AECOM

Peer Cities Analysis

Intel Impact Study

Columbus Foundation

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Intel Impact Study Overview

Key Questions

- What are the impacts of similar facilities to the two Intel semiconductor manufacturing plants being built in the Columbus region in other parts of the US?
- How have other regions addressed these impacts?
- How have other regions leveraged the opportunities that accompany these investments?

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Impact Areas

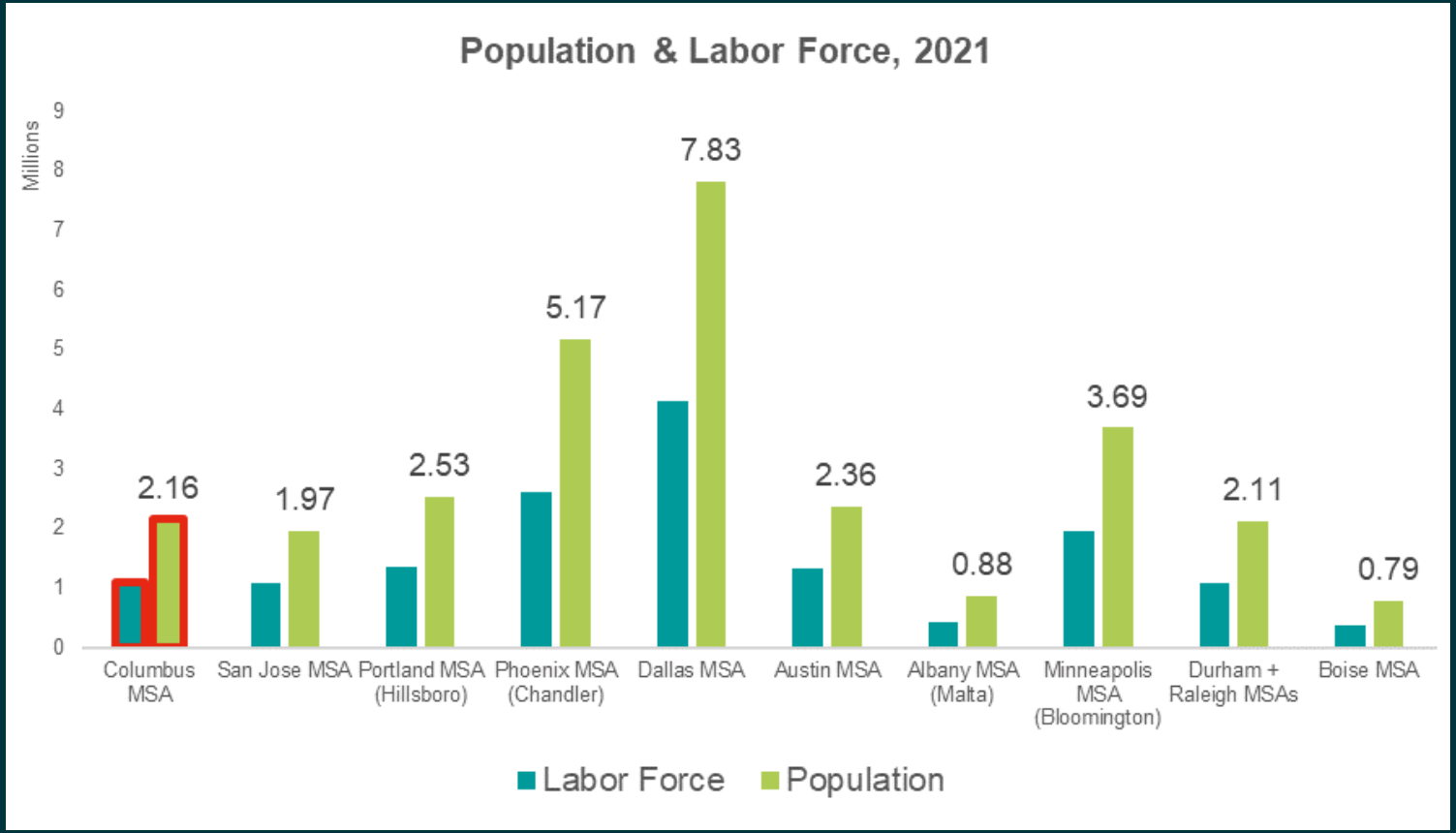
- Population & Housing
- Education & Workforce
- Economy & Employment
- Environment
- Transportation & Land Use

Peer City Selection

Peer Cities

Top 10 Cities for Semiconductor Manufacturing Jobs, 2021

- San Jose, CA
- Hillsboro, OR (Portland MSA)
- Chandler, AZ (Phoenix MSA)
- Dallas, TX
- Austin, TX
- Malta, NY (Albany MSA)
- Bloomington, MN (Minneapolis MSA)
- Durham, NC (Durham and Raleigh MSAs)
- Boise, ID

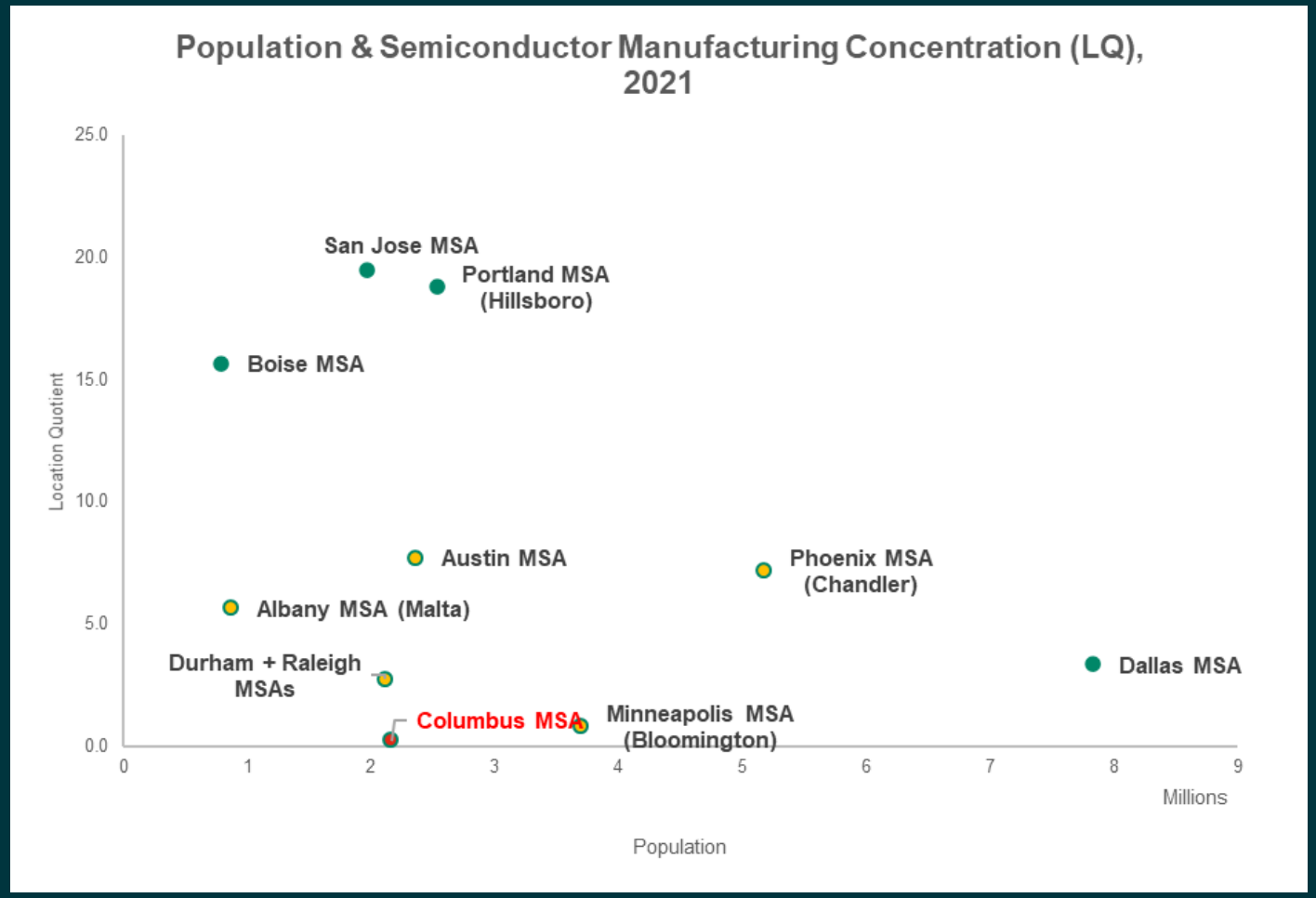


Source: Emsi, AECOM, 2022

Peer Cities

Selected Peer Cities

- Albany-Schenectady-Troy, NY
- Austin, TX
- Minneapolis, MI
- Raleigh-Cary-Durham-Chapel Hill, NC
- Chandler, AZ



