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ECONOMIC IMPACT ANALYSIS OF FORT LEE, VIRGINIA

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Background

Fort Lee is a major U.S. Army military installation located in Prince George County, Virginia. Fort Lee is home to several major military agencies and training facilities, such as the Combined Arms Support Command, Defense Contract Management Agency, Defense Commissary Agency Headquarters, and Army Logistics University. As a result, Fort Lee hosts thousands of military and civilian personnel, contractors, and students each year. The operations of the installation and spending by installation personnel, contractors, and students generate significant economic impact in the Tri-Cities Area.¹

A major military installation such as Fort Lee has various economic connections with the surrounding area. The daily operations of Fort Lee require many local services, which are acquired through defense contracts. The military personnel, civilians, and defense contractors, as well as their spouses, live and spend their wages in the region. Students and trainees need housing accommodations off the installation, spend money in the region on leave days, and may also bring their families to the region to attend graduation or other events.

Combining these components, it is estimated that **the total economic impact (direct, indirect, and induced) of Fort Lee was \$2.25 billion in the region, supporting 23,483 jobs in 2019.** This accounts for about 10.1% of 2019 gross domestic product (GDP) in the Tri-Cities Area.²

Economic Impact 101

The primary measures of change in economic activity in an economic impact analysis are 1) spending and 2) jobs. The direct economic impact comes from the ongoing operations of Fort Lee and the household and visitor spending of those associated with the installation.³ For example, for military personnel stationed at the installation full time, the direct impact is measured as the number of military personnel and the estimated household spending they and their spouses generate in the region. In addition to the direct economic impact, there are other layers of impact that can be felt in the region: indirect and induced economic impacts.

The indirect and induced economic impacts are secondary in nature. Using contract spending in utilities service as an example, direct spending is the amount paid by Fort Lee to local utility companies. These transactions generate sales across the supply chain for all industries that support the local utility companies. They will also generate benefits when employees of local utility companies spend their wages in the region on consumer goods and services (induced impact). When indirect and induced jobs and spending are included, the direct economic impact is increased, yielding a larger total impact.

The direct impact is estimated based on the data provided by Fort Lee and Chmura research, while the indirect and induced impacts are estimated using the IMPLAN model.

Figure 1: Economic Impact Analysis



¹ In this report, the Tri-Cities Area or study region is defined as the cities of Colonial Heights, Hopewell, and Petersburg, and the counties of Chesterfield, Dinwiddie, and Prince George. This is the same study area that was used in the 2012 study, *The Economic Impact of Fort Lee on the Petersburg Region*.

² Source: JobsEQ® by Chmura.

³ Direct impact for an entity can be measured in two ways—revenue or expenditure. Generally, both methods provide similar estimates. For a business, direct impact is typically measured by the total revenue (or sales) of the business. However, for non-profit organizations and government agencies such as Fort Lee, which do not generate direct revenue by selling products or services, the expenditure approach has been used in recent studies. For the Fort Lee study, Chmura also uses this approach, and the total expenditure includes payroll (military personnel and contractors) and procurement spending to acquire products and services to maintain the military base.

Economic Impact of Fort Lee

Economic Impact of Military Personnel

Fort Lee hosts thousands of military staff members who are stationed at the installation full-time, and their household spending benefits the economy in the region. Data on the number of military personnel and their associated annual income were provided by Fort Lee. There are an estimated 3,795 full-time military personnel on the installation, earning an average monthly wage of \$4,564, for total annual wages of \$207.8 million.⁴ Eligible full-time military personnel also receive basic allowance for housing (BAH) and for subsistence (BAS), adding more than \$54.2 million in BAH and more than \$15.6 million in BAS to total estimated household income in 2019.⁵

Military spouses living in the region also contribute to household earnings and expenditures. Fort Lee estimates there are 1,822 military spouses living in the region. National studies estimate 57% of military spouses participate in the labor market, for an estimated 1,038 spouses employed in the region.⁶ It is assumed military spouses earn slightly below the regional annual average wage, primarily due to fewer hours worked, and make on average \$33,856 per year.^{7,8}

Not all income from military personnel and their spouses is spent in the region. Chmura utilized IMPLAN commodity trade models to estimate the percentage of household spending within the region.⁹ After total household spending was determined, Chmura estimated household spending in different categories such as food, housing, and healthcare, based on typical spending patterns from the annual consumer expenditure survey (CES) conducted by the Bureau of Labor Statistics. Finally, household spending was entered into corresponding IMPLAN model sectors to estimate their indirect and induced impacts in the region.

