



# Talent Pipeline Study

for  
Health Care, Manufacturing,  
Transportation and Logistics

Workforce Development Council of Seattle-King County



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

est. 2005

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The WDC is a nonprofit workforce think tank and grant-making organization whose mission is to support a strong economy and the ability of each person to achieve self-sufficiency.

For their valuable contributions to this study, special thanks go to Laurie Black, Project Manager with the Workforce Development Council of Seattle-King County, Desiree Phair, Regional Labor Economist from the Labor Market and Economic Analysis Division of the Washington Employment Security Department, and to Bryan Pannell, Performance Management Analyst from the Employment and Career Development Division of the Washington Employment Security Department.

# EXECUTIVE SUMMARY

## Introduction

This report presents findings of the Seattle-King County Talent Pipeline Study commissioned by the Workforce Development Council of Seattle-King County (WDC).

The Workforce Development Council of Seattle-King County supports the local economy by matching the skills of the workforce to the skills that employers need, while ensuring that every person has the opportunity to gain skills and be self-sufficient. The WDC funds job training and employment services for adults, youth and employers throughout King County. The WDC oversees the WorkSource system of employment centers, and also serves as a workforce think tank, facilitating collaboration among business, education, labor, nonprofit, and other leaders to find and fund solutions to workforce gaps.

The Seattle-King County Talent Pipeline Study is a demand and supply analysis that aims to calculate the supply of workers by industry sector and occupation and compare it to demand projections to determine the gaps that may persist without changes in workforce preparation efforts. WDC will use the results to ensure workforce development planning efforts take into consideration these estimates.

The first phase of the Seattle-King County Talent Pipeline Study targets three of WDC's focus sectors. Focus sectors are reviewed biennially by the WDC using the following key criteria: 1) economic size and scope of the industry, 2) job demand, 3) alignment of demand with labor supply, and 4) potential for impacting the labor supply. Focus sectors analyzed in this study include Health Care, Manufacturing and Transportation and Logistics. The occupations studied in each sector were selected based on:

- Requirement of industry-specific training
- Projected employment growth
- Minimum threshold of total job openings available

The following summarizes key talent pipeline findings for each of these three sectors.

## Key Findings

Overall, the Talent Pipeline Study shows that King County supply of eligible workers is keeping pace with demand for Health Care jobs. Workforce supply is estimated to exceed demand for Manufacturing jobs, due in large part to the pool of eligible unemployed workers. Transportation and Logistics is forecasted to face a labor shortage. Beyond these sector-level generalizations, individual occupations within each sector may show either a surplus or a shortage of workers. Despite findings that supply may exceed demand at the sector level, labor shortages are estimated for a total of 81 (44%) of the 184 occupations studied.

**Exhibit 1** below summarizes the results of the supply and demand analysis by sector for the occupations studied.

### Exhibit 1 Talent Pipeline Summary by Sector

|                            | Est. Total<br>Employment<br>(2014) | Est. Total<br>Employment<br>(2019) | Avg. Total Annual<br>Openings<br>(2014 - 2019) | Projected Talent Supply                                     |   |   | Surplus or<br>(Shortage) |
|----------------------------|------------------------------------|------------------------------------|--|---|---|---|--------------------------|
|                            |                                    |                                    |  | Annual<br>Unemployed<br>(Avg. of April<br>2007, April 2011) | Annual Newly<br>Trained Candidates<br>(Class of 2010) | Total Annual<br>Supply<br>(Unemployed +<br>Newly Trained) |                          |
| Health Care                | 111,570                            | 124,069                            | 4,698  | 1,574   | 3,243   | 4,817   | 119                      |
| Manufacturing              | 100,210                            | 104,151                            | 3,044  | 3,948   | 805   | 4,753   | 1,709                    |
| Transportation & Logistics | 79,429                             | 83,486                             | 2,865  | 2,214   | 283   | 2,497   | (368)                    |
| <b>Total</b>               | <b>291,209</b>                     | <b>311,706</b>                     | <b>10,607</b>                                  | <b>7,736</b>  | <b>4,331</b>  | <b>12,067</b>   | <b>1,460</b>             |

### Health Care

In the 42 Health Care occupations studied, total employment is projected to rise from over 111,500 in 2014 to more than 124,000 in 2019. For Health Care occupations overall, the average supply of new talent is estimated to marginally outpace demand during that period by approximately 120 jobs per year, with an annual average of 4,820 candidates versus 4,700 openings.

However, this aggregation masks variation in demand versus supply among the individual occupations. Of the 42 Health Care occupations studied, only 16 are estimated to experience a surplus of available talent, with the great majority of that surplus (86%) accounted for by only five occupations. The five occupations include Health Care Support Workers,

Medical Secretaries, Medical Assistants, Nursing Aides and Attendants, and Social and Community Service Workers.

The top five Health Care occupations are estimated to account for nearly half (49%) of all annual Health Care job openings from 2014 to 2019, with the top ten accounting for 66% of all openings. The five top-ranking occupations in order include: Registered Nurses, Personal and Home Care Aides, Home Health Aides, Medical Scientists, and Medical Secretaries. Four of the top five occupations will face a shortage of trained workers (all except Medical Secretaries).

### **Manufacturing**

In the 100 Manufacturing sector occupations studied, total employment is estimated to rise by approximately 4,000 jobs, from 100,200 in 2014 to nearly 104,200 in 2019. For Manufacturing occupations overall, the average supply of talent is estimated to outpace demand during this period by nearly 1,700 candidates per year. This represents an average of 4,750 eligible workers versus only 3,050 openings.

Similar to Health Care occupations; however, such aggregation masks variation in demand versus supply among the individual occupations. Of the 100 Manufacturing sector occupations studied, only 32 are estimated to experience a shortfall of available talent. The remaining occupations are projected to experience a surplus of talent, ranging from minimal to 50 or more candidates per year.

### **Transportation and Logistics**

In the 42 Transportation and Logistics sector occupations studied total employment is estimated to rise from nearly 79,000 in 2014 to over 83,000 in 2019. The Transportation and Logistics sector as a whole is estimated to experience a shortage of 370 aggregate, annual job openings.

Of the 42 Transportation occupations studied, 24 are estimated to experience a shortage of talent and 18 are estimated to experience a surplus. The majority of the shortage occurs in the five occupations with the highest overall demand, which are collectively projected to experience a shortfall of trained workers relative to job openings of nearly 550 positions per year. In order, they are: Laborers and Freight, Stock, and Material Movers, Hand; Truck Drivers, Heavy and Tractor-Trailer; Truck Drivers, Light or Delivery Services; Industrial Truck and Tractor

Operators; and Taxi Drivers and Chauffeurs. That overall total is influenced by the high number of job openings for laborers and material movers, where a shortfall of over 650 workers per year is expected.

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## INTRODUCTION

### Background and Purpose

During the spring of 2011, the Board of the Workforce Development Council of Seattle-King County decided to pursue a Talent Pipeline Study. The goal of the Talent Pipeline Study is to anticipate King County's future employment demand by occupation and industry and identify shortfalls (or surpluses) of local workers with the skills, experience and educational qualifications to fill that demand. By understanding potential gaps in demand and supply, the workforce preparation system, made up of educators, career counselors, and workforce development professionals can collaborate to ensure the region is offering the appropriate mix of educational opportunities. Linking educational preparation to occupation and industry-specific employment growth ensures that a competitive workforce is available to fuel the region's economy with the human capital needed to foster continued prosperity.

Regions across the United States and internationally analyze their talent pipelines in response to economic evolution. For the purposes of this analysis, our definition of the talent pipeline generally refers to a group of qualified candidates ready for career opportunities in growth sectors as well as sectors anticipating openings due to retirements based on their previous work experience and/or educational attainment.

Companies, local and state governments and quasi-governmental institutions are anticipating shortfalls of competitive labor due to a variety of factors, including: rapid product innovations that require evolving skill sets, a more complex, technical environment, an aging workforce, offshore outsourcing, and newly emerging industries. This analysis aims to increase awareness of the local labor demand and supply chain and to highlight opportunities for support organizations involved in economic and workforce development.

The Workforce Development Council recognizes the need to identify the skill sets required to staff emerging and growing industries as well as those anticipating openings due to retirements, with special attention on mid-level occupations and how the region can best respond to projections. As part of this effort, the Workforce Development Council contracted Community Attributes International to conduct the Talent Pipeline Study.

## Methods

Community Attributes' analysis relies on data regularly published by Washington State 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 and the Bureau of Labor Statistics.** These data provide current estimates and forecasted demand for occupations in King County and associated educational requirements.
- **Washington unemployment insurance (UI) claims.** These data provide monthly unemployment claims and the previous occupations of the claimants.
- **Educational attainment data from the National Center for Education Statistics Integrated Postsecondary Education System (IPEDs).** IPEDS provides the number of graduates by educational program for King County's higher education institutions and a crosswalk (a table of equivalences used to translate) between educational programs and occupations.

The details and limits of these data are discussed in subsequent sections. In general, the data provide measures of demand and supply by occupation. The occupations are defined using definitions from the Bureau of Labor Statistics Standard Occupational Classification (SOC) system.

## Organization of Report

- **Approach.** Provides an overview of methods and data sources used to calculate workforce demand and supply. Limitations of the study and data are also discussed.
- **Talent Pipeline Analysis.** Presents findings on workforce supply and demand for Health Care, Manufacturing, and Transportation and Logistics sectors. Demand and supply for the highest demand occupations within each sector are highlighted, as are workforce needs by educational requirements.
- **Appendix A. Demand and Supply Tables.** A list of occupations included in the study forecasted by sector.

- **Appendix B. King County Higher Education Institutions.** Provides a list of educational institutions covered by NCES data used in this report.
- **Appendix C. Most Significant Education.** The Bureau of Labor Statistics most significant education and education groupings used to classify occupations in this report.

## APPROACH

### Industries and Occupations Definitions

This analysis calculates the supply and demand for specific occupations associated with the focus sectors of the Workforce Development Council of Seattle-King County. Focus sectors analyzed in this report include Health Care, Manufacturing, and Transportation and Logistics. Some occupations may work in multiple sectors. For example, a registered nurse may work in a hospital, which is included in the Health Care sector or in a school, in which case the occupation would be counted in the Government or Education sector.

For most industries, the associated occupations identified by the Standard Occupational Classification (SOC) code groupings provide a fairly reliable indicator for which occupations fit well within the particular industry. The Health Care SOC codes line up well with the Health Care North American Industry Classification System (NAICS) industry codes, for example. In other cases, a large number of workers in a certain occupation may work within and make important contributions to the studied industry, even though the SOC code for that occupation falls within a non-aligned classification. For example, Aerospace Engineers are an important part of the Manufacturing industry, even though aerospace engineering is not considered a Manufacturing position.

Occupations included in the study met the following criteria:

- **Industry-specific occupations.** Occupations were included where 20% or more work within the Health Care sector, and 30% or more in the Manufacturing and Transportation and Logistics sectors. Occupations selected are also concentrated within the focus sector relative to all other sectors. The 2010 quarter two Occupation-Industry Matrix for Seattle-King County from WA ESD was used to inform these criteria.

- **Industry-specific training.** Occupations were included that were associated with the occupation based on the Bureau of Labor Statistics (BLS) educational data.
- **Projected growth.** Growth refers to forecasts in total annual employment from 2014 to 2019 based on WA ESD occupational forecasts for King County.
  - This five year time period was selected since the current study period, 2009-2013, is more than half completed.
  - For the Health Care sector, occupations estimated to have at least 20 total annual openings and grow at a 1% annual rate or more are used as screening criteria for studied occupations.
  - For the Manufacturing and Transportation and Logistics sectors, *any* occupation that is estimated to produce annual openings is included. Although some occupations are forecasted to experience overall decline in total jobs, annual openings are expected due to retirement and separations. In addition, each occupation selected includes at least 50 total jobs in 2009 in King County.
  - The criteria to select occupations in Manufacturing and Transportation and Logistics are different than Health Care because the concentration of jobs in any one occupation in these sectors is much less than in Health Care.

## **Demand Calculations**

Workforce demand is based on occupational forecasts for Seattle-King County for years 2009, 2014 and 2019. Occupational forecasts were publically released by the Washington State Employment Security Department in May 2011.

