[HPS] LEADING THINKING

Ranking Amazon's HQ2 Options

February 2018

Executive Summary

Hamilton Place Strategies (HPS) analyzed the requirements and preferences outlined in Amazon's HQ2 RFP to rank the remaining U.S. cities on Amazon's top 20 list. Our review of the HQ2 RFP resulted in the identification and analysis of 11 metrics* in four categories for all of the 19 U.S. finalist locations.** The four categories are:

- Transportation

- Education

- Business, Lifestyle, and Culture

- Connectivity

Each of the 19 U.S. locations received a final score based on these metrics out of a possible score of 11. For each metric, locations above the "city average"*** received one point, locations below the "city average" received zero points, and locations exactly at the "city average" received half a point. Our full methodology can be found on slide 15.

*Certain requirements related to commercial real estate, incentives, and transportation were not measurable due to lack of publicly available data
**Due to lack of uniform data between the U.S. and Canada, Toronto was excluded from this analysis
***City average refers to the average of the 19 cities for a given metric

Based On Amazon's HQ2 Criteria, Washington, D.C. Scores Highest

■ = Above Average   ■ = Below Average   ■ = Average

	Atlanta	Austin	Boston	Chicago	Columbus	Dallas	Denver	Indianapolis	Los Angeles	Miami	Montgomery County	Nashville	Newark	New York City	Northern Virginia	Philadelphia	Pittsburgh	Raleigh	Washington, D.C.	Average
Within 45 minutes of an international airport	Y	N	Y	Y	N	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	N/A
Number of total direct international destinations	44	1	25	42	0	29	9	0	51	78	36	1	49	129	30	14	0	1	36	30
Direct flights to Seattle, NYC, Bay Area, and D.C.	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N/A
Overall mass transit score	7.9	5.1	9.4	9.1	5.1	6.8	7.9	4.0	7.7	8.7	7.0	3.6	8.7	9.6	7.4	9.0	8.3	4.8	9.3	7.3
Percent of population with bachelor's degree or higher	36.5%	42.0%	45.4%	36.1%	34.8%	33.1%	41.3%	32.2%	32.6%	30.1%	49.4%	33.0%	38.1%	38.1%	49.4%	35.5%	32.5%	44.3%	49.4%	38.6%
Number of top 50 national universities within 50 miles	2	0	7	2	0	0	0	0	5	1	2	1	3	3	2	4	1	2	2	1.95
Business and career rankings	9	8	30	76	11	10	4	21	91	84	77	12	152	113	57	83	85	2	57	52
"Livability" score	6.6	7.8	7.1	6.1	6.5	7.1	7.5	6.5	5.9	5.8	7.3	7.1	6.1	6.1	7.3	6.2	6.5	7.2	7.3	6.7
Diversity, by percent of foreign-born population	13.4%	14.6%	17.7%	17.7%	7.3%	17.8%	12.2%	6.4%	33.6%	39.4%	22.3%	7.6%	28.7%	28.7%	22.3%	10.3%	3.7%	11.8%	22.3%	17.8%
Percent of state population covered by fiber optic networks	26.9%	20.4%	39.7%	5.4%	11.6%	20.4%	12.6%	17.3%	17.2%	27.1%	60.9%	28.0%	64.9%	59.1%	48.4%	41.9%	41.9%	22.3%	57.4%	32.8%
Area with cellular network coverage from at least one major provider	78.9%	84.6%	92.7%	96.8%	94.8%	97.3%	96.7%	94.7%	96.2%	96.2%	77.1%	78.6%	100.0%	98.5%	80.7%	98.1%	97.5%	77.9%	98.6%	91.4%
Final score	6	4	9	6	2	6	7	2	7	6	8	3	8	8	8.5	6	3	5	10	6.0

D.C. Edges Out Boston For Gold, But Access To Top Universities May Impact Amazon's Final Choice

Washington D.C.

