of two ways: either as a single occupancy vehicle (SOV) or high occupancy vehicle (HOV). In the Metropolitan Washington area, the type of HOV trip depends on the corridor because the I-95/I-395 facility requires a minimum of three persons per vehicle, while most facilities require only at least two people. Transit trips are made by bus or by train. The latter includes commuter trains or the Metro train. The MWCOG model calculates mode share for each TAZ on the basis of demand, availability of service, and travel time.
- *Assignment.* After the trip generation, distribution, and mode share steps are completed, the model assigns vehicle trips onto the roadway network. The trips are assigned on the minimum path with capacity constraints (i.e., the trips are distributed on the links on the basis of their origins or destinations until each link reaches capacity. Vehicle trips are loaded in an iterative manner to allow travel times to be recalculated to reflect congestion. As the most direct route becomes congested, vehicles are redirected to longer routes and the demand is balanced across the alternate routes available. This process plays a critical role in the way traffic changes created by the proposed action were analyzed. As traffic increases because of the new employment, people who used those routes to make their trip might divert to other routes to avoid congestion. The diversion of trips to alternate routes reduces the magnitude of the net increase in traffic on facilities adjacent to Fort Belvoir; however, it could increase the trips on other facilities in the transportation system.

The Army's proposed action involves the net relocation of approximately 22,000 jobs within the region, not the creation of new jobs. Alternate methods to account for the reduced number of jobs elsewhere were considered; after consultation with VDOT and Fairfax County, the following methodology was adopted. In the MWCOG model, when jobs in the region shift geographically, the model can identify the new site of those jobs and *control by production*" (as the total

population did not change) to maintain the attractions at a constant regional level. This approach simulates very small reductions in employment throughout the region to match the increase in jobs at Fort Belvoir. In Fort Belvoir's case, the jobs are changing location and, as a result, some residents might relocate as well. This change is factored into the model input by having 50 percent of the personnel follow the existing Fort Belvoir distribution of residential location, with the remaining 50 percent of employees following their existing residential locations. The assumption of this distribution is that through attrition, retiring, and hiring, new employees will tend to favor residential locations to the south, while existing employees that stay with their current agencies will not be inclined to move.

The results of the model runs using this approach show the effect on the transportation system to be substantial in the areas immediately surrounding Fort Belvoir. This traffic effect, however, decreases relatively quickly and accounts for less than 10 percent of the traffic flow within approximately 3 miles. In lay terms, what is happening is that when the people stop reporting to Crystal City, Reston, Bethesda, and so on, those offices are filled by other jobs and different people (productions) who report to work in those locations (attractions), and this occurrence draws trips away from the areas surrounding Fort Belvoir. The trips are rebalanced and the effect is not as great as might be perceived by some. This phenomenon is often described as the "bean bag effect." Adding more trips in the areas surrounding Fort Belvoir pushes trips out of the other areas; this effect is similar to sitting on a bean bag chair and changing its shape. The total volume of the bean bag (total regional trips) does not change, but the shape does (the matching of trips to productions and, thus, the choice of route for the trips).

4.3.2 AFFECTED ENVIRONMENT

This section documents existing conditions and travel patterns in the vicinity of Fort Belvoir's Main Post and EPG and the GSA Parcel. The transportation systems consist of the road network and transit system (comprising rail and bus services). Available capacity and performance of the transportation system indicate the conditions that commuters and travelers encounter.

4.3.2.1 Existing Regional Transportation Network

As shown in Figure 4.3-4, in the vicinity of Fort Belvoir, the following roadways serve as commuter routes, with I-95 and I-495 serving longer distance, non-commuter traffic as well:

- Interstate 95 (I-95)
- I-395 (Shirley Highway)
- I-495 (Capital Beltway)
- U.S. Route 1 (Richmond Highway)
- State Route 7100 (Fairfax County Parkway)
- State Route 235 (Mount Vernon Memorial Highway)
- State Route 611 (Telegraph Road)
- State Route 613 (Beulah Street/Van Dorn Street)
- State Route 641 (Pohick Road)
- State Route 642 (Lorton Road)
- George Washington Memorial Parkway

LEGEND

- Interstate Highway
- Highway
- Mass Transit Line
- River/ Water

Existing Regional Transportation Network

Fort Belvoir, Virginia

Figure 4.3-4

In addition to I-95 and the Fairfax County Parkway, the following regional roadways also serve EPG:

- State Route 7900 (Franconia-Springfield Parkway)
- State Route 617 (Backlick Road)
- State Route 638 (Rolling Road)

The interstate roadways, serving as major commuter routes to employment locations in Fairfax County, Alexandria, Arlington, and the Washington, DC core, provide access to land uses adjacent to the Main Post and EPG. They also provide for long distance truck and auto travel along the Eastern Seaboard's I-95 corridor.

4.3.2.2 Fort Belvoir Local Street Network

Figure 1-2 presented a detailed view of the roadways within approximately one mile of Fort Belvoir's two primary sites, the Main Post and EPG.

Main Post. The roadway system on Fort Belvoir's Main Post includes the following:

- John J. Kingman Road on North Post, which provides access from the Fairfax County Parkway to a number of sites, including the Andrew T. McNamara Headquarters Complex, Mosby Reserve Center, and Davison Army Airfield.
- Beulah Street, which provides access to the North Post from Telegraph Road.
- Gunston Road, which serves as the major north-south roadway connecting the North and South Posts and is the only connector that has a bridge across U.S. Route 1. Gunston Road crosses over U.S. Route 1 with no ramp connection to that facility, except on weekdays from 3:00 PM to 6:00 PM, when one ramp is open from northbound Gunston Road to northbound U.S. Route 1.
- Pohick Road, which provides access to the South Post from U.S. Route 1 via Tulley Gate. All visitors to Fort Belvoir must enter the post via Tulley Gate and be processed at the Post Visitor Center.
- Belvoir Road, which provides access to the South Post from U.S. Route 1 via Pence Gate.
- Mount Vernon Road, which provides access to South Post from Mount Vernon Memorial Highway via Walker Gate.
- 9th, 12th, 16th, 18th, 21st, and 23rd Streets, which provide for east-west movement on South Post and connect Gunston Road with Belvoir Road.

EPG. EPG can be entered via gates from Backlick Road and Rolling Road. There is minimal roadway circulation within the grounds itself. Barta Road provides entry from Backlick Road on the east side of EPG. Barta Road connects to Cissna Road, which crosses EPG from east to west; the bridge over Accotink Creek is presently not in service.

4.3.2.3 The Transit System

Three public agencies provide transit service to the Fort Belvoir area of Fairfax County. The Washington Metropolitan Area Transit Authority (WMATA) provides rail service (Metrorail) and bus service (Metrobus) throughout the Washington metropolitan area. Fairfax County's

Department of Transportation provides local bus service throughout the county, operated under the name of Fairfax Connector. Virginia Railway Express (VRE) provides commuter rail service into Washington from the Virginia suburbs to the south and southwest. In addition to these three public agencies, one private company, Lee Coaches, also provides commuter bus service to Fort Belvoir from the Fredericksburg/Stafford County area.

4.3.2.3.1 The Rail System

While no rail transit service is provided directly to Fort Belvoir or EPG, two rail services—WMATA's Metro and the VRE—have stations within a few miles of Fort Belvoir, as discussed below.

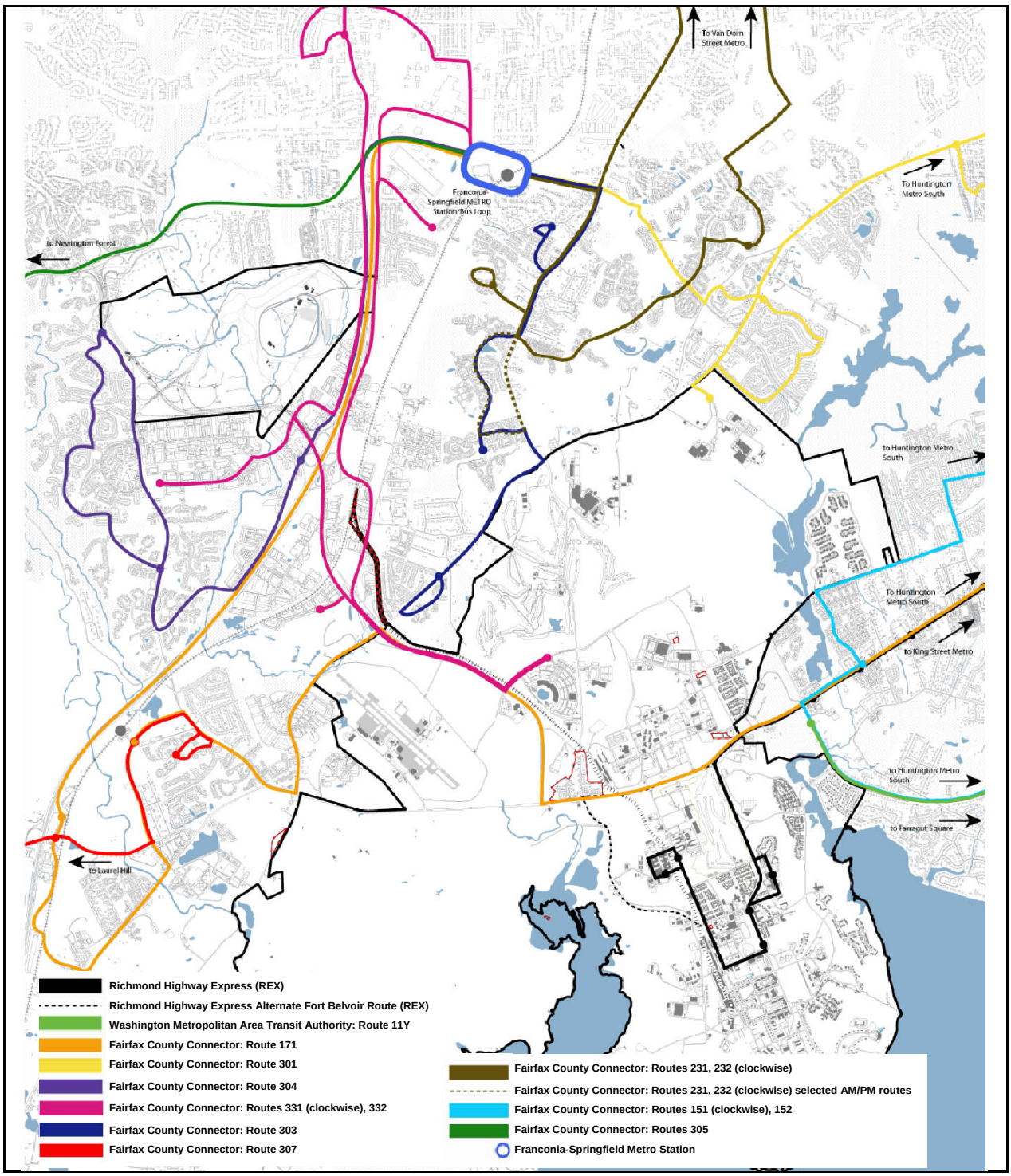
Metrorail. Metrorail has two stations that serve Fort Belvoir. The Franconia-Springfield station on the Blue Line is approximately 3 miles north of Fort Belvoir. The Huntington station on the Yellow Line is located just south of Alexandria, approximately 7 miles northeast of Fort Belvoir. Both the Blue and Yellow Lines provide service to Ronald Reagan National Airport and the Pentagon as well as the central core area of Washington, DC, with connections to each of the other Metro lines. Metro operates 7 days a week with weekday service generally available from 5:30 AM to midnight. Service frequency on the Blue and Yellow Lines generally is 6 minutes during peak times and 12 minutes during off-peak times.

Virginia Railway Express (VRE). The Fort Belvoir area of Fairfax County is served by VRE's Fredericksburg Line. Two VRE stations are in the general vicinity of Fort Belvoir. The Lorton station is approximately 1.5 miles west of Fort Belvoir, east of I-95, and south of Pohick Road. The Franconia-Springfield station is adjacent to the Franconia-Springfield Metro station, approximately 3 miles north of Fort Belvoir. The Fredericksburg Line operates between Fredericksburg and Union Station in Washington, DC. It serves locations in Stafford County, Prince William County, Fairfax County, Alexandria, and Arlington County. Service frequency at these stations is every 30 minutes from approximately 6:00 AM to 8:30 AM and from 4:00 PM to 7:00 PM.

4.3.2.3.2 Bus Service—Routes Serving Main Post

Six bus routes directly serve portions of Main Post, including one WMATA Metrobus route, four Fairfax Connector routes, and one private bus line. Each route is described briefly below. Figure 4.3-5 illustrates the existing bus services that are provided by the Fairfax Connector and WMATA Metrobus in this section of Fairfax County.

- *Metrobus REX* (Richmond Highway Express). The REX route provides express service between Fort Belvoir and the King Street Metro station in Alexandria.
- *Fairfax Connector Route 171* (Richmond Highway Line). Route 171 provides service between the Franconia-Springfield Metro station and the Huntington Metro station.
- *Fairfax Connector Route 301* (Telegraph Road Line). Route 301 also provides local service between the Franconia-Springfield Metro station and the Huntington Metro station.
- *Fairfax Connector Routes 331/332* (I-95 Circulator). These two routes operate in a loop connecting the Franconia-Springfield Metro station, Springfield Mall, the Springfield business district, Fort Belvoir, and various destinations along both sides of the I-95 corridor.



Bus Routes in Southern Fairfax County

Fort Belvoir, Virginia

Figure 4.3-5

- *Lee Coaches*. A private bus company in Stafford County, Lee Coaches operates one weekday round trip between the Route 208 Commuter Lot in Spotsylvania and Fort Belvoir. It also serves the Route 17 North Commuter Lot near Fredericksburg. At Fort Belvoir, the bus circulates through the South Post and makes a number of stops.

4.3.2.3.3 Bus Service – Routes Operating in Proximity to Main Post

Six additional bus routes operate within the vicinity of Main Post, either terminating immediately outside the boundaries of the post or passing in close proximity. These routes are included here because they represent a potential resource for expanded service to the Main Post. They could be modified at relatively low cost to provide service if the demand for transit service at the Main Post were to increase. None of these routes serve any Main Post locations. Brief descriptions of these routes are provided below.

- *Metrobus Route 11Y* (Mt. Vernon Express Line). Route 11Y provides express service between the Mount Vernon area and Farragut Square in downtown Washington, D.C.
- *Fairfax Connector Routes 231/232* (Kingstowne Line). These loop routes operate between the Van Dorn Metrorail Station and the Franconia-Springfield Metrorail Station.
- *Fairfax Connector Route 303* (Island Creek Line). This route provides local service between the Franconia-Springfield Metrorail Station and the intersection of Mt. Air Drive and Telegraph Road.
- *Fairfax Connector Routes 151/152* (Richmond Highway Circulator). These routes operate in a loop between the Mount Vernon area and the Huntington Metrorail Station.

4.3.2.3.4 Transit Service at EPG

The EPG site is not currently served by transit. A number of bus and rail lines operate in close proximity to the site. The Franconia-Springfield Metro and VRE stations are approximately 1 mile to the northeast of the EPG site. A number of bus routes operate within a half-mile or less of the site. These include Fairfax Connector Routes 304, 305, 331, and 332 and Metrobus Routes 18R and 18S. All six of these routes connect to the Franconia-Springfield Station. The major roads adjacent to or in close proximity to the EPG site on which transit service is provided include Backlick Road, Fullerton Road, Rolling Road, the Fairfax County Parkway, and the Franconia-Springfield Parkway.

4.3.2.3.5 Transit Service at the GSA Parcel

The GSA Parcel abuts Loisdale Road, which is currently serviced by Fairfax Connector Route 331 and Route 332. These two bus routes operate on ½ hour frequency during the peak periods and hour frequency during the off-peak hour. The routes, referred to as the I-95 circulator routes and are described in section 4.3.2.3.2 above, provide services to the Franconia-Springfield Metrorail Station and the Medical College, which is located to the northeast and south of the GSA site, respectively. No other routes operate in proximity of the GSA Parcel. The Franconia-Springfield Metrorail site is located less than ½ mile to the northeast.

4.3.2.4 Travel Patterns to and from Fort Belvoir

Existing travel patterns were examined by reviewing Fort Belvoir employees' residential locations via payroll data as of August 2006 and by examining MWCOG's Cooperative Land Use Forecast (Round 7, revised).

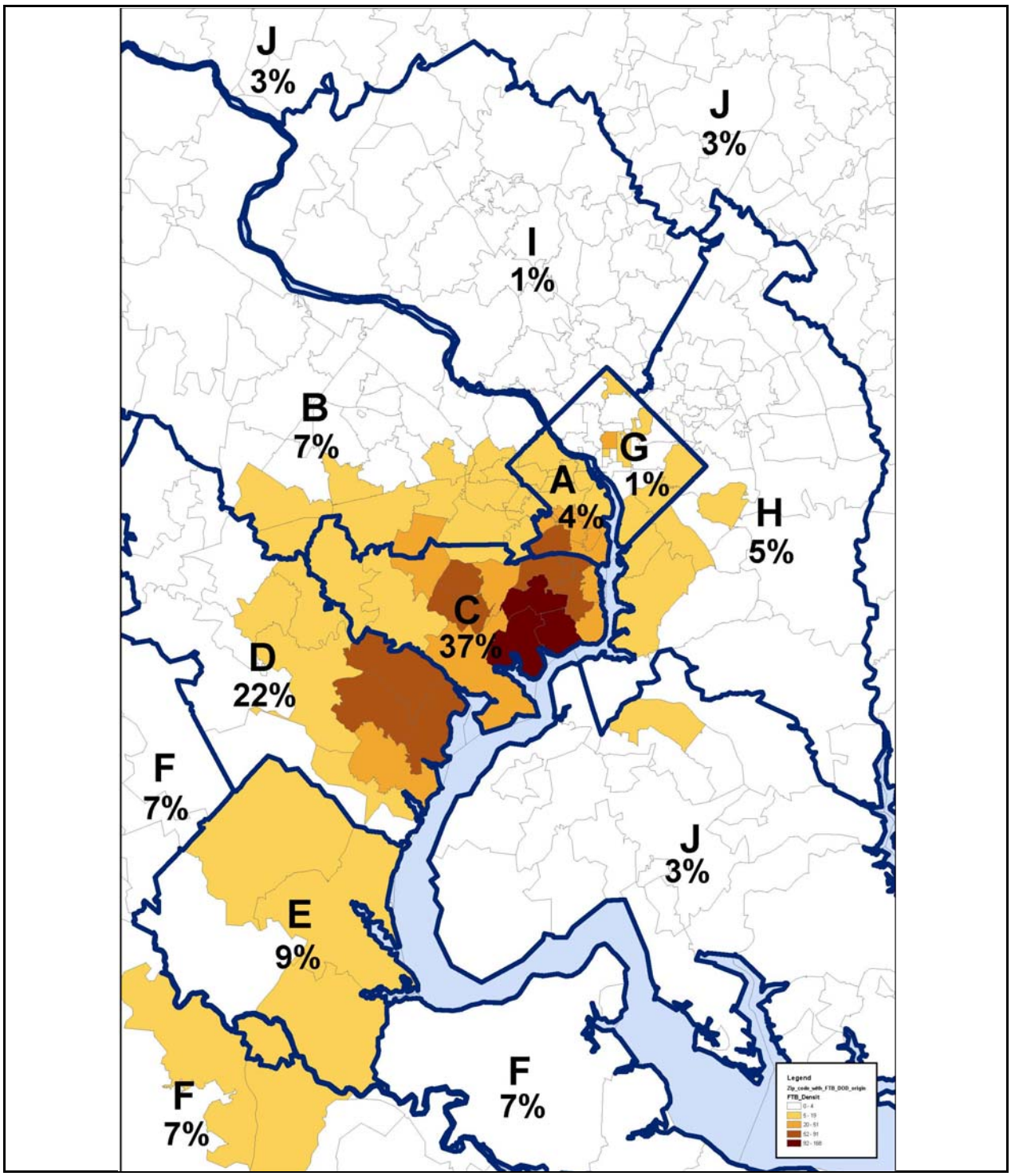
Table 4.3-1 and Figure 4.3-6 show the distribution of place of residence for employees at Fort Belvoir in August 2006. The distribution based on the payroll data is similar to the distribution identified from a 2002 survey conducted of Fort Belvoir employees in conjunction with the Fort Belvoir Transit Study, with the most notable difference being an increase in the estimated number of employees in Fairfax County. The difference between the payroll and survey data suggests that those employees with longer commutes tend to be more likely to respond to surveys regarding transportation, which could result in an overestimation of longer distance trips.

Table 4.3-1
Existing residential locations of Fort Belvoir employees

District	Location	Existing residential distribution of Fort Belvoir employees[a]
A	Arlington/Alexandria	4%
B	Northern Fairfax County and Loudoun County	7%
C	Southern Fairfax County	37%
D	Prince William County	22%
E	Near South	9%
F	Remainder of Virginia	7%
G	District of Columbia	1%
H	Prince George's County	5%
I	Montgomery County	1%
J	Remainder of Maryland	3%
K	Outside of DC, Maryland, and Virginia	4%
	TOTAL	100%

[a]Percentages are based on review of payroll data for 10,548 Fort Belvoir employees.

Potential shifts in the residential location of employees in response to the change in employment location could alter the distribution of employee residences and thus, affect regional travel patterns. To assess this effect, travel time contours surrounding Fort Belvoir's Main Post and EPG for both the AM and PM peak hours were developed and are illustrated in Figures 4.3-7 and 4.3-8. These figures illustrate the travel time contours for existing Fort Belvoir employees traveling to work in the morning and returning home in the evening. Depending on specific residential location, some employees travel in the off-peak direction for a large portion of their trip. Comparing the contours to available information of residential locations of existing employees indicates that more than 70 percent of incoming employees currently live within an hour of Fort Belvoir at peak-hour travel speeds. This proportion suggests that rapid, large-scale relocation of residences is not likely. Rather, change would occur over time in response to turnover in staff, the affordability of housing, and construction of new transportation infrastructure such as the high occupancy toll (HOT) lanes on I-95 from Fredericksburg to the Potomac River.

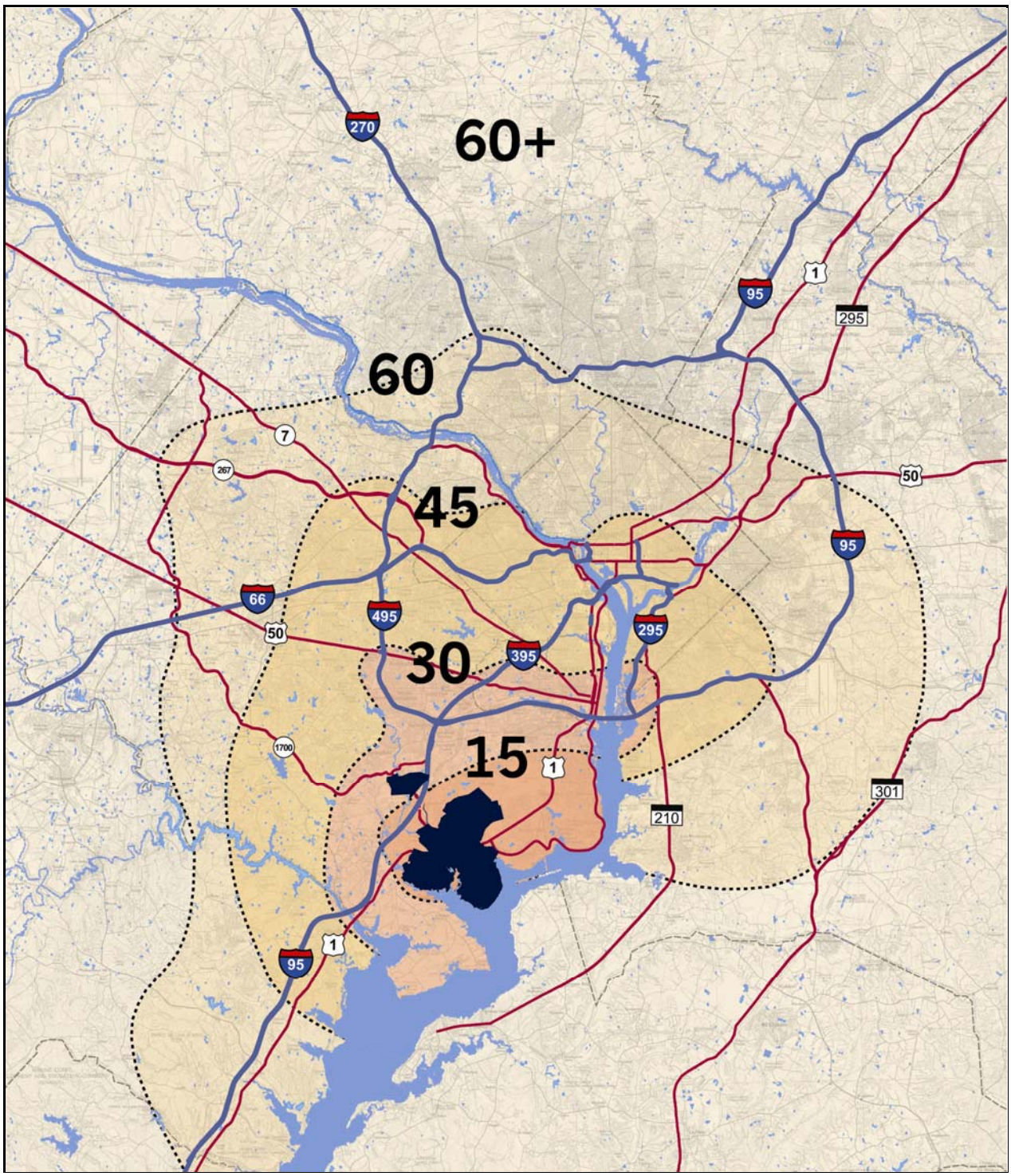


Note: Employee Density within Zip Code Boundary (Employee/sq.mi.) based on payroll data

Current Residential Distribution of Fort Belvoir Employees

Fort Belvoir, Virginia

Figure 4.3-6



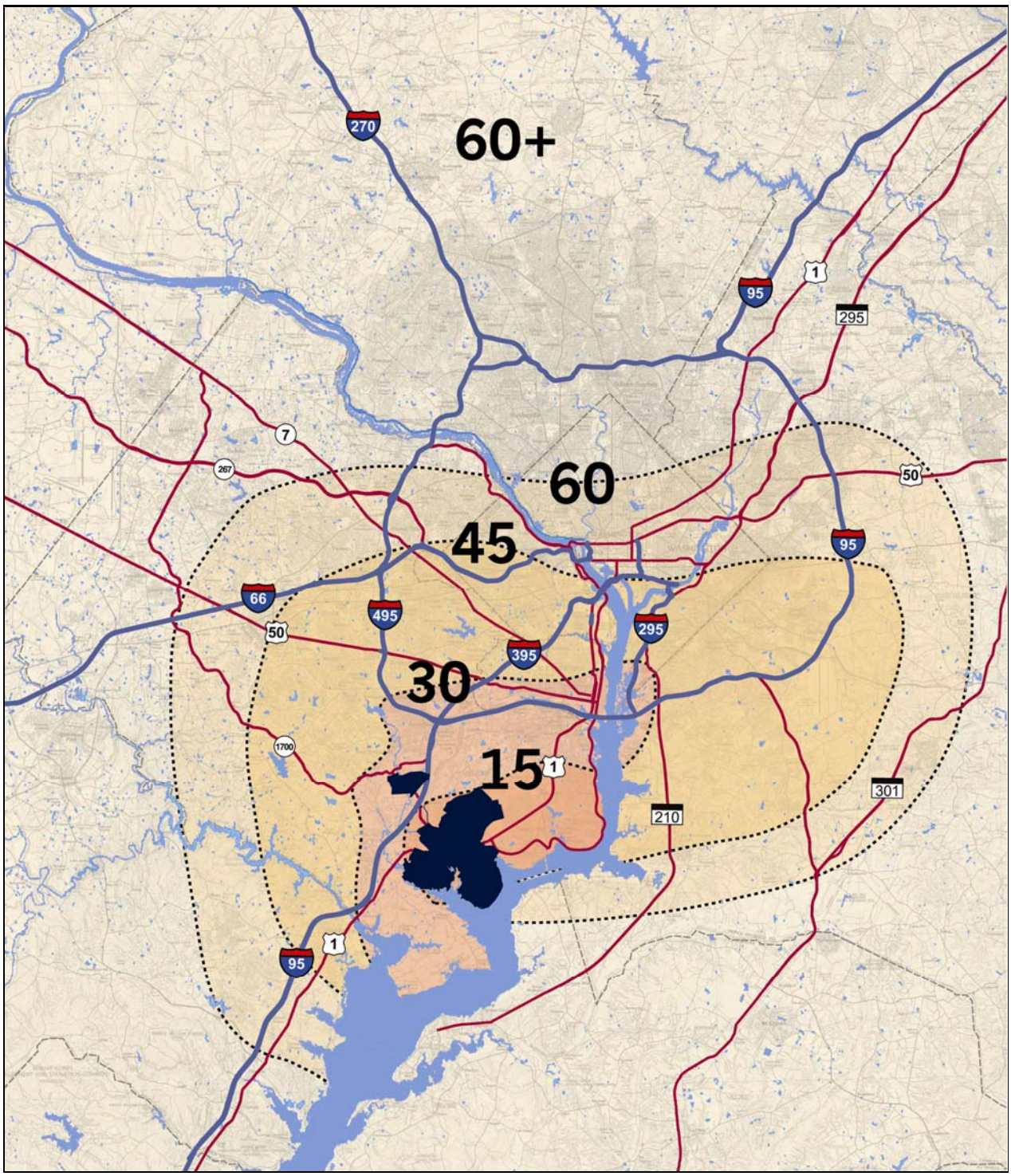
LEGEND

Interstate Highway
Highway
River/ Water

AM Peak Hour Travel Time, Existing Fort Belvoir Conditions

Fort Belvoir, Virginia

Figure 4.3-7



LEGEND

Interstate Highway
Highway
River/ Water

PM Peak Hour Travel Time, Existing Fort Belvoir Conditions

Fort Belvoir, Virginia
Figure 4.3-8

Table 4.3-2 presents the population, employment, trip productions, and trip attractions for the 2006 existing conditions MWCOG model that was run. Data for the study area are shown in the context of the larger region. Figure 4.3-9 displays the population and employment levels in the sub-districts within the study area. Almost every district surrounding Fort Belvoir has a higher population than employment, while Fort Belvoir is higher in employment because of its function.

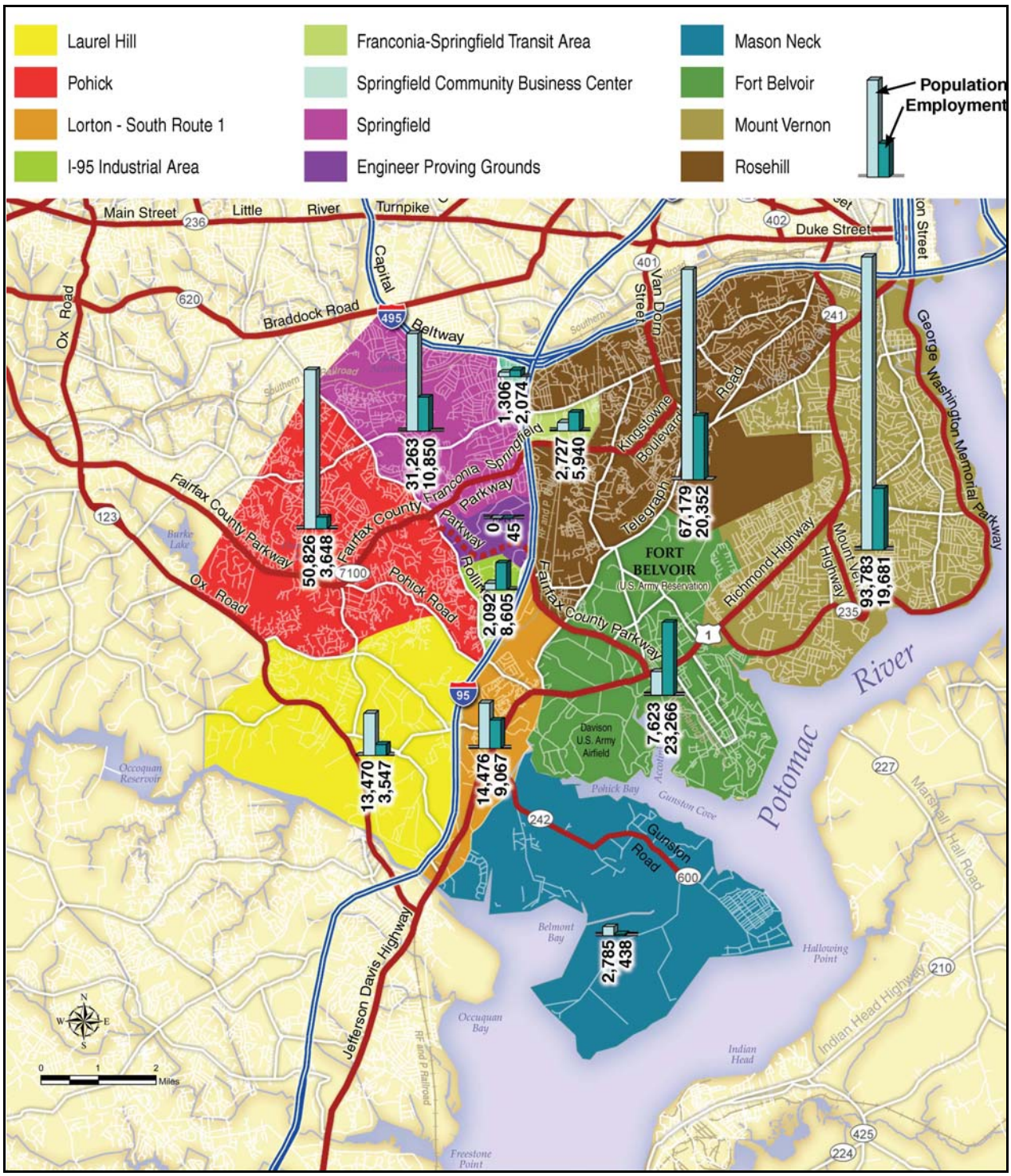
Table 4.3-2
2006 population, employment, productions, and attractions

District	Land use		Daily	
	Population	Employment	Productions	Attractions
Laurel Hill	13,470	3,547	31,891	31,825
Pohick	50,826	3,648	109,597	109,719
Lorton South of U.S. Route 1	14,476	9,067	43,441	43,430
I-95 Industrial Area	2,092	8,605	20,802	20,753
Franconia-Springfield Transit Area	2,727	5,940	37,799	38,044
Springfield Community Business Center	1,306	2,074	11,586	11,601
Springfield	31,263	10,850	98,365	98,274
EPG	0	45	81	87
Mason Neck	2,785	438	5,979	5,948
Fort Belvoir (Main Post)	7,623	23,266	35,176	35,342
Mount Vernon	93,783	19,681	250,418	250,606
Rose Hill	67,179	20,352	184,223	184,200
Total Study Area	287,530	107,513	829,357	829,830
Rest of Virginia	2,142,682	1,258,264	6,952,561	6,952,125
Maryland	3,318,699	1,723,958	10,587,588	10,586,616
District of Columbia	583,733	752,719	1,572,672	1,572,360
West Virginia	47,735	15,173	153,721	153,849
Other States	0	0	715,116	716,236
Total Outside Study Area	6,092,849	3,750,114	19,981,658	19,981,186
REGIONAL TOTAL	**6,380,379**	3,857,627	20,811,015	20,811,015

Source: VHB, 2006.

Note: Production and attraction totals for each district includes internal trips within that district. A production is the beginning of a trip; an attraction is the end of a trip.

To gain a sense of the scope and scale of the BRAC action, it is useful to compare the number of jobs and the expected vehicle trips involved to several benchmarks. The net increase in employment of 22,000 is relatively small when compared to the region (approximately 3,750,000 employees) and even to Fairfax County (Fort Belvoir represents approximately 3.5 percent of the total employment within all of Fairfax County in 2006). Perhaps more relevant is the relationship to employment and vehicle trips within the transportation corridors serving Fort Belvoir and the study area. A recent study by the Northern Virginia Transportation Commission (NVTC) to develop The TransAction 2030 Plan (see Section 4.3.2.6) identified eight transportation corridors in Northern Virginia that serve the major employment centers. While no corridor is totally independent of the transportation system as a whole, each corridor does have its own characteristics and a significant degree of operational independence. Fort Belvoir is located at approximately the midpoint of the I-95/U.S. Route 1 Corridor (Corridor 8) and at the southeastern end of the Fairfax County Parkway Corridor (Corridor 5). These two corridors serve as the primary access routes to the Fort Belvoir sites. Within Corridor 8, Fort Belvoir represents



LEGEND

Interstate Highway
Highway
River/ Water

2006 Population and Employment Within the Study Area

Fort Belvoir, Virginia

Figure 4.3-9

approximately 6.1 percent of the total employment level of 385,000 workers. Within Corridor 5, Fort Belvoir represents approximately 15 percent of the total employment level of 155,000 workers.

