

The ECONOMIC & OFFICE MARKET IMPACT OF AMAZON'S HQ2 IN CRYSTAL CITY, VA

November 2018

A joint publication between Sage Policy Group and Transwestern

INTRODUCTION

Sage Policy Group, Inc. (Sage) and Transwestern collaborated to estimate the potential economic and office market impacts given Amazon will be locating its second headquarters (HQ2) of 25,000 employees in Crystal City, Virginia. Here are some of the reasons why we believe Northern Virginia won HQ2:

- Jeff Bezos owns The Washington Post (and the largest house in the District).
- Northern Virginia is home to Amazon's largest cloud computing facility outside Seattle.
- Given ongoing discussions regarding antitrust issues and the company's human capital practices, Amazon will arguably benefit from proximity to federal lawmakers.
- Virginia has a relatively advantageous tax structure and development codes.
- The region checked all the boxes outlined in the HQ2 request for proposal (RFP), including access to transit.



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INPUTS, DATA, AND METHODOLOGY

On September 7th, 2017, Amazon released an HQ2 RFP. That eight-page document tosses around some rather gaudy numbers, including more than \$5 billion in capital investment and 50,000 full time jobs averaging more than \$100,000 in annual compensation. These numbers are staggeringly large, but somewhat lacking in detail. The RFP states that “jobs will likely be broken down into the following categories: executive/management, engineering with a preference for software development engineers (SDE), legal, accounting, and administrative.”

The only additional detail provided by Amazon is a schedule of the three capital investments phases that will occur over “the initial 15-17 years of the Project.” While the RFP indicates up to \$5 billion in capital investment, this analysis models only the roughly \$3.8 billion accounted for in the first three phases. We’ve recreated the corresponding table as Table 1.

Sage modeled the three separate phases using a custom multi-regional input/output analysis (MRIO) using IMPLAN. MRIO is a type of economic modeling in which economic impacts are studied across multiple localities without sacrificing individual regional detail, something that frequently occurs when multiple communities are aggregated into a larger study area. See Appendix B for detail on how to best interpret the results.

With Crystal City as the winner, the core region for this analysis was Arlington County. Other geographies included in the model were:

Frederick, Maryland

Montgomery County, Maryland

Prince George’s County, Maryland

District of Columbia

Alexandria City, Virginia

Fairfax County, Virginia

Loudoun County, Virginia

Prince William County, Virginia

Table 1: Amazon’s Capital Investment Schedule

BUILDING PHASE	ESTIMATED CAPITAL INVESTMENT
Phase I	
500,000 - 1,000,000 SF	\$300,000,000 - \$600,000,000
Phase II	
1,000,000 - 2,000,000 SF	\$600,000,000 - \$1,260,000,000
Phase III	
2,000,000 - 3,000,000 SF	\$1,260,000,000 - \$1,985,000,000

Source: Amazon HQ2 RFP



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ECONOMIC AND OFFICE MARKET IMPACT

Arlington County

The majority of the economic benefits of HQ2 will be generated within Arlington County. The first three phases of capital investment, which total \$1.9 billion, will support approximately 8,000 direct jobs in Arlington County (direct jobs being those involved in the development of the new campus). Once multiplier effects are considered, capital investments will support more than 10,800 jobs within Arlington County. Those jobs will be associated with \$855 million in employee compensation and more than \$1.7 billion in augmented economic activity.

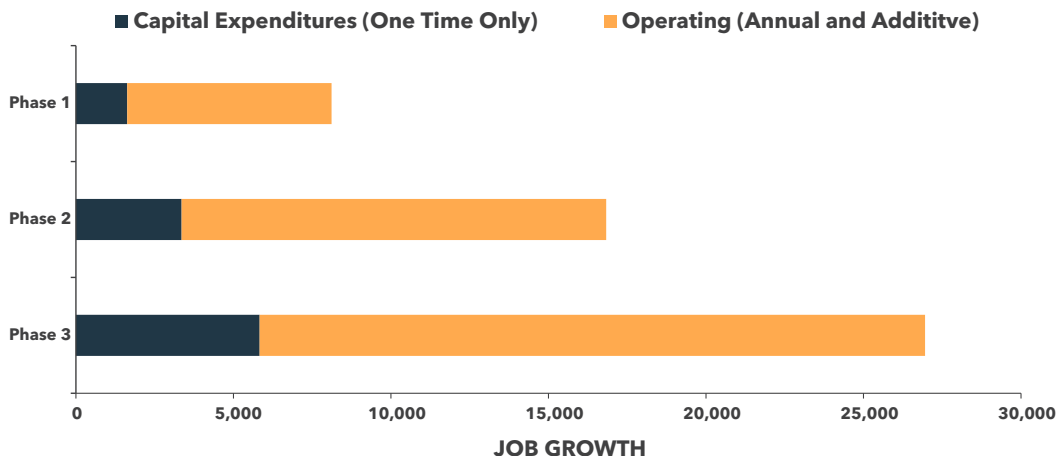
Note that all impacts associated with capital investments will exist for the duration of the project and do not exist into perpetuity. Jobs can be thought of as job-years. For example, if Phase I lasts five years, the 1,629 jobs associated with that phase translates into about 325 jobs supported per annum on average.