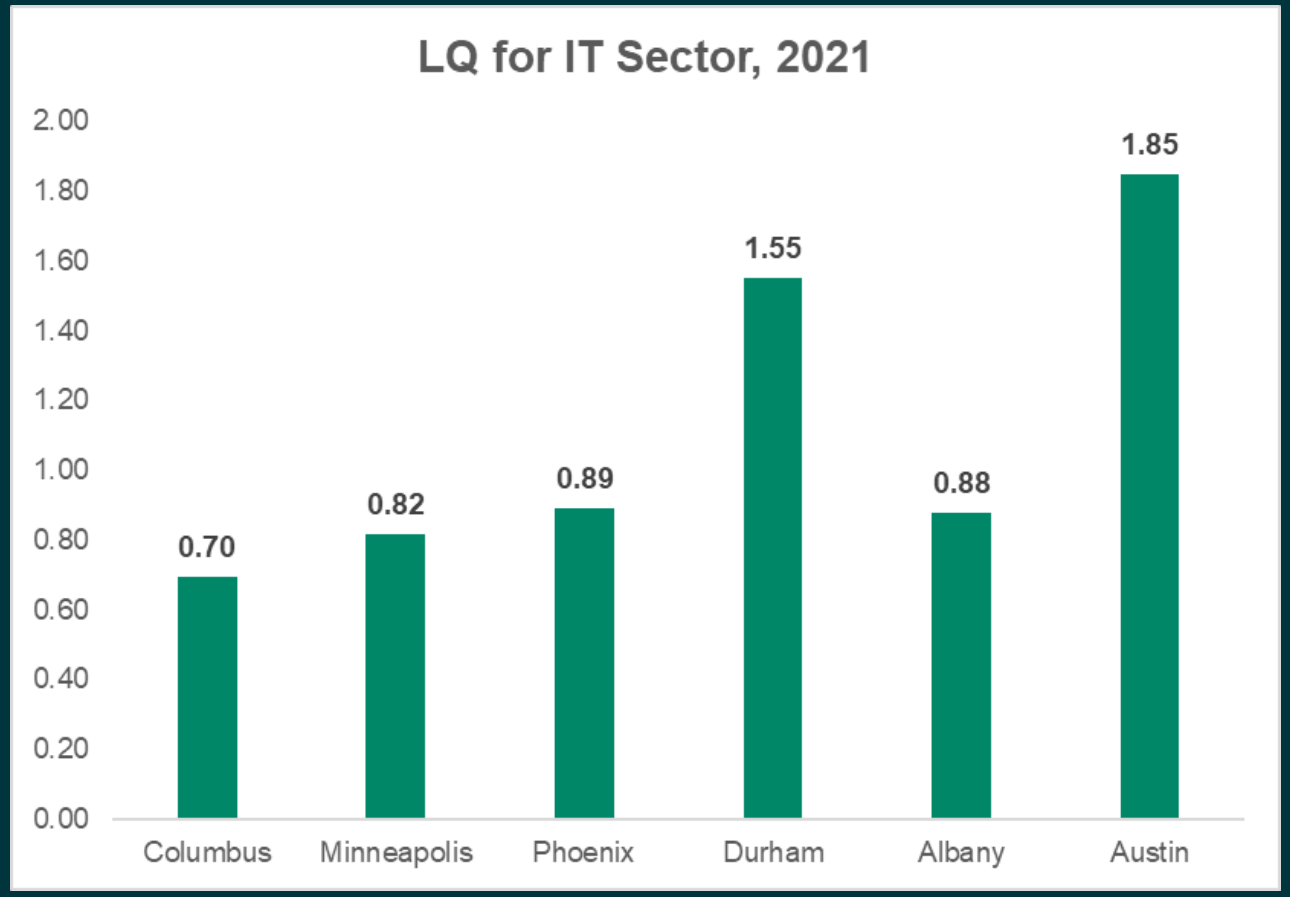
Source: Emsi, AECOM, 2022

Peer Cities

Criteria

- Population
- Concentration of semiconductor manufacturing employment
- Existing overall tech industry footprint

- Malta & Minneapolis MSAs have **nascent** tech clusters - good benchmarks for Columbus
- Both Bloomington & Saratoga had **limited tech industries** until relatively recently
- As of 2021, the Information Technology LQs for Columbus, Minneapolis, and Albany MSAs were **within 0.2 points** of each other



Source: Emsi, AECOM, 2022

Peer Cities

Semiconductor Plants & Employment

Albany MSA

GlobalFoundries has a chip fabrication plant in Malta, Fab 8, that started production in **2014**

GlobalFoundries reportedly employs nearly **3,000 people** at the Fab 8 plant. In July 2021, they announced plans to build a **second plant** in the region

Austin MSA

Austin is home to multiple plants, the first opening in 1989:

- Skorpios Tech (1989)
- NXP (1991)
- Infineon (1994)
- NXP (1995)
- Samsung (2011)

The Austin MSA employs nearly **11,000 people** in the semiconductor manufacturing industry.

Minneapolis MSA

Bloomington, within the Minneapolis MSA, has a Sanken Electric Co. fab plant that was retrofitted for semiconductor manufacturing in **2014**.

The Minneapolis MSA employs a little over **2,000 people** in the semiconductor manufacturing industry.

Phoenix MSA

The Phoenix MSA, which includes the cities of Tempe, Mesa, and Chandler, is home to 9 chip fab plants as of 2022, of which 4 are Intel plants, built in 1996, 2007, and 2020.

The Phoenix MSA employs nearly **20,000 people** in the semiconductor manufacturing industry.

Raleigh-Durham

The city of Durham, NC, is home to a CREE Inc. chip fabrication plant that started production in 1997 and is estimated to employ nearly **3,500 people**.

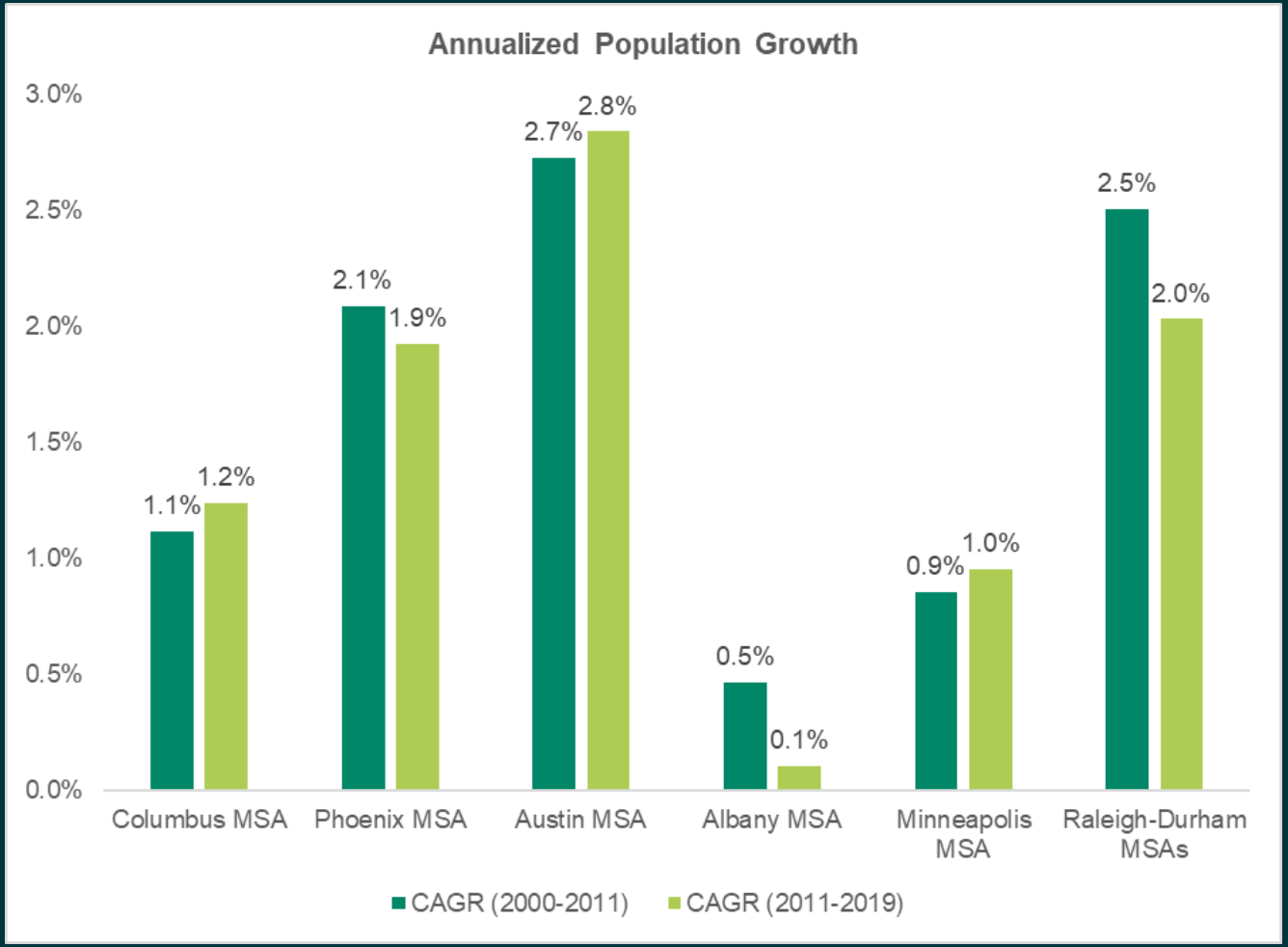
The Raleigh-Durham region provides insight into the impacts of a single plant, which has provided stable employment for several decades.

Impacts

Population

How does the advent of tech manufacturing impact population growth in peer cities?

- The majority of Peer City chip fab plants have come online since 2011
- Austin and Phoenix, now established tech hubs, have been some of the fastest-growing cities in the U.S. over the last decade
- Raleigh-Durham, a smaller MSA, has also seen rapid, largely tech-driven growth
- There is not enough detail to show correlation vs. causation, but population growth + burgeoning tech sectors appear to go hand-in-hand

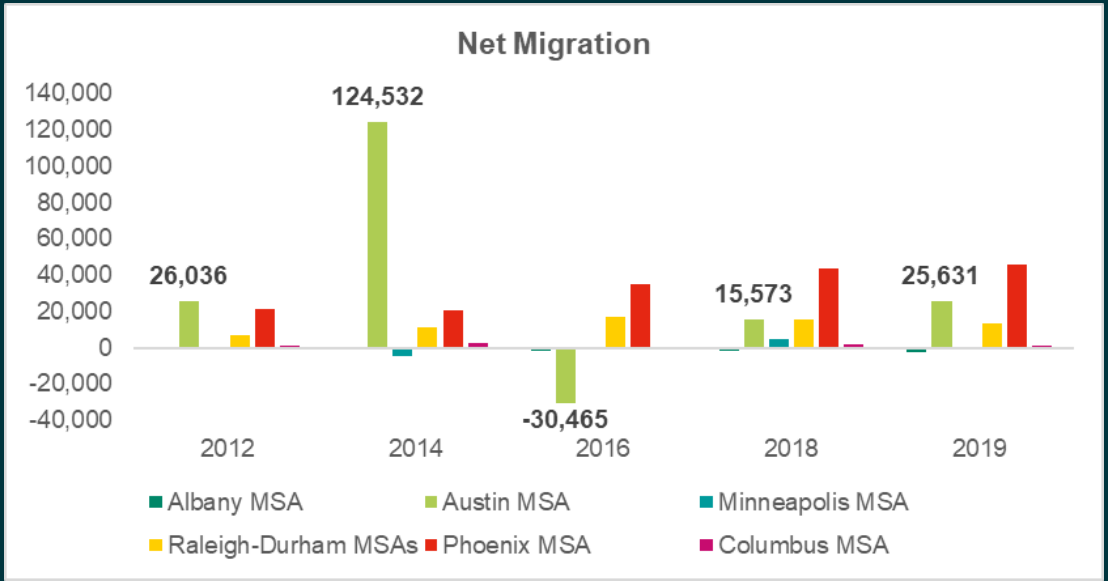


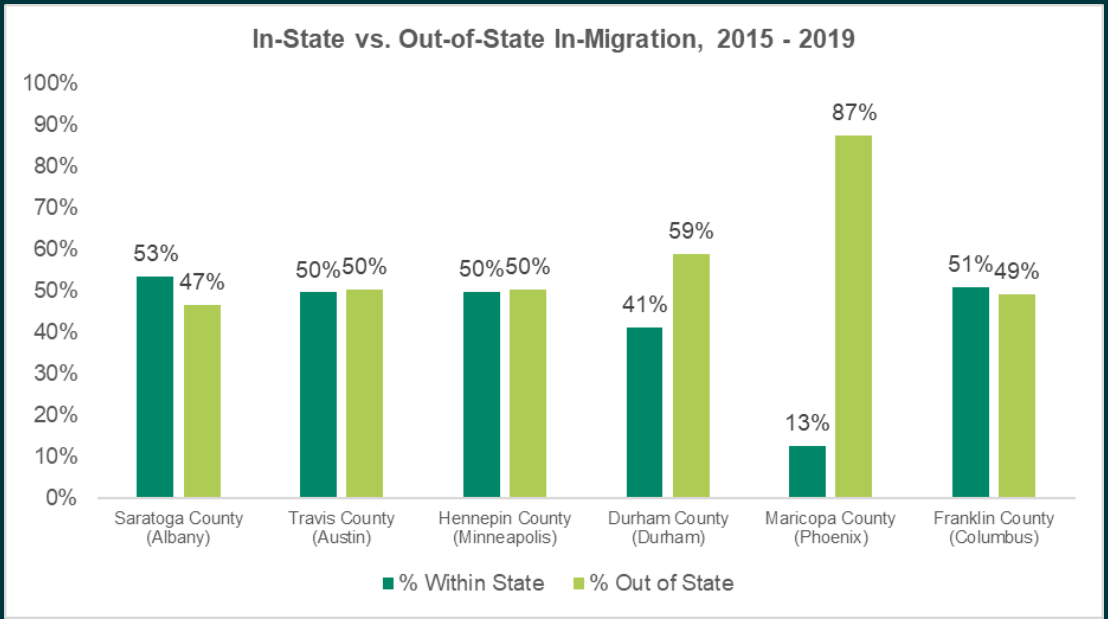
Source: Emsi, AECOM, 2022

Population

How does tech manufacturing impact in-migration?

