



SKILLS GAP ANALYSIS & SECTOR STRATEGIES



Commissioned by WorkForce Central on behalf of the
Pierce County Workforce Development Council

AUGUST 2016





*Community Attributes Inc. tells data-rich stories about communities
that are important to decision makers.*

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EXECUTIVE SUMMARY

Background and Purpose

WorkForce Central (WFC) and the Pierce County Workforce Development Council (WDC) work closely together to support a strong economy by leading and overseeing our region's comprehensive workforce development system that prepares job seekers and workers with 21st century knowledge and skills required by businesses. WFC and WDC partner with leaders from the business community, philanthropic organizations, organized labor, education, government, community based organizations and other key stakeholders to shape and support workforce solutions.

Commissioned by WFC on behalf of the WDC, this study compares projected demand for specific occupations against labor supply to identify potential workforce gaps. Summarized key findings from six key industry reports including: healthcare; construction; advanced manufacturing; transportation, warehousing and logistics; information, communications technology (ICT) and cybersecurity; and military and defense can be found in this report. The skills gap and sector strategy analysis, combined with feedback from industry stakeholders, will be used to plan for the changing needs of the industry and inform workforce preparation strategies. In addition, this study may be used to influence policy and investment decisions throughout and beyond the workforce development system.

Since 2010, Community Attributes Inc. (CAI) has produced multiple talent pipeline studies that examine various sectors. The studies compare projected demand for specific occupations against labor supply to identify potential workforce gaps.

Methods

Talent pipeline analysis draws from data published by the Washington State Employment Security Department (ESD), the Bureau of Labor Statistics (BLS) and the National Center for Education Statistics (NCES).

In addition to the talent pipeline analysis, in-depth interviews conducted with stakeholders in the six key industries inform findings. Interviews covered topics of hiring, recruiting, education and training as well as skills needs. Stakeholders interviewed included representatives from a variety of county employers who provided a range of perspectives on their industries and “on-the-ground” realities.

For details on the methodology, as well as in-depth industry findings, please refer to the individual industry reports.

Key Findings

Data findings indicate that each of the six key industries in Pierce County are projected to experience overall surpluses in local talent.

Healthcare is projected to experience a surplus of 248 local workers annually; construction is projected to have a surplus of 1,493 workers; advanced manufacturing is expected to experience a surplus of 190 local candidates; transportation, warehousing and logistics is forecasted to see a surplus of 113 local workers; ICT and cybersecurity is projected to have a surplus of 205 annual openings; and military and defense is projected to see an overall surplus of 51 local workers annually.

Although the data demonstrates overall surpluses in each of these industries, stakeholders in each of these industries are all experiencing challenges in finding qualified candidates. Much of the surpluses in talent are due to a few large surpluses among certain occupations. This includes a surplus of 349 medical assistants in the healthcare industry, surpluses of unemployment insurance (UI) claimants among construction laborers and contractors, a surplus of UI claimants in production worker helpers, a large supply of UI claimants among heavy and tractor-trailer truck drivers, a large supply of graduates qualified to be computer network support specialists and a surplus of graduates qualified to be natural science managers in the military and defense industry.

In most of the industries studied, there were a few occupations that generated high numbers of UI claimants each year. Developing systems and partnerships to better understand the needs of these claimants may yield improved systems that serve them better and improve employment results.

Employers across Pierce County's six key industries agreed that many job applicants are lacking essential soft skills. This include those needed at initial contact, such as resume writing skills and interview skills, as well as those skills needed to succeed in the workplace. The diverse set of employers providing feedback are looking for candidates that have communication skills, an understanding of workplace etiquette, and a basic understanding that showing up to work on time is required to remain employed. Many suggested that educational programs and workforce organizations should focus additional efforts on providing training in soft skills.

Stakeholders across industries also shared that they often receive many applications for open jobs, but few qualified applications. Those positions that require specialized skills and experience are the most difficult to fill. During the recession employers experienced a bubble of talented applicants, however, as the economy has improved it is becoming a worker's job market, increasing competition between employers, industries and regions.

A detailed analysis of the talent pipeline for key occupations in each industry highlight some important talent gaps. **The largest shortage of talent in any of the six key industries is among registered nurses,** with a projected shortage of 109 local workers. There are also notable shortages in talent among social and human service assistants; home health aides; massage therapists; physicians and surgeons, all other; laborers and freight, stock, and material movers, hand; and software developers, applications.

Many employers across multiple industries reported success recruiting applicants from Joint Base Lewis McChord (JBLM). They reported good systems to post open jobs, and the success that JBLM has had in providing candidates that were a good fit for the jobs.

Employers in construction, advanced manufacturing and transportation, warehousing and logistics are frustrated about the lack of a pipeline of candidates coming from high school. The general sentiment is that they graduate from high school, opt out of the college path, and get a low paying service, or retail job. They struggle to move up a career path and earn more money, but eventually realize they are stuck. Some make it to the trades. Stakeholders lamented the lost time for both the individual and the industry.

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INTRODUCTION

Background and Purpose

WorkForce Central (WFC) has identified six key industries that are most strategic for workforce development and job growth. These six industries are: healthcare; construction; advanced manufacturing; transportation, warehousing and logistics; information communications technology (ICT) and cybersecurity; and military and defense. Each of these industries is of importance to the Pierce County economy.

As each of these six industries is core to Pierce County's economy, a strong understanding of demand, supply and employer perceptions will allow WFC and industry leaders to help address the workforce challenges of the future. Workforce professionals, educators and employers can use this information to help ensure Pierce County's workforce programs are providing the appropriate mix of training opportunities to meet the needs for each of these key industries and for the county's workforce as a whole.

Methods

WorkForce Central serves employers and workers within Pierce County, representing nearly ten percent of Washington's total employment. CAI's analysis relies on data published by the state of Washington and federal agencies. Specifically, the following data sources form the foundation of the modeling:

- **Occupational estimates and forecasts from the Washington State Employment Security Department (ESD) and the Bureau of Labor Statistics.** This data provides current estimates and forecasted demand for occupations in Pierce County and associated educational requirements, as well as occupational wages. Occupational forecasts include openings created by retirements and separations. For this reason, average annual openings are larger than the average of net jobs created over a period of time.
- **Washington unemployment insurance claims.** This data, also published by ESD, provides monthly unemployment claims and the previous occupations of the claimant by occupation code.
- **Educational attainment data from the National Center for Education Statistics' Integrated Postsecondary Education System (IPEDS).** IPEDS provides the number of graduates by educational program, defined according to the Classification of Instructional Programs, for Pierce County's higher education institutions as well as a table of equivalence used to match educational programs to occupations.

Subsequent sections explain the details and limits of this data. In general, this data provides measures of demand and supply by occupation across

industries. The occupations are defined in accordance with the Bureau of Labor Statistics Standard Occupational Classification system and industries are delineated using definitions from the North American Industry Classification System.

Comprehensive interviews were also conducted concurrently with the data-driven, quantitative analysis. These interviews were open-ended discussions that provided insight into the qualitative trends industry employers grapple with in their day-to-day operations.

Organization of Report

- **Regional Profile:** Describes population, demographic and employment trends across Pierce County as a whole.
- **Healthcare:** Assesses in detail the results of the talent pipeline analysis and interviews.
- **Construction:** Assesses in detail the results of the talent pipeline analysis and interviews.
- **Advanced Manufacturing:** Assesses in detail the results of the talent pipeline analysis and interviews.
- **Transportation, Warehousing and Logistics:** Assesses in detail the results of the talent pipeline analysis and interviews.
- **ICT and Cybersecurity:** Assesses in detail the results of the talent pipeline analysis and interviews.
- **Military and Defense:** Assesses in detail the results of the talent pipeline analysis and interviews

REGIONAL PROFILE

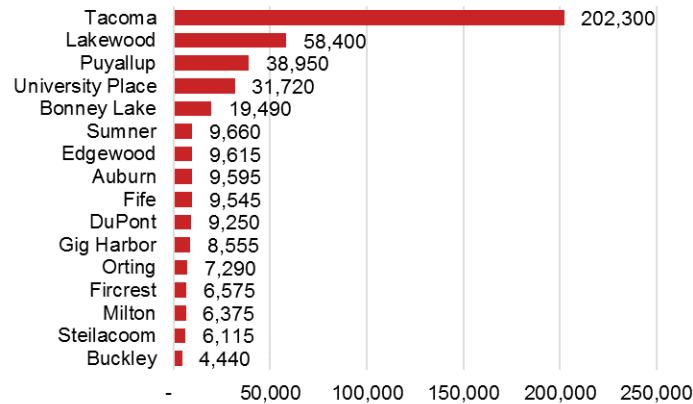
Pierce County is the second most populous county in Washington. Home to more than 830,000 people in 2015, it represents 12 percent of the state’s population. The county has nonfarm employment exceeding 289,000 workers, representing almost nine percent of total statewide nonfarm employment.

Residents of Pierce County are diverse; 25 percent identify as non-white, 15 percent speak a language other than English, and ten percent of the population are foreign born.

Population

Tacoma, the county-seat, is by far the largest city within the county. More than 24 percent of the county’s population resides within the city. Just over 53 percent of Pierce County’s population live in incorporated areas. Lakewood, Puyallup and University Place follow Tacoma in population, each with more than 30,000 residents. (**Exhibit 1**)

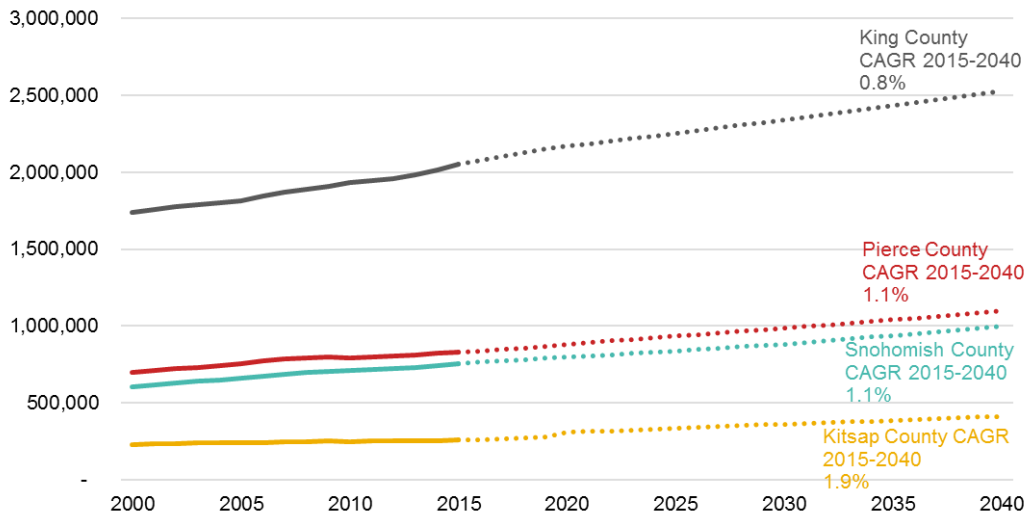
Exhibit 1. Population by City, Pierce County, 2015



Sources: Washington State Office of Financial Management, 2016; Community Attributes Inc., 2016.