While the capital investment-related impacts last only for the duration of the project, the impacts stemming from HQ2's operations are ongoing. Given that HQ2 will have 25,000 employees earning an average annual salary that exceeds \$100,000, it should come as no surprise that associated impacts are massive.

They are also rather concentrated geographically. One might think that these jobs would be neatly dispersed over a broad area given their large number. But it's important to put Amazon HQ2 impacts in context. While 25,000 direct jobs is a large number, the Washington metro area routinely adds more than twice that many jobs in a given year. As an example, between September 2017 and September 2018, the region added nearly 67,000 net new jobs, including nearly 23,000 in professional/business services, 4,400 in financial activities, and 2,000 in government – all significant users of office space. Amazon's

Projected Job Growth Due to HQ2

Arlington County



Source: Sage Policy Group, IMPLAN.

The Economic & Office Market Impact of Amazon's HQ2 in Crystal City, Virginia

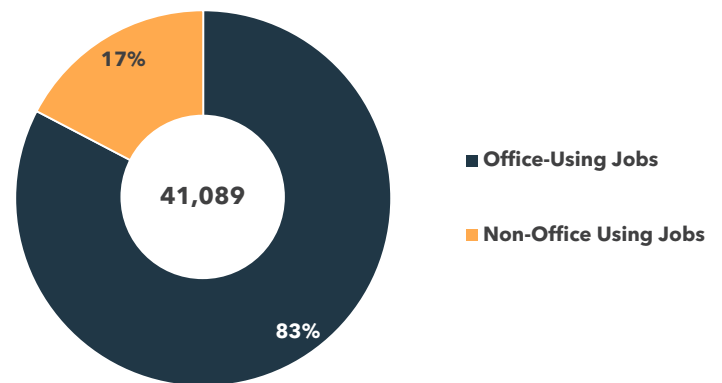
25,000 jobs will be added over multiple phases, each lasting multiple years, with Crystal City already prepared to accommodate many of them in presently under-utilized space or ready-to-build land parcels. It is worth remembering that several years ago approximately 17,000 Department of Defense (DoD) workers were required to move out of leased office space in Crystal City due to recommendations rendered by the BRAC Commission in 2005.

Based on our analysis, once all three phases are complete, HQ2 will support more than 41,000 jobs in Arlington County alone. According to the Quarterly Census of Employment and Wages, a United States Bureau of Labor Statistics program that publishes county-level employment estimates (among other things), those 41,000 plus jobs will represent a 23% increase to the county's March 2018 employment level. That staggering quantity of jobs will be associated with more than \$4.5 billion in annual labor income and more than \$8.7 billion in annual economic activity.

There is only 2.2 million SF of available office space in the Crystal City/Pentagon City submarket as of the third quarter of 2018. With 25,000 new jobs and a demand for up to 4.0 million SF of office space for HQ2 alone, new office will have to be constructed, likely on land parcels or by converting existing product to office. Our office projection assumes the majority of direct jobs created by HQ2, with the exception of the 500,000 SF needed by 2019, will require new office development. The indirect and induced jobs created, along with the 500,000 SF needed by 2019, will likely lease up existing vacant office space, which all told could reduce the overall vacancy rate to 7.2% by the end of Phase 3, notably lower than 15.5% today. Analyzing rent growth when the vacancy was at a similar rate historically, it is likely rents will rise by 4% to 5% annually, with stronger growth nearing Phase 3 as space tightens.

In the neighboring RCB Corridor, there is currently 5.1 million SF of available office space. We estimate that given

Projected Operational Job Growth Due to HQ2
Arlington County



Source: Sage Policy Group, IMPLAN, Transwestern.