The total annual economic impact (direct, indirect, and induced) of Fort Lee's military personnel in the region is estimated to be \$517.5 million in 2019, which supported 6,042 jobs. The direct spending impact of military personnel and their spouses is measured by household spending in the region, which was \$348.1 million in 2019. The direct employment impact is the number of full-time military personnel employed at Fort Lee, as well as military spouses employed in the region, which amounted to 4,833.¹⁰

Table 1: Economic Impact of Fort Lee Military Personnel

	DIRECT	INDIRECT	INDUCED	TOTAL IMPACT	MULTIPLIER
Spending (\$Million)	\$348.1	\$81.0	\$88.5	\$517.5	1.49
Employment	4,833	560	649	6,042	1.25

Source: IMPLAN 2017 and Chmura

Note: Numbers may not sum due to rounding

When Fort Lee military household members make purchases in the region in various industries, the indirect impact measures the benefit to other regional industries when those direct beneficiaries purchase supplies or services to support their ongoing operations.

⁴ In 2012, the deactivation of the 49th Quartermaster Group resulted in a reduction of about 1,000 Fort Lee personnel, accounting for the difference between the current estimate and that of the previous report conducted for 2011. This reduction also results in lower total impact estimates compared with the previous study.

⁵ Source: Estimates provided by Fort Lee, based on allowances detailed online at <https://militarypay.defense.gov/PAY/Allowances/bah.aspx>.

⁶ Source: *Military Spouses in the Labor Market*, The Council of Economic Advisors, May 2018. Available at <https://www.whitehouse.gov/wp-content/uploads/2018/05/Military-Spouses-in-the-Labor-Market.pdf>.

⁷ Ibid. Military spouses earned on average 26.8% less income than non-military spouses with similar characteristics, most of which can be explained by military spouses working fewer hours per week and fewer weeks of the year.

⁸ Source: JobsEQ by Chmura. The average annual wage in the region in 2019Q2 is \$46,252.

⁹ The percentage of spending outside the study area is considered leakage; the IMPLAN model estimates that the average consumer spending leakage is 16% in the region.

¹⁰ Source: Fort Lee. Employment data in this report represent both full-time and part-time workers, and they are not full-time equivalent positions. In addition, the employment estimate is based on the place of work.

Examples include warehousing and storage companies and local food service companies. The indirect impact of Fort Lee military personnel is estimated to be \$81.0 million, which supported 560 jobs in 2019.

Induced impact mostly benefits regional consumer-related businesses resulting from household spending, such as restaurants and healthcare industries. Spending by Fort Lee military personnel generated an estimated induced impact of \$88.5 million that sustained 649 jobs in the region in 2019.¹¹

A standardized measure of indirect and induced impact is an economic multiplier. The output multiplier measures the amount of indirect and induced impact based on each dollar of Fort Lee's direct impact. The regional output multiplier for Fort Lee's military personnel is 1.49, meaning each dollar of military personnel expenditure in the region can generate \$0.49 in additional regional spending. Similarly, the employment multiplier measures additional jobs that can be supported by one Fort Lee job. The employment multiplier for Fort Lee's military personnel is 1.25, meaning each job can support 0.25 additional jobs in the region.

Economic Impact of Students and Trainees

As a major training center for the military, Fort Lee hosts more than 9,000 trainees for Advanced Individual Training (AIT) courses and almost 2,000 students for the Army Logistics University (ALU) courses. ALU students spend an average of 55 days on the installation, while AIT trainees have longer-term training over approximately 13 weeks. Students in short-term training who are not required to stay on the installation contribute money to the local economy through household spending in off-post lodging, food, and other products and services. AIT trainees primarily stay on the installation but may take occasional leave, during which they spend some of their pay in the region. Fort Lee estimates ALU students earn on average \$4,584 per month while AIT trainees earn on average \$2,116 per month. Additionally, trainees may bring family members to the region for graduation ceremonies. Family members contribute to the local economy through hotel stays and visitor spending on items such as food, beverages, and gasoline.

Utilizing a similar methodology, Chmura estimated household and visitor spending in different categories such as food and lodging. Spending that stays in the region was estimated based on IMPLAN commodity trade models.¹² Total spending was entered into corresponding IMPLAN model sectors to estimate their indirect and induced impacts in the region.

The total annual economic impact (direct, indirect, and induced) of Fort Lee's students and trainees in the Tri-Cities Area is estimated to be \$408.6 million in 2019, which supported 3,754 jobs. The direct spending impact of students and trainees is measured by household and visitor spending, which was \$292.5 million in 2019. The direct employment impact is the number of jobs directly supported by household and visitor spending, which amounted to 2,939.