Washington’s population is concentrated within the Central Puget Sound’s four counties: King, Kitsap, Pierce and Snohomish Counties. Together these counties represent 55 percent of the state’s total population. Among these four counties Pierce County is projected to see population grow at 1.1 percent annually between 2015 and 2040. This growth rate is only exceeded by the projected 1.9 percent annual growth in Kitsap County. (**Exhibit 2**)

Exhibit 2. Historic and Forecasted Population, King, Kitsap, Pierce and Snohomish Counties, 2000-2015



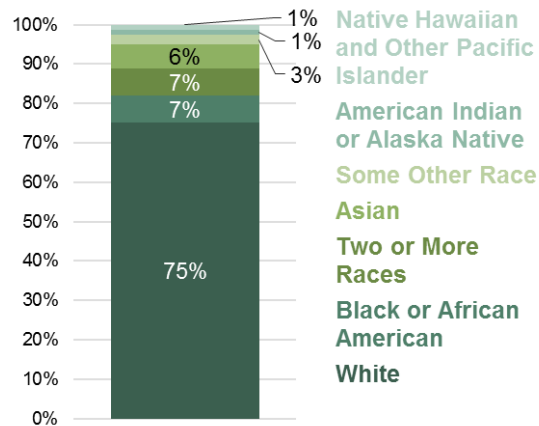
Sources: Washington State Office of Financial Management, 2016; Puget Sound Regional Council, 2016; Community Attributes Inc., 2016.

Demographics

Race and Ethnicity

Like most of Washington, Pierce County is predominantly white. However, among Central Puget Sound counties only King County is more diverse in terms of race and ethnicity. Additionally, Pierce County has larger share of Black or African American residents, as well as residents self-identifying as two or more races when compared to other Central Puget Sound counties and the state as a whole. (**Exhibit 3**)

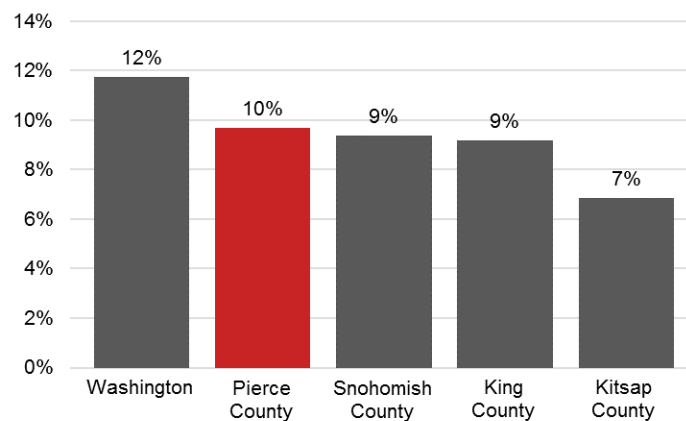
Exhibit 3. Share of Population by Race and Ethnicity, Pierce County, 2014



Sources: American Community Survey 2014 5-Year Estimates, 2016; Community Attributes Inc., 2016.

Across the State of Washington 12 percent of the population identified as Hispanic or Latino. In Pierce County ten percent of the population identifies as Hispanic or Latino (**Exhibit 4**).

Exhibit 4. Hispanic Share of Population, Washington State, King, Kitsap, Pierce and Snohomish Counties, 2014



Sources: American Community Survey 2014 5-Year Estimates, 2016; Community Attributes Inc., 2016.

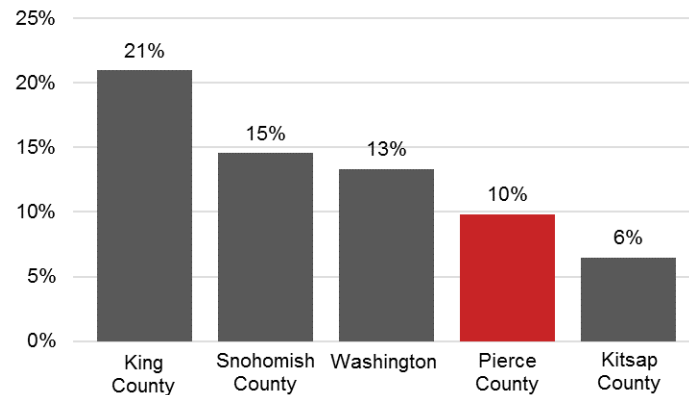
Overall 85 percent of Pierce County’s population speaks only English. Of the remaining 15 percent, six percent speak Spanish, five percent speak Asian languages and three percent speak other Indo-European languages. Across Washington 81 percent of the population speaks only English, while eight percent speak Spanish. The most common languages spoken

in Pierce County other than English and Spanish are Korean, Tagalog, Vietnamese, German, Russian and Mon-Khmer.

Foreign Born Residents

Pierce County has a relatively low share of foreign born residents when compared with the state as a whole and other Central Puget Sound counties (**Exhibit 5**).

Exhibit 5. Foreign Born Share of Population, Washington, King, Kitsap, Pierce and Snohomish Counties, 2014



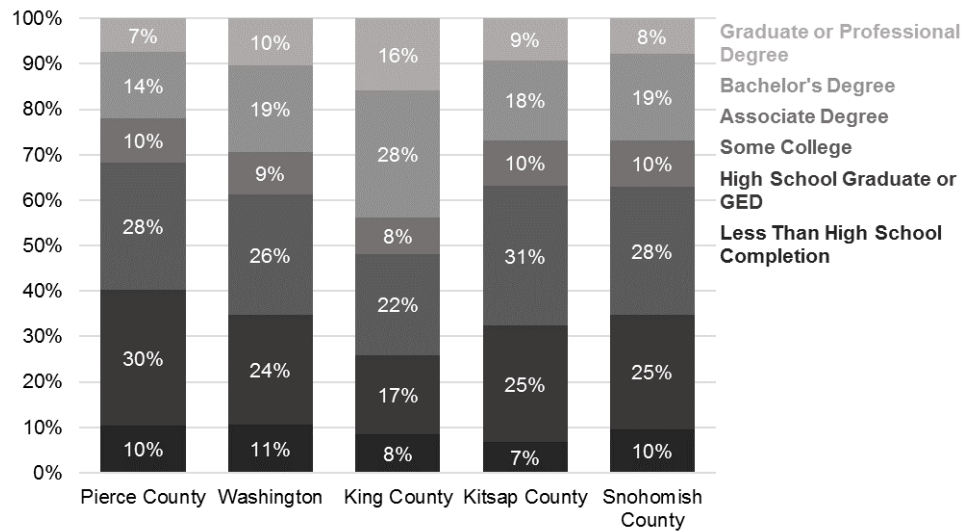
Sources: American Community Survey 2014 5-Year Estimates, 2016; Community Attributes Inc., 2016.

Among the foreign born population in Pierce County 42 percent come from Asian countries, 24 percent come from Central America and 22 percent come from Europe. The single-largest share of the foreign born population comes from Mexico at 22 percent. This is followed by residents from Korea, 12 percent, and the Philippines at ten percent. Residents born in Vietnam, Germany and the Ukraine all also represent more than five percent of the foreign born population in Pierce County.

Education

Approximately 40 percent of the population ages 16 and above in Pierce County have a high school diploma or less. An additional 28 percent have just some college experience, but no degree. Pierce County's 58 percent of the population without some type of degree is higher than the state average, and also higher than all of the other Central Puget Sound counties. Pierce County has just 21 percent of their population 16 and over with a Bachelor's degree or higher. This is eight percent lower than the state average with 29 percent, six percent lower than Kitsap and Snohomish County's 27 percent, and significantly lower than King County's 44 percent of the population with a Bachelor's degree or higher. (**Exhibit 6**)

Exhibit 6. Educational Attainment, Washington State, King, Kitsap, Pierce and Snohomish Counties, 2014

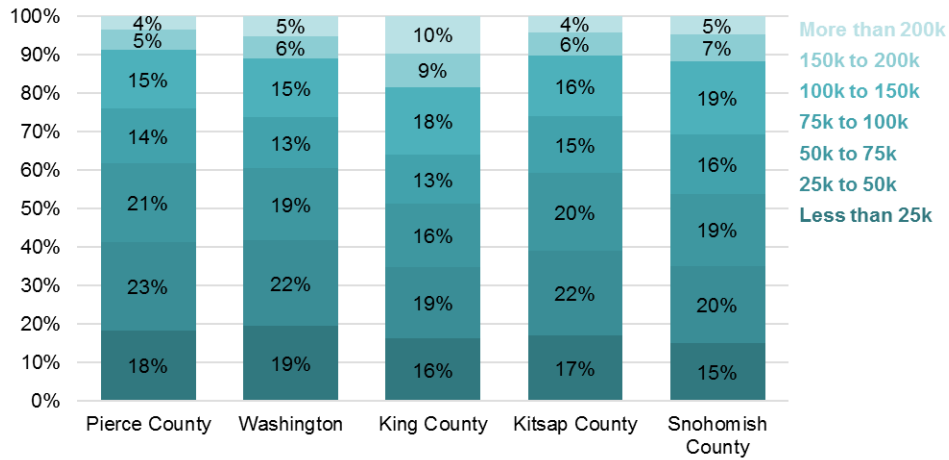


Sources: American Community Survey 2014 5-Year Estimates, 2016; Community Attributes Inc., 2016.

Income

Pierce County and Washington have similar composition in terms of household income. Households earning less than \$50,000 annually represent 41 percent of Pierce County's households and Washington's as well. At higher income levels, those earning \$150,000 and above, Pierce County has a lower share of households when compared to other Central Puget Sound counties and the state, with just nine percent at these higher income levels. Households earning less than \$50,000 represent the largest share of Pierce County households at 41 percent. Households earning between \$50,000 and \$100,000 represent 35 percent and just 24 percent earn more than \$100,000 annually. For comparison, King County has 37 percent of households earning more than \$100,000 annually. (**Exhibit 7**)

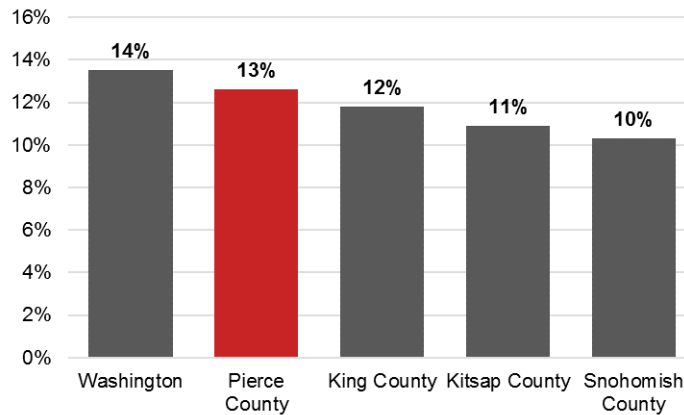
Exhibit 7. Household Income, Washington State, King, Kitsap, Pierce and Snohomish Counties, 2014



Sources: American Community Survey 2014 5-Year Estimates, 2016; Community Attributes Inc., 2016.