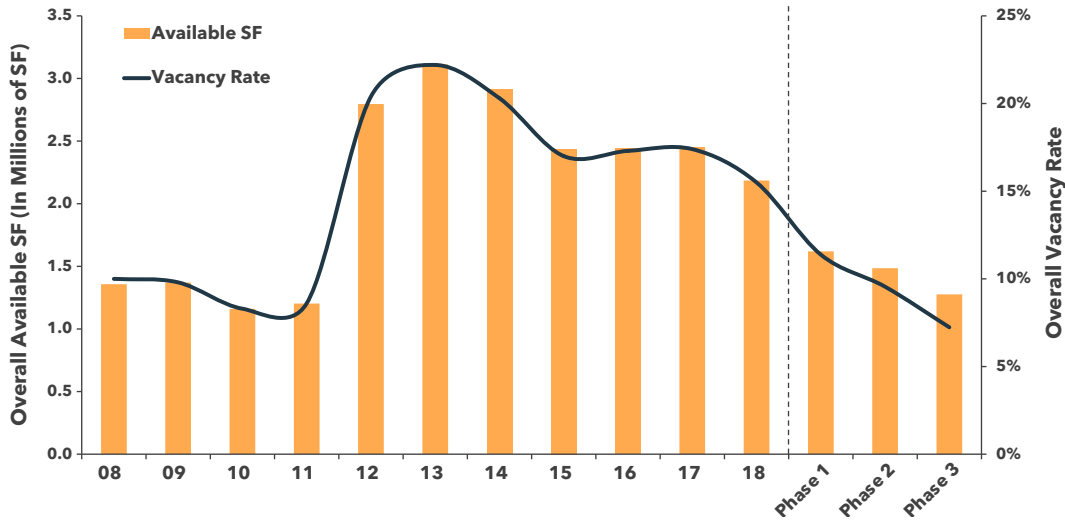
the projected tight office market conditions in the Crystal City/Pentagon City submarket, some of the indirect and induced jobs will fall to the RCB Corridor. This could reduce the overall vacancy rate to 16.1% by the end of Phase 3, lower than 20.3% today. Analyzing rent growth when the vacancy was at a similar rate historically, it is likely rents will rise by 2% to 3% annually, with stronger growth nearing Phase 3 as space tightens.

It is conceivable that the Amazon HQ2's presence in Arlington County will boost the office market, including in immediately adjacent communities like the District of Columbia and Alexandria, Virginia. This may ultimately lead some non-HQ2-related activities to choose locations they otherwise may not have, including in communities like Montgomery, Prince George's, and Loudoun counties. However, this is purely speculative. Often, business people and workers are willing to pay more to be closer to the epicenter of transactional volume and to reduce commuting times.

The Economic & Office Market Impact of Amazon's HQ2 in Crystal City, Virginia

Office Vacancy and Availability

Crystal City/Pentagon City

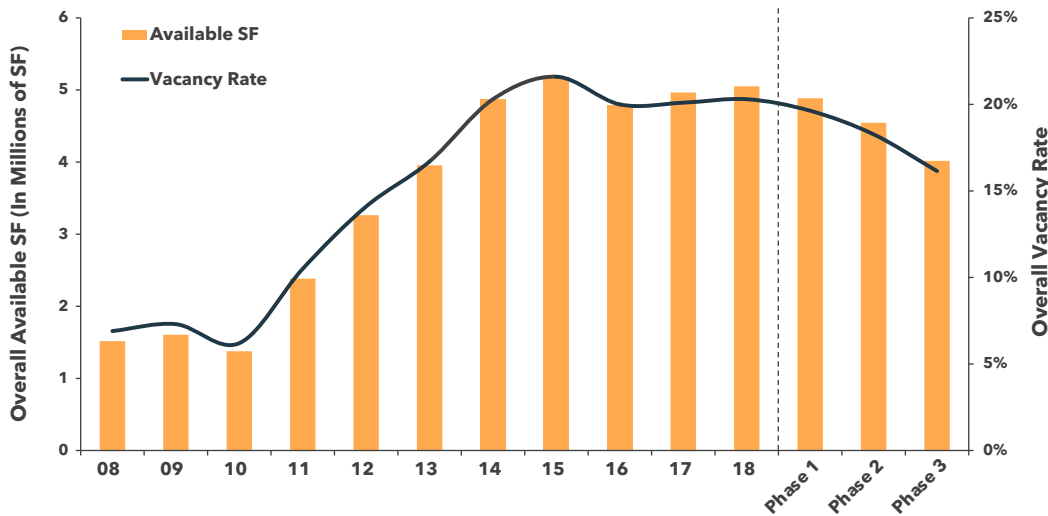


Note: Projections assume 200 SF per employee and only account for jobs generated by HQ2. Projections do not account non-HQ2 job growth, but do account for new construction of HQ2 to support the direct 25,000 Amazon jobs.

Source: CoStar, Transwestern.

Office Vacancy and Availability

RCB Corridor



Note: Projections assume 200 SF per employee and only account for jobs generated by HQ2. Projections do not account for new construction or non-HQ2 job growth.

Source: CoStar, Transwestern.