This analysis applies total average annual openings from 2014 to 2019 to illustrate future employment demand on a yearly basis. Total annual openings as defined by ESD accounts for new jobs created by occupational and industry growth as well as openings created by retirement and separation from occupations for other reasons. ESD's estimate of total openings "does not include the normal turnover in each

occupation as workers go from one employer to another or from one area to another without changing their occupations.”<sup>1</sup>

## **Supply Calculations**

The Talent Pipeline calculates the supply for two cohorts: unemployed workers and recently trained candidates such as college graduates. Combining these two data sources for the overall supply calculation provides a more comprehensive snapshot of qualified candidates based on both educational attainment and previous work experience. This study assumes that unemployed workers are eligible and qualified for positions they previously held and are as competitive in the marketplace as recently trained candidates. This may not always be the case; however, rather than attempting to estimate relative competitiveness, the study clearly distinguishes the two sources of supply in associated exhibits for easy reference. Industry experts can determine whether the unemployed are comparably competitive to trained candidates for each occupation and sector.

## **Unemployed Workers**

The supply of unemployed workers is estimated based on current unemployment insurance claimants (May 2011) and averaged with unemployment figures from 2007. Data for 2011 unemployment claimants categorizes workers by previous occupation using the BLS Standard Occupational Classification Codes (SOC); however, occupational categorization of the unemployed is not available for 2007. To account for this, 2011 occupational classifications are discounted to estimate 2007 unemployment figures, a year of relatively low unemployment. Due to higher than usual unemployment figures in 2011 following the economic recession, an average was then used between a low period (2007) and high period (2011). This average unemployment is used to illustrate a more typical supply of unemployed workers categorized by occupation.

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<sup>1</sup> Employment Projections, Methodology and Results. Washington State Employment Security Department. June 2010. For more information on methods used for WA ESD occupational forecasts see:

[http://www.workforceexplorer.com/admin/uploadedPublications/10516\\_Projections\\_June\\_10.pdf](http://www.workforceexplorer.com/admin/uploadedPublications/10516_Projections_June_10.pdf)

## Trained Candidates

Trained candidates include college graduates and other individuals that completed post-secondary training at King County higher education institutions in the year 2009-2010. Estimates of trained candidates are based on data published by National Center for Education Statistics (NCES) IPEDS, which identifies the number of students that complete specific instructional programs at various award levels (such as post-secondary certificate, bachelor's or master's degree) at each King County higher education institution. See **Appendix B** for a list of King County Institutions.

For each instructional program, NCES identifies relevant occupations that trained candidates may be eligible to fill. This analysis uses the NCES Classifications of Instructional Programs (CIP) to the SOC crosswalk table as well as King County occupational demand forecasts to determine the total number of trained candidates for specific occupations.

Trained candidate supply calculations attempt to account for out-migration by taking into consideration the reality that some locally-educated certificate-recipients and graduates will not stay in King County. To account for out-migration, supply calculations incorporate an out-migration factor based on the Washington State Higher Education Coordinating Board's standard. The Board assumes 25% of graduates will either leave the area or continue on to complete a higher educational degree. This is a generalized assumption across educational levels, economic conditions and programs.

## Surplus and Shortage Assessment

In order to determine either a shortage or a surplus of workers in a given sector and occupation we applied this simple equation:

$$(\text{UI claimants} + \text{Trained Candidates}) - \text{Demand} = \text{Surplus (Shortage)}$$

This equation is applied to each sector (Health Care, Manufacturing, Transportation and Logistics) to determine the surplus or shortage by occupation. The study also assesses demand and supply of occupations based on educational attainment to determine what type and level of coursework is expected to be in high demand in future years. By understanding supply and demand by both occupation and educational preparation, stakeholders can determine the competitiveness of their academic and auxiliary programs.

Demand figures are based on annual projections from 2014 to 2019. Supply data is a snapshot in time based on the most recent educational attainment data available (2009-2010), and unemployment insurance data from 2007 (a year with low unemployment) and 2011 (a year with high unemployment).

In some cases, industry leaders may find less significant shortages than anticipated. However, the Workforce Development Council's mission is to evaluate both demand for and supply of labor, and by providing a combined supply figure with both unemployed claimants and trained candidates, take into consideration the total labor pool available in King County.

## **Educational Requirements**

The Bureau of Labor Statistics identifies the most significant education of individuals in a given occupation reported through national survey data from the American Community Survey and O\*NET. This is not to be confused with the minimal education required, nor should people with higher levels of training be considered over-qualified.

The BLS data include 11 different levels of training and experience. For simplicity, this report condenses the education levels into four groups based on a review of the types of occupations held for each training and education level. The four groups are defined as follows based on the BLS education definitions<sup>2</sup>.

- **On-the-job training** includes short, moderate and long-term on-the-job training as well as work experience in a related occupation. Jobs for which on-the-job training is the most significant source of training may also include occupations with workers who pursue post-secondary certificates or licenses.
- **Associate's Degree or Post-Secondary Vocational Award**  
Associate's degrees usually require at least 2 years of full-time academic study beyond high school. Post-secondary vocational awards are programs that lead to a certificate or other award, but not a degree. Such programs may last anywhere from a few weeks to more than a year. Occupations in this category include those

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<sup>2</sup> Bureau of Labor Statistics Occupational Variable Data Definitions. For more information see: [http://www.bls.gov/emp/ep\\_nem\\_definitions.htm#education](http://www.bls.gov/emp/ep_nem_definitions.htm#education)

that require only the completion of a training program and others that require individuals to pass a licensing exam after completion of the program before they are considered eligible for a specific occupation.

- **Bachelor's Degree** generally requires at least four years, but not more than five years of full-time academic study beyond high school.
- **Master's Degree, First Professional Degree or Higher**  
Master's degrees typically involve completion of one or two years of full-time academic study beyond a bachelor's degree, while first professional degree usually requires at least three years of full-time study beyond a bachelor's degree. First professional degrees are especially common for Health Care occupations.

This category also includes doctoral degrees as well as occupations that require a bachelor's degree or higher, plus additional work experience. Most occupations that require a bachelor's degree or higher, plus additional work experience are management positions.

The BLS defines most significant education based on the following principles<sup>3</sup>:

- An occupation is placed into the category that best describes the education or training that most workers need to become fully qualified in that occupation.
- Postsecondary awards or degrees, if generally needed for entry into the occupation, take precedence over work-related training, even though additional skills or experience may be needed for a worker to become fully qualified.

The length of time that an average worker generally needs to become fully qualified through a combination of on-the-job training and experience is used to categorize occupations in which a postsecondary award or degree usually is not needed for entry. See **Appendix C** for more information.

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<sup>3</sup> Bureau of Labor Statistics. Measures of Education and Training. For more information see: [http://www.bls.gov/emp/ep\\_education\\_tech.htm](http://www.bls.gov/emp/ep_education_tech.htm)

## Data and Model Limitations

This project makes use of available data to estimate supply and projected demand by occupations in each target sector. Key limitations are as follows:

- The precision of supply estimates may be impacted by the following:
  - Industries may hire people with higher or lower educational attainment than the most significant educational attainment identified by the BLS for each occupation.
  - People may drop out of educational programs and still be hireable for the same occupation.
  - The class of 2009-2010 is the only group of trained candidates considered for the purposes of this analysis.
  - Supply estimates do not include transferable skills and the current workforce's ability to transform with changing economic conditions.
  - The model assumes that all unemployed individuals previously employed in an occupation are hireable again for the same occupation.
  - The analysis does not address that the local workforce competes with people from outside the area for local jobs.
- The most granular definitions of occupations by the BLS may not classify occupations in the same way as the job market. For example, Medical Assistants is a broad occupational definition that includes both clinical and administrative roles. Clinical positions are expected to require a higher degree of technical skill to perform tasks such as drawing blood or administering vaccinations whereas administrative duties may include filing and seeking insurance pre-authorizations.



# Health Care Talent Pipeline

for Seattle-King County

## Key Facts and Findings: Health Care

### Demand

- ➔ **Growth Rate:** Overall, the Health Care sector will continue in a growth mode. The 42 Health Care occupations studied are projected to grow by 2.1% annually, outpacing total King County employment growth between 2014 and 2019 (1.4% compound annual growth rate or CAGR).
- ➔ **Job Openings:** The Health Care occupations included in the study are projected to produce nearly 23,500 openings in King County from 2014 to 2019, of which 12,500 will be new jobs added in the five year period. The sector's top 10 jobs, which account for 64% of Health Care employment, will grow from approximately 72,200 in 2014 to close to 81,200 by 2019; a gain of 9,000 new jobs from 2014-2019.
- ➔ **Highest Demand:** The five highest demand jobs in terms of total annual job openings are projected to account for nearly half of all job openings: Registered Nurses, Personal and Home Care Aides, Home Health Aides, Medical Scientists, and Medical Secretaries.
- ➔ **Issues & Trends:** Industry observers have commented on an employer trend to raise the education requirement when hiring for occupations such as Registered Nurse. According to the BLS, the most significant education for RNs is an associate's degree, yet data indicate that 60% of trained candidates in King County have a bachelor's degree.

### Supply

- ➔ **Supply Gap:** Across all Health Care occupations studied, there is a projected labor shortage for 26 of 42 occupations. Based on education level, shortages appear for occupations at the associate's degree or vocational award level and the master's degree level or higher, the latter having a significant shortage of 394 candidates annually.
- ➔ **Greatest Shortages:** The greatest shortages are for the Registered Nurse, Personal and Home Care Aide, and Home Health Aide occupations.
- ➔ **Issues & Trends:** The number of graduates from private vocational schools is projected to create surpluses in occupations such as Medical Assistant and Medical Secretary.

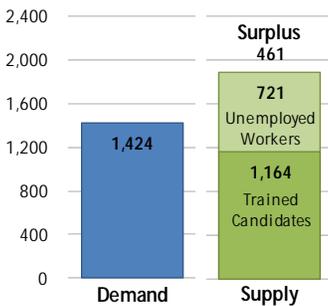
# Health Care Talent Pipeline

Top 5 Occupations By Education Level: Total Employment (2014 and 2019) and Growth (2014 - 2019)



## On-th-Job Training (also includes individuals seeking post-secondary certification)

### ANNUAL Avg Demand and Supply All Occupations by Education



| Occupation                            | Employment 2014 | Employment 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply for Top 5 Occupations (2014 - 2019) Scale: 0 - 1,200 annual openings |
|---------------------------------------|-----------------|-----------------|------------|------------------|---|
| 1 Personal and Home Care Aides        | 10,953          | 12,398          | 2.5%       | \$ 22,900        | Demand: 454<br>Supply: 315<br><b>139 Shortage</b>   |
| 2 Home Health Aides                   | 5,808           | 6,829           | 3.3%       | \$ 24,400        | Demand: 276<br>Supply: 44<br><b>232</b>   |
| 3 Medical Secretaries                 | 7,107           | 7,691           | 1.6%       | \$ 38,000        | Demand: 215<br>Supply: 422<br><b>323 Surplus</b>  |
| 4 Medical Assistants                  | 4,558           | 4,969           | 1.7%       | \$ 35,600        | Demand: 143<br>Supply: 203<br><b>187</b>  |
| 5 Social and Human Service Assistants | 3,341           | 3,613           | 1.6%       | \$ 30,700        | Demand: 88<br>Supply: 45<br><b>20</b>   |

## Associate Degree or Post-Secondary Vocational Award

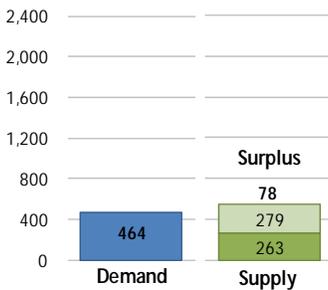
### ANNUAL Avg Demand and Supply All Occupations by Education



| Occupation   | Employment 2014 | Employment 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply for Top 5 Occupations (2014 - 2019) Scale: 0 - 1,200 annual openings |
|--|-----------------|-----------------|------------|------------------|---|
| 1 Registered Nurses                                  | 22,105          | 25,249          | 2.7%       | \$ 77,800        | Demand: 1,111<br>Supply: 821<br><b>112 178</b>  |
| 2 Nursing Aides, Orderlies, and Attendants           | 7,398           | 8,005           | 1.6%       | \$ 30,900        | Demand: 210<br>Supply: 208<br><b>142 144</b>  |
| 3 Massage Therapists                                 | 2,885           | 3,393           | 3.3%       | \$ 55,900        | Demand: 149<br>Supply: 152<br><b>17</b>   |
| 4 Licensed Practical and Licensed Vocational Nurses  | 2,674           | 2,827           | 1.1%       | \$ 46,600        | Demand: 117<br>Supply: 144<br><b>71 44</b>  |
| 5 Medical Records and Health Information Technicians | 2,006           | 2,208           | 1.9%       | \$ 37,800        | Demand: 88<br>Supply: 45<br><b>20</b>   |