In 2014, 13 percent of Pierce County’s population was below the poverty level. This is just one percent less than the state average, and higher than all three of the other Central Puget Sound counties (**Exhibit 8**). Among children age 18 and younger, 17 percent were below the poverty level in 2014. The share of children below the poverty level was 14 percent in 2009 and has been steadily increasing each year to date.

Exhibit 8. Share of Population Below Poverty Line, Washington State, King, Kitsap, Pierce and Snohomish Counties, 2014

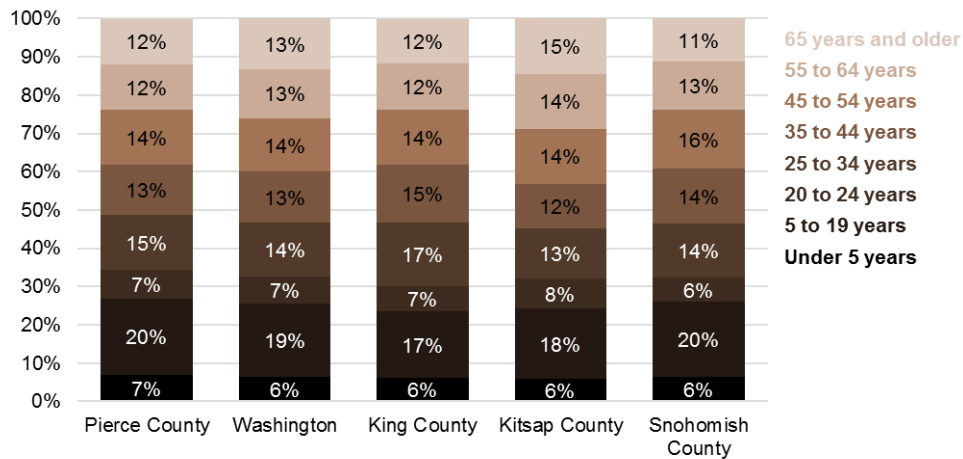


Sources: American Community Survey 2014 5-Year Estimates, 2016; Community Attributes Inc., 2016.

Age

A larger proportion of residents in Pierce County are under 25 years of age compared to Washington and other Central Puget Sound counties. A total of 34 percent of Pierce County's population was under 25 in 2014. King and Pierce counties have the same proportion of residents aged 55 years and above, at 24 percent. However, King County has a larger proportion of residents between the ages of 25 and 55, with 46 percent compared to Pierce County's 42 percent. (Exhibit 9)

Exhibit 9. Share of Population by Age, Washington State, King, Kitsap, Pierce and Snohomish Counties, 2014



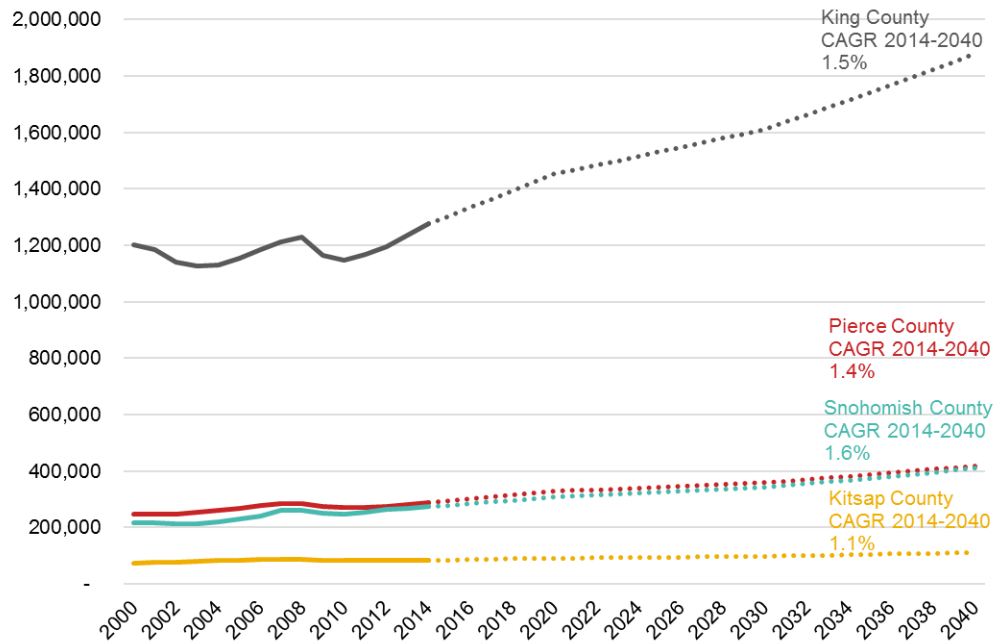
Sources: American Community Survey 2014 5-Year Estimates, 2016; Community Attributes Inc., 2016.

Employment

Pierce County in 2014 had nonfarm employment of more than 289,000. Almost 63 percent of Washington's total 3,000,000 jobs were located in the four counties of the Central Puget Sound. Pierce County is the second densest county in terms of employment with more than nine percent of statewide employment. Only King County supports more employment, almost 42 percent of all statewide nonfarm jobs.

All four counties in the Central Puget Sound are projected to grow at rates greater than one percent annually through 2040. Employment in Pierce County is project to reach almost 330,000 in 2020 and almost 419,000 in 2040. (Exhibit 10)

Exhibit 10. Total Nonfarm Employment, King, Kitsap, Pierce and Snohomish Counties, 2000-2040

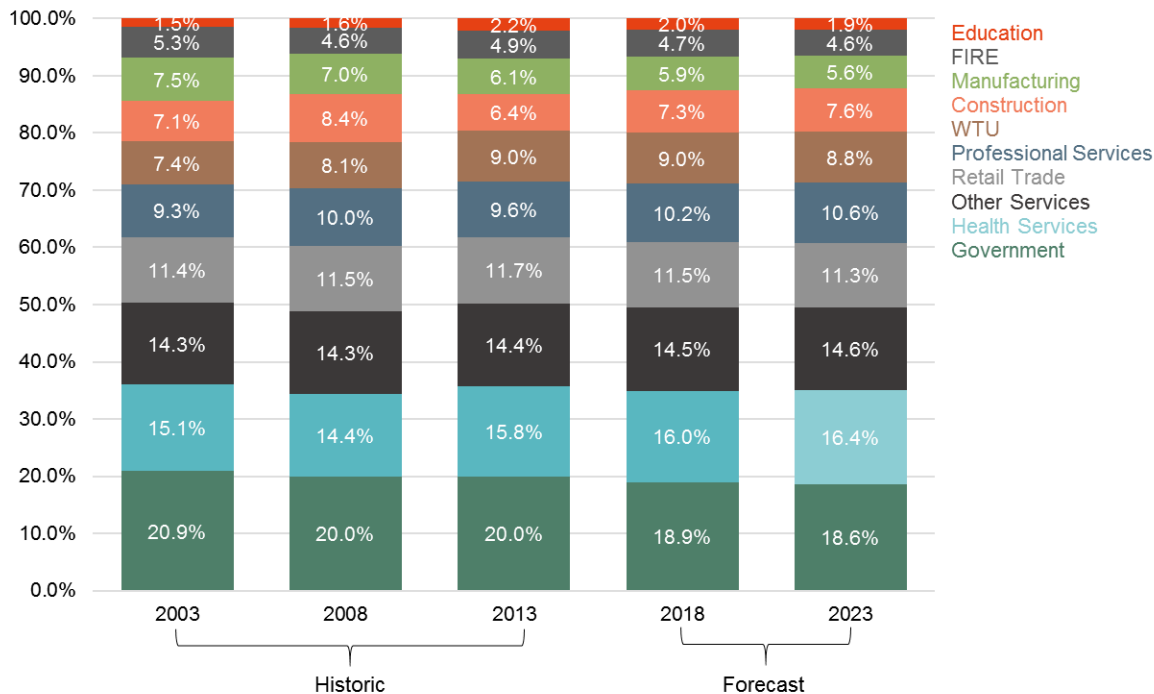


Sources: Washington State Employment Security Department, 2016; Puget Sound Regional Council, 2016; Community Attributes Inc., 2016.

The distribution of employment across industries in Pierce County has remained relatively stable since 2003. Government; Finance, Insurance and Real Estate (FIRE); Manufacturing; and Construction all decreased between 2003 and 2013. In contrast Warehousing, Transportation and Utilities (WTU); Professional Services; Retail; and Education and Health Services have all increased as a share of total employment. (**Exhibit 11**)

Among all industries Construction, and Education and Health Services are projected to see the largest gains as a share of total employment between 2013 and 2023. The government sector is projected to decrease by 2.4 percent as a share of total employment by 2023. (**Exhibit 11**)

Exhibit 11. Employment by Industry, Pierce County, 2003-2023



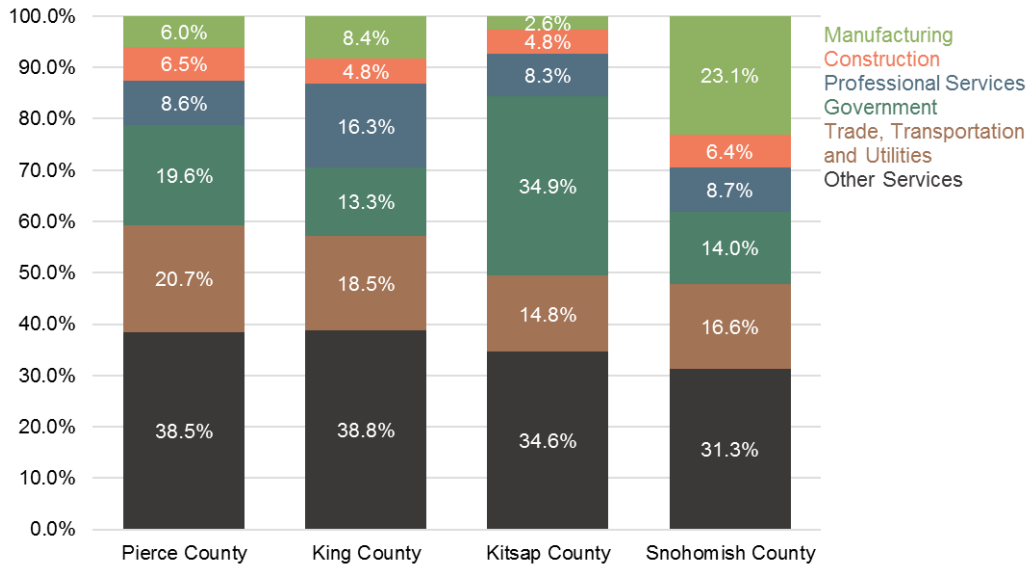
Sources: Washington State Employment Security Department, 2016; Community Attributes Inc., 2016.