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District of Columbia

Adjacency matters. Once HQ2 is fully operational, an estimated 1,783 additional jobs will be added in the District of Columbia. These jobs will be associated with nearly \$152 million in annual income, which translates into nearly \$85,000 per job. Local business sales will be bolstered by nearly \$265 million per annum.

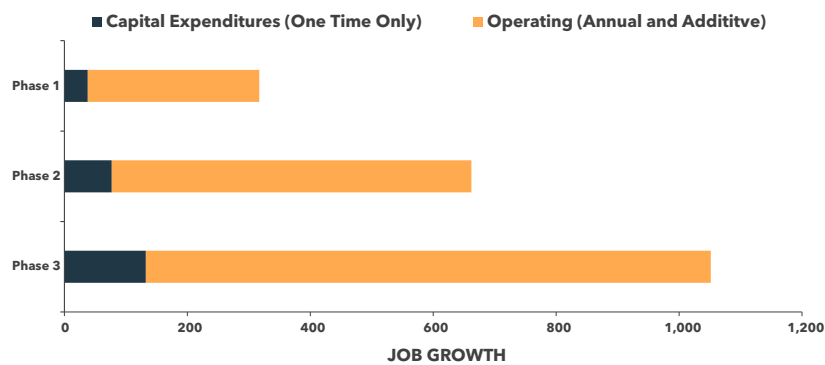
Most of the office-using demand will occur in the CBD and East End submarkets, due to the current distribution of similar positions primarily already located in these submarkets. Although we expect 85% of the indirect and induced Amazon HQ2-related jobs to be office-using, we do not expect the demand generated to have a significant impact on these submarkets due to the already sizable availability.

There is currently 3.4 million SF of available space in the CBD. By the end of Phase 3, we expect the overall vacancy rate will only decrease to 8.1% from 8.2% today. This decline will have minimal to no impact to rents. The East End submarket currently has 5.6 million SF of available space. We expect the overall vacancy rate to decline to 11.6% by the end of Phase 3, compared to 11.7% today. Similar to the CBD, we expect this demand to have minimal to no impact to rents.

Of note, these projections only take into account the impact from Amazon HQ2-related jobs. The projection does not account for non-Amazon related job growth that could lower the vacancy rate further.

Projected Job Growth Due to HQ2

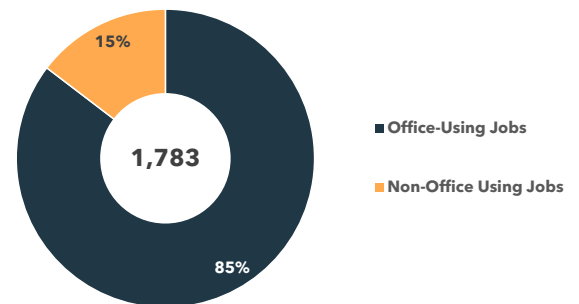
District of Columbia



Source: Sage Policy Group, IMPLAN.

Projected Operational Job Growth Due to HQ2

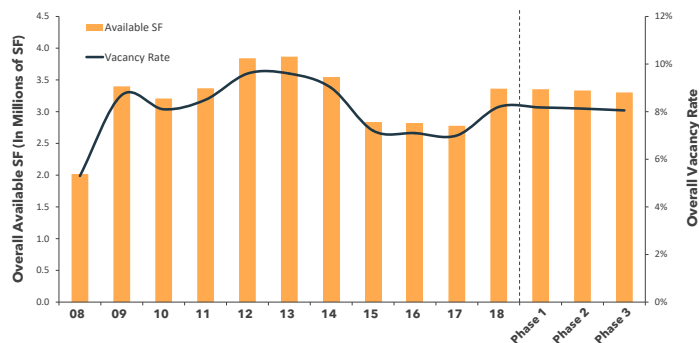
District of Columbia



Source: Sage Policy Group, IMPLAN, Transwestern.

Office Vacancy and Availability

CBD

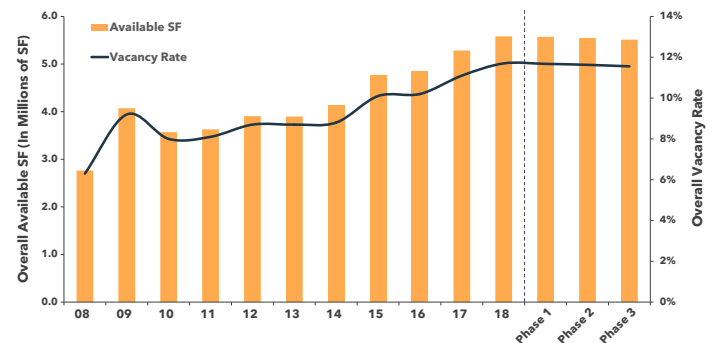


Note: Projections assume 200 SF per employee and only account for jobs generated by HQ2. Projections do not account for new construction or HQ2 job growth.

