Housing the Region’s Future Workforce

2012-2032

by

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- 2030 Group
Summary of Key Research Findings

Over the next 20 years, the Washington DC metropolitan area will add 857,334 net new jobs. To ensure that this employment growth can occur, a sufficient supply of housing must be available for these new workers—in the right locations, of the right types, and at affordable prices and rents. This analysis determines amount of housing, as well as the type (single-family and multi-family), tenure (owner and renter), price or rent, and location of housing that will be needed over the next 20 years to accommodate new workers.

Key Findings

- The Washington DC metropolitan area is expected to add **857,334 net new jobs** between 2012 and 2032. The largest share of these net new jobs, 46.9 percent or 401,804 jobs, will be in Professional and Technical Services and Management. While this sector includes many higher wage jobs, new jobs in this sector will also include entry-level positions, with lower starting salaries. The region will add 139,082 jobs in the administrative and waste service sector and 95,024 construction jobs. Together, these sectors account for 27.3 percent of the net new jobs. Wages in these sectors are below average and lower priced housing will be needed to accommodate these workers.

- If each jurisdiction provides enough housing to accommodate all of its future workers, the Washington DC area will need to add **548,298 new housing units** between 2012 and 2032. In order to meet this demand, the region will need to produce 27,415 new housing units each year. This level of residential construction has not been seen since 2006.

- If each jurisdiction maintains its current in-commuting rate and the region houses only a portion of its future workforce, there will be a need for 281,416 net new housing units to house workers who both work and live in the same jurisdiction. There will be a need for an additional 210,283 housing units within the region to accommodate inter-jurisdictional commuters and to maintain the current regional commuting patterns. Combined, a total of 491,698 housing units will be needed within the region to maintain current commuting patterns, which means that the workers in 56,599 households will commute to the Washington DC area from places outside the metro area.

- The types of housing that will be needed for these net new workers reflect the changing demographics of the working age population and the mix of jobs and wages that the region is expecting. The housing demand forecasts imply that **344,624 single-family units** and **203,674 multi-family units** will be needed over the next 20 years.

- There will be a continued shift in the homeownership rates in the Washington DC area. Currently, the region’s homeownership rate is 64.5 percent. **Only 56.2 percent of the new...**
households resulting from these net new workers will be homeowners, while 43.8 percent will rent.

- The region’s new housing must be priced so that it is affordable to these new workers. Based on the housing need forecasts, **44.1 percent of rental units will need to have rents of less than $1,250 a month**, while only 2.4 percent of the rental demand will be for units priced at $2,250 a month or more. About 16.4 percent of the owner-occupied units forecasted need to be valued at less than $200,000 and only 13.5 percent at over $600,000.
Economic Growth and Housing Demand in the Washington DC Area

While the Washington DC area’s future economic growth will not continue at the rapid pace it did between 1980 and 2010, current economic forecasts indicate substantial job growth over the next 20 years. Between 2012 and 2032, total regional employment will increase 27.6 percent, adding 857,334 net new jobs (Table 1). But there are potential obstacles that may prevent this job growth from occurring. At the most fundamental level, the projected job growth will not materialize without a sufficient number of workers to fill these new jobs. To attract new workers, the region will need to have a sufficient supply of housing that meets the needs of the future workforce, is affordable given the changing wage structure of the economy, and is located near emerging and growing job centers.

There are significant consequences associated with not having enough housing to accommodate the region’s future workforce close to where jobs are projected. Without an adequate supply of housing, there will be untenable strains on the region’s transportation and transit networks, and an erosion of the region’s economic base. The resources that would be needed to expand the region’s transportation capacity to accommodate thousands of additional commuters from outside the region and hundreds of thousands additional inter-jurisdiction commuters are not available. Even if the long-distance commuting capacity could be provided, there would still be a substantial loss of wealth from the region to adjacent jurisdictions and an erosion of the region’s tax base. There would also be serious and growing environmental impacts associated with a growing number of workers commuting into the Washington DC metro area each day. Thus, housing the future workforce within the region not only reduces the transportation needs, but also increases local spending and tax revenue, which provides more local funding to for regional investments.

The Washington DC area economy is evolving, and the types of jobs coming to the region over the next 20 years are somewhat different from the jobs added over the past 20 years. Future job growth will be driven primarily by three sectors: Professional and Business Services, Education and Health Services, and Construction. Many of the region’s new workers will have substantially lower wages than the current workforce. The sectoral changes in the economy—along with changing demographics that are leading to a younger, more racially and ethnically diverse workforce—will have important implications for the types of housing that will be demanded. In order to accommodate the region’s new workforce, there will be greater needs for smaller homes, multi-family buildings, and homes available to renters. Without sufficient housing—in the right locations, of the right types, and at the right prices—the Washington DC area faces the possibility of slower economic growth, increasing traffic congestion and worsening quality of life.
Table 1: Net New Jobs: 2012 – 2032  
Washington DC Metropolitan Area

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Net New Jobs</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>District of Columbia</td>
<td>148,507</td>
<td>19.8%</td>
</tr>
<tr>
<td>Calvert</td>
<td>10,014</td>
<td>44.0%</td>
</tr>
<tr>
<td>Charles</td>
<td>18,831</td>
<td>43.2%</td>
</tr>
<tr>
<td>Frederick</td>
<td>36,020</td>
<td>36.5%</td>
</tr>
<tr>
<td>Montgomery</td>
<td>129,619</td>
<td>27.1%</td>
</tr>
<tr>
<td>Prince George's</td>
<td>60,352</td>
<td>18.8%</td>
</tr>
<tr>
<td>Suburban Maryland</td>
<td>254,836</td>
<td>26.4%</td>
</tr>
<tr>
<td>Alexandria</td>
<td>19,257</td>
<td>19.0%</td>
</tr>
<tr>
<td>Arlington</td>
<td>30,797</td>
<td>16.7%</td>
</tr>
<tr>
<td>Clarke</td>
<td>773</td>
<td>19.8%</td>
</tr>
<tr>
<td>Fairfax (a)</td>
<td>133,941</td>
<td>20.4%</td>
</tr>
<tr>
<td>Fauquier</td>
<td>7,321</td>
<td>32.6%</td>
</tr>
<tr>
<td>Loudoun</td>
<td>103,018</td>
<td>69.7%</td>
</tr>
<tr>
<td>Prince William (b)</td>
<td>83,176</td>
<td>54.7%</td>
</tr>
<tr>
<td>Spotsylvania (c)</td>
<td>38,062</td>
<td>64.5%</td>
</tr>
<tr>
<td>Stafford</td>
<td>28,305</td>
<td>67.0%</td>
</tr>
<tr>
<td>Warren</td>
<td>4,075</td>
<td>32.9%</td>
</tr>
<tr>
<td>Northern Virginia</td>
<td>448,725</td>
<td>32.5%</td>
</tr>
<tr>
<td>Jefferson Co WV</td>
<td>5,266</td>
<td>34.5%</td>
</tr>
<tr>
<td>Washington DC Metro Area</td>
<td>857,334</td>
<td>27.6%</td>
</tr>
</tbody>
</table>

(a) Includes the cities of Fairfax and Falls Church  
(b) Includes the cities of Manassas and Manassas Park  
(c) Includes the city of Fredericksburg  

Sources: IHS Global Insight, Metropolitan Washington Council of Government, and GMU Center for Regional Analysis
Forecasts of Housing Need to Support Regional Economic Growth

This research builds upon the “Housing the Region’s Future Workforce” report published in 2011. Like the 2011 report, the objective of this research is to forecast the amount of housing that will be needed for the region’s future workers. These housing forecasts are derived solely from the region’s net new workers and therefore excludes units that will be needed for replacement workers and non-working households. As a result, these housing demand forecasts should be considered a lower bound of the region’s future comprehensive housing needs. Estimates of employment growth by sector and by jurisdiction form the basis of these housing demand forecasts. Assumptions about workers’ wages, age structure, and household composition are used to forecast the amount, type and price of housing that the region will need over the 2012 – 2032 period.

Four main questions are analyzed in this research:

1. **How much housing will be needed to accommodate the region’s new workers?** The forecasts estimate the total number of housing units that will be needed to accommodate the Washington DC area’s net new workers between 2012 and 2022, and between 2022 and 2032.

2. **Where should this housing be located?** The location of the new housing units is analyzed two ways:
   a. The first method assumes each worker is housed in the same jurisdiction where he/she works. This method keeps the levels of inter-jurisdiction commuting stable and therefore assumes no worsening of traffic congestion. The forecasts of units resulting from this method are referred to as the “By Work Location” estimates.
   b. Alternatively, the second method is based on current commuting patterns. This method assumes that each jurisdiction houses the same share of new workers as it does for existing workers in the region. These forecasts are broken down by workers who are both non-commuters (i.e. people who live and work in the same jurisdiction) and jurisdiction-to-jurisdiction commuters. The forecasts of units resulting from this method are referred to as the “By Current Commuting Patterns” estimates.

3. **What types of housing units will be needed?** These forecasts assess the demand for single-family (detached and attached/townhouse) and multi-family housing. The housing type is further divided by tenure (owner/renter) resulting in four mutually exclusive housing types—single-family owner, single-family renter, multi-family owner and multi-family renter.

4. **What prices and rents will new workers be able to afford?** The forecasts take into account the wages of the net new workers and the number of workers per household to determine the demand for housing at different price and rental levels.

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1 This research is not directly comparable to the 2011 report due to methodological differences. See the Appendix for a detailed methodology.
I. How much housing will be needed for the future workforce?

In order to accommodate the 857,334 estimated net new workers, the Washington DC metropolitan area needs to add 548,298 housing units over the next 20 years. Of these units, 285,596 will be needed between 2012 and 2022, while the remaining 262,702 units will be needed between 2022 and 2032. Table 2 shows the distribution of these housing unit forecasts by jurisdiction, assuming that each new worker is housed in the same jurisdiction in which he or she works.

Table 2: Estimates of Housing Demand: 2012 – 2032
Washington DC Metropolitan Area
By Work Location (a)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>2012-2022</th>
<th>2022-2032</th>
<th>2012-2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>District of Columbia</td>
<td>48,920</td>
<td>56,320</td>
<td>105,240</td>
</tr>
<tr>
<td>Calvert</td>
<td>2,952</td>
<td>3,411</td>
<td>6,363</td>
</tr>
<tr>
<td>Charles</td>
<td>5,970</td>
<td>6,120</td>
<td>12,089</td>
</tr>
<tr>
<td>Frederick</td>
<td>11,667</td>
<td>10,860</td>
<td>22,527</td>
</tr>
<tr>
<td>Montgomery</td>
<td>47,613</td>
<td>36,216</td>
<td>83,829</td>
</tr>
<tr>
<td>Prince George’s</td>
<td>20,705</td>
<td>15,301</td>
<td>36,006</td>
</tr>
<tr>
<td>Suburban Maryland</td>
<td>88,907</td>
<td>71,908</td>
<td>160,815</td>
</tr>
<tr>
<td>Alexandria</td>
<td>7,480</td>
<td>5,578</td>
<td>13,058</td>
</tr>
<tr>
<td>Arlington</td>
<td>11,876</td>
<td>7,840</td>
<td>19,717</td>
</tr>
<tr>
<td>Clarke</td>
<td>178</td>
<td>298</td>
<td>476</td>
</tr>
<tr>
<td>Fairfax (b)</td>
<td>44,931</td>
<td>38,137</td>
<td>83,069</td>
</tr>
<tr>
<td>Fauquier</td>
<td>2,209</td>
<td>2,293</td>
<td>4,501</td>
</tr>
<tr>
<td>Loudoun</td>
<td>33,700</td>
<td>29,667</td>
<td>63,367</td>
</tr>
<tr>
<td>Prince William (c)</td>
<td>25,692</td>
<td>23,469</td>
<td>49,161</td>
</tr>
<tr>
<td>Spotsylvania (d)</td>
<td>11,164</td>
<td>13,822</td>
<td>24,986</td>
</tr>
<tr>
<td>Stafford</td>
<td>7,990</td>
<td>10,173</td>
<td>18,164</td>
</tr>
<tr>
<td>Warren</td>
<td>1,016</td>
<td>1,491</td>
<td>2,506</td>
</tr>
<tr>
<td>Northern Virginia</td>
<td>146,235</td>
<td>132,769</td>
<td>279,004</td>
</tr>
<tr>
<td>Jefferson Co WV</td>
<td>1,533</td>
<td>1,705</td>
<td>3,239</td>
</tr>
<tr>
<td>Washington DC Metro Area</td>
<td>285,596</td>
<td>262,702</td>
<td>548,298</td>
</tr>
</tbody>
</table>

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.
(b) Includes the cities of Fairfax and Falls Church
(c) Includes the cities of Manassas and Manassas Park
(d) Includes the city of Fredericksburg

Source: GMU Center for Regional Analysis
In order to meet this housing demand, the region will need to produce 27,415 units annually during the next two decades. While this annual production is consistent with the average level of residential construction between 1990 and 2012, this level of residential construction activity has not been seen in the region since 2006. Moreover, the types of housing that will be needed are projected to differ from those that have been produced historically.