- Third highest scored mass transit after New York City and Boston, but multiple international airports and above average international destinations
- Best educated workforce, but fewer top 50 universities than Boston, Los Angeles, Philadelphia, Newark, and New York City
- Above average livability and diversity, but below average business and career ranking
- Nearly 60 percent fiber optic coverage and nearly 99 percent cellular coverage

Boston

- Second highest scored mass transit, but below average international destinations
- Second highest educated workforce and seven top 50 universities, five more than Washington, D.C.
- Above average livability and business and career ranking, but slightly below average diversity
- Nearly 40 percent fiber optic coverage and nearly 93 percent cellular coverage

Northern Virginia

- Above average mass transit score and average number of international destinations
- Best educated workforce, but fewer top 50 universities than Boston, Los Angeles, Philadelphia, Newark, and New York City
- Above average livability and diversity, but below average business and career ranking
- Nearly 50 percent fiber optic coverage but below average cellular coverage, at nearly 81 percent

3

[HPS]

Within 45 Minutes Of An International Airport

Atlanta	Austin	Boston	Chicago
✔	✘	✔	✔
ATL		BOS	ORD
Columbus	**Dallas**	**Denver**	**Indianapolis**
✘	✔	✔	✘
	DFW	DEN	
Los Angeles	**Miami**	**Montgomery County**	**Nashville**
✔	✔	✔	✘
LAX	MIA, FLL	BWI, IAD	
Newark	**New York City**	**Northern Virginia**	**Philadelphia**
✔	✔	✔	✔
EWR	EWR, JFK	IAD	PHL
Pittsburgh	**Raleigh**	**Washington, D.C.**	
✘	✘	✔	
		BWI, IAD	

Source: Department of Transportation, Office of Aviation Analysis, U.S. International Air Passenger and Freight Statistics Report, 2016, accessed 1/24/18
Note: Airport assumed to be "international" if there are more than 10 direct international destinations

Number Of Total Direct International Destinations

Average City: 30

Atlanta	Austin	Boston	Chicago
44	1	25	42
Columbus	**Dallas**	**Denver**	**Indianapolis**
0	29	9	0
Los Angeles	**Miami**	**Montgomery County**	**Nashville**
51	78	36	1
Newark	**New York City**	**Northern Virginia**	**Philadelphia**
49	129	30	14
Pittsburgh	**Raleigh**	**Washington, D.C.**	
0	1	36	

Direct Flights To Seattle, New York, The Bay Area, And D.C.

Atlanta	Austin	Boston	Chicago
✔	✔	✔	✔
Columbus	**Dallas**	**Denver**	**Indianapolis**
✘	✔	✔	✘
Los Angeles	**Miami**	**Montgomery County**	**Nashville**
✔	✔	✔	✔
Newark	**New York City**	**Northern Virginia**	**Philadelphia**
✔	✔	✔	✔
Pittsburgh	**Raleigh**	**Washington, D.C.**	
✘	✔	✔	

Source: Bureau of Transportation Statistics, T-100 Domestic Segment (All Carriers), 2016, accessed 2/7/18

Overall Mass Transit Score

Average City: 7.3

Atlanta	Austin	Boston	Chicago
7.9	**5.1**	**9.4**	**9.1**
Columbus	**Dallas**	**Denver**	**Indianapolis**
5.1	**6.8**	**7.9**	**4.0**
Los Angeles	**Miami**	**Montgomery County**	**Nashville**
7.7	**8.7**	**7.0**	**3.6**
Newark	**New York City**	**Northern Virginia**	**Philadelphia**
8.7	**9.6**	**7.4**	**9.0**
Pittsburgh	**Raleigh**	**Washington, D.C.**	
8.3	**4.8**	**9.3**	

Source: Center for Neighborhood Technology, AllTransit Performance Score, accessed 2/1/18
Note: Northern Virginia is the average of Arlington County and Fairfax County