## Bachelor's Degree

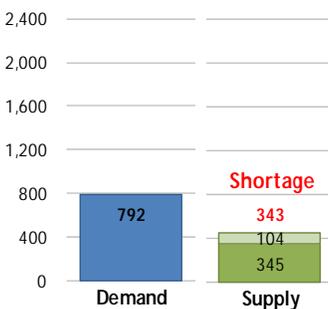
### ANNUAL Avg Demand and Supply All Occupations by Education



| Occupation                                      | Employment 2014 | Employment 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply for Top 5 Occupations (2014 - 2019) Scale: 0 - 300 annual openings |
|---|-----------------|-----------------|------------|------------------|---|
| 1 Medical and Health Services Managers          | 3,661           | 4,070           | 2.1%       | \$ 106,700       | Demand: 168<br>Supply: 70<br><b>10 88</b>   |
| 2 Medical and Clinical Laboratory Technologists | 1,641           | 1,795           | 1.8%       | \$ 62,800        | Demand: 68<br>Supply: 9<br><b>15 44</b>   |
| 3 Medical and Public Health Social Workers      | 1,268           | 1,386           | 1.8%       | \$ 58,800        | Demand: 58<br>Supply: 48<br><b>3 13</b>   |
| 4 Social and Community Service Managers         | 1,150           | 1,218           | 1.2%       | \$ 70,300        | Demand: 44<br>Supply: 78<br><b>119 85</b>   |
| 5 Child, Family, and School Social Workers      | 1,080           | 1,147           | 1.2%       | \$ 40,500        | Demand: 42<br>Supply: 27<br><b>20</b>   |

## Master's, First Professional or Higher Degree

### ANNUAL Avg Demand and Supply All Occupations by Education



| Occupation                                   | Employment 2014 | Employment 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply for Top 5 Occupations (2014 - 2019) Scale: 0 - 300 annual openings |
|--|-----------------|-----------------|------------|------------------|---|
| 1 Medical Scientists, Except Epidemiologists | 4,347           | 4,938           | 2.6%       | \$ 60,900        | Demand: 224<br>Supply: 63<br><b>26 135</b>  |
| 2 Physicians and Surgeons, All Other         | 2,674           | 2,890           | 1.6%       | \$ 189,900       | Demand: 96<br>Supply: 105<br><b>13</b>  |
| 3 Pharmacists                                | 2,268           | 2,415           | 1.3%       | \$ 112,800       | Demand: 85<br>Supply: 56<br><b>14 15</b>  |
| 4 Physical Therapists                        | 1,721           | 1,955           | 2.6%       | \$ 76,400        | Demand: 72<br>Supply: 11<br><b>61</b>   |
| 5 Mental Health Counselors                   | 1,558           | 1,636           | 1.0%       | \$ 39,400        | Demand: 51<br>Supply: 50<br><b>24 25</b>  |

## Health Care

### Industry Definition

Health Care is one of the largest employment sectors in Washington State. Health Care occupations are estimated to produce nearly 23,500 total openings and 12,500 new jobs in King County alone from 2014 to 2019.

For the purposes of this analysis, the Health Care sector encompasses 42 occupations primarily employed within the Health Care and Social Assistance industry sector (NAICS 62). See **Appendix A** for a full list of Health Care occupations. The Health Care sector includes both Health Care and social assistance. NAICS arranges the industries in this sector on a continuum starting with establishments providing medical care exclusively, continuing with those providing medical care and social assistance, and those providing only social assistance. The services provided by establishments in this sector are delivered by trained professionals. Many of the industries in the sector are defined based on the educational degree held by the practitioner.

Specific subsectors which are not typically delivered by health practitioners are excluded from Health Care, such as recreation, nonmedical diet and weight reducing centers, among others.

### Top Ranking Occupations

Ten occupations are estimated to account for 64% of Health Care occupational employment by 2019 (**Exhibit 2**). Top ranking occupations include Registered Nurses, Personal and Home Care Aides, Nursing Aides, Medical Secretaries, Home Health Aides, Medical Assistants, Medical Scientists, Medical and Health Service Managers, Social and Human Service Assistants and Massage Therapists. The remaining 32 occupations that define the Health Care sector in this study are estimated to account for 36% of employment.

The majority of the ten largest Health Care occupations are projected to grow at a faster average annual rate (2.2% CAGR, or compound annual growth rate) than the average for all King County employment (1.4% CAGR) for the ten-year period from 2009 to 2019.

**Exhibit 2**  
**Health Care Occupations,**  
**Ranked by Total Projected Employment, King County, 2009-2019**

| <b>Occupation</b>                            | <b>Est. Total<br/>Employment<br/>(2009)</b> | <b>Est. Total<br/>Employment<br/>(2014)</b> | <b>Est. Total<br/>Employment<br/>(2019)</b> | <b>% of Total<br/>Employment<br/>(2009)</b> | <b>CAGR<br/>(2009-2019)</b> |
|--|---|---|---|---|-----------------------------|
| 1 Registered Nurses                          | 19,922                                      | 22,105                                      | 25,249                                      | 20%   | 2.4%                        |
| 2 Personal and Home Care Aides               | 9,054                                       | 10,953                                      | 12,398                                      | 9%  | 3.2%                        |
| 3 Nursing Aides, Orderlies, and Attendants   | 7,202                                       | 7,398                                       | 8,005                                       | 7%  | 1.1%                        |
| 4 Medical Secretaries                        | 6,729                                       | 7,107                                       | 7,691                                       | 7%  | 1.3%                        |
| 5 Home Health Aides                          | 5,128                                       | 5,808                                       | 6,829                                       | 5%  | 2.9%                        |
| 6 Medical Assistants                         | 4,265                                       | 4,558                                       | 4,969                                       | 4%  | 1.5%                        |
| 7 Medical Scientists, Except Epidemiologists | 3,844                                       | 4,347                                       | 4,938                                       | 4%  | 2.5%                        |
| 8 Medical and Health Services Managers       | 3,414                                       | 3,661                                       | 4,070                                       | 3%  | 1.8%                        |
| 9 Social and Human Service Assistants        | 3,096                                       | 3,341                                       | 3,613                                       | 3%  | 1.6%                        |
| 10 Massage Therapists                        | 2,508                                       | 2,885                                       | 3,393                                       | 2%  | 3.1%                        |
|  | <b>65,162</b>                               | <b>72,163</b>                               | <b>81,155</b>                               | <b>64%</b>                                  | <b>2.2%</b>                 |
| Remaining healthcare occupations             | 36,977                                      | 39,407                                      | 42,914                                      | 36%   | 1.5%                        |
|  | <b>102,139</b>                              | <b>111,570</b>                              | <b>124,069</b>                              | <b>100%</b>                                 | <b>2.0%</b>                 |

Source: WA ESD, Community Attributes (2011)

### Job Openings

Health Care job openings are forecasted to concentrate among only one quarter of total Health Care occupations in this study. The ten Health Care occupations with the highest numbers of estimated job openings from 2014-2019 will account for 66% of all annual job openings during that period. The top five are projected to account for nearly half (49%) of all job openings in the sector.

By comparison, the next five highest-opening occupations account for 17% of the total, and remaining Health Care occupations account for only 34%. The top five Health Care occupations with the highest projected total annual job openings for 2014-2019 are shown below in **Exhibit 3**.

**Exhibit 3**  
**Health Care Occupations**  
**Ranked by Avg. Total Annual Job Openings, King County, 2014-2019**

| Occupation                                   | Avg. Total Annual Openings (2014 - 2019) | % of Total Openings |
|--|--|---------------------|
| 1 Registered Nurses                          | 1,111                                    | 24%                 |
| 2 Personal and Home Care Aides               | 454                                      | 10%                 |
| 3 Home Health Aides                          | 276                                      | 6%                  |
| 4 Medical Scientists, Except Epidemiologists | 224                                      | 5%                  |
| 5 Medical Secretaries                        | 215                                      | 5%                  |
|  | 2,280                                    | 49%                 |
| Next 5 highest occupations                   | 803                                      | 17%                 |
| Remaining healthcare occupations             | 1,615                                    | 34%                 |
|  | 4,698                                    | 100%                |

Source: WA ESD, Community Attributes (2011)

**Openings (Demand) vs. Supply**

Labor shortages are projected for four of the top five highest demand Health Care occupations (**Exhibit 4**). In total, projected demand for these five occupations is expected to exceed the supply of new workforce talent by over 350 jobs annually. The four highest-demand occupations together show a combined projected shortfall of 684 jobs, while the fifth, Medical Secretaries, is projected to experience a surplus of 323 jobs.

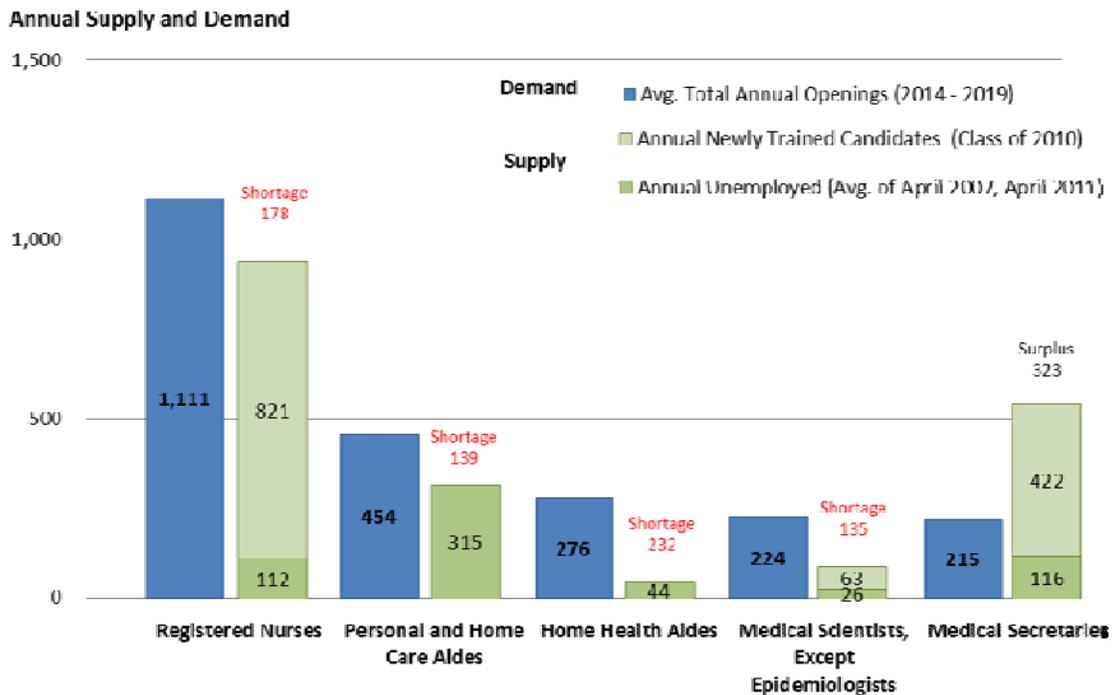
**Exhibit 4**  
**Annual Demand and Supply for Top Five Health Care Occupations,**  
**Ranked by Avg. Total Annual Openings, King County, 2014-2019**

| Occupation                                   | Avg. Total Annual Openings (2014 - 2019) | Projected Talent Supply                     |   |                                     | Surplus or (Shortage) |
|--|--|---|---|-------------------------------------|-----------------------|
|  |  | Unemployed (Avg. of April 2007, April 2011) | Annual Newly Trained Candidates (Class of 2010) | Supply (Unemployed + Newly Trained) |                       |
| 1 Registered Nurses                          | 1,111                                    | 112   | 821   | 933                                 | (178)                 |
| 2 Personal and Home Care Aides               | 454                                      | 315   | 0   | 315                                 | (139)                 |
| 3 Home Health Aides                          | 276                                      | 44  | 0   | 44                                  | (232)                 |
| 4 Medical Scientists, Except Epidemiologists | 224                                      | 26  | 63  | 89                                  | (135)                 |
| 5 Medical Secretaries                        | 215                                      | 116   | 422   | 538                                 | 323                   |
|  | 2,280                                    | 613   | 1,306   | 1,919                               | (361)                 |

Source: Community Attributes, WA ESD, WA UI, NCES (2011)

**Exhibit 5** visually depicts the total annual supply of candidates relative to demand for the five occupations with the highest projected number of job openings between 2014 and 2019.