Of course, workers often live and work in different jurisdictions—sometimes by preference and sometimes by necessity. Some of the region’s current workforce lives outside of the Washington DC metro area and commute in, which results in serious strains on the region’s transportation networks and results in a loss of economic potential within the region. Many others commute from one jurisdiction to another, which has led to severe traffic problems. If current commuting patterns persisted for net new workers, these problems would be aggravated. Under those assumptions, however, the region would still need to add 461,699 housing units over the next two decades, and workers in 56,599 households would commute to the metro area from places outside.
II. Where will this housing be located?

This research forecasts the location of demand for net new housing units using two methods: 1) assuming that all workers live and work in the same jurisdiction (“By Work Location”) and 2) assuming that the share of new workers commuting from one jurisdiction to another is the same as the existing inter-jurisdictional commuting rates (“By Current Commuting Patterns”).

Using the work location method, the greatest housing demand will be in Northern Virginia, because the majority of the net new jobs forecasted in the region will be in Northern Virginia. Between 2012 and 2032, Northern Virginia is expected to add nearly 450,000 net new jobs. These workers will need an estimated 279,004 new housing units, with more than half of those units forecasted for Fairfax and Loudoun counties. The nearly 255,000 net new workers in Suburban Maryland lead to a demand for 160,815 new units, with more than half in Montgomery County. The District of Columbia is projected to add nearly 150,000 jobs between 2012 and 2032. If the city housed all of its new workers, it will need 105,240 new housing units over the next 20 years.

However, not all workers live in same jurisdiction in which they work. Households may have multiple workers who work in different jurisdictions and these households may choose a home location that is the most convenient for all their workers. Some households choose where to live based on reasons independent of their work location, such as proximity to family or amenities. Some other households, however, cannot find affordable housing close to where they work so they are forced to move further out. To account for these preferences and constraints, future housing demand is also analyzed using current commuting patterns in the region, assuming that new workers will commute the same way current workers do. The forecasts that result from this method lead to increased levels of jurisdiction-to-jurisdiction commuting, which would increase the strain on the region’s transit and highways systems and potentially increase the number of commutes to a level beyond current capacity in some locations. As a result, these forecasts reflect a less than optimal scenario.

Table 3, and Figures 1 and 2 show the estimates generated from both methods—by work location and by current commuting pattern. The net new units as determined by the current commuting pattern consist both of those who live and work in the same jurisdiction (“Non-Commuters”) and those who work in and live in different jurisdictions within the region (“Commuters”). Because of the current distribution of commuters, the housing unit forecasts by jurisdiction differ considerably from the estimates that assume all workers live in the jurisdiction in which they work. In Suburban Maryland, the demand for housing is higher using the commuting patterns method than it is using the work location method. Northern Virginia would need nearly the same number of housing units using both methods, while the District of Columbia would need 60 percent fewer units using the commuting patterns compared to the estimates that assume the city houses all of its future workers.

These housing demand forecasts do not suggest locations for housing within jurisdictions. However, based on the assessment of the need for housing of different types and price/rent ranges (see below), a substantial portion of the housing that will be needed by future workers will need to be located close to
established and growing employment centers, near transit and transportation networks, and in more compact developments.
Table 3: Estimates of Housing Demand: 2012 – 2032
Washington DC Metropolitan Area
By Work Location and Current Commuting Patterns (a)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>By Work Location</th>
<th>By Current Commuting Patterns</th>
<th>Total by Commuting Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Non-Commuters</td>
<td>Commuters</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>105,240</td>
<td>29,994</td>
<td>11,810</td>
</tr>
<tr>
<td>Calvert</td>
<td>6,363</td>
<td>4,903</td>
<td>3,138</td>
</tr>
<tr>
<td>Charles</td>
<td>12,089</td>
<td>8,205</td>
<td>6,802</td>
</tr>
<tr>
<td>Frederick</td>
<td>22,527</td>
<td>15,049</td>
<td>6,305</td>
</tr>
<tr>
<td>Montgomery</td>
<td>83,829</td>
<td>53,011</td>
<td>29,648</td>
</tr>
<tr>
<td>Prince George's</td>
<td>36,006</td>
<td>19,336</td>
<td>38,363</td>
</tr>
<tr>
<td>Suburban Maryland</td>
<td>160,815</td>
<td>100,504</td>
<td>84,256</td>
</tr>
<tr>
<td>Alexandria</td>
<td>13,058</td>
<td>3,040</td>
<td>9,883</td>
</tr>
<tr>
<td>Arlington</td>
<td>19,177</td>
<td>4,438</td>
<td>13,960</td>
</tr>
<tr>
<td>Clarke</td>
<td>476</td>
<td>202</td>
<td>535</td>
</tr>
<tr>
<td>Fairfax (b)</td>
<td>83,069</td>
<td>45,019</td>
<td>39,451</td>
</tr>
<tr>
<td>Fauquier</td>
<td>4,501</td>
<td>2,761</td>
<td>2,751</td>
</tr>
<tr>
<td>Loudoun</td>
<td>63,367</td>
<td>34,694</td>
<td>13,202</td>
</tr>
<tr>
<td>Prince William (c)</td>
<td>49,161</td>
<td>31,588</td>
<td>20,937</td>
</tr>
<tr>
<td>Spotsylvania (d)</td>
<td>24,986</td>
<td>15,757</td>
<td>4,305</td>
</tr>
<tr>
<td>Stafford</td>
<td>18,164</td>
<td>9,809</td>
<td>6,448</td>
</tr>
<tr>
<td>Warren</td>
<td>2,506</td>
<td>1,593</td>
<td>1,141</td>
</tr>
<tr>
<td>Northern Virginia</td>
<td>279,004</td>
<td>148,902</td>
<td>112,614</td>
</tr>
<tr>
<td>Jefferson Co WV</td>
<td>3,239</td>
<td>2,015</td>
<td>1,602</td>
</tr>
<tr>
<td>Reside outside of Region</td>
<td>0</td>
<td>56,599</td>
<td>0</td>
</tr>
<tr>
<td>Washington DC Metro Area</td>
<td>548,298</td>
<td>338,015</td>
<td>210,283</td>
</tr>
</tbody>
</table>

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes. The Non-commuters include workers who live in their work jurisdiction based on current commuting patterns. The Commuters include workers who do not live in their work jurisdiction, but live elsewhere within the region and are also based on current commuting patterns.
(b) Includes the cities of Fairfax and Falls Church
(c) Includes the cities of Manassas and Manassas Park
(d) Includes the city of Fredericksburg

Source: GMU Center for Regional Analysis
Figure 4: Estimates of Housing Demand By Work Location: 2012 – 2032

Figure 5: Estimates of Housing Demand By Current Commuting Patterns: 2012 – 2032

Source: GMU Center for Regional Analysis
III. What types of housing units will be needed?

The housing demand forecasts are divided into four housing types—single-family owner, single-family rental, multi-family owner, and multi-family renter. Single-family units include single-family detached homes and single-family attached homes/townhomes. Multi-family units include units in structures with more than one unit and include apartments, condominiums and cooperatives.

Table 4: Comparing Unit Types: Housing Need by Housing Type
Washington DC Metropolitan Area
By Work Location (a)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Total Units</th>
<th>Single-Family</th>
<th>Multi-Family</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Owner Renter</td>
<td>Owner Renter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Owner Renter</td>
<td>Owner Renter</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>105,240</td>
<td>27,023</td>
<td>10,989</td>
</tr>
<tr>
<td>Calvert</td>
<td>6,363</td>
<td>3,642</td>
<td>1,069</td>
</tr>
<tr>
<td>Charles</td>
<td>12,089</td>
<td>6,599</td>
<td>2,057</td>
</tr>
<tr>
<td>Frederick</td>
<td>22,527</td>
<td>12,430</td>
<td>3,664</td>
</tr>
<tr>
<td>Montgomery</td>
<td>83,829</td>
<td>41,032</td>
<td>10,284</td>
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<td>Prince George's</td>
<td>36,006</td>
<td>20,585</td>
<td>5,287</td>
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<tr>
<td>Suburban Maryland</td>
<td>160,815</td>
<td>84,288</td>
<td>22,360</td>
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<tr>
<td>Alexandria</td>
<td>13,058</td>
<td>3,173</td>
<td>1,271</td>
</tr>
<tr>
<td>Arlington</td>
<td>19,717</td>
<td>4,505</td>
<td>2,041</td>
</tr>
<tr>
<td>Clarke</td>
<td>476</td>
<td>310</td>
<td>66</td>
</tr>
<tr>
<td>Fairfax (b)</td>
<td>83,069</td>
<td>54,519</td>
<td>7,576</td>
</tr>
<tr>
<td>Fauquier</td>
<td>4,501</td>
<td>2,875</td>
<td>630</td>
</tr>
<tr>
<td>Loudoun</td>
<td>63,367</td>
<td>41,331</td>
<td>8,562</td>
</tr>
<tr>
<td>Prince William (c)</td>
<td>49,161</td>
<td>30,218</td>
<td>7,360</td>
</tr>
<tr>
<td>Spotsylvania (d)</td>
<td>24,986</td>
<td>12,698</td>
<td>4,760</td>
</tr>
<tr>
<td>Stafford</td>
<td>18,164</td>
<td>10,903</td>
<td>2,858</td>
</tr>
<tr>
<td>Warren</td>
<td>2,506</td>
<td>1,547</td>
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</tr>
<tr>
<td>Northern Virginia</td>
<td>279,004</td>
<td>162,079</td>
<td>35,496</td>
</tr>
<tr>
<td>Jefferson Co WV</td>
<td>3,239</td>
<td>1,878</td>
<td>512</td>
</tr>
<tr>
<td>Washington DC Metro Area</td>
<td>548,298</td>
<td>275,268</td>
<td>69,356</td>
</tr>
<tr>
<td></td>
<td></td>
<td>344,624</td>
<td>203,674</td>
</tr>
</tbody>
</table>

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.
(b) Includes the cities of Fairfax and Falls Church
(c) Includes the cities of Manassas and Manassas Park
(d) Includes the city of Fredericksburg

Source: GMU Center for Regional Analysis
Figure 3a. Comparing Unit Types: Existing and Needed

**Current Housing Stock**

- Multi-Family: 33.4%
- Single-Family Detached: 46.9%
- Single-Family Attached: 19.8%

**Housing Needed for Net New Workers**

By Work Location (a)

- Multi-Family: 37.1%
- Single-Family Detached: 40.9%
- Single-Family Attached: 22.0%

Source: 2009-2011 American Community Survey
Source: GMU Center for Regional Analysis

Figure 3b. Comparing Owner versus Rental Unit Types: Existing and Needed

**Current Housing Stock**

- Owner: 64.5%
- Renter: 35.5%

**Housing Needed for Net New Workers**

By Work Location (a)

- Owner: 56.2%
- Renter: 43.8%

Source: 2009-2011 American Community Survey
Source: GMU Center for Regional Analysis

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.
The demographic characteristics of new workers, the types of jobs they will hold and the locations of the forecasted units are used to determine the types of housing units that will be needed to accommodate net new workers to the Washington DC area. As shown in Table 4, the forecasts suggest a need for 344,624 single-family units and 203,674 multi-family units. Of the single-family units, the largest need is for owner-occupied units. Single-family owner housing is projected to be half (50.2 percent) of all housing demand, which is the highest of all housing types. The second largest need will be for multi-family rental units which accounts for 31.2 percent of all housing demand. Single-family renter units and multi-family owner units account for 12.6 percent and 6.0 percent, respectively, of the housing demand forecast.

The younger, more racially and ethnically diverse workforce, coupled with lower household incomes, leads to greater demand for multi-family housing, smaller housing and rental housing. As compared to the current housing stock, a larger share of the future units needed in the region will be multi-family units (Table 5 and Figure 3a). Over 37 percent of the housing that will be needed to accommodate future workers is forecasted to be in multi-family buildings, compared to 33.4 percent of the current housing stock. The analysis suggests that the future demand for multi-family units will be from renter households (84 percent), while only 16 percent of this demand will be from owner households.

There will be a decline in the demand for single-family homes over the forecast period. The forecasted share of single-family homes is 3.8 percentage points less than its current share of the building stock. However, while the demand for single-family detached homes declines fairly substantially over the next 20 years, there will be an increase in demand for single-family attached homes (townhomes, rowhouses, etc).

Table 5: Comparing Unit Types: Existing and Future Housing
Washington DC Metropolitan Area
By Work Location (a)

<table>
<thead>
<tr>
<th>Structure</th>
<th>Current Housing Stock</th>
<th>Housing Needed for Net New Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Family</td>
<td>66.6%</td>
<td>62.9%</td>
</tr>
<tr>
<td>Single-Family Detached</td>
<td>46.9%</td>
<td>40.9%</td>
</tr>
<tr>
<td>Single-Family Attached</td>
<td>19.8%</td>
<td>22.0%</td>
</tr>
<tr>
<td>Multi-Family</td>
<td>33.4%</td>
<td>37.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tenure</th>
<th>Current Housing Stock</th>
<th>Housing Needed for Net New Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>64.5%</td>
<td>56.2%</td>
</tr>
<tr>
<td>Renter</td>
<td>35.5%</td>
<td>43.8%</td>
</tr>
</tbody>
</table>

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.