- Austin has experienced the highest net in-migration, roughly half from in-state vs. half from outside
- Columbus & Minneapolis experienced the lowest out of the regions compared
- Phoenix and Raleigh-Durham saw larger shares of migrants from out-of-state
- Key question – how can Columbus prepare current residents to be employable in tech manufacturing?



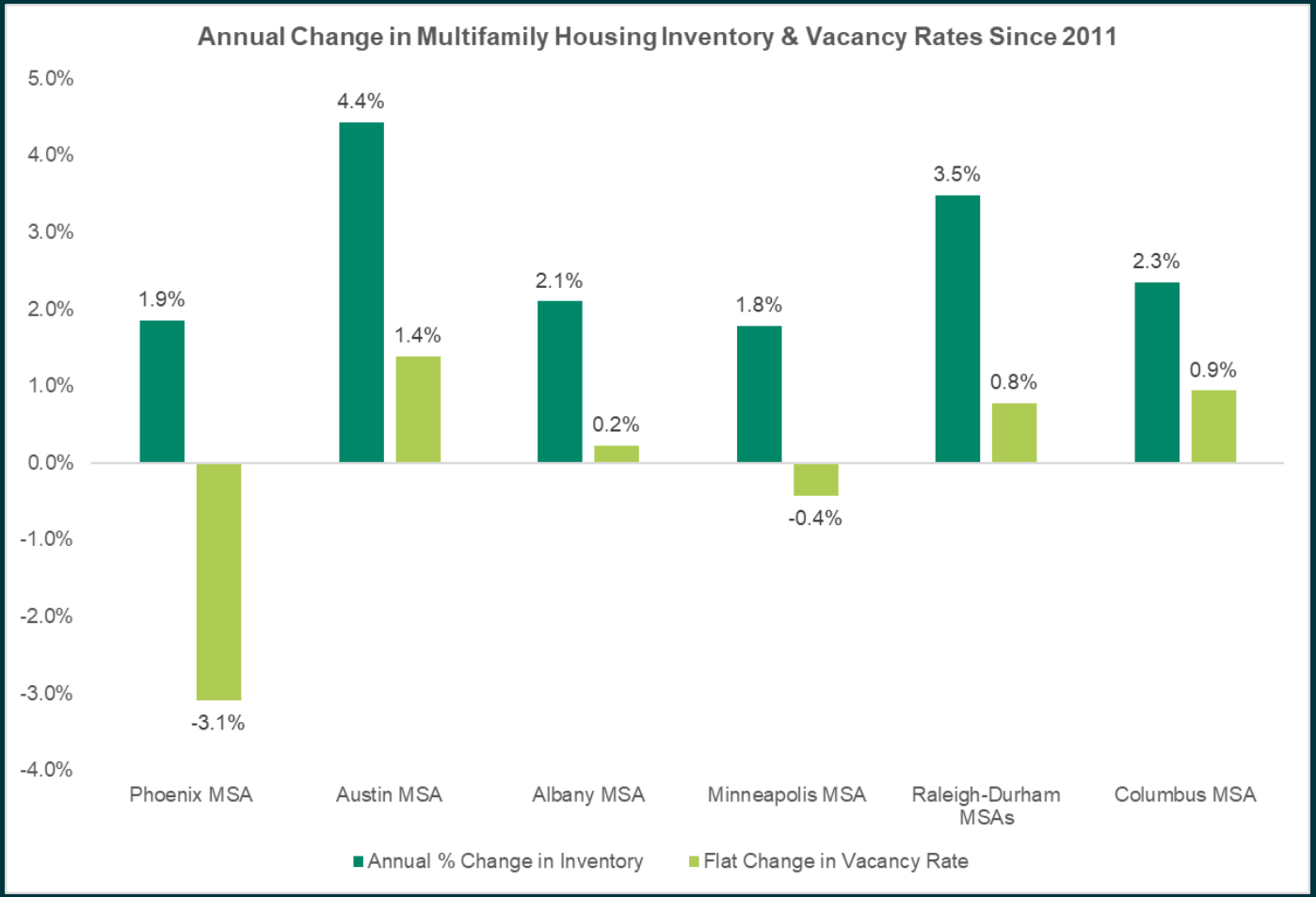


Source: Emsi, AECOM, 2022

Housing

How do burgeoning tech clusters impact housing supply & demand?

- Austin & Raleigh-Durham have seen significant increases in multifamily housing post-plant establishment
- Negligible change in vacancies implies that supply is more or less keeping up with demand; cities like Phoenix and Minneapolis have since drops in vacancies, suggesting increased demand for multifamily housing outpacing supply
- Key question – how can Columbus position itself to increase housing supply at a sustainable pace, to accommodate both tech growth and growth spurred by its other major industries?

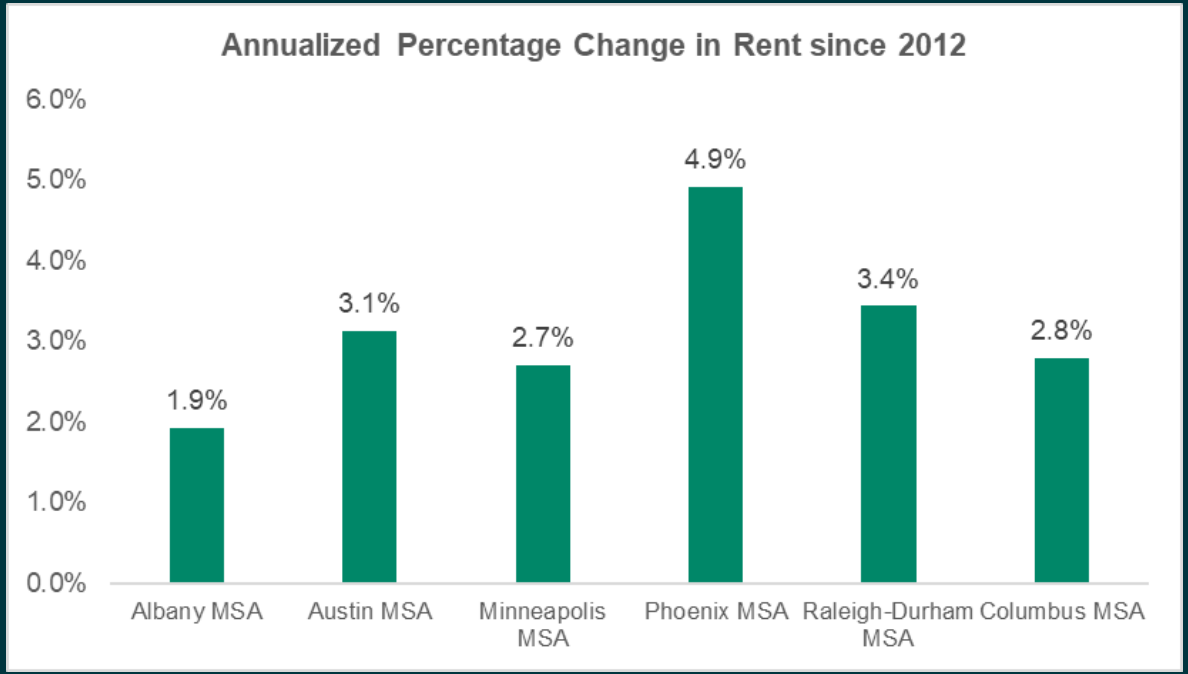


Source: CoStar, AECOM, 2022

Housing

How does tech/overall growth impact rents?

- The Austin and Minneapolis MSAs had the highest average asking rent per housing unit in 2019
- Phoenix and Austin saw the fastest growth in average rents
- Columbus has already seen steady uptick in rents since 2012, which will likely be exacerbated by additional demand
- Peer cities are exploring options like relaxing zoning, allowing accessory dwelling units, and fast-tracking by-right development of housing; some, like Austin, or directly funding the development of affordable units, like Minneapolis



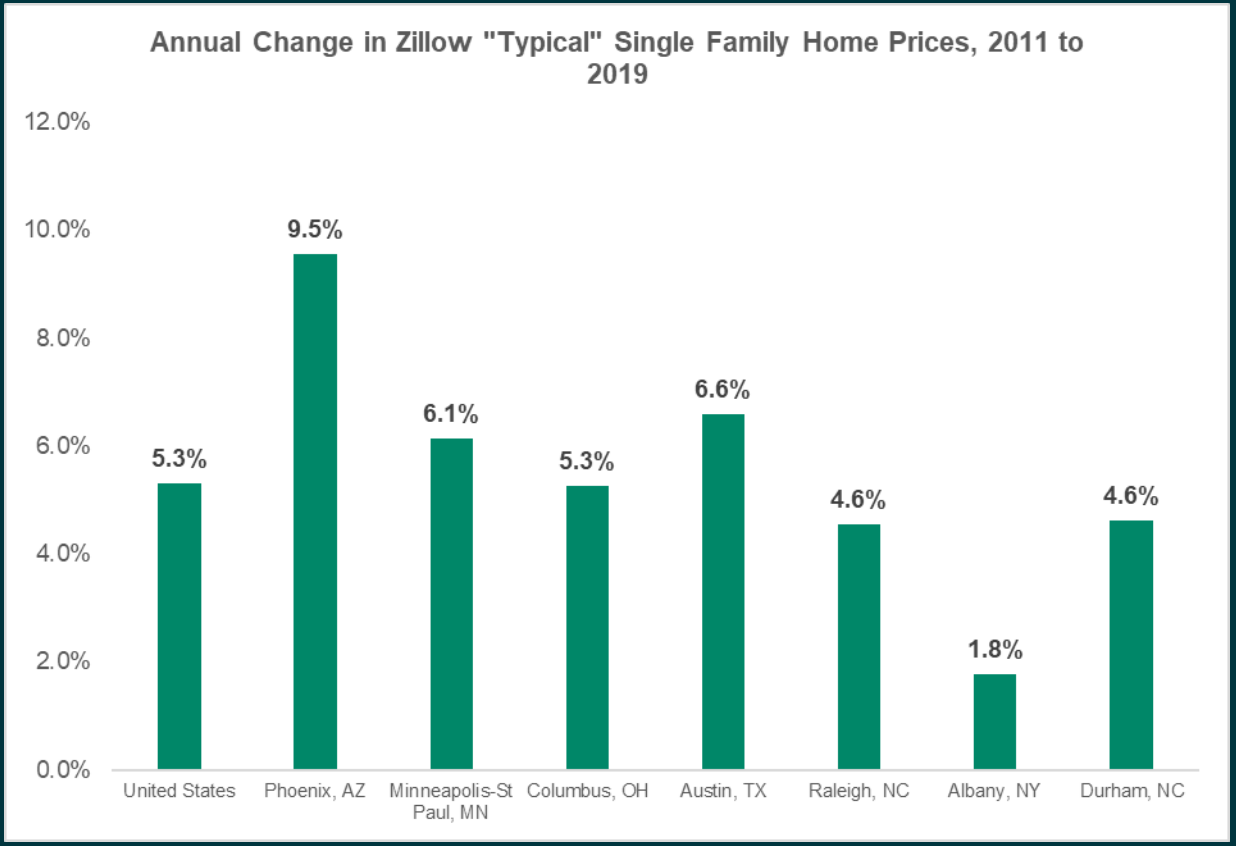
Market	2019 Asking Rent per Unit	Annual % Change in Rent since 2012
Albany MSA	$1,238	1.9%
Austin MSA	$1,352	3.1%
Minneapolis MSA	$1,303	2.7%
Phoenix MSA	$1,220	4.9%
Raleigh-Durham MSA	$1,190	3.4%
Columbus MSA	$1,002	2.8%

Source: CoStar, AECOM, 2022

Housing

How does tech/overall growth impact housing prices?