Table 2: Economic Impact of Fort Lee Students and Trainees

	DIRECT	INDIRECT	INDUCED	TOTAL IMPACT	MULTIPLIER
Spending (\$Million)	\$292.5	\$66.5	\$49.5	\$408.6	1.40
Employment	2,939	452	363	3,754	1.28

Source: IMPLAN 2017 and Chmura

Note: Numbers may not sum due to rounding

The indirect impact of Fort Lee students and trainees is estimated to be \$66.5 million, which supported 452 jobs in 2019. Spending by Fort Lee students and trainees generated an estimated induced impact of \$49.5 million that sustained 363 jobs in the region in 2019.

¹¹ The IMPLAN model considers both commuting patterns and household spending outside the region to estimate the induced impact.

¹² The percentage of spending outside the study area is considered leakage; the IMPLAN model estimates that average consumer spending leakage is 16% in the region.

In terms of multipliers, the regional output multiplier for Fort Lee's students and trainees is 1.40, meaning each dollar of student and trainee expenditure in the region can generate \$0.40 in additional regional spending. The employment multiplier for Fort Lee's students and trainees is 1.28, meaning each job can support 0.28 additional jobs in the region.

Economic Impact of Civilians

In addition to military personnel, more than 5,000 civilians work at Fort Lee, and their household spending contributes to the regional economy. In 2019, an estimated 5,164 civilians worked on the installation, earning an average annual wage of \$66,257.¹³ Employees typically receive healthcare benefits in addition to the base pay; consistent with the previous study, an additional 15% is applied to total wages to account for these benefits.

Civilian spouses living in the region also contribute to household earnings and expenditures. Chmura used the current household structure of the region to estimate the number of civilian spouses and their labor force participation. In the region, 49.8% of the total population 15 years and older is married, and 50.6% of spouses participate in the labor force, based on the latest Census data.¹⁴ It is assumed that spouses earn the average regional wage of \$46,252 in 2019, plus healthcare benefits.

Utilizing a similar methodology, Chmura estimated household spending in different categories such as food and housing. Spending that stays in the region was estimated based on IMPLAN commodity trade models.¹⁵ Total spending was entered into corresponding IMPLAN model sectors to estimate their indirect and induced impacts in the region.

The total annual economic impact (direct, indirect, and induced) of civilians at Fort Lee in the Tri-Cities Area is estimated to be \$766.9 million in 2019, which supported 8,142 jobs. The direct spending impact of civilians, including spouses employed in the region, is measured by household spending in the region, which was \$531.8 million in 2019. The direct employment impact is 6,465.

Table 3: Economic Impact of Civilians at Fort Lee

	DIRECT	INDIRECT	INDUCED	TOTAL IMPACT	MULTIPLIER
Spending (\$Million)	\$531.8	\$113.3	\$121.8	\$766.9	1.44
Employment	6,465	783	894	8,142	1.26

Source: IMPLAN 2017 and Chmura

Note: Numbers may not sum due to rounding

The indirect impact of Fort Lee civilians is estimated to be \$113.3 million, which supported 783 jobs in 2019. Spending by Fort Lee civilians generated an estimated induced impact of \$121.8 million that sustained 894 jobs in the region in 2019.

In terms of multipliers, the regional output multiplier for Fort Lee's civilians is 1.44, meaning each dollar of civilian expenditure in the region can generate \$0.44 in additional regional spending. The employment multiplier for Fort Lee's civilians is 1.26, meaning each job can support 0.26 additional jobs in the region.

Economic Impact of Contractors

Fort Lee employed approximately 1,720 on-base, private-sector contractors in 2019.¹⁶ Based on the industry mix of contracts collected from Chmura's federal spending database FedSpendTOP, Chmura estimated these contractors earn an average annual wage of

¹³ Wages were estimated by Fort Lee from OPM pay tables at the GS-10 pay grade, step 5.

¹⁴ Source: Chmura's calculations are based on data from American Community Survey 5-year Estimates (2017), United States Census Bureau.

¹⁵ The percentage of spending outside the study area is considered leakage; the IMPLAN model estimates that the average consumer spending leakage is 16% in the region.

¹⁶ Source: Fort Lee.

\$62,030 in 2019.¹⁷ Employees typically receive healthcare benefits in addition to base pay; consistent with the previous study, an additional 15% is applied to total wages to account for these benefits.