Sources: 2009-2011 American Community Survey, and GMU Center for Regional Analysis
There will also be a downward shift in the homeownership rate among future workers of the Washington DC area. Currently, 64.5 percent of households in the Washington DC area are homeowners. Among future new workers, the projected homeownership rate is just 56.2 percent. During the forecast period, there will be increases in the demand for single-family rental housing, largely caused by the increase in demand for single-family attached homes. A larger share of single-family attached homes is projected to be rental units (30 percent) than their detached counterparts (15 percent). Combined with the increase in demand for multi-family rental units, the share of rental units is forecasted to be 43.8 percent, compared to 35.5 percent of the current housing stock (Figure 3b and Table 5).

During the next 20 years, the Washington DC area will need to produce an average of 27,415 new housing units annually. Over the 1990-2012 period, the region added an average of 28,242 housing units per year, which is consistent with the overall need suggested by the forecasts. However, the housing types and locations of the housing needed over the forecast period differs notably from what has been built in the past. Compared to residential construction over the past two decades, nearly all jurisdictions will need to produce more multi-family and fewer single-family units over the next 20 years. To house workers in the jurisdiction in which they work, relatively more housing will be needed in the closer-in jurisdictions of District of Columbia, Montgomery County, Arlington County and the City of Alexandria. Table 6 and Figures 4 and 5 detail these changes.

**Table 6: Comparing Unit Types: Housing Permits and Needed Washington DC Metropolitan Area**

By Work Location (a)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>1990-2012 Average Annual Housing Permits</th>
<th>2012-2032 Annual Average Units Needed</th>
<th>Number of Units Needed above/below 1990-2012 Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>District of Columbia</td>
<td>180 SF (b) 988 MF (c) 1,169 Total</td>
<td>1,901 SF 3,361 MF 5,262 Total</td>
<td>1,720 SF 2,373 MF 4,093 Total</td>
</tr>
<tr>
<td>Suburban Maryland</td>
<td>7,911 SF 2,041 MF 9,952 Total</td>
<td>5,332 SF 2,708 MF 8,041 Total</td>
<td>(2,578) SF 668 MF (1,911) Total</td>
</tr>
<tr>
<td>Northern Virginia</td>
<td>12,303 SF 4,416 MF 16,720 Total</td>
<td>9,879 SF 4,071 MF 13,950 Total</td>
<td>(2,425) SF (345) MF (2,769) Total</td>
</tr>
<tr>
<td>Washington DC Metro Area</td>
<td>20,769 SF 7,474 MF 28,242 Total</td>
<td>17,231 SF 10,184 MF 27,415 Total</td>
<td>(3,537) SF 2,710 MF (827) Total</td>
</tr>
</tbody>
</table>

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.
(b) Includes single-family detached units and the majority of single family attached units
(c) Includes structures with more than one unit

Source: GMU Center for Regional Analysis
Figure 4: Housing Permits and Housing Needed for Net New Workers:
District of Columbia, Montgomery County, Arlington County, and the City of Alexandria
4a: Single-Family Units
4b: Multi-Family Units

1990-2012 Annual Average: 3,606
2012-2032 Annual Needed: 6,076

Figure 5: Housing Permits and Housing Needed for Net New Workers:
Remainder of Washington DC Metropolitan Area
5a: Single-Family Units
5b: Multi-Family Units

1990-2012 Annual Average: 17,998
2012-2032 Annual Needed: 12,215

Sources: U.S. Census Bureau, and GMU Center for Regional Analysis
IV. What housing costs can future new workers afford?

Even with a sufficient supply of housing in optimal locations, new workers may locate outside of the region if housing costs are unaffordable. Or they may choose not to come to work in the region at all, opting for jobs in lower cost regions. The region’s housing must be priced so that it is affordable to new workers. The new workers coming to the Washington DC area will have a range of wages and, therefore, there will be a need for housing at a range of prices and rents. While the industries with relatively higher wages will have job growth, there will be substantial employment growth in lower-wage sectors. In addition to the shifting wage structure, a growing share of workers will live alone and will therefore have only one income. As a result, the Washington DC area will need a substantial amount of housing at relatively moderate prices and rents.

Professional, Scientific and Technical Services and Management will account for the largest share of net new job growth (46.9 percent) over the next 20 years. The median wage for this sector is $81,500, which is the second highest median wage. The sectors with the second and third highest net new job growth are the Administrative & Waste Services and Construction sectors. Together, they account for 27.3 percent of the future job growth, but currently account for only 10.5 percent of the jobs in the region. These sectors have the third and fourth lowest median wage, respectively. Table 7 shows net new job growth by sector and the median wage of the sector.

Table 7: Employment Forecasts by Sector: 2012-2032
Washington DC Metropolitan Area

<table>
<thead>
<tr>
<th>Sector</th>
<th>Net New Jobs</th>
<th>Median Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>857,334</td>
<td>$48,900</td>
</tr>
<tr>
<td>Construction, Natural Resources &amp; Mining</td>
<td>95,024</td>
<td>$36,700</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>(6,678)</td>
<td>$57,600</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>3,694</td>
<td>$43,900</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>4,324</td>
<td>$46,800</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>17,709</td>
<td>$22,500</td>
</tr>
<tr>
<td>Information</td>
<td>25,374</td>
<td>$67,200</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>7,071</td>
<td>$62,400</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>3,415</td>
<td>$49,300</td>
</tr>
<tr>
<td>Prof, scientific &amp; technical services; Mgt</td>
<td>401,804</td>
<td>$81,500</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>139,082</td>
<td>$29,500</td>
</tr>
<tr>
<td>Education</td>
<td>22,329</td>
<td>$45,700</td>
</tr>
<tr>
<td>Health Services</td>
<td>71,277</td>
<td>$39,500</td>
</tr>
<tr>
<td>Leisure &amp; Hospitality</td>
<td>45,926</td>
<td>$18,300</td>
</tr>
<tr>
<td>Other Services</td>
<td>10,599</td>
<td>$37,200</td>
</tr>
<tr>
<td>Government</td>
<td>11,414</td>
<td>$83,800</td>
</tr>
<tr>
<td>Military</td>
<td>4,969</td>
<td>$69,200</td>
</tr>
</tbody>
</table>

Sources: IHS Global Insight, 2009-2011 American Community Survey, and GMU Center for Regional Analysis
The median wages by sector and by work jurisdiction are combined with assumptions about the average number of workers per household for different household types to calculate household incomes. Affordable rents and homes prices are then based on household incomes. The maximum affordable home price is assumed to be no more than four times the annual household income. The maximum monthly rent that is affordable to a household depends on household income, and is assumed to be no more than 30 percent of the monthly household income (Table 8).

### Table 8: Household Income and Maximum Home Prices and Monthly Rents

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Home Price</th>
<th>Monthly Rent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $50,000</td>
<td>Less than $200,000</td>
<td>Less than $1,250</td>
</tr>
<tr>
<td>$50,000-$74,999</td>
<td>$200,000-$299,999</td>
<td>$1,250-$1,314</td>
</tr>
<tr>
<td>$75,000-$99,999</td>
<td>$300,000-$399,999</td>
<td>$1,315-$1,749</td>
</tr>
<tr>
<td>$100,000-$124,999</td>
<td>$400,000-$499,999</td>
<td>$1,750-$1,874</td>
</tr>
<tr>
<td>$125,000-$149,999</td>
<td>$500,000-$599,999</td>
<td>$1,875-$2,249</td>
</tr>
<tr>
<td>$150,000 or more</td>
<td>$600,000 or more</td>
<td>$2,250 or more</td>
</tr>
</tbody>
</table>

Source: GMU Center for Regional

About 16 percent of the owner-occupied homes that will be needed to house new workers will need to be priced below $200,000 (Figure 6a and Table 9). An additional 16.9 percent of new owner households will be able to afford homes priced between $200,000 and $299,999. Only 13.5 percent of new owners in the region will be able to afford a home priced at $600,000 or more given then wages and household demographics of new workers. By contrast, 19.1 percent of 2013 home sales were for houses that sold for $600,000 or more.²

There will be a substantial need for moderately priced rental units to accommodate the region’s future workforce. Among new renter households, 44.1 percent will be able to afford a maximum monthly rent of $1,250 (Figure 6b and Table 10). Another 21.2 percent will be able to afford a unit renting for between $1,250 and $1,314. Only 2.4 percent of renter households will have a household income sufficient to afford to rent a unit for $2,250 or more. By contrast, 11.2 percent of current renters are paying $2,250 or more, and a significant share of new rental construction targets this upper income group.

The demand for moderately priced owner and rental units does not mean that all of these more affordable units will be new construction. In some local markets, it would be very difficult to build new units at these lower price and rent levels without significant subsidy. Therefore, these forecasts suggest that a large share of the lower cost housing that will be needed in the future will have to come through preservation of existing affordable housing.

² Source: MRIS, January through October 2013 Sales
Figure 6a. Comparing Home Prices: Existing and Needed
Current Housing Stock

Figure 6b. Comparing Rent: Existing and Needed
Current Housing Stock

Housing Needed for Net New Workers
By Work Location (a)

Source: GMU Center for Regional Analysis

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.
Table 9: Estimates of Housing Demand: 2012-2032  
Owner-Occupied Units  
Washington DC Metropolitan Area  
By Work Location (a)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Total Owner-Occupied Units</th>
<th>Home Price (2011 $)</th>
<th>Less than $200,000</th>
<th>$200,000-399,999</th>
<th>$400,000-599,999</th>
<th>$600,000 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>District of Columbia</td>
<td>38,575</td>
<td></td>
<td>5,575</td>
<td>17,769</td>
<td>12,006</td>
<td>3,225</td>
</tr>
<tr>
<td>Calvert</td>
<td>3,761</td>
<td></td>
<td>958</td>
<td>1,460</td>
<td>1,059</td>
<td>285</td>
</tr>
<tr>
<td>Charles</td>
<td>6,848</td>
<td></td>
<td>2,011</td>
<td>2,751</td>
<td>1,389</td>
<td>697</td>
</tr>
<tr>
<td>Frederick</td>
<td>12,927</td>
<td></td>
<td>3,458</td>
<td>6,974</td>
<td>1,986</td>
<td>510</td>
</tr>
<tr>
<td>Montgomery</td>
<td>46,763</td>
<td></td>
<td>9,022</td>
<td>16,699</td>
<td>15,530</td>
<td>5,511</td>
</tr>
<tr>
<td>Prince George’s</td>
<td>21,490</td>
<td></td>
<td>4,765</td>
<td>8,844</td>
<td>4,663</td>
<td>3,219</td>
</tr>
<tr>
<td>Suburban Maryland</td>
<td>91,790</td>
<td></td>
<td>20,214</td>
<td>36,727</td>
<td>24,627</td>
<td>10,223</td>
</tr>
<tr>
<td>Alexandria</td>
<td>4,904</td>
<td></td>
<td>383</td>
<td>2,069</td>
<td>2,014</td>
<td>438</td>
</tr>
<tr>
<td>Arlington</td>
<td>6,985</td>
<td></td>
<td>463</td>
<td>2,959</td>
<td>4,297</td>
<td>(734)</td>
</tr>
<tr>
<td>Clarke</td>
<td>319</td>
<td></td>
<td>31</td>
<td>143</td>
<td>118</td>
<td>28</td>
</tr>
<tr>
<td>Fairfax (b)</td>
<td>60,495</td>
<td></td>
<td>2,227</td>
<td>16,967</td>
<td>23,983</td>
<td>17,317</td>
</tr>
<tr>
<td>Fauquier</td>
<td>2,970</td>
<td></td>
<td>464</td>
<td>1,157</td>
<td>1,098</td>
<td>251</td>
</tr>
<tr>
<td>Loudoun</td>
<td>42,648</td>
<td></td>
<td>6,309</td>
<td>15,232</td>
<td>16,970</td>
<td>4,137</td>
</tr>
<tr>
<td>Prince William (c)</td>
<td>31,263</td>
<td></td>
<td>6,567</td>
<td>8,464</td>
<td>11,544</td>
<td>4,687</td>
</tr>
<tr>
<td>Spotsylvania (d)</td>
<td>13,165</td>
<td></td>
<td>4,768</td>
<td>6,360</td>
<td>1,613</td>
<td>425</td>
</tr>
<tr>
<td>Stafford</td>
<td>11,250</td>
<td></td>
<td>2,688</td>
<td>3,433</td>
<td>3,943</td>
<td>1,186</td>
</tr>
<tr>
<td>Warren</td>
<td>1,598</td>
<td></td>
<td>267</td>
<td>689</td>
<td>517</td>
<td>125</td>
</tr>
<tr>
<td>Northern Virginia</td>
<td>175,598</td>
<td></td>
<td>24,167</td>
<td>57,473</td>
<td>66,097</td>
<td>27,861</td>
</tr>
<tr>
<td>Jefferson Co WV</td>
<td>1,948</td>
<td></td>
<td>460</td>
<td>903</td>
<td>465</td>
<td>120</td>
</tr>
<tr>
<td>Washington DC Metro Area</td>
<td>307,911</td>
<td></td>
<td>50,417</td>
<td>112,872</td>
<td>103,194</td>
<td>41,429</td>
</tr>
</tbody>
</table>