### Exhibit 5 Annual Demand and Supply for Top Five Health Care Occupations, King County, 2014 – 2019

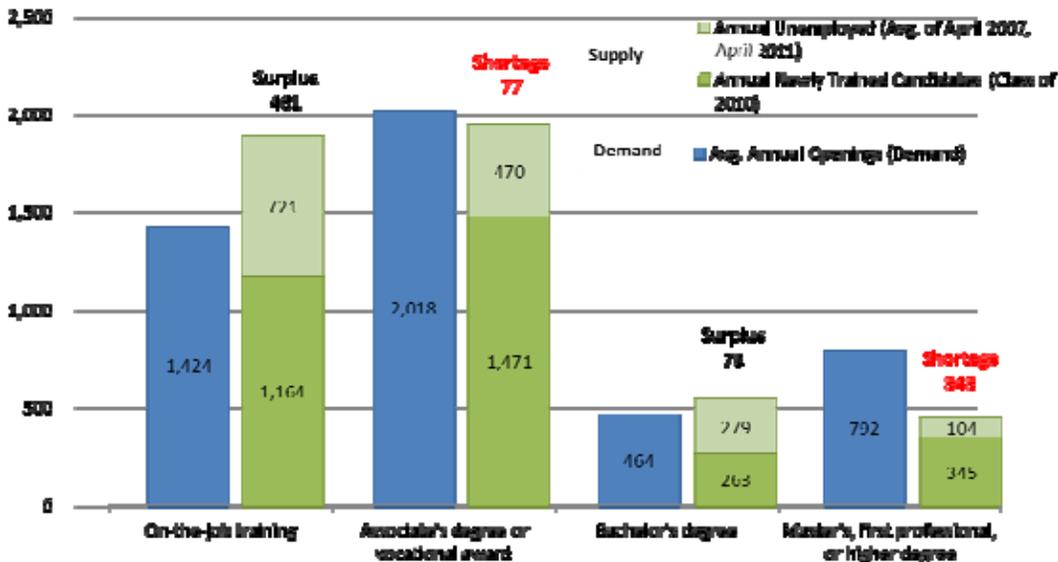


Source: Community Attributes, WA ESD, WA UI, NCES (2011)

#### Demand vs. Supply by Level of Most Significant Education

Supply and demand can also be evaluated based on the level of educational attainment necessary to fill projected job openings. **Exhibit 6** below illustrates the average annual total demand (job openings) and supply of new trained candidates for 2014-2019 across all Health Care occupations studied, grouped by educational level.

**Exhibit 6**  
**Annual Demand and Supply for Health Care Occupations**  
**by Education Requirement, King County, 2014 – 2019**  
**All Health Care Occupations Studied**



Source: Community Attributes, WA ESD, WA UI, NCES, BLS (2011)

In the 42 Health Care occupations studied total employment is projected to rise from nearly 111,500 in 2014 to over 124,000 in 2019. The average supply of new talent is projected to marginally outpace demand during that period by a pace of approximately 120 jobs per year, with an average of 4,820 candidates versus 4,700 openings.

However, this aggregation masks variation in demand versus supply among the individual occupations. Of the 42 Health Care occupations studied, only 17 are projected to experience a surplus of available talent. Of those 17, only five account for 86% of the total surplus.

For occupations requiring only on-the-job training, the supply of new talent will exceed the demand by over 460 positions per year. Occupations requiring a bachelor's or first professional degree will see excess supply as well, albeit to a lesser extent.

In practice, some occupations may require a higher level of education for a job seeker to be competitive. For example, according to the BLS, the

most significant education for an RN is an associate's degree; however, 60% of trained candidates seeking employment as an RN hold a bachelor's degree or more.

Demand will outpace supply for occupations requiring either an associate's degree or a master's degree or higher.

**Exhibit 7**  
**Top 5 Health Care Occupations by Educational Requirements**  
**Ranked by Average Annual Total Job Openings, King County, 2014- 2019**

| Occupation   | Most Significant Educational Requirement          | Avg. Wage  | % in Health Care Industry | Avg. Annual Job Openings (2014 - 2019) | Newly Trained Job Candidates | Unemployed Workers | Annual Surplus or (Shortage) |
|--|---|------------|---------------------------|--|------------------------------|--------------------|------------------------------|
| <i>Occupations that require on-the-job training or similar work experience</i>   |   |            |                           |  |                              |                    |                              |
| 1 Personal and Home Care Aides   | Short-term on-the-job training                    | \$ 22,850  | 77%                       | 454                                    | 0                            | 315                | (139)                        |
| 2 Home Health Aides  | Short-term on-the-job training                    | \$ 24,414  | 91%                       | 276                                    | 0                            | 44                 | (232)                        |
| 3 Medical Secretaries  | Moderate-term on-the-job training                 | \$ 37,974  | 95%                       | 215                                    | 422                          | 116                | 323                          |
| 4 Medical Assistants   | Moderate-term on-the-job training                 | \$ 35,625  | 90%                       | 143                                    | 203                          | 127                | 187                          |
| 5 Social and Human Service Assistants  | Moderate-term on-the-job training                 | \$ 30,715  | 67%                       | 133                                    | 11                           | 40                 | (82)                         |
| <i>Occupations that require an Associate's degree or post-secondary award</i>    |   |            |                           |  |                              |                    |                              |
| 1 Registered Nurses  | Associate degree                                  | \$ 77,800  | 77%                       | 1,111                                  | 821                          | 112                | (178)                        |
| 2 Nursing Aides, Orderlies, and Attendants                                       | Postsecondary vocational award                    | \$ 30,917  | 91%                       | 210                                    | 208                          | 144                | 142                          |
| 3 Massage Therapists   | Postsecondary vocational award                    | \$ 55,939  | 67%                       | 149                                    | 152                          | 14                 | 17                           |
| 4 Licensed Practical and Licensed Vocational Nurses                              | Postsecondary vocational award                    | \$ 46,625  | 81%                       | 117                                    | 144                          | 44                 | 71                           |
| 5 Medical Records and Health Information Technicians                             | Associate degree                                  | \$ 37,785  | 79%                       | 88                                     | 23                           | 45                 | (20)                         |
| <i>Occupations that require a Bachelor's degree</i>                              |   |            |                           |  |                              |                    |                              |
| 1 Medical and Health Services Managers   | Bachelor's or higher degree, plus work experience | \$ 106,703 | 67%                       | 168                                    | 70                           | 88                 | (10)                         |
| 2 Medical and Clinical Laboratory Technologists                                  | Bachelor's degree                                 | \$ 62,770  | 85%                       | 68                                     | 9                            | 15                 | (44)                         |
| 3 Medical and Public Health Social Workers                                       | Bachelor's degree                                 | \$ 58,828  | 90%                       | 58                                     | 48                           | 13                 | 3                            |
| 4 Social and Community Service Managers  | Bachelor's degree                                 | \$ 70,266  | 48%                       | 44                                     | 78                           | 85                 | 119                          |
| 5 Child, Family, and School Social Workers                                       | Bachelor's degree                                 | \$ 40,469  | 71%                       | 42                                     | 35                           | 27                 | 20                           |
| <i>Occupations that require a Master's, first professional, or higher degree</i> |   |            |                           |  |                              |                    |                              |
| 1 Medical Scientists, Except Epidemiologists                                     | Doctoral degree                                   | \$ 60,861  | 15%                       | 224                                    | 63                           | 26                 | (135)                        |
| 2 Physicians and Surgeons, All Other   | Master's degree                                   | \$ 189,933 | 77%                       | 96                                     | 105                          | 4                  | 13                           |
| 3 Pharmacists  | First professional degree                         | \$ 112,810 | 33%                       | 85                                     | 56                           | 14                 | (15)                         |
| 4 Physical Therapists  | Master's degree                                   | \$ 76,409  | 87%                       | 72                                     | 11                           | 0                  | (61)                         |
| 5 Mental Health Counselors   | Master's degree                                   | \$ 39,445  | 92%                       | 51                                     | 50                           | 25                 | 24                           |



# Manufacturing Talent Pipeline

for Seattle-King County

## Key Facts & Findings: Manufacturing

### Demand

- ➔ **Growth Rate:** Manufacturing jobs studied are forecasted to grow at an annual rate of 0.8%, well below the average for all King County employment (1.4% CAGR).
- ➔ **Job Openings:** While the local manufacturing sector has experienced a decline comparable to national trends, it will still create more than 18,200 job openings from 2014 to 2019; 4,000 of which will be new jobs added during the five year period; the balance are due to retirements and separations.
- ➔ **Highest Demand:** 20 Manufacturing occupations account for 2/3 of all annual openings. The top 5 are Shipping, Receiving and Traffic Clerks, Team Assemblers, Purchasing Agents, and Logisticians, and Assemblers and Fabricators, All Other. Together these five will account for a demand of just over 800 vacancies per year.
- ➔ **Issues & Trends:** a) Since the majority of job openings in this sector are created by retirements versus growth, this may raise two challenges: how to attract new candidates and how to address the loss of experience needed for on-the-job training and mentorship; b) An employer trend observed is an increasing emphasis on industry-recognized skill certifications; and c) While demand for several aerospace-related positions is currently projected to be flat, product line changes locally could create growth and this warrants continued monitoring.

### Supply

- ➔ **Supply Gap:** Overall in the sector, supply will outpace demand; however a labor shortage is projected for 32 of the 100 occupations studied.
- ➔ **Greatest Shortages:** Four of the top five highest demand occupations named above will have a shortfall of 320 candidates per year. The supply pipeline for these occupations is primarily experienced workers who have been trained on-the-job. Based on education level, shortages appear at the Bachelor's degree level, including most prominently Logisticians, Mechanical Engineers, and Industrial Engineers.
- ➔ **Issues & Trends:** The supply gap for engineering occupations appears to highlight the opportunity to emphasize related technical education at the K-12 level and increase the number of technical graduates at the 4-year level.