Each of the four counties in the Central Puget Sound have different industry compositions of total employment. Overall Pierce and King Counties have the most similarities. Snohomish County has a much larger reliance on Manufacturing, while Kitsap County has a much larger share of Government employment. (**Exhibit 12**)

Other services in **Exhibit 12** include financial activities, information, education and health services, leisure and hospitality and other services. Industries are grouped in this way in order to compare across counties, due to data limitations for Kitsap County industries. In Pierce County, education and health services represents almost 18 percent of total nonfarm employment, and is largely represented by healthcare.

Pierce County's Trade, Transportation and Logistics industry has a larger proportion of county employment than in any of the other three counties. The county also has more Government employment than either King or Snohomish counties. Pierce County also has the largest share of Construction employment comparatively. (**Exhibit 12**)

Exhibit 12. Employment by Industry, King, Kitsap, Pierce and Snohomish Counties, 2014

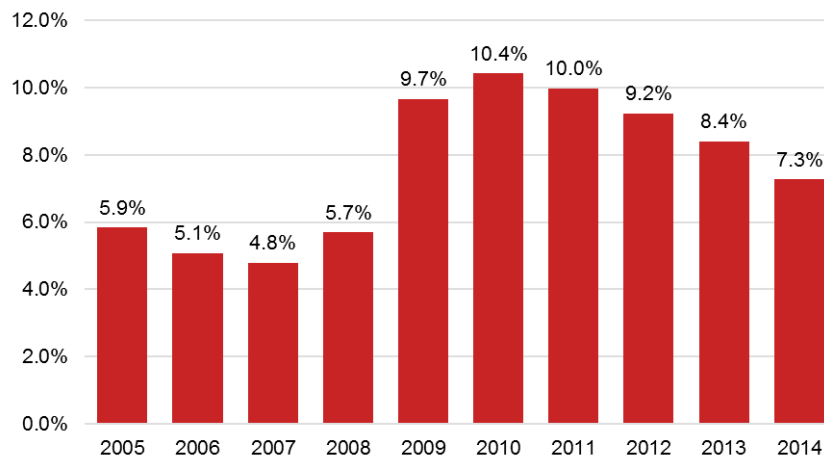


Sources: Washington State Employment Security Department, 2016; Community Attributes Inc., 2016.

Unemployment

In 2014 Pierce County's unemployment rate was 7.3 percent, dropping 3.1 percent since the high in 2010 of 10.4 percent (**Exhibit 13**). Pierce County had its lowest unemployment rate in the past 25 years in 1998 when it reached 3.9 percent (**Exhibit 14**).

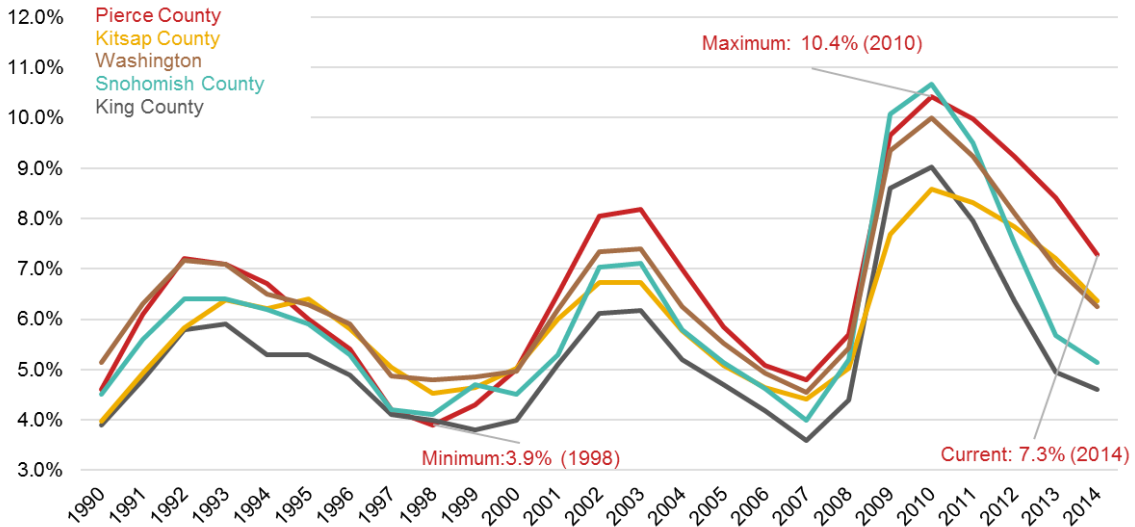
Exhibit 13. Unemployment Rate, Pierce County, 2005-2014



Sources: Washington State Unemployment Security Department, 2015. Community Attributes Inc., 2016.

Pierce County unemployment rates follow the regional and state trends closely. However, unemployment rates in the county tend to be higher than the statewide rate and those of the Central Puget Sound counties. The county has also had a slower recovery rate compared to King and Snohomish counties and the state as a whole. (Exhibit 14)

Exhibit 14. Unemployment Trends, Washington State, King, Kitsap, Pierce and Snohomish Counties, 1990-2014



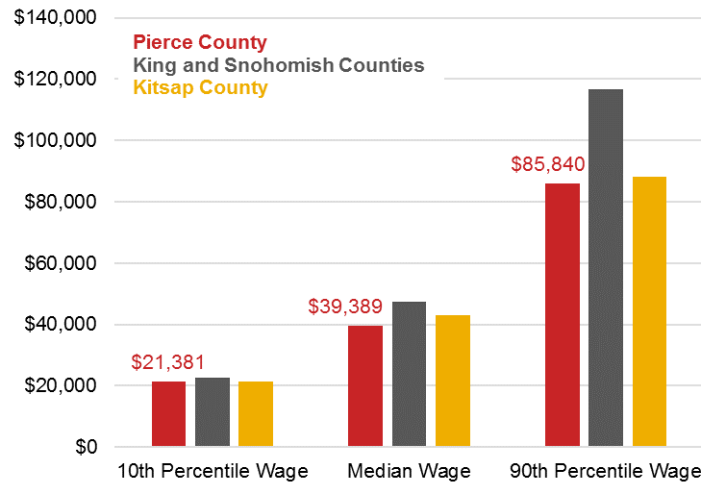
Sources: Washington State Employment Security Department, 2015; Community Attributes Inc., 2016.

Wages

The median Pierce County wage in March 2015 was just under \$40,000 a year. Wages at all levels in Pierce County tend to be lower than in its fellow Central Puget Sound counties. Entry level wages in Pierce County were just over \$24,000, compared to \$26,400 in King and Snohomish counties.

The experienced wage in Pierce County is almost \$60,700, more than \$16,000 lower than the wage in Snohomish and King counties. The wage gap between counties widens at the highest levels. In Pierce County the 90th percentile wage, or the wage at which ten percent of the population earns more and 90 percent earn less is \$85,800. In Snohomish and King counties this is almost \$116,800 annually. (Exhibit 15)

Exhibit 15. Comparative Wages, Pierce, King, Snohomish and Kitsap Counties, March 2015



Sources: Washington State Employment Security Department, 2015. Community Attributes Inc., 2016.

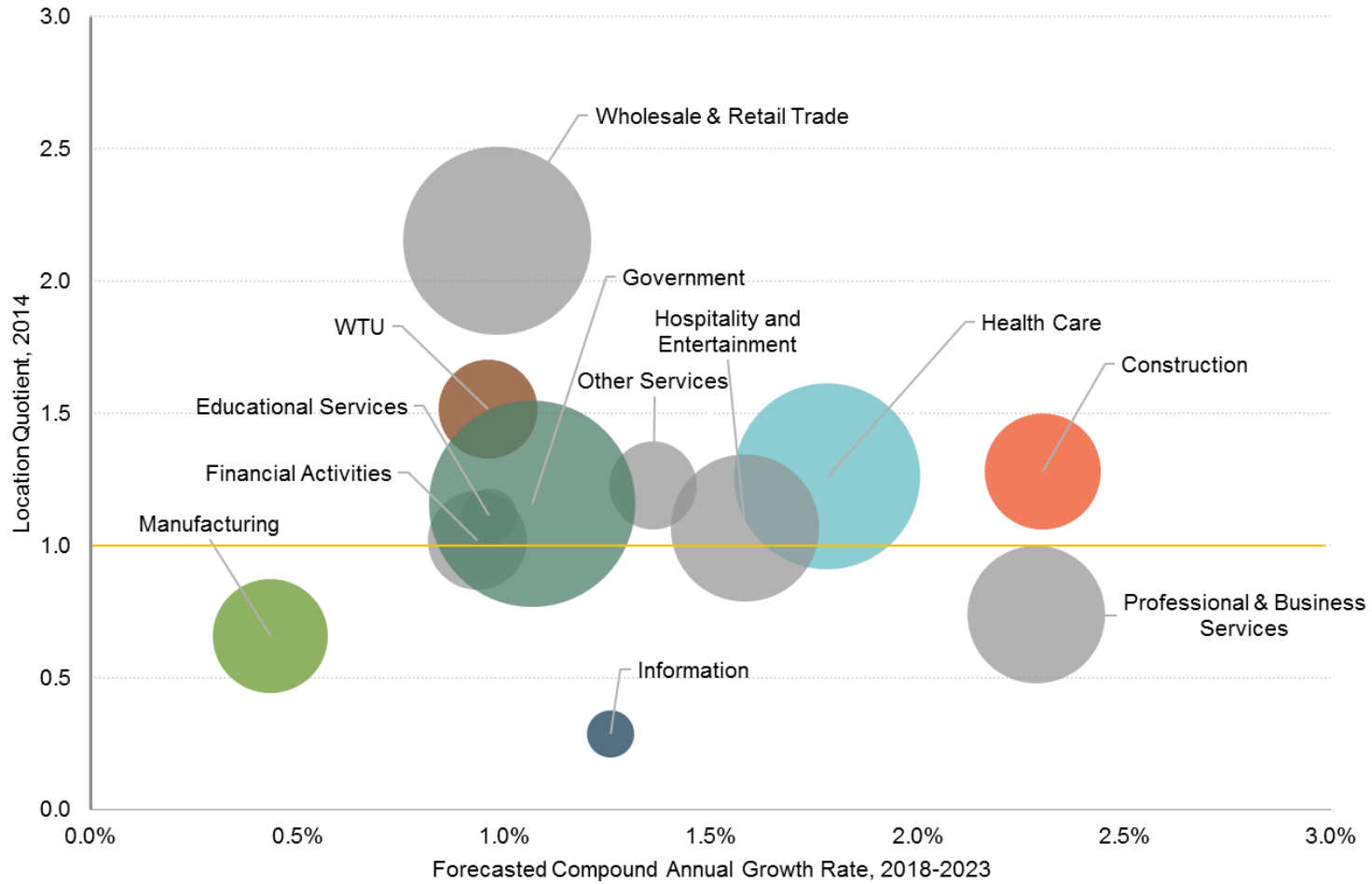
Location Quotients and Economic Base Drivers

Exhibit 16 shows Pierce County's industries sized by employment in industry. The colored industries are WorkForce Central's Key Industry Sectors. The center of each bubble is distributed along the x-axis based on the forecasted annual growth rate between 2018 and 2023. Each bubble is distributed vertically based on the industry's location quotient.