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.  
(b) Includes the cities of Fairfax and Falls Church  
(c) Includes the cities of Manassas and Manassas Park  
(d) Includes the city of Fredericksburg  

Source: GMU Center for Regional Analysis
### Table 10: Estimates of Housing Demand: 2012-2032

#### Renter-Occupied Units

**Washington DC Metropolitan Area**

By Work Location (a)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Total Renter-Occupied Units</th>
<th>Monthly Rent (2011 $)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Less than $1,250</td>
<td>$1,250 - 1,749</td>
<td>$1,750 - 2,249</td>
<td>$2,250 or More</td>
<td></td>
</tr>
<tr>
<td>District of Columbia</td>
<td>66,665</td>
<td>28,946</td>
<td>25,314</td>
<td>10,481</td>
<td>1,924</td>
<td></td>
</tr>
<tr>
<td>Calvert</td>
<td>2,602</td>
<td>1,459</td>
<td>958</td>
<td>166</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Charles</td>
<td>5,241</td>
<td>3,354</td>
<td>1,609</td>
<td>231</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>Frederick</td>
<td>9,599</td>
<td>5,296</td>
<td>3,931</td>
<td>315</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Montgomery</td>
<td>37,066</td>
<td>17,139</td>
<td>13,580</td>
<td>5,798</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>Prince George's</td>
<td>14,516</td>
<td>8,000</td>
<td>5,366</td>
<td>889</td>
<td>262</td>
<td></td>
</tr>
<tr>
<td><strong>Suburban Maryland</strong></td>
<td><strong>69,025</strong></td>
<td><strong>35,248</strong></td>
<td><strong>25,444</strong></td>
<td><strong>7,399</strong></td>
<td><strong>933</strong></td>
<td></td>
</tr>
<tr>
<td>Alexandria</td>
<td>8,154</td>
<td>2,247</td>
<td>3,751</td>
<td>1,938</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>Arlington</td>
<td>12,731</td>
<td>2,303</td>
<td>6,042</td>
<td>4,368</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Clarke</td>
<td>156</td>
<td>49</td>
<td>90</td>
<td>16</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Fairfax (b)</td>
<td>22,574</td>
<td>3,848</td>
<td>11,592</td>
<td>5,315</td>
<td>1,820</td>
<td></td>
</tr>
<tr>
<td>Fauquier</td>
<td>1,531</td>
<td>710</td>
<td>652</td>
<td>150</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Loudoun</td>
<td>20,719</td>
<td>9,613</td>
<td>8,551</td>
<td>2,239</td>
<td>317</td>
<td></td>
</tr>
<tr>
<td>Prince William (c)</td>
<td>17,898</td>
<td>10,071</td>
<td>5,279</td>
<td>2,210</td>
<td>339</td>
<td></td>
</tr>
<tr>
<td>Spotsylvania (d)</td>
<td>11,821</td>
<td>7,633</td>
<td>3,804</td>
<td>336</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Stafford</td>
<td>6,913</td>
<td>4,252</td>
<td>2,012</td>
<td>575</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>Warren</td>
<td>908</td>
<td>415</td>
<td>413</td>
<td>71</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><strong>Northern Virginia</strong></td>
<td><strong>103,407</strong></td>
<td><strong>41,140</strong></td>
<td><strong>42,186</strong></td>
<td><strong>17,217</strong></td>
<td><strong>2,864</strong></td>
<td></td>
</tr>
<tr>
<td>Jefferson Co WV</td>
<td>1,291</td>
<td>710</td>
<td>501</td>
<td>69</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td><strong>Washington DC Metro Area</strong></td>
<td><strong>240,387</strong></td>
<td><strong>106,044</strong></td>
<td><strong>93,444</strong></td>
<td><strong>35,166</strong></td>
<td><strong>5,733</strong></td>
<td></td>
</tr>
</tbody>
</table>

(a) The estimates by work location assume all new workers are housed in the jurisdiction in which they work and jurisdiction-to-jurisdiction commuting levels will not increase from present volumes.

(b) Includes the cities of Fairfax and Falls Church

(c) Includes the cities of Manassas and Manassas Park

(d) Includes the city of Fredericksburg

Source: GMU Center for Regional Analysis
Policy Implications

Housing Should be Part of a Regional Economic Development Strategy

A sufficient supply of housing is essential to ensuring that the Washington DC area is able to achieve its full economic potential. New jobs cannot be filled without workers available to fill them. And while some workers may be willing to commute long distances or from outside the region, the wage of the job must be high enough to justify the commute and the transportation infrastructure must have the capacity for these workers. Many workers, however, will look elsewhere for jobs if they cannot find appropriate and affordable housing close to work.

A strategy to supply sufficient housing for the future workforce is a key component of an overall regional economic development strategy. Regions that have adequate housing to accommodate future workers will have a competitive advantage over other places. Regions with housing close to employment centers also benefit by not having to supply extension additional transportation services and can benefit from additional worker spending in the region.

For the Washington DC area to realize its economic development potential, all jurisdictions need to have a housing policy that reflects their specific housing requirements to accommodate future economic growth and the workforce housing demands that this desired growth implies.

Housing is where the workforce lives. It is where workers spend a large share of their incomes and where they pay their taxes. Recognizing this critical link between housing and regional economic growth is critical to the future vitality of the Washington DC area economy. The Washington DC area cannot achieve its projected growth potential without new workers. And this workforce will not be available to the region’s future businesses in the absence of sufficient housing, located to minimize commuting, and priced at levels affordable to new workers. As the structure of the Washington DC area economy evolves and becomes less dependent on the Federal government, it is important for the region to find ways to be as competitive as possible. Without meeting the projected future demand for housing, the Washington DC area will lose position to other metropolitan area economies that have now rebounded from the economic downturn and have achieved a better balance between housing and their future workforce requirements.

Housing Needed for Net New Workers is Just Part of the Total Future Need

These housing demand forecasts are not comprehensive; they include estimates only of the housing that will be needed to accommodate the region’s net new workers. The forecasts do not include the housing that will be demanded by the replacement workers in the region over the next 20 years, which is estimated to be 40 percent more than the number of net new workers. Some replacement jobs will result from current workers leaving the region, which will therefore free up a housing unit for another worker. However, a substantial share of the region’s replacement workers will need additional housing that is not accounted for in these forecasts. This is particularly true for workers backfilling jobs vacated by retirees. Between 50 and 60 percent of retirees stay in the region in which they were working; while
they may move to a different type of house within the region, they will not make a housing unit available to the workers who move to the region to fill their jobs.

There are additional housing needs in the region for non-working households, including retirees, students, volunteers and interns, which are also not included in these forecasts. Lastly, there will need to be an additional number of vacant housing units to allow for current and future households to move as their needs change. For the 548,298 new units needed to accommodate the net new workers alone, it is estimated that an additional 14,000 units will be needed for this frictional vacancy.

**Multi-family Housing, Rental Housing and More Affordable Housing Will Be in Demand**

These forecasts suggest that the housing that will be needed for the future workforce will include more multi-family units (including rental and condominium), and will need to include a substantial share of units at moderate prices and rents, compared to the existing housing stock. The reasons for the shift towards smaller, less expensive and rental housing relates to the changing demographics of the labor force and the distribution of wages of new jobs as the region’s economy evolves. The workers coming into the region over the next 20 years will be younger than the existing workforce, and they will be more likely to live in one-person households. Furthermore, they will be more likely to work in somewhat lower-wage jobs than current workers.

There has been a surge in multi-family construction in the region over the last few years. However, much of this new rental construction targets the highest end of the market. Housing that is affordable to lower-income working households is very difficult to build in many places in the Washington DC area without significant subsidies or incentives. Local commitment of dedicated funding for affordable housing can help facilitate the development of lower cost housing. However, much of the more affordable housing that will be demanded by new workers is existing, rather than new, housing. Therefore, it is essential that there is an inventory of market rate and subsidized affordable housing units in the region, and that efforts are made to preserve existing lower priced housing, particularly in the fastest-growing and in-demand locations.

**Without Sufficient Housing, Traffic Congestion and Quality of Life Worsen**

A lack of sufficient housing within the Washington DC area and located in proximity to the region’s employment centers and to transit will lead to increased traffic and transit congestion, and will result in longer commutes, lower worker productivity, and declining quality of life for all residents of the region. Increased funding for transportation expansions and improvements beyond those that have been planned currently is unlikely. Therefore, the ability to build out of the region’s traffic problems is untenable. Allowing land use and zoning changes that permit the construction of more housing near jobs, which will require less commuting, is a critical implication of these housing demand forecasts.

The lack of housing, increasing traffic congestion and declining quality of life will make it more difficult for businesses to recruit workers and will make it less attractive for new firms to locate in the region. Other parts of the country have achieved a better balance between their housing supply and economic growth. Workers may choose to leave the Washington DC area for places with more affordable housing.
closer to jobs and with shorter, less stressful commutes. The pull of the Federal government is lessening. And while the Washington DC area has many amenities that will continue to be attractive to workers and businesses, there are many other choices as both firms and labor are increasingly footloose.
Appendix
Methodology

The housing demand forecasts generated by the Center for Regional Analysis are employment driven forecasts of the need for housing. This is the second housing demand analysis that the Center has produced for the Washington DC area. In addition to updated employment forecasts, the methodology was updated as well to take advantage of more current data and more appropriate assumptions. Because of the methodology changes, making a direct comparison with the 2011 report is not always possible.

Like the 2011 analysis, these forecasts link regional economic employment growth with the availability, location and price of housing. Housing forecasts were generated for 17 jurisdictions or groups of jurisdictions that comprise the Washington DC Metropolitan Statistical Area\(^3\). These housing forecasts were based on forecasts of job growth by industry sector for each jurisdiction and included an assessment of the amount and type of housing that would be needed to house each jurisdiction’s new workers.

Figure A1. Methodology for Forecasting Housing Needs

\(^3\) There are 22 counties and cities in the Washington DC Metropolitan Statistical Area. For this research, several independent cities in Virginia were combined with their surrounding county. The cities of Fairfax and Falls Church are included in the Fairfax County forecasts. The cities of Manassas and Manassas Park are included in the Prince William County forecasts. The city of Fredericksburg is included in the Spotsylvania County forecasts.
The Center conducted a six-step model for generating housing demand forecasts (see Figure A1). Each step in the process was important for modeling not simply the overall demand for housing, but also the need for housing in different jurisdictions, of different types, and at different price/rent points. The characteristics of the housing units needed for the region’s future workers depend on the age, household composition, and household income of new workers, which are all factors included in the analysis. This section briefly outlines the methodology and data used to derive the forecasts.

1. Determine job growth by industry

It is important to understand the types of jobs coming to the region so we can develop estimates of worker age and household income, which will determine household composition, housing types and affordability levels. IHS Global Insight provides annual job forecasts for each of the region’s jurisdictions. These employment forecasts are based on a county-level econometric model that Global Insight updates regularly. The forecasts include payroll jobs only, excluding unincorporated self-employed persons. Therefore, the Global Insight figures undercount the total employment activity in the region.

The Global Insight forecasts include 13 major industry sectors. In some cases, we split the Global Insight sectors into subsectors if the workers in different subsectors were likely to have different wages. We split the Global Insight transportation, trade and utilities sector into transportation and utilities, wholesale trade and retail trade. We divided the education and health services sector into two sectors. We split the financial services sector into finance and insurance and real estate. Finally, we split the professional and business services sector into professional and technical services/management and administrative/waste services. Sub-regional⁴ employment data from the U.S. Bureaus of Labor Statistics was used to divide the sectors. Tables A1-1 through A1-17 summarize the employment change by sector for each jurisdiction.

2. Assign net new jobs to workers by age category

Understanding the age distribution by sector of the region’s future workforce is important for estimating housing demand, since the demand for different types of housing is strongly associated with individuals’ ages. The first step in moving from jobs to housing demand is to estimate the age distribution of the net new workers. For each jurisdiction and job sector, we assigned some share of the net new workers in each sector to one of three age groups: under 30, 30-44 or 45-64. We assumed no net new workers are aged 65 or older.

New workers will be somewhat younger than the existing workforce. We analyzed data from the 2009-2011 American Community Survey (3-year microdata sample) to estimate the age distribution of current

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⁴ The divisions consist of Washington, DC; the entirety of Northern Virginia; Montgomery and Frederick counties combined; and Prince George’s, Calvert and Charles counties combined.
workers for each industry sector. This analysis was done separately for each jurisdiction or combination of jurisdictions if the county/city was too small.\footnote{The ACS data can be analyzed by public use microdata area (PUMA). Each PUMA contains at least 100,000 people, based on the 2000 Census. For the analysis of the 2009-2011 ACS data, the cities of Fairfax and Falls Church and Fairfax County are combined. The cities of Manassas and Manassas Park, and Prince William County are combined. The city of Fredericksburg is and Spotsylvania County are combined. Loudoun, Clarke, Warren and Fauquier are combined and the ratios are used for Jefferson, WV.}

We then adjusted the age distribution to account for the fact that net new workers would be younger by analyzing 2009-2011 ACS data on the age distribution of workers\footnote{For calculations using ACS data, a worker is defined as anyone in the labor force.} who had recently moved in the Washington DC area. Through this analysis, we found that recent movers were more likely to be 18-29 or 30-44 than existing workers. Recent movers were less likely to be 45-64. Tables A2-1 through A2-17 summarize the age distribution of the net new workers by sector for each jurisdiction.