- Across the nation, home values have grown at 5.3% each year
- The cities of Phoenix, Minneapolis, and Austin have outpaced the rest of the country
- On average, the cost of for-sale housing rose faster than rents between 2011 and 2019
- Across the nations, communities are struggling to keep pace with the demand for single-family homes; land and construction costs are prohibitive to building “missing-middle” and workforce housing



Source: Zillow, AECOM, 2022

Housing

How might tech growth specifically impact housing costs?

- Redfin conducted an analysis of how housing prices are impacted by the **influx of tech workers** in multiple major metro areas
- The analysis found that for every **1% increase** in technology workers, there is a **~0.5 % increase** in home prices above and beyond the national rate of appreciation

MSA	Year-Over-Year Home-Price Increases	Year-Over-Year % Increase in Tech Workers
Denver	16.7%	9%
Portland	8.3%	12%
Austin	14.8%	14%
Silicon Valley	22.2%	15%
Boston	3.0%	18%
Seattle	12.7%	21%
Weighted Average	14.1%	16%
National Average	6.5%	3%

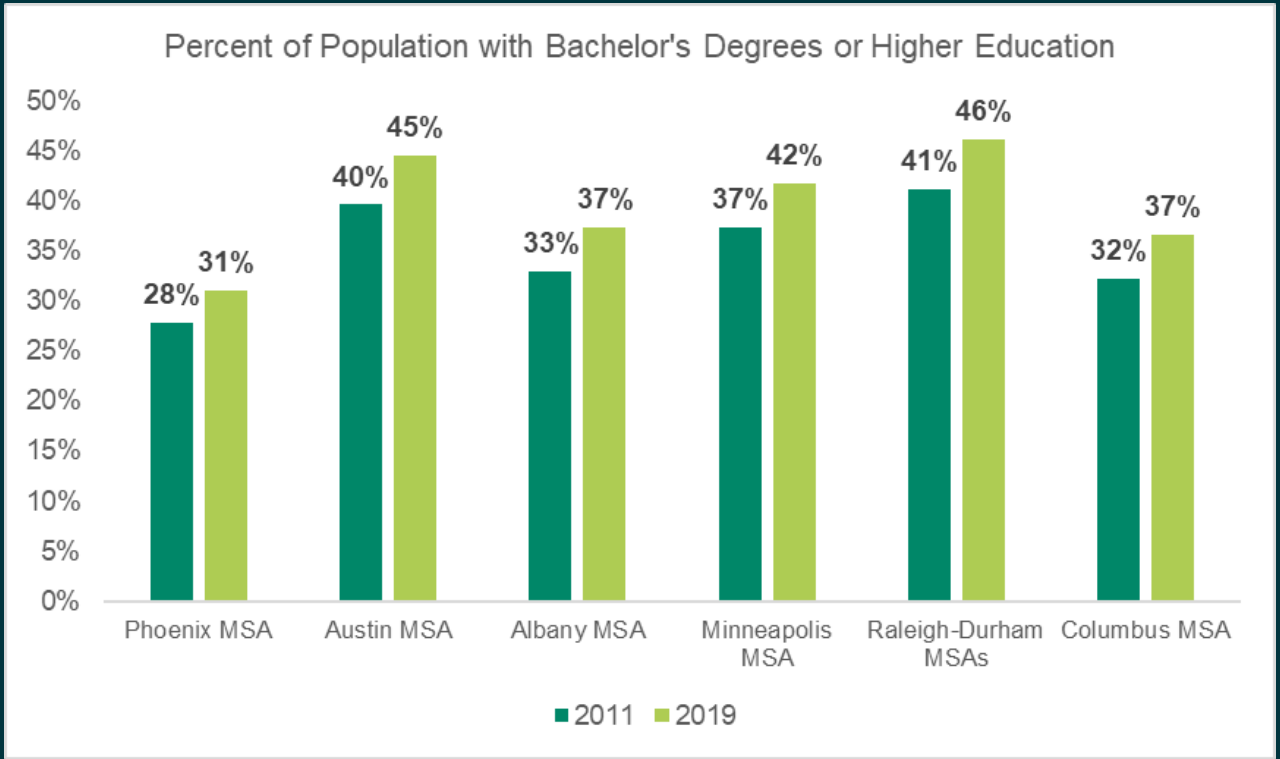
Source: Redfin, 2022

- Key question – can Columbus start identifying **target areas** for higher density growth near the new plants, while still providing a range of housing options that appeal to both the single- and multifamily housing markets?

Education & Workforce

What does educational attainment look like in peer cities?

- On average, the % of population with at least a 4-year degree increased by **4%** since 2011 across the peer cities
- Only Austin and Raleigh-Durham exceed the U.S. average of ~42% of adults holding at least a college degree
- All saw growth in advanced degrees (including Columbus) during the time period, suggestion "degree inflation" is a broader trend



Source: Emsi, AECOM, 2022

Education & Workforce

What programs are available to educate tech workers in the peer cities?

- Many universities in peer cities have partner programs with the Semiconductor Research Corporation, which provides research and employment links between member companies (including Intel) and research universities. These universities include:
    - Arizona State University
    - University of Texas, Austin
    - Duke University
    - University of Minnesota
    - University of North Carolina, Chapel Hill
    - North Carolina State University

Arizona State University
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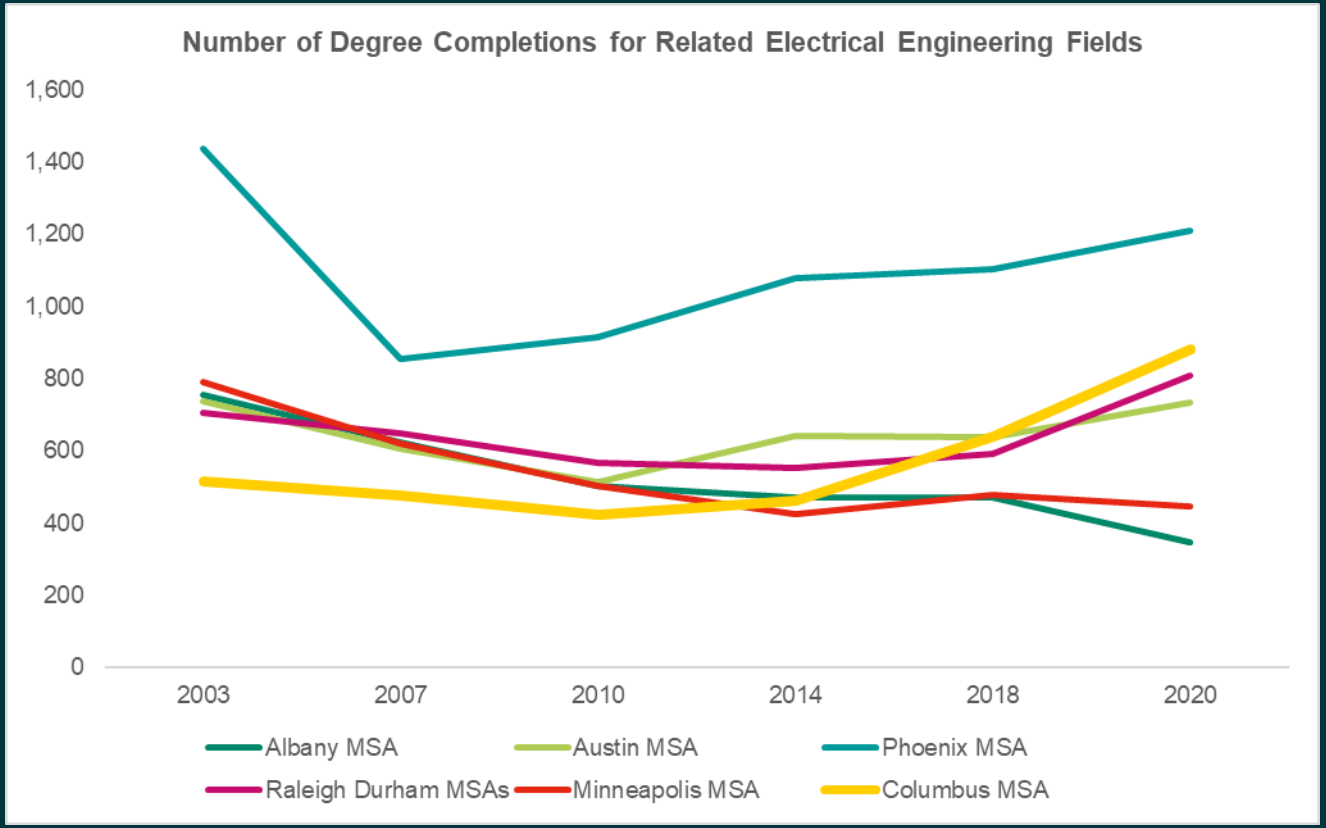
Education and Workforce

What's the relationship between an increase in chip fab plants & the electrical engineering field?

- For related electrical engineering fields, degree completions in each region (including Columbus) increased between 2007 & 2020, except for Minneapolis & Phoenix, which dipped slightly
- Tech engineering degree completions have been increasing in the Columbus region since 2014
- Key question – how can Columbus partner with Intel and other existing tech employers in the community to ensure that regional educational programs align with the "jobs of the future?"