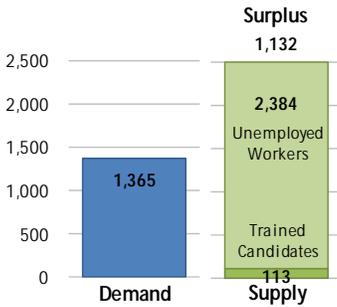
# Manufacturing Talent Pipeline

Top 5 Occupations By Education Level: Total Employment (2014 and 2019) and Growth (2014 - 2019)



## On-the-Job Training, Durable Manufacturing (also includes individuals seeking post-secondary certificates)

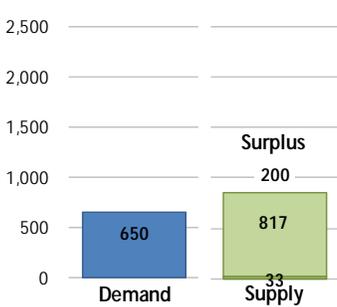
ANNUAL Avg Demand and Supply  
All Occupations by Education



| Occupation   | Jobs 2014 | Jobs 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply by Top 5 Occupations (2014 - 2019) Scale: 0 - 300 annual openings |
|--|-----------|-----------|------------|------------------|--|
| 1 Team Assemblers  | 4,426     | 4,765     | 1.5%       | \$ 32,000        | Demand: 173, Supply: 18  |
| 2 Purchasing Agents, Except Wholesale, Retail, and Farm Products | 4,068     | 4,321     | 1.2%       | \$ 64,000        | Demand: 169, Supply: 67  |
| 3 Assemblers and Fabricators, All Other                          | 2,878     | 3,144     | 1.8%       | \$ 30,700        | Demand: 122, Supply: 87  |
| 4 Production, Planning, and Expediting Clerks                    | 2,794     | 2,958     | 1.1%       | \$ 45,200        | Demand: 109, Supply: 5   |
| 5 Production Workers, All Other                                  | 1,586     | 1,833     | 2.9%       | \$ 26,600        | Demand: 90, Supply: 108  |

## On-the-Job Training, Non-Durable Manufacturing (also includes individuals seeking post-secondary certificates)

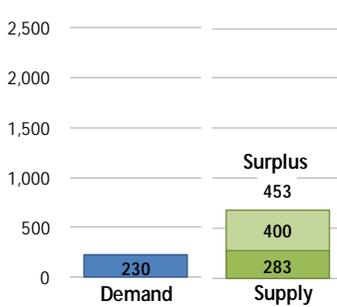
ANNUAL Avg Demand and Supply  
All Occupations by Education



| Occupation  | Jobs 2014 | Jobs 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply by Top 5 Occupations (2014 - 2019) Scale: 0 - 300 annual openings |
|---|-----------|-----------|------------|------------------|--|
| 1 Shipping, Receiving, and Traffic Clerks             | 6,883     | 7,119     | 0.7%       | \$ 33,500        | Demand: 221, Supply: 164   |
| 2 Meat, Poultry, and Fish Cutters and Trimmers        | 2,012     | 2,260     | 2.4%       | \$ 22,200        | Demand: 118, Supply: 100   |
| 3 Bakers  | 1,548     | 1,583     | 0.4%       | \$ 31,700        | Demand: 48, Supply: 39   |
| 4 Printing Machine Operators                          | 1,487     | 1,535     | 0.6%       | \$ 41,900        | Demand: 44, Supply: 64   |
| 5 Packaging and Filling Machine Operators and Tenders | 1,299     | 1,399     | 1.5%       | \$ 29,100        | Demand: 42, Supply: 108  |

## Associate Degree or Post-Secondary Vocational Award

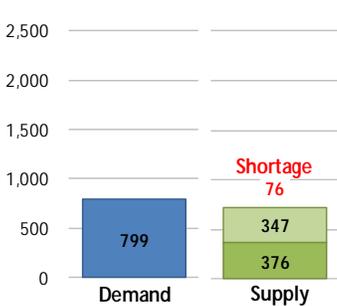
ANNUAL Avg Demand and Supply  
All Occupations by Education



| Occupation  | Jobs 2014 | Jobs 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply by Top 5 Occupations (2014 - 2019) Scale: 0 - 300 annual openings |
|---|-----------|-----------|------------|------------------|--|
| 1 Welders, Cutters, Solderers, and Brazers            | 1,937     | 1,975     | 0.4%       | \$ 45,000        | Demand: 69, Supply: 261  |
| 2 Electrical and Electronic Engineering Technicians   | 1,015     | 1,080     | 1.2%       | \$ 56,800        | Demand: 146, Supply: 184   |
| 3 Engineering Technicians, Except Drafters, All Other | 1,239     | 1,215     | -0.4%      | na               | Demand: 33, Supply: 79   |
| 4 Mechanical Drafters                                 | 985       | 961       | -0.5%      | \$ 64,200        | Demand: 19, Supply: 2  |
| 5 Jewelers and Precious Stone and Metal Workers       | 508       | 535       | 1.0%       | \$ 39,200        | Demand: 18, Supply: 31   |

## Bachelor's Degree or Higher

ANNUAL Avg Demand and Supply  
All Occupations by Education



| Occupation             | Jobs 2014 | Jobs 2019 | CAGR 14-19 | Median Wage 2010 | ANNUAL Demand and Supply by Top 5 Occupations (2014 - 2019) Scale: 0 - 300 annual openings |
|------------------------|-----------|-----------|------------|------------------|--|
| 1 Logisticians         | 3,529     | 3,704     | 1.0%       | \$ 70,800        | Demand: 123, Supply: 29  |
| 2 Mechanical Engineers | 2,931     | 3,098     | 1.1%       | \$ 82,900        | Demand: 114, Supply: 39  |
| 3 Industrial Engineers | 2,823     | 2,917     | 0.7%       | \$ 83,100        | Demand: 98, Supply: 50   |
| 4 Engineering Managers | 3,002     | 3,122     | 0.8%       | \$ 124,700       | Demand: 17, Supply: 61   |
| 5 Engineers, All Other | 2,775     | 2,850     | 0.5%       | \$ 95,700        | Demand: 91, Supply: 106  |

## **Manufacturing**

### **Industry Definition**

The Manufacturing sector, long a central part of the local and regional economy, has experienced a decline in industrial employment in recent years, comparable to national trends. Nevertheless, it remains an important component of the regional economy. More than 18,000 total openings and nearly 4,000 new Manufacturing jobs will be created in Seattle-King County from 2014 to 2019.

For the purposes of this analysis, the Manufacturing sector encompasses 100 occupations primarily employed within the three Manufacturing areas described by NAICS codes 31, 32, and 33.

The BLS defines the Manufacturing sector as including establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products... Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. (BLS.gov)

The BLS notes that while Manufacturing companies often use power-driven machines and materials-handling equipment, similar work done by hand or sold directly from where they are produced in smaller establishments are also classified as Manufacturing. Such smaller-scale establishments may include bakeries, candy stores, custom tailors, and the like.

This distinction relates to the differentiation between durable and non-durable goods. In general, NAICS 31 industries are primarily engaged in the production of non-durable goods, including Food and Beverage Production, Textiles and Apparel, and Leatherworking.

NAICS 32 industries engage primarily in non-durables production: Paper Production; Printing and Related Activities; Petroleum and Coal Products Manufacturing; Chemical Manufacturing; and Plastics and Rubber Manufacturing. However, two NAICS 32 subsectors (Wood Product Manufacturing and Non-metallic Mineral Product Manufacturing) are classified as producing durable goods.

NAICS 33 industries are primarily engaged in durables production: Metal, Metal Products, and Machinery; Electronic and Electrical Equipment;

Transportation Equipment; and Furniture and other Miscellaneous Manufacturing.

### Top Ranking Occupations

In general, Manufacturing occupations are projected to present fewer job openings than Health Care. Similarly, no single Manufacturing occupation is projected to present an exceptionally large number of openings.

The top ten high demand Manufacturing occupations range from 120 to 220 average job openings per year from 2014-2019. As such, these occupations are projected to account for only 37% of Manufacturing occupational employment by 2019 (**Exhibit 8**).

### Exhibit 8 Manufacturing Occupations, Ranked by Total Projected Employment, King County, 2009 - 2019

| Occupation  | Est. Total<br>Employment<br>(2009) | Est. Total<br>Employment<br>(2014) | Est. Total<br>Employment<br>(2019) | % of Total<br>Employment<br>(2019) | CAGR<br>(2009-2019) |
|---|------------------------------------|------------------------------------|------------------------------------|------------------------------------|---------------------|
| 1 Shipping, Receiving, and Traffic Clerks                             | 6,599                              | 6,883                              | 7,119                              | 7%                                 | 0.8%                |
| 2 Team Assemblers   | 3,926                              | 4,426                              | 4,765                              | 5%                                 | 2.0%                |
| 3 Purchasing Agents, Except Wholesale, Retail, and Farm Products      | 3,813                              | 4,068                              | 4,321                              | 4%                                 | 1.3%                |
| 4 Logisticians  | 3,338                              | 3,529                              | 3,704                              | 4%                                 | 1.0%                |
| 5 First-Line Supervisors/Managers of Production and Operating Workers | 3,500                              | 3,607                              | 3,673                              | 4%                                 | 0.5%                |
| 6 Assemblers and Fabricators, All Other                               | 2,634                              | 2,878                              | 3,144                              | 3%                                 | 1.8%                |
| 7 Engineering Managers  | 2,873                              | 3,002                              | 3,122                              | 3%                                 | 0.8%                |
| 8 Mechanical Engineers  | 2,715                              | 2,931                              | 3,098                              | 3%                                 | 1.3%                |
| 9 Inspectors, Testers, Sorters, Samplers, and Weighers                | 2,855                              | 2,959                              | 2,997                              | 3%                                 | 0.5%                |
| 10 Aerospace Engineers  | 2,915                              | 3,030                              | 2,993                              | 3%                                 | 0.3%                |
|   | 35,168                             | 37,313                             | 38,936                             | 37%                                | 1.0%                |
| Remaining core manufacturing occupations                              | 59,592                             | 62,897                             | 65,215                             | 63%                                | 0.9%                |
|   | 94,760                             | 100,210                            | 104,151                            | 100%                               | 0.9%                |

Source: WA ESD, Community Attributes (2011)

Top-ranking occupations in terms of total employment in 2019 include Shipping, Receiving, and Traffic Clerks; Team Assemblers; Purchasing Agents; Logisticians; First-line Supervisors and Managers; Other Assemblers and Fabricators; Engineering Managers; Mechanical Engineers; Inspectors and Testers; and Aerospace Engineers.

The remaining 90 occupations studied in the Manufacturing sector are projected to account for 63% of employment.

All but two of the ten largest Manufacturing occupations are projected to grow at a slower average annual rate (an average 1.0% CAGR) than the

average for all King County employment (1.4% CAGR) for the ten-year period from 2009 to 2019. Team Assemblers are projected to grow at 2.0% CAGR, and Other Assemblers and Fabricators at 1.8%. Purchasing Agents and Mechanical Engineers are both projected to grow at 1.3% annually, just under the overall King County average.

### **Job Openings**

The majority of Manufacturing job openings are forecasted to concentrate among only 20% of total Manufacturing occupations. The 20 Manufacturing sector occupations with the highest number of projected openings from 2014-2019 will account for 66% of all annual job openings.

However, as noted above, each occupation accounts for relatively lower proportions of the total. The top five are projected to account for just over one quarter of all Manufacturing job openings (27%), and the next five account for an additional 17% of job openings.

The top Manufacturing occupations with the highest projected total annual job openings for 2014-2019 are shown in **Exhibit 9**. See appendix A for a complete list of Manufacturing occupations studied.

**Exhibit 9**  
**Manufacturing Occupations**  
**Ranked by Avg. Total Annual Job Openings, King County, 2014-2019**

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| Occupation, Ranked by Total Openings, 2014 - 2019                | Avg. Total Annual<br>Openings<br>(2014 - 2019) | % of Total<br>Openings |
|--|--|------------------------|
| 1 Shipping, Receiving, and Traffic Clerks                        | 221  | 7%                     |
| 2 Team Assemblers  | 173  | 6%                     |
| 3 Purchasing Agents, Except Wholesale, Retail, and Farm Products | 169  | 6%                     |
| 4 Logisticians   | 123  | 4%                     |
| 5 Assemblers and Fabricators, All Other                          | 122  | 4%                     |
|  | 808  | 27%                    |
| 6-10 Next 5 highest occupations (# 6 - 10)                       | 530  | 17%                    |
| 11-15 Next 5 highest occupations (# 11 - 15)                     | 384  | 13%                    |
| 16-20 Next 5 highest occupations (# 16 - 20)                     | 299  | 10%                    |
| Remaining core manufacturing occupations                         | 1,023  | 34%                    |
|  | 3,044  | 100%                   |

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Source: WA ESD, Community Attributes (2011)

**Openings (Demand) vs. Supply**

Labor shortages are projected for four of the top five highest demand Manufacturing occupations (**Exhibit 10**). In total, projected demand for these five occupations is expected to exceed the supply of new workforce talent by over 300 jobs. The four highest-demand occupations combined show a projected shortfall of 408 jobs, with the fifth, Other Assemblers and Fabricators, projected to experience a surplus of 87 jobs. The talent pipeline for these top five high demand Manufacturing occupations are composed entirely of unemployed, trained workers. There are no trained candidates for these jobs since these occupations most commonly require on-the-job training.