Source: CoStar, Transwestern.

Office Vacancy and Availability

East End



Note: Projections assume 200 SF per employee and only account for jobs generated by HQ2. Projections do not account for new construction or HQ2 job growth.

Source: CoStar, Transwestern.

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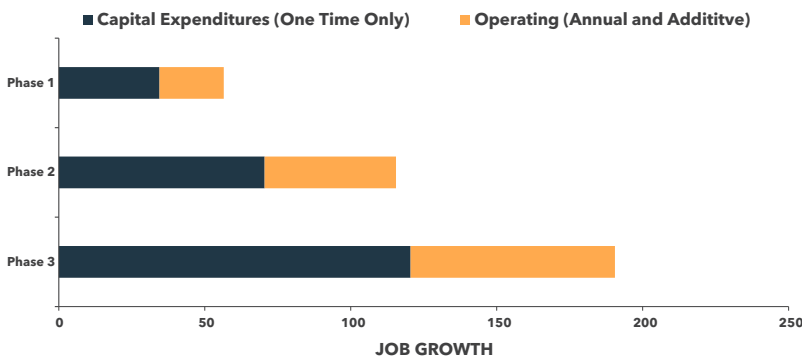
Alexandria City

Once HQ2 is through its initial three phases of development, Alexandria will support an additional 140 positions on an ongoing basis. These jobs will be associated with average income of \$70,000 per position. This translates into annual worker income approaching \$10 million. Citywide, business sales will be bolstered by nearly \$27 million per annum.

Given limited job growth projected for Alexandria due to Amazon's HQ2, we estimate limited impact to the office market. There is currently just over 800,000 SF of available space in Old Town Alexandria. By the end of Phase 3, we expect the overall vacancy rate will decrease to 9.9% from 10% today. The Eisenhower Avenue Corridor currently has 1.5 million SF of available space. We expect the overall vacancy rate to decline to 16.0% by the end of Phase 3, compared to 16.1% today. Given only a slight decline in the vacancy rate, we expect minimal to no impact to rents in both submarkets.

Projected Job Growth Due to HQ2

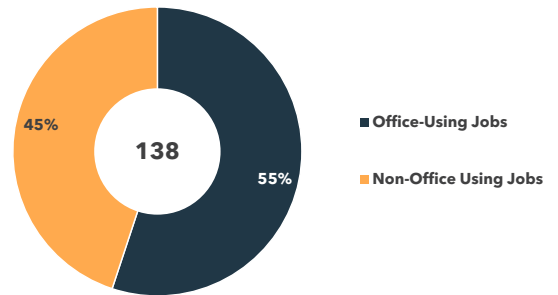
Alexandria City



Source: Sage Policy Group, IMPLAN.

Projected Operational Job Growth Due to HQ2

Alexandria City



Source: Sage Policy Group, IMPLAN, Transwestern.

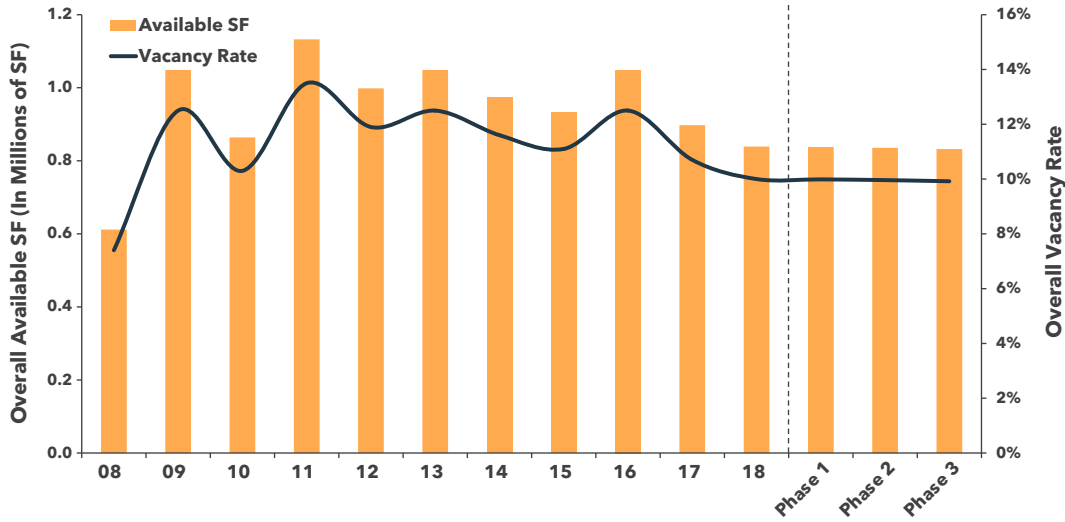
Balance of the Washington Metro Area

The remainder of the Washington metro area, which this analysis defines as Fairfax, Frederick, Loudoun, Montgomery, Prince George's, and Prince William Counties, will collectively support over 860 positions on an ongoing basis, which will be associated with an average of \$78,000 per position. Many of these jobs will be in professional services, retail and hospitality. This translates into nearly \$68.3 million in annual worker compensation. Business sales will be expanded by more than \$200 million per annum.