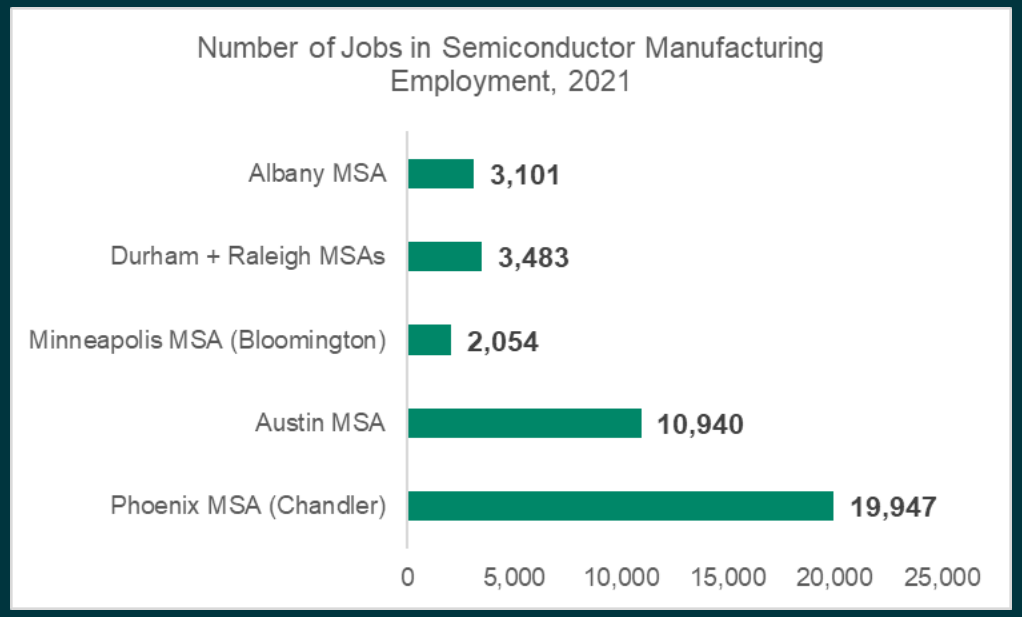


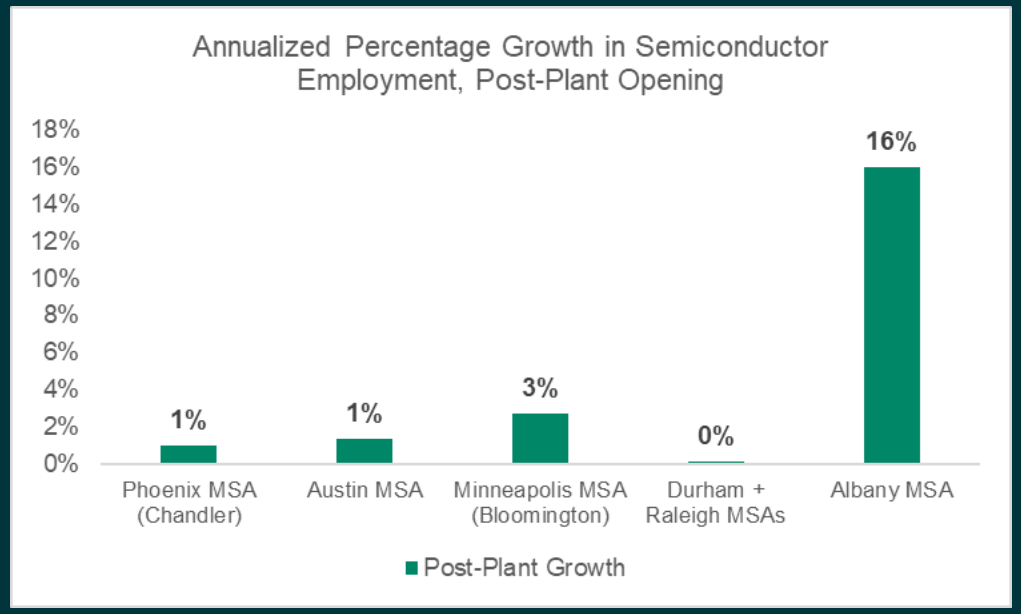
Source: Emsi, AECOM, 2022

Economy & Employment

How has semiconductor manufacturing employment changed since the advent of the first plants?

- The Albany, Raleigh-Durham, and Minneapolis regions all have one plant each, with job counts ranging from 2,000 – 3,500
- Austin (5 plants) and Phoenix (11) have much higher job counts – plants have **clustered** in these regions
- Albany had the highest rate of job growth, despite having only a single plant



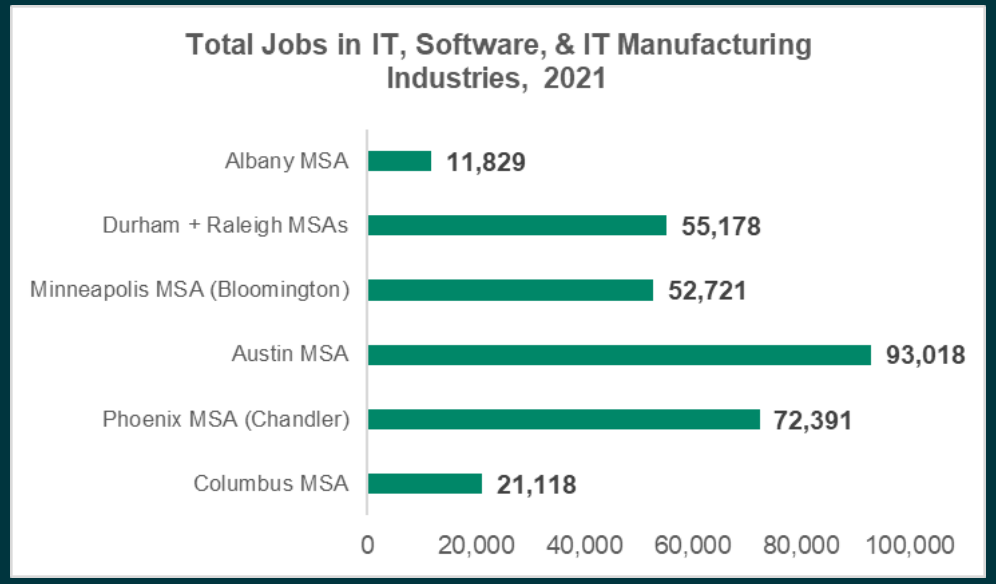


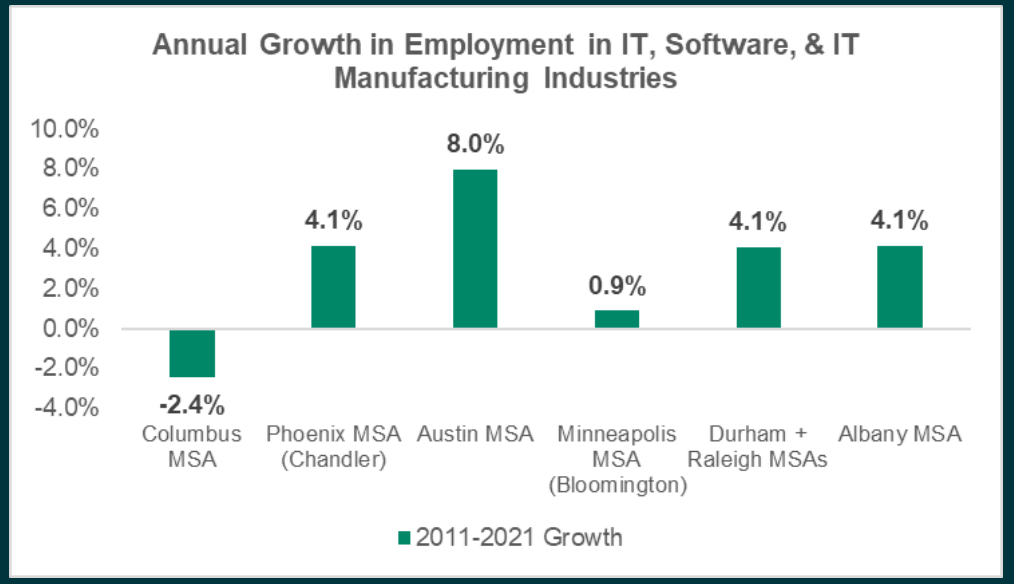
Source: Emsi, AECOM, 2022

Economy & Employment

What does overall tech industry employment look like in the peer cities?

- Austin, Phoenix, Durham-Raleigh, and Albany have all seen **significant growth** in overall tech employment in the last decade
- Conversely, Columbus has seen **declines** in tech employment; compared to similar-sized metros (Austin, Raleigh-Durham, & Minneapolis), Columbus currently has fewer tech jobs
- Key question – how can Columbus leverage the advent of these new plants to jump-start tech industry growth throughout the region?



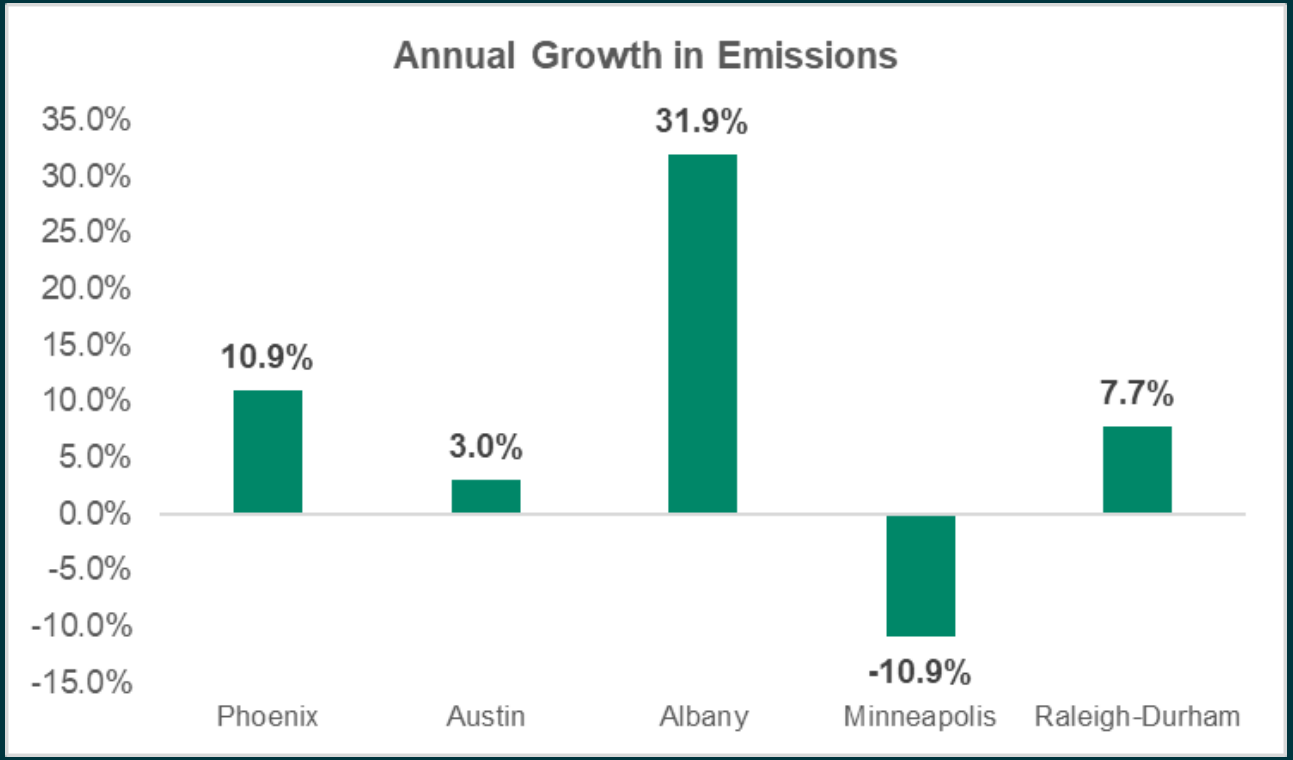


Source: Emsi, AECOM, 2022

Environmental Impact

What are the greenhouse gas impacts of semiconductor manufacturing?