Fort Belvoir and EPG represent 2.7 percent (7,623 residents on Fort Belvoir and 0 on EPG for a total population of 7,623 within the study area total of 287,530) of the population in the study area in 2006. Fort Belvoir and EPG account for 21.7 percent (23,266 employees on Fort Belvoir and 45 on EPG for a total employment of 23,311 within the study area total of 107,513) of the employment and attract 4.3 percent of all trips in the study area. This proportion is notable because Fort Belvoir is not a large attractor of trips, considering its share of the study area employment, when compared to such districts as Rose Hill, which has 18.5 percent of the study area employment but 30.2 percent of the attractions. The higher percentage of attractions at Rose Hill is likely because of land use within the area, such as shopping plazas.

In Fairfax County, the ratio of workers to jobs is about 1.0. This means that the county is balanced, and if every worker worked at a job available within the county, no one would have to leave the county to work, and no one would be coming to the county to work (TRB, 2006). The MWCOG model, however, only looks at population and employment. The ratio of jobs (employment) to total population (includes workers and non-workers), however, can be used as a basis to assess how the study area performs in striving to meet this balanced ratio. The ratio of jobs to population within the study area is 0.37, or 37 jobs to 100 residents. Ideally, the ratio should be similar to the ratio of Fairfax County of 0.60. The regional average ratio is also approximately 0.60, because the region is relatively balanced as a whole. Note that not all of the population works, as some are retired, some are homemakers, and others are still in school. Some parts of the region have a higher ratio than the regional average, such as the District of Columbia (DC), with a ratio of 1.29. A ratio higher than the regional average means that the area needs workers from outside the area to come in to work. DC's ratio is high because commuters from Virginia and Maryland travel into DC in the morning peak period, because many jobs are there. From the other perspective, if the ratio is lower than the regional average, people have to leave the area for their jobs, much like the study area. A balanced ratio within an area means that potentially external trips are reduced, because the ability for workers to live and work within the same area exists. This balance helps to reduce the overall average trip length and potentially the number of vehicular trips.

These comparisons indicate that at a regional level, the redirection of vehicle trips is not significant and even at the corridor level, traffic effects are likely limited to the immediate area of the installation.

A trip within the regional model consists of a beginning and an end, and the trip occurs on roadway links (or rail, depending on mode of transport). A production is the beginning of a trip; an attraction is the end of a trip. An analogy can be used to explain this process. In the morning, people leave their homes to go to work; the residential locations produce trips in the morning—this is production. Work locations attract these trips that started at the homes (i.e., work attracts trips in the morning). Thus, a trip begins with a production at home, travels on roads or rail links (depending on the mode), and ends with an attraction at work. Together, one production and one attraction produces one trip.

Table 4.3-3 presents the internal trips to the study area, external trips destined to the study area, and external trips that originate within the study area. The table illustrates that most of the trips that have an origin or a destination within the study area originate from or are destined to points

Table 4.3-3
2006 Study Area Trips

Time	Internal trips within study area	External trips ending in study area	External trips beginning in study area
AM Peak	66,376	55,349	71,782
PM Peak	122,669	100,834	87,235
Off-Peak	294,120	190,482	187,175
Daily	**483,165**	**346,665**	**346,192**

outside the study area, as opposed to being an internal trip within the study area (i.e., a trip beginning and ending within the study area). That is, approximately 693,000 external trips begin or end in the study area, and approximately 483,000 trips occur completely within the study area. The table does not include external trips that pass through the study area (i.e., a trip from Fredericksburg to Washington DC, traveling on I-95).

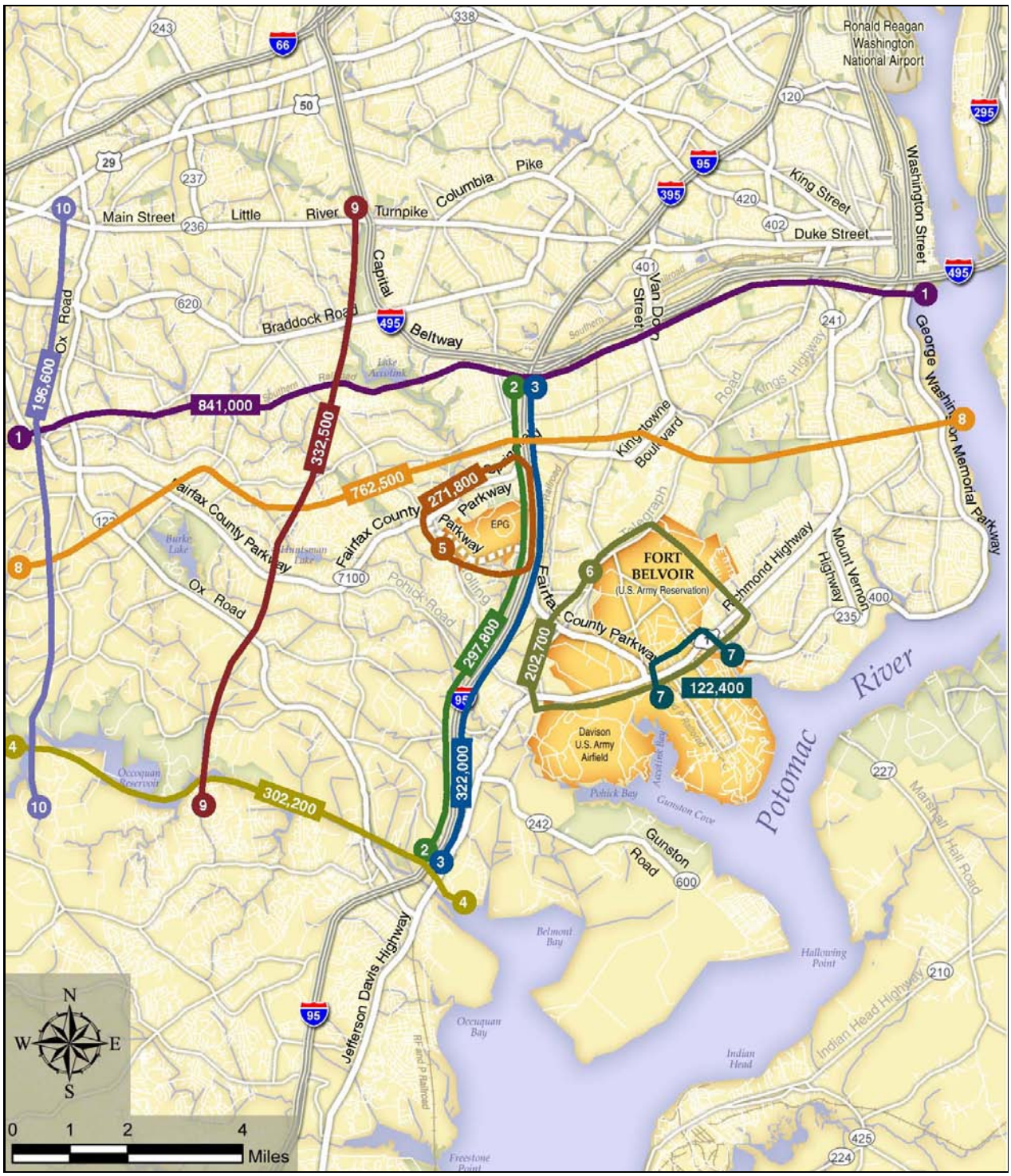
Figure 4.3-10 illustrates the volumes on the screen lines (natural or man-made barriers and/or imaginary lines used to divide a study area into large sections; examples of barriers include a river, a stream, or a railroad track) and cordons (imaginary closed loop defined within a study area, used to tally total inbound and outbound trips) on roadways in the study area surrounding and within Main Post and EPG. The screen lines and cordons identify volumes of traffic crossing them in either direction. This data enables comparisons of existing conditions to future conditions created by implementation of proposals or alternatives.

4.3.2.5 Available Capacity and Performance

In the area of the proposed action, the transportation network is greatly strained from rapid development, significant employment growth within Fairfax County and Alexandria's Cameron Valley area, and residential growth in Prince William County, Stafford County, and Fredericksburg. The result is one of the busiest and most congested transportation corridors in the country. Even if no further growth were to result from the proposed action, area traffic would substantially increase over the next 2 decades.

To assess available roadway capacity and identify possible transportation system improvements to accommodate the projected travel demand, available traffic counts from the past 3 years were reviewed and compared to the capacity of the major facilities approaching Fort Belvoir. Assessing the transportation network for its available capacity will allow for understanding the constraints to accommodate additional traffic destined for Fort Belvoir. The available capacity then can be used to determine the sizing of any transportation improvements that might be needed. As the expected traffic conditions are analyzed for each of the alternatives, the assessment of available capacity will allow for sizing that would be needed to mitigate any effects to the transportation system. The following per lane assumptions were made for each facility type, as identified in Table 4.3-4.

Review of available capacity indicates that the existing transportation network within the Fort Belvoir area is operating at or near capacity during peak periods in peak directional travel. Available vehicle capacity for additional vehicle trips traveling to Fort Belvoir or EPG is limited to trips to and from the north and west, because there is no available capacity from the south on I-95 and U.S. Route 1 under existing conditions. I-95 will be widened from three to four general purpose lanes between the Fairfax County Parkway and Route 123 by 2011. This improvement is



2006 Existing Daily Volumes on Screen Lines

Fort Belvoir, Virginia

Figure 4.3-10

Table 4.3-4
Capacity per lane by facility type

Facility type	Capacity	Explanation
Freeway	1,600–1,800 vehicles per hour (vph)	Varies because of interchange spacing; weaving, merge, and diverge operations; and downstream bottlenecks
HOV	1,900–2,100 vph	Volume is higher because of fewer ramps (ideally, volume would remain below 1,700 vph to provide an adequate level of service)
Ramp	1,200–1,600 vph	Specific design features determine actual capacity
Major arterial	1,100–1,300 vph	Varies based on signal progression, green time split, and cross-street volume
Minor arterial	850–1,000 vph	Varies based on signal progression, green time split, and cross-street volume

not expected to help alleviate congestion along I-95 because the region will continue to grow, offsetting any additional roadway capacity.

Regional and local roadways (upon completion of the Springfield Interchange, the Fairfax County Parkway through the EPG, and the Van Dorn Street/Franconia Road Interchange) could potentially accommodate up to 3,500 vehicles per hour (vph) for new vehicle trips to Fort Belvoir. This available capacity is illustrated in Figure 4.3-11. From the west, the proposed Fairfax County Parkway extension, depending on ultimate design, could provide access for up to 2,000 additional vehicles per hour. From the north, up to an additional 1,000 vph could travel to Fort Belvoir or EPG via I-95. Local access via the major arterials could provide access to approximately 500 vph under existing conditions.

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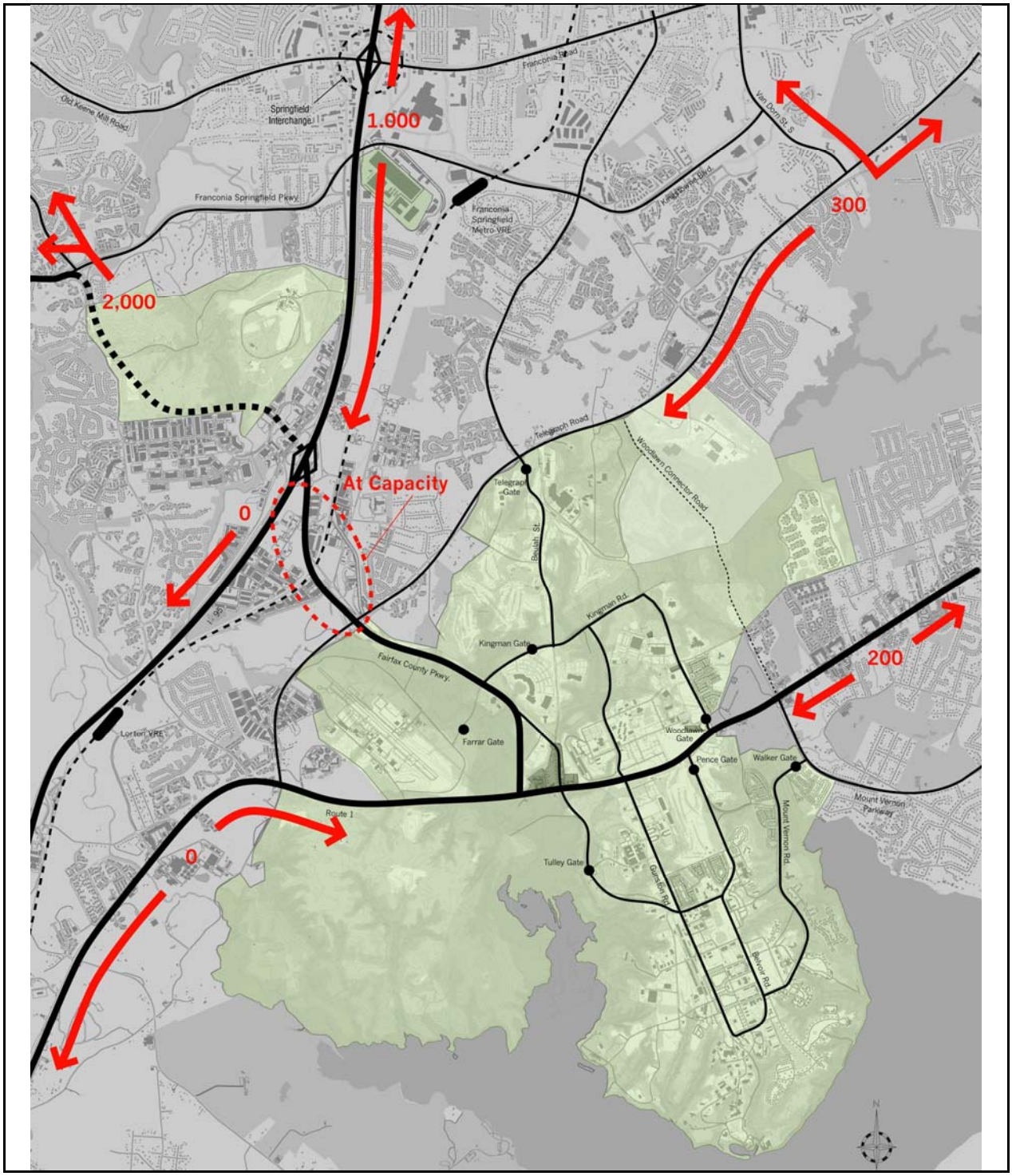
To assess existing conditions and available capacity in the immediate areas surrounding EPG and the Main Post, turning movement counts were performed at 28 intersections. The summary of the turning movement counts for the Existing Conditions is provided in Table D-1 and Figures D-1 and D-2 in Appendix D. These intersections were analyzed for their operational performance. The following table presents the *Volume-to-Capacity* (V/C) ratio, intersection *Level-of-Service* (LOS), and *delay* measures of effectiveness. The V/C ratio is a quantitative measure of demand versus the capacity of an intersection. LOS is a qualitative measure of an intersection's performance. LOS is ranked A to F, where A represents free flow or negligible delay, and F represents extensive delay and congestion. An intersection's LOS is typically at LOS F once the control delay at the intersection reaches an average of 80 seconds per vehicle.

Several intersections shown in Table 4.3-5 are of key interest because of their proximity to the Main Post and EPG. Key intersections along U.S. Route 1 operate at or above capacity. The intersection of Franconia- Springfield Parkway and Spring Village Drive is at capacity, and a



LEGEND

Roadways

River/ Water

Available Capacity

Fort Belvoir, Virginia

Figure 4.3-11

Table 4.3-5
Intersection Measures of Effectiveness—Existing Conditions

	AM Peak Hour[a]			PM Peak Hour[a]		
Intersection Location	**V/C**	**LOS**	**Delay[b]**	**V/C**	**LOS**	**Delay[b]**
Commerce Street/Old Keene Mill Road	0.59	B	16.3	0.80	C	20.5
Commerce Street/Amherst Ave.	0.65	C	27.1	0.79	D	36.6
Commerce Street/Backlick Road	0.29	C	22.1	0.70	D	38.5
Commerce Street/Franconia Road EB	0.45	C	30.6	0.78	C	31.6
Commerce Street/Franconia Road. WB	0.55	E	59.4	0.57	D	45.0
Backlick Road/Calamo Street	0.68	A	5.6	0.73	B	17.4
Loisdale Road/Spring Mall Drive	0.42	C	21.8	0.80	D	36.4
Franconia Springfield Parkway/Spring Village Drive	1.02	E	59.5	1.07	E	70.7
Franconia Springfield Parkway EB Ramp/Backlick Road	0.93	E	55.6	0.78	D	36.0
Franconia Springfield Parkway WB Ramp/Backlick Road	0.85	B	10.3	0.77	B	19.4
Franconia Springfield Parkway/I-95 HOV Ramps	0.89	D	35.5	1.23	F	96.6
Franconia Springfield Parkway EB Ramp/Frontier Drive	0.61	C	28.3	0.82	D	39.4
Franconia Springfield Parkway WB Ramp/Frontier Drive	0.45	C	24.3	0.75	F	99.3
Franconia Springfield Parkway/Beulah Street	1.12	F	87.4	1.26	F	135.7
Fairfax County Parkway/Fullerton Road	1.23	F	304.1	1.66	F	349.6
Fairfax County Parkway/Terminal Road	0.84	D	40.4	0.82	C	21.9
Fairfax County Parkway SB Ramps/Telegraph Road	0.45	B	18.0	0.68	D	50.7
Fairfax County Parkway NB Ramps/Telegraph Road	0.49	B	14.3	0.66	C	21.8
Fairfax County Parkway/John J. Kingman Road	0.75	D	40.0	0.99	F	83.6
Telegraph Road/Beulah Street	0.56	D	35.2	0.54	C	28.1
Telegraph Road/S. Van Dorn Street	0.73	C	21.3	0.90	D	42.4
U.S. Route 1/Telegraph Road—Old Colchester Road	0.76	D	47.6	0.74	D	43.8
U.S. Route 1/Fairfax County Parkway	0.94	D	36.2	0.87	C	32.8
U.S. Route 1/Backlick Road—Pohick Road	0.85	C	29.3	1.06	F	107.4
U.S. Route 1/Belvoir Road	0.80	B	16.1	0.57	B	11.7
U.S. Route 1/Woodlawn Road	0.70	A	6.2	0.72	B	11.9
U.S. Route 1/Old Mill Road	1.37	F	187.8	1.08	F	118.5
Loisdale Road./GSA Access Road[b]	0.50	A	1.5	0.30	A	1.1

Note: Delay represents the average number of seconds a vehicle is delayed from free-flow conditions.

[a]AM Peak Hour: 7:15 AM to 8:15 AM; PM Peak Hour: 4:30 PM to 5:30 PM

[b]Intersection analyzed as unsignalized intersection

number of intersections on Fairfax County Parkway are also congested. The intersection between the Franconia-Springfield Parkway and the I-95 HOV ramps operates under LOS F. This indicates the need for improvements to the HOV system under existing conditions.

The trip generation at Fort Belvoir must be examined to understand how the above intersection capacity analyses relate to Fort Belvoir. Understanding Fort Belvoir arrival and travel patterns

will aid in the development of the concepts for the proposed action and its four land use alternatives. Currently, a total of 26,000 daily trips are destined to Fort Belvoir. This value is a low trip generation to the site, considering that approximately 23,000 military personnel, civilians, and contractors work on the Main Post. Also, approximately 7,000 people live on Fort Belvoir, which helps reduce external trips to the site, as some residents work on-post. During the AM peak hour, the heaviest arrival hour in the morning peak period, there are only approximately 4,000 trips destined to Fort Belvoir, a generation rate of 18 inbound trips per 100 people (0.18 trips for every person). The Fort Belvoir trip generation rate is lower than typical rates calculated in the Institute of Trip Engineers (ITE) Trip Generation Manual. Sample rates for the AM peak hour, the heaviest arrival period, for other types of development from the ITE manual include 54 inbound trips per 100 employees traveling to a government office complex and 40 trips per 100 employees traveling to an office park (ITE, 2003). The comparisons of Fort Belvoir to other development for the heaviest arrival hour allow for assessment of the potential impacts of the proposed BRAC action. Thus, Fort Belvoir traffic does not have as large an effect on the transportation system as would other developments of similar size. Table 4.3-6 presents the inbound hourly flow into Fort Belvoir and Figure 4.3-12 presents the hour-by-hour flow rate.

Figure 4.3-12 illustrates the inbound flow into Fort Belvoir of approximately 4,000 vph during the AM peak hour of the cumulative daily flow of about 26,400 vehicles (14.7 percent of the daily flow). Tulley Gate is the most heavily used gate for South Post with more than 9,000 trips per day (representing 34 percent of the total trips) because it serves all visitors and is the southernmost gate on U.S. Route 1 for traffic from U.S. Route 1 and the Fairfax County Parkway. The Kingman Gate is the busiest gate for North Post with more than 5,000 trips per day (25 percent of the total trips). Since the time of the count reported in Table 4.3-6, the Woodlawn Road Gate has been closed to traffic. The counts do not include all gates at Fort Belvoir because the DLA and DCEETA gates are not included above. These gate counts are used as a guide in conjunction with turning movement counts at intersections that serve as gateways onto the Main Post as well as employee surveys, to develop future trip generation rates for Fort Belvoir.

There are a number of problems with traffic circulation on the Main Post, as some locations on the Main Post experience traffic congestion. Chief among these problematic locations are the following:

- Gunston Road, which is the only north-south connection between North and South Posts that is grade separated from U.S. Route 1. This roadway carries a high volume of traffic and is often congested during the peak periods.
- Lack of north-south connections over U.S. Route 1 in the vicinity of Belvoir Road. Travelers can use Pence Gate and Kingman Gate to travel on U.S. Route 1 and Fairfax County Parkway to get from South Post to North Post or vice versa. These much longer routes deter their use, resulting in heavy use of Gunston Road.
- Belvoir Road is congested between U.S. Route 1 and 12th Street.
- A lack of cross streets between Gunston and Belvoir Roads forces all traffic onto the limited number of connections between the two roadways, adding to the congestion on both of these major roadways.

Table 4.3-6
Inbound Gate Counts for Fort Belvoir Access Points

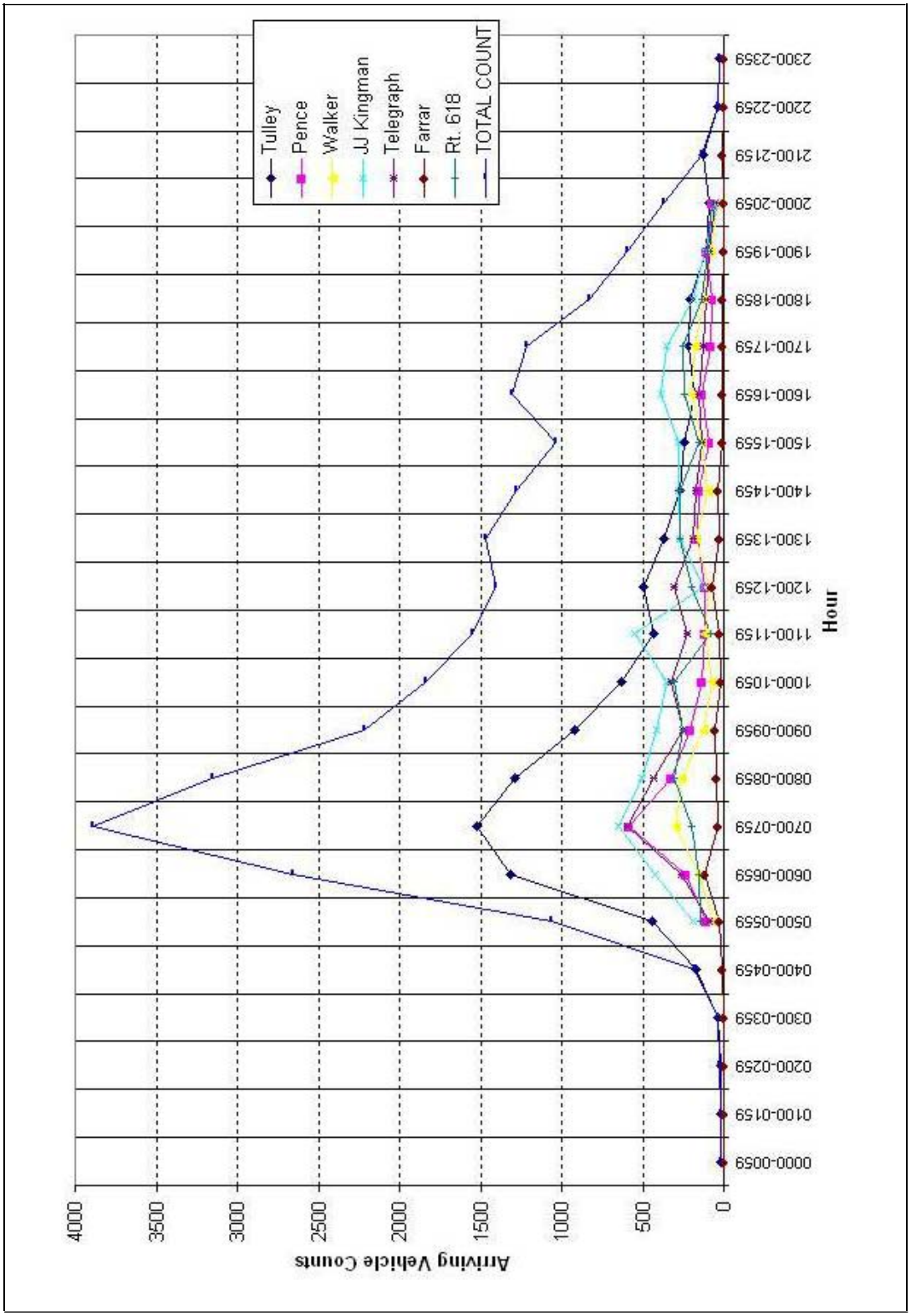
Gate	Tulley	Pence	Walker	Kingman	Telegraph	Farrar	Woodlawn	All Gates
Gate serves	South Post	South Post	South Post	North Post	North Post	Airfield	North Post	Fort Belvoir
No. of ID booths	3	2	1	2	1	1	1	11
Hour								
0000–0059	21					1		22
0100–0159	18					3		21
0200–0259	21					4		25
0300–0359	34					3		37
0400–0459	171					9		180
0500–0559	441	112	64	192	90	25	140	1,064
0600–0659	1,317	230	157	423	264	114	150	2,655
0700–0759	1,519	585	301	651	597	40	200	3,893
0800–0859	1,287	321	265	504	429	42	303	3,151
0900–0959	921	203	125	413	248	52	254	2,216
1000–1059	630	138	68	351	325	15	307	1,834
1100–1159	428	119	119	548	224	27	81	1,546
1200–1259	495	120	92	128	303	74	197	1,409
1300–1359	368	162	172	271	192	31	274	1,470
1400–1459	273	155	103	275	174	37	266	1,283
1500–1559	245	88	133	280	133	9	150	1,038
1600–1659	181	134	198	388	157	5	242	1,305
1700–1759	214	81	178	352	130	7	255	1,217
1800–1859	203	70	114	189	111	5	135	827
1900–1959	110	105	82	116	91	0	95	599
2000–2059	88	76	37	37	50	2	76	366
2100–2159	123					8		131
2200–2259	34					2		36
2300–2359	27					0		27
Total	**9,169**	**2,699**	**2,208**	**5,118**	**3,518**	**515**	**3,125**	**26,352**

Source: Greenhorn and O'Mara, 2005.
Notes: Cross-hatching indicates time period when gate is closed; dark shading represents the AM Peak Hour.

4.3.2.6 Transportation Plans

Various transportation projects within regional, state, and local long-range plans could have the potential to alleviate some of the congestion anticipated to occur with the BRAC relocations and to meet the shortfall in roadway capacity. These plans are described below. In addition, Tables 4.3-7 through 4.3-9 and Figure 4.3-13 illustrate the improvements within these plans that are slated for this area of the region.

VDOT Six-Year Improvement Program. The Commonwealth Transportation Board (CTB) of Virginia maintains this program, which allocates funds for transportation projects proposed for



Inbound Gates Hour-by-Hour Flow Rate
Fort Belvoir, Virginia

Figure 4.3-12

Table 4.3-7
List of improvements to be constructed by 2011

VDOT 6-Year Improvement Program	From (where applicable)	To (where applicable)	Map #
Highways			
Reconstruct I-95/I-395/I-495 Interchange (Phase II-VII)			1
I-95, widen to 8 lanes	Newington	VA 123	5
VA 7100 (Fairfax County Parkway), construct 4 lanes	Rolling Road	Fullerton Road	2
Telegraph Connector Road[1]	U.S. Route 1	Telegraph	4
Transit			
U.S. Route 1 bus priority project			3

[1]Timeline depends on funding. Most funding has been identified to construct Phase 1 (2 lane cross-section); however, there is a funding shortfall for the full cross-section.

Fairfax County spot improvements per CIP			
Highways			
Additional turn lane for NB U.S. Route 1 left turn movement at Engleside Post Office			
Provide turn lanes at Harrison Lane and South Kings Highway			
Additional turn lane for NB Mount Vernon Highway left turn movement at U.S. Route 1			
Additional turn lane for SB Roberts Road left turn movement at Braddock Road			
Transit			
Park & Ride lots along Franconia-Springfield Parkway			
New structured parking at Burke Centre VRE station			
U.S. Route 1 Public Transit initiatives			
New structured parking at Huntington Metro station to replace and expand existing parking			

Note: all projects listed above are funded and are expected to be completed by 2011.

Table 4.3-8
List of Improvements per the Constrained Long-Range Plan

Improvement	From (where applicable)	To (where applicable)	Map #
Highways			
I-95, reconstruct interchange at VA 642	Reconstruct Lorton Road Interchange		1
I-95, construct interchange at VA 7900	LOV access to & from West / from & to North		2
U.S. Route 1 Improvements			4
U.S. Route 1 Location Study (4 to 6 lanes, 6 to 8 lanes)	Stafford County Line	SCL Alexandria	
Widen (4 to 6 lanes)	Armistead Road	Lorton Road	

Table 4.3-8
List of Improvements per the Constrained Long-Range Plan *(continued)*

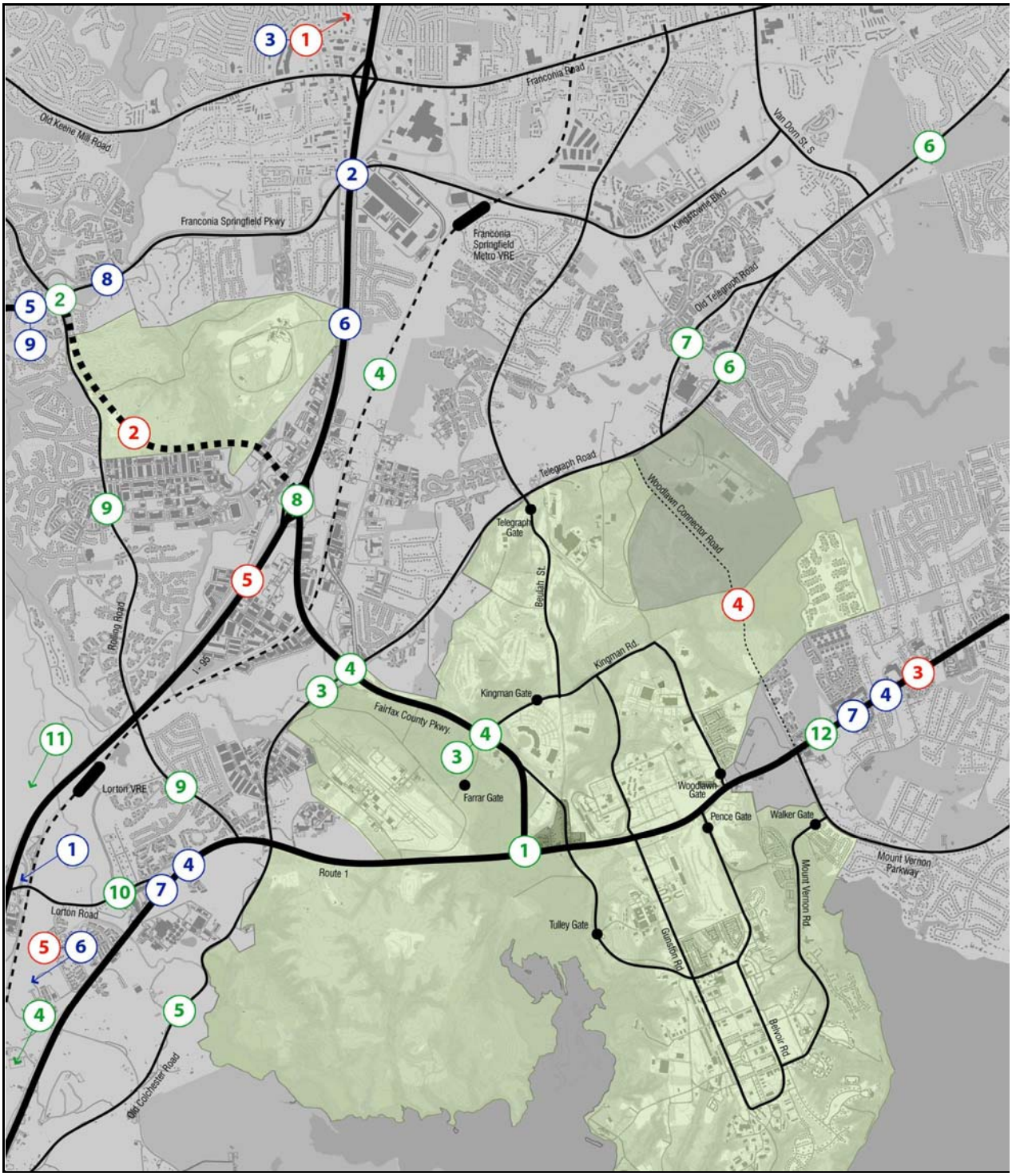
Transit	From (where applicable)	To (where applicable)	Map #
Widen (3 lanes NB, 4 lanes SB)	Lorton Road	Telegraph Road	
Install	@ VA 1332 (Huntington Avenue)		
Reconstruct intersection	@ VA 619 (Joplin Road)	USMC Heritage Ctr Access	
Widen (Neabsco Creek Bridge) (4 to 6 lanes)	VA 610 (Neabsco Road)	VA 638 (Neabsco Mills Road)	
Reconstruct Interchange	@ Russell Road		
Widen (4 to 6 lanes)	VA 235 South	VA 235 North	
Widen (4 to 6 lanes)	Stafford County Line	VA 235 South	
Widen (bus/right-turn lanes) (6 to 8 lanes)	VA 235 North	SCL Alexandria	
VA 123, widen to 6 lanes, 2008, 2015			
Widen (4 to 6 lanes)	U.S. Route 1	Occoquan Road	
Construct interchange	@ U.S. Route 1		
VA 7100, widen from 4 to 6 lanes	VA 640 (Sydenstricker Road)	VA 7900 (F-S Pkwy)	5
I-95 HOV, extend HOV lanes	Stafford County Line	Quantico Creek	6
I-95 HOV, restripe to 3 lanes	Quantico Creek	I-395/I-495 intersection	
I-95/I-395/I-495, interchange reconstruction with access ramps to I-495, HOV	Reconstruct Springfield Interchange		3
U.S. Route 1, widen for bus right turn lanes			
U.S. Route 1 Transit Improvements			
U.S. Route 1 Corridor Light Rail Study	King Street Metro Station	Potomac Yard	
Install U.S. Route 1 Traffic Signal Preemption	Mount Vernon Highway / Old Mill Road	Fort Hunt Road	
Implement U.S. Route 1 Transit Improvements	Gunston Road	Huntington Avenue	
U.S. Route 1 Transit Service Improvements Study	Stafford County Line	Pentagon	7
U.S. Route 1 Bus Rapid Transit (BRT) Study	Stafford County Line	Pentagon	
U.S. Route 1 Priority Bus Study	Stafford County	SCL Alexandria	
U.S. Route 1 Corridor Light Rail Study	Potomac Yard	Pentagon	
U.S. Route 1 Priority Bus Study	SCL Alexandria	King Street Metro station	
Franconia/Springfield Parkway HOV	VA 7100	VA 2677 (Frontier Dr.)	8
Fairfax County Parkway HOV, construct 2 lanes	VA 640 (Sydenstricker)	VA 7900 (F-S Pkwy)	9

Note: Projects are planned to be constructed by 2030, in the timeframe following the BRAC action. Specific order and timeline will depend on funding and priorities.