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Office Vacancy and Availability

Old Town Alexandria

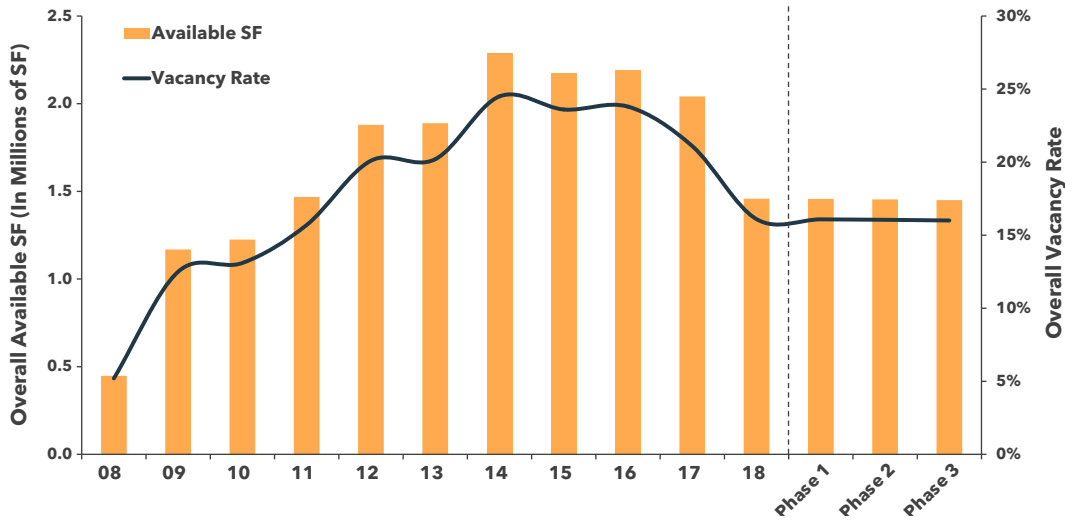


Note: Projections assume 200 SF per employee and only account for jobs generated by HQ2. Projections do not account for new construction or HQ2 job growth.

Source: CoStar, Transwestern.

Office Vacancy and Availability

Eisenhower Avenue Corridor



Note: Projections assume 200 SF per employee and only account for jobs generated by HQ2. Projections do not account for new construction or HQ2 job growth.

Source: CoStar, Transwestern.

The Economic & Office Market Impact of Amazon's HQ2 in Crystal City, Virginia

APPENDIX A: ECONOMIC IMPACT BY JURISDICTION

Table 2: Arlington, Virginia | Economic Impact

ARLINGTON COUNTY		JOBS	LABOR INCOME	OUTPUT
Capital Expenditure Impacts (One Time Only)				
Phase I	Direct effects	1,329	\$111,237,379	\$216,614,857
	Indirect effects	69	\$7,154,904	\$16,212,265
	Induced effects	232	\$13,267,610	\$38,827,060
	Total	1,629	\$131,659,892	\$271,654,182
Phase II	Direct effects	2,747	\$225,626,379	\$436,516,987
	Indirect effects	138	\$14,418,387	\$32,670,560
	Induced effects	470	\$26,898,680	\$78,717,782
	Total	3,354	\$266,943,445	\$547,905,330
Phase III	Direct effects	4,792	\$386,331,661	\$747,431,783
	Indirect effects	237	\$24,688,067	\$55,940,584
	Induced effects	804	\$46,057,609	\$134,785,532
	Total	5,833	\$457,077,337	\$938,157,899
Total Capital Expenditure Impacts		10,816	\$855,680,674	\$1,757,717,409
Operating Impacts (Annual & Additive)				
Phase I	Direct effects	3,901	\$554,587,709	\$944,399,231
	Indirect effects	1,102	\$97,865,020	\$221,335,323
	Induced effects	1,485	\$85,210,196	\$249,283,516
	Total	6,487	\$737,662,925	\$1,415,018,070
Phase II	Direct effects	8,192	\$1,134,908,429	\$1,921,136,378
	Indirect effects	2,250	\$199,295,189	\$448,942,482
	Induced effects	3,036	\$174,234,258	\$509,723,802
	Total	13,479	\$1,508,437,875	\$2,879,802,662
Phase III	Direct effects	12,906	\$1,758,390,769	\$2,981,979,231
	Indirect effects	3,509	\$310,929,760	\$699,089,160
	Induced effects	4,708	\$270,161,786	\$790,357,203
	Total	21,123	\$2,339,482,315	\$4,471,425,593
Total Operational Impacts at Full Build Out		41,089	\$4,585,583,114	\$8,766,246,325