The location quotient is an indicator of the industry's relative concentration within the county compared to its concentration in the state. A location quotient of 1.0 indicates average concentration, or the same relative concentration of the industry in the county as found statewide.

Pierce County's largest industries are Government, Wholesale & Retail Trade and Healthcare. The industries with the highest forecasted growth rates are Construction and Professional & Business Services. The county has a high concentration of Wholesale & Retail Trade, as well as Warehousing, Transportation and Utilities (WTU). Government, Health Care, Construction and Education Services are also all above the state level of concentration. (**Exhibit 16**)

Exhibit 16. Pierce County Location Quotients and Industry Forecasted Compound Annual Growth Rates, 2014 and 2018-2023



WTU is Warehousing, Transportation and Utilities.

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; Community Attributes Inc., 2016.

Military Residents

Pierce County is home to Joint Base Lewis-McChord (JBLM). JBLM is the largest base in Washington in terms of personnel, and has the most active duty and reserve personnel in the state. Only Naval Base Kitsap employs more personnel than JBLM among all of Washington's bases.

This base is a major contributor to the County's workforce, population and economy. In 2014 JBLM was home to almost 33,000 active duty military personnel, including almost 29,400 Army, and more than 3,400 Air Force. In addition to active duty personnel the base also supports more than 8,000 reservists, composed primarily of Army National Guard, Army Reserve, Air National Guard and Air Force Reserve. The base also employs almost 9,200 civilian workers. In total the base is hosts more than 50,000 personnel.

This strong network of active duty, reserve and civilian personnel also support a robust population of military families and veterans. According to the Census, Pierce County is home to more than 89,000 veterans. Additionally, more than 84,800 civilians in the county are covered under Tricare, the military health coverage. This represents more than ten percent of the total civilian population within the county.

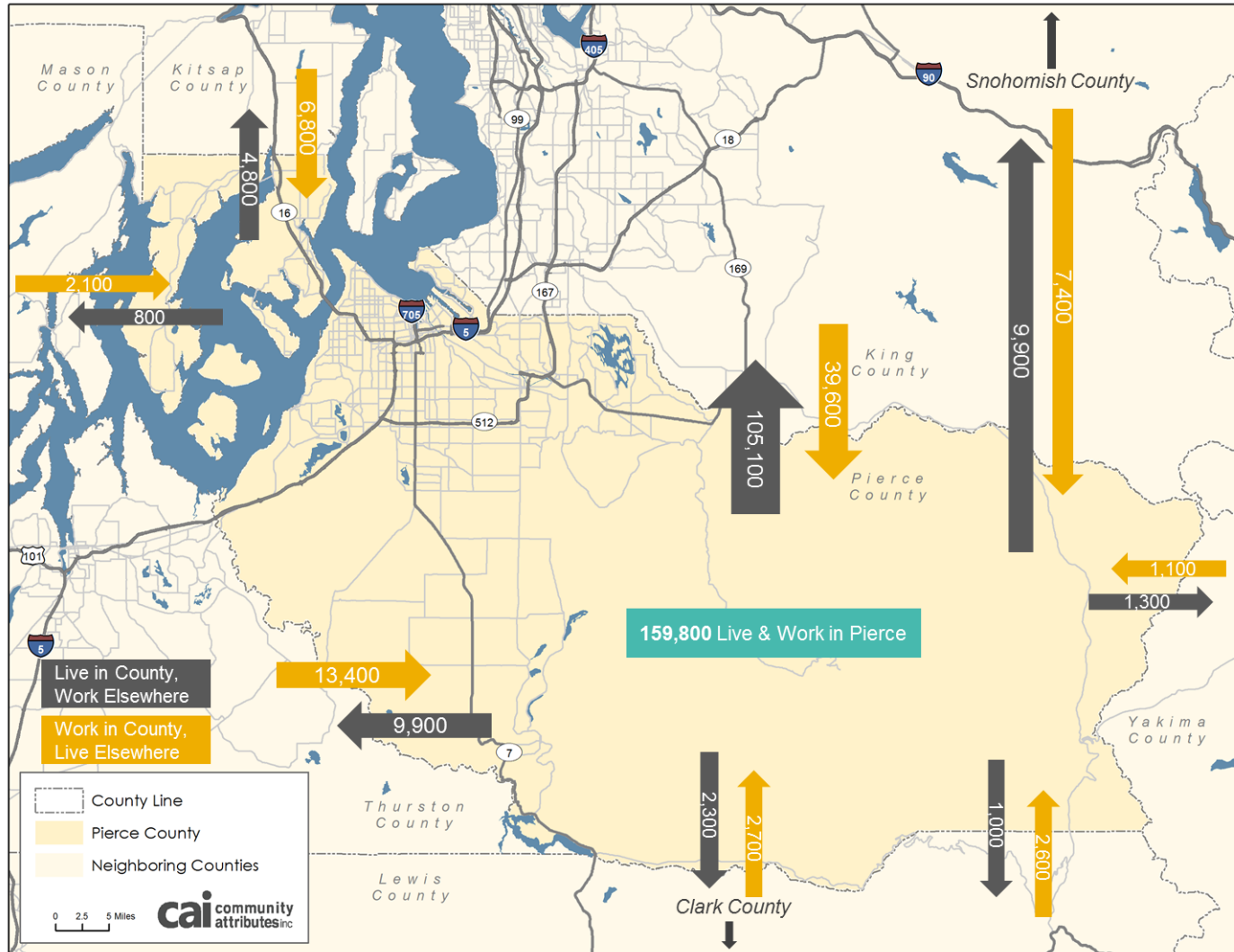
Commute Patterns

A large proportion of residents in Pierce County commute to nearby counties for work, in particular King County. King County is the largest job center in Washington, supporting almost 42 percent of total statewide nonfarm employment. According to the U.S. Census Longitudinal Employer-Household Dynamics (LEHD) database, approximately 48 percent of covered employees residing in Pierce County work elsewhere. Covered employees are those workers covered under unemployment insurance, and the data used by LEHD does not include military workers, as well as certain federal government employees working specifically in national security fields. Given that Pierce County has a strong military component to its workforce, the share of total employment that commute outside of Pierce County is less than the 48 percent of covered employment.

The largest share of workers traveling outside of Pierce County travel to Seattle, more than 19 percent. Other important work destinations for Pierce County residents include: Kent, Auburn, Federal Way, Renton, Bellevue, Tukwila, SeaTac, Everett and Olympia.

Although a large portion of residents in Pierce County that are covered employees commute outside of the county for work, many people residing outside of the county commute to work within the county. More than 92,000 workers covered under unemployment insurance are employed in Pierce County, but live elsewhere.

Exhibit 17. Pierce County Commute Trends, 2014



Sources: U.S. Census Longitudinal Employer-Household Dynamics, 2014. Community Attributes Inc., 2016.

HEALTHCARE

Industry Overview

The healthcare industry employs more than 40,500 people in Pierce County. Including healthcare employment in government, the healthcare industry employs more than 43,700 people in the county. Pierce County's healthcare industry is primarily composed of employment in hospitals, followed by employment in offices of physicians and individual and family services. Government entities employ more than 3,000 healthcare workers. Throughout this analysis, estimates of healthcare industry employment include government employment of healthcare workers in addition to employment in the healthcare industry.

Median wages across the healthcare industry range between \$21,750 annually and \$179,280 annually¹. Wage levels are mixed among education levels, indicating that the healthcare industry has options for high wage employment for a range of talent and skill levels. The average wage across the industry is almost \$58,900 compared to \$57,370 for the entire region.

Occupational Supply and Demand

Across the healthcare industry there is a total supply of 1,182 local graduates and 389 unemployment insurance claimants whose previous occupation matches to a healthcare occupation. This indicates a total supply of 1,571 candidates annually. Average annual openings among all healthcare occupations is 1,445 in total, with 1,323 projected to be within the healthcare industry. This represents a compound annual growth rate of 1.8 percent between 2018 and 2023. Combining the elements of supply and demand leaves a final surplus of 248 workers in Pierce County.

(Exhibit 19)

The overall surplus in workers across the industry is driven in large part by an oversupply of 349 medical assistants **(Exhibit 18)**. Stakeholders indicated that the majority of this oversupply occurs because private, for-profit trade schools oversupply the region. Local employers find that many of these graduates are unqualified and prefer to hire new graduates from community colleges.

¹ Due to data limitations median wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are used as a proxy for Pierce County specific occupational wage data, which is not available.