Table 4.3-9
List of Improvements beyond the Constrained Long-Range Plan

TRANSACTION 2030 - BEYOND CLRP	From (where applicable)	To (where applicable)	Map #
Corridor 8 - I-95/I-395/U.S. Route 1			
Highways			
Construct U.S. Route 1 interchange	Rippon Boulevard/Dale Boulevard		
Construct U.S. Route 1 interchange	Fairfax County Pkwy, Kings Hwy, Huntington Ave./Ft Hunt Rd		1
U.S. Route 1/Neabsco Creek Bridge, widen	VA 610 (Neabsco Road)	VA 638 (Neabsco Mills Road)	
Transit			
Metro Extension	Springfield	Potomac Mills	4
High capacity transit along U.S. Route 1	Alexandria	the Pentagon	
Corridor 5 - Fairfax County Parkway			
Highways			
Route 7100 (Fairfax County Parkway), construct interchanges	Rolling Road, Pohick Road		2
Transit			
Implement Corridor-Wide Priority Bus Service			3
Fairfax County Transportation Plan–beyond CLRP	**From**	**To**	**Map #**
Highways			
Improve Old Colchester Road	U.S. Route 1	Southern terminus	5
Widen Telegraph Road	Beulah Street	I-495 Capital Beltway	6
Improve Old Telegraph Road	North and south of Hayfield	North and south of Hayfield	7
Improve I-95/Route 7100 interchange			8
Route 7900 (Franconia-Springfield Parkway), construct interchange	Neuman Street		
Widen Rolling Road–Pohick Road	Route 7100	U.S. Route 1	9
Widen Lorton Road	Laurel Hill area	U.S. Route 1	10
Widen Silverbrook Road	Laurel Hill area	Lorton Road	11
Transit			
Construct LRT along U.S. Route 1	Fort Belvoir	Huntington Metrorail Station	12

Note: The above projects are beyond the funding constraints as identified in the CLRP. Projects may/may not occur by 2030 depending on funding source. For example, Fairfax County may proceed to widen Telegraph Road without funding from FHWA or VDOT. No commitments have been given to these projects.



LEGEND
Roadways
River/ Water

Transportation Improvements Identified by State and County Transportation Plans

Fort Belvoir, Virginia

Figure 4.3-13

construction, development, or study in the next 6 fiscal years. The program is updated annually. The CTB has updated the VDOT Six-Year Improvement Program, which identifies the roadway improvements to be identified in the next six years.

Fairfax County Capital Improvement Program (CIP). The CIP is Fairfax County's 5-year roadmap for creating, maintaining, and funding present and future infrastructure requirements. While the program serves as a long-range plan, it is reviewed and revised annually. When adopted, the CIP provides the framework for the County Executive and the County Board of Supervisors with respect to managing bond sales, investment planning, and project planning. Fairfax County's CIP includes not only a 5-year plan but a future outlook with potential long-term requirements.

Constrained Long Range Plan (CLRP). The CLRP is a comprehensive plan of transportation projects and strategies that the Metropolitan Washington Transportation Planning Board realistically anticipates can be implemented over the next 25 years. The major highway, HOV, and transit improvements and major studies are identified in the plan, which is updated annually. These projects cover the metropolitan Washington region, including a portion of Virginia.

Fairfax County Comprehensive Plan. This plan is required by state law to be used as a guide in decision-making about the built and natural environment by the County's Board of Supervisors and other agencies, such as the Planning Commission and the Board of Zoning Appeals. It is also a guide for county staff and the public to use in the planning process. The Fairfax County Transportation Plan is an element of the Fairfax County Comprehensive Plan and serves as a guide for long-range transportation development in the county. The county makes modifications to the Comprehensive Plan, including the Transportation Plan, through a continual plan review process. The county recently completed a comprehensive review of the Transportation Plan to provide an updated outlook for the county's vision for the transportation system.

TransAction 2030. This plan, sponsored by the Northern Virginia Transportation Authority, was a regional transportation planning effort covering the counties of Arlington, Fairfax, Loudoun, and Prince William and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park. TransAction 2030 is a study that identified the short-, medium-, and long-term transportation needs in Northern Virginia and the specific improvements that should be pursued to meet those needs.

Between November 2006 (baseline period) and 2011, the existing conditions that have been discussed in this section can be expected to change. Projects in the VDOT Six-Year Improvement Program and the Fairfax County CIP are assumed to be completed within their respective time frames. Moreover, upon their completion, the projects become part of the baseline for modeling effects of the Army's proposed action and alternatives, beginning in 2011. Projects identified in the recommendations of transportation planners, especially those outside the 6-year planning horizon, are also considered in cumulative effects analyses.

4.3.3 NO ACTION ALTERNATIVE

This section presents the projected traffic conditions for the 2011 No Action Alternative.

Section 4.3.2 describes existing conditions as of 2006 (the existing conditions used the 2006 analysis year because the data collection effort for intersection turning movement counts was conducted in the first part of 2006). The proposed action, however, would not be fully implemented until 2011. Between 2006 and 2011, several transportation-related changes can be

expected to occur, independently of the proposed action, thus shifting the baseline for transportation analysis from 2006 to 2011, with the latter typically being referred to as the *opening year*. The transportation review agencies require that this opening year be used as the analysis year.

The 2011 opening year of the proposed action includes transportation projects expected to be operational by that time. Also, regional population and economic growth are factored into the MWCOG model in the out-years. Doing so recognizes a more appropriate baseline (2011) for comparison of effects associated with the alternatives. This approach is consistent with methodologies typically employed within the transportation planning community.

The following section identifies transportation projects expected to occur before 2011.

4.3.3.1 Planned Transportation Projects

On the regional roadway network, several projects that would increase roadway capacity are ongoing or can be expected to begin in the near future. Table 4.3-10 lists these projects within the Fort Belvoir study area.

These projects will be needed to address the continued growth expected in Northern Virginia and the Washington metropolitan area; however, they are not expected to alleviate the congestion because highway improvements have generally not kept pace with the growth in the region. Implementing these projects represents the changed baseline for analysis of the No Action Alternative.

4.3.3.2 Fort Belvoir Main Post Roadway Network

Fort Belvoir would widen or construct new roadway links before 2011, regardless of the proposed action. These projects, as illustrated in Figure 4.3-14 by letter, include the following:

a. Widening of Gunston Road from 2 to 4 lanes between 12th Street and John J. Kingman Road, to include a widened grade-separation over U.S. Route 1.

b. Widening of Belvoir Road from 2 to 4 lanes between 12th Street and U.S. Route 1.

c. Widening of 9th Street from 2 to 4 lanes between Gunston and Belvoir Roads.

d. Constructing a new access control point to serve North Post.

These transportation improvements would improve traffic flow on the Main Post. The biggest improvement is likely to be the widening of Gunston Road. This widening would improve the connectivity between North and South Post and improve traffic flow.

4.3.3.3 The Transit System

No major changes to the transit services within the study area are planned during the period 2006 to 2011. VRE is examining the potential to add a third track between the Lorton area and Alexandria to address current issues with service reliability because of the sharing of the CSX freight rail line tracks. The third line would improve on-time service reliability and allow for future headway improvements on VRE (headway is defined as the amount of time between trains, i.e., a 5 minute headway means that a train leaves every 5 minutes). Metro is not planning to extend either the Blue or Yellow Lines.

Table 4.3-10
Projects assumed to be completed by 2011

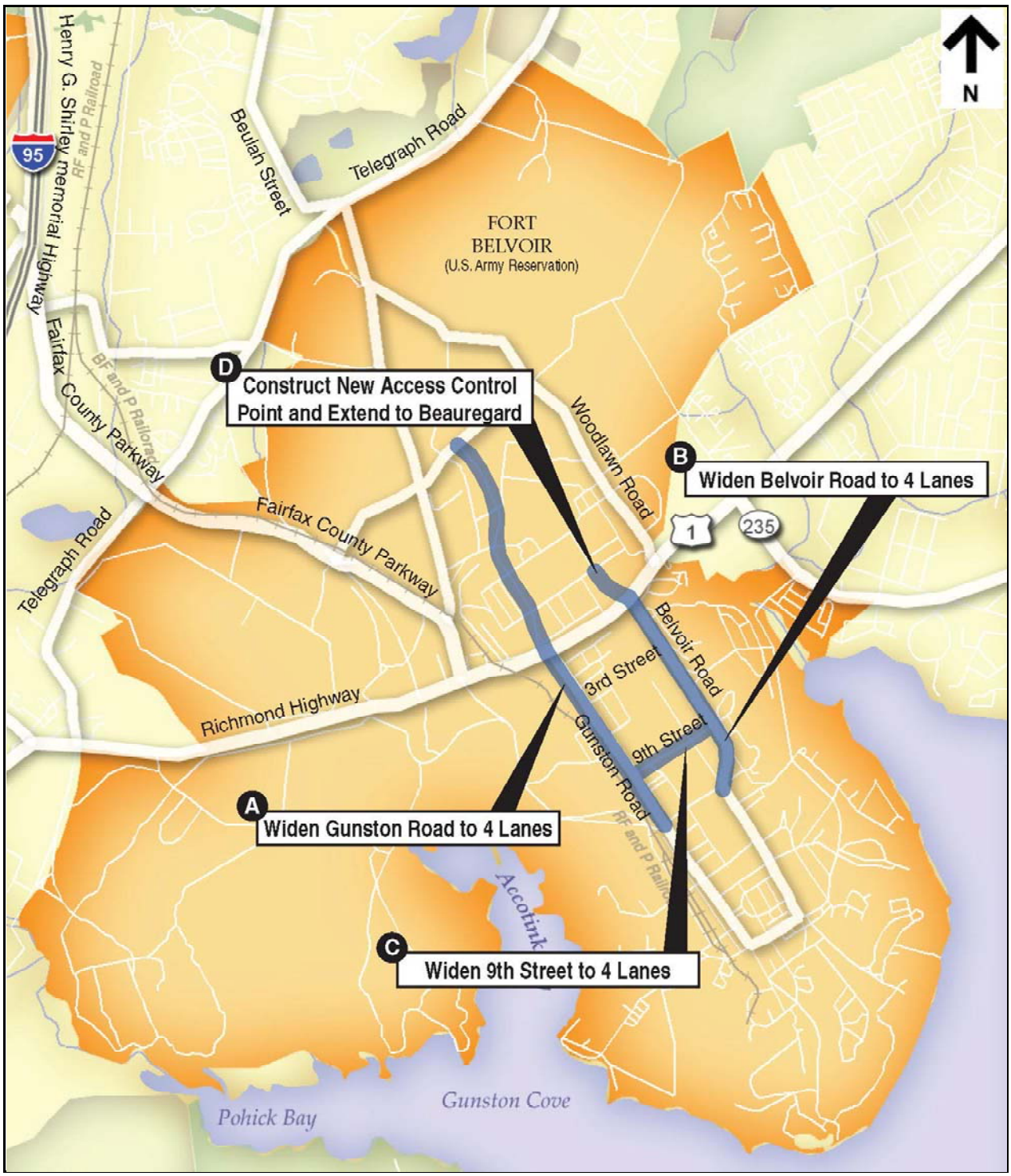
VDOT 6-Year Improvement Program	From (where applicable)	To (where applicable)	Map #
Reconstruct I-95/I-395/I-495 interchange (Phase II-VII)			1
VA 7100 (Fairfax County Parkway), construct 4 lanes	Rolling Road	Fullerton Road	2
VA 645 (Burke Lake Road)	VA 643 (Lee Chapel Road)	VA 7100 (Fairfax County Parkway)	
U.S. Route 1 (3 lanes NB, 4 lanes SB)	Lorton Road	Telegraph Road	
U.S. Route 1 (4 to 6 lanes)	Armistead Road	Lorton Road	
VA 642 (Lorton Road)	VA 600 (Silverbrook Road)	U.S. Route 1 (Richmond Highway)	10
VA 123 (complete widening to 6 lanes & widen Occoquan Bridge crossing)	VA 722 North	Hooes Road	
I-95 (provide fourth lane)	Newington	VA 123	5
I-95 (Wilson Bridge and approaches)	U.S. Route 1	MD 210	
I-95 (Wilson Bridge and approaches)	VA 241 (Telegraph Road)	U.S. Route 1	
Construct interchange at U.S. Route 1 and Route 123			
Widen U.S. Route 1 from 4 to 6 lanes at Neabsco Creek			
Transit–U.S. Route 1 Bus Priority Project			12
Trails–Bike trails/routes	throughout Fairfax County		
Fairfax County CIP (spot improvements)			
Additional turn lane for NB U.S. Route 1 left turn movement at Engleside Post Office			
Provide turn lanes at Harrison Lane and South Kings Highway			
Additional turn lane for the left turn movement from Mount Vernon Highway onto U.S. Route 1 (toward Pence Gate)			
Additional turn lane for SB Roberts Road left turn movement at Braddock Road			
Four Park & Ride lots along Franconia-Springfield Parkway, one on Gambrill Road, one on Sydenstricker Road, and two on Backlick Road			
New structured parking at Burke Centre VRE station to replace the existing 614 spaces with 1290 structured parking spaces and 235 surface parking spaces			
U.S. Route 1 Public Transit initiatives			
New structured parking at Huntington Metro station to replace and expand existing parking. This improvement will increase the total parking spaces from 925 to 1,425.			
FHWA funding (federal project)	**From**	**To**	
New Connector Road—Extend Old Mill Road to provide connection from U.S. Route 1 to Telegraph	Pole Road	Telegraph Road	4

Note: Map numbers refer to Figure 4.3-13

Overall, bus services are expected to remain similar to current services. Note that service providers routinely examine and readjust their services as needed to provide their clientele with better service options and to respond to changes in demand.

4.3.3.4 Travel Patterns

It is assumed that the current distribution of Fort Belvoir employees' residential locations will remain constant. Over the next 5 years, the region will continue to grow in both population and



Assumed Main Post Improvements Under the No Action Alternative

Fort Belvoir, Virginia

Figure 4.3-14

employment. This growth, in turn, will increase the productions and attractions, which means that the total number of trips will increase. Several observations can be made from the following tables. The population of the Laurel Hill district will nearly double from 2006 to 2011 under the No Action Alternative, and the population within the study area increases by more than 10 percent. The large increase in Laurel Hill can potentially increase the number of trips on the I-95 corridor through the study area. The net increase to the study area employment under the No Action Alternative is less than half of the employment that would occur at Fort Belvoir (Main Post and BRAC) as a result of the proposed action. Tables 4.3-11 and 4.3-12 present the population, employment, productions, and attractions for the No Action Alternative in 2011.

Table 4.3-11
Population and employment for the existing conditions (2006) and 2011 No Action Alternative

	Population		Employment	
District	**Existing**	**No Action**	**Existing**	**No Action**
Laurel Hill	13,470	25,121	3,547	3,996
Pohick	50,826	51,766	3,648	3,849
Lorton South of U.S. Route 1	14,476	18,200	9,067	11,233
I-95 Industrial Area	2,092	2,175	8,605	8,683
Franconia-Springfield Transit Area	2,727	2,821	5,940	6,764
Springfield Community Business Center	1,306	1,483	2,074	2,141
Springfield	31,263	32,201	10,850	11,387
EPG	0	0	45	45
Mason Neck	2,785	5,552	438	464
Fort Belvoir (Main Post)	7,623	7,623	23,266	23,267
Mount Vernon	93,783	102,230	19,681	21,457
Rose Hill	67,179	70,513	20,352	23,157
Total Study Area	287,530	319,685	107,513	116,443
Rest of Virginia	2,142,682	2,399,710	1,258,264	1,427,055
Maryland	3,318,699	3,483,648	1,723,958	1,870,517
District of Columbia	583,733	615,375	752,719	790,205
West Virginia	47,735	52,555	15,173	17,191
Other States	0	0	0	0
Total Outside Study Area	6,092,849	6,551,288	3,750,114	4,104,968
Regional Total	**6,380,379**	**6,870,973**	**3,857,627**	**4,221,411**

Source: VHB, 2006.

In the No Action Alternative in 2011, Fort Belvoir represents 2.4 and 20.0 percent of the population and employment in the study area, respectively; however, Fort Belvoir accounts for only 3.9 percent of the attractions in the study area. This value is a slight decrease compared to existing conditions (2006). The reason for this change is that the region continues to grow, while little change would occur at Fort Belvoir. The ratio of jobs to population within the study area is 0.36, or 36 jobs to 100 residents, in both 2006 and 2011. Figure 4.3-15 presents the population and employment for the study area. Generally, the ratio of population and employment stays the same as in existing conditions for all districts. The population in Laurel Hill and Mason Neck almost doubles.

Table 4.3-12
Productions and attractions for the existing conditions (2006) and 2011 No Action Alternative

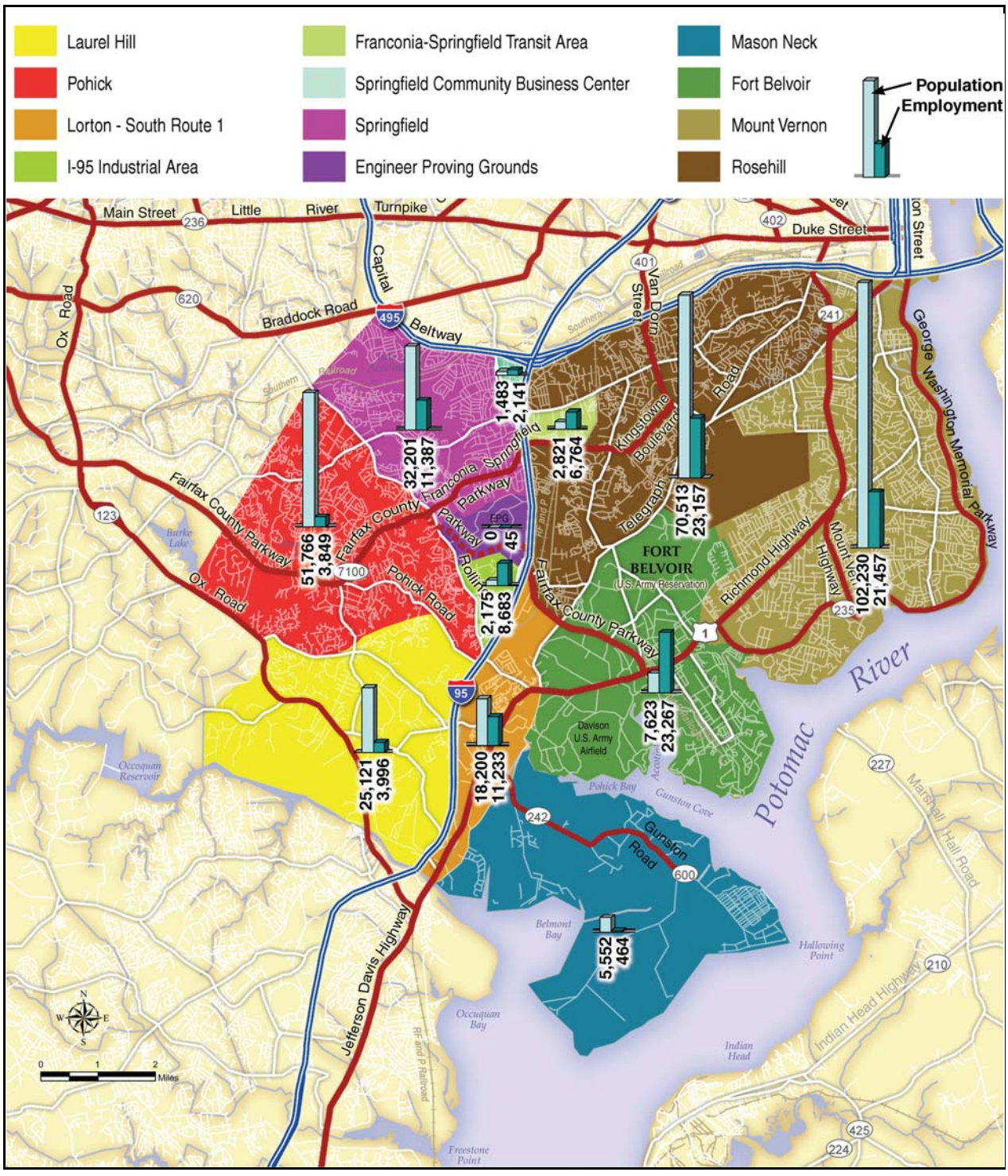
	Productions		Attractions	
District	**Existing**	**No Action**	**Existing**	**No Action**
Laurel Hill	31,891	52,247	31,825	52,327
Pohick	109,597	110,862	109,719	110,848
Lorton South of U.S. Route 1	43,441	55,677	43,430	55,560
I-95 Industrial Area	20,802	20,880	20,753	20,969
Franconia-Springfield Transit Area	37,799	41,046	38,044	41,275
Springfield Community Business Center	11,586	12,158	11,601	12,053
Springfield	98,365	101,148	98,274	101,153
EPG	81	89	87	102
Mason Neck	5,979	11,012	5,948	10,998
Fort Belvoir (Main Post)	35,176	35,177	35,342	35,343
Mount Vernon	250,418	271,298	250,606	271,297
Rose Hill	184,223	197,462	184,200	197,283
Total Study Area	829,357	909,055	829,830	909,209
Rest of Virginia	6,952,561	7,768,560	6,952,125	7,768,134
Maryland	10,587,588	11,254,561	10,586,616	11,252,945
District of Columbia	1,572,672	1,614,479	1,572,360	1,614,396
West Virginia	153,721	172,023	153,849	172,056
Out of State	715,116	828,980	716,236	830,919
Total Outside Study Area	19,981,658	21,638,603	19,981,186	21,638,450
Regional Total	**20,811,015**	**22,547,658**	**20,811,015**	**22,547,658**

Source: VHB, 2006.

Fort Belvoir represents approximately 3.2 percent of the total employment within Fairfax County in 2011. Within TransAction's Corridor 8, the I-95/U.S. Route 1 corridor, Fort Belvoir represents approximately 5.5 percent of the total employment. This corridor is the main route for Fort Belvoir employees. Table 4.3-13 presents the internal trips to the study area, external trips destined to the study area, and external trips that originate within the study area. Like the existing conditions, internal trips account for less than half of the trips that have an origin or destination in the study area. The table does not include external trips that pass through the study area.

4.3.3.5 Performance under Expected Conditions (2011)

Under the No Action Alternative, the region is expected to continually grow, with little changes occurring at Fort Belvoir. Therefore, an increase in traffic volumes on roadways surrounding Fort Belvoir and EPG would occur naturally and not be caused by Fort Belvoir. Several projects are expected to be completed by 2011 that would improve transportation flows near the study area.



LEGEND

- Interstate Highway
- Highway
- River/ Water

Population and Employment for the 2011 No Action Alternative

Fort Belvoir, Virginia

Figure 4.3-15

Table 4.3-13
Study area trips – 2011 No Action Alternative

Time	Internal Trips Within Study Area	External Trips Ending in Study Area	External Trips Beginning in Study Area
AM Peak	73,797	58,621	77,863
PM Peak	135,590	109,426	93,733
Off-Peak	324,713	207,062	203,359
Daily	**534,100**	**375,109**	**374,955**

Congestion along the I-95 corridor is not expected to increase by 2011 under the No Action Alternative. A series of roadway improvement projects will increase capacity along the I-95 corridor through the study area; however, the region will continue to grow, so the increased capacity will be offset by the increased demand. Thus, the overall congestion levels will remain similar to existing conditions. The I-95 Fourth Lane project will be completed before the BRAC action and the Springfield Interchange (up to construction Phase 8, which is on hold) will be completed in 2007. The Woodrow Wilson Bridge is also slated to be completed sometime in 2011. These projects will add capacity to the road network within the study area. Any bottlenecks upstream or downstream of these transportation improvements, however, would limit the benefit of this roadway improvement.

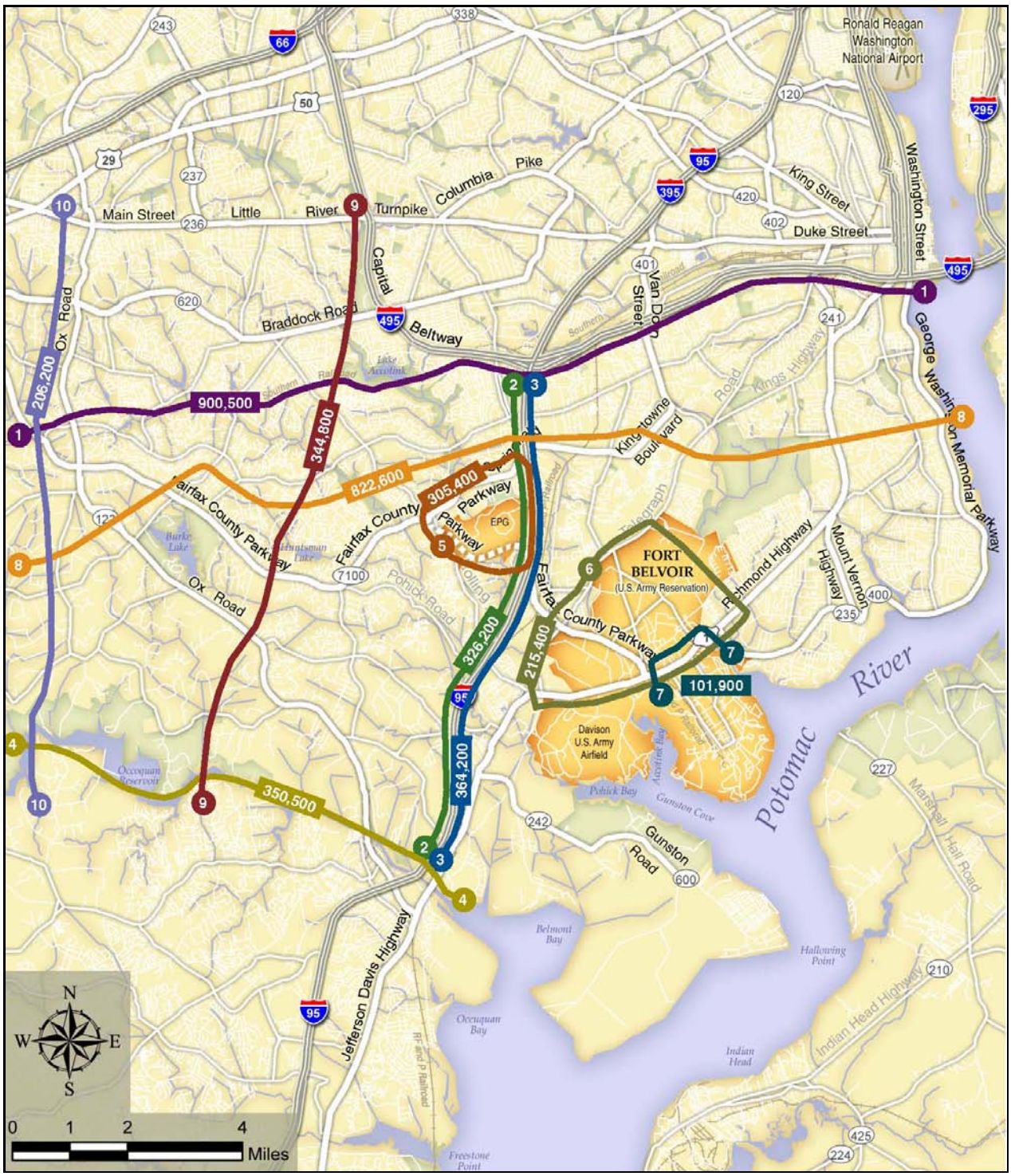
Increased traffic volumes along U.S. Route 1 will increase the hours of congestion on that roadway by one-half to one hour. Because of the increase of traffic volumes on regional roadways and roadways adjacent to Fort Belvoir, the intersection LOS will deteriorate, impeding access to and egress from Fort Belvoir. This impediment will increase travel times for personnel exiting from Fort Belvoir in the evening.

The biggest effect to the transportation system is the addition of the Fairfax County Parkway through the EPG site. This segment creates a new transportation link and diverts trips from I-95 and the Capital Beltway. Figure 4.3-16 presents the screen line volumes for the No Action Alternative

As the region continues to grow, the traffic volumes on the roadways will continue to increase, as shown by comparing the screen lines in the above figure to those of the existing conditions. Only Screen Line 7 experiences a decrease of traffic volumes; this change is from the addition of the new Connector Road along the eastern boundary of North Post linking U.S. Route 1 to Telegraph Road. The new road will cause a redistribution of east-west trips across the roadway facilities surrounding the study area and divert some trips away from U.S. Route 1 through Fort Belvoir.

Intersection operational analyses were performed at 23 key intersections within the study area for the No Action Alternative. The summary of the turning movement counts for the No Action Alternative can be found in Table D-2 and Figures D-3 and D-4 in Appendix D. The results of the analyses are summarized in Table 4.3-14.

As shown in Table 4.3-14 and compared to 2006 existing conditions, regional growth will continue to deteriorate LOS at a number of intersections within the study area. For instance, the 2006 AM Peak Hour V/C for the U.S. Route 1/Backlick—Pohick intersection (*downtown Accotink*) of 0.85 will increase to 0.97 by 2011 and LOS will degrade from C to D. The 2006 PM peak hour V/C of 0.99 for the Fairfax County Parkway/John. J. Kingman intersection will



Daily Screen Line Volumes under The 2011 No Action Alternative

Fort Belvoir, Virginia

Figure 4.3-16

Table 4.3-14
Intersection measures of effectiveness–2011 No Action Alternative

	AM peak hour			PM peak hour		
Intersection location	**V/C**	**LOS**	**Delay**	**V/C**	**LOS**	**Delay**
Commerce St./Amherst Ave.	0.72	D	35.3	0.85	D	48.0
Commerce St./Backlick Rd.	0.38	C	29.9	0.75	D	46.8
Backlick Rd./Calamo St.	0.73	B	12.3	0.80	C	23.7
Loisdale Rd./Spring Mall Dr.	0.47	C	24.0	0.86	D	40.2
Franconia Springfield Parkway/Spring Village Dr.	1.06	E	66.3	1.09	F	90.1
Franconia Springfield Parkway EB Ramp/Backlick Rd.	0.99	E	66.9	0.79	D	37.9
Franconia Springfield Parkway WB Ramp/Backlick Rd.	0.66	B	10.3	0.90	C	24.1
Franconia Springfield Parkway/I-95 HOV Ramps	1.01	E	56.5	1.41	F	185.2
Franconia Springfield Parkway EB Ramp/Frontier Dr.	0.82	C	29.2	0.87	D	50.3
Franconia Springfield Parkway WB Ramp/Frontier Dr.	0.50	C	33.8	0.78	F	93.0
Franconia Springfield Parkway/Beulah St.	1.12	F	116.0	1.34	F	153.9
Fairfax County Parkway/Terminal Rd.	0.93	C	26.4	0.87	B	19.2
Fairfax County Parkway SB Ramps/Telegraph Rd.	0.57	C	20.8	0.87	C	31.1
Fairfax County Parkway NB Ramps/Telegraph Rd.	0.62	B	15.2	0.78	C	23.1
Fairfax County Parkway John J. Kingman Rd.	0.79	D	45.7	1.16	F	112.8
Telegraph Rd./Beulah St.	0.66	D	37.0	0.67	C	30.3
Telegraph Rd./S. Van Dorn St.	0.91	C	29.3	1.02	D	44.2
U.S. Route 1/Telegraph Rd. - Old Colchester Rd.	0.82	D	54.4	0.77	E	76.7
U.S. Route 1/Fairfax County Parkway	0.96	D	38.8	0.89	D	35.9
U.S. Route 1/Backlick Rd.—Pohick Rd.	0.97	D	37.0	1.12	F	129.9
U.S. Route 1/Belvoir Rd.	0.83	B	19.3	0.59	B	12.0
U.S. Route 1/Old Mill Rd.	0.86	E	65.1	0.89	E	57.8
Loisdale Rd./GSA Access Rd.	0.64	A	6.5	0.42	A	5.0

Note: Delay represents the average number of seconds a vehicle is delayed from free-flow conditions.

increase to 1.16 by 2011 and the time delay per vehicle will rise from 83.6 seconds to 112.8 seconds, an increase of 35 percent. The growth in non-fort traffic would cause five intersections in the AM and five in the PM to deteriorate by a letter grade, including one intersection from an E under existing conditions to an F under expected conditions for the No Action Alternative.

Intersections where improvements could potentially be needed to reduce future congestion and delays include the following:

- Franconia-Springfield Parkway at Spring Village Drive/Bonniemill Lane
- Franconia-Springfield Parkway at Beulah Street
- Fairfax County Parkway at John J. Kingman Road
- U.S. Route 1 at Backlick and Pohick Roads

Subsequent analyses in this section of the document compare the Army's Preferred Alternative and other alternatives to the conditions of the No Action Alternative set forth above.

4.3.4 ENVIRONMENTAL CONSEQUENCES OF THE PREFERRED ALTERNATIVE

4.3.4.1 Land Use Plan Update

No effects would be expected. Adopting a revised land use plan would not, in the absence of additional activities such as facilities' development and increased population, result in effects to the transportation system. Effects to the transportation system would not occur until further development occurred in accordance with the terms of the new land use plan. The Preferred Alternative Land Use Plan would add the EPG to the inventory of actively managed resources. Inclusion of this area within the planning regime would not, by itself, affect the transportation system unless and until development occurred at the site. Similarly, an alternative location for the troop area at Fort Belvoir would have negligible effects, or none, on the transportation system.

4.3.4.2 BRAC Implementation and Facilities Projects

Long-term significant adverse effects would be expected. Implementing the Preferred Alternative, when compared to the No Action Alternative set forth in Section 4.3.3, would worsen traffic conditions in the immediate vicinity of Fort Belvoir. From the regional perspective, implementation would produce a combination of minor (negligible) adverse and beneficial effects. This section will further discuss and present the impacts at the localized level.

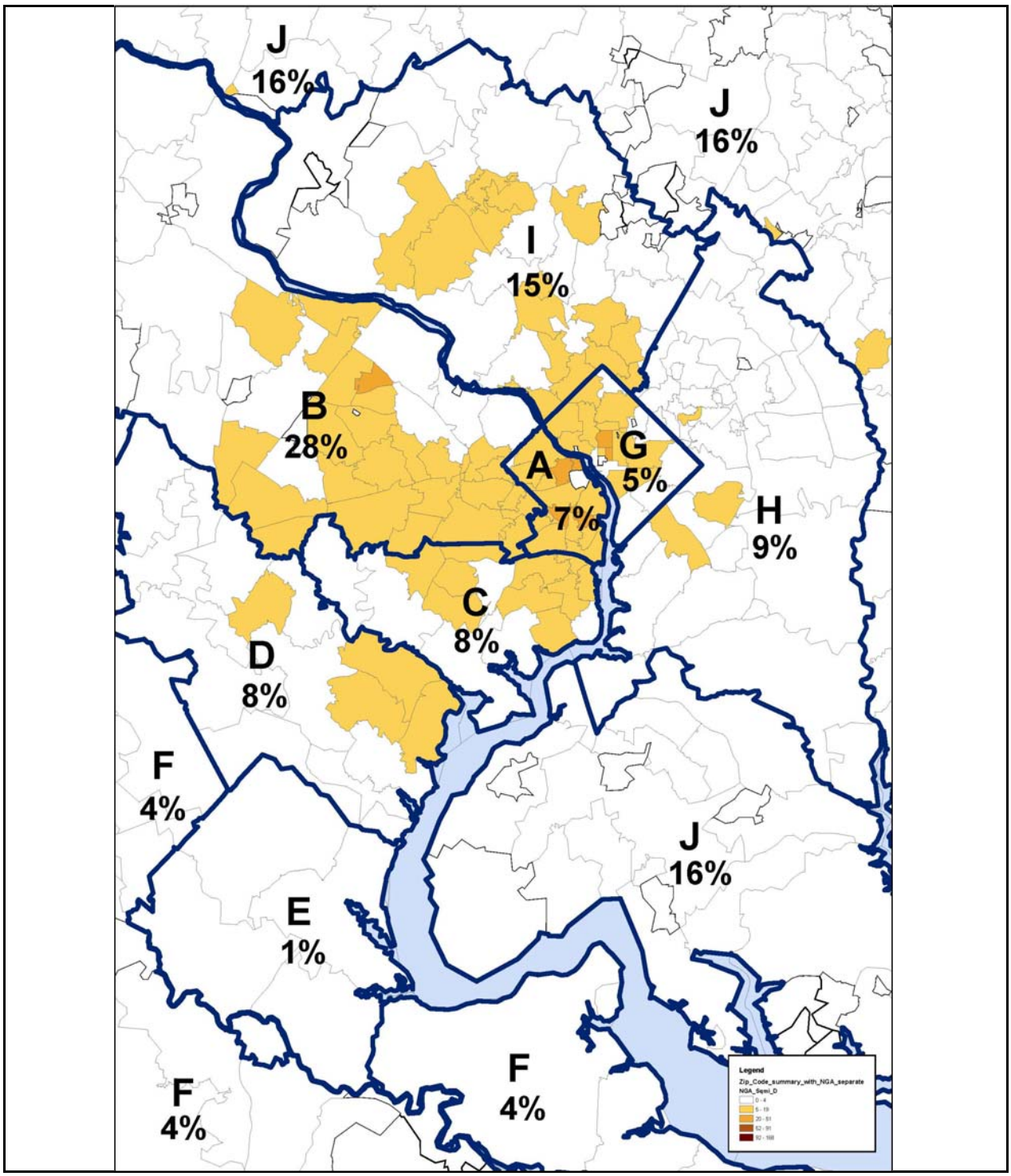
Under the Preferred Alternative, NGA and WHS would be on EPG. A new hospital would be constructed on South Post. Army Lease, PEO EIS, and MDA would also be on South Post in a combination of existing and new facilities. The BRAC action would increase total employment levels on the Main Post and EPG by approximately 22,000 personnel, with slightly fewer than 18,000 of the personnel being assigned to EPG. The following subsection discusses and evaluates the effects to the transportation system that would occur as a result of assigning these additional personnel to the specific portions of the post.