Percent Of Population With A Bachelor's Degree Or Higher

Average City: 38.6%

Atlanta	Austin	Boston	Chicago
36.5%	**42.0%**	**45.4%**	**36.1%**
Columbus	**Dallas**	**Denver**	**Indianapolis**
34.8%	**33.1%**	**41.3%**	**32.2%**
Los Angeles	**Miami**	**Montgomery County**	**Nashville**
32.6%	**30.1%**	**49.4%**	**33.0%**
Newark	**New York City**	**Northern Virginia**	**Philadelphia**
38.1%	**38.1%**	**49.4%**	**35.5%**
Pittsburgh	**Raleigh**	**Washington, D.C.**	
32.5%	**44.3%**	**49.4%**	

Number Of Top 50 National Universities Within 50 Miles

Average City: 1.95

Atlanta	Austin	Boston	Chicago
2	**0**	**7**	**2**
Emory, Georgia Tech		*Harvard, MIT, Tufts, BC, Brandeis, BU, Northeastern*	*University of Chicago, Northwestern*
Columbus	**Dallas**	**Denver**	**Indianapolis**
0	**0**	**0**	**0**
Los Angeles	**Miami**	**Montgomery County**	**Nashville**
5	**1**	**2**	**1**
Cal Tech, UCLA, USC, UC Irvine, Pepperdine	*University of Miami*	*Johns Hopkins, Georgetown*	*Vanderbilt*
Newark	**New York City**	**Northern Virginia**	**Philadelphia**
3	**3**	**2**	**4**
Princeton, Columbia, NYU	*Princeton, Columbia, NYU*	*Johns Hopkins, Georgetown*	*Princeton, Penn, Lehigh, Villanova*
Pittsburgh	**Raleigh**	**Washington, D.C.**	
1	**2**	**2**	
Carnegie Mellon	*Duke, UNC*	*Johns Hopkins, Georgetown*	

Source: *U.S. News & World Report*, "National University Rankings," 2018, Note: "Within 50 miles of the city" determined by algorithm in *U.S. News & World Report*'s searchable database using city name except for Los Angeles and Philadelphia, which were directing to other locations (East Los Angeles and New Philadelphia, respectively), so we used the zip code of city hall for these cities

Business And Career Rankings

Average Ranking: #52

Atlanta #9	Austin #8	Boston #30	Chicago #76
Columbus #11	Dallas #10	Denver #4	Indianapolis #21
Los Angeles #91	Miami #84	Montgomery County #77	Nashville #12
Newark #152	New York City #113	Northern Virginia #57	Philadelphia #83
Pittsburgh #85	Raleigh #2	Washington, D.C. #57	

"Livability" Score

Average Score: 6.7

Atlanta	Austin	Boston	Chicago
6.6	**7.8**	**7.1**	**6.1**
Columbus	Dallas	Denver	Indianapolis
6.5	**7.1**	**7.5**	**6.5**
Los Angeles	Miami	Montgomery County	Nashville
5.9	**5.8**	**7.3**	**7.1**
Newark	New York City	Northern Virginia	Philadelphia
6.1	**6.1**	**7.3**	**6.2**
Pittsburgh	Raleigh	Washington, D.C.	
6.5	**7.2**	**7.3**	

Source: *U.S. News & World Report*, "100 Best Places To Live In The USA," 2017.
Note: Scores based on MSA. New York City and Newark share a MSA; Washington, D.C., Northern Virginia, and Montgomery County share a MSA

[HPS]

Diversity, By Percent Of Foreign-Born Population

Average City: 17.8%

Atlanta	Austin	Boston	Chicago
13.4%	**14.6%**	**17.7%**	**17.7%**
Columbus	**Dallas**	**Denver**	**Indianapolis**
7.3%	**17.8%**	**12.2%**	**6.4%**
Los Angeles	**Miami**	**Montgomery County**	**Nashville**
33.6%	**39.4%**	**22.3%**	**7.6%**
Newark	**New York City**	**Northern Virginia**	**Philadelphia**
28.7%	**28.7%**	**22.3%**	**10.3%**
Pittsburgh	**Raleigh**	**Washington, D.C.**	
3.7%	**11.8%**	**22.3%**	

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates, "S0501 Selected Characteristics Of The Native And Foreign-Born Populations," accessed 2/1/18
Note: Percentages based on MSA. New York City and Newark share a MSA; Washington, D.C., Northern Virginia, and Montgomery County share a MSA