Exhibit 18. Annual Healthcare Supply and Demand, On-the-Job Training and Associate Degree or Postsecondary Award, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Social and Human Service Assistants	0	80	(80)	13	(67)
Home Health Aides	0	76	(76)	14	(62)
Food Servers, Nonrestaurant	0	27	(27)	4	(23)
Interviewers, Except Eligibility and Loan	0	15	(15)	0	(15)
Medical Equipment Preparers	0	9	(9)	0	(9)
Health Technologists and Technicians, All Other	0	17	(17)	10	(7)
Opticians, Dispensing	0	6	(6)	0	(6)
Substance Abuse and Behavioral Disorder Counselors	0	6	(6)	6	0
Personal Care Aides	0	73	(73)	87	15
Medical Secretaries	101	46	55	41	96
On-the-Job Training Subtotal	101	355	(254)	174	(80)
Registered Nurses	139	249	(109)	0	(109)
Massage Therapists	6	47	(41)	7	(35)
Dental Hygienists	0	28	(28)	11	(17)
Physical Therapist Assistants	0	11	(11)	0	(11)
Diagnostic Medical Sonographers	0	10	(10)	0	(10)
Respiratory Therapists	0	9	(9)	0	(9)
Surgical Technologists	0	9	(9)	0	(9)
Radiologic Technologists	0	17	(17)	9	(8)
Cardiovascular Technologists and Technicians	0	5	(5)	0	(5)
Magnetic Resonance Imaging Technologists	0	5	(5)	0	(5)
Ophthalmic Medical Technicians	0	4	(4)	0	(4)
Medical and Clinical Laboratory Technicians	7	12	(5)	8	3
Nursing Assistants	101	87	14	0	14
Dental Assistants	28	38	(10)	28	18
Medical Records and Health Information Technicians	56	23	33	9	42
Licensed Practical and Licensed Vocational Nurses	120	60	60	35	95
Phlebotomists	176	12	164	0	164
Medical Assistants	357	56	301	48	349
Associate degree or Postsecondary Award Subtotal	990	680	309	154	463

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

Registered nurses are projected to have the greatest annual demand at almost 250 openings annually, and also are projected to experience a shortage in local supply of 109 workers annually. Other notable shortages are projected among social and human services assistants, home health aides, massage therapists and physicians and surgeons.

A total of 36 out of 50 core healthcare occupations are projected to experience shortages in local talent. However, these shortages are countered by large surpluses among several occupations. Most notable among these are medical assistants mentioned above. Other significant surpluses in talent are projected for phlebotomists; medical secretaries; licensed practical and licensed vocational nurses; and social and community service managers.

Exhibit 19. Annual Healthcare Supply and Demand, Bachelor's Degree and Higher, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Medical and Clinical Laboratory Technologists	0	18	(18)	0	(18)
Healthcare Practitioners and Technical Workers, All Other	0	8	(8)	0	(8)
Dietitians and Nutritionists	0	5	(5)	0	(5)
Health Educators	0	5	(5)	0	(5)
Mental Health and Substance Abuse Social Workers	4	9	(5)	7	2
Medical and Health Services Managers	21	34	(13)	23	10
Social and Community Service Managers	50	19	32	19	50
Bachelor's degree Subtotal	76	98	(22)	49	26
Physicians and Surgeons, All Other	0	32	(32)	0	(32)
Physical Therapists	1	25	(24)	0	(24)
Dentists, General	0	17	(17)	0	(17)
Physician Assistants	0	14	(14)	0	(14)
Family and General Practitioners	0	11	(11)	0	(11)
Nurse Practitioners	0	10	(10)	0	(10)
Occupational Therapists	1	11	(10)	0	(10)
Anesthesiologists	0	9	(9)	0	(9)
Chiropractors	0	8	(8)	0	(8)
Mental Health Counselors	0	16	(16)	9	(8)
Health Diagnosing and Treating Practitioners, All Other	0	7	(7)	0	(7)
Surgeons	0	7	(7)	0	(7)
Oral and Maxillofacial Surgeons	0	5	(5)	0	(5)
Healthcare Social Workers	4	10	(6)	4	(2)
Marriage and Family Therapists	9	8	1	0	1
Master's degree or higher Subtotal	16	190	(174)	13	(161)
Grand Total	1,182	1,323	(141)	389	248

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

Stakeholders noted that the shortage of registered nurses has implications across other occupations in the industry. As employers struggle to find registered nurses some are starting to increase the number of LPNs on staff in order to compensate for the shortage. Because LPN educational programs have been scaled down over the past decade due to declining demand, healthcare employers are finding it challenging to recruit LPNs. For this reason, stakeholder feedback indicated that the demand for LPNs is possibly understated in the employment projection data.

CONSTRUCTION

Industry Overview

The construction industry employs almost 24,460 people in Pierce County. Pierce County's construction industry is primarily composed of employment in building equipment contractors, which represent 24 percent of industry employment

Another method for defining the construction industry is to identify the core occupations that represent the primary skills that define Pierce County's construction industry. Among the 51 core construction occupations employment in Pierce County totals more than 27,500. Out of total occupational employment, more than 20,500 are employed in the construction industry, representing 75 percent of construction occupational employment

Median wages across the healthcare industry range between \$28,280 annually and \$119,070 annually². The majority of core construction occupations require on-the-job training for entry rather than an educational degree or certification. Among these occupations median wages across the Seattle-Tacoma-Bellevue MSA range between \$28,280 and \$85,310, indicating that this industry provides career pathways for individuals that are not interested in the college path.

Occupational Supply and Demand

Annual supply between 2018 and 2023 in the construction industry is composed of a projected 108 Pierce County graduates and 2,394 UI claimants whose previous occupation matches a core construction occupation. Total supply is projected to be 2,502 local candidates annually. Average annual openings among these occupations is projected to be 1,008 openings. The combination of supply and demand across the industries core occupations leads to a projected annual surplus of 1,493 local workers. (**Exhibit 21**)

Large supplies of UI claimants among construction laborers and carpenters are large contributors to the projected annual surplus of construction workers. Construction stakeholders interviewed reported difficulty hiring and stakeholders from the Joint Apprenticeship Training Councils and Training Trusts claimed they had increased the size of their programs to meet current and future demand.

Construction industry stakeholders indicated that they expect to see high demand within their core occupations due to a strong pipeline of

² Due to data limitations median wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are used as a proxy for Pierce County specific occupational wage data, which is not available.

construction work in Pierce County coupled with anticipated retirements due to an aging workforce. They also mentioned that they are experiencing shortages in qualified candidates. In some cases, they receive plenty of applicants for open positions, however few are qualified.

Exhibit 20. Annual Construction Supply and Demand, On-the-Job Training, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Security and Fire Alarm Systems Installers	1	13	(13)	0	(13)
Electrical Power-Line Installers and Repairers	0	23	(23)	14	(9)
Fence Erectors	0	13	(13)	7	(6)
Telecommunications Line Installers and Repairers	1	16	(16)	10	(6)
First-Line Supervisors of Mechanics, Installers, and Repairers	0	6	(6)	3	(4)
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	0	2	(2)	0	(2)
Control and Valve Installers and Repairers, Except Mechanical Door	0	1	(1)	0	(1)
Terrazzo Workers and Finishers	0	1	(1)	0	(1)
Helpers--Painters, Paperhangers, Plasterers, and Stucco					
Masons	0	1	(1)	0	(1)
Helpers--Carpenters	0	1	(1)	0	(1)
Carpet Installers	0	5	(5)	5	0
Tapers	0	11	(11)	12	1
Helpers--Electricians	0	4	(4)	6	2
Hazardous Materials Removal Workers	0	2	(2)	5	2
Millwrights	0	2	(2)	4	3
Reinforcing Iron and Rebar Workers	0	3	(3)	6	3
Insulation Workers, Floor, Ceiling, and Wall	0	5	(5)	10	5
Earth Drillers, Except Oil and Gas	1	4	(3)	8	5
Payroll and Timekeeping Clerks	6	3	3	2	5
Assemblers and Fabricators, All Other	0	2	(2)	8	6
Mobile Heavy Equipment Mechanics, Except Engines	0	6	(6)	12	6
Crossing Guards	0	3	(3)	14	11
Plasterers and Stucco Masons	0	0	0	12	12
Construction and Related Workers, All Other	0	1	(1)	18	16
First-Line Supervisors of Construction Trades and Extraction Workers	20	69	(49)	65	16
Welders, Cutters, Solderers, and Brazers	3	3	0	19	19
Pipelayers	0	3	(3)	23	20
Glaziers	0	5	(5)	25	20
Paving, Surfacing, and Tamping Equipment Operators	1	2	(0)	26	25
Brickmasons and Blockmasons	0	4	(4)	33	29
Sheet Metal Workers	0	3	(3)	33	30
Drywall and Ceiling Tile Installers	0	17	(17)	64	47
Painters, Construction and Maintenance	0	70	(70)	118	49
Structural Iron and Steel Workers	0	17	(17)	91	74
Plumbers, Pipefitters, and Steamfitters	0	28	(28)	103	74
Roofers	0	62	(62)	137	75
Cement Masons and Concrete Finishers	0	24	(24)	122	97
Electricians	1	77	(77)	229	152
Operating Engineers and Other Construction Equipment Operators	1	34	(33)	231	198
Carpenters	3	157	(154)	411	256
Construction Laborers	0	132	(132)	404	272
On-the-Job Training Subtotal	38	837	(799)	2,289	1,489

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

Pierce County's construction industry is projected to have an annual supply of 2,502 local candidates between 2018 and 2023. This supply is composed of 96 percent unemployment insurance claimants. Stakeholder interviews indicate that although there may be a surplus of local candidates many of these candidates may not be considered to be qualified by local employers.

Exhibit 21. Annual Construction Supply and Demand, Associate Degree or Postsecondary Award and Higher, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Electrical and Electronics Drafters	1	3	(2)	0	(2)
Architectural and Civil Drafters	1	2	(2)	0	(2)
Mechanical Drafters	0	1	(1)	0	(1)
Audio and Video Equipment Technicians	0	2	(1)	2	1
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	14	31	(16)	27	11
Associate degree or Postsecondary Award Subtotal	17	38	(21)	30	8
Computer Programmers	2	7	(4)	0	(4)
Architects, Except Landscape and Naval	0	3	(3)	1	(2)
Construction Managers	27	85	(58)	57	(1)
Cost Estimators	24	37	(13)	13	(0)
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	0	2	(2)	5	3
Bachelor's degree Subtotal	53	133	(80)	76	(4)
Grand Total	108	1,008	(901)	2,394	1,493

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

The construction industry does not have an adequate high school pipeline. Students are not exposed to construction and other skilled trades in high school and this impacts career path choices. Rather, they focus on the professional services and other office occupations. Stakeholders indicated that they get a number of candidates who side tracked into careers in low paying retail or service industries before finding construction. The industry needs help promoting itself as a good option for all types of candidates, focusing on reaching youth more effectively.

ADVANCED MANUFACTURING

Industry Overview

The advanced manufacturing industry employs more than 6,360 people in Pierce County. Major industry components include aerospace; computer and peripheral equipment manufacturing; and petroleum and coal production. Among core advanced manufacturing occupations more than 12,250 people are employed in Pierce County. Within this employment almost 4,460 workers are employed in the advanced manufacturing industry.

Median wages across the construction industry range between \$23,510 and \$143,070 annually³. Among occupations that require an associate degree or less for entry, 13 have median wages greater than \$50,000 annually. The average wage across the industry is almost \$62,900 compared to \$57,370 for the entire region.