4.3.4.2.1 Travel Patterns to and from Fort Belvoir

Existing travel patterns were examined using the following sources:

- MWCOG's Cooperative Land Use Forecast (Round 7, revised)
- A survey conducted on the approximately 23,000 Fort Belvoir employees in December 2002
- Zip code surveys provided by the NGA
- A survey of incoming DoD agencies completed by the Fort Belvoir BRAC office
- Residential and duty locations from the DoD's payroll register for the NCR as of August 2006

Figure 4.3-6 showed the distribution of residential locations for existing employees at Fort Belvoir in August 2006. Figure 4.3-17 shows the distribution of residences for current NGA employees, and Figure 4.3-18 shows the distribution of residences for the DoD employees (WHS and others) reporting to work in Crystal City, Pentagon City, the Pentagon, and Rosslyn. Table 4.3-15 presents the assumed existing distribution based on the data received from the various agencies.

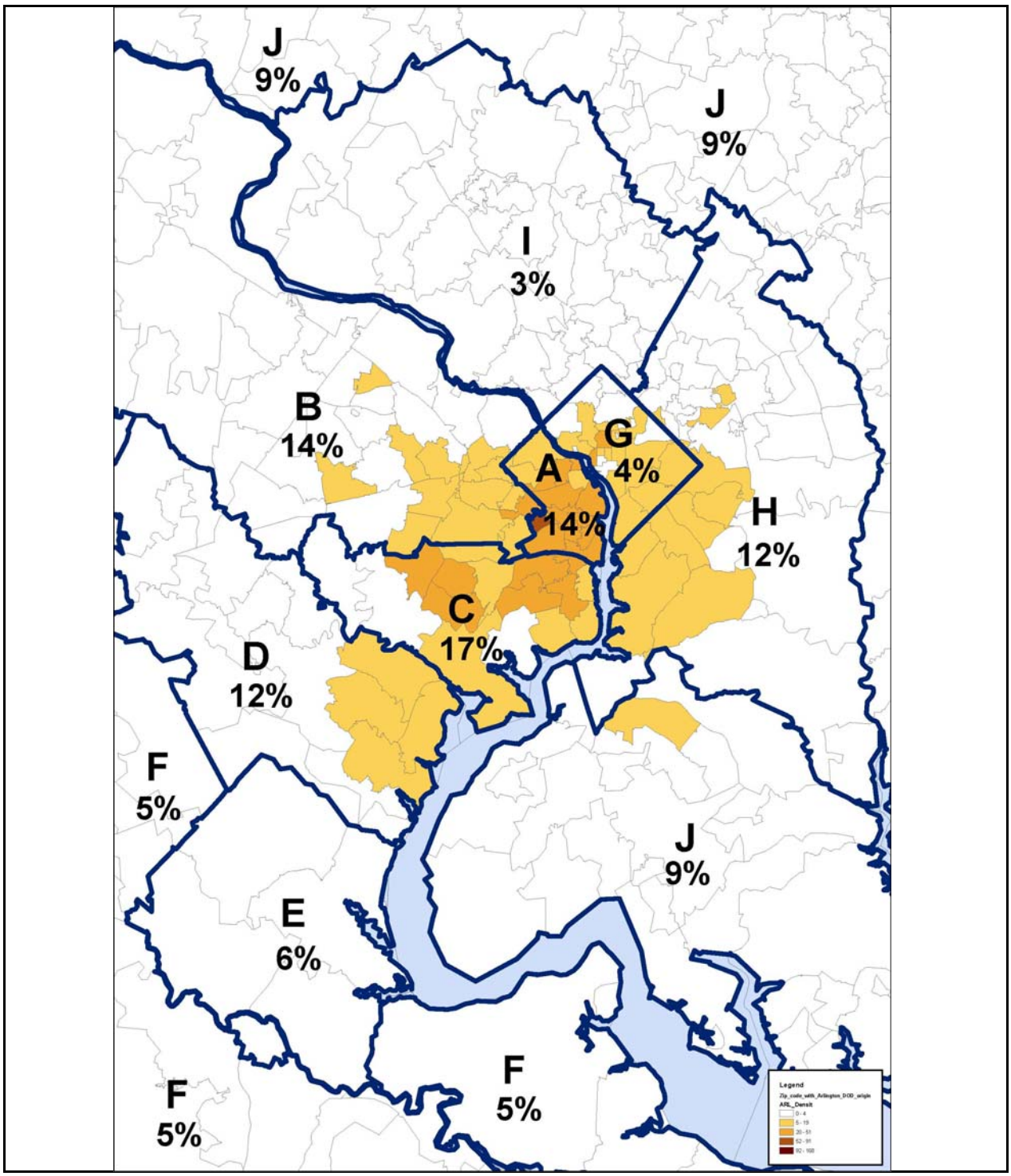


Note: Employee Density within Zip Code Boundary (Employee/sq.mi.) based on payroll data

Current Residential Distribution of NGA Employees

Fort Belvoir, Virginia

Figure 4.3-17



Note: Employee Density within Zip Code Boundary (Employee/sq.mi.) based on payroll data

Current Residential Distribution of WHS and DoD Employees

Fort Belvoir, Virginia

Figure 4.3-18

Table 4.3-15
Existing residential locations of Fort Belvoir, WHS/DoD, and NGA employees

District	Location	Residential distribution of Fort Belvoir employees[a]	Residential distribution of WHS and DoD (Arlington) employees[a]	Residential distribution of NGA employees[b]
A	Arlington/Alexandria	4%	14%	7%
B	Northern Fairfax Co. and Loudoun Co.	7%	14%	28%
C	Southern Fairfax Co.	37%	17%	8%
D	Prince William Co.	22%	12%	8%
E	Near South	9%	6%	1%
F	Remainder of Virginia	7%	5%	4%
G	District of Columbia	1%	4%	5%
H	Prince Georges Co.	5%	12%	9%
I	Montgomery Co.	1%	3%	15%
J	Remainder of Maryland	3%	9%	16%
K	Non DC, MD, VA	4%	4%	1%
	TOTAL	**100%**	**100%**	**100%**

Notes:

[a]Information based on employee data provided on September 20, 2006 from DoD.

[b]NGA ZIP Code Study Data, dated June 20, 2006 and received August 22, 2006.

Percentages are based on review of payroll data and survey results for 10,548 Fort Belvoir employees, 19,004 WHS/DoD employees, and 3,243 NGA employees.

It can be expected that the residential locations of employees of NGA, WHS, and other incoming agencies affected by BRAC (hospital, MDA, PEO EIS) would shift, becoming similar to the patterns of current Fort Belvoir employees. The time frame for this shift to occur cannot be predicted, though it would be expected to take up to 10 to 15 years. For 2011 it was assumed that 50 percent of both NGA and WHS employees would adhere to their existing distribution and the remaining 50 percent would mimic the distribution of Fort Belvoir's existing employees. The net effect is that more trips would be northbound on I-95 destined for the BRAC sites than currently combined to Fort Belvoir, Arlington County, and the NGA sites. Table 4.3-16 presents the distribution of employees in 2011, given the assumption above. This future distribution under the Preferred Alternative is assumed the same for all four alternatives.

The consequence of the shifting travel patterns to the south is that traffic to Fort Belvoir (including EPG) northbound on I-95 would represent a larger portion of the overall traffic flow. Current highway facilities to the south would constrain the traffic flows if adequate roadway capacity is not provided.

The total number of trips within the region remains fixed as the regional employment total is held constant; it is the redistribution of employment that causes a shift in travel patterns. As discussed under travel demand modeling in Section 4.3.1.1, the net increase in traffic is noticeably less than the amount of traffic headed to or from the BRAC sites because of the rebalancing of productions (households) and attractions (employment) throughout the region resulting from the relocation of

Table 4.3-16
Assumed residential location of employees in Year 2011 due to the BRAC action

		Fort Belvoir employees		WHS & DoD employees		NGA employees	
District	Location	Number of employees	Percentage	Number of employees	Percentage	Number of employees	Percentage
A	Arlington/Alexandria	964	4.3%	855	9.2%	469	5.5%
B	Northern Fairfax Co. Loudoun Co.	1,561	6.9%	950	10.3%	1,466	17.2%
C	Southern Fairfax Co.	8,398	37.1%	2,488	26.9%	1,901	22.4%
D	Prince William Co.	5,018	22.2%	1,604	17.3%	1,268	14.9%
E	Near South	2,016	8.9%	674	7.3%	428	5.0%
F	Remainder of Virginia	1,684	7.4%	576	6.2%	471	5.5%
G	District of Columbia	262	1.2%	258	2.8%	251	3.0%
H	Prince Georges Co.	1,024	4.5%	749	8.1%	581	6.8%
I	Montgomery Co.	236	1.0%	205	2.2%	664	7.8%
J	Remainder of Maryland	685	3.0%	553	6.0%	817	9.6%
K	Non-DC, MD, VA	801	3.5%	349	3.8%	184	2.2%
	TOTAL	**22,650**	**100.0%**	**9,263**	**100.0%**	**8,500**	**100.0%**

employment to Fort Belvoir. In essence, the residential redistribution within the region would increase the portion of Fort Belvoir traffic that is coming up from the south during the AM peak period. A potential consequence of the additional Fort Belvoir traffic is that this traffic could force other trips to divert to other roadways to avoid any potential congestion on facilities adjacent to Fort Belvoir and EPG. For example, a person that currently would use I-95 and the Capital Beltway to reach the Dulles Corridor might use Route 123 instead as he chooses to divert away from BRAC traffic. This means that trips on other facilities could increase as trips are diverted.

Table 4.3-17 presents the population and employment levels, which is also illustrated in Figure D-5 in Appendix D, for the 2011 conditions for the Preferred Alternative. Table 4.3-18 presents the productions and attractions for the study area. Total study area employment increases by approximately 30 percent over existing conditions, compared to the study area growth of approximately 8 percent from existing conditions to the No Action Alternative.

Under the Preferred Alternative, Fort Belvoir's Main Post and EPG would represent 2.9 percent of the population and 33.4 percent of the employment within the study area, and the two sites account for only 8.6 percent of the attractions in the study area. The ratio of jobs to residents within the study area would be 0.43, or 43 jobs per 100 residents, an increase of 7 jobs per 100 residents over the No Action Alternative. Compared to the existing and No Action conditions, the percentage of employment at Fort Belvoir within the study area in the Preferred Alternative would be approximately 12 percent higher. This higher employment percentage within the study area would increase the number of trips to Fort Belvoir. The population would be less than one percent higher. The increased ratio, compared to the ration under the No Action Alternative, means that the study area would be closer to being balanced between jobs and population.

Table 4.3-17
Population and employment for existing conditions (2006), 2011 No Action Alternative, and 2011 Preferred Alternative

	Population			Employment		
District	Existing	No Action	Preferred	Existing	No Action	Preferred
Laurel Hill	13,470	25,121	25,121	3,547	3,996	3,996
Pohick	50,826	51,766	51,766	3,648	3,849	3,849
Lorton South of U.S. Route 1	14,476	18,200	18,200	9,067	11,233	11,233
I-95 Industrial Area	2,092	2,175	2,175	8,605	8,683	8,683
Franconia-Springfield Transit Area	2,727	2,821	2,821	5,940	6,764	6,764
Springfield Community Business Center	1,306	1,483	1,483	2,074	2,141	2,141
Springfield	31,263	32,201	32,201	10,850	11,387	11,387
EPG	0	0	0	45	45	18,794
Mason Neck	2,785	5,552	5,552	438	464	464
Fort Belvoir (Main Post)	7,623	7,623	9,387	23,266	23,267	27,959
Mount Vernon	93,783	102,230	102,230	19,681	21,457	21,457
Rose Hill	67,179	70,513	70,513	20,352	23,157	23,157
Total Study Area	287,530	319,685	321,449	107,513	116,443	139,884
Rest of Virginia	2,142,682	2,399,710	2,399,710	1,258,264	1,427,055	1,430,055
Maryland	3,318,699	3,483,648	3,483,648	1,723,958	1,870,517	1,870,517
District of Columbia	583,733	615,375	615,375	752,719	790,205	790,205
West Virginia	47,735	52,555	52,555	15,173	17,191	17,191
Other States	0	0	0	0	0	0
Total Outside Study Area	6,092,849	6,551,288	6,551,288	3,750,114	4,104,968	4,107,968
Regional Total	**6,380,379**	**6,870,973**	**6,872,737**	**3,857,627**	**4,221,411**	**4,247,852**

Source: VHB, 2006.

Fort Belvoir would represent approximately 6.1 percent of the total employment within all of Fairfax County in the Preferred Alternative. This value would be almost a doubling of the employment at the post over the No Action Alternative. Within transportation Corridor 8, Fort Belvoir would be approximately 10.4 percent of the total employment; a near doubling of the percentage within Corridor 8 over the No Action Alternative from implementing BRAC. Table 4.3-19 presents the internal trips to the study area, external trips destined for the study area, and external trips that originate within the study area. The table illustrates that most of the trips that have an origin or a destination within the study area originate from or are destined for points outside of the study area, as opposed to being an internal trip within the study area (i.e., a trip beginning and ending within the study area). The table does not include external trips that pass through the study area, such as a trip traveling on I-95 from Fredericksburg to Washington, DC. The proposed action would relocate jobs from Arlington County and other areas to Fort Belvoir, which would redistribute the trips within the region, which would cause some locations to decrease in volume compared to the No Action Alternative.

Table 4.3-18
Productions and attractions for existing conditions (2006), 2011 No Action Alternative, and Preferred Alternative

	Productions			Attractions		
District	**Existing**	**No Action**	**Preferred**	**Existing**	**No Action**	**Preferred**
Laurel Hill	31,891	52,247	52,416	31,825	52,327	52,413
Pohick	109,597	110,862	109,442	109,719	110,848	109,361
Lorton South of U.S. Route 1	43,441	55,677	55,022	43,430	55,560	54,842
I-95 Industrial Area	20,802	20,880	20,249	20,753	20,969	20,304
Franconia-Springfield Transit Area	37,799	41,046	40,705	38,044	41,275	40,803
Springfield Community Business Center	11,586	12,158	12,057	11,601	12,053	12,052
Springfield	98,365	101,148	100,143	98,274	101,153	100,316
EPG	81	89	25,609	87	102	26,298
Mason Neck	5,979	11,012	10,917	5,948	10,998	10,896
Fort Belvoir (Main Post)	35,176	35,177	55,308	35,342	35,343	54,831
Mount Vernon	250,418	271,298	269,647	250,606	271,297	269,691
Rose Hill	184,223	197,462	195,649	184,200	197,283	195,472
Total Study Area	829,357	909,055	947,163	829,830	909,209	947,278
Rest of Virginia	6,952,561	7,768,560	7,731,797	6,952,125	7,768,134	7,731,018
Maryland	10,587,588	11,254,561	11,239,590	10,586,616	11,252,945	11,238,401
District of Columbia	1,572,672	1,614,479	1,606,015	1,572,360	1,614,396	1,605,998
West Virginia	153,721	172,023	171,904	153,849	172,056	171,912
Out of State	715,116	828,980	829,168	716,236	830,919	831,029
Total Outside Study Area	19,981,658	21,638,603	21,578,474	19,981,186	21,638,450	21,578,359
Regional Total	**20,811,015**	22,547,658	22,525,637	20,811,015	22,547,658	22,525,637

Source: VHB, 2006

Table 4.3-19
Study area trips–2011 Preferred Alternative

Time	Internal trips within study area	External trips ending in study area	External trips beginning in study area
AM Peak	79,193	64,251	78,469
PM Peak	139,316	109,142	97,933
Off-Peak	342,747	212,629	209,505
DAILY	**561,256**	**386,022**	**385,907**

4.3.4.2.2 Performance under Expected Conditions

Few changes to Northern Virginia's transportation system are expected over the next 5 years, as identified in Section 4.3.3.1 because of funding shortfalls and the resulting delays in implementing long-term transportation plans. The modeling assumed that the off-post transportation improvement projects identified in the No Action Alternative are also included in the Preferred Alternative.

A key finding from the analyses of the Preferred Alternative is that EPG would need additional access points beyond the access points provided by the currently approved VDOT project to extend the Fairfax County Parkway through EPG as a four-lane facility. The assessment of available capacity (under the current funded roadway configuration) and the capacity needed is discussed further in this section.

Road Network. Use of the MWCOG model shows that increased traffic to and from Fort Belvoir accounts for up to 30 percent of the traffic flow on roadways adjacent to the gates (EPG entrances in the case of the Preferred Alternative) and quickly drops to under 10 percent of the traffic away from the gates as shown in Figures D-6 and D-7 in Appendix D. These figures illustrate the areas of influence under the Preferred Alternative.

Figures D-8 and D-9 show both the growth in traffic and the change in the traffic flow that would be due to BRAC at selected locations. To understand these graphics, the following explanation is provided, referring to the location "SB Beltway (Rte 236)." The purple and blue bars break out the total number of trips on the link into BRAC trips (726) and non-BRAC trips (13,730) that would occur on this roadway segment under the Preferred Alternative. The green and yellow bars break out the total trips on that link between the No Action Alternative (14,003) volume and the increase in volume that the link would exhibit due to the BRAC action (453). This illustrates that the total number of BRAC trips (726 on this specific link) is more than the increase of traffic volumes on the link, because some of the BRAC trips (273, which is the difference between the total BRAC trips and the growth) were already in the traffic stream, but with other destinations previously. The purpose of showing multiple locations is to illustrate that the growth on individual highway links is not as high as the total volume of BRAC traffic, because some of the BRAC traffic would already be in the traffic stream at those locations. Other factors that affect the growth of volumes on the links include the redistribution of trips onto other facilities and the rebalancing of productions and attractions because of the redistribution of residential locations.

The area of influence shows that the effect of BRAC traffic on roadways would diminish as one moves away from the sites. This decrease would be from traffic getting off and on at the interchanges along the roadways. Traffic volumes crossing the Occoquan River would increase over the No Action volumes on this link because of the residential patterns assumed for the modeling. Currently, most of the employees that work for the agencies being relocated commute north via I-95 and are already included in the traffic flow. Therefore, the increase in traffic across the Occoquan River that would occur with implementing BRAC would be from the assumed gradual relocation of residences as discussed previously.

The traffic volumes projected by the MWCOG model represent the best estimate of traffic given the current, long-range land use plans of the local jurisdictions. Concern has been expressed, however, that the relocation of jobs in such numbers would cause a ripple effect in the marketplace and the long-range plans of the local jurisdictions. In response to companies who desire to be close to government agencies, increased office development might be approved along with increases in housing density in surrounding areas. The current planning and travel demand

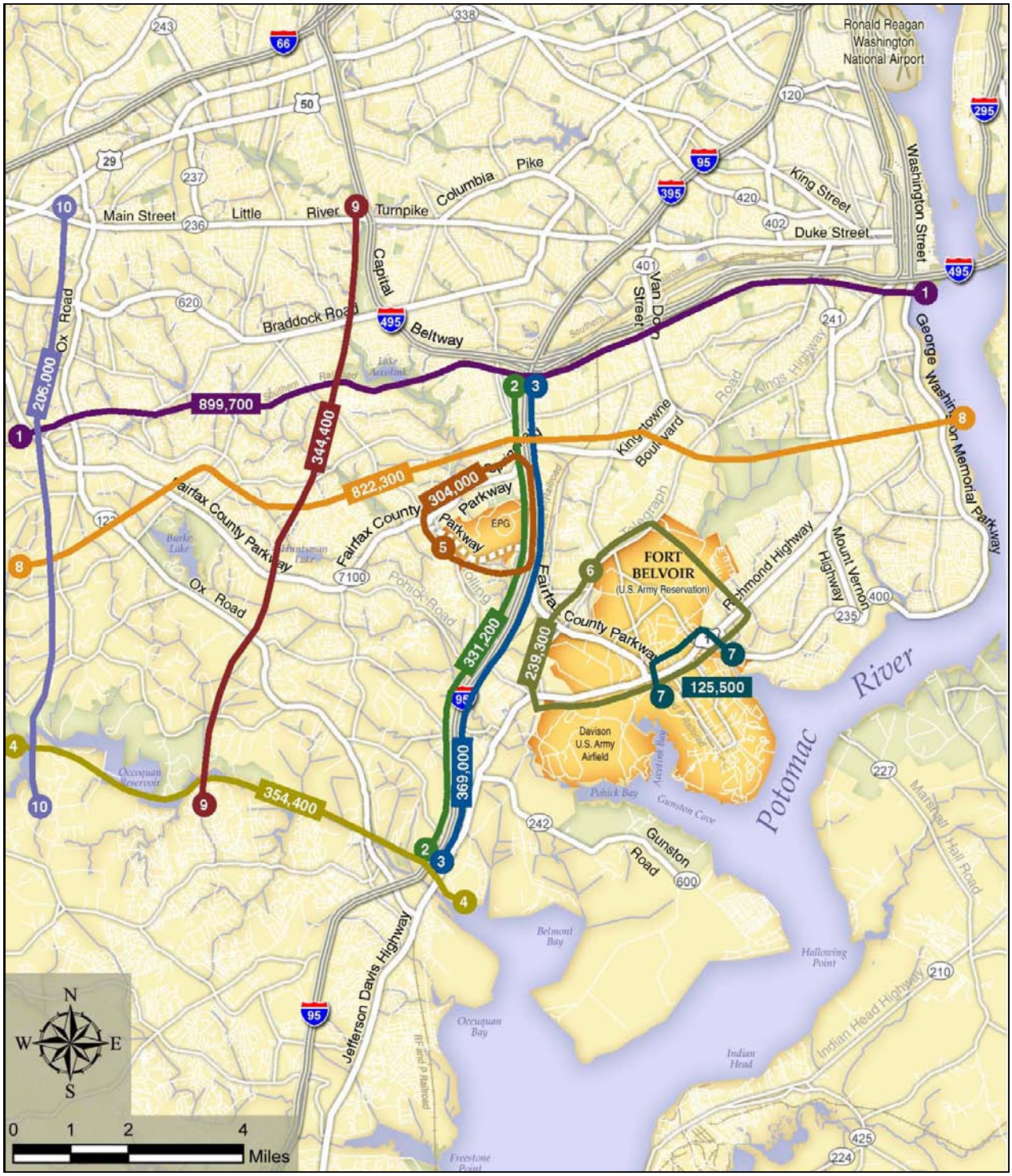
modeling process in Northern Virginia does not provide the information or tools to assess these types of potential changes.

Figure 4.3-19 provides another perspective on the changes in travel patterns. Total volumes crossing selected screen lines are shown. Again, the net effects on traffic volumes would decrease quickly as the distance from Fort Belvoir grows.

The screen lines north of EPG and Main Post show there would be slight decreases in traffic volumes over the No Action Alternative due to trips diverting from I-95 at the Fairfax County Parkway to travel to EPG or Fort Belvoir. Under the No Action Alternative, these trips would continue on I-95/I-395 to head to the Pentagon or other nearby employment centers. For instance, Screen Line 1 in the No Action Alternative shows a total daily two-way volume of 900,500 vehicles trips. Upon implementation of BRAC, that number would decrease to 899,700 two-way vehicle trips. This slight decrease is due to the redistribution of these trips from points in Arlington County to Fort Belvoir (Main Post and EPG). On the other hand, Screen Line 4 to the south shows an increase in daily volume from the No Action Alternative to the Preferred Alternative over the Occoquan River of approximately 5,000 two-way vehicle trips. This increase is due to the assumed gradual shift in employee residential location to the south. Moving closer to Fort Belvoir, the effect on adjacent roadway facilities is shown in Table 4.3-20, which show V/C ratios, LOS, and delay for 23 key intersections. The summary of the turning movement counts for the Preferred Alternative can be found in Table D-3 and Figures D-10 and D-11 in Appendix D.

The intersection measures of effectiveness would deteriorate over the No Action Alternative and existing conditions because the traffic volumes at these intersections would be higher from the additional employment. For instance, under the No Action Alternative, the V/C ratio at U.S. Route 1/Backlick-Pohick Roads in the AM peak hour is 0.97, the LOS is D, and the delay is 37.0 seconds. Upon implementation of the Preferred Alternative, in the AM peak hour for that intersection the analysis reveals a V/C ratio of 1.25, a LOS of F, and delay of 197.3 seconds. An example close to the EPG site would involve the Franconia-Springfield Parkway intersection with Spring Village Drive. At that location, under the No Action Alternative, the AM peak hour V/C ratio would be 1.06, the LOS would be E, and delays would be 66.3 seconds. Under implementation of the Preferred Alternative, in the AM peak hour for that intersection the V/C ratio would be 1.43, the LOS would be F, and there would be an average delay of 198.9 seconds per vehicle. A comparison of 2011 No Action Alternative and 2011 Preferred Alternative measures of effectiveness at selected intersections is provided in Table 4.3-21. Overall comparison of the expected operational performance of these intersections in the Preferred Alternative over the expected No Action Alternative, indicate that the LOS at nine intersections degrade by a LOS letter grade of one or more (i.e., from LOS D to LOS E). These intersections would be examples of intersections in which mitigating actions would reduce the effects from the Preferred Alternative.

The hours of congestion along the I-95 corridor are not expected to increase substantially over the duration of the No Action Alternative, because the growth in demand would be less than 5 percent if the BRAC action were to be implemented. Some localized congestion points might result with the increased traffic volumes within the I-95/Fairfax County Parkway interchange.



Daily Screen Line Volumes under The 2011 Preferred Alternative

Fort Belvoir, Virginia

Figure 4.3-19

Table 4.3-20
Intersection measures of effectiveness – 2011 Preferred Alternative

Intersection Location	AM Peak Hour[a]			PM Peak Hour[a]		
	V/C	LOS	Delay (seconds)	V/C	LOS	Delay (seconds)
Commerce St./Amherst Ave.	0.76	D	37.4	0.91	D	51.5
Commerce St./Backlick Rd.	0.41	C	30.6	0.78	D	50.6
Backlick Rd./Calamo St.	0.75	B	13.5	0.81	C	24.6
Loisdale Rd./Spring Mall Dr.	0.49	C	25.1	0.89	D	43.9
Franconia Springfield Parkway/Spring Village Dr.	1.43	F	198.9	1.31	F	146.5
Franconia Springfield Parkway EB Ramp/Backlick Rd.	1.00	E	68.2	0.82	D	41.8
Franconia Springfield Parkway WB Ramp/Backlick Rd.	0.91	B	11.9	0.92	C	22.0
Franconia Springfield Parkway/I-95 HOV Ramps	1.05	E	78.1	1.48	F	199.1
Franconia Springfield Parkway EB Ramp/Frontier Dr.	0.82	C	29.8	0.97	E	72.8
Franconia Springfield Parkway WB Ramp/Frontier Dr.	0.50	D	40.2	0.88	F	96.6
Franconia Springfield Parkway/Beulah St.	1.20	F	118.7	1.36	F	155.8
Fairfax County Parkway/Terminal Rd.	0.94	C	31.4	0.85	B	19.1
Fairfax County Parkway SB Ramps/Telegraph Rd.	0.57	C	20.2	0.70	C	30.6
Fairfax County Parkway NB Ramps/Telegraph Rd.	0.70	B	19.9	0.58	B	18.0
Fairfax County Parkway/John J. Kingman Rd.	0.85	D	36.3	0.70	F	140.8
Telegraph Rd./Beulah St.	0.60	D	46.8	1.27	C	30.6
Telegraph Rd./S. Van Dorn St.	0.91	D	53.2	1.05	D	48.2
U.S. Route 1/Telegraph Rd. – Old Colchester Rd.	0.82	E	55.2	0.75	E	59.1
U.S. Route 1/Fairfax County Parkway	1.10	F	89.4	0.94	D	37.5
U.S. Route 1/Backlick Rd. – Pohick Rd.	1.10	F	89.0	1.25	F	197.3
U.S. Route 1/Belvoir Rd.	1.18	E	77.8	0.89	C	29.1
U.S. Route 1/Old Mill Rd.	0.95	E	78.9	1.03	F	81.6
Loisdale Rd./GSA Access Rd.	0.71	A	7.2	0.49	A	5.0

[a]AM Peak Hour: 7:15 AM to 8:15 AM; PM Peak Hour: 4:30 PM to 5:30 PM.

The analyses assumed completion of the I-95 Fourth Lane Project. Even with the completion of the widening project, the hours of congestion on I-95 are expected to increase by 30 to 45 minutes. The duration of congestion along U.S. Route 1 would increase by approximately 30 minutes over the No Action Alternative conditions under the Preferred Alternative if there is no widening of U.S. Route 1. Along the Fairfax County Parkway east of I-95, the duration of congestion would likely increase by an hour.

Table 4.3-21
Comparison of 2011 No Action Alternative and 2011 Preferred Alternative measures of effectiveness at selected intersections

	AM Peak Hour[a]			PM Peak Hour[a]		
Intersection	**V/C**	**LOS**	**Delay (seconds)**	**V/C**	**LOS**	**Delay (seconds)**
U.S. Route 1 and Backlick Road/Pohick Road (near Main Post)						
No Action Alternative	0.97	D	37.0	1.12	F	129.9
Preferred Alternative	1.10	F	89.0	1.25	F	197.3
Franconia-Springfield Parkway and Spring Village Drive (near EPG)						
No Action Alternative	1.06	E	66.3	1.09	F	90.1
Preferred Alternative	1.43	F	198.9	1.31	F	146.5

[a]AM Peak Hour: 7:15 AM to 8:15 AM; PM Peak Hour: 4:30 PM to 5:30 PM.

In the areas immediately surrounding EPG, severe congestion lasting 3 to 4 hours would occur if mitigating actions, including transportation improvements, are not taken. With only the currently funded improvements, the available access to EPG could process between 2,000 and 3,000 vph, roughly 40 to 50 percent of the projected peak-hour demand. Queuing of traffic from the access point off the Fairfax County Parkway adjacent to EPG can be expected to back up onto the I-95 corridor. This queuing would translate into an extension of the AM congested period by over an hour, up to 2 hours. In the evening peak period, egress from EPG would be slow and spread over several hours. As a result, the effects on the regional transportation facilities would be limited as compared to the AM peak period. If the Fairfax County Parkway segment through EPG is not constructed as per the currently funded improvements, then the sole access to EPG will be via Backlick Road. Providing only this single access point would require that work arrivals be spread out over an 11 to 12-hour period, due to limited capacity on Backlick Road. Currently, the issue over full funding of the Parkway improvements, ownership of the facility, and environmental clean-up is stalling the construction of this approved facility.

Backlick Road would also experience an increase in traffic flows if only the currently approved and funded improvements were provided, because Barta Road would be a secondary access point to EPG. Limited capacity exists in the Backlick Road corridor to handle much increase in traffic flow, the constraint being downtown Springfield, which is immediately to the north. This location would also cause congestion.

Assessing the transportation network for its available capacity would allow for understanding the constraints to accommodate additional traffic destined to Fort Belvoir (Main Post or EPG) and the needed improvements to the transportation network to ensure that the LOS does not deteriorate unacceptably. The current approved plan for the Fairfax County Parkway through EPG would yield an access capacity of approximately 2,000 to 3,000 vph, well below the forecasted demand of 5,600–6,200 vph to the EPG site. This demand, if left unserviced, would cause severe congestion on roadways surrounding EPG, including I-95, which would affect the regional traffic through the study area. Additional capacity and access points would be required to mitigate this effect. In identifying various mitigations, which are described in Section 4.3.4.4, considerations need to be given to the constraints posed by the existing transportation infrastructure and adjacent land uses. A widened Fairfax County Parkway, to the ultimate build-out design of six lanes, and other access points would increase the capacity to access EPG.

Adjacent to the Main Post, the effects on off-post traffic would be less. The delays at intersections along U.S. Route 1 and the Fairfax County Parkway between U.S. Route 1 and I-95, however, would increase, thus increasing the delays exiting the post in the evening. The Fairfax County Parkway is the main gateway between Fort Belvoir and the I-95 corridor. With increased site traffic and no improvements to the Parkway, including interchange improvements, increased congestion and travel time would result.

Pohick Road (via Tulley Gate) on South Post is the main thoroughfare for exiting traffic. Without any improvements to the intersections along U.S. Route 1, egress from South Post would become more difficult, as traffic would attempt to shift over to Belvoir Road (via Pence Gate), increasing congestion of egress traffic along that facility. The lack of improvements to U.S. Route 1 would also affect through-traffic along U.S. Route 1, potentially forcing vehicles to find alternate routes, including local roadways, to avoid the Fort Belvoir area. Congestion spillover onto local roadways would decrease the quality of life for local residents and could potentially create undesirable conditions for the residents with the higher traffic volumes.

Transit Systems. Mode split—the fraction of the employee population that would use mass transit—for the Main Post is 1 to 2 percent. The rail portion of the transit system does not directly serve the Main Post or EPG. Implementation of the BRAC-related projects, which would affect the vast majority of new personnel at Fort Belvoir, would likely not adversely affect use of the rail systems because of the continued lack of direct service. Consequences of implementing the Preferred Alternative would be similar with respect to the bus portion of the transit system. Neither the Main Post nor EPG are served to any substantial degree because of the perceived difficulties in those modes' gaining access to the post because of security requirements. Demand for additional bus services could evolve, resulting in higher ridership figures. The local bus routes, however, tend to be limited to the study area, which represents only a small fraction of the locations where the employee population would reside. There are only a limited number of long-haul routes serving the Main Post. A 1 to 2 percent mode share equates to approximately 200 to 450 daily riders. Achieving a 10 percent mode share would remove approximately 725 vehicles from the roadway in the peak hour; this number includes both the Main Post and EPG.

4.3.4.3 Other Projects Sitings/Operations

Minor effects would be expected during the AM and PM peak periods. Other projects associated with BRAC implementation (see Section 2.2.2.3) would include projects such as infrastructure, the USANCA support facility, access control point, barracks modernization, and MWR family travel camp. These projects generally involve a relatively minor or negligible number of personnel that would be using the transportation system.

4.3.4.4 Mitigation

Implementing the Preferred Alternative would result in significant adverse effects to the transportation system with respect to congestion and increased travel time. These effects would lead to reduced employee productivity, higher commuting costs, and degradation of quality of life. These effects would not be limited to personnel at Fort Belvoir. Through commuters and the local community would also be affected. Note that VDOT has stated that I-95 will not be widened beyond the current planned widening from three to four general purpose lanes in each direction. It is expected that under the Preferred Alternative, there would be some increase to traffic on I-95 that would lengthen the peak period.

This section identifies potential mitigation actions to avoid, reduce, or compensate for the magnitude of predicted effects. The mitigation actions are evaluated for their efficacy so that an informed decision over their adoption and implementation can be made.

Road Network and Associated Facilities. Thirteen projects have been identified to mitigate adverse effects to the road network associated with implementing the Preferred Alternative. Another objective of the projects is to ensure that arriving personnel can access EPG and the Main Post without queue spillback onto the adjacent roadways. The following describes each of these potential measures and their estimated costs. Estimated mitigation costs presented in this EIS represent order-of-magnitude costs and are subject to change as the design is carried forward. The designs have not reached a level where quantities take-off (developing estimates of the amounts of materials needed, i.e., *XX tons of asphalt,* by reviewing engineering drawings) have been prepared. Costs presented here are order-of-magnitude on the basis of comparisons to similar projects.