## Exhibit 10

### Annual Demand and Supply for Top Five Manufacturing Occupations, Ranked by Avg. Total Annual Openings, King County, 2014-2019

| Occupation, Ranked by Total Openings, 2014 - 2019                | Projected Talent Supply                  |  |   |  | Surplus or (Shortage) |
|--|--|--|---|--|-----------------------|
|  | Avg. Total Annual Openings (2014 - 2019) | Annual Unemployed (Avg. of April 2007, April 2011) | Annual Newly Trained Candidates (Class of 2010) | Total Annual Supply (Unemployed + Newly Trained) |                       |
| 1 Shipping, Receiving, and Traffic Clerks                        | 221                                      | 164  | 0   | 164  | (57)                  |
| 2 Team Assemblers  | 173                                      | 18   | 0   | 18   | (155)                 |
| 3 Purchasing Agents, Except Wholesale, Retail, and Farm Products | 169                                      | 67   | 0   | 67   | (102)                 |
| 4 Logisticians   | 123                                      | 29   | 0   | 29   | (94)                  |
| 5 Assemblers and Fabricators, All Other                          | 122                                      | 209  | 0   | 209  | 87                    |
|  | 808                                      | 487  | 0   | 487  | (321)                 |

Source: Community Attributes, WA ESD, WA UI, NCES (2011)

Exhibit 11 below visually depicts the total annual demand for and supply of candidates for the five occupations with the highest number of job openings.

## Exhibit 11

### Annual Demand and Supply for Top Five Manufacturing Occupations, King County, 2014 - 2019



Source: Community Attributes, WA ESD, WA UI, NCES (2011)

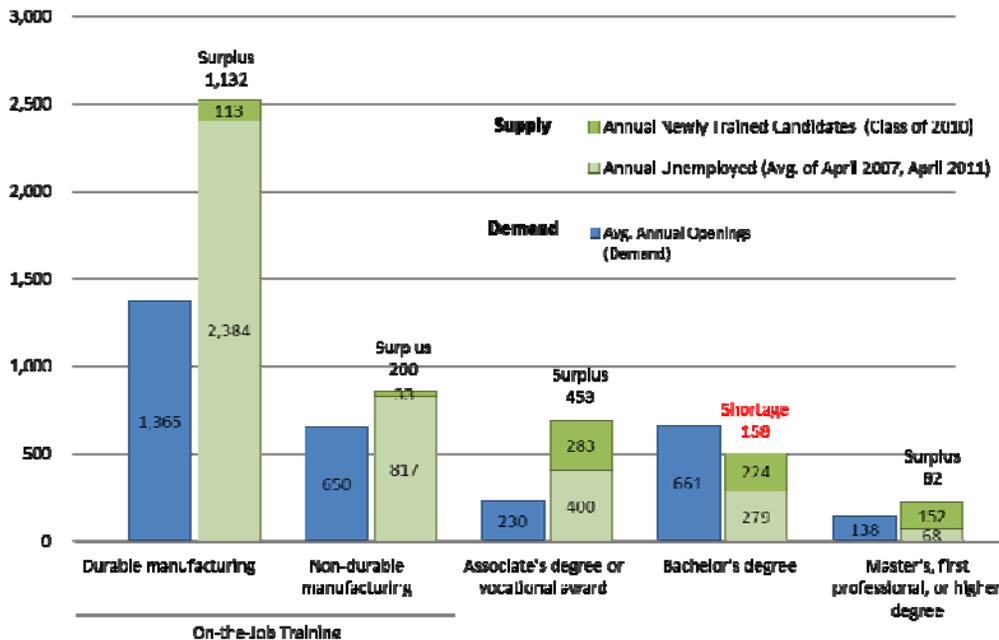
## Demand vs. Supply by Most Significant Education

In the 100 Manufacturing sector occupations studied total employment is projected to rise by approximately 4,000 jobs, from 100,200 in 2014 to nearly 104,100 in 2019. For those Manufacturing occupations overall, the average supply of talent is projected to significantly outpace demand during that period by a pace of approximately 1,700 jobs per year, an average of 4,750 candidates versus only 3,950 openings.

However, such aggregation masks variation in demand versus supply among the individual occupations. Of the 100 Manufacturing sector occupations studied, only 32 are projected to experience a shortfall of available talent, with only five of those accounting for 55% of the total shortfall.

**Exhibit 12** illustrates the average annual total demand (job openings) and supply of potential job candidates for 2014-2019 across all Manufacturing occupations studied, grouped by the educational level associated with each occupation.

**Exhibit 12**  
**Annual Demand and Supply for Manufacturing Occupations**  
**by Education Requirement, King County, 2014 – 2019**  
**All Occupations Studied**



Source: Community Attributes, WA ESD, WA UI, NCES, BLS (2011)

For occupations requiring only on-the-job training, the supply of new talent will exceed demand by over 1,300 positions per year, while supply of talent associated with an associate's degree or vocational award will exceed demand by over 450 positions annually.

Demand is projected to outpace supply for occupations associated with a bachelor's degree by over 150 positions per year. The total supply of candidates for occupations associated with master's or other advanced degrees will exceed demand by approximately 80 workers per year.

### **The Impact of Unemployment**

The number of unemployed workers plays a relatively greater role in determining future supply/demand conditions for Manufacturing than does a supply or undersupply of trained workers. The distinction between unemployed workers and newly-trained candidates shown in **Exhibit 12** illustrates the impact of recent unemployment in Manufacturing occupations.

In the two lower-level education groupings (on-the-job training and associate's degree or vocational award), the number of unemployed workers exceeds projected job openings from 2014 – 2019. The number of trained job candidates who completed a course of study relevant to that occupation is far below the number of job openings (146 trained candidates vs. 2,015 openings). This might be expected, given the emphasis on on-the-job training for the occupations. The trained worker shortfall is far outweighed; however, by the number of unemployed workers in that educational grouping, which exceeds the total number of job openings by over 1,200.

For those occupations associated with a master's or other advanced degrees, the number of projected job openings exceeds the number of unemployed workers (138 to 68, respectively). However, the supply of trained candidates exceeds that shortfall, producing a total surplus of potential candidates of approximately 82 workers per year.

The only overall net shortfall is found at the bachelor's degree level, where the total of unemployed workers and newly-trained candidates (279 and 224, respectively) falls short of the 661 job openings projected for those occupations.

**Exhibit 13** presents the five occupations with the greatest projected demand for each educational grouping. Labor shortages are projected for occupations at all training levels, from on-the-job training to master's degrees or higher.

**Exhibit 13**  
**Top Five Manufacturing Occupations by Educational Requirements**  
**Ranked by Average Annual Total Job Openings, King County, 2014- 2019**

| Occupation   | Most Significant Educational Requirement       | Avg. Wage  | % in Health Care Industry | Avg. Annual Job Openings (2014 - 2019) | Newly Trained Job Candidates | Unemployed Workers | Annual Surplus or (Shortage) |
|--|--|------------|---------------------------|--|------------------------------|--------------------|------------------------------|
| <i>Occupations that require on-the-job training or similar work experience</i>   |  |            |                           |  |                              |                    |                              |
| <i>Durable Manufacturing</i>   |  |            |                           |  |                              |                    |                              |
| 1 Team Assemblers  | Moderate-term on-the-job training              | \$ 32,029  | 68%                       | 173                                    | 0                            | 18                 | (155)                        |
| 2 Purchasing Agents, Except Wholesale, Retail, and Farm                          | Long-term on-the-job training                  | \$ 63,973  | 38%                       | 169                                    | 0                            | 67                 | (102)                        |
| 3 Assemblers and Fabricators, All Other  | Moderate-term on-the-job training              | \$ 30,670  | 52%                       | 122                                    | 0                            | 209                | 87                           |
| 4 Production, Planning, and Expediting Clerks                                    | Moderate-term on-the-job training              | \$ 45,205  | 22%                       | 109                                    | 0                            | 114                | 5                            |
| 5 Production Workers, All Other  | Moderate-term on-the-job training              | \$ 26,573  | 42%                       | 90                                     | 0                            | 198                | 108                          |
| <i>Non-Durable Manufacturing</i>   |  |            |                           |  |                              |                    |                              |
| 1 Shipping, Receiving, and Traffic Clerks  | Short-term on-the-job training                 | \$ 33,485  | 31%                       | 221                                    | 0                            | 164                | (57)                         |
| 2 Meat, Poultry, and Fish Cutters and Trimmers                                   | Short-term on-the-job training                 | \$ 22,226  | 76%                       | 118                                    | 0                            | 218                | 100                          |
| 3 Bakers   | Long-term on-the-job training                  | \$ 31,684  | 40%                       | 48                                     | 27                           | 60                 | 39                           |
| 4 Printing Machine Operators   | Moderate-term on-the-job training              | \$ 41,920  | 68%                       | 44                                     | 0                            | 108                | 64                           |
| 5 Packaging and Filling Machine Operators and Tenders                            | Short-term on-the-job training                 | \$ 29,123  | 86%                       | 42                                     | 0                            | 36                 | (6)                          |
| <i>Occupations that require an Associate's degree or post-secondary award</i>    |  |            |                           |  |                              |                    |                              |
| 1 Welders, Cutters, Solderers, and Brazers                                       | Postsecondary vocational award                 | \$ 45,029  | 67%                       | 69                                     | 146                          | 184                | 261                          |
| 2 Electrical and Electronic Engineering Technicians                              | Associate degree                               | \$ 56,764  | 30%                       | 33                                     | 48                           | 64                 | 79                           |
| 3 Engineering Technicians, Except Drafters, All Other                            | Associate degree                               | n/a        | 83%                       | 19                                     | 3                            | 18                 | 2                            |
| 4 Mechanical Drafters  | Postsecondary vocational award                 | \$ 64,177  | 78%                       | 17                                     | 26                           | 22                 | 31                           |
| 5 Jewelers and Precious Stone and Metal Workers                                  | Postsecondary vocational award                 | \$ 39,173  | 55%                       | 16                                     | 8                            | 15                 | 7                            |
| <i>Occupations that require a Bachelor's degree</i>                              |  |            |                           |  |                              |                    |                              |
| 1 Logisticians   | Bachelor's degree                              | \$ 70,837  | 57%                       | 123                                    | 0                            | 29                 | (94)                         |
| 2 Mechanical Engineers   | Bachelor's degree                              | \$ 82,890  | 48%                       | 114                                    | 39                           | 50                 | (25)                         |
| 3 Industrial Engineers   | Bachelor's degree                              | \$ 83,122  | 82%                       | 98                                     | 17                           | 20                 | (61)                         |
| 4 Engineers, All Other   | Bachelor's degree                              | \$ 95,664  | 70%                       | 80                                     | 3                            | 46                 | (31)                         |
| 5 Electrical Engineers   | Bachelor's degree                              | \$ 85,194  | 27%                       | 77                                     | 52                           | 41                 | 16                           |
| <i>Occupations that require a Master's, first professional, or higher degree</i> |  |            |                           |  |                              |                    |                              |
| 1 Engineering Managers   | Bachelor's or higher degree, plus work experie | \$ 124,665 | 29%                       | 91                                     | 152                          | 45                 | 106                          |
| 2 Operations Research Analysts   | Master's degree                                | \$ 89,045  | 21%                       | 47                                     | 0                            | 23                 | (24)                         |



# Transportation and Logistics Talent Pipeline for Seattle-King County

## Key Facts & Findings: Transportation and Logistics

### Demand

- ➔ **Growth Rate:** The sector's top ten jobs are expected to grow at a rate of 1.3%, below the average annual rate for King County employment (1.4% CAGR).
- ➔ **Job Openings:** The Transportation and Logistics sector is projected to have 14,000 total job openings from 2014 to 2019; 2,900 of which will be new jobs added during the five year period. The majority of openings will be due to retirements or other separations.
- ➔ **Highest Demand:** Five occupations are projected to account for 1,800 job openings per year, 64% of total job openings in all of the occupations studied: Laborers and Material Movers, Truck Drivers both Heavy and Light, Taxi Drivers and Chauffeurs, and Industrial Truck and Tractor Operators.
- ➔ **Issues & Trends:** Aircraft Mechanics and Service Technicians is currently projected to be flat, although potential changes in local aircraft production could create additional demand.