Occupational Supply and Demand

Total demand among advanced manufacturing occupations is projected to be 125 openings annually. Overall supply among these same occupations is projected to be 351 local candidates, of which almost 77 percent are unemployment insurance claimants whose previous occupation is a core advanced manufacturing occupation. This leaves a projected surplus of 190 local candidates annually. (**Exhibit 22**)

Among the 52 core advanced manufacturing occupations the bulk are in balance with small shortages or surpluses in local talent. The largest shortages in talent are found among industrial engineers and ophthalmic laboratory technicians. The overall surplus in local talent is driven primarily by large surpluses of talent among production worker helpers; welders, cutters, solderers and brazers; and machinists.

³ Due to data limitations median wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are used as a proxy for Pierce County specific occupational wage data, which is not available.

Exhibit 22. Annual Advanced Manufacturing Supply and Demand, On-the-Job Training, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Ophthalmic Laboratory Technicians	0	6	(6)	0	(6)
Industrial Machinery Mechanics	0	7	(7)	2	(5)
Petroleum Pump System Operators, Refinery Operators, and Gaugers	0	5	(5)	0	(5)
Team Assemblers	0	4	(4)	0	(4)
Structural Metal Fabricators and Fitters	0	4	(4)	2	(2)
Electrical and Electronic Equipment Assemblers	0	1	(1)	0	(1)
Purchasing Agents, Except Wholesale, Retail, and Farm Products	0	2	(2)	1	(1)
Crane and Tower Operators	0	1	(1)	1	0
Production, Planning, and Expediting Clerks	0	3	(2)	4	1
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	2	1	1	0	1
Dental Laboratory Technicians	0	3	(3)	4	2
Grinding and Polishing Workers, Hand	0	3	(3)	5	2
Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	3	0	3	0	3
Layout Workers, Metal and Plastic	3	0	3	0	3
Inspectors, Testers, Sorters, Samplers, and Weighers	0	9	(9)	13	3
Tool and Die Makers	0	0	0	3	3
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0	1	(1)	5	4
Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	0	2	(2)	6	4
Assemblers and Fabricators, All Other	0	2	(2)	6	5
Production Workers, All Other	0	2	(2)	7	6
Paving, Surfacing, and Tamping Equipment Operators	0	0	(0)	6	6
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	2	1	1	6	7
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	6	1	6	2	7
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	4	0	4	4	8
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	3	0	3	5	8
Painters, Transportation Equipment	2	1	2	6	8
Machinists	2	11	(9)	25	16
Computer-Controlled Machine Tool Operators, Metal and Plastic	2	4	(2)	18	16
Welders, Cutters, Solderers, and Brazers	4	4	0	24	25
Helpers--Production Workers	0	2	(2)	33	31
On-the-Job Training Subtotal	35	79	(44)	189	145

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

Across the advanced manufacturing industry there are challenges in finding qualified candidates. Although there are plenty of applicants for open positions, there is a high dropout rate among these applicants. Certain basic skills seem to be the biggest problem in finding qualified candidates. Stakeholders indicated that they face challenges finding workers with basic math skills required for the industry, as well as soft skills required at any job.

**Exhibit 23. Annual Advanced Manufacturing Supply and Demand,
Associate Degree or Postsecondary Award and Higher, Pierce County,
2018-2023**

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Mechanical Drafters	0	1	(1)	0	(1)
Electric Motor, Power Tool, and Related Repairers	1	0	0	2	2
Electrical and Electronics Engineering Technicians	4	2	2	4	6
Industrial Engineering Technicians	0	0	0	8	8
First-Line Supervisors of Production and Operating Workers	0	5	(5)	14	9
Associate degree or Postsecondary Award Subtotal	5	9	(4)	27	24
Industrial Engineers	0	6	(6)	0	(6)
Architectural and Engineering Managers	1	3	(2)	0	(2)
Computer Hardware Engineers	0	6	(6)	4	(2)
Electronics Engineers, Except Computer	0	2	(1)	0	(1)
Sales Engineers	0	1	(1)	0	(1)
Software Developers, Systems Software	2	3	(1)	0	(1)
Chemical Engineers	0	1	(1)	0	(1)
Human Resources Managers	0	1	(1)	0	(1)
Materials Engineers	0	1	(1)	0	(1)
Mechanical Engineers	0	6	(5)	5	(0)
Engineers, All Other	0	1	(1)	1	1
Logisticians	0	2	(2)	3	1
Aerospace Engineers	1	1	0	3	3
Industrial Production Managers	8	2	6	3	10
Computer and Information Systems Managers	8	2	6	5	12
Computer Network Architects	14	1	13	0	13
Bachelor's degree Subtotal	34	36	(2)	25	22
Orthotists and Prosthetists	0	1	(1)	0	(1)
Master's degree or higher Subtotal	0	1	(1)	0	(1)
Grand Total	74	125	(51)	241	190

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

The number of women working in advanced manufacturing is increasing. As employers look for qualified talent, women are becoming an increasingly important potential talent resource. Unfortunately, it can be challenging to recruit women. The workforce system needs to put more concerted effort into providing information about manufacturing jobs to women.

Regional vocational schools have strong programs and graduates, however, due to the skills crossover between manufacturing, construction and other skilled trades there is competition for some of these graduates. According to advanced manufacturing industry stakeholders the trades often pay higher wages than manufacturing and thus are more successful in recruiting regional graduates.

TRANSPORTATION, WAREHOUSING & LOGISTICS

Industry Overview

The transportation, warehousing and logistics industry is projected to grow 1.3 percent annually, and with a location quotient of 1.5 is highly concentrated in Pierce County. More than 12,000 people are employed in the industry in Pierce County, and employment within the industry represents 14 percent of statewide transportation, warehousing and logistics industry employment.

In 2013 more than 26,300 people were employed in transportation, warehousing and logistics occupations. Among these 9,560 were employed within the transportation, warehousing and logistics industry, just 36 percent of total occupational employment. This indicates a strong degree of crossover between industries, which stakeholders noted presents challenges for recruitment efforts within the industry.

Occupational Supply and Demand

Pierce County's transportation, warehousing and logistics industry is projected to have an annual supply of 487 local candidates between 2018 and 2023. This supply is composed of 49 graduates from local educational programs and 438 unemployment claimants whose previous occupation matches to a core transportation, warehousing and logistics occupation. Local graduates are projected to represent just ten percent of annual anticipated supply. Projected annual demand is projected to be 374 annual openings. Combining the elements of supply and demand leads to a projected surplus of 113 candidates annually. **(Exhibit 24)**

Feedback from industry stakeholders indicates that although there may be a surplus of local candidates for transportation, warehousing and logistics occupations many of these candidates may not be considered qualified by local employers. Stakeholders indicated that they generally see a lack of applicants for their openings, especially among a few specific occupations. Additionally, employers stated that of the applicants they get, there were not enough qualified candidates.

Although the overall talent pipeline indicates a surplus of qualified workers between 2018 and 2023, it is important to note that there are shortages among key transportation, warehousing and logistics occupations. Among all 35 core industry occupations, 25 are projected to have no local graduate supply within the same time period.

Exhibit 24. Annual Transportation, Warehousing & Logistics Supply and Demand, On-the-Job Training, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Laborers and Freight, Stock, and Material Movers, Hand	0	69	(69)	40	(29)
Packers and Packagers, Hand	0	28	(28)	14	(14)
First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	0	15	(15)	6	(9)
Industrial Machinery Mechanics	0	12	(12)	3	(9)
Dispatchers, Except Police, Fire, and Ambulance	0	15	(15)	9	(7)
First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	0	13	(13)	8	(6)
Railroad Conductors and Yardmasters	0	4	(4)	0	(4)
Locomotive Engineers	0	3	(3)	0	(3)
Driver/Sales Workers	0	6	(6)	3	(2)
Team Assemblers	0	2	(2)	0	(2)
Rail Car Repairers	0	2	(2)	0	(2)
Tank Car, Truck, and Ship Loaders	0	2	(2)	0	(2)
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	0	3	(3)	2	(2)
Machine Feeders and Offbearers	0	1	(1)	0	(1)
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	0	1	(1)	0	(1)
Shipping, Receiving, and Traffic Clerks	0	6	(6)	5	(1)
Railroad Brake, Signal, and Switch Operators	0	1	(1)	0	(1)
Signal and Track Switch Repairers	1	1	(0)	0	(0)
Maintenance Workers, Machinery	0	1	(1)	1	(0)
Motor Vehicle Operators, All Other	0	4	(4)	4	1
Crane and Tower Operators	1	11	(9)	11	1
Material Moving Workers, All Other	0	6	(6)	8	1
Rail-Track Laying and Maintenance Equipment Operators	1	0	1	0	1
Cargo and Freight Agents	5	10	(5)	6	1
Millwrights	0	1	(1)	3	2
Industrial Truck and Tractor Operators	0	34	(34)	37	3
Assemblers and Fabricators, All Other	0	2	(2)	6	4
Commercial Pilots	2	1	1	4	5
Light Truck or Delivery Services Drivers	2	9	(7)	11	5
Bus and Truck Mechanics and Diesel Engine Specialists	17	6	11	5	16
Production Workers, All Other	0	6	(6)	27	21
Transportation, Storage, and Distribution Managers	12	6	6	24	29
On-the-Job Training Subtotal	41	282	(240)	236	(4)
Aircraft Mechanics and Service Technicians	0	3	(3)	6	2
Heavy and Tractor-Trailer Truck Drivers	8	89	(81)	196	115
Associate degree or Postsecondary Award Subtotal	8	92	(84)	201	117
Grand Total	49	374	(325)	438	113

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

Employers across the transportation, warehousing and logistics industry have challenges finding applicants with strong soft skills. Most employers are willing to invest in training for the hard skills specific to their organization; however, they struggle to find workers that have basic skills necessary for employment. Employers require workers that reliably come to work on time and that have the basic communication skills to succeed in a team environment.

ICT & CYBERSECURITY

Industry Overview

The ICT and cybersecurity industry in Pierce County employs more than 6,470 people in Pierce County. Among ICT and cybersecurity core occupations employment is projected to grow 2.1 percent annually between 2013 and 2023. Occupational employment is projected to see net growth of 675 jobs per year. Employment among these core occupations is projected to grow from more than 14,200 in 2013 to more than 17,500 in 2023.

Wages among ICT and cybersecurity occupations are much higher than the regional average wage. The average wage in the ICT and cybersecurity industry is more than \$72,800 annually⁴, compared to a regional average wage of \$57,370. Median wages within the industry range between \$26,870 and \$143,000.

ICT and cybersecurity occupations are increasingly demanded among industries across the county's economy. As evidenced by relatively low concentration of ICT and cybersecurity occupational employment within the industry at 30 percent. As well as by high employment in other industries, with almost 10,000 workers in core occupations employed in other industries.