1. *Reconstruction of the I-95/Fairfax County Parkway Interchange.* This measure would reconstruct the I-95/Fairfax County Parkway interchange to add HOV connections to and from the south. It would encourage new HOV trips between Fort Belvoir and points to the south on I-95, reducing SOV trips and, thus, overall demand on the road network. This improvement would provide better traffic operations for the increased traffic flows from EPG and from the Main Post, reducing delays during the peak periods. Estimated cost: $75 million.
2. *Additional or Improved Ramps to and from I-95 for EPG.* This measure would add new connections from I-95 into EPG. It would reduce the vehicular demand at the I-95/Fairfax County Parkway interchange and on the Parkway through EPG by providing alternative access options, such as (1) direct connection for southbound (SB) I-95 traffic into EPG at Fairfax County Parkway, (2) SB I-95 flyover ramp to Backlick Road, with a direct connection into EPG, and (3) northbound (NB) I-95 HOV traffic to I-95 general purpose (GP) lanes flyover ramp connection into EPG for NB HOV and egress for SB HOV vehicles. Estimated cost: $40 million.
3. *Widen EPG Segment of Fairfax County Parkway.* Widening the Parkway from four to six lanes through EPG would increase capacity on the Parkway to accommodate the additional vehicular demand from development at EPG. Estimated cost: $50 million.
4. *Fairfax County Parkway Improvements between I-95 and Kingman Road.* Improvements to the parkway between I-95 and Kingman Road would provide additional roadway capacity, via intersection improvements and widening, to improve traffic flow and reduce congestion. Estimated cost: $55 million.
5. *Rideshare Facility.* A rideshare facility on EPG would encourage a shift from SOV to HOV trips. This shift would reduce traffic volumes on the roadway, which in turn would reduce the effects of the development. Estimated cost: $15 million.
6. *Transit Center/Facilities.* This measure would construct a transit center and other facilities to provide for additional choices of travel over the SOV. This improvement would be developed in conjunction with increased bus service. Siting has not been determined. Estimated cost: $30 million.
7. *Additional EPG Access.* This measure would provide multiple choices for access to EPG, which would diffuse traffic to multiple points and provide alternative routes for employees and visitors if one access is blocked. The access would be from I-95 in the

vicinity of the Newington interchange, enabling HOV access to and from EPG. Estimated cost: $15 million.

8. *Intersection Improvements.* Intersection improvements at key locations such as U.S. Route 1 at Backlick/Pohick (Tulley Gate), U.S. Route 1 at Fairfax County Parkway, U.S. Route 1 at Belvoir Road (Pence Gate), Franconia-Springfield Parkway ramps at Frontier Drive, and Franconia-Springfield Parkway at Beulah Street, would improve traffic flow and reduce congestion. Improvements could include signalization, additional turning lanes, lengthening of turning lanes, or other measures appropriate to an intersection. Estimated cost: $15 million.
9. *Additional U.S. Route 1 Crossing for Main Post.* An additional crossing over U.S. Route 1 would improve internal roadway circulation on Fort Belvoir between North and South Posts. The likely location of this improvement would be between Gunston and Belvoir Roads, with final siting dependent on the site layout of other facilities projects (e.g., the new hospital proposed at the South Post golf course). This improvement would reduce the number of trips on off-post roadways between North and South Posts. Estimated cost: $15 million.
10. *Fairfax County Parkway/John J. Kingman Road Intersection Improvements.* This measure would provide a flyover ramp to reduce congestion on the parkway and improve access to North Post. Estimated cost: $10 million.
11. *Franconia-Springfield Parkway/Neuman Street Interchange.* This measure would replace the existing at-grade intersection on the Franconia-Springfield Parkway with a full interchange at Neuman Street. An interchange would provide additional access to EPG from the north by creating a direct connection between the Franconia-Springfield Parkway and EPG, in conjunction with the following improvement. These two improvements would reduce congestion on the Fairfax County Parkway through EPG by diverting traffic to this point. For employees living north or west of EPG, this measure would provide a shorter route and thereby reduce commuting time. Estimated cost: $50 million.
12. *Access to EPG via Neuman Street.* This project would provide roadway access to EPG from the north, with entry into EPG occurring east of Accotink Creek. Existing residences and a building used as a church would likely have to be removed. Estimated cost: $26 million.
13. *Beulah and Telegraph Roads Improvements.* This measure would widen roadways and provide other improvements, such as signalization and safety measures (e.g., improved crosswalks, lighting), to enhance flow of the increased traffic volumes caused by BRAC. Estimated cost: $50 million.

Total estimated cost for the foregoing mitigation measures would be $446 million. This figure excludes contingency costs and costs associated with supervision, inspection, and overhead. More detailed studies and designs will be required, including potential NEPA studies.

The transportation network has been evaluated from a regional, sub-regional, and local perspective, and the effects on the transportation system have been quantified and compared to both existing conditions and the No Action Alternative. On the basis of these comprehensive comparisons, improvements have been identified that would mitigate most of the significant adverse effects of the Preferred Alternative on the transportation system in the immediate area of Fort Belvoir. The additional site entrance points, improved site circulation, improved interchanges, and widened roadways would result in reduced delay, limit the possibility of Fort

Belvoir traffic backing up onto the major regional highways, and improve the operation of the intersections within the area of influence of the BRAC-related actions. As engineering and design work proceeds, detailed traffic operations studies would be completed to ensure that intersection levels of service are maintained or improved in the immediate area of Fort Belvoir.

On a regional level, the relocation of 22,000 jobs toward the south of the metropolitan area, combined with regional projects, such as the widening of I-95 and construction/implementation of HOT lanes in the I-95 corridor, would be expected to lead to additional travel demand from the south. With no plans for additional capacity in the corridor beyond the planned widening and HOT lanes, the analysis indicates that the congested period during the morning and afternoon would be extended by 30 to 45 minutes. Traffic traveling toward Fort Belvoir on regional facilities could experience some limited congestion during the peak hour, but that direction of travel remains the "reverse commute," with heavier traffic headed toward Tyson's Corner, Arlington, Alexandria, and Washington, DC.

Transit System. This section describes proposed mitigation measures to the transit system to help avoid, reduce, or compensate for the effects associated with implementing the Preferred Alternative. Mitigation measures are appropriate for bus service but none are identified for rail services. Expansion or improvements to rail service might occur in the future on the basis of further evaluation of the transportation system undertaken as a result of experiences related to BRAC or other developments in the study area.

Initial bus service concept plans have been developed on the basis of the origin data for the BRAC employees destined for EPG and existing origin patterns for Main Post employees. These are preliminary concept plans intended to serve as a guide to the levels of transit service that could be required to serve both a 5 and 10 percent transit mode share to EPG and the Main Post. Detailed route and service planning would be conducted later. The purpose of these concept plans is to demonstrate that feasible transit service options are viable to support the assumed mode shares. Reduction of the mode share from 10 percent to 5 percent would not occur by reducing in half the number of bus trips, an action that would result in longer headways. It is assumed that no headways would exceed 30 minutes. For an overall 5 percent transit mode share, it is assumed that the major reductions would come out of the local buses rather than the Metro shuttle. The quality and quantity of Metro service and feeders would remain the same, so it is assumed that this portion of the transit ridership would remain at the same levels as in the 10 percent scenario.

Five basic service areas have been identified, as follows:

- Southern Prince William County (Dumfries, Cherry Hill, and Powells Creek areas)
- Northern Prince William County (Woodbridge, Dale City, and Lake Ridge areas)
- U.S. Route 1 in Fairfax County (Lorton, Fort Belvoir, Mount Vernon, Hybla Valley, Beacon Hill, and Huntington areas)
- Western Fairfax County (Burke, Fairfax, and Chantilly areas and, possibly, the Herndon and Reston areas)
- Franconia-Springfield Metro station

General route and service level concepts have been developed for each service area for both modal share assumptions. These are based on the projected 2011 origin patterns for EPG site employees along with existing Fort Belvoir origin patterns.

Main Post Service Concept for 10 Percent Mode Share

- *Southern Prince William County (2 Peak Hour Buses).* Bus service on a 30-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.
- *Northern Prince William County (2 Peak Hour Buses).* A 30-minute headway is also assumed for service from northern Prince William County. This service would operate in the Dale City, Woodbridge, and Lake Ridge areas.
- *U.S. Route 1 in Fairfax County (2 Additional Peak Hour Buses).* Two additional buses per hour would be added to existing services along the U.S. Route 1 corridor between Huntington and the Main Post.
- *Western Fairfax County (1 Additional Peak Hour Bus).* One additional bus per hour would operate in the Fairfax County Parkway corridor to the Burke area. This service would require a transfer to shuttle bus at the Franconia-Springfield Metro station.
- *Franconia-Springfield (5 Peak Hour Buses).* A shuttle linking the Main Post to the Franconia-Springfield Metro station would be needed. Pending a refinement of the numbers, a 12-minute headway on this shuttle is assumed. This service would link those commuters with access to one of the regional Metro lines to the Main Post area.

Main Post Service Concept for 5 Percent Mode Share

- *Prince William County (2 Peak Hour Buses).* One combined route serving major origin locations in both the northern and southern portions of the county, operating on a 30-minute headway, is assumed.
- *U.S. Route 1 in Fairfax County (1 Additional Peak Hour Bus).* One additional peak hour vehicle would provide service along the U.S. Route 1 corridor between Huntington and the Main Post.
- *Franconia-Springfield (5 Additional Peak Hour Buses).* A 12-minute headway on the shuttle linking the Main Post to the Franconia-Springfield Metro is also assumed under the 5 percent mode share scenario.

EPG Service Concept for 10 Percent Mode Share

- *Southern Prince William County (2 Peak Hour Buses).* Bus service on a 30-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.
- *Northern Prince William County (4 Peak Hour Buses).* Two routes linking the northern portion of Prince William County to EPG would be operated to serve the Dale City, Woodbridge, and Lake Ridge areas. A combined headway of 15 minutes is assumed.
- *U.S. Route 1 in Fairfax County (2 Additional Peak Hour Buses).* Two additional buses per hour would be added to existing services along the U.S. Route 1 corridor between Huntington and Lorton and continuing north to the EPG site.
- *Western Fairfax County (3 Peak Hour Buses).* This route would link the western portion of Fairfax County to EPG via the Fairfax County Parkway. The current assumption includes a route serving the Burke area with extended service to the Route 50 corridor into the Fair Oaks or Chantilly areas. The route would need to be

anchored by a park and ride lot on the western end and likely operate as a limited stop route to EPG. A 20-minute headway is assumed to be required.

- *Franconia-Springfield Metrorail (5 Peak Hour Buses).* This route would be the shuttle from the Franconia-Springfield Metro station to EPG operating on a 12-minute headway.

EPG Service Concept for 5 Percent Mode Share

- *Prince William County (3 Peak Hour Buses).* Under this scenario, one combined route from Prince William County serving major park and ride lots in the southern and northern sections operating on a 20-minute headway is assumed.
- *U.S. Route 1 in Fairfax County (1 Additional Peak Hour Bus).* Under this scenario, one additional peak hour vehicle would provide service along the U.S. Route 1 corridor between Huntington, Lorton, and EPG.
- *Western Fairfax County (2 Additional Peak Hour Buses).* A 30-minute service linking the EPG to the Burke area via the Fairfax County Parkway is assumed.
- *Franconia-Springfield Metrorail (5 Additional Peak Hour Buses).* As indicated above, the assumption of a 12-minute headway for the shuttle would still be called for under this scenario.

Bus service of a high enough quality to realize a 5 to 10 percent mode share for transit would complement the road network mitigation actions and help to reduce congestion and limit vehicle delays resulting from the Preferred Alternative. Achieving a 10 percent mode split would reduce the number of vehicles accessing the Fort Belvoir area in the peak hour by nearly 725 on the basis of the MWCOG average auto occupancy of 1.1 passengers per vehicle. A 5 percent mode share for transit would reduce the number of peak hour vehicles by approximately 360.

The foregoing expanded bus services would be supplemented by internal circulator bus systems designed to provide more direct access to various areas of Fort Belvoir not directly accessible from the regional transit services. Such circulator buses would operate within the grounds of Fort Belvoir on schedules designed to meet the needs of employees.

The estimated cost of the transit-related mitigation actions would be $10 to $12 million in initial capital costs and $6 to $9 million in annual operating expenses depending on the ultimate operational requirements of the system. Note that these estimates are preliminary order-of-magnitude costs. More precise cost estimates can be prepared when site circulation and security plans are finalized and detailed route and service planning are completed.

Transportation Management Plan—Framework. The largest contributor to traffic congestion is the SOV. Implementing the Preferred Alternative would result in many personnel reporting to Fort Belvoir every day as SOV trips. To reduce adverse effects on the road network, the Army could appoint a Transportation Demand Management Coordinator (TDMC) whose principal function would be to develop and manage a transportation management plan (TMP), which would include measures to reduce the number of SOVs. Appointing a TDMC before fiscal year 2009 would allow development of transportation program initiatives before BRAC relocation of personnel.

A TDMC would be knowledgeable of principles, practices, and methods of transportation demand management. These would include, but not be limited to, employee rideshare and commute programs; current regional programs regarding air quality and transportation; employer

trip reduction requirements; marketing, promotion, and event planning practices; and parking management practices. The TDMC would perform the following functions:

- Administer the post's transportation demand management program and direct the planning and implementation of transportation demand strategies, programs, and policies
- Promote employee awareness of available programs and commuting alternatives; conduct employee surveys to determine commuting needs and preferences; distribute ride-match forms and transit/commuter information packets; and administer a rideshare program for all employees
- Consider implementing use of flextime, compressed workweek, and teleworking as a requirement to reduce peak period travel
- Manage employee access to parking facilities and implement preferential parking for carpools and vanpools
- Develop and implement programs to provide financial incentives such as subsidized bus passes, carpool mileage, and subscription custom bus operation
- Select, train, supervise, and evaluate staff

In coordination with the Fort Belvoir Master Planner, the TDMC would maintain a TMP that takes travel demand management practices into account. A TMP documents programs and adopts strategies for efficient employee commuting patterns. The plan would include specific strategies and timeline goals to encourage change in employee travel modes, trip timing, frequency, length, and travel routes. The goal of the TMP would be to encourage alternative commuting modes to reduce traffic congestion and the demand for parking spaces. The TMP should emphasize ridesharing, transit, and other non-SOV modes of transportation for commuters; maximize telework strategies in accordance with applicable laws and regulations; and promote the use of compressed and variable work schedules. The following is a list of some of the potential transportation demand management programs that a TDMC could assist in implementing and managing.

- *Commuter information programs.* Establishing of a centralized point of information on available commuter options and a means of disseminating information to employees and employers.
- *Alternative work schedules.* Using various strategies to reduce peak hour traffic including flex-time (variable work schedules so that not all employees arrive and depart at the same time) and compressed work schedules (such as working four 10-hour days rather than five 8-hour days to reduce the total number of vehicle trips).
- *Rideshare matching services.* Helping establish carpools by matching up employees with similar residential locations and schedules.
- *Ad hoc carpooling (slugging).* Establishing and managing of an informal carpool area where ad hoc carpools can be assembled each day so that the drivers can take advantage of the regional HOV lanes.
- *Encouragement and promotion of commuting by bicycle.* Providing of appropriate amenities to encourage bicycle commuting, such as secure bike lockers and showers.
- *Guaranteed ride home.* Providing information and assistance to commuters wishing to take part in the region's guaranteed ride home program wherein carpoolers and

transit riders have an alternative means of getting home in case of emergency or unexpected schedule change.

- *High occupancy vehicle (HOV) priority.* Providing preferred parking or site access to carpool vehicles.
- *Transit service interface.* Providing a centralized point of contact with the regional transit service providers to help get transit information into the hands of employees and to provide feedback to the transit providers about schedules, bus stop locations, or operating problems.
- *Pedestrian accommodation.* Promoting efforts to ensure that on-post pedestrian paths are available where needed and that transit riders and others arriving on foot are appropriately accommodated.
- *Telecommuting.* Promoting programs whereby certain employees are allowed and encouraged to work away from the office on occasion, thus reducing the amount of daily travel to Fort Belvoir.
- *Shuttle services.* Providing various shuttles including on-site shuttle services so that people can travel from one building or campus to another without needing to drive their own vehicles; shuttles connecting Fort Belvoir to the regional rail transit system; and shuttles between Fort Belvoir and other major installations such as the Pentagon.
- *Transit and ridesharing incentives.* Working with employees and employers to encourage participation in the MetroChek program, which provides fare transit and vanpool subsidies on a tax-free basis. The MetroChek program is authorized under federal legislation that allows employers to provide employees with a tax-free or pre-tax transit benefit. The maximum amount allowable each month under this program is adjusted every few years. Such incentives encourage additional transit and vanpool usage and can help in meeting the transit mode share goals and assist in mitigating the traffic effects from SOV trips.

The effectiveness of appointing a TDMC to reduce traffic congestion would depend on several factors including the amount of resources applied (to provide adequate staffing levels and facilities) and the receptiveness of Fort Belvoir's personnel towards efforts to reduce commuting in SOVs. It would be expected that the TDMC would invoke environmental management program procedures to review TMP initiatives. For instance, data tracking employee participation in a rideshare program could be compiled to quantify the TMP's effectiveness in reducing SOV usage. A comprehensive TMP program is expected to be developed as the design and Master Plan processes are carried forth. A successful TMP would need to incorporate all agencies located at Fort Belvoir, both existing and incoming BRAC agencies.

The proposed mitigations have been examined for the efficacy of mitigating the effects of the Preferred Alternative. Table 4.3-22 presents the results of the evaluation.

Table 4.3-22
Efficacy of transportation mitigation measures for the Preferred Alternative

Mitigation Measure	Before	After	Comments
1) Improvements at I-95/Fairfax County Parkway interchange with HOV connections	LOS F 50-200 HOV trips during peak periods on I-95 corridor destined to Fort Belvoir	LOS D 500-600 HOV trips during peak periods on HOV ramps	With directional ramps, LOS D could be achieved, but modifications of interchange would require coordination with I-95 HOT Lanes Project Each HOV vehicle would remove 2 SOV vehicles from the traffic stream
2) Additional EPG Access SB I-95 at Backlick flyover SB I-95 direct connections at parkway	 N/A N/A	LOS C, with expected 900 vph on ramp LOS D, with expected 1,100 vph on ramp	Final Site Access plans would ensure LOS D or better SB to EPG connections would reduce the sizing of improvements needed at the I-95/Pkwy interchange Volumes on the Parkway would decrease by 2,500, LOS = D
3) Modified section of Fairfax County Parkway through EPG	LOS = F	LOS = D	Analyzed in conjunction with number 2. Modified interchange design at Rolling Road to provide improved connections into EPG
4) Fairfax County Parkway Improvements	V/C = 0.9 or higher in peak direction, LOS F	V/C = 0.7 in peak direction, LOS = D	Allows for improvements as described in number 10
5) Rideshare facility	N/A	Allows for 200-300 HOV trips per hour to form at EPG	Each HOV vehicle would remove 2 SOV vehicles from the traffic stream.
6) Transit Center/Facilities (in conjunction with increased bus services)	N/A	5% mode share would attract 350 riders in the peak period, while a 10% mode share would attract 700-750 riders	To be developed with increased bus services. One full bus can carry 40 people, so would remove 40 SOV trips.
7) Additional EPG access	N/A	LOS A, with expected 300 vph	Provides for NB HOV direct access.
8) Intersection Improvements U.S. Route 1/Pkwy U.S. Route 1/Tulley Gate U.S. Route 1/Pence Gate Franconia-Springfield/Frontier Drive	v/c is presented as AM/PM peak hour 1.1 and 0.94 1.1 and 1.29 1.12 and 0.89 0.82 and 0.97	 0.86 and 0.91 1.01 and 1.2 1.02 and 0.83 0.75 and 0.88	Improvements would restore intersection performance similar to that under No Action Alternative
9) Additional Crossing over U.S. Route 1	Gunston Road LOS = E	Gunston Road and new crossing LOS = C	New crossing alleviates congestion on Gunston Road and reduces trips traveling off-post between North and South Posts
10) Fairfax County Parkway and Kingman intersection improvements	LOS D in AM and LOS F in PM	LOS B in AM and LOS C in PM	Improvement specific to SB access and WB egress on North Post
11) Franconia-Springfield/Neuman Interchange	LOS F in AM and PM	LOS C or better	Requires coordination with VDOT

Table 4.3-22
Efficacy of transportation mitigation measures for the Preferred Alternative *(continued)*

Mitigation Measure	Before	After	Comments
12) Access to EPG via Neuman Street	N/A	LOS C Reduces volume on Parkway by 500 vph	Needs improvement 11 and likely requires property acquisition
13) Roadway Improvements: Telegraph Road Beulah Street	v/c is presented as AM/PM peak hour 1.12 and 1.13 1.02 and 1.14	0.7 and 0.65 0.8 and 0.85	Improves traffic flow

4.3.5 ENVIRONMENTAL CONSEQUENCES OF TOWN CENTER ALTERNATIVE

4.3.5.1 Land Use Plan Update

No effects would be expected. Adoption of a revised land use plan would not, in the absence of additional activities such as facilities' development, result in effects to the transportation system. Effects to the transportation system would not occur until further development occurred in accordance with the terms of the new land use plan. The Town Center Land Use Plan would not, by itself, affect the transportation system unless and until development occurred at the site. The area that would be developed would straddle both sides of U.S. Route 1. The total number of personnel relocating to Fort Belvoir would not differ from the Preferred Alternative.

4.3.5.2 BRAC Implementation and Facilities Projects

Long-term significant adverse effects would be expected. Implementing the Town Center Alternative, when compared to the No Action Alternative (Section 4.3.3), would worsen traffic conditions in the immediate vicinity of Fort Belvoir. From the regional perspective, implementation would produce a combination of minor (negligible) adverse and beneficial effects.

Under the Town Center Alternative, NGA and WHS would be on the Main Post. A new hospital would be constructed on South Post. Army Lease, PEO EIS, and MDA would also be on the South Post in a combination of existing and new facilities. The BRAC action would increase total employment levels on the Main Post by approximately 22,000 personnel. The following subsections discuss and evaluate the effects to the transportation system that would occur as a result of assigning these additional personnel to the specific portions of the post.

4.3.5.2.1 Travel Patterns to and from Fort Belvoir

The assumed residential distribution for the expected BRAC employees for the Town Center Alternative is the same as described under the Preferred Alternative.

The net increase in traffic on the roadways (proposed action over no action) would be noticeably less than the amount of BRAC traffic due to the rebalancing of productions (households) and attractions (employment) throughout the region resulting from the relocation of employment to Fort Belvoir. In essence, the residential redistribution within the region would increase the portion of Fort Belvoir traffic that is coming up from the south during the AM peak period. A potential consequence of the additional Fort Belvoir traffic on some facilities is that it could cause

other trips to seek alternative routes to avoid U.S. Route 1 and increase the total traffic volumes on those facilities. I-95, Telegraph Road, and Beulah Street would likely become alternative roadway paths, depending on the length and final destination of those trips.

The MWCOG model distributed the decrease in employment to other traffic analysis zones across the region, as the model process was to control the amount of production in the region. The way the market would react is that the loss of employment in one location would spread throughout the region and that some building projects in some areas of the region could be delayed.

Residential locations of employees of NGA and WHS would slowly shift toward Fort Belvoir, the same distribution assumed for the Preferred Alternative. Thus, regional travel would be similar to that of the Preferred Alternative.

Tables 4.3-23 and 4.3-24 present the population and employment levels for the 2011 conditions for the Town Center Alternative, as well as the production and attractions for the study area. The only difference between the Town Center Alternative and the Preferred Alternative is the specific siting of the agencies affected by the Town Center Alternative. This change would also affect the productions and attractions between the various districts. These are also illustrated in Figure D-12 in Appendix D.

Table 4.3-23
Population and employment for existing conditions (2006), 2011 No Action Alternative, and 2011 Town Center Alternative

	Population			Employment		
District	Existing	No Action	Town Center	Existing	No Action	Town Center
Laurel Hill	13,470	25,121	25,121	3,547	3,996	3,996
Pohick	50,826	51,766	51,766	3,648	3,849	3,849
Lorton South of U.S. Route 1	14,476	18,200	18,200	9,067	11,233	11,233
I-95 Industrial Area	2,092	2,175	2,175	8,605	8,683	8,683
Franconia-Springfield Transit Area	2,727	2,821	2,821	5,940	6,764	6,764
Springfield Community Business Center	1,306	1,483	1,483	2,074	2,141	2,141
Springfield	31,263	32,201	32,201	10,850	11,387	11,387
EPG	0	0	0	45	45	0
Mason Neck	2,785	5,552	5,552	438	464	464
Fort Belvoir (Main Post)	7,623	7,623	9,387	23,266	23,267	46,753
Mount Vernon	93,783	102,230	102,230	19,681	21,457	21,457
Rose Hill	67,179	70,513	70,513	20,352	23,157	23,157
Total Study Area	287,530	319,685	321,449	107,513	116,443	139,884
Rest of Virginia	2,142,682	2,399,710	2,399,710	1,258,264	1,427,055	1,430,055
Maryland	3,318,699	3,483,648	3,483,648	1,723,958	1,870,517	1,870,517
District of Columbia	583,733	615,375	615,375	752,719	790,205	790,205
West Virginia	47,735	52,555	52,555	15,173	17,191	17,191
Out of State	0	0	0	0	0	0
Total Outside Study Area	6,092,849	6,551,288	6,551,288	3,750,114	4,104,968	4,107,968
Regional Total	**6,380,379**	**6,870,973**	**6,872,737**	**3,857,627**	**4,221,411**	**4,247,852**

Source: VHB, 2006.

Table 4.3-24
Productions and attractions for existing conditions (2006), 2011 No Action Alternative, and 2011 Town Center Alternative

	Productions			Attractions		
District	Existing	No Action	Town Center	Existing	No Action	Town Center
Laurel Hill	31,891	52,247	52,426	31,825	52,327	52,424
Pohick	109,597	110,862	109,442	109,719	110,848	109,362
Lorton South of U.S. Route 1	43,441	55,677	55,040	43,430	55,560	54,862
I-95 Industrial Area	20,802	20,880	20,250	20,753	20,969	20,308
Franconia-Springfield Transit Area	37,799	41,046	40,708	38,044	41,275	40,810
Springfield Community Business Center	11,586	12,158	12,057	11,601	12,053	12,053
Springfield	98,365	101,148	100,142	98,274	101,153	100,320
EPG	81	89	0	87	102	0
Mason Neck	5,979	11,012	10,920	5,948	10,998	10,899
Fort Belvoir (Main Post)	35,176	35,177	81,003	35,342	35,343	81,174
Mount Vernon	250,418	271,298	269,746	250,606	271,297	269,794
Rose Hill	184,223	197,462	195,675	184,200	197,283	195,504
Total Study Area	829,357	909,055	947,410	829,830	909,209	947,509
Rest of Virginia	6,952,561	7,768,560	7,731,717	6,952,125	7,768,134	7,730,979
Maryland	10,587,588	11,254,561	11,239,496	10,586,616	11,252,945	11,238,333
District of Columbia	1,572,672	1,614,479	1,606,010	1,572,360	1,614,396	1,605,999
West Virginia	153,721	172,023	171,904	153,849	172,056	171,912
Out of State	715,116	828,980	829,157	716,236	830,919	831,021
Total Outside Study Area	19,981,658	21,638,603	21,578,284	19,981,186	21,638,450	21,578,244
Regional Total	**20,811,015**	**22,547,658**	**22,525,694**	**20,811,015**	**22,547,658**	**22,525,753**

Source: VHB, 2006.

Under the Town Center Alternative, Fort Belvoir would represent 2.9 and 33.4 percent of the population and employment, respectively, and the post would account for only 8.6 percent of the attractions in the study area. The ratio of jobs to residents within the study area would be 0.43, or 43 jobs per 100 residents, an increase of 7 jobs per 100 residents over the No Action Alternative. The change over the No Action Alternative would be identical to that of the Preferred Alternative.

Fort Belvoir would represent approximately 6.1 percent of the total employment within all of Fairfax County in the Town Center Alternative; an increase of 2.9 percent over the No Action Alternative. Within transportation Corridor 8, Fort Belvoir would be approximately 10.4 percent of the total employment, a near doubling of the percentage over the No Action Alternative. The only difference between the Town Center Alternative and the Preferred Alternative is the specific siting of the employees affected by the BRAC action. This shift in employment causes a change in the productions and attractions for the study area.

Table 4.3-25 presents the internal trips to the study area, external trips destined to the study area, and external trips that originate within the study area. The table illustrates that most of the trips that have an origin or a destination within the study area would originate from or be destined to points outside the study area, as opposed to being an internal trip within the study area (i.e., a trip beginning and ending within the study area). The table does not include external trips that pass through the study area (i.e., a trip from Fredericksburg to Washington, DC, traveling on I-95). Findings on total study area trips under the Town Center Alternative are similar to that of the Preferred Alternative. Slight differences do exist between the two alternatives; however, the differences are insignificant and likely due to the slight difference in the locations of employees.

Table 4.3-25
Study area trips – 2011 Town Center Alternative

Time	Internal trips within study area	External trips ending in study area	External trips beginning in study area
AM Peak	79,303	64,179	78,451
PM Peak	139,404	109,077	97,827
Off-Peak	343,461	212,576	209,514
Daily	**562,168**	385,832	385,792

4.3.5.2.2 Performance under Expected Conditions

Few changes to Northern Virginia's transportation system would be expected over the next 5 years because of funding shortfalls and the resulting delays in implementing long-term transportation plans. The modeling assumed that the off-post transportation improvement projects identified in the No Action Alternative are also included in the Town Center Alternative.

One key finding from the analyses is that the Fairfax County Parkway would need to be widened from I-95 to U.S. Route 1. The cross-section would need to change from 4 lanes (2-2 configuration) to at least 8 lanes, such as a 3-2-3 configuration, in which the middle two lanes would be reversible.

Road Network. Increased traffic to and from Fort Belvoir would account for up to 40 percent of the traffic flow on roadways adjacent to the gates and quickly drop to under 10 percent of the traffic away from the gates, as shown in Figures D-13 and D-14, area of influence.

Figures D-15 and D-16 show both the growth in traffic and the change in the traffic flow that would be a result of the BRAC action at selected locations.

The area of influence shows that the effect of BRAC traffic on roadways diminishes as one moves away from the site. This decrease would be due to traffic getting off and on at the interchanges along the roadways. Regional travel patterns would be similar to the Preferred Alternative. It is only when moving closer to the specific siting that changes are noticeable between the alternatives. Because the Town Center Alternative would place more development at the Main Post, the effects would be higher at that location and less to the west. The roadways that are affected to a greater extent are the Fairfax County Parkway (east of I-95), U.S. Route 1, Telegraph Road, and Beulah Street.

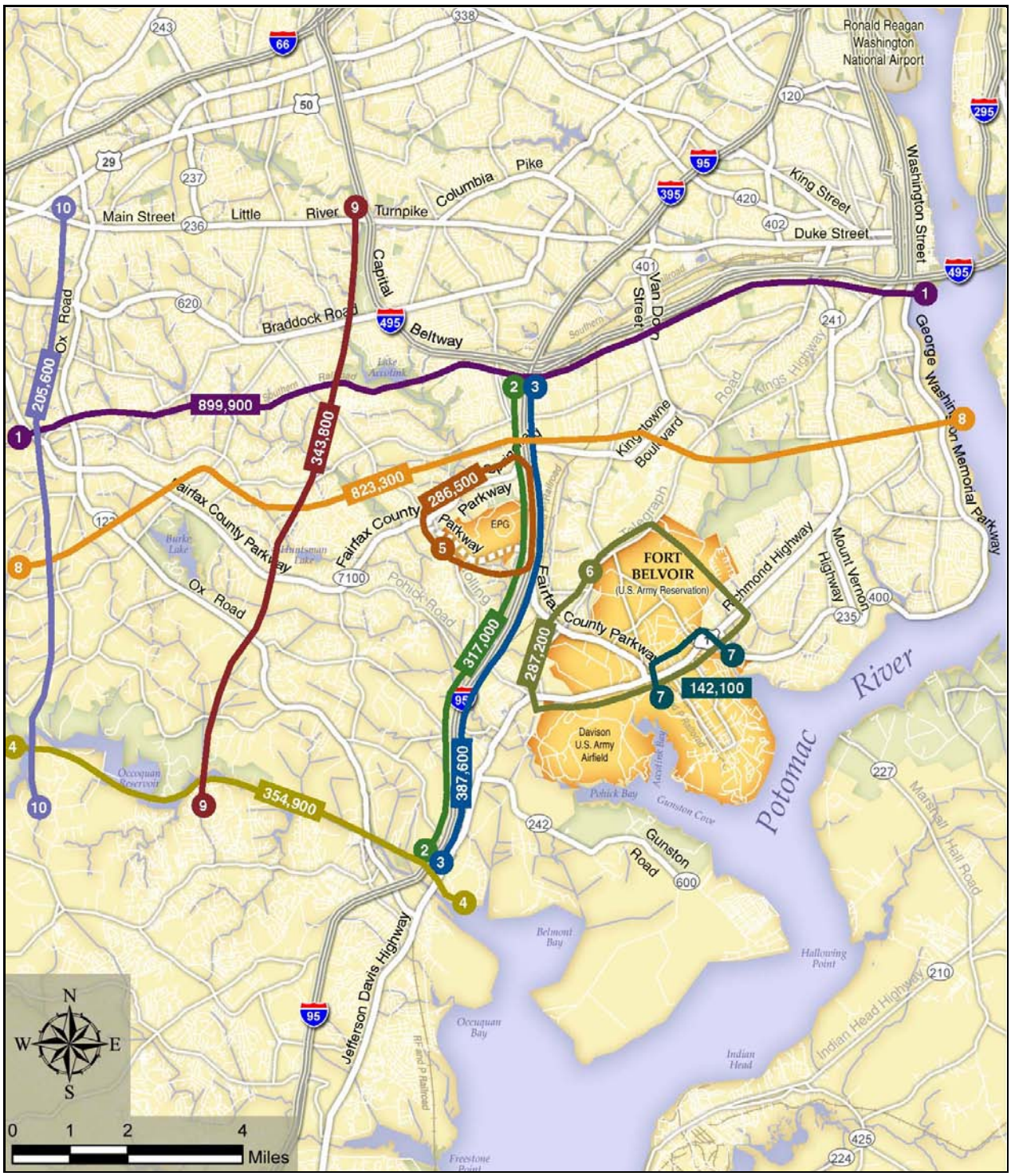
Figure 4.3-20 provides another perspective on the changes in travel patterns. Total volumes crossing selected screen lines are shown. Again, the net effect on traffic volumes would decrease quickly as the distance from Fort Belvoir grows.

The screen lines north of Fort Belvoir show a slight decrease in traffic volumes over the No Action Alternative. This change would be due to trips diverting from I-95 at the Fairfax County Parkway that previously traveled north to the Pentagon or other nearby employment centers, which would now travel to Fort Belvoir. To the south, the increase in daily volume from the No Action Alternative to the Town Center Alternative crossing the Occoquan River would be approximately 5,000 trips (two-way). A major reason that there would be only a slight increase at this screen line is that some trips that are part of BRAC are already within the traffic stream (in the No Action Alternative) but their destination would be the Pentagon or other nearby employment centers. Screen lines around the Main Post show that the Town Center Alternative would increase volumes on roadways in the immediate Fort Belvoir area over the No Action Alternative.

Moving closer to the post, the projected effects on adjacent roadway facilities are shown in Table 4.3-26, which shows V/C ratios, delay, and LOS for 23 key intersections. The summary of the turning movement counts for the Town Center Alternative can be found in Table D-4 and Figures D-17 and D-18 in Appendix D.

The intersection measures of effectiveness (MOEs) would deteriorate over the No Action Alternative and existing conditions as the traffic volumes at these intersections would be higher because of the additional employment, especially the intersections adjacent to Fort Belvoir. Several intersections that are near the main gateways to North and South Posts should be highlighted for effects due to the BRAC action; these intersections are along U.S. Route 1 adjacent to Main Post and the intersection of Fairfax County Parkway and Kingman Road. A comparison of 2011 No Action Alternative and 2011 Town Center Alternative measures of effectiveness at these intersections is provided in Table 4.3-27. These intersections would perform at LOS F, with delays exceeding 200 seconds at those intersections, which are at or near the main gateways to North and South Posts. A total of 10 intersections in the AM peak hour experience a degradation of at least one letter grade, and 8 intersections did in the PM peak hour. Mitigating actions could include intersection improvements or upgrading the intersection to an interchange.

Congestion along U.S. Route 1 would increase to 5 to 6 hours in the peak direction of travel, and the off-peak direction would become congested as trips from the north in the AM peak period increase. Likewise, the Fairfax County Parkway would also be congested 3 to 4 hours in the peak direction of travel in each peak period if no improvements were made. These effects would be from the doubling of the employment levels at Fort Belvoir. If improvements were not made to the major roadways, the traffic would spill onto adjacent roadways, potentially creating congestion on those facilities; such roadways include Beulah Street, Hayfield Road, and South Kings Highway.