Source: Sage, IMPLAN

The Economic & Office Market Impact of Amazon's HQ2 in Crystal City, Virginia

Table 3: District of Columbia | Economic Impact

DISTRICT OF COLUMBIA		JOBS	LABOR INCOME	OUTPUT
Capital Expenditure Impacts (One Time Only)				
Phase I	Direct effects	0	\$0	\$0
	Indirect effects	11	\$1,172,030	\$2,514,857
	Induced effects	27	\$1,714,926	\$4,628,931
	Total	38	\$2,886,955	\$7,143,788
Phase II	Direct effects	0	\$0	\$0
	Indirect effects	23	\$2,361,846	\$5,067,877
	Induced effects	55	\$3,476,058	\$9,382,864
	Total	77	\$5,837,903	\$14,450,741
Phase III	Direct effects	0	\$0	\$0
	Indirect effects	39	\$4,044,101	\$8,677,537
	Induced effects	94	\$5,951,924	\$16,065,929
	Total	133	\$9,996,025	\$24,743,466
Total Capital Expenditure Impacts		248	\$18,720,882	\$46,337,994
Operating Impacts (Annual & Additive)				
Phase I	Direct effects	0	0	0
	Indirect effects	229	\$19,862,149	\$33,058,015
	Induced effects	50	\$4,007,784	\$8,651,793
	Total	279	\$23,869,932	\$41,709,808
Phase II	Direct effects	0	0	0
	Indirect effects	482	\$41,618,438	\$69,147,303
	Induced effects	103	\$8,289,535	\$17,911,191
	Total	585	\$49,907,973	\$87,058,493
Phase III	Direct effects	0	0	0
	Indirect effects	758	\$65,375,363	\$108,573,692
	Induced effects	161	\$12,935,999	\$27,964,974
	Total	919	\$78,311,361	\$136,538,665
Total Operational Impacts at Full Build Out		1,783	\$152,089,266	\$265,306,966

Source: Sage, IMPLAN

The Economic & Office Market Impact of Amazon's HQ2 in Crystal City, Virginia

Table 4: Alexandria City, Virginia | Economic Impact

ALEXANDRIA CITY		JOBS	LABOR INCOME	OUTPUT
Capital Expenditure Impacts (One Time Only)				
Phase I	Direct effects	0	\$0	\$0
	Indirect effects	9	\$844,850	\$1,951,409
	Induced effects	26	\$1,505,030	\$4,399,777
	Total	35	\$2,349,879	\$6,351,186
Phase II	Direct effects	0	\$0	\$0
	Indirect effects	17	\$1,702,520	\$3,932,432
	Induced effects	54	\$3,051,129	\$8,919,606
	Total	71	\$4,753,648	\$12,852,038
Phase III	Direct effects	0	\$0	\$0
	Indirect effects	29	\$2,915,162	\$6,733,357
	Induced effects	91	\$5,224,334	\$15,272,709
	Total	121	\$8,139,495	\$22,006,066
Total Capital Expenditure Impacts		225	\$15,243,022	\$41,209,289
Operating Impacts (Annual & Additive)				
Phase I	Direct effects	0	0	0
	Indirect effects	14	\$1,068,143	\$3,068,267
	Induced effects	8	\$473,889	\$1,373,807
	Total	22	\$1,542,032	\$4,442,074
Phase II	Direct effects	0	0	0
	Indirect effects	29	\$2,163,408	\$6,141,693
	Induced effects	17	\$965,486	\$2,798,608
	Total	45	\$3,128,894	\$8,940,301
Phase III	Direct effects	0	0	0
	Indirect effects	45	\$3,367,511	\$9,547,443
	Induced effects	26	\$1,499,452	\$4,346,680
	Total	70	\$4,866,963	\$13,894,123
Total Operational Impacts at Full Build Out		138	\$9,537,889	\$27,276,497