- In 2019, semiconductor fabrication plants in the 5 cities generated 1.89 million metric tons of GHGs
- Minneapolis's plant GHG emissions declined between 2012 and 2019 as a result of heavy investment into alternative energy sources such as wind farms, which have started to replace coal-burning energy across the state
- The industry has partnered with the EPA to work to reduce GHG emissions

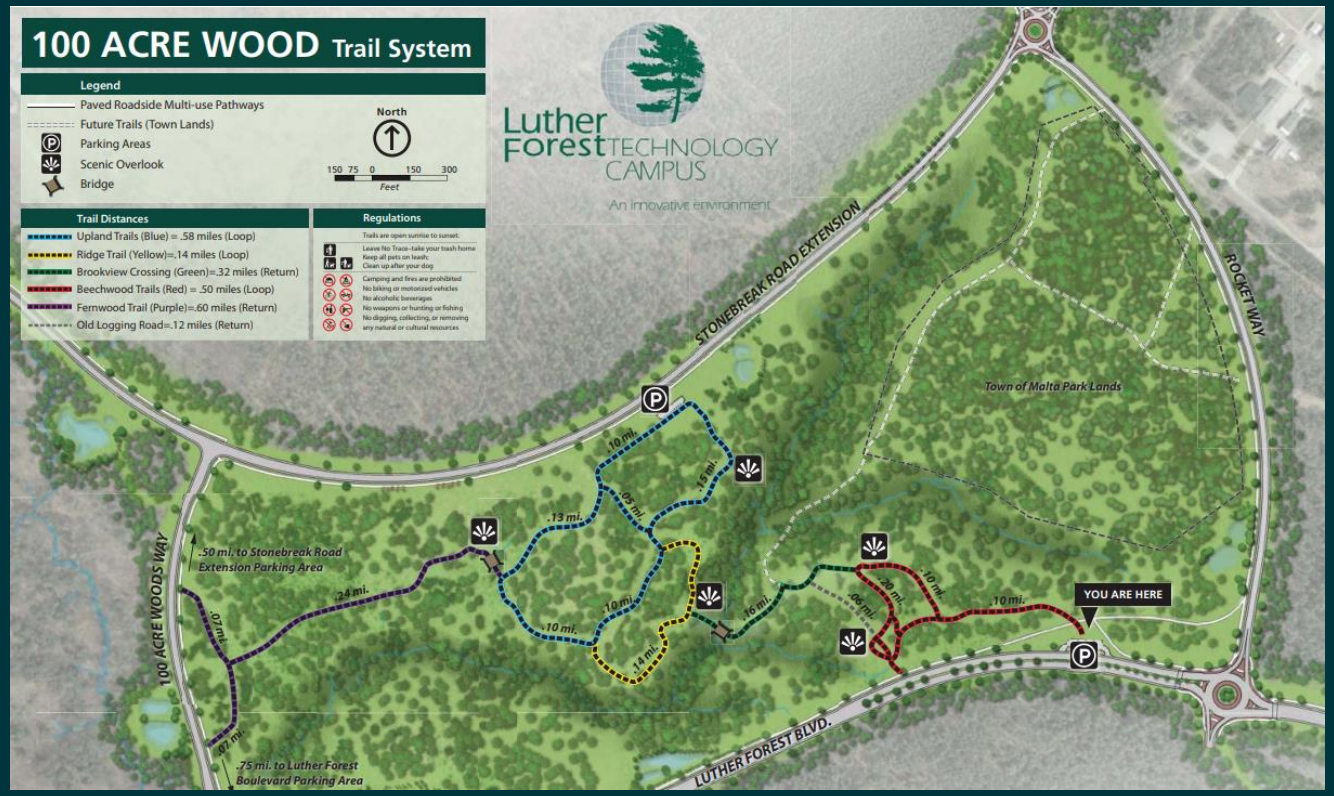


Source: Environmental Protection Agency, AECOM, 2022

Environmental Impact

What are the water & energy impacts of semiconductor manufacturing?

- National reports indicate that semiconductor manufacturing fab plants require between **2 – 4 million gallons of water per day**
- GlobalFoundries Fab 8 in Malta required a minimum of 3.1 million gallons of water per day in 2013
- Key question for Columbus – how can the region ensure that its infrastructure is ready to handle not only the water & energy demands of the new plants, but the additional growth spurred by the plants and other similar investments in the coming years?



To preserve water and environmental features, Malta, NY (Saratoga County) used New York State Environmental Quality Review regulations to address potential adverse environmental impacts. This allowed Malta to create a tech campus district with forestry buffer zones, wetlands protection, and a public trail system.
Source: Lutherforest.org

Transportation

What have the peer cities done to enhance their transportation networks to accommodate the additional demands spurred by tech-related growth?

Albany MSA

Since 2005, **30.65 miles** of new roads have been built, many of which are within a 5-mile radius of the GlobalFoundries fabrication plant (most roads are 2-lane)

Austin MSA

In Austin, the I-35 Capital Express Central Project proposes adding two non-tolled managed lanes in each direction along I-35, **the primary interstate** serving the Austin Samsung campus

Managed lanes are proposed in high congestions areas where right of way is limited (construction to begin in 2025).

Minneapolis MSA

The area around the Sanken Electric Co. plant was already serviced by **14 bus routes and light rail** prior to the beginning of semiconductor manufacturing, largely due to the plant's location in the South Loop District, which is close to the Minneapolis-Saint Paul Airport as well as to The Mall of America

Phoenix MSA

To address increasing congestion, Chandler opted to redesign existing highways; Interstate-10, immediately west of the Intel campus, is being **widened to six lanes** and two high-occupancy vehicle lanes in each direction.

Collector-distributor lanes parallel to the interstate are also being added to separate interstate traffic from local traffic and ease congestion

Raleigh-Durham

Public transit from downtown Durham to the plant takes an hour, (2-mile walk included). In 2015, GoDurham increased the frequency of the bus that services this route. Currently, the best method of access is a private car.

As of 2022, there are proposals for an updated transit plant that would increase bus service in the city, though this route is not yet set to be impacted.

Land Use

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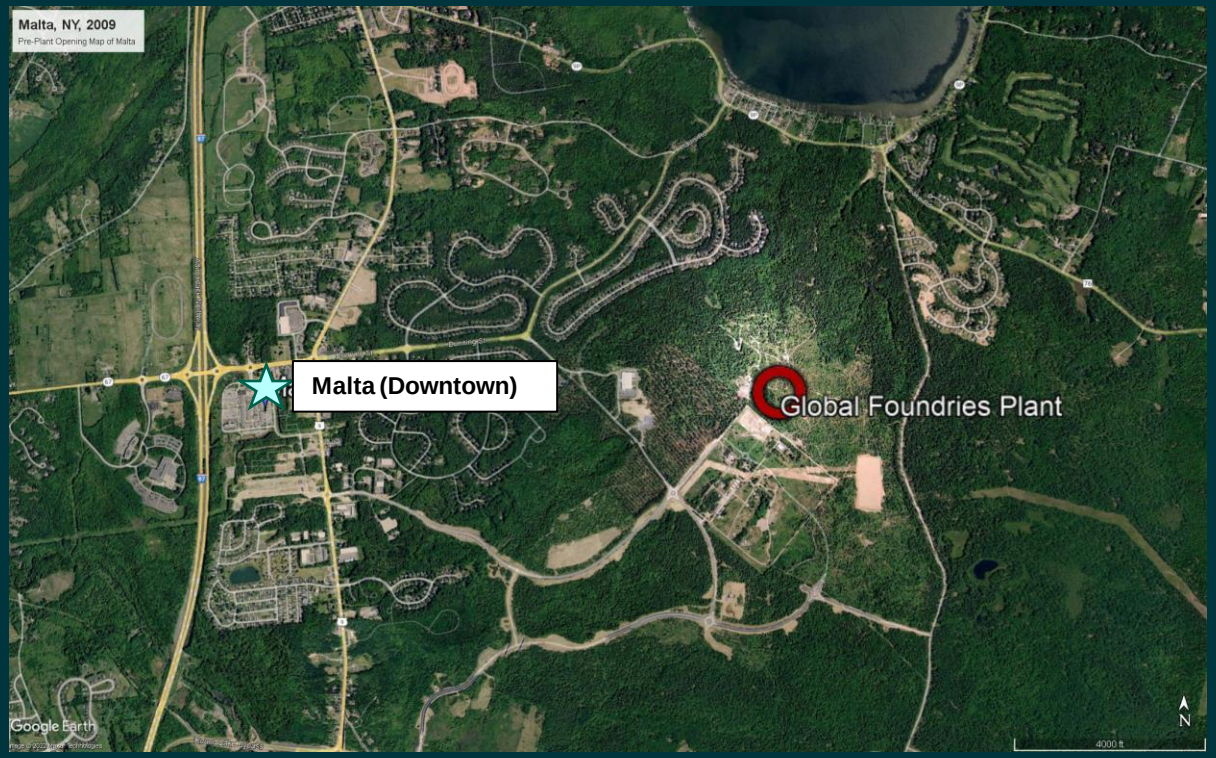
Pre- and Post-Plant Aerial Views