Daily Screen Line Volumes under The Town Center Alternative

Fort Belvoir, Virginia

Figure 4.3-20

Table 4.3-26
Intersection measures of effectiveness—2011 Town Center Alternative

	AM Peak Hour[a]			PM Peak Hour[a]		
Intersection location	**V/C**	**LOS**	**Delay**	**V/C**	**LOS**	**Delay**
Commerce St./Amherst Ave.	0.75	D	36.8	0.91	D	50.8
Commerce St./Backlick Rd.	0.41	C	30.6	0.78	D	49.6
Backlick Rd./Calamo St.	0.75	B	13.3	0.80	C	23.1
Loisdale Rd./Spring Mall Dr.	0.51	C	25.3	0.88	D	43.9
Franconia Springfield Parkway/Spring Village Dr.	1.06	E	65.0	1.09	F	86.3
Franconia Springfield Parkway EB Ramp/Backlick Rd.	0.99	E	66.7	0.81	D	41.6
Franconia Springfield Parkway WB Ramp/Backlick Rd.	0.91	B	12.0	0.92	C	22.4
Franconia Springfield Parkway/I-95 HOV Ramps	1.00	E	56.1	1.36	F	175.1
Franconia Springfield Parkway EB Ramp/Frontier Dr.	0.84	C	31.9	0.90	E	57.5
Franconia Springfield Parkway WB Ramp/Frontier Dr.	0.53	D	37.9	0.90	F	92.4
Franconia Springfield Parkway/Beulah St.	1.21	F	113.3	1.42	F	167.3
Fairfax County Parkway/Terminal Rd.	1.11	F	86.2	1.03	D	41.5
Fairfax County Parkway SB Ramps/Telegraph Rd.	0.59	C	21.3	0.89	C	33.5
Fairfax County Parkway NB Ramps/Telegraph Rd.	0.75	C	21.9	0.78	C	23.4
Fairfax County Parkway/John J. Kingman Rd.	1.34	F	160.3	1.84	F	285.1
Telegraph Rd./Beulah St.	0.82	D	44.9	0.75	C	33.3
Telegraph Rd./S. Van Dorn St.	1.01	D	47.0	1.05	D	50.1
U.S. Route 1/Telegraph Rd.—Old Colchester Rd.	0.86	E	57.9	0.96	F	82.6
U.S. Route 1/Fairfax County Parkway	1.23	F	99.7	0.80	F	85.9
U.S. Route 1/Backlick Rd.—Pohick Rd.	1.60	F	201.0	1.16	F	226.7
U.S. Route 1/Belvoir Rd.	1.19	F	113.3	1.34	F	167.3
U.S. Route 1/Old Mill Rd.	1.1	F	111.0	1.01	E	79.8
Loisdale Rd./GSA Access Rd.	0.73	A	7.5	0.52	A	5.1

[a]AM Peak Hour: 7:15 AM to 8:15 AM; PM Peak Hour: 4:30 PM to 5:30 PM

Traffic from the Fairfax County Parkway could potentially spill back onto I-95, as the parkway would have insufficient capacity to handle the increased demand. Furthermore, traffic would spill onto adjacent roadways, such as Telegraph Road and Beulah Street, and would decrease the quality of life for local residents and could potentially create undesirable conditions for the residents with the higher traffic volumes. Major congestion in the area would prompt the need to widen the parkway, likely to a 3-2-3 lane configuration in which the center lanes would be reversible HOV lanes.

The severe congestion on the major roadways adjacent to Fort Belvoir would affect the ability of Fort Belvoir traffic to exit during the PM peak hour, especially via the three main access points: Pohick Road (via Tulley Gate), Belvoir Road (via Pence Gate), and Kingman Road.

Table 4.3-27
Comparison of 2011 No Action Alternative and 2011 Town Center Alternative measures of effectiveness at selected intersections

	AM Peak Hour[a]			PM Peak Hour[a]		
Intersection	**V/C**	**LOS**	**Delay (seconds)**	**V/C**	**LOS**	**Delay (seconds)**
Fairfax County Parkway/John J. Kingman Road						
No Action Alternative	0.79	D	45.7	1.16	F	112.8
Town Center Alternative	1.34	F	160.3	1.84	F	285.1
U.S. Route 1/Telegraph Road-Old Colchester Road						
No Action Alternative	0.82	D	54.4	0.77	E	76.7
Town Center Alternative	0.86	E	57.9	0.96	F	82.6
U.S. Route 1/Fairfax County Parkway						
No Action Alternative	0.96	D	38.8	0.89	D	35.9
Town Center Alternative	1.23	F	99.7	0.80	F	85.9
U.S. Route 1/Backlick Road-Pohick Road						
No Action Alternative	0.97	D	37.0	1.12	F	129.9
Town Center Alternative	1.60	F	201.0	1.16	F	226.7
U.S. Route 1/Belvoir Road						
No Action Alternative	0.83	B	19.3	0.59	B	12.0
Town Center Alternative	1.19	F	113.3	1.34	F	167.3

[a]AM Peak Hour: 7:15 AM to 8:15 AM; PM Peak Hour: 4:30 PM to 5:30 PM

Transit Systems. Mode split—the fraction of the employee population that would use mass transit—for Main Post is 1 to 2 percent. The rail portion of the transit system does not directly serve the Main Post. Implementing the BRAC-related projects, which would affect the vast majority of new personnel at Fort Belvoir, would likely not adversely affect use of the rail systems because of the continued lack of direct service. Consequences of implementing the Town Center Alternative would be similar with respect to the bus portion of the transit system. Fort Belvoir is not served to any substantial degree because of the difficulties in those modes' gaining access to the post because of security requirements. Demand for additional bus services could evolve, resulting in higher ridership figures. The local bus routes, however, tend to be limited to the study area, which represents only a small fraction of the locations where the employee population would reside. There are only a limited number of long-haul routes serving the Main Post. A 1 to 2 percent mode share equates to approximately 200 to 450 daily riders. Achieving a 10 percent mode share would remove approximately 725 vehicles from the roadway in the peak hour; this number includes both the Main Post and EPG.

4.3.5.3 Other Projects Sitings/Operations

No effects would be expected. Other projects associated with BRAC implementation (see Section 2.2.2.3) include projects such as infrastructure, access control point, barracks modernization, and MWR family travel camp. These projects generally involve a relatively minor or negligible number of personnel that would be using the transportation system.

4.3.5.4 Mitigation

Implementing the Town Center Alternative would result in significant adverse effects to the transportation system with respect to congestion and increased travel time. These effects would lead to reduced employee productivity, higher commuting costs, and degradation of quality of life. These effects would not be limited to personnel at Fort Belvoir. Through commuters and the local community would also be affected.

This section identifies potential mitigation actions to avoid, reduce, or compensate for the magnitude of predicted effects. The mitigation actions are evaluated for their efficacy so that an informed decision can be made regarding their adoption and implementation.

Road Network and Associated Facilities. Measures for the Town Center Land Use Alternative have been identified to mitigate the effects associated with its implementation.

1. *Reconstruction of the I-95/Fairfax County Parkway Interchange.* This measure would reconstruct the I-95/Fairfax County Parkway interchange to add HOV connections to and from the south. It would encourage new HOV trips between Fort Belvoir and points to the south on I-95, reducing SOV trips and, thus, overall demand on the road network. This improvement would provide better traffic operations for the increased traffic flows from EPG and the Main Post, reducing delays during the peak periods. Estimated cost: $75 million.
2. *Improvements to Fairfax County Parkway between I-95 and John J. Kingman Road.* Widening the Parkway to a 3-2-3 lane configuration, similar to I-395, would provide the necessary directional capacity. Additional roadway capacity, via intersection improvements and widening, would improve traffic flow and reduce congestion. The center lanes could be reserved for HOV traffic only, or be used by all traffic. Estimated cost: $100 million.
3. *Rideshare Facility.* A rideshare facility on the Main Post would encourage a shift from SOV to HOV trips. This shift would reduce traffic volumes on the roadway, which, in turn, would reduce the effect of the development. Estimated cost: $15 million.
4. *Transit Center/Facilities.* This measure would construct a transit center and other facilities to provide for additional choices of travel over the SOV. This improvement would be developed in conjunction with increased bus service. Siting has not been determined. Estimated cost: $30 million.
5. *Intersection Improvements.* Intersection improvements at key locations such as U.S. Route 1 at Backlick/Pohick (Tulley Gate), U.S. Route 1 at Belvoir Road (Pence Gate), Telegraph Road at South Van Dorn Street, Franconia-Springfield Parkway ramps at Frontier Drive, and Franconia-Springfield Parkway at Beulah Street, would improve traffic flow and reduce congestion. Improvements could include signalization, additional turning lanes, lengthening of turning lanes, or other measures appropriate to an intersection. Estimated cost: $15 million.
6. *Additional U.S. Route 1 Crossings for Main Post.* Two additional crossings over U.S. Route 1 would improve internal roadway circulation on Fort Belvoir between North and South Posts. The likely location of these two improvements would be between Gunston and Belvoir Roads, with final sitings dependent on the site layout of other facilities projects (e.g., the new hospital proposed at the South Post golf course). These improvements would reduce the number of trips on off-post roadways between North and South Posts. Estimated cost: $25 million

7. *Fairfax County Parkway/John J. Kingman Road Intersection Improvements.* Improvement would consist of upgrading the intersection into a full interchange configuration, which would reduce congestion on the parkway at this intersection and improve access to North Post. Estimated cost: $30 million.
8. *Improvements to Beulah, Telegraph, and Newington Roads.* This measure would widen roadways and provide other improvements, such as signalization and safety measures (e.g., improved crosswalks, lighting), to enhance flow of the increased traffic volumes caused by BRAC. Estimated cost: $80 million.
9. *Widening of U.S. Route 1 through Fort Belvoir.* Widening U.S. Route 1 through Fort Belvoir would provide needed capacity to handle the additional influx of workers on the Main Post. The widening could also include interchanges at the Fairfax County Parkway and U.S. Route 1. Estimated cost: $75 million.
10. *Improvements to Lorton Road.* Widening and other improvements to Lorton Road would improve the access between U.S. Route 1 and I-95 and reduce the effects on the Fairfax County Parkway. Estimated cost: $10 million.
11. *Franconia-Springfield Parkway/Neuman Street Interchange.* This measure would improve traffic flow along the Franconia-Springfield Parkway and reduce vehicular demand on the Fairfax County Parkway. Estimated cost: $50 million.
12. *Completion of Van Dorn Street/Franconia Road Interchange.* This improvement would reduce congestion at this intersection, which is an expected pathway for vehicles traveling to and from Fort Belvoir. Estimated cost: $90 million.
13. *Interchange at U.S. Route 1 and Fairfax County Parkway.* Improvement would reduce the delays at the intersection and improve traffic flows. It also could serve as a replacement to Pohick Road to provide access to Tulley Gate. Estimated cost: $55 million.
14. *Interchange at U.S. Route 1 and Telegraph Road.* Improvements would reduce the delays at the intersection and improve traffic flows. Estimated cost: $75 million.

Total estimated cost for the foregoing mitigation measures would be $720 million. This figure excludes contingency costs and costs associated with supervision, inspection, and overhead. More detailed studies and designs will be required, including potential NEPA studies.

The transportation network has been evaluated from a regional, sub-regional, and local perspective, and the effects on the transportation system have been quantified and compared to both existing conditions and the No Action Alternative. On the basis of these comprehensive comparisons, improvements have been identified that would mitigate most of the adverse effects of the Town Center Alternative on the transportation system in the immediate area of Fort Belvoir. The additional site entrance points, improved site circulation, improved interchanges, and widened roadways would result in reduced delay, limit the possibility of Fort Belvoir traffic backing up onto the major regional highways, and improve the operation of the intersections within the area of influence of the BRAC-related actions. As engineering and design work proceeds, detailed traffic operations studies would be completed to ensure that intersection levels of service are maintained or improved in the immediate area of the installation. A major improvement needed would be to widen the Fairfax County Parkway eastward from the I-95 interchange from a 4-lane cross-section to a 3-2-3 lane configuration.

On a regional level, the relocation of 22,000 jobs toward the south of the metropolitan area, combined with regional projects, such as the widening of I-95 and construction/implementation of HOT lanes in the I-95 Corridor, would be expected to lead to additional travel demand from the south. With no plans for additional capacity in the corridor beyond the planned widening and HOT lanes, the analysis indicates that the congested period during the morning and afternoon would be extended by 30 to 45 minutes. Traffic traveling towards Fort Belvoir on regional facilities could experience some limited congestion during the peak hour, but that direction of travel remains the "reverse commute," with heavier traffic headed towards Tyson's Corner, Arlington, Alexandria, and Washington, DC.

Transit System. This section describes proposed mitigation measures to the transit system to help avoid, reduce, or compensate for the effects associated with implementing the Town Center Alternative. Mitigation measures are appropriate for bus service but none are identified for rail services. Expansion or improvements to rail service could occur in the future on the basis of further evaluation of the transportation system undertaken as a result of experiences related to BRAC or other developments in the study area.

Initial bus service concept plans have been developed based on the origin data for the BRAC employees destined for Fort Belvoir and existing origin patterns for Main Post employees. These are preliminary concept plans intended to serve as a guide to the levels of transit service that could be required to serve both a 5 and 10 percent transit mode share to the Main Post. Detailed route and service planning would be conducted later. The purpose of these concept plans is to demonstrate that feasible transit service options are viable to support the assumed mode shares.

Five basic service areas have been identified. These basic service areas are identical to those identified in the Preferred Alternative; however, the appropriate service routes might vary, because all routes would be serving just the Main Post. The service areas are as follows:

- Southern Prince William County (Dumfries, Cherry Hill, and Powells Creek areas)
- Northern Prince William County (Woodbridge, Dale City, and Lake Ridge areas)
- U.S. Route 1 in Fairfax County (Lorton, Fort Belvoir, Mount Vernon, Hybla Valley, Beacon Hill, and Huntington areas)
- Western Fairfax County (Burke, Fairfax, and Chantilly areas and, possibly, the Herndon and Reston areas)
- Franconia-Springfield Metro station

Service Concept for 10 Percent Mode Share

- *Southern Prince William County (4 Peak Hour Buses).* Bus service on a 15-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.
- *Northern Prince William County (6 Peak Hour Buses).* A 10-minute headway is assumed for service from northern Prince William County. This service would operate in the Dale City, Woodbridge, and Lake Ridge areas.
- *U.S. Route 1 in Fairfax County (4 Additional Peak Hour Buses).* Four additional buses per hour would be added to existing services along the U.S. Route 1 corridor between Huntington and the Main Post.

- *Western Fairfax County (4 Additional Peak Hour Buses).* Four additional buses per hour would operate in the Fairfax County Parkway corridor to the Burke area. This service would require a transfer to shuttle bus at the Franconia-Springfield Metro station.
- *Franconia-Springfield Metrorail (10 Peak Hour Buses).* A shuttle linking the Main Post to the Franconia-Springfield Metro station would be needed. Pending a refinement of the numbers, a 6-minute headway on this shuttle is assumed. This service would link those commuters with access to one of the regional Metro lines to the Main Post area.

Service Concept for 5 Percent Mode Share

- *Southern Prince William County (2 Peak Hour Buses).* Bus service on a 30-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.
- *Northern Prince William County (3 Peak Hour Buses).* A 20-minute headway is assumed for service from northern Prince William County. This service would operate in the Dale City, Woodbridge, and Lake Ridge areas.
- *U.S. Route 1 in Fairfax County (2 Additional Peak Hour Buses).* Two additional peak hour vehicles would provide service along the U.S. Route 1 corridor between Huntington and the Main Post.
- *Western Fairfax County (2 Additional Peak Hour Buses).* Two additional buses per hour would operate in the Fairfax County Parkway corridor to the Burke area. This service would require a transfer to shuttle bus at the Franconia-Springfield Metrorail Station.
- *Franconia-Springfield Metrorail (10 Additional Peak Hour Buses).* A 6-minute headway on the shuttle linking the Main Post to the Franconia-Springfield Metrorail Station is also assumed under the five percent mode share scenario.

Bus service of a high enough quality to realize a 5 to 10 percent mode share for transit would complement the road network mitigation actions and help to reduce congestion and limit vehicle delays resulting from the Town Center Alternative. Achieving a 10 percent mode split would reduce the number of vehicles accessing the Fort Belvoir area in the peak hour by nearly 725 according to the MWCOG average auto occupancy of 1.1 passengers per vehicle. A 5 percent mode share for transit would reduce the number of peak hour vehicles by approximately 360.

The foregoing expanded bus services would be supplemented by internal circulator bus systems designed to provide more direct access to various areas of Fort Belvoir not directly accessible from the regional transit eservices. Such circulator buses would operate within the grounds of Fort Belvoir on schedules designed to meet the needs of employees.

The estimated cost of the transit-related mitigation actions would be $8 to $10 million in initial capital costs and $5 to $7 million in annual operating expenses depending on the ultimate operational requirements of the system. Note that these estimates are preliminary order-of-magnitude costs. More precise cost estimates can be prepared when site circulation and security plans are finalized and detailed route and service planning are completed.

Transportation Management Plan—Framework. Effects associated with implementing the Town Center Alternative could be reduced by appointing a TDMC and deploying a TMP. Such a mitigation action, described at the end of Section 4.3.4, could apply equally to implementation of the Town Center Alternative.

The proposed mitigations have been examined for the efficacy of mitigating the effects of the Town Center Alternative. Table 4.3-28 presents the results of the evaluation.

Table 4.3-28
Efficacy of the transportation mitigation for the Town Center Alternative

Mitigation Measure	Before	After	Comments
1) Improvements at I-95/Fairfax County Parkway interchange with HOV connections	LOS F 100-250 HOV trips during peak periods on I-95 corridor destined for Fort Belvoir	LOS D 800-1000 HOV trips during peak periods on HOV ramps	With directional ramps, LOS D could be achieved, but modifications of interchange would require coordination with I-95 HOT Lanes Project Each HOV vehicle would remove 2 SOV vehicles from the traffic stream
2) Fairfax County Parkway improvements	V/C ranging 0.9 to 1.13, LOS = F	V/C less than= 0.7 in peak direction, LOS = D	Improves HOV traffic's LOS to B with improvements in conjunction with 1
3) Rideshare facility	N/A	Allows for 200-300 HOV trips per hour	Each HOV vehicle would remove 2 SOV vehicles from the traffic stream. Would also require improvements 1 & 2
4) Transit center/facilities (in conjunction with increased bus services)	N/A	5% mode share would attract 400 riders in the peak period, while a 10% mode share would attract 800-850 riders	To be developed with increased bus services. One full bus can carry 40 passengers; so one bus would remove 40 SOV trips.
5) Intersection improvements U.S. Route 1/Pence Gate Telegraph/Van Dorn Streets Franconia-Springfield Parkway/Beulah Street	v/c is presented as AM/PM peak hour 1.19 and 1.34 1.01 and 1.05 1.21 and 1.42	 1.01 and 0.86 0.7 and 0.72 1.02 and 1.12	Improvements at Telegraph and Van Dorn would be in conjunction with the widening and improvements to Telegraph Road. Improvements would restore intersection performance similar to that under No Action Alternative
6) Additional Crossing over U.S. Route 1	Gunston Road LOS = F	Gunston Road and new crossings LOS = C	New crossings would alleviate congestion on Gunston Road and reduces trips traveling off-post between North and South Posts
7) Fairfax County Parkway and Kingman Interchange	LOS F in both AM and PM peaks	LOS C in both AM and PM peaks	Improvement would alleviate congestion at this intersection that occurs due to heavy turning movements
8) Roadway Improvements Beulah Street Telegraph Road Newington Road	v/c is presented as AM/PM peak hour 1.11 and 0.98 1.23 and 1.22 0.86 and 0.8	 0.8 and 0.75 0.75 and 0.73 0.40 and 0.45	Reduces traffic spillover into adjacent residential neighborhoods

Table 4.3-28
Efficacy of the transportation mitigation for the Town Center Alternative *(continued)*

Mitigation Measure	Before	After	Comments
9) Widen U.S. Route 1	v/c ranges between 1.05-1.17 in AM and 1.25-1.43 in PM	v/c ranges of 0.65-0.7 in AM; PM = 0.8-0.95	Completed in conjunction to intersection improvement and interchange construction
10) Widen Lorton Road	v/c of 1.04 in AM and 1.08 in PM	v/c 0.82 in AM and 0.85 in PM	Improves access from U.S. Route 1 to I-95
11) Franconia-Springfield/Neuman Street Interchange	LOS F in AM and PM	LOS C or better	Requires coordination with VDOT
12) Van Dorn/Franconia Interchange	LOS F in AM and PM	LOS D or better	Requires coordination with VDOT
13) U.S. Route 1 and parkway interchange	LOS F in AM and PM	LOS D or better	Replaces access via Pohick Road (Tulley Gate)
14) U.S. Route 1 and Telegraph Road interchange	LOS E in AM and F in PM	LOS D or better	Improves traffic flow on U.S. Route 1 immediately west of Fort Belvoir

4.3.6 ENVIRONMENTAL CONSEQUENCES OF THE CITY CENTER ALTERNATIVE

4.3.6.1 Land Use Plan Update

No effects would be expected. Adoption of a revised land use plan would not, in the absence of additional activities such as facilities development, result in effects to the transportation system. Effects to the transportation system would not occur until further development occurred in accordance with the terms of the new land use plan. The proposed land use plan would add the EPG and the GSA Parcel to the inventory of actively managed resources. Including these areas within the planning regime would not, by itself, affect the transportation system unless and until development occurred at the sites.

4.3.6.2 BRAC Implementation and Facilities Projects

Long-term significant adverse effects would be expected. Implementing the City Center Alternative, when compared to the No Action Alternative (set forth in Section 4.3.3), would worsen traffic conditions in the immediate vicinity of EPG and the GSA Parcel. From the regional perspective, implementation would produce a combination of minor (negligible) adverse and beneficial effects.

Under the City Center Alternative, all personnel relocating to Fort Belvoir would be located at EPG and the GSA Parcel. No additional personnel would be at the Main Post. The City Center Alternative would increase total employment levels at EPG and the GSA Parcel by approximately 22,000 personnel. The following subsection discusses and evaluates the effects on the transportation system that would occur as a result of assigning these additional personnel.

4.3.6.2.1 Travel Patterns to and from Fort Belvoir

The assumed residential distribution for the expected BRAC employees for the City Center Alternative is the same as described under the Preferred Alternative.

As discussed previously under travel demand modeling, the net increase in traffic would be noticeably less than the amount of traffic headed to or from the BRAC sites because of the rebalancing of productions (households) and attractions (employment) throughout the region resulting from the relocation of employment to Fort Belvoir. In essence, the residential redistribution within the region would increase the portion of post traffic that is coming from the south during the AM peak period. A potential consequence of the additional Fort Belvoir traffic is that it might force traffic away from the I-95 corridor onto U.S. Route 1 and other minor/local roadways as travelers attempt to avoid any consequence of the traffic destined to EPG. Specific routing of each vehicle would depend on its final destination.

The MWCOG model distributed the decrease in employment to other traffic analysis zones across the region, because the model process was to control the amount of production in the region. Residential locations of employees of NGA and WHS would slowly shift toward being similar to those of Fort Belvoir employees, the same distribution assumed for the Preferred Alternative. Thus, regional travel would be similar to that of the Preferred Alternative.

Tables 4.3-29 and 4.3-30 presents the population and employment levels, which is also illustrated in Figure D-19 (in Appendix D), for the 2011 conditions for the City Center Alternative, as well as the production and attractions for the study area.

Table 4.3-29
Population and employment for existing conditions (2006), 2011 No Action Alternative, and 2011 City Center Alternative

	Population			Employment		
District	Existing	No Action	City Center	Existing	No Action	City Center
Laurel Hill	13,470	25,121	25,121	3,547	3,996	3,996
Pohick	50,826	51,766	51,766	3,648	3,849	3,849
Lorton South of U.S. Route 1	14,476	18,200	18,200	9,067	11,233	11,233
I-95 Industrial Area	2,092	2,175	2,175	8,605	8,683	8,683
Franconia-Springfield Transit Area	2,727	2,821	2,821	5,940	6,764	7,795
Springfield Community Business Center	1,306	1,483	1,483	2,074	2,141	2,141
Springfield	31,263	32,201	32,201	10,850	11,387	11,387
EPG	0	0	0	45	45	22,702
Mason Neck	2,785	5,552	5,552	438	464	464
Fort Belvoir (Main Post)	7,623	7,623	9,387	23,266	23,267	23,020
Mount Vernon	93,783	102,230	102,230	19,681	21,457	21,457
Rose Hill	67,179	70,513	70,513	20,352	23,157	23,157
Total Study Area	287,530	319,685	321,449	107,513	116,443	139,884
Rest of Virginia	2,142,682	2,399,710	2,399,710	1,258,264	1,427,055	1,430,055
Maryland	3,318,699	3,483,648	3,483,648	1,723,958	1,870,517	1,870,517
District of Columbia	583,733	615,375	615,375	752,719	790,205	790,205
West Virginia	47,735	52,555	52,555	15,173	17,191	17,191
Out of State	0	0	0	0	0	0
Total Outside Study Area	6,092,849	6,551,288	6,551,288	3,750,114	4,104,968	4,107,968
Regional Total	**6,380,379**	**6,870,973**	**6,872,737**	**3,857,627**	**4,221,411**	**4,247,852**

Source: VHB, 2006

Table 4.3-30
Productions and attractions for existing conditions (2006), 2011 No Action Alternative, and 2011 City Center Alternative

	Productions			Attractions		
District	Existing	No Action	City Center	Existing	No Action	City Center
Laurel Hill	31,891	52,247	52,439	31,825	52,327	52,433
Pohick	109,597	110,862	109,476	109,719	110,848	109,388
Lorton South of U.S. Route 1	43,441	55,677	55,049	43,430	55,560	54,868
I-95 Industrial Area	20,802	20,880	20,256	20,753	20,969	20,313
Franconia-Springfield Transit Area	37,799	41,046	42,020	38,044	41,275	42,167
Springfield Community Business Center	11,586	12,158	12,060	11,601	12,053	12,055
Springfield	98,365	101,148	100,162	98,274	101,153	100,334
EPG	81	89	28,736	87	102	29,382
Mason Neck	5,979	11,012	10,923	5,948	10,998	10,901
Fort Belvoir (Main Post)	35,176	35,177	51,981	35,342	35,343	51,555
Mount Vernon	250,418	271,298	269,763	250,606	271,297	269,806
Rose Hill	184,223	197,462	195,700	184,200	197,283	195,522
Total Study Area	829,357	909,055	948,565	829,830	909,209	948,724
Rest of Virginia	6,952,561	7,768,560	7,732,052	6,952,125	7,768,134	7,731,233
Maryland	10,587,588	11,254,561	11,239,616	10,586,616	11,252,945	11,238,423
District of Columbia	1,572,672	1,614,479	1,606,027	1,572,360	1,614,396	1,606,012
West Virginia	153,721	172,023	171,904	153,849	172,056	171,912
Out of State	715,116	828,980	829,176	716,236	830,919	831,036
Total Outside Study Area	19,981,658	21,638,603	21,578,776	19,981,186	21,638,450	21,578,617
Regional Total	**20,811,015**	**22,547,658**	**22,527,341**	**20,811,015**	**22,547,658**	**22,527,341**

Source: VHB, 2006.

Fort Belvoir (Main Post and EPG) and the GSA Parcel would represent 2.9 and 32.7 percent of the population and employment, respectively, and the sites would account for only 8.5 percent of the attractions in the study area. The ratio of jobs to residents within the study area would be 0.43, or 43 jobs per 100 residents, an increase of 7 jobs per 100 residents over the No Action Alternative. The change over the No Action Alternative would be identical to that of the Preferred Alternative.

Fort Belvoir would represent approximately 6.1 percent of the total employment within all of Fairfax County in the City Center Alternative, an increase of 2.9 percent over the No Action Alternative. Within the transportation Corridor 8, Fort Belvoir would be approximately 10.4 percent of the total employment, a near doubling of the percentage of the county total over the No Action Alternative. These percentages and changes over the No Action Alternative would be identical to the other alternatives, because the total employment would not change between the alternatives. Specific siting of the employees change the employment levels compared to the other alternatives. In turn, this changes the production and attractions to and from the districts under the City Center Alternative.

Table 4.3-31 presents the internal trips to the study area, external trips destined for the study area, and external trips that originate within the study area. The table illustrates that most of the trips that have an origin or a destination within the study area originate from or are destined for points outside of the study area, as opposed to being an internal trip within the study area (i.e., a trip beginning and ending within the study area). The table does not include external trips that pass through the study area (i.e., a trip from Fredericksburg to Washington, DC, traveling on I-95). The numbers of study area trips are similar to that of the other alternatives. Slight differences do exist between the alternatives because of the specific locations of the employees; however, the differences are not significant.

Table 4.3-31
Study area trips – 2011 City Center Alternative

Time	Internal trips within study area	External trips ending in study area	External trips beginning in study area
AM Peak	78,711	63,067	78,216
PM Peak	138,710	108,791	96,802
Off-Peak	341,358	211,217	208,061
Daily	**558,779**	**383,075**	**383,078**

4.3.6.2.2 Performance under Expected Conditions

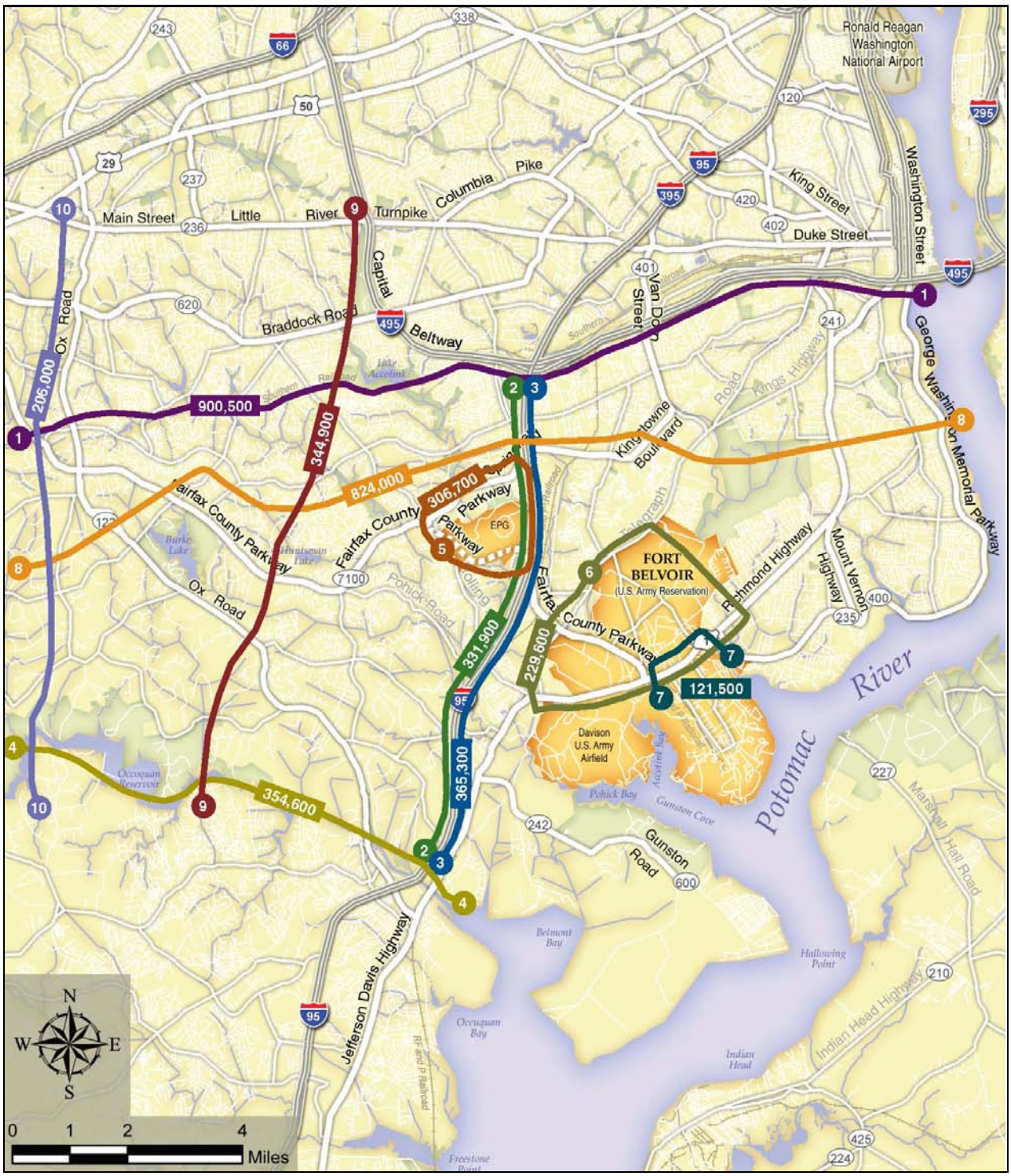
Few changes to Northern Virginia's transportation system are expected over the next 5 years because of funding shortfalls and the resulting delays in implementing long-term transportation plans. The modeling assumed that the off-post transportation improvement projects identified in the No Action Alternative would be in place for the City Center Alternative.

One key finding of the analyses is that to accommodate the 9,263 new employees at the GSA Parcel, a new access point would be needed on the Franconia-Springfield Parkway. This new access point would require major reconfiguration of that facility. Alternatively, the total employment at the GSA Parcel could be reduced so that access from Loisdale Road would be the only one required.

Road Network. Increased traffic to and from EPG and the GSA Parcel would account for up to 40 percent of the traffic flow on roadways adjacent to the gates and quickly drops to less than 10 percent of the traffic, as shown in Figures D-20 and D-21 in Appendix D. These figures illustrate the areas of influence from implementing the City Center Alternative.

The area of influence shows that the effect of BRAC-related traffic on roadways diminishes as one moves away from the sites. This would be because of traffic getting off and on at the interchanges along the roadways. Regional travel patterns would be similar to the Preferred Alternative. It is only when moving closer to the specific siting that changes are noticeable between the alternatives. Because the City Center Alternative would place more development at EPG and the GSA Parcel, the effects would be higher at those locations and minimal around the Main Post. Figures D-22 and D-23 in Appendix D show both the growth in traffic and the change in the traffic flow that would be caused by the BRAC action at selected locations.

Figure 4.3-21 provides another perspective on the changes in travel patterns. Total volumes crossing selected screen lines are shown. Again, the net effects on traffic volumes would decrease quickly as the distance from the post grows.



Daily Screen Line Volumes under The City Center Alternative

Fort Belvoir, Virginia

Figure 4.3-21

The screen lines north of Fort Belvoir show a slight decrease in traffic volumes over the No Action Alternative. This would be because of trips diverting from I-95 at the Fairfax County Parkway that previously traveled north to the Pentagon or other nearby employment centers; now they would travel to Fort Belvoir. To the south, the increase in daily volume from the No Action Alternative to the City Center Alternative crossing the Occoquan River would be approximately 5,000 trips (two-way). A major reason that there would be only a slight increase at this screen line is that some trips that would be caused by the BRAC action are already within the traffic stream (in the No Action Alternative), but their destination would be the Pentagon or other nearby employment centers.

Moving closer to the post, the effect on adjacent highway facilities are shown in Table 4.3-32, which shows V/C ratios, delay, and LOS for 23 key intersections. The summary of the turning movement counts for the City Center Alternative can be found in Table D-5 and Figures D-24 and D-25 in Appendix D.