Percent Of State Population Covered By Fiber Optic Networks

Average City: 32.8%

Atlanta	Austin	Boston	Chicago
26.9%	**20.4%**	**39.7%**	**5.4%**
Columbus	Dallas	Denver	Indianapolis
11.6%	**20.4%**	**12.6%**	**17.3%**
Los Angeles	Miami	Montgomery County	Nashville
17.2%	**27.1%**	**60.9%**	**28.0%**
Newark	New York City	Northern Virginia	Philadelphia
64.9%	**59.1%**	**48.4%**	**41.9%**
Pittsburgh	Raleigh	Washington, D.C.	
41.9%	**22.3%**	**57.4%**	

13

Area With Cellular Network Coverage From At Least One Major Provider

Average City: 91.4%

Atlanta	Austin	Boston	Chicago
78.9%	**84.6%**	**92.7%**	**96.8%**
Columbus	Dallas	Denver	Indianapolis
94.8%	**97.3%**	**96.7%**	**94.7%**
Los Angeles	Miami	Montgomery County	Nashville
96.2%	**96.2%**	**77.1%**	**78.6%**
Newark	New York City	Northern Virginia	Philadelphia
100.0%	**98.5%**	**80.7%**	**98.1%**
Pittsburgh	Raleigh	Washington, D.C.	
97.5%	**77.9%**	**98.6%**	

14

Methodology

HPS reviewed Amazon's HQ2 RFP to identify and analyze 11 metrics in four categories for all 19 U.S. finalist locations, including:

Transportation
- Proximity to international airport (45 minutes)
    - Metric: Approximate travel time from a city's downtown to an international airport using Google Maps. We use 10 direct international flights to qualify an airport as international
    - Metric: Combined number of direct international routes per year with more than 90,000 passengers from international airports in proximity to a city's downtown
- Direct daily flights to Seattle, New York (JFK, LGA), San Francisco (SFO, OAK, SJC), and Washington, D.C. (BWI, IAD, DCA)
    - Metric: Direct domestic routes from that city to the listed destinations with more than 36,000 passengers annually
- Access to mass transit (on site)
    - Metric: Overall mass transit score as measured by AllTransit, a project of Center for Neighborhood Technology

Education
- A highly educated labor pool and strong university system
    - Metric: Percent of population with a bachelor's degree or higher by MSA from U.S. Census Bureau American Community Survey 2016 5-Year Estimates
    - Metric: Top 50 national university within 50 miles from U.S. News & World Report 2018 National University Rankings, "within 50 miles" determined by algorithm in U.S. News & World Report searchable database using city name*

Business, Lifestyle, and Culture
- A stable and business-friendly environment
    - Metric: "Best Places For Business And Careers" from Forbes, 2017**
- Urban or suburban locations with the potential to attract and retain strong technical talent
    - Metric: "100 Best Places to Live in the USA" from U.S. News & World Report, 2017***
- Diverse population
    - Metric: Percent of population that is foreign-born by MSA from U.S. Census Bureau American Community Survey 2016 5-Year Estimates

Connectivity
- Fiber connectivity
    - Metric: Fiber optic coverage by share of state population covered via BROADBANDNOW
- Cell phone coverage
    - Metric: Percentage of area with cell phone coverage under 1 or more network with OpenSignal images analyzed via Image Color Summarizer

*Los Angeles and Philadelphia were directing to other locations (East Los Angeles and New Philadelphia, respectively), so we used the zip code of city hall for these cities
**Forbes criteria includes the following: job growth, net migration, cultural opportunities, colleges, business cost, and educational attainment. Cities are ranked 1-200
***U.S. News & World Report criteria includes the following: happiness, housing, healthcare, retiree taxes, job market, and desirability. Cities are graded on a scale of 1-10

Please feel free to reach out to HPS with questions or comments about this report.

Contact:
Matt McDonald, Partner
(202) 822-1205
mmcdonald@hamiltonps.com