### Supply

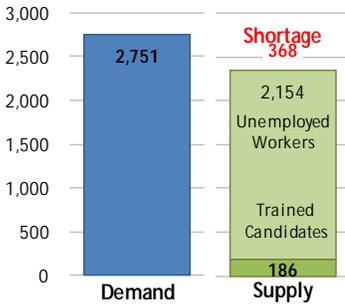
- ➔ **Supply Gap:** 25 of 47 occupations studied are projected to have a supply gap totaling a shortage of 350 annually.
- ➔ **Greatest Shortages:** The majority of the projected shortage of workers is seen in three of the five highest demand occupations with the greatest in Laborers and Material Movers. By education level, the majority of projected job openings in the sector is associated with on-the-job training and experience as the most significant education level. Only 3% of new openings are associated with Associate's degrees or post-secondary certificates and only 1% with Bachelor's degrees.
- ➔ **Issues & Trends:** Three of the five highest demand occupations are also the lowest paid of the occupations studied and may only offer limited pathways to wage progression and career advancement.

# Transportation and Logistics Talent Pipeline

Top 5 Occupations By Education Level: Total Employment (2014 and 2019) and Growth (2014 - 2019)

## On-the-Job Training (also includes individuals seeking post-secondary certificates)

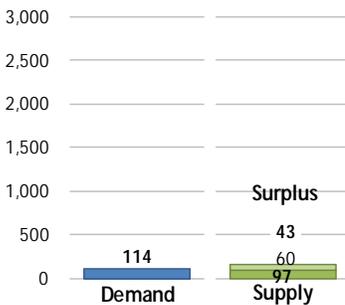
**ANNUAL Avg Demand and Supply**  
All Occupations by Education



| Occupation<br>Ranked by Total Openings (2014-19)  | Employment |        | CAGR<br>14-19 | Median<br>Wage<br>2010 | ANNUAL Demand and Supply for Top 15 Occupations<br>(2014 - 2019) Scale: 0 - 600 annual openings |        |
|---|------------|--------|---------------|------------------------|---|--------|
|   | 2014       | 2019   |               |                        | Demand  | Supply |
| 1 Laborers and Freight, Stock, and Material Movers, Hand  | 18,924     | 20,946 | 2.1%          | \$ 25,500              | 1,008   | 344    |
| 2 Truck Drivers, Heavy and Tractor-Trailer  | 10,169     | 10,689 | 1.0%          | \$ 43,600              | 306   | 531    |
| 3 Truck Drivers, Light or Delivery Services   | 7,927      | 8,225  | 0.7%          | \$ 32,100              | 217   | 239    |
| 4 Industrial Truck and Tractor Operators  | 4,192      | 4,420  | 1.1%          | \$ 38,500              | 175   | 124    |
| 5 Taxi Drivers and Chauffeurs   | 2,957      | 3,260  | 2.0%          | \$ 20,600              | 122   | 42     |
| 6 Bus Drivers, School   | 2,922      | 3,095  | 1.2%          | \$ 37,900              | 95  | 167    |
| 7 Postal Service Mail Carriers  | 2,216      | 2,222  | 0.1%          | \$ 53,800              | 76  | 73     |
| 8 Cargo and Freight Agents  | 1,637      | 1,808  | 2.0%          | \$ 46,200              | 74  | 64     |
| 9 First-Line Supervisors/Managers of Transportation and Material-Moving Machine and Vehicle Operators | 2,733      | 2,780  | 0.3%          | \$ 62,600              | 65  | 28     |
| 10 Sailors and Marine Oilers  | 1,262      | 1,269  | 0.1%          | \$ 47,900              | 62  | 41     |
| 11 Transportation, Storage, and Distribution Managers   | 1,696      | 1,749  | 0.6%          | \$ 94,300              | 60  | 133    |
| 12 Reservation and Transportation Ticket Agents and Travel Clerks                                     | 2,131      | 2,163  | 0.3%          | \$ 29,300              | 55  | 33     |
| 13 Dispatchers, Except Police, Fire, and Ambulance  | 1,567      | 1,630  | 0.8%          | \$ 37,700              | 48  | 59     |
| 14 Captains, Mates, and Pilots of Water Vessels   | 892        | 924    | 0.7%          | \$ 83,300              | 45  | 26     |
| 15 First-Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand                    | 1,629      | 1,680  | 0.6%          | \$ 49,200              | 43  | 26     |

## Post-Secondary Vocational Award, Associate Degree or Bachelor's Degree

**ANNUAL Avg Demand and Supply**  
All Occupations by Education



| Occupation<br>Ranked by Total Openings (2014-19) | Employment |       | CAGR<br>14-19 | Wage<br>2010 | ANNUAL Demand and Supply for Top 5 Occupations<br>(2014 - 2019) Scale: 0 - 600 annual openings |        |
|--|------------|-------|---------------|--------------|--|--------|
|  | 2014       | 2019  |               |              | Demand   | Supply |
| 1 Aircraft Mechanics and Service Technicians     | 3,582      | 3,524 | -0.3%         | \$ 63,400    | 63   | 38     |
| 2 Airline Pilots, Copilots, and Flight Engineers | 617        | 610   | -0.2%         | \$ 124,100   | 20   | 0      |
| 3 Commercial Pilots                              | 416        | 424   | 0.4%          | \$ 89,600    | 16   | 97     |
| 4 Avionics Technicians                           | 650        | 664   | 0.4%          | \$ 46,300    | 15   | 10     |

## Transportation and Logistics

### Industry Definition

The Transportation and Logistics sector encompasses ground-and air-based services as well as maritime transportation. Transportation and Logistics occupations studied are projected to produce over 17,000 total job openings and 5,000 new positions in Seattle-King County from 2014 to 2019.

For the purposes of this analysis, the Transportation and Logistics sector study encompasses 42 occupations primarily employed within the Transportation and Warehousing industry sector (NAICS 48 and 49). See **Appendix A** for a full list of studied Transportation and Logistics occupations. According to the BLS, the Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation and support activities related to modes of transportation, where transportation equipment or transportation related facilities are used as a productive asset. The BLS identifies the modes of transportation as air, rail, water, road and pipeline.

### Top Ranking Occupations

Ten occupations are projected to account for 73% of Transportation sector employment by 2019 (**Exhibit 14** below). The largest single occupation, Laborers and Material Movers, alone accounts for 23% of total projected sector employment in 2019. The next two occupations (Drivers of Heavy Trucks, and Drivers of Light Trucks, respectively) account for 23% of sector employment. Other top ranking occupations include Industrial Truck and Tractor Operators, Aircraft Mechanics, School Bus Drivers, Taxi Drivers and Chauffeurs, First-line Managers of Machine and Vehicle Operators, Mail Carriers, and Transportation Ticket Agents and Travel Clerks. The remaining 32 occupations that define the sector account for 27% of projected employment.

Of these ten occupations, only two (Laborers and Material Movers, and Taxi Drivers and Chauffeurs) are projected to grow at a faster average annual rate (2.2% and 2.0% CAGR, respectively) than the average for all King County employment (1.4% CAGR) for the ten-year period from 2009 to 2019. Two occupations, School Bus Drivers and Industrial Truck Operators, are projected to grow at just under the average King County

rate at 1.3% and 1.2% respectively. Based on available data at the time of the analysis, aircraft mechanics and service technician employment is projected to hold steady and possesses virtually zero growth in percentage terms. However, industry stakeholders point out that developments in the region's aerospace industry could produce growth in this category not yet forecast.. Postal Mail Carrier employment, while still the ninth-largest occupation in terms of total employment, is projected to decline at an annual rate of 0.3% but will still produce openings. Other occupations are projected to experience approximately 0.7% annual growth.

**Exhibit 14**  
**Transportation & Logistics Occupations,**  
**Ranked by Total Projected Employment, King County, 2009 - 2019**

| Occupation  | Est. Total<br>Employment<br>(2009) | Est. Total<br>Employment<br>(2014) | Est. Total<br>Employment<br>(2019) | % of Total<br>Employment<br>(2019) | CAGR<br>(2009-2019) |
|---|------------------------------------|------------------------------------|------------------------------------|------------------------------------|---------------------|
| 1 Laborers and Freight, Stock, and Material Movers, Hand          | 16,784                             | 18,924                             | 20,946                             | 23%                                | 2.2%                |
| 2 Truck Drivers, Heavy and Tractor-Trailer                        | 9,657                              | 10,169                             | 10,689                             | 13%                                | 1.0%                |
| 3 Truck Drivers, Light or Delivery Services                       | 7,653                              | 7,927                              | 8,225                              | 10%                                | 0.7%                |
| 4 Industrial Truck and Tractor Operators                          | 3,932                              | 4,192                              | 4,420                              | 5%                                 | 1.2%                |
| 5 Aircraft Mechanics and Service Technicians                      | 3,518                              | 3,582                              | 3,524                              | 5%                                 | 0.0%                |
| 6 Bus Drivers, School   | 2,732                              | 2,922                              | 3,095                              | 4%                                 | 1.3%                |
| 7 Taxi Drivers and Chauffeurs                                     | 2,664                              | 2,957                              | 3,260                              | 4%                                 | 2.0%                |
| 8 First-Line Supervisors/Managers of Transportation and Material- | 2,657                              | 2,733                              | 2,780                              | 4%                                 | 0.5%                |
| 9 Postal Service Mail Carriers                                    | 2,286                              | 2,216                              | 2,222                              | 3%                                 | -0.3%               |
| 10 Reservation and Transportation Ticket Agents and Travel Clerks | 2,047                              | 2,131                              | 2,163                              | 3%                                 | 0.6%                |
|   | 53,930                             | 57,753                             | 61,324                             | 73%                                | 1.3%                |
| Remaining core transp. occupations                                | 20,359                             | 21,182                             | 21,807                             | 27%                                | 0.7%                |
|   | 74,289                             | 78,935                             | 83,131                             | 100%                               | 1.1%                |

Source: WA ESD, Community Attributes (2011)

## Job Openings

The five Transportation and Logistics sector occupations with the largest total employment projections are also projected to have the highest number of annual job openings. The top five occupations are projected to account for nearly 2/3 (64%) of total annual job openings. Of the 2,865 annual sector job openings projected for 2014-2019, over 1,000 (35%) are expected to be in the Laborers and Material Movers occupation alone. The next two occupations (Drivers of Heavy and Light Trucks) combined will account for 18% of total annual openings, at 306 and 217 respectively. The next two (Industrial Truck and Tractor Operators and Aircraft Mechanics) are projected to average more than 100 new annual job openings.

Twenty-one of the 42 occupations studied are projected to average 20 or fewer job openings annually.

The top five Transportation and Logistics sector occupations with the highest projected total annual job openings for 2014-2019 are shown in **Exhibit 15**.

### **Exhibit 15 Transportation & Logistics Occupations Ranked by Avg. Total Annual Job Openings, King County, 2014-2019**

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| Occupation                                       | Avg. Total<br>Annual<br>Openings<br>(2014 - 2019) | % of Total<br>Openings |
|--|---|------------------------|
| Laborers and Freight, Stock, and Material Movers | 1,008   | 35%                    |
| Truck Drivers, Heavy and Tractor-Trailer         | 306   | 11%                    |
| Truck Drivers, Light or Delivery Services        | 217   | 8%                     |
| Industrial Truck and Tractor Operators           | 175   | 6%                     |
| Taxi Drivers and Chauffeurs                      | 122   | 4%                     |
|  | 1,828   | 64%                    |
| Next 5 highest occupations                       | 373   | 13%                    |
| Remaining manufacturing occupations              | 664   | 23%                    |
|  | 2,865   | 100%                   |

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Source: WA ESD, Community Attributes (2011)

## Openings (Demand) vs. Supply

The Transportation and Logistics sector as a whole is projected to experience an aggregate shortfall of trained workers relative to job openings of approximately 250 jobs annually. The majority of this shortage is seen in the five occupations with the highest overall demand, which are collectively projected to experience a shortfall of trained workers relative to job openings of nearly 550 positions per year. The overall total is influenced by the high number of job openings for laborers and material movers, where a shortfall of over 650 workers per year is expected. Among the other four top occupations, shortages of eligible workers are projected for two (Industrial Truck Operators and Taxi Drivers), while the two Truck Driver occupations are projected to have annual surpluses of workers stemming from levels of unemployment that exceed the projected annual openings (**Exhibit 16**). It is uncertain whether the situation will change over time if continued economic growth results in reabsorption of the supply of unemployed workers. This cannot be predicted from this data set.