3. Assign net new workers to a household type and sector

This process of assigning workers to households consisted of two steps: i) determining the type of household to which a worker is most likely to belong based on age and job sector, and then ii) calculating the average number of workers within each household type to determine the number of net new households.

i) Determine the household type

Age is an important determinant of housing demand largely because of the household composition implied by the ages of the individuals in the households. For example, workers under age 30 are more likely to live in one-person households or two adult-no children households and workers age 30 to 44 are more likely to live in households with children.

We assigned each net new worker in each sector to one of 11 household types based on the age group to which they were assigned in the previous analytic step. The 11 household types are listed below.

<table>
<thead>
<tr>
<th>Household Size</th>
<th>Household Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-person households</td>
<td>1 adult</td>
</tr>
<tr>
<td>2-person households</td>
<td>1 adult, 1 child</td>
</tr>
<tr>
<td></td>
<td>2 adults</td>
</tr>
<tr>
<td>3-person households</td>
<td>1 adult, 2 child</td>
</tr>
<tr>
<td></td>
<td>2 adults, 1 child</td>
</tr>
<tr>
<td></td>
<td>3 adults</td>
</tr>
<tr>
<td>4+ person households</td>
<td>1 adult, 3+ children</td>
</tr>
<tr>
<td></td>
<td>2 adults, 2+ children</td>
</tr>
<tr>
<td></td>
<td>3 adults, 1+ children</td>
</tr>
<tr>
<td></td>
<td>4+ adults, 1+ children</td>
</tr>
<tr>
<td></td>
<td>4+ adults</td>
</tr>
</tbody>
</table>
We used the 2009-2011 ACS 3-year data and analyzed the current distribution of household types for each age group and for each jurisdiction. Thus, for each jurisdiction, we assessed the percent of workers under 30 who live in one-adult households, the percent who live in one-adult, one-child households and so on. From step 2 above, we know how many workers in each sector are in each age group (under 30, 30-44, and 45-64) for each jurisdiction. We used the distribution of household types by age from the 2009-2011 ACS to assign workers in each sector and age group to a household type. Tables A3-1 through A3-17 summarize the distribution of household types by age group for each sector.

ii) Calculate the average number of workers per household

We then used the 2009-2011 ACS 3-year data to calculate the average number of workers in each household. Because this forecast is for net new workers only, this average includes only households with a worker.

The average number of workers in each of the 11 household types is used to convert workers into households. This was calculated by dividing the total number of workers assigned to each household type by the average number of workers in each household type. (See Figure A2 for example.) This step assumes that workers who live in the same household also work in the same sector and jurisdiction. Tables A3-1 through A3-17 summarize the average workers per household by household type for each jurisdiction.

**Figure A2. Example of Assigning Workers to Household Types**

Assume there were 1,000 net new workers in the construction sector in Fairfax County who were between the ages of 30 and 44. From the 2009-2011 ACS we have the household type distribution for people age 30 to 44 in Fairfax County, as show in the second column of the table below. We use that distribution to assign the 1,000 net new construction workers to a household type, as shown in the fourth column of the table below. We repeat this process for all age groups and all sectors in each jurisdiction.

<table>
<thead>
<tr>
<th>Household Type</th>
<th>% of all 30-44 year olds in Fairfax County</th>
<th>Average No. of Workers</th>
<th>No. of Net New Construction Workers Age 30-44</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 adult</td>
<td>11%</td>
<td>1.00</td>
<td>110</td>
</tr>
<tr>
<td>1 adult, 1 child</td>
<td>2%</td>
<td>1.00</td>
<td>20</td>
</tr>
<tr>
<td>2 adults</td>
<td>16%</td>
<td>1.41</td>
<td>160</td>
</tr>
<tr>
<td>1 adult, 2 child</td>
<td>1%</td>
<td>1.00</td>
<td>10</td>
</tr>
<tr>
<td>2 adults, 1 child</td>
<td>15%</td>
<td>1.66</td>
<td>150</td>
</tr>
<tr>
<td>3 adults</td>
<td>4%</td>
<td>2.33</td>
<td>40</td>
</tr>
<tr>
<td>1 adult, 3+ children</td>
<td>1%</td>
<td>1.00</td>
<td>10</td>
</tr>
<tr>
<td>2 adults, 2+ children</td>
<td>30%</td>
<td>1.56</td>
<td>300</td>
</tr>
<tr>
<td>3 adults, 1+ children</td>
<td>9%</td>
<td>2.38</td>
<td>30</td>
</tr>
<tr>
<td>4+ adults, 1+ children</td>
<td>8%</td>
<td>3.57</td>
<td>22</td>
</tr>
<tr>
<td>4+ adults</td>
<td>3%</td>
<td>3.59</td>
<td>30</td>
</tr>
</tbody>
</table>

Then, we combine workers into households. For example, the 110 workers in the first row of the table above form 110 households, but the 160 workers in the third row form 113 households (160 workers / 1.41 workers per household).
4. Calculate household income in net new households

Housing demand is driven by housing preferences, which are associated with age and household composition, but demand is also necessarily related to household income. We calculated median household incomes for all 11 household types and all industry sectors. Then, we tabulate the total number of households in each of six income categories: less than $50,000; $50,000 – 74,999; $75,000 – 99,999; $100,000 - 124,999; $125,000 – 149,999; and $150,000 and greater.

We used the 2009-2011 ACS 3-year data to calculate the median wages by industry for each jurisdiction. Tables A4-1 through A4-17 summarize the median wages by sector for each jurisdiction. Using the median wage by industry and the average number of workers per household (assuming both are in the same industry), we calculate the household income for each household type and sector for each jurisdiction. We then sum up—across sectors—the number of households in each of the six income categories for each of the ten household types. Thus, we have a count of the numbers of 1 adult households in each income group, the numbers of 1 adult, 1 child households in each income group, and so on.

5. Assign each household a unit type by income group

After step 4, we have a count of the number of households by household type and household income that are associated with net new job growth. Household type and household income are both associated with the type of housing demand. Therefore, we use these counts to estimate the need for four different types of housing units in six rent/price categories. The four housing unit types are: single-family (included single-family detached and townhouse/single-family attached) owner and renter, and multi-family owner and renter. The six rent/price categories are associated with the six income groups and represent the maximum rent or home price affordable to households in each income group.

We used the 2009-2011 ACS 3-year data to run crosstabulations of housing type (i.e. four types) by household composition (i.e. 11 household types) for each of the six income groups. The results of this analysis show the current distribution of housing types for different household types and household incomes.

We ran this analysis for the following jurisdictions: Washington, DC, for Arlington and Alexandria combined, for Fairfax and Montgomery combined, and for Prince William, Loudoun, Spotsylvania, Prince George’s and Frederick combined. We did not run the analysis for all jurisdictions because the sample sizes were too small.

We then applied these distributions to the projected households for each jurisdiction to estimate the need for housing by unit type and rent/price. This step assumes that housing preferences do not change in the future.

We made assumptions about the affordable price and rent levels for households in each income group. The maximum affordable rent was set as a percentage of household income. We assumed that rents
would not exceed 30% of renters’ income with incomes below $50,000; 21% of income for renters with
incomes between $50,000 and 99,999; and 18% of income for renters with incomes about $100,000.

These rent percentages are based standard definitions of housing burden for the lowest income group
and on an analysis of rents as a percentage of household income in the 2009-2011 ACS for the other
income groups, knowing that higher income renters tend to spend a lower percentage of their income
on rent than do lower income renters. The housing price for homeowners was set at four times
household income. Table A5 summarizes the maximum home prices and rents for each income group.

Table A5. Home Value and Monthly Rental Price

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Home Value</th>
<th>Rental Price (Monthly)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$50K</td>
<td>Less than $199,999</td>
<td>Less than $1,250</td>
</tr>
<tr>
<td>$50-74K</td>
<td>$200,000-299,999</td>
<td>$1,250-1,314</td>
</tr>
<tr>
<td>$75-99K</td>
<td>$300,000-399,999</td>
<td>$1,315-1,749</td>
</tr>
<tr>
<td>$100-124K</td>
<td>$400,000-499,999</td>
<td>$1,750-1,874</td>
</tr>
<tr>
<td>$125-149K</td>
<td>$500,000-599,999</td>
<td>$1,875-2,249</td>
</tr>
<tr>
<td>$150K+</td>
<td>$600,000+</td>
<td>$2,250+</td>
</tr>
</tbody>
</table>

6. Develop jurisdiction-level estimates based on in-commuting assumptions

After step 6, we have a count of the number of new housing units needed by type and price needed to
accommodate all new workers in a jurisdiction. These estimates are “By Work Location” and are roughly
comparable to the “High” forecasts in the 2011 report. These forecasts assume that all new workers
over the next 20 years will live in the jurisdiction in which they work.

We generated another set of forecasts that assumed that the new jobs in each jurisdiction had the same
in-commuting rate associated with existing jobs. For example, 54 percent of Fairfax County jobs are held
by people who live in Fairfax. For the set of forecasts based on commuting patterns, we assumed that 54
percent of Fairfax’s new workers would be housed in Fairfax. We made this assumption for all the
jurisdictions, given their individual current in-commuting rates. These units are referred to the “Non-
Commuters” and are most comparable to the “Low” Estimates in the 2011 report.

However, to maintain the regional commuting rates, the inter-jurisdictional commuters are added to
these forecasts. Even though only 54 percent of jobs in Fairfax County are held by Fairfax residents, 95
percent are held by those who reside anywhere within the region. This means that 41 percent of Fairfax
jobs are held by those who reside outside of Fairfax, but within the region. Table A6 summarizes the in-
commuting rates for each jurisdiction.
Study Limitations

The demand for housing depends on many factors. Modeling this housing demand necessarily involves making several simplifying assumptions. Some of the complexity of housing need will be excluded from the analysis and some of the limitations of the research are described briefly in this section.

The housing demand forecasts exclude the housing needed to accommodate replacement workers, as well as other non-paid working households. This analysis excludes the housing needs for replacement workers resulting from the aging of the current workforce ages and retirement. Some retiring workers will leave the region, thus freeing up housing units for new or replacement workers. However, many of the retiring workers will stay in the region. As a result, the housing demand forecasts presented in this report understate the actual need for housing over the next 20 years.

It is assumed that there are no major shifts in the housing unit preferences of future cohorts or in the direction of Federal policies related to homeownership. These forecasts are based on data on the housing characteristics of current residents by age group, household composition and household income in order to make estimates of future housing needs. This method assumes that there are no major changes in the housing unit preferences of future cohorts.

In addition, this research makes no assumptions about the direction of Federal policies related to homeownership which might make owning relatively less attractive or feasible over time. If there are major changes to the federal mortgage interest deduction or to regulation related to down payment and other requirements for securing a home mortgage, then homeownership may be less desirable or less achievable for future workers. Thus, there could be a shift to a need for even more rental housing in the region.

It is assumed that workers’ housing location choices are related solely to their place of work. The forecasts by work location were generated to keep current jurisdiction-to-jurisdiction commuting levels constant over the next 20 years. The means to achieving this goal is to place all workers’ homes in the jurisdictions in which they work. This is an oversimplification of the decisions people make about where to live. Many households with multiple workers have work places in different jurisdictions. Workers have become increasingly more mobile with respect to work, changing jobs more frequently than in the past. And while telecommuting is still a small part of the labor force, with a very small share of workers regularly working from home, some workers are not tied to a physical workplace. These housing demand forecasts are not meant to suggest that people should live in the same jurisdiction in which they work. Rather, these forecasts provide guidance for the amount of housing that would be required so that workers have the options for affordable housing closer to where they work. The overall quantity of housing needed could be redistributed somewhat throughout the region given other factors that influence housing choice.
### Table A1. Job Change by Sector: 2012 - 2032

#### Table A1-1. District of Columbia

<table>
<thead>
<tr>
<th>Sector</th>
<th>2012</th>
<th>2022</th>
<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>749,213</td>
<td>818,225</td>
<td>897,719</td>
<td>69,013</td>
<td>79,494</td>
</tr>
<tr>
<td>Construction, Natural Resources and Mining</td>
<td>13,483</td>
<td>19,451</td>
<td>23,771</td>
<td>5,968</td>
<td>4,319</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>975</td>
<td>901</td>
<td>797</td>
<td>(74)</td>
<td>(103)</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>4,096</td>
<td>4,358</td>
<td>4,514</td>
<td>262</td>
<td>156</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>4,996</td>
<td>5,315</td>
<td>5,505</td>
<td>319</td>
<td>190</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>18,683</td>
<td>19,877</td>
<td>20,589</td>
<td>1,194</td>
<td>712</td>
</tr>
<tr>
<td>Information</td>
<td>17,267</td>
<td>19,450</td>
<td>22,488</td>
<td>110</td>
<td>806</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>11,157</td>
<td>11,230</td>
<td>11,760</td>
<td>73</td>
<td>531</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>107,947</td>
<td>146,836</td>
<td>191,506</td>
<td>38,888</td>
<td>44,670</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>45,136</td>
<td>61,397</td>
<td>80,075</td>
<td>16,260</td>
<td>18,678</td>
</tr>
<tr>
<td>Education</td>
<td>50,811</td>
<td>55,547</td>
<td>58,234</td>
<td>4,736</td>
<td>2,688</td>
</tr>
<tr>
<td>Health Services</td>
<td>63,789</td>
<td>69,734</td>
<td>73,108</td>
<td>5,945</td>
<td>3,374</td>
</tr>
<tr>
<td>Leisure &amp; Hospitality</td>
<td>65,325</td>
<td>71,687</td>
<td>73,348</td>
<td>6,362</td>
<td>1,661</td>
</tr>
<tr>
<td>Other Services</td>
<td>68,100</td>
<td>68,973</td>
<td>69,501</td>
<td>873</td>
<td>528</td>
</tr>
<tr>
<td>Government</td>
<td>242,567</td>
<td>227,294</td>
<td>224,222</td>
<td>(15,273)</td>
<td>(3,072)</td>
</tr>
<tr>
<td>Military</td>
<td>17,946</td>
<td>19,131</td>
<td>20,449</td>
<td>1,186</td>
<td>1,318</td>
</tr>
</tbody>
</table>

Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

#### Table A1-2. Calvert County, Maryland

<table>
<thead>
<tr>
<th>Sector</th>
<th>2012</th>
<th>2022</th>
<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
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<td>Finance &amp; Insurance</td>
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<td>364</td>
<td>408</td>
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<td>44</td>
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<td>1,675</td>
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<td>411</td>
<td>483</td>
<td>59</td>
<td>73</td>
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<td>563</td>
<td>695</td>
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<td>4,264</td>
<td>645</td>
<td>547</td>
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<td>1,286</td>
<td>101</td>
<td>192</td>
</tr>
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<td>5,306</td>
<td>6,293</td>
<td>817</td>
<td>987</td>
</tr>
<tr>
<td>Military</td>
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<td>349</td>
<td>355</td>
<td>20</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
### Table A1-3. Charles County, Maryland

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<th>Change 2022-2032</th>
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<td>9,547</td>
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<td>6,265</td>
<td>1,669</td>
<td>1,204</td>
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<td>659</td>
<td>741</td>
<td>772</td>
<td>83</td>
<td>31</td>
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<td>277</td>
<td>229</td>
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<td>1,934</td>
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<td>227</td>
<td>188</td>
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<td>8,447</td>
<td>9,266</td>
<td>993</td>
<td>819</td>
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<td>Information</td>
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<td>508</td>
<td>661</td>
<td>154</td>
<td>153</td>
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<td>672</td>
<td>753</td>
<td>59</td>
<td>81</td>
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<td>691</td>
<td>54</td>
<td>75</td>
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<td>2,816</td>
<td>526</td>
<td>885</td>
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<td>598</td>
<td>710</td>
<td>103</td>
<td>112</td>
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<td>5,729</td>
<td>6,806</td>
<td>990</td>
<td>1,076</td>
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<td>1,210</td>
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<td>277</td>
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<td>1,188</td>
<td>66</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

### Table A1-4. Frederick County, Maryland

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<th>Change 2022-2032</th>
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<td>117,376</td>
<td>134,727</td>
<td>18,669</td>
<td>17,351</td>
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<td>11,576</td>
<td>3,064</td>
<td>(19)</td>
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<td>4,594</td>
<td>4,206</td>
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<td>(388)</td>
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<td>1,502</td>
<td>136</td>
<td>134</td>
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<td>3,614</td>
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<td>323</td>
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<td>14,458</td>
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<td>1,900</td>
<td>253</td>
<td>351</td>
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<td>15,235</td>
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<td>2,047</td>
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<td>200</td>
<td>598</td>
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<td>252</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
### Table A1-5. Montgomery County, Maryland

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<th>2012</th>
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<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
</tr>
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<td>73,574</td>
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<td>14,758</td>
<td>9,267</td>
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<td>(1,561)</td>
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<td>22,826</td>
<td>204</td>
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<td>687</td>
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<td>69,027</td>
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<td>277</td>
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<td>1,345</td>
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<td>8,248</td>
<td>8,395</td>
<td>897</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

### Table A1-6. Prince George's County, Maryland

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<td>(650)</td>
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<td>(63)</td>
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<td>(58)</td>
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<td>91,515</td>
<td>92,860</td>
<td>1,653</td>
<td>1,345</td>
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<tr>
<td>Military</td>
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<td>8,248</td>
<td>8,395</td>
<td>897</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
### Table A1-7. City of Alexandria, Virginia

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<th>Change 2022-2032</th>
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<td>1,654</td>
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<td>(234)</td>
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<td>6,932</td>
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<td>3,608</td>
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<td>12,773</td>
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<td>1,673</td>
<td>1,693</td>
<td>21</td>
<td>20</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

### Table A1-8. Arlington County, Virginia

<table>
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<th>Sector</th>
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<th>2032</th>
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<th>Change 2022-2032</th>
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<td>1,897</td>
</tr>
<tr>
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<td>(181)</td>
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<tr>
<td>Transportation &amp; Utilities</td>
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<td>11,462</td>
<td>(101)</td>
<td>(1,783)</td>
</tr>
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<td>567</td>
<td>244</td>
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<tr>
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<td>2,086</td>
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<td>17,595</td>
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<td>12,886</td>
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<td>(3)</td>
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<td>(3,250)</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
Table A1-9. Clarke County, Virginia

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<th>Change 2022-2032</th>
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<td>121</td>
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<td>(75)</td>
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<td>(1)</td>
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<td>68</td>
<td>(1)</td>
<td>(1)</td>
</tr>
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<td>291</td>
<td>285</td>
<td>(5)</td>
<td>(6)</td>
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<td>(1)</td>
<td>(1)</td>
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<td>644</td>
<td>110</td>
<td>197</td>
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<td>53</td>
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<td>22</td>
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<td>73</td>
<td>76</td>
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<td>289</td>
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<td>824</td>
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<td>Military</td>
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<td>43</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

Table A1-10. Fairfax County, Virginia (includes the independent cities of Fairfax and Falls Church)

<table>
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<th>Sector</th>
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<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
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<td>789,470</td>
<td>72,469</td>
<td>61,473</td>
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<td>35,314</td>
<td>40,473</td>
<td>9,313</td>
<td>5,159</td>
</tr>
<tr>
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<td>6,900</td>
<td>5,032</td>
<td>(1,008)</td>
<td>(1,867)</td>
</tr>
<tr>
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<td>13,793</td>
<td>11,857</td>
<td>(596)</td>
<td>(1,936)</td>
</tr>
<tr>
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<td>13,092</td>
<td>12,549</td>
<td>10,788</td>
<td>(542)</td>
<td>(1,761)</td>
</tr>
<tr>
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<td>45,223</td>
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<td>(7,383)</td>
</tr>
<tr>
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<td>26,586</td>
<td>1,942</td>
<td>1,372</td>
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<td>23,495</td>
<td>22,654</td>
<td>(949)</td>
<td>(841)</td>
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<td>10,167</td>
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<td>(377)</td>
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<td>242,494</td>
<td>306,087</td>
<td>52,894</td>
<td>63,593</td>
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<td>64,579</td>
<td>81,515</td>
<td>14,086</td>
<td>16,936</td>
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<td>16,690</td>
<td>16,495</td>
<td>1,623</td>
<td>(195)</td>
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<td>56,724</td>
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<td>(670)</td>
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<td>48,568</td>
<td>1,088</td>
<td>(3,255)</td>
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<td>25,633</td>
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<td>(620)</td>
<td>(65)</td>
</tr>
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<td>73,951</td>
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<td>(7,327)</td>
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<td>7,781</td>
<td>95</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
### Table A1-11. Fauquier County, Virginia

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<tr>
<th>Sector</th>
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<th>Change 2022-2032</th>
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<td>26,065</td>
<td>29,794</td>
<td>3,592</td>
<td>3,728</td>
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<td>(423)</td>
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<td>659</td>
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<td>(87)</td>
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<td>721</td>
<td>746</td>
<td>58</td>
<td>25</td>
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<td>656</td>
<td>679</td>
<td>53</td>
<td>22</td>
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<td>2,845</td>
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<td>94</td>
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<td>44</td>
<td>117</td>
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<td>704</td>
<td>821</td>
<td>66</td>
<td>53</td>
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<td>53</td>
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<td>940</td>
<td>1,544</td>
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<td>250</td>
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<td>210</td>
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<td>3,858</td>
<td>721</td>
<td>629</td>
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<td>65</td>
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<td>482</td>
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<td>201</td>
<td>204</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

### Table A1-12. Loudoun County, Virginia

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<th>Change 2022-2032</th>
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<td>5,209</td>
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<td>4,982</td>
<td>1,038</td>
<td>(423)</td>
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<td>7,471</td>
<td>1,420</td>
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<td>6,798</td>
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<td>3,019</td>
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<td>5,412</td>
<td>986</td>
<td>927</td>
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<td>814</td>
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<td>(165)</td>
<td>(178)</td>
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</table>

Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
Table A1-13. Prince William County, Virginia (includes the independent cities of Manassas and Manassas Park)

<table>
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<tr>
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<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
</tr>
</thead>
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<td>235,279</td>
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<td>39,771</td>
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</tr>
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<td>4,089</td>
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<td>(366)</td>
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<td>7,097</td>
<td>1,181</td>
<td>524</td>
</tr>
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<td>1,998</td>
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<td>4,406</td>
<td>656</td>
<td>794</td>
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<td>356</td>
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<td>43,104</td>
<td>10,372</td>
<td>16,025</td>
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<td>2,762</td>
<td>4,268</td>
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<td>1,347</td>
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<td>18,577</td>
<td>23,209</td>
<td>5,447</td>
<td>4,631</td>
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<td>23,399</td>
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<td>3,196</td>
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<td>8,627</td>
<td>922</td>
<td>1,785</td>
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<tr>
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<td>36,839</td>
<td>42,363</td>
<td>6,057</td>
<td>5,524</td>
</tr>
<tr>
<td>Military</td>
<td>6,552</td>
<td>6,634</td>
<td>6,712</td>
<td>82</td>
<td>78</td>
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</table>

Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

Table A1-14. Spotsylvania County, Virginia (includes the independent city of Fredericksburg)

<table>
<thead>
<tr>
<th>Sector</th>
<th>2012</th>
<th>2022</th>
<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>59,007</td>
<td>76,017</td>
<td>97,068</td>
<td>17,010</td>
<td>21,052</td>
</tr>
<tr>
<td>Construction, Natural Resources and Mining</td>
<td>2,625</td>
<td>4,209</td>
<td>6,014</td>
<td>1,584</td>
<td>1,805</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,093</td>
<td>1,185</td>
<td>1,126</td>
<td>91</td>
<td>(59)</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>2,447</td>
<td>2,906</td>
<td>3,276</td>
<td>458</td>
<td>370</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>2,227</td>
<td>2,644</td>
<td>2,981</td>
<td>417</td>
<td>337</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>9,335</td>
<td>11,083</td>
<td>12,494</td>
<td>1,748</td>
<td>1,412</td>
</tr>
<tr>
<td>Information</td>
<td>847</td>
<td>1,137</td>
<td>1,568</td>
<td>289</td>
<td>431</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>1,459</td>
<td>1,752</td>
<td>2,229</td>
<td>293</td>
<td>477</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>655</td>
<td>786</td>
<td>1,001</td>
<td>132</td>
<td>214</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>4,337</td>
<td>6,881</td>
<td>11,426</td>
<td>2,544</td>
<td>4,545</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>1,155</td>
<td>1,833</td>
<td>3,043</td>
<td>678</td>
<td>1,210</td>
</tr>
<tr>
<td>Education</td>
<td>2,590</td>
<td>3,573</td>
<td>4,569</td>
<td>984</td>
<td>1,086</td>
</tr>
<tr>
<td>Health Services</td>
<td>8,905</td>
<td>12,287</td>
<td>16,021</td>
<td>3,382</td>
<td>3,734</td>
</tr>
<tr>
<td>Leisure &amp; Hospitality</td>
<td>8,575</td>
<td>10,639</td>
<td>12,884</td>
<td>2,064</td>
<td>2,245</td>
</tr>
<tr>
<td>Other Services</td>
<td>2,525</td>
<td>2,781</td>
<td>3,660</td>
<td>257</td>
<td>879</td>
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<tr>
<td>Government</td>
<td>9,778</td>
<td>11,863</td>
<td>14,223</td>
<td>2,085</td>
<td>2,359</td>
</tr>
<tr>
<td>Military</td>
<td>453</td>
<td>458</td>
<td>464</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
Table A1-15. Stafford County, Virginia