Spouses of contractors living in the region also contribute to household earnings and expenditures. Chmura used the current household structure of the region to estimate the number of civilian spouses and their labor force participation and estimated 433 spouses participating in the labor force.¹⁸ It is assumed that spouses earn the average regional wage of \$46,252 in 2019, plus healthcare benefits.

Utilizing a similar methodology, Chmura estimated household spending in different categories such as food and housing. Spending in the region was estimated based on IMPLAN commodity trade models.¹⁹ Total spending was entered into corresponding IMPLAN model sectors to estimate their indirect and induced impacts in the region.

The total annual economic impact (direct, indirect, and induced) of contractors at Fort Lee in the Tri-Cities Area is estimated to be \$202.7 million in 2019, which supported 2,670 jobs. The direct spending impact of civilians, including spouses employed in the region, is measured by household spending, which was \$130.2 million in 2019. The direct employment impact amounted to 2,153.

Table 4: Economic Impact of Fort Lee Contractors

	DIRECT	INDIRECT	INDUCED	TOTAL IMPACT	MULTIPLIER
Spending (\$Million)	\$130.2	\$35.9	\$36.6	\$202.7	1.56
Employment	2,153	249	268	2,670	1.24

Source: IMPLAN 2017 and Chmura

Note: Numbers may not sum due to rounding

The indirect impact of Fort Lee civilians is estimated to be \$35.9 million, which supported 249 jobs in 2019. Spending by Fort Lee contractors generated an estimated induced impact of \$36.6 million that sustained 268 jobs in the region in 2019.

In terms of multipliers, the regional output multiplier for Fort Lee's contractors is 1.56, meaning each dollar of contractor expenditure in the region can generate \$0.56 in additional regional spending. The employment multiplier for Fort Lee's contractors is 1.24, meaning each job can support 0.24 additional jobs in the region.

Economic Impact of Defense Contract Spending

In addition to employing on-base contractors, Fort Lee contracts with companies in the region and across the nation to provide goods and services that support its daily operations. Defense contract data are from Chmura's federal spending database FedSpendTOP. To estimate the impact on the region, contracts are filtered to only include those performed at or commissioned by Fort Lee and performed by contractors within the region—contracts outside the study region are excluded.

Care must also be taken to avoid double-counting contractors employed at Fort Lee, as their pay may also appear in the contracts database. The previous study found that most of the contractors worked as instructors or in Information Technology.²⁰ Accordingly, contracts in education and computer services industries were excluded from the contract impact analysis.

¹⁷ Chmura's FedSpendTOP is a database of federal contracts that is user-friendly and well-descriptive of contract work performed by both time and place. Published federal awards data are problematic in several regards. Chmura aggregates this massive data set, then cleans and adjusts the minutiae of the individual awards to create the FedSpendTOP dataset. This title is derived from (FedEDeral SpendPENDing by Time of Performance). The values of the awards are adjusted by contract length to more accurately depict the value of work performed during contracts spanning multiple fiscal years. FedSpendTOP data also capture the effects of subcontract work being performed in places different from the prime awards.

¹⁸ Source: Chmura's calculations from American Community Survey 5-year Estimates (2017), United States Census Bureau.

¹⁹ The percentage of spending outside the study area is considered leakage; the IMPLAN model estimates that the average consumer spending leakage is 16% in the region.

²⁰ Source: *The Economic Impact of Fort Lee on the Petersburg Region*. Nathalie P. Voorhees Center, August 2012. p. 11.

In 2019, approximately \$217.2 million in contracts were performed at Fort Lee or paid for by Fort Lee and performed by firms located within the region. Contracts were classified by IMPLAN sectors to estimate direct employment impacts and the indirect and induced impacts in the region. Some of the largest sectors include facilities support services, software publishers, food and drinking places, construction, architectural and engineering services, and services to buildings.

The total annual economic impact (direct, indirect, and induced) of Fort Lee contracts in the Tri-Cities Area is estimated to be \$351.6 million in 2019, which supported 2,875 jobs. The direct spending impact is measured by contract spending at Fort Lee and in the region, which was \$217.2 million in 2019. The direct employment impact is the number of jobs supported by these contracts, which amounted to 1,836.

Table 5: Economic Impact of Defense Contract Spending

	DIRECT	INDIRECT	INDUCED	TOTAL IMPACT	MULTIPLIER
Spending (\$Million)	\$217.2	\$60.0	\$74.5	\$351.6	1.62
Employment	1,836	471	568	2,875	1.57

Source: IMPLAN 2017 and Chmura

Note: Numbers may not sum due to rounding

The indirect impact measures the benefit to other regional industries when contracting firms purchase supplies or services to support their ongoing operations. The indirect impact of Fort Lee contract spending is estimated to be \$60.0 million, which supported 471 jobs in 2019.