Table 4.3-32
Intersection measures of effectiveness—2011 City Center Alternative

	AM Peak Hour[a]			PM Peak Hour[a]		
Intersection Location	**V/C**	**LOS**	**Delay**	**V/C**	**LOS**	**Delay**
Commerce St./Amherst Ave.	0.77	D	37.8	0.94	D	53.6
Commerce St./Backlick Rd.	0.42	C	30.4	0.80	D	52.3
Backlick Rd./Calamo St.	0.75	B	14.1	0.82	C	24.2
Loisdale Rd./Spring Mall Dr.	0.69	D	36.5	1.08	E	76.5
Franconia Springfield Parkway/Spring Village Dr.	1.43	F	200.6	1.29	F	136.1
Franconia Springfield Parkway EB Ramp/Backlick Rd.	1.00	E	68.2	0.82	D	41.9
Franconia Springfield Parkway WB Ramp/Backlick Rd.	0.91	B	12.1	0.93	C	22.1
Franconia Springfield Parkway/I-95 HOV Ramps	1.06	E	79.6	1.51	F	198.7
Franconia Springfield Parkway EB Ramp/Frontier Dr.	0.82	C	30.9	0.99	E	78.0
Franconia Springfield Parkway WB Ramp/Frontier Dr.	0.51	D	40.5	0.9	F	101.1
Franconia Springfield Parkway/Beulah St.	1.23	F	122.2	1.35	F	155.5
Fairfax County Parkway/Terminal Rd.	0.91	C	24.9	0.85	B	19.6
Fairfax County Parkway SB Ramps/Telegraph Rd.	0.56	B	19.6	0.90	C	33.7
Fairfax County Parkway NB Ramps/Telegraph Rd.	0.70	B	19.8	0.77	C	22.8
Fairfax County Parkway/John J. Kingman Rd.	0.81	D	45.8	1.21	F	120.2
Telegraph Rd./Beulah St.	0.65	D	36.1	0.72	C	30.7
Telegraph Rd./S. Van Dorn St.	0.90	C	30.7	1.04	D	47.3
U.S. Route 1/Telegraph Rd. - Old Colchester Rd.	0.82	D	54.5	0.76	E	62.9
U.S. Route 1/Fairfax County Parkway	1.02	E	62.0	0.97	D	45.3
U.S. Route 1/Backlick Rd. - Pohick Rd.	1.12	E	71.5	1.17	F	157.9
U.S. Route 1/Belvoir Rd.	0.95	C	28.4	0.83	C	23.4
U.S. Route 1/Old Mill Rd.	0.96	F	82.8	0.99	E	79.4
Loisdale Road/GSA Access Road	1.65	F	120.5	1.16	F	92.1

[a]AM Peak Hour: 7:15 AM to 8:15 AM; PM Peak Hour: 4:30 PM to 5:30 PM

The intersections adjacent to Fort Belvoir along U.S. Route 1, Telegraph Road, and Fairfax County Parkway would perform at a similar LOS as in the No Action Alternative, with some increase to through traffic due to trip diversion. This would be expected, as no new major development would occur at North or South Posts. A total of seven intersections would experience a degradation of LOS under the City Center Alternative in the AM and PM peak hour.

The results of the LOS analysis indicate that if access to EPG were made via Neuman Street, an interchange would be required to mitigate the effects. Having only a signalized intersection would result in severe congestion, as shown in Table 4.3-32. The Fairfax County Parkway section through EPG would also need to be widened beyond the current funded plan of four lanes to reduce congestion under the City Center Alternative.

The hours of congestion along the I-95 corridor would not be expected to increase much because the growth in demand would be less than 5 percent if the City Center Alternative were to be implemented. The period of congestion is likely to lengthen by 30 to 45 minutes on the I-95 corridor, even with the I-95 widening project being completed before 2011. Some localized congestion points might result with the increased traffic volumes within the I-95/Fairfax County Parkway interchange. The analyses assumed completion of the I-95 Fourth Lane Project.

Congestion along U.S. Route 1 would increase by 30 minutes over the No Action Alternative under the City Center Alternative because of increased through movement if no widening or improvements of U.S. Route 1 occurred. Increased through traffic, likely caused by a diversion of traffic because of implementing the City Center Alternative, traveling through Fort Belvoir on U.S. Route 1 would increase delays for vehicles exiting South Post via Tulley Gate. Congestion along Fairfax County Parkway (east of I-95) would be similar to that of the No Action Alternative, because no new development would occur at Main Post.

The GSA Parcel would require major access improvements to satisfy demand from the influx of WHS employees. Because of site constraints, access would be limited to Loisdale Road. The Franconia-Springfield Parkway and Metro station limit access to the north, and the location of the CSX railroad prevents access to the east. Thus, Loisdale Road is the only viable means of ingress and egress for the GSA Parcel. Congestion on Loisdale Road would last all day if this site were developed as proposed; therefore, it would need to be widened to four lanes between Spring Mall Road to the GSA Parcel access point, with major intersection improvements. Even with these improvements, access capacity would be limited to 1,000 to 1,500 vph. This limitation of capacity would require that WHS stagger workers' arrival across 5 hours to avoid severe congestion on Loisdale Road. This drives the need for an additional access point from the Franconia-Springfield Parkway, which would require a costly reconfiguration of the Franconia-Springfield Parkway.

Overall, at a regional level, traffic patterns under the City Center Alternative would be similar to those of the Preferred Alternative. It is only when moving closer to the Main Post, EPG, and the GSA Parcel that the differences would become apparent. The differences would be because of the different land use in each alternative. This would be from the siting of the additional 22,000 employees under the BRAC action. The Preferred Alternative would split the employment between EPG and Main Post (North and South Posts), while the City Center Alternative would locate all employees at EPG and the GSA Parcel.

In the areas immediately surrounding EPG, severe congestion lasting 3 to 4 hours would occur if mitigating actions including transportation improvements were not taken. This range is approximately the same as would be expected under the Preferred Alternative around the EPG

site. With only the currently funded improvements, the available access to EPG could process between 2,000 and 3,000 vph, roughly 55 to 70 percent of the projected peak-hour demand. This traffic would cause queuing from the access point off of the Fairfax County Parkway and would back up onto the I-95 corridor, affecting through movement vehicles. The spillback in this area would be similar to that of the Preferred Alternative. This queuing would translate into an extension of the AM congested period by one hour. In the evening peak period, egress from EPG would be slow and spread over several hours. As a result, the effect on the regional transportation facilities in the PM peak period would be limited as compared to the AM peak period.

The effect of not improving the Fairfax County Parkway beyond the currently funded improvement would be that it would cause vehicles to find alternative routes around the EPG area to avoid the congestion at EPG. Such routes would include Backlick Road and Rolling Road to the south. Congestion spillover onto local roadways would decrease the quality of life for local residents and could potentially create undesirable conditions for the residents with the higher traffic volumes.

Backlick Road would also experience an increase in traffic flows if only the currently approved funded improvements were provided because Barta Road would be a secondary access point to EPG. Limited capacity exists along the Backlick Road corridor to handle much increase in traffic flow—the constraint being downtown Springfield which is immediately to the north. This constraint would also cause severe congestion on the local roadways.

If roadway improvements beyond the currently funded improvements were to occur, site traffic could be dispersed across multiple points, reducing the effects to any one location. The City Center Alternative would have little effect on the roadways surrounding the Main Post because the alternative would not increase the employment population on the Main Post. The traffic volumes on the Fairfax County Parkway east of I-95 would increase but would not prompt the need for major improvements because the increase in traffic would be in the off-peak direction of the parkway. Improvements would be required to Loisdale Road to provide for improved access to the GSA Parcel to accommodate the influx of WHS employees.

Transit Systems. Mode split—the fraction of the employee population that uses mass transit—for Main Post is 1 to 2 percent. The rail portion of the transit system does not directly serve the Main Post. Implementing the BRAC-related projects, which would affect the vast majority of new personnel at Fort Belvoir, would likely not adversely affect use of the rail systems because of the continued lack of direct service. Consequences of implementing the City Center Alternative would be similar with respect to the bus portion of the transit system. Demand for additional bus services could evolve, resulting in higher ridership figures. The local bus routes, however, tend to be limited to the study area, which represents only a small fraction of the locations where the employee population would reside. The GSA Parcel is potentially accessible from the rail system by foot, assuming that adequate walkways are provided as part of the detailed site design process. A 1 to 2 percent mode share equates to approximately 200 to 450 daily riders. Achieving a 10 percent mode share would remove approximately 725 vehicles from the roadway in the peak hour; this number includes both the Main Post and EPG/GSA Parcel.

4.3.6.3 Other Projects Sitings/Operations

No effects would be expected. Other projects associated with BRAC implementation (see Section 2.2.2.3) include projects such as infrastructure, the USANCA support facility, access control point, barracks modernization, and MWR family travel camp. These projects generally

involve a relatively minor or negligible number of personnel that would be using the transportation system.

4.3.6.4 Mitigation

Implementing the City Center Alternative would result in significant adverse effects to the transportation system with respect to congestion and increased travel time. These effects would lead to reduced employee productivity, higher commuting costs, and degradation of quality of life. These effects would not be limited to personnel at Fort Belvoir. Through commuters and the local community would also be affected.

This section identifies potential mitigation actions to avoid, reduce, or compensate for the magnitude of predicted effects. The mitigation actions are evaluated for their efficacy so that an informed decision can be made regarding their adoption and implementation.

Road Network and Associated Facilities. Proposed mitigating actions for the City Center Land Use Alternative have been identified. These include improvements to highway and transit facilities and potential transit service improvements.

1. *Reconstruction of the I-95/Fairfax County Parkway Interchange.* This measure would reconstruct the I-95/Fairfax County Parkway interchange to add HOV connections to and from the south. It would encourage new HOV trips between Fort Belvoir and points to the south on I-95, reducing SOV trips and, thus, overall demand on the road network. This improvement would provide better traffic operations for the increased traffic flows from EPG and from the Main Post, reducing delays during the peak hours. Estimated cost: $75 million.
2. *Additional or Improved Ramps to and from I-95 for EPG.* This measure would add new connections from I-95 into EPG. It would reduce the vehicular demand at the I-95/Fairfax County Parkway interchange and on the Parkway through EPG by providing alternative access options, such as (1) direct connection for SB I-95 traffic into EPG at Fairfax County Parkway, (2) SB I-95 flyover ramp to Backlick Road, with a direct connection into EPG, and (3) NB I-95 HOV traffic to I-95 GP lanes and flyover ramp connection into EPG for NB HOV and egress for SB HOV vehicles. Estimated cost: $40 million.
3. *Widen EPG Segment of Fairfax County Parkway.* Widening the parkway from four to six lanes through EPG would increase capacity on the parkway to accommodate the additional vehicular demand due to development at EPG. This improvement includes the costs for a reconfigured interchange. Estimated cost: $50 million.
4. *Fairfax County Parkway Improvements between I-95 and John J. Kingman Road.* Improvements to the Parkway between I-95 and Kingman Road would provide additional roadway capacity, via intersection improvements and widening, to improve traffic flow and reduce congestion. Estimated cost: $40 million.
5. *Rideshare Facility.* A rideshare facility on EPG would encourage a shift from SOV to HOV trips. This shift would reduce traffic volumes on the roadway, which, in turn, would reduce the effects of the development. Estimated cost: $15 million.
6. *Transit Center/Facilities.* This measure would construct a transit center and other facilities to provide for additional choices of travel over the SOV. This improvement would be developed in conjunction with increased bus service. Siting has not been determined. Estimated cost: $30 million.

7. *Additional EPG Access.* This measure would provide multiple choices for access to EPG, which would diffuse traffic to multiple points and provide alternative routes for employees and visitors if one access is blocked. The access would be from I-95 in the vicinity of the Newington interchange, enabling HOV access to and from EPG. Estimated cost: $15 million.
8. *Intersection Improvements.* Intersection improvements at key locations such as along Backlick Road (north of Franconia Springfield Parkway), Loisdale Road at Spring Mall Drive, Franconia-Springfield Parkway ramps at Frontier Drive, intersections along U.S. Route 1 through Fort Belvoir, and Franconia-Springfield Parkway at Beulah Street, would improve traffic flow and reduce congestion. Improvements could include signalization, additional turning lanes, lengthening of turning lanes, or other measures appropriate to an intersection. Estimated cost: $15 million.
9. *Franconia-Springfield Parkway/Neuman Street Interchange.* This measure would replace the existing at-grade intersection on the Franconia-Springfield Parkway with a full interchange at Neuman Street. An interchange would provide additional access to EPG from the north by creating a direct connection between the Franconia-Springfield Parkway and EPG in conjunction with the subsequent improvement. This improvement would reduce congestion on the Fairfax County Parkway through EPG by diverting traffic to this point. For employees living north or west of EPG, this measure would provide a shorter route and thereby reduce commuting time. Estimated cost: $50 million.
10. *Access to EPG via Neuman Street.* This project would provide roadway access to EPG from the north, with entry into EPG occurring east of Accotink Creek. Existing residences and a building used as a church would have to be removed. Estimated cost: $26 million.
11. *Improvements to Beulah, Newington, and Telegraph Roads.* This measure would widen roadways and provide other improvements, such as signalization and safety measures (e.g., improved crosswalks, lighting), to enhance flow of the increased traffic volumes caused by BRAC. Estimated Cost: $50 million.
12. *Franconia-Springfield Parkway Improvements.* This improvement would construct a direct connection from the parkway to the GSA Parcel would alleviate congestion on Loisdale Road. Estimated cost: $50 million.
13. *Improvements to Loisdale Road for Additional GSA Parcel Access.* This improvement would provide needed capacity improvements on Loisdale Road at the intersection with the access point into the GSA Parcel. This improvement would help alleviate congestion because of the influx of WHS employees at this site. Estimated cost: $5 million.

Total estimated cost for the foregoing mitigation measures would be $461 million. This figure excludes contingency costs and costs associated with supervision, inspection, and overhead. More detailed studies and designs will be required, including potential NEPA studies.

The transportation network has been evaluated from a regional, sub-regional, and local perspective, and the effect on the transportation system have been quantified and compared to both existing conditions and the No Action Alternative. On the basis of these comprehensive comparisons, improvements have been identified that would mitigate most of the adverse effects of the City Center Alternative on the transportation system in the immediate area of Fort Belvoir. The additional site entrance points, improved site circulation, improved interchanges, and widened roadways would result in reduced delay, limit the possibility of Fort Belvoir traffic backing up onto the major regional highways, and improve the operation of the intersections

within the area of influence of the BRAC-related actions. As engineering and design work proceeds, detailed traffic operations studies can be completed to ensure that intersection levels of service are maintained or improved in the immediate area of the installation. The GSA Parcel would require access to the Franconia-Springfield Parkway, which would result in major reconstruction of that segment of roadway.

On a regional level, the relocation of 22,000 jobs toward the south of the metropolitan area, combined with regional projects, such as the widening of I-95 and construction/implementation of HOT lanes in the I-95 Corridor, would be expected to lead to additional travel demand from the south. With no plans for additional capacity in the corridor beyond the planned widening and HOT lanes, the analysis indicates that the congested period during the morning and afternoon would be extended by 30 to 45 minutes. Traffic traveling toward Fort Belvoir on regional facilities could experience some limited congestion during the peak hour, but that direction of travel remains the "reverse commute," with heavier traffic headed towards Tyson's Corner, Arlington, Alexandria, and Washington, DC.

Transit System. This section describes proposed mitigation measures to the transit system to help avoid, reduce, or compensate for the effects associated with implementing the City Center Alternative. Mitigation measures are appropriate for bus service but none are identified for rail services. Expansion or improvements to rail service could occur in the future on the basis of further evaluation of the transportation system undertaken as a result of experiences related to BRAC or other developments in the study area.

Initial bus service concept plans have been developed based on the origin data for the BRAC employees destined for EPG and the GSA Parcel. These are preliminary concept plans intended to serve as a guide to the levels of transit service that could be required to serve both a 5 and 10 percent transit mode share to EPG and the GSA Parcel. Detailed route and service planning would be conducted later. The purpose of these concept plans is to demonstrate that feasible transit service options are viable to support the assumed mode shares.

Five basic service areas have been identified. These basic service areas are identical to those identified in the Preferred and Town Center Alternatives; however, the appropriate service routes might vary, because all routes would be serving multiple destination points, differing from the Preferred Alternative. The service areas are as follows:

- Southern Prince William County (Dumfries, Cherry Hill, and Powells Creek areas)
- Northern Prince William County (Woodbridge, Dale City, and Lake Ridge areas)
- U.S. Route 1 in Fairfax County (Lorton, Fort Belvoir, Mount Vernon, Hybla Valley, Beacon Hill, and Huntington areas)
- Western Fairfax County (Burke, Fairfax, and Chantilly areas and, possibly, the Herndon and Reston areas)
- Franconia-Springfield Metro station

EPG/GSA Parcel Service Concept for 10 Percent Mode Share

- *Southern Prince William County (3 Peak Hour Buses).* Bus service on a 20-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.

- *Northern Prince William County (5 Peak Hour Buses).* A 12-minute headway is assumed for service from northern Prince William County. This service would operate in the Dale City, Woodbridge, and Lake Ridge areas.
- *U.S. Route 1 in Fairfax County (2 Additional Peak Hour Buses).* Two additional buses per hour would be added to existing services along the U.S. Route 1 corridor between Huntington and the Main Post.
- *Western Fairfax County (4 Additional Peak Hour Buses).* Four additional buses per hour would operate in the Fairfax County Parkway corridor to the Burke area.
- *Franconia-Springfield Metrorail (5 Peak Hour Buses).* A shuttle linking the Main Post to the Franconia-Springfield Metro station would be needed. Pending a refinement of the numbers, a 12-minute headway on this shuttle is assumed. This service would link those commuters with access to one of the regional Metro lines to the Main Post area.

EPG/GSA Parcel Service Concept for 5 Percent Mode Share

- *Southern Prince William County (2 Peak Hour Buses).* Bus service on a 30-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.
- *Northern Prince William County (2 Peak Hour Buses).* A 30-minute headway is also assumed for service from northern Prince William County. This service would operate in the Dale City, Woodbridge, and Lake Ridge areas.
- *U.S. Route 1 in Fairfax County (2 Additional Peak Hour Buses).* Two additional peak hour vehicles would provide service along the U.S. Route 1 corridor between Huntington and the Main Post.
- *Western Fairfax County (3 Additional Peak Hour Buses).* Three additional buses per hour would operate in the Fairfax County Parkway corridor to the Burke area. This service would require a transfer to shuttle bus at the Franconia-Springfield Metro station.
- *Franconia-Springfield Metrorail (5 Additional Peak Hour Buses).* A 12-minute headway on the shuttle linking the Main Post to the Franconia-Springfield Metro station is also assumed under the 5 percent mode share scenario.

Bus service of a high enough quality to realize a 5 to 10 percent mode share for transit would complement the road network mitigation actions and help to reduce congestion and limit vehicle delays resulting from the City Center Alternative. Achieving a 10 percent mode split would reduce the number of vehicles accessing the Fort Belvoir area in the peak hour by nearly 725 using the MWCOG average auto occupancy of 1.1 passengers per vehicle. A 5 percent mode share for transit would reduce the number of peak hour vehicles by approximately 360.

The foregoing expanded bus services would be supplemented by internal circulator bus systems designed to provide more direct access to various areas of Fort Belvoir not directly accessible from the regional transit services. Such circulator buses would operate within the grounds of Fort Belvoir on schedules designed to meet the needs of employees.

The estimated cost of the transit-related mitigation actions would be $10 to $12 million in initial capital costs and $6 to $9 million in annual operating expenses depending on the ultimate operational requirements of the system. Note that these estimates are preliminary order-of-

magnitude costs. More precise cost estimates can be prepared when site circulation and security plans are finalized and detailed route and service planning are completed.

Transportation Management Plan—Framework. Effects associated with implementing the City Center Alternative could be reduced by appointing a TDMC and deploying a TMP. Such a mitigation action, described at the end of Section 4.3.4, could apply equally to implementation of the City Center Alternative.

The proposed mitigations have been examined for the efficacy of mitigating the effects of the City Center Alternative. Table 4.3-33 presents the results of the evaluation.

Table 4.3-33
Efficacy of the transportation mitigation for the City Center Alternative

Mitigation Measure	Before	After	Comments
1) Improvements at I-95/Fairfax County Parkway interchange with HOV connections	LOS F 50-100 HOV trips during peak periods on I-95 corridor destined to Fort Belvoir	LOS D 200-300 HOV trips during peak periods on HOV ramps	With directional ramps, LOS D could be achieved, but modifications of interchange would require coordination with I-95 HOT Lanes Project Each HOV vehicle would remove 2 SOV vehicles from the traffic stream
2) Additional EPG Access SB I-95 at Backlick flyover SB I-95 direct connections at Fairfax County Parkway	 N/A N/A	 LOS C, with expected 600 vph on ramp LOS D, with expected 800 vph on ramp	Final Site Access plans would ensure LOS D or better SB to EPG connections would reduce the sizing of improvements needed at the I-95/Pkwy interchange Volumes on the Parkway would decrease by 1,500, LOS = D
3) Modified section of Fairfax County Parkway through EPG	LOS = F	LOS = D	Analyzed in conjunction with number 2. Modified interchange design at Rolling Road to provide improved connections into EPG
4) Fairfax County Parkway Improvements	V/C = 0.85 or higher in peak direction, LOS F	V/C = 0.65 in peak direction, LOS = D	
5) Rideshare facility	N/A	Allows for 200-300 HOV trips per hour to form at EPG	Each HOV vehicle would remove 2 SOV vehicles from the traffic stream.
6) Transit Center/Facilities (in conjunction with increased bus services)	N/A	5% mode share would attract 350 riders in the peak period, while a 10% mode share would attract 700-750 riders	To be developed with increased bus services. One full bus can carry 40 people, so would remove 40 SOV trips.
7) Additional EPG access	N/A	LOS A, with expected 200-300 vph	Provides for NB HOV direct access.

Table 4.3-33
Efficacy of the transportation mitigation for the City Center Alternative *(continued)*

Mitigation Measure	Before	After	Comments
8) Intersection Improvements Along Backlick Loisdale/Spring Mall Road Franconia-Springfield/Frontier U.S. Route 1/Parkway U.S. Route 1/Tulley Gate	v/c is presented as AM/PM peak hour 0.9 and 1.1 0.69 and 1.08 0.82 and 0.99 1.02 and 0.97 1.12 and 1.17	 0.7 and 0.7 0.7 and 0.87 0.8 and 0.9 0.86 and 0.96 0.99 and 0.99	Improvements would restore intersection performance similar to that under No Action Alternative
9) Franconia-Springfield/Neuman Street Interchange	LOS F in AM and PM	LOS C or better	Requires coordination with VDOT
10) Access to EPG via Neuman Street	N/A	LOS C Reduces volume on Parkway by 500 vph	Needs improvement 11 and likely requires property acquisition
11) Roadway Improvements Beulah Street Newington Road Telegraph Road	v/c is presented as AM/PM peak hour 1.02 and 1.14 0.86 and 0.8 1.12 and 1.13	 0.8 and 0.85 0.45 and 0.4 0.7 and 0.65	Improves traffic flow
12) Access to GSA site via Franconia-Springfield Pkwy	N/A	LOS C or better	Alleviates congestion on Loisdale Road
13) Improvements to Loisdale Road, including access to GSA site	LOS F in AM and PM	LOS C in AM and PM	Requires improvement number 12

4.3.7 ENVIRONMENTAL CONSEQUENCES OF SATELLITE CAMPUSES ALTERNATIVE

4.3.7.1 Land Use Plan Update

No effects would be expected. Adoption of a revised land use plan would not, in the absence of additional activities such as facilities development, result in effects to the transportation system. Effects to the transportation system would not occur until further development occurred in accordance with the terms of the new land use plan. The Satellite Campuses Land Use Plan would not, by itself, affect the transportation system unless and until development occurred at the site. The area that would be developed would straddle U.S. Route 1. The total number of personnel relocating to Fort Belvoir would not differ from that which was presented in the section on the Preferred Alternative.

4.3.7.2 BRAC Implementation and Facilities Projects

Long-term significant adverse effects would be expected. Implementing the Satellite Campuses Alternative, when compared to the No Action Alternative (set forth in Section 4.3.3), would worsen traffic conditions in the immediate vicinity of the Main Post. From the regional

perspective, implementation would produce a combination of minor (negligible) adverse and beneficial effects.

Under the Satellite Campuses Alternative, all personnel relocating to Fort Belvoir would be situated on North Post, South Post, and Davison Army Airfield. The Southwest Area of Fort Belvoir and the EPG would not be developed. The BRAC action would results in a net increase in total employment of approximately 22,000 personnel. The following subsection discusses and evaluates the effects on the transportation system that would occur as a result of assigning these additional personnel.

4.3.7.2.1 Travel Patterns to and from Fort Belvoir

The assumed residential distribution for the expected BRAC employees for the Satellite Campuses Alternative is the same as described under the Preferred Alternative.

As discussed previously under travel demand modeling, the net increase in traffic would be noticeably less than the amount of traffic headed to or from the BRAC sites because of the rebalancing of productions (households) and attractions (employment) throughout the region resulting from the relocation of employment to Fort Belvoir. In essence, the residential redistribution within the region would increase the portion of post traffic that is coming from the south during the AM peak period. A potential consequence of the additional post traffic is that it might force traffic away from U.S. Route 1 onto adjacent roadways as drivers attempt to avoid any consequence of the additional Fort Belvoir traffic. I-95 and Telegraph Road might become alternative roadway paths, depending on the length and final destination of those trips.

The MWCOG model distributed the decrease in employment to other traffic analysis zones across the region because the model process was to control the amount of production in the region. Residential locations of employees of NGA and WHS would slowly shift towards that of Fort Belvoir, the same distribution assumed for the Preferred Alternative. Thus, regional travel would be similar to that of the Preferred Alternative.

Table 4.3-34 presents the population and employment levels, which are also illustrated in Figure D-26 in Appendix D for the 2011 conditions for the Satellite Campuses Alternative. Table 4.3-35 presents the production and attractions for the study area. The population and employment levels are identical to the other alternatives. The specific siting of the employees compared to the other alternatives (Main Post vs. EPG vs. GSA Parcel) does shift the productions and attractions; however, the overall study area remains similar between the alternatives.

Fort Belvoir would represent 2.9 and 33.4 percent of the population and employment, respectively, within the study area, and the post would account for only 8.6 percent of the attractions in the study area. The ratio of jobs to residents within the study area would be 0.43, or 43 jobs per 100 residents, an increase of 7 jobs per 100 residents over the No Action Alternative.

Fort Belvoir would represent approximately 6.1 percent of the total employment within all of Fairfax County in the Satellite Campuses Alternative, an increase of 2.9 percent over the No Action Alternative. Within the transportation Corridor 8, Fort Belvoir would be approximately 10.4 percent of the total employment, a near doubling of the percentage of the Corridor total over the No Action Alternative. This corridor is important because it is the primary route of travel for most existing employees at Fort Belvoir and is expected to be the main travel route for the employees relocated to Fort Belvoir. The percentage change over the No Action Alternative is

Table 4.3-34
Population and employment for existing conditions (2006), 2011 No Action Alternative, and 2011 Satellite Campuses Alternative

	Population			Employment		
District	Existing	No Action	Satellite Campuses	Existing	No Action	Satellite Campuses
Laurel Hill	13,470	25,121	25,121	3,547	3,996	3,996
Pohick	50,826	51,766	51,766	3,648	3,849	3,849
Lorton South of U.S. Route 1	14,476	18,200	18,200	9,067	11,233	11,233
I-95 Industrial Area	2,092	2,175	2,175	8,605	8,683	8,683
Franconia-Springfield Transit Area	2,727	2,821	2,821	5,940	6,764	6,764
Springfield Community Business Center	1,306	1,483	1,483	2,074	2,141	2,141
Springfield	31,263	32,201	32,201	10,850	11,387	11,387
EPG	0	0	0	45	45	0
Mason Neck	2,785	5,552	5,552	438	464	464
Fort Belvoir (Main Post)	7,623	7,623	9,387	23,266	23,267	46,753
Mount Vernon	93,783	102,230	102,230	19,681	21,457	21,457
Rose Hill	67,179	70,513	70,513	20,352	23,157	23,157
Total Study Area	287,530	319,685	321,449	107,513	116,443	139,884
Rest of Virginia	2,142,682	2,399,710	2,399,710	1,258,264	1,427,055	1,430,055
Maryland	3,318,699	3,483,648	3,483,648	1,723,958	1,870,517	1,870,517
District of Columbia	583,733	615,375	615,375	752,719	790,205	790,205
West Virginia	47,735	52,555	52,555	15,173	17,191	17,191
Out of State	0	0	0	0	0	0
Total Outside Study Area	6,092,849	6,551,288	6,551,288	3,750,114	4,104,968	4,107,968
Regional Total	**6,380,379**	**6,870,973**	**6,872,737**	**3,857,627**	**4,221,411**	**4,247,852**

Source: VHB, 2006.

The same for the Satellite Campuses Alternative because it is for the Preferred Alternative, as the total employment levels would not change between alternatives.

Table 4.3-36 presents the internal trips to the study area, external trips destined to the study area, and external trips that originate within the study area. The table illustrates that most of the trips that have an origin or a destination within the study area originate from or are destined to points outside of the study area, as opposed to being an internal trip within the study area (i.e., a trip beginning and ending within the study area). The table does not include external trips that pass through the study area (i.e., a trip from Fredericksburg to Washington, DC, traveling on I-95). The total number of study area trips is similar to the other alternatives, with minor differences because of the specific siting of the employees.

Table 4.3-35
Productions and attractions for existing conditions (2006), 2011 No Action Alternative, and 2011 Satellite Campuses Alternative

	Productions			Attractions		
District	**Existing**	**No Action**	**Satellite Campuses**	**Existing**	**No Action**	**Satellite Campuses**
Laurel Hill	31,891	52,247	52,194	31,825	52,327	52,227
Pohick	109,597	110,862	109,099	109,719	110,848	109,094
Lorton South of U.S. Route 1	43,441	55,677	54,948	43,430	55,560	54,790
I-95 Industrial Area	20,802	20,880	20,167	20,753	20,969	20,239
Franconia-Springfield Transit Area	37,799	41,046	40,668	38,044	41,275	40,800
Springfield Community Business Center	11,586	12,158	12,029	11,601	12,053	12,030
Springfield	98,365	101,148	99,942	98,274	101,153	100,173
EPG	81	89	0	87	102	0
Mason Neck	5,979	11,012	10,901	5,948	10,998	10,886
Fort Belvoir (Main Post)	35,176	35,177	78,866	35,342	35,343	77,433
Mount Vernon	250,418	271,298	269,378	250,606	271,297	269,462
Rose Hill	184,223	197,462	195,489	184,200	197,283	195,393
Total Study Area	829,357	909,055	943,680	829,830	909,209	942,528
Rest of Virginia	6,952,561	7,768,560	7,729,361	6,952,125	7,768,134	7,729,465
Maryland	10,587,588	11,254,561	11,239,511	10,586,616	11,252,945	11,238,622
District of Columbia	1,572,672	1,614,479	1,605,988	1,572,360	1,614,396	1,606,036
West Virginia	153,721	172,023	171,906	153,849	172,056	171,914
Out of State	715,116	828,980	829,045	716,236	830,919	830,927
Total Outside Study Area	19,981,658	21,638,603	21,575,812	19,981,186	21,638,450	21,576,964
Regional Total	**20,811,015**	**22,547,658**	**22,519,492**	**20,811,015**	**22,547,658**	**22,519,492**

Source: VHB, 2006.

Table 4.3-36
Study Area Trips – 2011 Satellite Campuses Alternative

Time	Internal Trips Within Study Area	External Trips Ending in Study Area	External Trips Beginning in Study Area
AM Peak	78,796	63,597	78,387
PM Peak	138,545	107,970	97,503
Off-Peak	341,828	211,792	208,622
Daily	**559,169**	**383,359**	**384,511**

4.3.7.2.2 Performance under Expected Conditions

Few changes to Northern Virginia's transportation system are expected over the next 5 years because funding shortfalls and the resulting delays in implementing long-term transportation plans. The modeling assumed that the off-post transportation improvement projects identified in the No Action Alternative would be in place for the Satellite Campuses Alternative.

One key finding from the analyses is that the Fairfax County Parkway would need to be widened from I-95 to U.S. Route 1 to accommodate the increased travel demand. The cross-section would need to change from four lanes (2-2 configuration) to at least eight lanes, such as a 3-2-3 configuration, in which the middle two lanes would be reversible.

Road Network. Increased traffic to and from Fort Belvoir would account for 30 to 40 percent of the traffic flow on roadways adjacent to the gates and quickly drop to less than 10 percent of the traffic, as shown in Figures D-27 and D-28 in Appendix D.

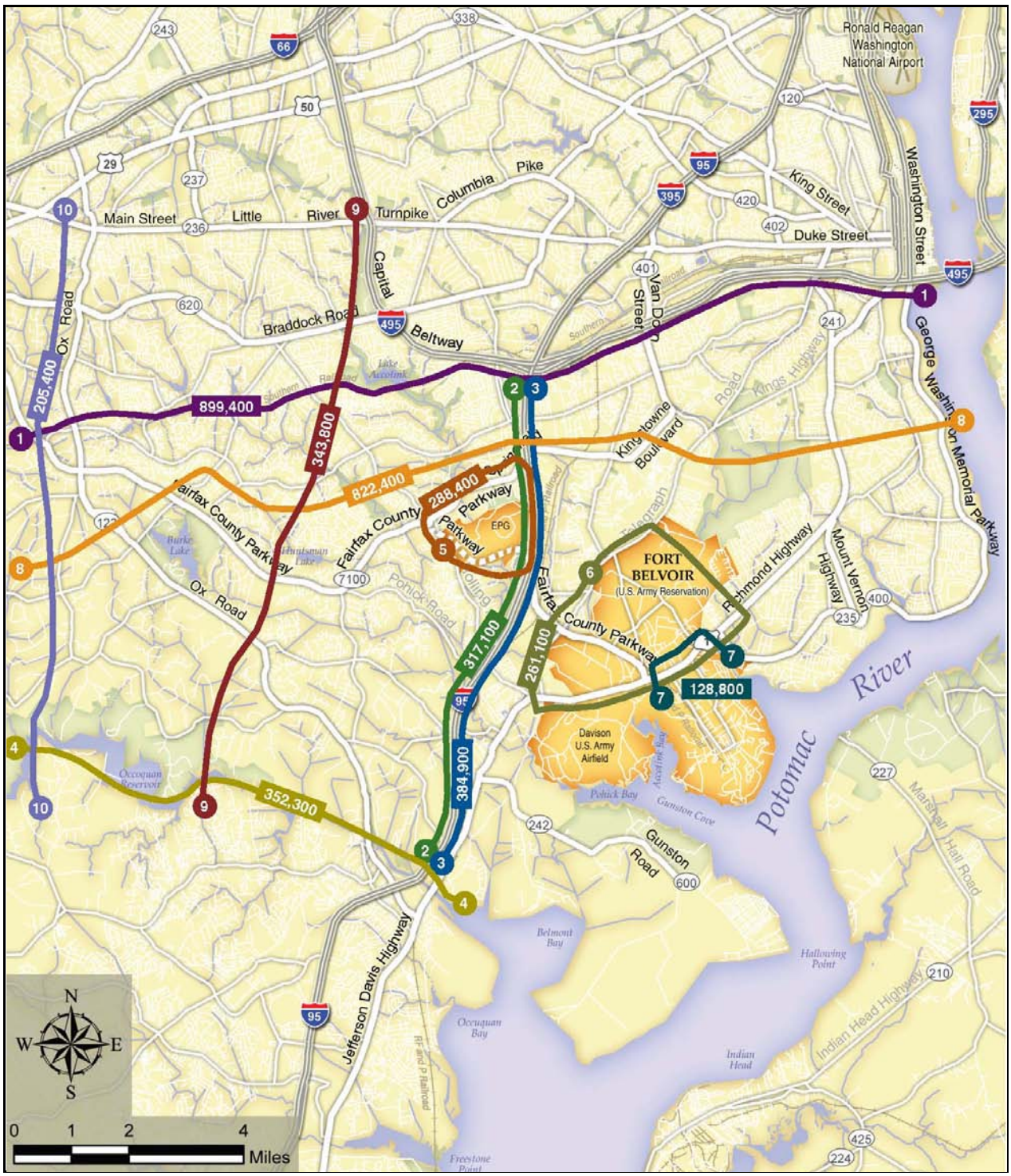
The area of influence shows that the effects of BRAC-related traffic on roadways diminishes as one moves away from the sites. This would be because of traffic getting off and on at the interchanges along the roadways. Regional travel patterns would be similar to the Preferred Alternative. It is only when moving closer to the specific siting that changes are noticeable between the alternatives. As the Satellite Campuses Alternative would place more development at the Main Post, including Davison Airfield, the effects would be higher in the vicinity of Main Post and less pronounced to the west when compared to the Preferred Alternative. Figures D-29 and D-30 show both the growth in traffic and the change in the traffic flow that would be caused by BRAC-related actions at selected locations. On the regional roadways, the growth in traffic would be less than the percentage of BRAC traffic in the overall traffic stream because some BRAC traffic is already in the existing traffic stream, as previously described.

Figure 4.3-22 provides another perspective on the changes in travel patterns. Total volumes crossing selected screen lines are shown. Again, the net effects on traffic volumes would decrease quickly as the distance from the post grows. The screen lines show that the traffic effects from the Satellite Campuses Land Use Alternative is higher around Main Post and is less west of I-95 when compared with the Preferred Alternative.

The screen lines north of Fort Belvoir show that there would be a slight decrease in traffic volumes over the No Action Alternative. This would be because of trips diverting from I-95 at the Fairfax County Parkway that previously traveled north to the Pentagon or other nearby employment centers; now they would travel to Fort Belvoir. To the south, the increase in daily volume from the No Action Alternative to the Satellite Campuses Alternative crossing the Occoquan River would be approximately 5,000 trips (two-way). A major reason for there being only a slight increase at this screen line would be that some trips that would be caused by the BRAC action would already be within the traffic stream (in the No Action Alternative), but their destination would be the Pentagon or other nearby employment centers.