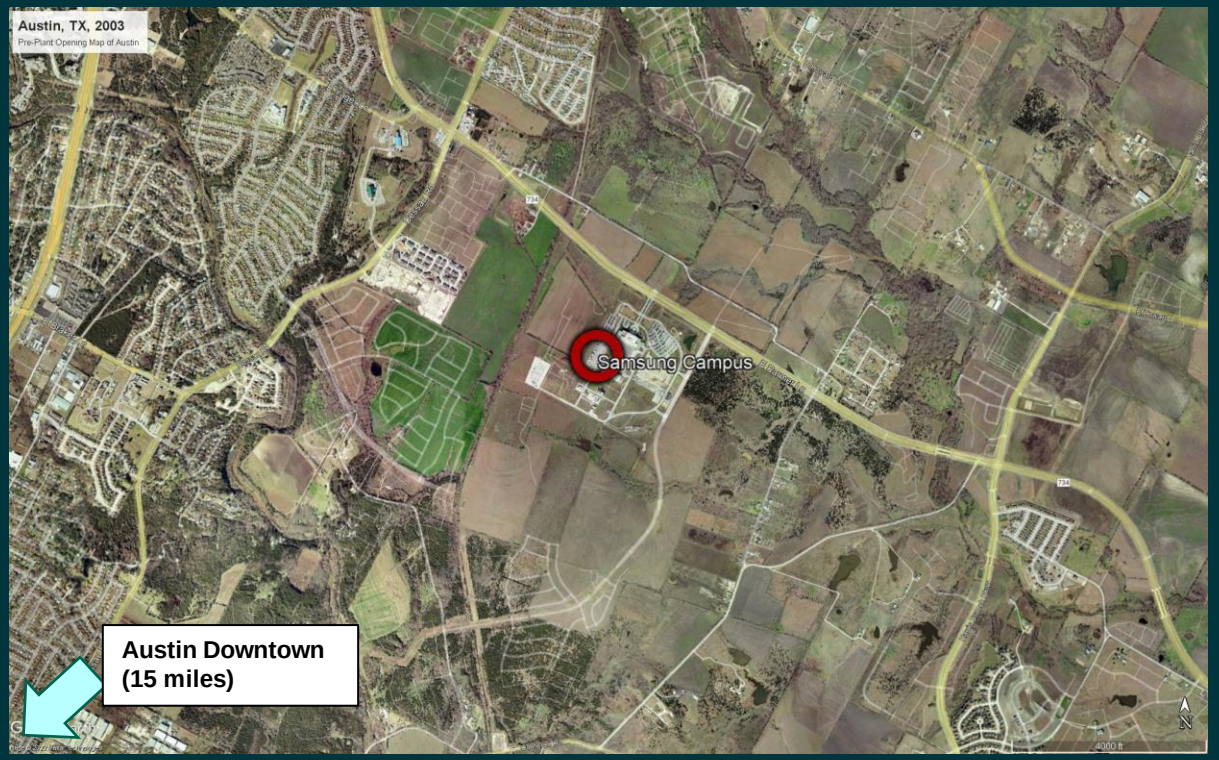
Albany MSA – GlobalFoundries Fabrication Plant

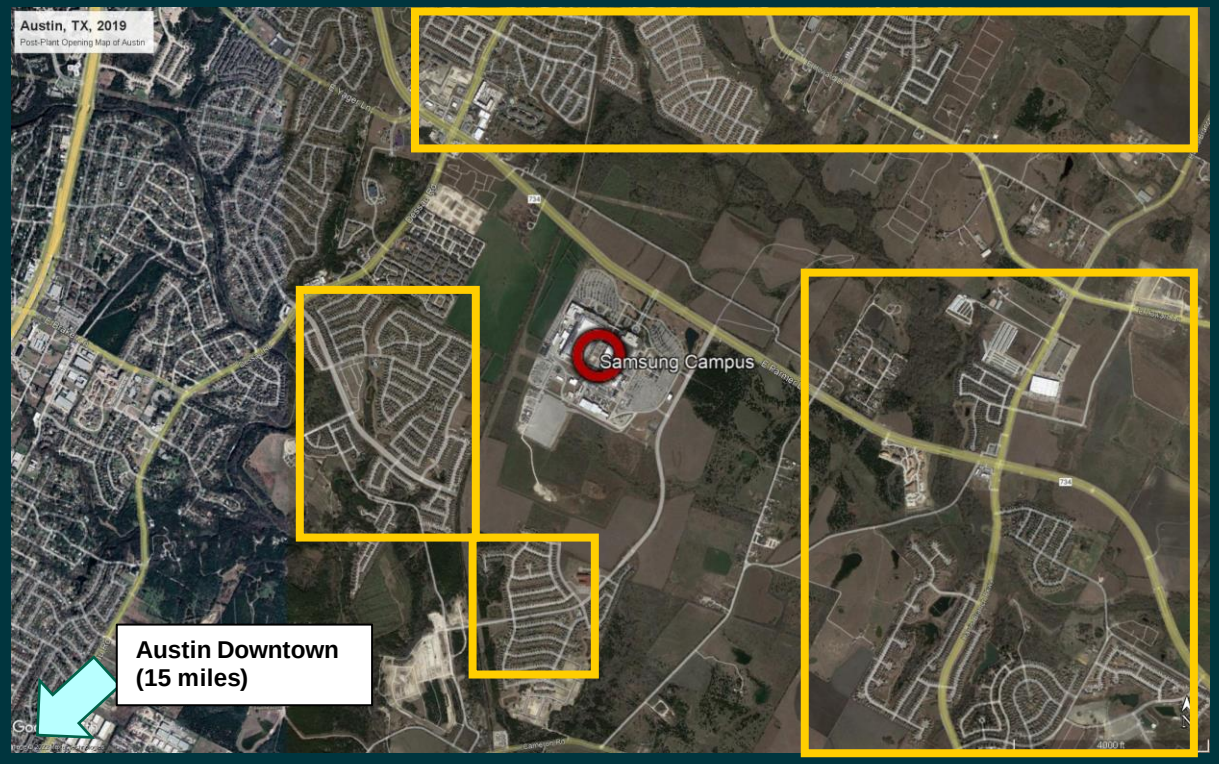


*Note – these images are not meant to imply that growth was directly caused by the location of the plants, but simply to note changing land use patterns nearby pre- and post-plant

Pre- and Post-Plant Aerial Views

Austin MSA – Samsung Campus





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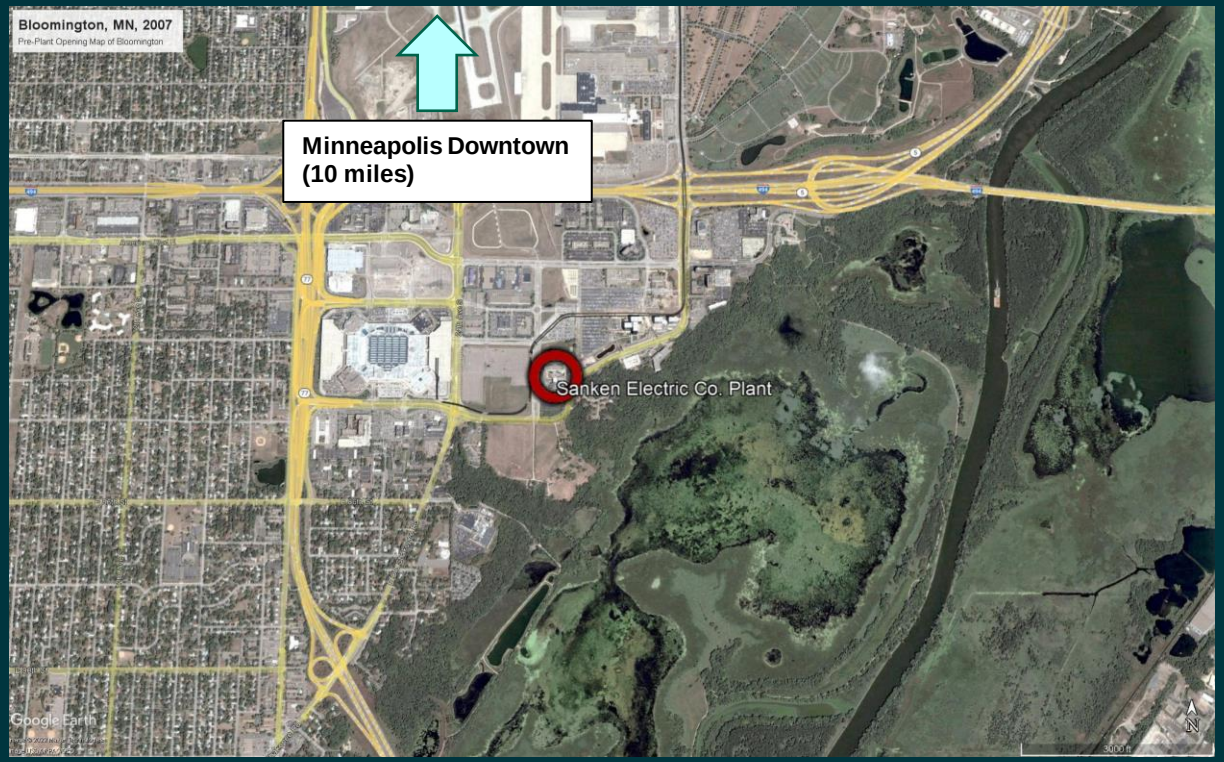
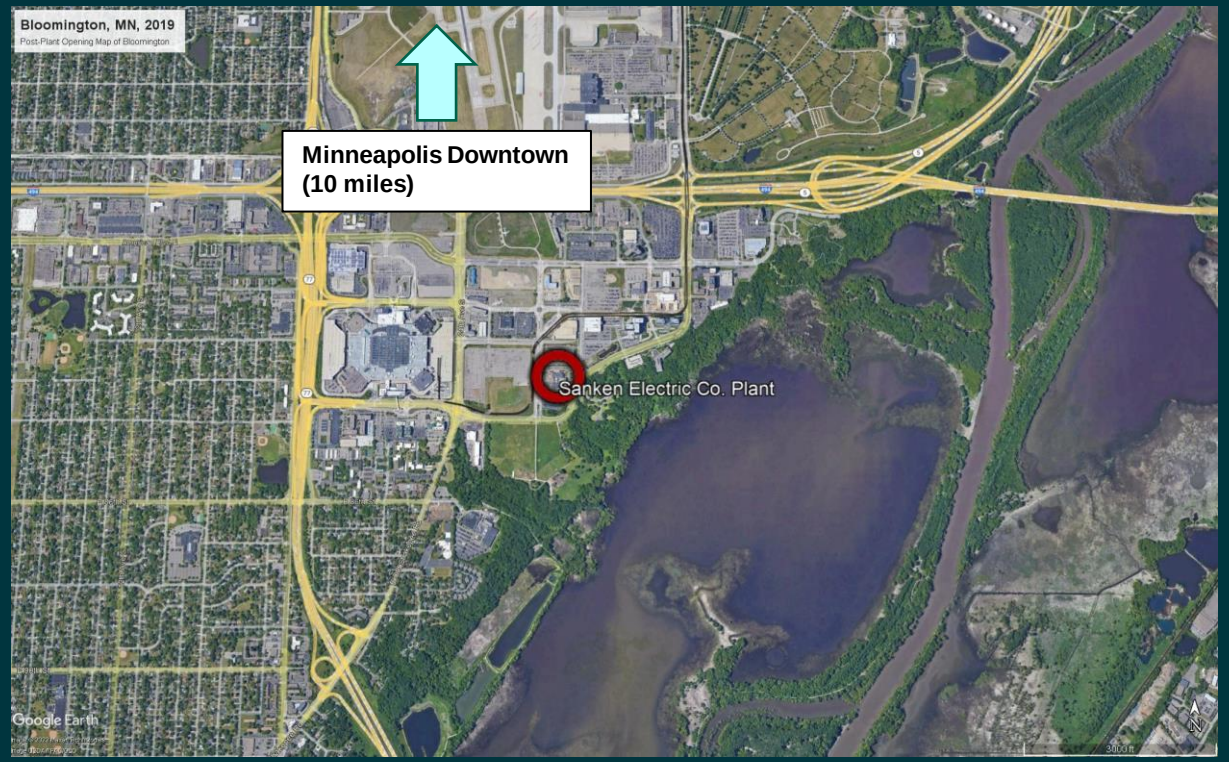
Pre- and Post-Plant Aerial Views