The induced impact mostly benefits regional consumer-related businesses, such as restaurants and healthcare businesses. Spending by employees at firms in the region that contract with Fort Lee generated an estimated induced impact of \$74.5 million that sustained 568 jobs in the region in 2019.²¹

In terms of multipliers, the regional output multiplier for Fort Lee's contract spending is 1.62, meaning each dollar of contract expenditure in the region can generate \$0.62 in additional regional spending. The employment multiplier for Fort Lee's contract spending is 1.57, meaning each job can support 0.57 additional jobs in the region.

Economic Impact Summary of Fort Lee

Table 6 summarizes the overall economic impact of Fort Lee in the Tri-Cities Area in 2019, when adding impacts from military personnel, students and trainees, civilians, contractors, and defense contracts. Chmura estimates that the total impact of Fort Lee (direct, indirect, and induced) in 2019 reached more than \$2.2 billion, which supported 23,483 jobs in the Tri-Cities Area. Total gross domestic product in the region in 2019 is \$22.4 billion, suggesting the total impact of Fort Lee is equivalent to more than 10% of regional GDP. The regional output and employment multipliers of Fort Lee are estimated to be 1.48 and 1.29, respectively, meaning each dollar of expenditure tied to Fort Lee can generate \$0.48 in additional regional spending and each job can support 0.29 additional jobs in the region.

Table 6: Economic Impact of Fort Lee

	DIRECT	INDIRECT	INDUCED	TOTAL IMPACT	MULTIPLIER
Spending (\$Million)	\$1,519.8	\$356.6	\$370.8	\$2,247.3	1.48
Employment	18,226	2,515	2,742	23,483	1.29

Source: IMPLAN 2017 and Chmura

Note: Numbers may not sum due to rounding

²¹ The IMPLAN model considers both commuting patterns and household spending outside the region to estimate the induced impact. It is assumed that those contracts are performed by contractors at the base, which is part of the economic impact of contractors.

Tax Revenue for Local and State Governments

The operations of Fort Lee in the Tri-Cities Area also bring tax revenue for the local and state governments. In order to be conservative, only tax revenue from the direct impact is estimated in this section.²²

At the local level, spending in the community is subject to various taxes. Spending by students, trainees, military personnel, and contractors at local retail establishments is subject to sales tax. Residents who engage in various recreation may be subject to admission tax and dining out generates meal tax revenue. Visitors who stay overnight are subject to lodging tax. Finally, all retail and service business are subject to business, professional, and occupational license (BPOL) taxes. In sum, the total local tax revenue tied to Fort Lee's operations is estimated at \$19.5 million in 2019.

Fort Lee's operations also generate significant tax revenue at the state level. State taxes include retail sales tax, personal income tax, and corporate income tax. In total, the state government received an estimated \$107.5 million in taxes in 2019 from the ongoing operations of Fort Lee.

Table 7 summarizes these estimates. Combining the local and state tax revenues, Fort Lee's operations generate an estimated \$127.0 million in tax revenue.

Table 7: Tax Revenue for Local and State Governments from Fort Lee Operations

	LOCAL	STATE	TOTAL
Tax Revenue 2019 (\$Millions)	\$19.5	\$107.5	\$127.0

Source: IMPLAN 2017 and Chmura

Note: Numbers may not sum due to rounding

Appendix 1: Impact Analysis Glossary

Impact Analysis—an examination of business-business and business-consumer economic relationships capturing all monetary transactions in a given period, allowing one to calculate the effects of a change in an economic activity on the entire economy (input-output analysis).

Direct Impact—economic activity generated by a project or operation. For construction, this represents activity of the contractor; for operations, this represents activity by tenants of the property.

Overhead—construction inputs not provided by the contractor.

Indirect Impact—secondary economic activity that is generated by a project or operation. An example might be a new office building generating demand for parking garages.

Induced (Household) Impact—economic activity generated by household income resulting from direct and indirect impacts.

Ripple Effect—the sum of induced and indirect impacts. In some projects, it is more appropriate to report ripple effects than indirect and induced impacts separately.

Total Economic Impact—the sum of the direct, indirect and induced impact.

Fiscal Impact—the tax revenue for federal, state or local governments derived from the direct economic impact.

Multiplier—the cumulative impacts of a unit change in economic activity on the entire economy.

²² This approach is recommended by Burchell and Listokin in *The Fiscal Impact Handbook*.