Moving closer to Fort Belvoir, the effects on adjacent highway facilities are shown in Table 4.3-37, which shows V/C ratios, delay, and LOS for 23 selected locations. The summary of the turning movement counts for the Satellite Campuses Alternative can be found in Table D-6 and Figures D-31 and D-32 in Appendix D.

The intersection MOEs would deteriorate over the No Action Alternative and existing conditions because the traffic volumes at these intersections would be higher from the additional



Daily Screen Line Volumes under The Satellite Campuses Alternative

Fort Belvoir, Virginia

Figure 4.3-22

Table 4.3-37
Intersection measures of effectiveness—2011 Satellite Campuses Alternative

	AM Peak Hour[a]			PM Peak Hour[a]		
Intersection Location	**V/C**	**LOS**	**Delay**	**V/C**	**LOS**	**Delay**
Commerce St./Amherst Ave.	0.75	D	36.8	0.87	D	50.1
Commerce St./Backlick Rd.	0.41	C	30.6	0.80	D	52.2
Backlick Rd./Calamo St.	0.75	B	12.9	0.80	C	23.2
Loisdale Rd./Spring Mall Dr.	0.49	C	24.8	0.91	D	46.7
Franconia Springfield Parkway/Spring Village Dr.	1.05	E	63.6	1.09	F	86.2
Franconia Springfield Parkway EB Ramp/Backlick Rd.	0.99	E	67.1	0.82	D	40.4
Franconia Springfield Parkway WB Ramp/Backlick Rd.	0.91	B	10.5	0.92	C	22.9
Franconia Springfield Parkway/I-95 HOV Ramps	1.00	E	55.6	1.37	F	179.7
Franconia Springfield Parkway EB Ramp/Frontier Dr.	0.82	C	32.1	0.90	E	56.1
Franconia Springfield Parkway WB Ramp/Frontier Dr.	0.52	D	36.2	0.87	F	93.4
Franconia Springfield Parkway/Beulah St.	1.20	F	112.2	1.41	F	161.8
Fairfax County Parkway/ Terminal Rd.	1.16	F	96.9	1.04	D	49.6
Fairfax County Parkway SB Ramps/Telegraph Rd.	0.63	C	21.7	0.86	C	32.6
Fairfax County Parkway NB Ramps/Telegraph Rd.	0.77	C	22.6	0.76	C	20.9
Fairfax County Parkway/John J. Kingman Rd.	1.19	F	101.5	1.7	F	248.7
Telegraph Rd./Beulah St.	0.73	D	39.5	0.67	C	32.1
Telegraph Rd./S. Van Dorn St.	0.97	D	43.6	1.04	D	47.3
U.S. Route 1/Telegraph Rd.—Old Colchester Rd.	0.85	E	61.4	0.82	F	80.8
U.S. Route 1/Fairfax County Parkway	1.15	F	80.5	1.1	E	71.4
U.S. Route 1/Backlick Rd.—Pohick Rd.	1.08	E	69.6	1.23	F	193.5
U.S. Route 1/Belvoir Rd.	1.05	D	48.6	0.96	D	42.6
U.S. Route 1/Old Mill Rd.	1.03	F	101.1	1.05	F	87.5
Loisdale Road/GSA Access Road	0.75	A	7.8	0.53	A	5.1

[a]AM Peak Hour: 7:15 AM to 8:15 AM; PM Peak Hour: 4:30 PM to 5:30 PM

employment, especially at the intersections adjacent to Fort Belvoir. A total of 10 intersections in each the AM and PM peak hour, would experience a degradation in LOS under the Satellite Campuses Alternative. These intersections are along U.S. Route 1 adjacent to the Main Post and the intersection of Fairfax County Parkway and Kingman Road. These intersections, which are the main gateways to North and South Posts, perform at LOS F with excessive delays.

The hours of congestion along the I-95 corridor would not be expected to increase much because the growth in demand would be less than 5 percent if the Satellite Campuses Alternative were to be implemented. The period of congestion is likely to lengthen by 30 to 45 minutes on the I-95 corridor, even with the I-95 widening project being completed before 2011. Some localized congestion points might result with the increased traffic volumes within interchanges along the corridor because of BRAC-related traffic accessing the interstate, such as the I-95/Fairfax County Parkway interchange.

Congestion along U.S. Route 1 would increase to 5 to 6 hours in the peak direction of travel without widening U.S. Route 1, and the off-peak direction would become congested as trips from the north in the AM peak period increase. This occurrence illustrates the need for a widened U.S. Route 1 with interchanges for Main Post access. Likewise, the Fairfax County Parkway would

also be congested 3 to 4 hours in the peak direction of travel in each peak period if no improvements were made.

The intersection of Fairfax County Parkway and John J. Kingman Road would be a major bottleneck to the transportation system in the Satellite Campuses Alternative if no roadway improvements were made at this location. Severe congestion would result from the increase in travel demand resulting from the doubling of the employment levels at Fort Belvoir Main Post, including development at Davison Airfield. If improvements were not made to the major roadways approaching the Post, the traffic would spill onto adjacent roadways, potentially creating congestion on those facilities; such roadways include Beulah Street, Hayfield Road, and South Kings Highway.

In the areas immediately surrounding Fort Belvoir, severe congestion would last from 5 to 6 hours during each of the morning and evening peak periods unless major improvements were included as part of the access improvements. The congestion would spill into the off-peak hours, effectively extending the peak periods into a larger portion of the day. Without major improvements to U.S. Route 1 and the Fairfax County Parkway, these facilities would become congested because they are the major corridors for the post's traffic.

More so, the Fairfax County Parkway could potentially spill back onto I-95 because the parkway would have insufficient capacity to handle the increased demand. This traffic would also spill onto adjacent roadways, such as Telegraph Road and Beulah Street, and would potentially create undesirable conditions of higher traffic volumes for the local residents.

The severe congestion on the major roadways adjacent to Fort Belvoir would affect the ability of Fort Belvoir's traffic to exit during the PM peak hour, especially via the three main access points: Pohick Road (via Tulley Gate), Belvoir Road (via Pence Gate), and Kingman Road. The inability of the major roadways to handle the demand, unless increased capacity were to be provided, would cause spillover onto the adjacent local roadways such as Telegraph Road, Beulah Street, and Mount Vernon Highway. Traffic spillover onto local roadways would adversely affect the local traffic.

Transit Systems. Mode split—the fraction of the employee population that would use mass transit—for the Main Post is 1 to 2 percent. The rail portion of the transit system does not directly serve the Main Post. Implementing the BRAC-related projects, which would affect the vast majority of new personnel at Fort Belvoir, would likely not adversely affect use of the rail systems because of the continued lack of direct service. Consequences of implementing the Satellite Campuses Alternative would be similar with respect to the bus portion of the transit system. Fort Belvoir is not served to any substantial degree because of the difficulties in those modes' gaining access to the post because of security requirements. Demand for additional bus services could evolve, resulting in higher ridership figures. The local bus routes, however, tend to be limited to the study area, which represents only a small fraction of the locations where the employee population would reside. There are only a limited number of long-haul routes serving the Main Post. A 1 to 2 percent mode share equates to approximately 200 to 450 daily riders. Achieving a 10 percent mode share would remove approximately 725 vehicles from the roadway in the peak hour; this number includes both the Main Post and EPG.

4.3.7.3 Other Projects Sitings/Operations

No effects would be expected. Other projects associated with BRAC implementation (see Section 2.2.2.3) include projects such as infrastructure, access control point, barracks

modernization, and MWR family travel camp. These projects generally involve a relatively minor or negligible number of personnel that would be using the transportation system.

4.3.7.4 Mitigation

Implementing the Satellite Campuses Alternative would result in significant adverse effects to the transportation system with respect to congestion and increased travel time. These effects would lead to reduced employee productivity, higher commuting costs, and degradation of quality of life. These effects would not be limited to personnel at Fort Belvoir. Through commuters and the local community would also be affected.

This section identifies potential mitigation actions to avoid, reduce, or compensate for the magnitude of predicted effects. The mitigation actions are evaluated for their efficacy so that an informed decision can be made regarding their adoption and implementation.

Road Network and Associated Facilities. Proposed mitigating actions for the Satellite Campuses Alternative have been identified, including improvements to highway and transit facilities and potential transit service improvements.

1. *Reconstruction of the I-95/Fairfax County Parkway Interchange.* This measure would reconstruct the I-95/Fairfax County Parkway interchange to add HOV connections to and from the south. It would encourage new HOV trips between Fort Belvoir and points to the south on I-95, reducing SOV trips and, thus, overall demand on the road network. This improvement would provide better traffic operations for the increased traffic flows to and from the Main Post, reducing delays during the peak periods. Estimated cost: $75 million.
2. *Fairfax County Parkway Improvements between I-95 and John J. Kingman Road.* Widening the Parkway to a 3-2-3 lane configuration, similar to I-395, would provide the necessary directional capacity. Additional roadway capacity, via intersection improvements and widening, would improve traffic flow and reduce congestion. The center lanes could be reserved for HOV traffic only, or be used by all traffic. Estimated cost: $100 million.
3. *Rideshare Facility.* A rideshare facility on the Main Post would encourage a shift from SOV to HOV trips. This shift would reduce traffic volumes on the roadway, which, in turn, would reduce the effects of the development. Estimated cost: $15 million.
4. *Transit Center/Facilities.* This measure would construct a transit center and other facilities to provide for additional choices of travel over the SOV. This improvement would be developed in conjunction with increased bus service. Siting has not been determined. Estimated cost: $30 million.
5. *Intersection Improvements.* Intersection improvements at key locations such as U.S. Route 1 at Backlick/Pohick (Tulley Gate), U.S. Route 1 at Belvoir Road (Pence Gate), Telegraph Road at South Van Dorn Street, and Franconia-Springfield Parkway at Beulah Street would improve traffic flow and reduce congestion. Improvements could include signalization, additional turning lanes, lengthening of turning lanes, or other measures appropriate to an intersection. Estimated cost: $20 million.
6. *Additional U.S. Route 1 Crossings for Main Post.* Two additional crossings over U.S. Route 1 would improve internal roadway circulation on Fort Belvoir between North and South Posts. The likely location of these two improvements would be between Gunston and Belvoir Roads, with final sitings dependent on the site layout of other facilities

projects (e.g., the new hospital proposed at the South Post golf course). These improvements would reduce the number of trips on off-post roadways between North and South Posts. Estimated cost: $25 million.

7. *Fairfax County Parkway/John J. Kingman Road Intersection Improvements.* Improvements would consist of upgrading the intersection into a full interchange configuration, which would reduce congestion on the parkway at this intersection and improve access to North Post. Estimated cost: $30 million.
8. *Beulah and Telegraph Roads Improvements.* This measure would widen roadways and provide other improvements, such as signalization and safety measures (e.g., improved crosswalks, lighting), to enhance flow of the increased traffic volumes caused by BRAC. Estimated cost: $80 million.
9. *Widening of U.S. Route 1 through Fort Belvoir.* Widening U.S. Route 1 through Fort Belvoir would provide needed capacity to handle the additional influx of workers on Main Post. The widening could also include interchanges at the Fairfax County Parkway and U.S. Route 1. Estimated cost: $75 million.
10. *Interchange at U.S. Route 1 and Fairfax County Parkway.* This improvement would reduce the delays at the intersection and improve traffic flows. It also could serve as a replacement to Pohick Road to provide access to Tulley Gate and provide a direct connection to South Post. Estimated cost: $55 million.
11. *Interchange at U.S. Route 1 and Telegraph Road.* Improvements would reduce the delays at the intersection and improve traffic flows. Estimated cost: $75 million.
12. *Improvements to Lorton Road.* Widening and other improvements to Lorton Road would improve the access between U.S. Route 1 and I-95 and reduce the effects on the Fairfax County Parkway. Estimated cost: $10 million.
13. *Franconia-Springfield Parkway/Neuman Street Interchange.* This measure would improve traffic flow along the Franconia-Springfield Parkway and reduce vehicular demand on the Fairfax County Parkway. Estimated cost: $50 million.
14. *Completion of Van Dorn Street/Franconia Road Interchange.* This improvement would reduce congestion at this intersection, which is an expected pathway for vehicles traveling to and from Fort Belvoir. Estimated cost: $90 million.

Total estimated cost for the foregoing mitigation measures would be $730 million. This figure excludes contingency costs and costs associated with supervision, inspection, and overhead. More detailed studies and designs will be required, including potential NEPA studies.

The transportation network has been evaluated from a regional, sub-regional, and local perspective and the effects on the transportation system have been quantified and compared to both existing conditions and the No Action Alternative. On the basis of these comprehensive comparisons, improvements have been identified that would mitigate most of the adverse effects of the Satellite Campuses Alternative on the transportation system in the immediate area of Fort Belvoir. The additional site entrance points, improved site circulation, improved interchanges, and widened roadways would result in reduced delay, limit the possibility of Fort Belvoir traffic backing up onto the major regional highways, and improve the operation of the intersections within the area of influence of the BRAC-related actions. As engineering and design work proceeds, detailed traffic operations studies would be completed to ensure that intersection levels of service are maintained or improved in the immediate area of the Fort. A major improvement

needed would be to widen the Fairfax County Parkway east of the I-95 interchange from a 4-lane cross-section to a 3-2-3 lane configuration.

On a regional level, the relocation of 22,000 jobs toward the south of the metropolitan area, combined with regional projects, such as the widening of I-95 and construction and implementation of HOT lanes in the I-95 corridor, would be expected to lead to additional travel demand from the south. With no plans for additional capacity in the corridor beyond the planned widening and HOT lanes, the analysis indicates that the congested period during the morning and afternoon would be extended by 30 to 45 minutes. Traffic traveling toward Fort Belvoir on regional facilities might experience some limited congestion during the peak hour, but that direction of travel would remain the "reverse commute," with heavier traffic headed toward Tyson's Corner, Arlington, Alexandria, and Washington, DC.

Transit System. This section describes proposed mitigation measures to the transit system to help avoid, reduce, or compensate for the effects associated with implementing the Satellite Campuses Alternative. Mitigation measures are appropriate for bus service but none are identified for rail services. Expansion or improvements to rail service could occur in the future based on further evaluation of the transportation system undertaken as a result of experiences related to BRAC or other developments in the study area.

Initial bus service concept plans have been developed on the basis of the origin data for the BRAC employees destined for Fort Belvoir and existing origin patterns for Main Post employees. These are preliminary concept plans intended to serve as a guide to the levels of transit service that could be required to serve both a 5 and 10 percent transit mode share to the Main Post. Detailed route and service planning would be conducted later. The purpose of these concept plans is to demonstrate that feasible transit service options are viable to support the assumed mode shares.

Five basic service areas have been identified. These basic service areas are identical to those identified in the other three alternatives; however, the appropriate service routes could vary because as all routes would be serving multiple destination points, different from those under the Preferred Alternative. The service areas are as follows:

- Southern Prince William County (Dumfries, Cherry Hill, and Powells Creek areas)
- Northern Prince William County (Woodbridge, Dale City, and Lake Ridge areas)
- U.S. Route 1 in Fairfax County (Lorton, Fort Belvoir, Mount Vernon, Hybla Valley, Beacon Hill, and Huntington areas)
- Western Fairfax County (Burke, Fairfax, and Chantilly areas and, possibly, the Herndon and Reston areas)
- Franconia-Springfield Metro station

Service Concept for 10 Percent Mode Share

- *Southern Prince William County (4 Peak Hour Buses).* Bus service on a 15-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.
- *Northern Prince William County (6 Peak Hour Buses).* A 10-minute headway is assumed for service from northern Prince William County. This service would operate in the Dale City, Woodbridge, and Lake Ridge areas.

- *U.S. Route 1 in Fairfax County (4 Additional Peak Hour Buses).* Four additional buses per hour would be added to existing services along the U.S. Route 1 corridor between Huntington and the Main Post.
- *Western Fairfax County (4 Additional Peak Hour Buses).* Four additional buses per hour would operate in the Fairfax County Parkway corridor to the Burke area. This service would require a transfer to shuttle bus at the Franconia-Springfield Metro station.
- *Franconia-Springfield Metrorail (10 Peak Hour Buses).* A shuttle linking the Main Post to the Franconia-Springfield Metro station would be needed. Pending a refinement of the numbers, a 6-minute headway on this shuttle is assumed. This service would link those commuters with access to one of the regional Metro lines to the Main Post area.

Service Concept for 5 Percent Mode Share

- *Southern Prince William County (2 Peak Hour Buses).* Bus service on a 30-minute headway serving the southern portion of Prince William County along the I-95/U.S. Route 1 corridor.
- *Northern Prince William County (3 Peak Hour Buses).* A 20-minute headway is assumed for service from northern Prince William County. This service would operate in the Dale City, Woodbridge, and Lake Ridge areas.
- *U.S. Route 1 in Fairfax County (2 Additional Peak Hour Buses).* Two additional peak hour vehicles would provide service along the U.S. Route 1 corridor between Huntington and the Main Post.
- *Western Fairfax County (2 Additional Peak Hour Buses).* Two additional buses per hour would operate in the Fairfax County Parkway corridor to the Burke area. This service would require a transfer to shuttle bus at the Franconia-Springfield Metro station.
- *Franconia-Springfield (10 Additional Peak Hour Buses).* A 6-minute headway on the shuttle linking the Main Post to the Franconia-Springfield Metro station is also assumed under the 5 percent mode share scenario.

Bus service of a high enough quality to realize a 5 to 10 percent mode share for transit would complement the road network mitigation actions and help to reduce congestion and limit vehicle delays because of implementing the Satellite Campuses Alternative. Achieving a 10 percent mode split would reduce the number of vehicles accessing the Fort Belvoir area in the peak hour by nearly 725 using the MWCOG average auto occupancy of 1.1 passengers per vehicle. A 5 percent mode share for transit would reduce the number of peak hour vehicles by approximately 360.

The foregoing expanded bus services would be supplemented by internal circulator bus systems designed to provide more direct access to various areas of Fort Belvoir not directly accessible from the regional transit services. Such circulator buses would operate within the grounds of Fort Belvoir on schedules designed to meet the needs of employees.

The estimated cost of the transit-related mitigation actions would be $10 to $12 million in initial capital costs and $6 to $9 million in annual operating expenses depending on the ultimate operational requirements of the system. Note that these estimates are preliminary order-of-

magnitude costs. More precise cost estimates will be prepared when site circulation and security plans are finalized and detailed route and service planning are completed.

Transportation Management Plan—Framework. Effects associated with implementing the Satellite Campuses Alternative could be reduced by appointing a TDMC and deploying a TMP. Such a mitigation action, described at the end of Section 4.3.4, could apply equally to the Satellite Campuses Alternative.

The proposed mitigations have been examined for the efficacy of mitigating the effects of the Satellite Campuses Alternative. Table 4.3-38 presents the results of the evaluation.

Table 4.3-38
Efficacy of the transportation mitigation for the Satellite Campuses Alternative

Mitigation Measure	Before	After	Comments
1) Improvements at I-95/Fairfax County Parkway interchange with HOV connections	LOS F 100-250 HOV trips during peak periods on I-95 corridor destined to Fort Belvoir	LOS D 800-1000 HOV trips during peak periods on HOV ramps	With directional ramps, LOS D could be achieved, but modifications of interchange would require coordination with I-95 HOT Lanes Project Each HOV vehicle would remove 2 SOV vehicles from the traffic stream
2) Fairfax County Parkway Improvements	V/C ranging 0.9 to 1.25, LOS = F	V/C less than= 0.8 in peak direction, LOS = D	Improves HOV traffic's LOS to B with improvements in conjunction with 1
3) Rideshare facility	N/A	Allows for 200-300 HOV trips per hour	Each HOV vehicle would remove 2 SOV vehicles from the traffic stream. Would also require improvements 1 & 2
4) Transit Center/Facilities (in conjunction with increased bus services)	N/A	5% mode share would attract 400 riders in the peak period, while a 10% mode share would attract 800-850 riders	To be developed with increased bus services. One full bus can carry 40-45 passengers; so one bus would remove 40-45 SOV trips.
5) Intersection Improvements U.S. Route 1/Pence Gate Telegraph/Van Dorn Street Franconia-Springfield/Beulah Street	v/c is presented as AM/PM peak hour 1.05 and 0.96 0.97 and 1.04 1.2 and 1.4	 0.7 and 0.65 0.6 and 0.67 1.1 and 1.2	Improvements would restore intersection performance similar to that under No Action Alternative, some intersection improvements would be completed in conjunction with the widening of Route 1.
6) Additional Crossing over U.S. Route 1	Gunston Road LOS = F	Gunston Road and new crossings LOS = C	New crossings would alleviate congestion on Gunston Road and reduces trips traveling off-post between North and South Posts
7) Fairfax County Parkway and Kingman Road interchange	LOS F in both AM and PM peaks	LOS C in both AM and PM peaks	Improvement would alleviate congestion at this intersection that occurs due to heavy turning movements

Table 4.3-38
Efficacy of the transportation mitigation for the Satellite Campuses Alternative
(continued)

Mitigation Measure	Before	After	Comments
8) Roadway Improvements Beulah Street Telegraph Road	v/c is presented as AM/PM peak hour 1.15 and 0.98 1.25 and 1.24	 0.81 and 0.76 0.78 and 0.74 0.40 and 0.45	Reduces traffic spillover into adjacent residential neighborhoods
9) Widen U.S. Route 1	v/c ranges between 1.0-1.2 in AM and 1.25-1.45 in PM	v/c ranges of 0.65-0.7 in AM; PM = 0.8-0.95	Completed in conjunction to intersection improvement and interchange construction
10) U.S. Route 1 and parkway interchange	LOS F in AM and PM	LOS D or better	Replaces access via Pohick Road (Tulley Gate)
11) U.S. Route 1 and Telegraph Road interchange	LOS E in AM and F in PM	LOS D or better	Improves traffic flow on U.S. Route 1 immediately west of Fort Belvoir
12) Widen Lorton Road	v/c of 1.05 in AM and 1.10 in PM	v/c 0.8 in AM and 0.85 in PM	Improves access from U.S. Route 1 to I-95
13) Franconia-Springfield/Neuman Street Interchange	LOS F in AM and PM	LOS C or better	Requires coordination with VDOT
14) Van Dorn Street/Franconia Interchange	LOS F in AM and PM	LOS D or better	Requires coordination with VDOT

4.3.8 SECURITY IMPLICATIONS

Evaluation of the Army's proposed action reveals that relocation of personnel to result in a net increase of 22,000 employees at Fort Belvoir would increase traffic congestion in the vicinity of the post. The adequacy of the road network to support the employees' travel, however, is not the only important matter to address. There is also a potential transportation-related effect on maintaining security on-post. Stopping vehicles entering the post to verify each occupant's identity could cause delays at the post's access control points, resulting in vehicular backups (queues) onto the local road network.

The degree or level of vehicle-checking at Fort Belvoir's access control points depends on the Force Protection Condition (FPCON) in effect at the time a vehicle seeks entry. As set forth in DoD Instruction 2000.16, *DoD Antiterrorism (AT) Standards* (October 2, 2006), Force Protection Conditions are a DoD-approved system standardizing identification of and recommending preventive actions and responses to terrorist threats against U.S. personnel and facilities. There are five FPCONs:

- *FPCON Normal.* Applies when a general global threat of possible terrorist activity exists and warrants a routine security posture
- *FPCON Alpha.* Applies when there is an increased general threat of possible terrorist activity against personnel or facilities, the nature and extent of which are unpredictable

- *FPCON Bravo.* Applies when an increased or more predictable threat of terrorist activity exists
- *FPCON Charlie.* Applies when an incident occurs or when intelligence is received indicating some form of terrorist action or targeting against personnel or facilities is likely
- *FPCON Delta.* Applies in the immediate area where a terrorist attack has occurred or when intelligence has been received that terrorist action against a specific location or person is imminent

The level of effort and time required for occupant identification and vehicle inspection increases with the progression from FPCON Normal to FPCON Delta.

This section discusses potential transportation system effects associated with the FPCONs. The discussion recognizes the importance of gate inspection processing rates, and it presents operating scenarios for reducing delays at the post's entry points.

4.3.8.1 Gate Inspection Processing Rates

Today, approximately 4,000 vehicle trips enter Fort Belvoir gates during the peak hour. On the basis of the tenant profiles developed to date, future vehicle trips through the gates during the peak hour would fall in the range of 9,000 to 11,000, which equates to 5,000 to 7,000 new trips during the AM peak hour.

At FPCONs Alpha and Bravo, the gates currently process approximately 400 vehicles per hour per lane (vphpl). Table 4.3-39 illustrates the relationship between the time required for each inspection and the number of vehicles processed per hour. Even at relatively quick processing rates, implementing the proposed action would require 30 to 40 lanes, distributed at several gates, to avoid extensive queuing. This assessment suggests that parking strategies that rely on parking areas outside the security perimeter be explored to avoid the construction of extensive plaza areas for vehicle inspections.

To validate the above scenarios of gate capacity, various operating conditions were analyzed. An assumed flow rate of 1,900 vph was used to analyze the gates. The purpose is to quantify the effects of various operating scenarios (inspection processing effort) on traffic flow. Table 4.3-40 presents the results of the queue analyses, where it is assumed that a gate has two entry lanes.

Table 4.3-39
Gate capacity scenarios

Relationship	Time (seconds)				
Inspection time (seconds)	8–10	15	30	60	90
Total inspection and clearance time (seconds)	8–10	25	40	70	100
Vehicles per hour per lane	360–450	144	90	51	36

Table 4.3-40
Queue lengths for various inspection scenarios

Capacity (vph/gate)	Inspection and clearance time (sec/veh)	Throughput volume[(a)] (vph)	Unserviced volume (vph)	Queue length per lane[(b)] (miles)
400	10	1,594	306	0.7
200	20	791	1,109	2.6
120	30	473	1,427	3.4
60	60	236	1,664	3.9

[a]Assumed a four-gate screening facility and a demand of 1,900 vph.

[b]Queue length assumed to be 25 ft/veh for unserviced volume and two travel lanes approaching the facility from the off-post roadway network.

The results of the analyses show that as inspection time increases, the capacity (flow rate) of the gate decreases. Under a full vehicle-check, approximately 240 vehicles could be processed at a four-gate facility and would result in a queue of four lane-miles. This study illustrates the need to develop a security operating plan that would prevent backups onto adjacent roadways. To prevent traffic spillback onto the adjacent roadways, either more gates would need to be provided to handle the volume of traffic under higher threat levels, or some personnel would be required to not report in order to reduce the inbound traffic flow. As the FPCON increases, the level of effort for inspection increases as well. This occurrence causes longer inspection and clearance times. Under higher threat levels, some nonessential personnel might be required not to report to their office locations.

If a consolidated parking strategy with parking outside the security perimeter is possible for large numbers of personnel, these requirements would be reduced significantly. Without full identification checking or inspections, approximately 400 vphpl could be processed at the entrances to each garage, depending on the final design (layout and circulation patterns) of the garages.

4.3.8.2 Potential Security Operating Scenario for EPG

A conceptual security plan has been developed to provide a secured perimeter for EPG. This security plan enables development of the site access and circulation plan because security drives the number and size of access points, as well as the cross-section of the internal roadways. With an estimated 18,000 employees reporting to work each day at offices on EPG, a major challenge would be the screening of vehicles and the maintenance of the required setbacks from unscreened vehicles without causing extensive queuing back onto the regional roadway network. A layered approach to security and screening has been developed to address this issue, wherein EPG could be subdivided into the following zones that reflect increasing levels of security.

- *Installation Perimeter:* Access to EPG would be restricted to authorized vehicles at all access points except the entrance off the Fairfax County Parkway at the Rolling Road interchange. The latter access point would be the sole access point for visitors and trucks. Enforcement of this restriction would be passive (i.e., no stopping or vehicle inspection). Each access point would be signed to prohibit entry and would have the capability to detect unauthorized entry (e.g., via cameras, temporary gates) and to deploy temporary or permanent barricades to stop unauthorized entry. It is

anticipated that authorized vehicles could be equipped with decals or radio frequency identification (RFID) tags. All roadways in this zone would be outside the security setback requirements applicable to occupied buildings.

- *Campus East:* The second level of security would involve a personnel identity and vehicle-check as vehicles enter the Campus East zone from the proposed north or south spine road on EPG. No trucks would be allowed to enter this zone without first undergoing an inspection at the truck screening facility in the southwest area of EPG. Roadway and vehicle access in the Campus East zone would meet standoff distance requirements.
- *Other Facilities:* The highest level of security would be maintained at agency sites—garages, office buildings, and office areas. Garages, buildings, roads, and other parking areas would conform to standoff distance requirements.

4.3.8.3 Potential Security Operating Scenario for Main Post

The Main Post has a comprehensive security program that includes seven access control points. All visitors and trucks would continue to access both North and South Posts via Tulley Gate (Pohick Road). The gates that would need to increase capacity to handle the BRAC action include Pence Gate (Belvoir Road) and Kingman Gate because these are primary access points from the north on U.S. Route 1 and Fairfax County Parkway. Improvements or modifications to Pence Gate will likely be needed to accommodate the Hospital on the South Golf Course; the configuration will be developed during the final design process. Final configuration of each of these gates would be dependent on the alternative selected in the ROD.

4.3.8.4 Potential Security Operating Scenario for the GSA Parcel

Security checkpoints to the GSA Parcel would be on the present site access roadway from Loisdale Road and from the ramp(s) from the Franconia-Springfield Parkway (assuming approval and construction of such mitigation). Adjacent land development results in the GSA Parcel's being a compressed parcel with limited potential for access points. The configuration of the parcel would limit how the security checkpoints could be configured. Specific siting and layouts of the security checkpoints would be developed as the designs are carried forth and the security requirements for WHS occupying this site are developed.

4.3.9 SUMMARY OF COMPARISON OF ALTERNATIVES

The BRAC action would be expected to have significant effects on the transportation system, regardless of the land use alternative selected. The effects of each alternative would vary because of the siting of each of the agencies affected by the BRAC action. For example, the Preferred Alternative land use plan concentrates most of the new development onto EPG, with some increases to South Post. The Town Center Alternative's land use plan places all development on the Main Post on either side of U.S. Route 1. Thus, the effects on the transportation system caused by the new developments would vary by location. For example, the Preferred Alternative would affect the Fairfax County Parkway adjacent to EPG greater than the Town Center Alternative because of the locations of the various agencies. The Town Center Alternative has the greatest effect along U.S. Route 1 because more development is concentrated in that segment of the Main Post.

From a regional perspective, the alternatives are very similar. Overall, regional travel patterns would be expected to be identical, with any differences showing up only on a localized scale, depending upon the specific siting of individual BRAC elements within the immediate Fort Belvoir area. The MWCOG model was used to evaluate the alternatives, as that is the accepted transportation modeling tool for evaluating the impacts at a local and regional level. For all the alternatives, the significant transportation effects would be limited to the entrance points and the immediately adjacent transportation facilities. These significant effects would disappear into the regional traffic flow within 3 to 5 miles of Fort Belvoir. While the alternatives differ somewhat in terms of the detailed extent and location of these effects, on a regional basis, beyond the 3 to 5-mile range, the effects become negligible for all alternatives.

In terms of specifics, the alternatives placing all BRAC-related development within the Main Post area have greater effects than those that disperse the activities between the Main Post and the EPG site. The most significant of these larger effects relates to the added traffic on the segment of the Fairfax County Parkway between I-95 and U.S. Route 1. Mitigation to address this issue is likely to require a Fairfax County Parkway cross-section in this area of eight lanes, including a two-lane reversible HOV facility.

The City Center Alternative would also require additional mitigation because of the significant effect on the Franconia-Springfield Parkway by including the GSA Parcel into the BRAC planning regime. That site is relatively landlocked and would require additional access beyond what currently exists off Loisdale Drive. This mitigation would include the construction of new access from the Franconia-Springfield Parkway, which would have significant costs and adverse effects on existing traffic.

The Satellite Campuses Alternative is most similar to that of the Town Center Alternative, as the development is centered on Main Post and Davison Airfield. Slight differences in localized impacts exist due to the use of Davison Airfield.

An additional consideration for the Preferred Alternative is the fact that the needed transportation improvements can largely be constructed without interfering with existing traffic because the EPG site is largely undeveloped and the major access-related project would be constructing the new segment of the Fairfax County Parkway. Constructing this segment could be accomplished with minimal effect on existing traffic. Each of the other alternatives involves more highway projects that would need to be constructed within active traffic zones.

As noted previously, any significant traffic effects as a result of the BRAC action should be mitigated with transportation improvements, such that the negative effects become minor or negligible. Any development would always have some effects to the transportation system; however, the state and local agencies require, for development they control, that the developer mitigate those effects with some improvements to the transportation system. The level of mitigation depends on the alternative selected. Funding mechanisms to pay for improvements needed for the BRAC action would be commensurate within the legal authority of the Army, likely through the Defense Access Road Program.

The region's transportation system is already strained under existing traffic volumes (2006 conditions), and it will continue to be constrained under the No Action Alternative (2011), even with the transportation improvements proposed by FHWA, VDOT, and Fairfax County in their transportation improvement programs (see section 4.11.3.1). The 2011 conditions, which represent the opening year of BRAC, were assessed and compared to the 2011 No Action Alternative to determine the level of effects caused by the development in each land use alternative. Through the analyses of the four alternative land use plans, a series of transportation improvements have been proposed to mitigate the effects of each of the proposed alternatives. These improvements would be needed to maintain the transportation system's operational performance at an acceptable level of service and delay. These mitigation actions, along with the associated costs, are summarized in Table 4.3-41. Note that these costs are order-of-magnitude costs only.

Table 4.3-41 indicates that the order-of-magnitude costs for the mitigation actions are lowest for the Preferred Alternative and significantly higher for the two alternatives (Town Center and Satellite Campuses) that consolidate all BRAC-related development on the Main Post.

Finally, for the Preferred and City Center Alternatives, the ability of transit to contribute to the mitigation is greater than for the other alternatives because these alternatives use sites that are closer to the regional rail network. Their locations make it easier to achieve the targeted 5 to 10 percent transit mode share goals.

Table 4.3-41
Transportation improvements as mitigation strategies

	Transportation improvement costs in millions				
Transportation Improvement	**No Action Alternative**	**Preferred Alternative**	**Town Center Alternative**	**City Center Alternative**	**Satellite Campuses Alternative**
Complete the Fairfax County Parkway	89				
Reconstruction (with direct connections to the HOV lanes) of the I-95/Fairfax County Parkway interchange		75	75	75	75
Additional or improved ramps to and from I-95 for EPG		40		40	
Widen EPG Segment of Fairfax County Parkway (beyond what is already funded)		50		50	
Fairfax County Parkway improvements between I-95 and John J. Kingman Road		55	100	40	100
Rideshare facility (slugs)		15	15	15	15
Transit center/facilities		30	25	30	30
Expanded bus service		12	12	10	12

Table 4.3-41
Transportation improvements as mitigation strategies *(continued)*

Transportation Improvement	Transportation improvement costs in millions				
	No Action Alternative	**Preferred Alternative**	**Town Center Alternative**	**City Center Alternative**	**Satellite Campuses Alternative**
Additional EPG access		15		15	
Intersection improvements (not shown on map)		15	15	15	20
Access to GSA Parcel from Franconia-Springfield Parkway				50	
Improvements to Loisdale for additional GSA Parcel access				5	
Additional U.S. Route 1 crossing for Main Post		15	25		25
Widening of I-95 from 3 to 4 lanes from Newington to Route 123	68				
Fairfax County Parkway/John J. Kingman Road intersection improvements		10	30		30
Completion of the connector road between Telegraph Road and U.S. Route 1	48				
Franconia Springfield Parkway/Neuman Street interchange		50	50	50	50
Access to EPG via Neuman Street		26		26	
Improvements to Beulah, Telegraph, Backlick, Loisdale, and Newington Roads		50	80	50	80
Completion of Van Dorn Street/Franconia Road interchange			90		90
Widening of U.S. Route 1 through Fort Belvoir			75		75
Interchange at U.S. Route 1 and Fairfax County Parkway			55		55
Interchange at U.S. Route 1 and Telegraph Road			75		75
Improvements to Lorton Road			10		10
Total estimated costs in millions	**205**	**458**	**732**	**471**	**742**

Notes: Estimates include both costs for roadway network and associated facilities improvements, as well as capital costs for increased transit services, as described in the mitigation section for each alternative.

Costs for the No Action Alternative are considered "sunk" costs, as those costs would occur prior to the BRAC action and as the improvements are being built to address the on-going regional traffic needs.

Cost estimates are subject to change as the design process is carried forth, and they should therefore only be considered as order-of-magnitude costs. Costs exclude contingency costs and costs associated with supervision, inspection, and overhead. Costs do not include annual operating costs, such as the costs to operate the expanded bus services, or annual maintenance costs of the new roadways and facilities.