Source: Sage, IMPLAN

The Economic & Office Market Impact of Amazon's HQ2 in Crystal City, Virginia

Table 5: Remainder of Washington Metro Area | Economic Impact

REMAINDER OF WASHINGTON METRO AREA ¹		JOBS	LABOR INCOME	OUTPUT
Capital Expenditure Impacts (One Time Only)				
Phase I	Direct effects	0	\$0	\$0
	Indirect effects	37	\$3,388,864	\$9,670,025
	Induced effects	22	\$1,287,481	\$3,683,388
	Total	58	\$4,676,344	\$13,353,413
Phase II	Direct effects	0	\$0	\$0
	Indirect effects	73	\$6,829,156	\$19,486,798
	Induced effects	44	\$2,601,983	\$7,443,531
	Total	117	\$9,431,139	\$26,930,330
Phase III	Direct effects	0	\$0	\$0
	Indirect effects	125	\$11,693,310	\$33,366,520
	Induced effects	74	\$4,455,279	\$12,745,282
	Total	199	\$16,148,588	\$46,111,801
Total Capital Expenditure Impacts		373	\$30,256,071	\$86,395,543
Operating Impacts (Annual & Additive)				
Phase I	Direct effects	0	0	0
	Indirect effects	71	\$6,494,234	\$19,675,968
	Induced effects	70	\$4,633,739	\$13,053,811
	Total	141	\$11,127,972	\$32,729,779
Phase II	Direct effects	0	0	0
	Indirect effects	143	\$12,990,840	\$39,535,023
	Induced effects	142	\$9,418,830	\$26,532,735
	Total	285	\$22,409,671	\$66,067,757
Phase III	Direct effects	0	0	0
	Indirect effects	222	\$20,165,070	\$61,425,470
	Induced effects	220	\$14,611,340	\$41,160,766
	Total	442	\$34,776,409	\$102,586,235
Total Operational Impacts at Full Build Out		867	\$68,314,051	\$201,383,770

Source: Sage, IMPLAN

¹Includes Fairfax County, Frederick County, Loudon County, Montgomery County, Prince George's County, and Prince William County.

APPENDIX B: HOW TO INTERPRET THE RESULTS FROM IMPLAN

To quantify economic impacts, we used IMPLAN economic modeling software and its embodied multipliers to generate estimates of employment, labor income, and output (also referred to as economic activity or business sales). Below is an abbreviated glossary of terms presented as simply and efficiently as possible.²

Employment

As defined by IMPLAN, a job that lasts 12 months equals one job, two jobs that last six months also equal one job, three jobs that last four months equal one job, etc. Based on this, job-years represents a useful term. For instance, an endeavor that supports 200 jobs for a six-month period would be considered to support 100 jobs as measured in job-years.

For construction or capital investment events (one time only), for which the economic or fiscal impacts occur only once, the stated number of jobs is the total number of job-years that will be supported across the duration of the capital project. For operational (ongoing) impacts, job figures are annual and will occur every year so long as operations persist.

Note that IMPLAN jobs aren't quite the same thing as full-time equivalents (FTEs). Each of IMPLAN's 536 unique industries has a different conversion rate between jobs and FTEs, although for almost every industry one job is equal to less than one FTE.

Labor Income

Labor income encompasses wages, benefits, and proprietor income (accruing to business owners).

Labor income = all forms of employee compensation (wages and benefits) + proprietor income

Output (Business Activity, Economic Activity)

Output equals the value of industry production. It might be easier to conceptualize this as total business sales or economic activity. For retail industries, it is the gross margin (not gross sales). For manufacturing, output is the quantity of total sales plus/minus the change in inventories. For the service sector, output is directly equal to sales. This can be visualized by the following equation:

Output =

(Manufacturing sales +/- change in inventories) + (service sector sales) + (gross margin for wholesale and retail trade)

These figures are based on annual production estimates for the year of the dataset. In this instance, the year is 2016, the most recent year for which data are available.

DIRECT EFFECTS: Direct effects are impacts tightly aligned with the endeavor being analyzed. In this instance, Amazon's HQ2 produces direct effects via operational spending, employees, and compensation.

INDIRECT EFFECTS: Indirect effects stem from business-to-business spending activity within the study area that occurs as a result of the direct effects. These can also be considered broader supply chain effects.

INDUCED EFFECTS: Induced effects relate to household spending that occurs due to an expanded economy. For instance, if one were modeling a construction project, associated construction worker income spent at local restaurants or gift shops would be included in the induced effects category.

²These definitions are largely attributable to IMPLAN user Phil Cheney, who, as of this writing, has contributed over 300 articles to the IMPLAN Knowledge Base.

For More Information, Please Contact

Elizabeth Norton

Managing Research Director - Mid-Atlantic Region
202.775.7026
elizabeth.norton@transwestern.com



1717 K St NW
Suite 1000
Washington, D.C. 20006

202.775.7000 | transwestern.com

Anirban Basu

Chairman & CEO - Sage Policy Group, Inc.

Sage Policy Group, Inc

Sage Policy Group, Inc.
575 South Charles St
Suite 505
Baltimore, MD 21201

410.522.7243 | sagepolicy.com