Occupational Supply and Demand

Overall, the ICT and cybersecurity industry is expected to experience a surplus of 131 candidates annually. Total projected supply is estimated at 337 annual candidates from Pierce County, compared to total anticipated demand of 205 annual openings. **(Exhibit 25)**

ICT and cybersecurity stakeholders indicated that they expect to see high demand among core occupations, coupled with a high degree of competition for talent from other industries and counties. Stakeholders noted that they do not have difficulty finding workers qualified for entry level, low skill positions. Those positions requiring higher skill and experience levels are very difficult to fill.

Communications and soft skills are key in the ICT industry, but these are skills that are often lacking among applicants. New entrants into the ICT industry may not understand that writing and communications skills are vitally important to success within the industry. Educational programs often focus on required hard skills, but do not ensure that graduates have the necessary soft skills required by the work environment.

⁴ Due to data limitations median wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are used as a proxy for Pierce County specific occupational wage data, which is not available.

Exhibit 25. Annual ICT & Cybersecurity Supply and Demand, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Computer User Support Specialists	1	8	(7)	0	(7)
Telephone Operators	0	3	(3)	0	(3)
Order Clerks	0	4	(4)	1	(3)
Computer, Automated Teller, and Office Machine Repairers	0	4	(4)	2	(2)
Telemarketers	0	5	(5)	3	(2)
First-Line Supervisors of Non-Retail Sales Workers	0	2	(2)	1	(1)
Data Entry Keyers	0	0	(0)	4	3
Bill and Account Collectors	0	5	(5)	12	7
Customer Service Representatives	0	43	(43)	50	7
Sales Representatives, Services, All Other	3	10	(7)	19	12
On-the-Job Training Subtotal	5	85	(80)	91	11
Medical Transcriptionists	0	11	(11)	3	(7)
Medical Equipment Repairers	2	5	(3)	0	(3)
Web Developers	9	8	1	0	1
Electric Motor, Power Tool, and Related Repairers	0	0	0	1	1
Electrical and Electronics Engineering Technicians	4	2	2	4	6
Telecommunications Equipment Installers and Repairers, Except Line Installers	1	9	(8)	29	20
Computer Network Support Specialists	59	7	51	0	51
Associate degree or Postsecondary Award Subtotal	76	43	33	37	70
Software Developers, Applications	2	29	(26)	0	(26)
Computer Programmers	2	4	(3)	0	(3)
Computer Hardware Engineers	0	6	(6)	4	(2)
Architectural and Engineering Managers	1	2	(2)	0	(2)
Electronics Engineers, Except Computer	0	2	(1)	0	(1)
Sales Engineers	0	1	(1)	0	(1)
Software Developers, Systems Software	2	3	(1)	0	(1)
Industrial Engineers	0	1	(1)	0	(1)
Mechanical Engineers	0	4	(3)	3	(0)
Electrical Engineers	0	1	(1)	1	(0)
Operations Research Analysts	0	0	(0)	0	0
Computer Occupations, All Other	0	0	0	0	0
Database Administrators	1	0	1	0	1
Computer Systems Analysts	7	4	3	0	3
Network and Computer Systems Administrators	10	6	4	0	4
Information Security Analysts	12	4	8	0	8
Statistical Assistants	20	4	15	0	15
Computer Network Architects	27	1	25	0	25
Computer and Information Systems Managers	22	5	17	15	31
Bachelor's degree Subtotal	105	78	28	23	50
Grand Total	186	205	(19)	151	131

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

Finding qualified candidates to fill open positions in cybersecurity and information security is particularly challenging. The skills required for this specialty cover a broad set of technical expertise and exceptional critical thinking skills to counter creative and constantly evolving security threats. Truly qualified candidates for these types of positions need to be able to do a full forensic study of an IT system, use problem solving skills to determine the security risks, and identify solutions to mitigate these risks.

Additionally, cybersecurity is a growing segment within the ICT industry overall. Information security analysts are projected to see the strongest growth among ICT and cybersecurity occupations at 3.8 percent annually. As more and more industries and businesses implement networks and put their information online, there will be an increasing need for people with the skills to protect this information. For example, the increasing use of electronic medical records has led to an increased need for security surrounding these sensitive records.

Overall, the industry is expected to experience a surplus of 131 candidates annually. However, it is important to look at the detailed gaps for each occupation. Eighteen occupations are expected to experience shortages in local workers annually. The largest shortages are expected among applications software developers, followed by computer user support specialists and medical transcriptionists. (**Exhibit 25**)

MILITARY & DEFENSE

Industry Overview

The military and defense industry is primarily composed of employment by the federal government of more than 12,460 in Pierce County. The military in Pierce County is supported by a strong network of defense-related industries. These industries include construction, building services, aerospace, grocery and related product wholesalers, utility system construction, architectural and engineering services and much more. More than 32,000 people in Pierce County are employed in industries related to defense.

Employment in core military and defense occupations is projected to grow 0.9 percent between 2018 and 2023, growing from more than 12,800 workers in 2018 to more than 13,400 workers in 2023. In addition to healthy employment growth the industry also has high wages, with an average wage⁵ of more than \$70,250 across all core occupations

The average wage across Pierce County's military and defense industry is more than \$70,250 annually. The average wages based on education level groupings range between \$57,997 annually to \$106,461 annually at the master's degree or higher grouping. These occupations have high average wages across the industry compared to the regional average wage across the Seattle-Tacoma-Bellevue MSA of \$57,370 annually.

Occupational Supply and Demand

Pierce County's military and defense industry is projected to have an annual supply of 270 local candidates between 2018 and 2023. Comparing local supply with forecasted annual demand of 219 openings leaves a surplus of 51 local workers annually between 2018 and 2023. (**Exhibit 27**)

⁵ Due to data limitations median wages are those for the matching occupation in the Seattle-Tacoma-Bellevue MSA, and are used as a proxy for Pierce County specific occupational wage data, which is not available.

Exhibit 26. Annual Military & Defense Supply and Demand, On-the-Job Training and Associate Degree or Postsecondary Award, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Business Operations Specialists, All Other	0	26	(26)	5	(22)
Information and Record Clerks, All Other	0	17	(17)	0	(17)
Human Resources Assistants, Except Payroll and Timekeeping	0	5	(5)	0	(5)
Healthcare Support Workers, All Other	0	9	(9)	5	(5)
Procurement Clerks	4	9	(4)	0	(4)
Purchasing Agents, Except Wholesale, Retail, and Farm Products	0	7	(7)	4	(2)
Precision Instrument and Equipment Repairers, All Other	0	1	(1)	0	(1)
Airfield Operations Specialists	0	1	(1)	0	(1)
Media and Communication Equipment Workers, All Other	0	0	0	0	0
Eligibility Interviewers, Government Programs	0	1	(1)	1	0
Motor Vehicle Operators, All Other	0	2	(2)	2	0
Artists and Related Workers, All Other	2	1	1	0	1
Legal Support Workers, All Other	3	1	1	0	1
Word Processors and Typists	2	0	2	0	2
Plant and System Operators, All Other	0	1	(1)	5	4
Mobile Heavy Equipment Mechanics, Except Engines	0	16	(16)	31	15
On-the-Job Training Subtotal	11	98	(87)	53	(34)
Life, Physical, and Social Science Technicians, All Other	0	3	(3)	0	(3)
Air Traffic Controllers	0	2	(2)	0	(2)
Electrical and Electronics Repairers, Commercial and Industrial Equipment	3	4	(1)	0	(1)
Avionics Technicians	0	0	0	4	4
Aircraft Mechanics and Service Technicians	0	9	(9)	16	7
Engineering Technicians, Except Drafters, All Other	21	2	19	0	19
Associate degree or Postsecondary Award Subtotal	23	20	4	20	24

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

Although the overall talent pipeline indicates a surplus of qualified workers, it is largely driven by a large surplus of just one occupation, natural science managers with 53 annual graduates. By and large, the majority of occupations in this industry are in balance with either a slight shortage or surplus. The occupation with the largest shortage of workers is physicians and surgeons. (**Exhibit 27**)

Exhibit 27. Annual Military & Defense Supply and Demand, Bachelor's Degree and Higher, Pierce County, 2018-2023

Occupation	Total Graduate Supply	Total Demand	Interim Gap	Total UI Claims Supply	Final Gap ↓
Management Analysts	13	22	(9)	4	(5)
Tax Examiners and Collectors, and Revenue Agents	3	7	(4)	0	(4)
Education, Training, and Library Workers, All Other	0	2	(2)	0	(2)
Microbiologists	0	1	(1)	0	(1)
Physical Scientists, All Other	0	1	(1)	0	(1)
Biological Technicians	1	1	(0)	0	(0)
Occupational Health and Safety Specialists	2	3	(2)	2	(0)
Education Administrators, All Other	1	1	0	0	0
Airline Pilots, Copilots, and Flight Engineers	3	2	1	0	1
Teachers and Instructors, All Other	0	4	(4)	6	2
Budget Analysts	7	5	2	0	2
Social Scientists and Related Workers, All Other	5	3	2	0	2
Engineers, All Other	0	3	(3)	6	3
Social Workers, All Other	2	5	(3)	7	3
Logisticians	0	6	(6)	12	5
Computer Occupations, All Other	14	7	7	0	7
Natural Sciences Managers	53	1	52	0	52
Bachelor's degree Subtotal	105	74	31	36	66
Physicians and Surgeons, All Other	0	13	(13)	0	(13)
Dentists, All Other Specialists	0	3	(3)	0	(3)
Health Diagnosing and Treating Practitioners, All Other	0	3	(3)	0	(3)
Hydrologists	0	2	(1)	0	(1)
Orthotists and Prosthetists	0	1	(1)	0	(1)
Administrative Law Judges, Adjudicators, and Hearing Officers	0	0	(0)	0	(0)
Psychologists, All Other	22	6	16	0	16
Master's degree or higher Subtotal	22	27	(6)	-	(6)
Grand Total	161	219	(58)	109	51

Sources: U.S. Bureau of Labor Statistics, 2014; Washington State Employment Security Department, 2014; National Center for Education Statistics' Integrated Postsecondary Education System, 2014; Community Attributes Inc., 2016.

One important challenge for defense contractors is finding a supply of workers that both have the skills for an occupation and can pass the stringent background checks required for security clearance. These background checks cover criminal and financial history and have extremely strict requirements. Due to the sensitive work being done by some defense contractors, employees must have security clearance to work on defense projects.

Overall, stakeholders shared that the military is a strong source of talent supply for defense contractors. Individuals transitioning out of military service have access to excellent services through the military to find local job postings and industry information. Additionally, employers in the defense industry have found that individuals from the military often have experience and skills within the specialized occupations for which they hire.