<table>
<thead>
<tr>
<th>Sector</th>
<th>2012</th>
<th>2022</th>
<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>42,243</td>
<td>54,685</td>
<td>70,548</td>
<td>12,442</td>
<td>15,862</td>
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<tr>
<td>Construction, Natural Resources and Mining</td>
<td>2,101</td>
<td>3,047</td>
<td>3,779</td>
<td>946</td>
<td>731</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>629</td>
<td>760</td>
<td>756</td>
<td>130</td>
<td>(4)</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>1,296</td>
<td>1,611</td>
<td>1,868</td>
<td>315</td>
<td>257</td>
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<tr>
<td>Wholesale Trade</td>
<td>1,179</td>
<td>1,466</td>
<td>1,700</td>
<td>287</td>
<td>234</td>
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<tr>
<td>Retail Trade</td>
<td>4,942</td>
<td>6,145</td>
<td>7,125</td>
<td>1,203</td>
<td>980</td>
</tr>
<tr>
<td>Information</td>
<td>283</td>
<td>399</td>
<td>566</td>
<td>116</td>
<td>167</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>3,843</td>
<td>4,976</td>
<td>6,446</td>
<td>1,134</td>
<td>1,470</td>
</tr>
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<td>Real Estate &amp; Rental/Leasing</td>
<td>1,725</td>
<td>2,233</td>
<td>2,893</td>
<td>509</td>
<td>660</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>3,441</td>
<td>5,590</td>
<td>9,418</td>
<td>2,149</td>
<td>3,827</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>916</td>
<td>1,489</td>
<td>2,508</td>
<td>572</td>
<td>1,019</td>
</tr>
<tr>
<td>Education</td>
<td>790</td>
<td>1,153</td>
<td>1,546</td>
<td>363</td>
<td>393</td>
</tr>
<tr>
<td>Health Services</td>
<td>2,718</td>
<td>3,966</td>
<td>5,317</td>
<td>1,248</td>
<td>1,350</td>
</tr>
<tr>
<td>Leisure &amp; Hospitality</td>
<td>3,676</td>
<td>4,736</td>
<td>5,889</td>
<td>1,060</td>
<td>1,153</td>
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<td>2,006</td>
<td>2,676</td>
<td>277</td>
<td>670</td>
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<td>10,392</td>
<td>12,493</td>
<td>15,416</td>
<td>2,100</td>
<td>2,924</td>
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<td>2,614</td>
<td>2,645</td>
<td>32</td>
<td>31</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis

Table A1-16. Warren County, Virginia

<table>
<thead>
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<th>Sector</th>
<th>2012</th>
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<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
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<td>14,038</td>
<td>16,461</td>
<td>1,651</td>
<td>2,423</td>
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<td>529</td>
<td>776</td>
<td>993</td>
<td>247</td>
<td>217</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>852</td>
<td>786</td>
<td>690</td>
<td>(66)</td>
<td>(96)</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>540</td>
<td>574</td>
<td>602</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>Wholesale Trade</td>
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<td>523</td>
<td>547</td>
<td>31</td>
<td>25</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>2,060</td>
<td>2,190</td>
<td>2,295</td>
<td>131</td>
<td>105</td>
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<tr>
<td>Information</td>
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<td>69</td>
<td>86</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>238</td>
<td>258</td>
<td>305</td>
<td>20</td>
<td>47</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>107</td>
<td>116</td>
<td>137</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>1,070</td>
<td>1,482</td>
<td>2,269</td>
<td>412</td>
<td>787</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>285</td>
<td>395</td>
<td>604</td>
<td>110</td>
<td>210</td>
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<tr>
<td>Education</td>
<td>440</td>
<td>541</td>
<td>653</td>
<td>101</td>
<td>112</td>
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<tr>
<td>Health Services</td>
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<td>1,860</td>
<td>2,245</td>
<td>347</td>
<td>385</td>
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<td>Leisure &amp; Hospitality</td>
<td>1,471</td>
<td>1,622</td>
<td>1,815</td>
<td>151</td>
<td>194</td>
</tr>
<tr>
<td>Other Services</td>
<td>683</td>
<td>668</td>
<td>814</td>
<td>(15)</td>
<td>146</td>
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<tr>
<td>Government</td>
<td>1,934</td>
<td>2,064</td>
<td>2,291</td>
<td>130</td>
<td>227</td>
</tr>
<tr>
<td>Military</td>
<td>114</td>
<td>115</td>
<td>117</td>
<td>1</td>
<td>1</td>
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Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
Table A1-17. Jefferson County, West Virginia

<table>
<thead>
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<th>Sector</th>
<th>2012</th>
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<th>2032</th>
<th>Change 2012-2022</th>
<th>Change 2022-2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
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<td>17,754</td>
<td>20,526</td>
<td>2,494</td>
<td>2,772</td>
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<td>890</td>
<td>1,079</td>
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<td>190</td>
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<tr>
<td>Manufacturing</td>
<td>897</td>
<td>964</td>
<td>891</td>
<td>67</td>
<td>(72)</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>378</td>
<td>429</td>
<td>474</td>
<td>51</td>
<td>46</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>344</td>
<td>390</td>
<td>431</td>
<td>46</td>
<td>42</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>1,442</td>
<td>1,635</td>
<td>1,809</td>
<td>193</td>
<td>174</td>
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<tr>
<td>Information</td>
<td>110</td>
<td>131</td>
<td>163</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>297</td>
<td>320</td>
<td>369</td>
<td>23</td>
<td>48</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>133</td>
<td>144</td>
<td>165</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>526</td>
<td>838</td>
<td>1,284</td>
<td>312</td>
<td>446</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>140</td>
<td>223</td>
<td>342</td>
<td>83</td>
<td>119</td>
</tr>
<tr>
<td>Education</td>
<td>411</td>
<td>510</td>
<td>602</td>
<td>99</td>
<td>92</td>
</tr>
<tr>
<td>Health Services</td>
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<td>1,754</td>
<td>2,071</td>
<td>339</td>
<td>317</td>
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<tr>
<td>Leisure &amp; Hospitality</td>
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<td>4,692</td>
<td>5,220</td>
<td>442</td>
<td>528</td>
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<td>Other Services</td>
<td>538</td>
<td>618</td>
<td>811</td>
<td>80</td>
<td>193</td>
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<tr>
<td>Government</td>
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<td>3,948</td>
<td>4,550</td>
<td>450</td>
<td>603</td>
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<tr>
<td>Military</td>
<td>263</td>
<td>271</td>
<td>265</td>
<td>8</td>
<td>(6)</td>
</tr>
</tbody>
</table>

Sources: IHS Global Insight, U.S. Bureau of Labor Statistics and GMU Center for Regional Analysis
Table A2. Age Distribution by Sector

Table A2-1. District of Columbia

<table>
<thead>
<tr>
<th>Sector</th>
<th>Under 30</th>
<th>30-44</th>
<th>45-64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, Natural Resources and Mining</td>
<td>47%</td>
<td>43%</td>
<td>10%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>23%</td>
<td>43%</td>
<td>35%</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>24%</td>
<td>35%</td>
<td>41%</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>33%</td>
<td>43%</td>
<td>24%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>70%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>Information</td>
<td>35%</td>
<td>40%</td>
<td>25%</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>34%</td>
<td>45%</td>
<td>21%</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>33%</td>
<td>44%</td>
<td>23%</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>43%</td>
<td>44%</td>
<td>13%</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>50%</td>
<td>39%</td>
<td>11%</td>
</tr>
<tr>
<td>Education</td>
<td>53%</td>
<td>34%</td>
<td>13%</td>
</tr>
<tr>
<td>Health Services</td>
<td>43%</td>
<td>39%</td>
<td>18%</td>
</tr>
<tr>
<td>Leisure &amp; Hospitality</td>
<td>66%</td>
<td>34%</td>
<td>0%</td>
</tr>
<tr>
<td>Other Services</td>
<td>42%</td>
<td>41%</td>
<td>17%</td>
</tr>
<tr>
<td>Government</td>
<td>29%</td>
<td>39%</td>
<td>32%</td>
</tr>
<tr>
<td>Military</td>
<td>51%</td>
<td>49%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A2-2. Calvert County, Maryland

<table>
<thead>
<tr>
<th>Sector</th>
<th>Under 30</th>
<th>30-44</th>
<th>45-64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, Natural Resources and Mining</td>
<td>47%</td>
<td>31%</td>
<td>21%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>26%</td>
<td>47%</td>
<td>27%</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>24%</td>
<td>33%</td>
<td>44%</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>69%</td>
<td>16%</td>
<td>15%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>82%</td>
<td>18%</td>
<td>0%</td>
</tr>
<tr>
<td>Information</td>
<td>37%</td>
<td>63%</td>
<td>0%</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>74%</td>
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</tr>
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<td>Real Estate &amp; Rental/Leasing</td>
<td>39%</td>
<td>22%</td>
<td>39%</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>36%</td>
<td>37%</td>
<td>28%</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>48%</td>
<td>22%</td>
<td>30%</td>
</tr>
<tr>
<td>Education</td>
<td>36%</td>
<td>38%</td>
<td>26%</td>
</tr>
<tr>
<td>Health Services</td>
<td>56%</td>
<td>35%</td>
<td>9%</td>
</tr>
<tr>
<td>Leisure &amp; Hospitality</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other Services</td>
<td>33%</td>
<td>28%</td>
<td>39%</td>
</tr>
<tr>
<td>Government</td>
<td>27%</td>
<td>35%</td>
<td>38%</td>
</tr>
<tr>
<td>Military</td>
<td>51%</td>
<td>49%</td>
<td>0%</td>
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</table>

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
### Table A2-3. Charles County, Maryland

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<th>45-64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, Natural Resources and Mining</td>
<td>52%</td>
<td>39%</td>
<td>8%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>43%</td>
<td>33%</td>
<td>24%</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>44%</td>
<td>29%</td>
<td>27%</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>56%</td>
<td>31%</td>
<td>13%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>72%</td>
<td>26%</td>
<td>2%</td>
</tr>
<tr>
<td>Information</td>
<td>34%</td>
<td>18%</td>
<td>48%</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>32%</td>
<td>39%</td>
<td>29%</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>35%</td>
<td>37%</td>
<td>28%</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>41%</td>
<td>22%</td>
<td>37%</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>79%</td>
<td>21%</td>
<td>0%</td>
</tr>
<tr>
<td>Education</td>
<td>41%</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

### Table A2-4. Frederick County, Maryland

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
Table A2-5. Montgomery County, Maryland

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A2-6. Prince George's County, Maryland

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

### Table A2-10. Fairfax County, Virginia (includes the independent cities of Fairfax and I

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

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<td>30%</td>
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<td>Other Services</td>
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<td>34%</td>
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</table>

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
### Table A2-13. Prince William County, Virginia (includes the independent cities of Manassas and Manassas Park)

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<td>45%</td>
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<td>7%</td>
</tr>
<tr>
<td>Manufacturing</td>
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<td>35%</td>
<td>23%</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>43%</td>
<td>41%</td>
<td>16%</td>
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<tr>
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<td>42%</td>
<td>48%</td>
<td>10%</td>
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<td>Retail Trade</td>
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<td>40%</td>
<td>0%</td>
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<td>25%</td>
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<td>Real Estate &amp; Rental/Leasing</td>
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<td>44%</td>
</tr>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

### Table A2-14. Spotsylvania County, Virginia (includes the independent city of Fredericksburg)

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</tr>
<tr>
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<td>38%</td>
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<tr>
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<td>47%</td>
<td>11%</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
Table A2-15. Stafford County, Virginia

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<td>34%</td>
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<tr>
<td>Transportation &amp; Utilities</td>
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<td>35%</td>
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<td>39%</td>
<td>26%</td>
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<td>36%</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A2-16. Warren County, Virginia

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<tr>
<td>Transportation &amp; Utilities</td>
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<td>49%</td>
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<td>13%</td>
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<td>25%</td>
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<td>45%</td>
<td>16%</td>
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<td>Health Services</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
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<th>45-64</th>
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<td>Finance &amp; Insurance</td>
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<td>Education</td>
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<td>Health Services</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
Table A3. Household Types and Workers per Household by Age Group

Table A3-1. District of Columbia

<table>
<thead>
<tr>
<th>Household Type</th>
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<th>1 adult/ 1 child</th>
<th>2 adults</th>
<th>1 adult/ 2 children</th>
<th>2 adults/ 1 child</th>
<th>3 adults</th>
<th>1 adult/ 3+ children</th>
<th>2 adults/ 2+ children</th>
<th>3 adults/ 1+ children</th>
<th>4+ adults</th>
<th>4+ adults/ 1+ children</th>
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</thead>
<tbody>
<tr>
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<td>1.00</td>
<td>1.53</td>
<td>1.00</td>
<td>1.66</td>
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<td>1.58</td>
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<td>2%</td>
<td>3%</td>
<td>9%</td>
<td>3%</td>
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<td>7%</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A3-2. Calvert County, Maryland

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<th>1 adult/ 2 children</th>
<th>2 adults/ 1 child</th>
<th>3 adults</th>
<th>1 adult/ 3+ children</th>
<th>2 adults/ 2+ children</th>
<th>3 adults/ 1+ children</th>
<th>4+ adults</th>
<th>4+ adults/ 1+ children</th>
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<tbody>
<tr>
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<td>1.74</td>
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<td>2.58</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A3-3. Charles County, Maryland

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<th>2 adults/ 1 child</th>
<th>3 adults</th>
<th>1 adult/ 3+ children</th>
<th>2 adults/ 2+ children</th>
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<td>1.00</td>
<td>1.74</td>
<td>2.71</td>
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<td>4.19</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A3-4. Frederick County, Maryland

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
### Table A3-5. Montgomery County, Maryland

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

### Table A3-7. City of Alexandria, Virginia

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

### Table A3-8. Arlington County, Virginia

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
Table A3-9. Clarke County, Virginia