Minneapolis MSA – Sanken Electric Co. Fabrication Plant





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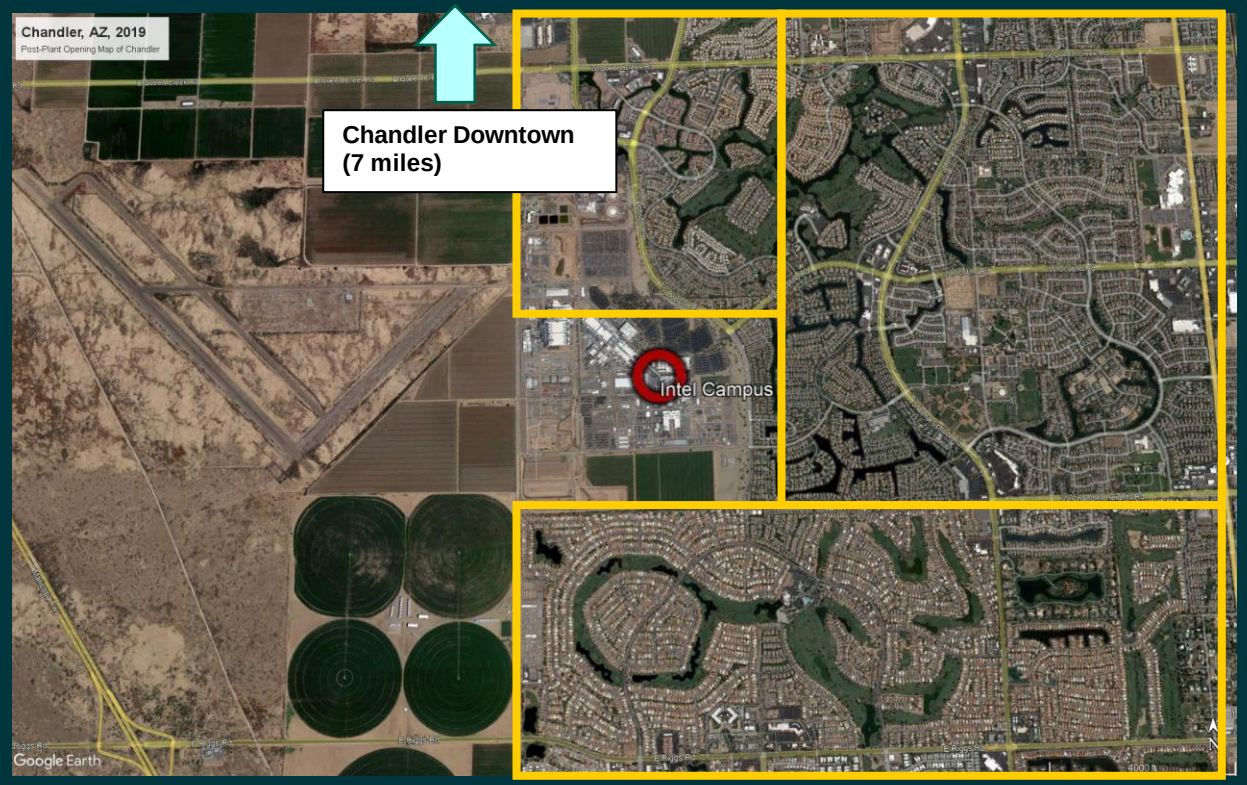
Pre- and Post-Plant Opening Aerial Views

Phoenix MSA – Intel Campus



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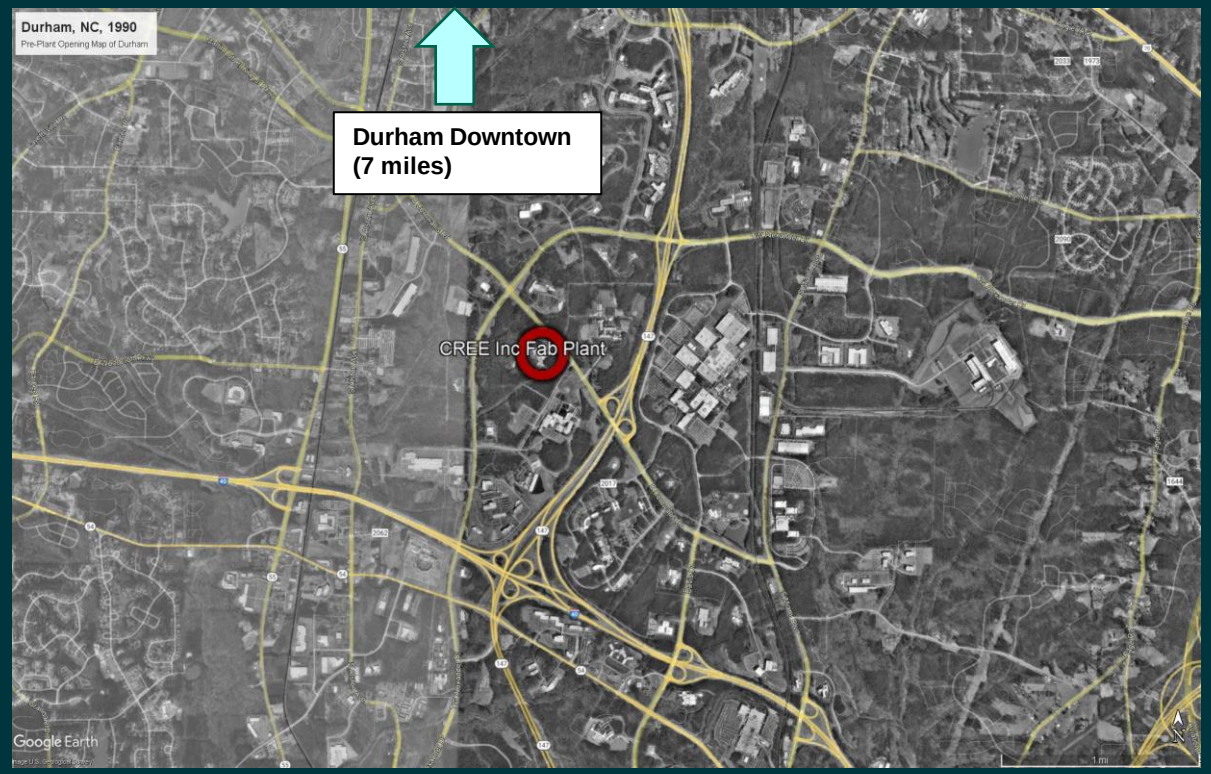
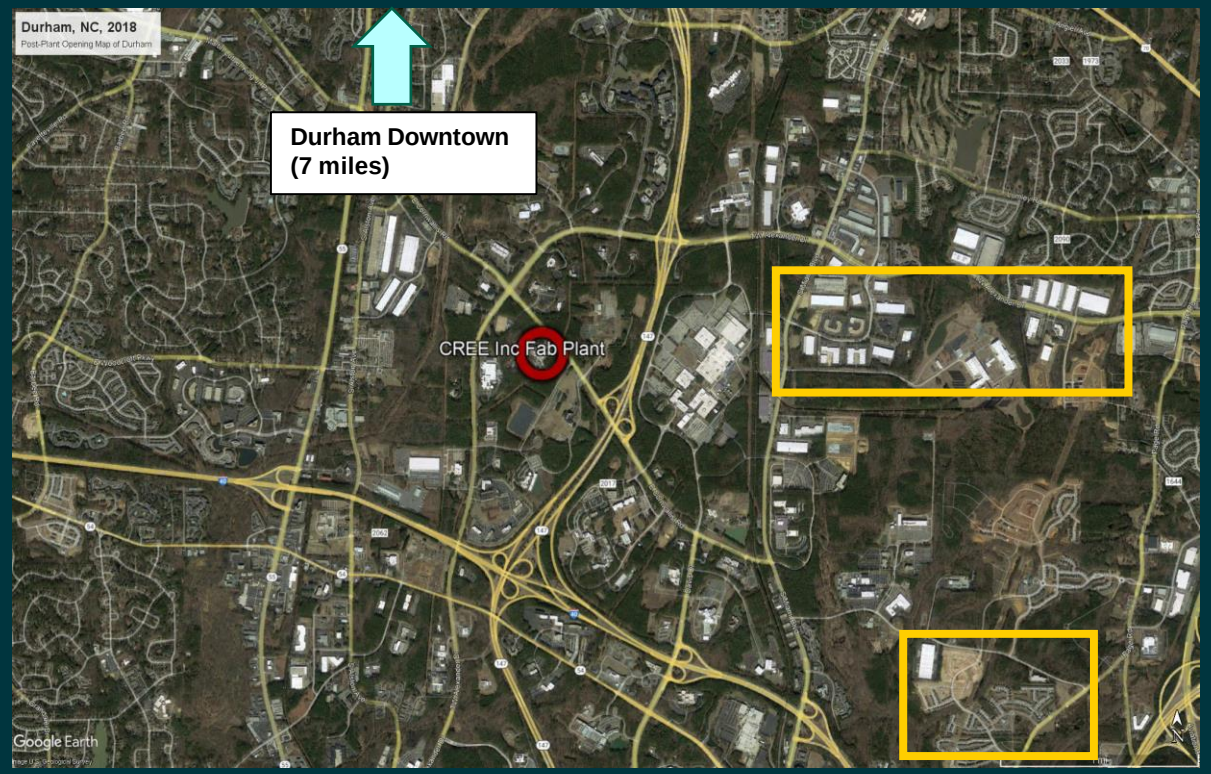
Pre- and Post-Plant Opening Aerial Views

Raleigh-Durham MSAs – CREE Inc. Fabrication Plant





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Takeaways

- Chip fab plants have the potential to be **catalytic investments** for burgeoning tech hubs, as the "decentralization" of tech from Silicon Valley continues
- High-paying jobs that require advanced degrees that come with a growing tech sector can have a positive socioeconomic impact; however, they also contribute to **increases in housing costs and "degree inflation"** that could have a negative impact on less-educated/lower-income populations
- Partnering between **companies** like Intel and **local educational institutions** is critical for ensuring that local residents have the opportunity to compete for jobs
- Chip manufacturing also comes with a significant impact to **water & energy usage**; for a growing region, ensuring that infrastructure is adequate to accommodate both the plants and additional growth they may spur is critical
- Transportation impacts are not just felt within a few miles of the plant site; rather, the overall increase in growth catalyzed by these investments in tech manufacturing calls for a **comprehensive look** at how transportation is serving the region, and the **timing** of new transportation investments
- Land use controls & intentionality around where regional growth is directed, in concert with transportation planning, is critical for avoiding **suburban sprawl** near new plants

Next Steps

- Estimate impacts to Columbus region from new Intel plants, based on understanding of existing conditions and **“lessons learned”** from peer cities, for the following key impact areas:
    - Population & Housing
    - Education & Workforce
    - Economy & Employment
    - Environment
    - Transportation & Land Use
- Based on best practices from peer cities and other regions that have experienced **catalytic investment** in the tech sector, make recommendations for how Columbus can **mitigate** potential negative impacts; leverage opportunities to **incentivize further growth and investment**, in line with the region’s overall goals and vision; and better position the region to receive the influx of highly skilled workers and specialized jobs that typically accompany a tech boom

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