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Age Group

Under 30            19%  3%  38%  2%  15%  5%  0%  9%  2%  3%  5%
30 - 44             12%  3%  15%  2%  17%  2%  1%  38%  6%  1%  2%
45 - 64             19%  2%  34%  1%  8%  9%  0%  13%  7%  4%  3%

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A3-10. Fairfax County, Virginia (includes the independent cities of Fairfax and Falls Church)

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Age Group

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45 - 64             21%  2%  30%  1%  9%  10%  0%  12%  7%  5%  4%

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A3-11. Fauquier County, Virginia

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Age Group

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30 - 44             12%  3%  15%  2%  17%  2%  1%  38%  6%  1%  2%
45 - 64             19%  2%  34%  1%  8%  9%  0%  13%  7%  4%  3%

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Table A3-12. Loudoun County, Virginia

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Age Group

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30 - 44             12%  3%  15%  2%  17%  2%  1%  38%  6%  1%  2%
45 - 64             19%  2%  34%  1%  8%  9%  0%  13%  7%  4%  3%

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
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<table>
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<th>2 adults/ 1 child</th>
<th>3 adults</th>
<th>1 adult/ 3+ children</th>
<th>2 adults/ 2+ children</th>
<th>3 adults/ 1+ children</th>
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<th>4+ adults/ 1+ children</th>
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<td>38%</td>
<td>2%</td>
<td>15%</td>
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<td>9%</td>
<td>2%</td>
<td>3%</td>
<td>5%</td>
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<td>17%</td>
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<td>38%</td>
<td>6%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
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<td>2%</td>
<td>34%</td>
<td>1%</td>
<td>8%</td>
<td>9%</td>
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Table A3-17. Jefferson County, West Virginia

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<th>1 adult/3+ children</th>
<th>2 adults/2+ children</th>
<th>3 adults/1+ children</th>
<th>4+ adults</th>
<th>4+ adults/1+ children</th>
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</thead>
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<tr>
<td><strong>Workers</strong></td>
<td>1.00</td>
<td>1.00</td>
<td>1.42</td>
<td>1.00</td>
<td>1.71</td>
<td>2.32</td>
<td>1.00</td>
<td>1.59</td>
<td>2.41</td>
<td>3.58</td>
<td>3.98</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>19%</th>
<th>3%</th>
<th>38%</th>
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<th>15%</th>
<th>5%</th>
<th>0%</th>
<th>9%</th>
<th>2%</th>
<th>3%</th>
<th>5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 - 44</td>
<td>12%</td>
<td>3%</td>
<td>15%</td>
<td>2%</td>
<td>17%</td>
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<td>1%</td>
<td>38%</td>
<td>6%</td>
<td>1%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>45 - 64</td>
<td>19%</td>
<td>2%</td>
<td>34%</td>
<td>1%</td>
<td>8%</td>
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<td>0%</td>
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<td>3%</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
### Table A4-1. Median Wages by Sector (2011 dollars)

<table>
<thead>
<tr>
<th>Sector</th>
<th>District of Columbia</th>
<th>Calvert County, MD</th>
<th>Charles County, MD</th>
<th>Frederick County, MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, Natural Resources and Mining</td>
<td>39,825</td>
<td>40,729</td>
<td>41,576</td>
<td>41,921</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>68,222</td>
<td>73,362</td>
<td>46,839</td>
<td>46,839</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>52,401</td>
<td>63,131</td>
<td>36,379</td>
<td>36,681</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>51,970</td>
<td>41,576</td>
<td>56,003</td>
<td>49,257</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>25,456</td>
<td>18,634</td>
<td>20,961</td>
<td>18,328</td>
</tr>
<tr>
<td>Information</td>
<td>73,313</td>
<td>33,537</td>
<td>70,680</td>
<td>41,680</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>83,842</td>
<td>36,587</td>
<td>41,576</td>
<td>44,017</td>
</tr>
<tr>
<td>Real Estate &amp; Rental/Leasing</td>
<td>54,049</td>
<td>41,921</td>
<td>29,345</td>
<td>28,297</td>
</tr>
<tr>
<td>Prof, scientific and technical services; Management</td>
<td>83,153</td>
<td>68,122</td>
<td>80,441</td>
<td>56,575</td>
</tr>
<tr>
<td>Admin &amp; waste services</td>
<td>31,441</td>
<td>32,698</td>
<td>25,153</td>
<td>20,365</td>
</tr>
<tr>
<td>Education</td>
<td>51,353</td>
<td>46,773</td>
<td>45,821</td>
<td>42,616</td>
</tr>
<tr>
<td>Health Services</td>
<td>45,065</td>
<td>31,441</td>
<td>29,345</td>
<td>34,620</td>
</tr>
<tr>
<td>Leisure &amp; Hospitality</td>
<td>27,492</td>
<td>8,315</td>
<td>10,394</td>
<td>16,903</td>
</tr>
<tr>
<td>Other Services</td>
<td>54,497</td>
<td>20,961</td>
<td>28,926</td>
<td>29,345</td>
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<tr>
<td>Government</td>
<td>91,178</td>
<td>83,153</td>
<td>67,561</td>
<td>61,094</td>
</tr>
<tr>
<td>Military</td>
<td>81,459</td>
<td>62,882</td>
<td>46,773</td>
<td>45,821</td>
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</table>

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

### Table A4-2. Median Wages by Sector (2011 dollars)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Montgomery County, MD</th>
<th>Prince George's County, MD</th>
<th>City of Alexandria, VA</th>
<th>Arlington County, VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, Natural Resources and Mining</td>
<td>39,825</td>
<td>39,497</td>
<td>31,769</td>
<td>41,576</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>64,443</td>
<td>40,873</td>
<td>52,401</td>
<td>98,744</td>
</tr>
<tr>
<td>Transportation &amp; Utilities</td>
<td>46,113</td>
<td>46,773</td>
<td>40,729</td>
<td>47,161</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>52,401</td>
<td>43,239</td>
<td>49,892</td>
<td>41,921</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>24,438</td>
<td>24,105</td>
<td>34,315</td>
<td>25,456</td>
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<td>45,318</td>
<td>43,135</td>
<td>66,026</td>
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<tr>
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<td>58,040</td>
<td>89,082</td>
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<td>Real Estate &amp; Rental/Leasing</td>
<td>48,852</td>
<td>40,729</td>
<td>79,422</td>
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<td>Prof, scientific and technical services; Management</td>
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<td>66,185</td>
<td>78,602</td>
<td>83,842</td>
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<tr>
<td>Admin &amp; waste services</td>
<td>28,297</td>
<td>27,249</td>
<td>33,602</td>
<td>36,681</td>
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<tr>
<td>Education</td>
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<td>46,773</td>
<td>41,748</td>
<td>47,161</td>
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<tr>
<td>Health Services</td>
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<td>40,537</td>
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<td>19,041</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
### Table A4-3. Median Wages by Sector (2011 dollars)

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<tr>
<th>Sector</th>
<th>Clarke County, VA</th>
<th>Fairfax County, VA*</th>
<th>Fauquier County, VA</th>
<th>Loudoun County, VA</th>
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<tbody>
<tr>
<td>Construction, Natural Resources and Mining</td>
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<td>41,576</td>
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<td>38,458</td>
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<tr>
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<td>43,551</td>
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<td>42,969</td>
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<td>52,948</td>
<td>47,161</td>
<td>47,161</td>
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<td>27,249</td>
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<td>46,773</td>
<td>46,773</td>
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<td>Health Services</td>
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<td>36,314</td>
<td>36,314</td>
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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

### Table A4-4. Median Wages by Sector (2011 dollars)

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<th>Sector</th>
<th>Prince William County, VA**</th>
<th>Spotsylvania County, VA***</th>
<th>Stafford County, VA</th>
<th>Warren County, VA</th>
<th>Jefferson County, WV</th>
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</thead>
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<tr>
<td>Construction, Natural Resources and Mining</td>
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<td>38,458</td>
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<td>48,875</td>
<td>38,777</td>
<td>46,773</td>
<td>46,773</td>
</tr>
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<td>42,969</td>
<td>42,969</td>
</tr>
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<td>40,873</td>
<td>25,456</td>
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<td>47,161</td>
</tr>
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<td>22,009</td>
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<td>83,842</td>
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<td>50,411</td>
</tr>
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<td>49,892</td>
<td>50,411</td>
<td>81,459</td>
<td>81,459</td>
</tr>
<tr>
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<td>81,459</td>
<td>81,459</td>
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<td>31,441</td>
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<td>36,314</td>
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<td>13,616</td>
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<td>16,292</td>
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<tr>
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<td>25,153</td>
</tr>
<tr>
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<td>48,875</td>
<td>78,995</td>
<td>62,364</td>
<td>62,364</td>
</tr>
<tr>
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<td>44,017</td>
<td>50,912</td>
<td>45,734</td>
<td>45,734</td>
</tr>
</tbody>
</table>

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

* Includes the cities of Fairfax and Falls Church
** Includes the cities of Manassas and Manassas Park
*** Includes the city of Fredericksburg
### Table A5. Unit Type by Household Type and Income

#### Table A5-1. District of Columbia

<table>
<thead>
<tr>
<th>Income Level</th>
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<th>2 adults</th>
<th>1 adult/2 children</th>
<th>2 adults/1 child</th>
<th>3 adults</th>
<th>1 adult/3+ children</th>
<th>2 adults/2+ children</th>
<th>3 adults/1+ children</th>
<th>4+ adults</th>
<th>4+ adults/1+ children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Less than $50,000</strong></td>
<td>SF-owner</td>
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<td>8%</td>
<td>16%</td>
<td>6%</td>
<td>8%</td>
<td>23%</td>
<td>3%</td>
<td>11%</td>
<td>14%</td>
<td>6%</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>SF-renter</td>
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<td>7%</td>
<td>10%</td>
<td>30%</td>
<td>22%</td>
<td>23%</td>
<td>34%</td>
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</tr>
<tr>
<td></td>
<td>MF-owner</td>
<td>7%</td>
<td>4%</td>
<td>3%</td>
<td>0%</td>
<td>4%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
</tr>
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</tbody>
</table>

Sources: 2009-2011 American Community Survey and George Mason University Center for Regional Analysis

Note: SF = single-family and includes single-family attached and detached units; MF = multi-family
Table A5-2. Arlington County, Virginia and the City of Alexandria, Virginia

### Less than $50,000

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<th>1 adult</th>
<th>1 adult/ 1 child</th>
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### $50,000 - $74,999

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### $75,000 - $99,999

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### $100,000 - $124,999

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### $125,000 - $149,999

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### $150,000 or More

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
Note: SF = single-family and includes single-family attached and detached units; MF = multi-family
Table A5-3. Fairfax County, Virginia, Fairfax City, Virginia, Falls Church City, Virginia and Montgomery County, Maryland

Less than $50,000

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$50,000 - $74,999

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$75,000 - $99,999

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$100,000 - $124,999

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$125,000 - $149,999

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$150,000 or More

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</table>

Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis
Note: SF = single-family and includes single-family attached and detached units; MF = multi-family
## Table A5-4. Remaining Jurisdictions

### Less than $50,000

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### $50,000 - $74,999

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### $75,000 - $99,999

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### $100,000 - $124,999

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### $150,000 or More

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Sources: 2009-2011 American Community Survey and GMU Center for Regional Analysis

Note: SF = single-family and includes single-family attached and detached units; MF = multi-family
### Table A6. Commuting Patterns

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</tr>
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<td>Calvert</td>
<td>23%</td>
<td>15%</td>
</tr>
<tr>
<td>Charles</td>
<td>32%</td>
<td>15%</td>
</tr>
<tr>
<td>Frederick</td>
<td>33%</td>
<td>25%</td>
</tr>
<tr>
<td>Montgomery</td>
<td>37%</td>
<td>10%</td>
</tr>
<tr>
<td>Prince George’s</td>
<td>46%</td>
<td>19%</td>
</tr>
<tr>
<td>Alexandria</td>
<td>77%</td>
<td>4%</td>
</tr>
<tr>
<td>Arlington</td>
<td>77%</td>
<td>7%</td>
</tr>
<tr>
<td>Clarke</td>
<td>57%</td>
<td>42%</td>
</tr>
<tr>
<td>Fairfax*</td>
<td>46%</td>
<td>5%</td>
</tr>
<tr>
<td>Fauquier</td>
<td>39%</td>
<td>20%</td>
</tr>
<tr>
<td>Loudoun</td>
<td>45%</td>
<td>9%</td>
</tr>
<tr>
<td>Prince William**</td>
<td>36%</td>
<td>6%</td>
</tr>
<tr>
<td>Spotsylvania***</td>
<td>37%</td>
<td>18%</td>
</tr>
<tr>
<td>Stafford</td>
<td>46%</td>
<td>12%</td>
</tr>
<tr>
<td>Warren</td>
<td>36%</td>
<td>31%</td>
</tr>
<tr>
<td>Jefferson Co WV</td>
<td>38%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Sources: 2010 Census and GMU Center for Regional Analysis
*Includes the cities of Fairfax and Falls Church
**Includes the cities of Manassas and Manassas Park
***Includes the city of Fredericksburg