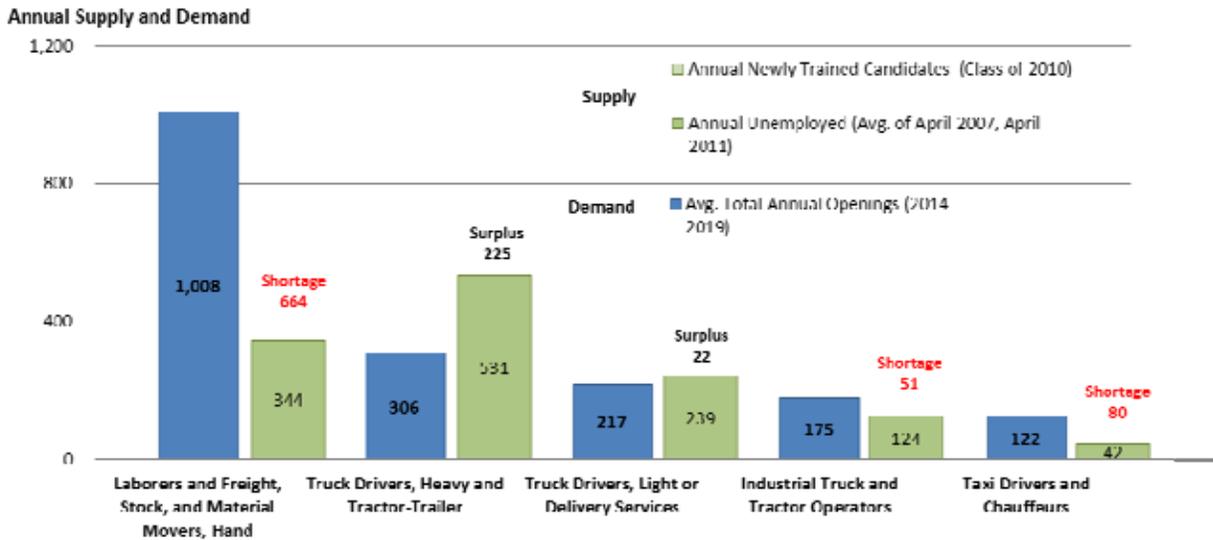
**Exhibit 16**  
**Annual Demand and Supply for Top Five Transportation & Logistics Occupations, Ranked by Avg. Total Annual Openings, King County, 2014-2019**

| Occupation                                  | Avg. Total Annual Openings (2014 - 2019) | Projected Talent Supply                     |   |                                     | Surplus or (Shortage) |
|---|--|---|---|-------------------------------------|-----------------------|
|   |  | Unemployed (Avg. of April 2007, April 2011) | Annual Newly Trained Candidates (Class of 2010) | Supply (Unemployed + Newly Trained) |                       |
| 1 Laborers and Freight, Stock, and Material | 1,008                                    | 344   | 0   | 344                                 | (664)                 |
| 2 Truck Drivers, Heavy and Tractor-Trailer  | 306                                      | 531   | 0   | 531                                 | 225                   |
| 3 Truck Drivers, Light or Delivery Services | 217                                      | 239   | 0   | 239                                 | 22                    |
| 4 Industrial Truck and Tractor Operators    | 175                                      | 124   | 0   | 124                                 | (51)                  |
| 5 Taxi Drivers and Chauffeurs               | 122                                      | 42  | 0   | 42                                  | (80)                  |
|   | 1,828                                    | 1,280                                       | 0   | 1,280                               | (548)                 |

Source: Community Attributes, WA ESD, WA UI, NCES (2011)

**Exhibit 17** below visually depicts the total annual supply of candidates for the five highest-demand occupations relative to demand (the total number of job openings) for each occupation.

**Exhibit 17**  
**Annual Demand and Supply for Top Five Transportation & Logistics Occupations, King County, 2014 – 2019**



Source: Community Attributes, WA ESD, WA UI, NCES (2011)

**Demand vs. Supply by Most Significant Education**

The educational profile of Transportation sector occupations differs from Health Care and Manufacturing. The great majority (96%) of all job openings projected for 2014-2019 are associated with on-the-job training or similar work experience, based on the Bureau of Labor Statistic’s most significant education classifications. However, workforce development professionals and industry stakeholders cite growing expectations for formal certification. Only 3% of new openings are associated with associate’s degrees or post-secondary awards, and only 1% with bachelor’s degrees.

Total employment in the 42 Transportation and Logistics sector occupations analyzed is projected to rise from 79,000 in 2014 to over 83,000 in 2019. For occupations overall, the average demand for new talent is projected to marginally outpace supply during that period by a pace of over 350 jobs per year, with an average of approximately 2,500 candidates for over 2,800 openings. **Exhibit 18** illustrates the average annual total demand (job openings) and supply of new trained candidates

for 2014-2019 grouped by educational level across all studied Transportation occupations. **Exhibit 19** then illustrates this in graphical form.

**Exhibit 18**  
**Annual Demand and Supply for Transportation & Logistics Occupations**  
**for each Education Level, King County, 2014 - 2019**

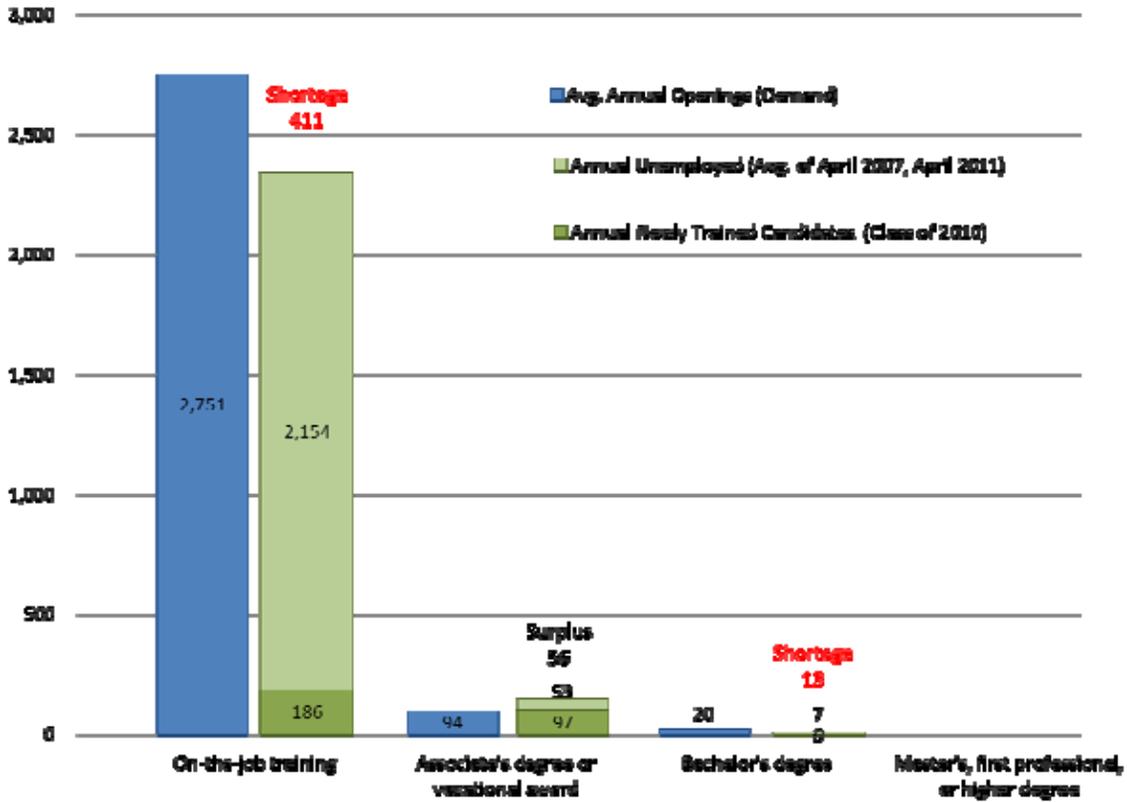
| Most Significant Educational Requirement       | Avg. Annual<br>Openings<br>(Demand) | Avg. Annual<br>Supply | Surplus or<br>(Shortage) |
|--|-------------------------------------|-----------------------|--------------------------|
| On-the-job training                            | 2,751                               | 2,340                 | (411)                    |
| Associate's degree or vocational award         | 94                                  | 150                   | 56                       |
| Bachelor's degree                              | 20                                  | 7                     | (13)                     |
| Master's, first professional, or higher degree | 0                                   | 0                     | 0                        |
| <b>TOTAL</b>                                   | <b>2,865</b>                        | <b>2,497</b>          | <b>(368)</b>             |

As with Health Care and Manufacturing occupations, this aggregation masks some variation in demand versus supply among the individual occupations. Of the 42 Transportation occupations studied, 24 are projected to experience a shortage of talent and 18 are projected to experience a surplus.

In three of the four occupations that are associated with associate's or bachelor's degrees or other post-secondary awards, the supply of trained workers is projected to fall short of job openings. In total, these four occupations are projected to experience a shortage of trained workers of approximately 40 workers per year.

For the 38 occupations that require only on-the-job training, in aggregate, the number of new job openings is expected to exceed the supply of trained candidates by over 400 jobs. In only 13 of the 38; however, the difference (surplus or shortage) is more than 20 jobs per year.

**Exhibit 19**  
**Annual Demand and Supply for Transportation & Logistics Occupations**  
**by Education Requirement, King County, 2014 – 2019**  
**All Transportation & Logistics Occupations Studied**



Source: Community Attributes, WA ESD, WA UI, NCES, BLS (2011)

**Exhibit 20** shows the top occupations with the greatest projected demand, grouped by education level required. Labor shortages are projected for occupations at all training levels, from on-the-job training to associate's and bachelor's degrees.

**Exhibit 20**  
**Top Transportation & Logistics Occupations by Significant Educational Grouping**  
**Ranked by Average Annual Total Job Openings, King County, 2014- 2019**

| Occupation   | Most Significant Educational Requirement | Avg. Wage  | % in Transp. Industry | Supply of Talent                       |                              |                    |                              |
|--|--|------------|-----------------------|--|------------------------------|--------------------|------------------------------|
|  |  |            |                       | Avg. Annual Job Openings (2014 - 2019) | Newly Trained Job Candidates | Unemployed Workers | Annual Surplus or (Shortage) |
| <i>Occupations that require on-the-job training or similar work experience</i>   |  |            |                       |  |                              |                    |                              |
| 1 Laborers and Freight, Stock, and Material Movers, Hand                         | Short-term on-the-job training           | \$ 25,509  | 23%                   | 1,008                                  | 0                            | 344                | (664)                        |
| 2 Truck Drivers, Heavy and Tractor-Trailer                                       | Short-term on-the-job training           | \$ 43,626  | 49%                   | 306                                    | 0                            | 531                | 225                          |
| 3 Truck Drivers, Light or Delivery Services                                      | Short-term on-the-job training           | \$ 32,133  | 34%                   | 217                                    | 0                            | 239                | 22                           |
| 4 Industrial Truck and Tractor Operators   | Short-term on-the-job training           | \$ 38,475  | 30%                   | 175                                    | 0                            | 124                | (51)                         |
| 5 Taxi Drivers and Chauffeurs  | Short-term on-the-job training           | \$ 20,571  | 33%                   | 122                                    | 0                            | 42                 | (80)                         |
| 6 Bus Drivers, School  | Moderate-term on-the-job training        | \$ 37,929  | 18%                   | 95                                     | 0                            | 167                | 72                           |
| 7 Postal Service Mail Carriers   | Short-term on-the-job training           | \$ 53,848  | 100%                  | 76                                     | 0                            | 3                  | (73)                         |
| 8 Cargo and Freight Agents   | Moderate-term on-the-job training        | \$ 46,211  | 89%                   | 74                                     | 18                           | 64                 | 8                            |
| 9 First-Line Supervisors/Managers of Transportation and Material-Moving          | Work experience in a related occupation  | \$ 62,580  | 36%                   | 65                                     | 0                            | 28                 | (37)                         |
| 10 Sailors and Marine Oilers   | Short-term on-the-job training           | \$ 47,936  | 39%                   | 62                                     | 0                            | 41                 | (21)                         |
| 11 Transportation, Storage, and Distribution Managers                            | Work experience in a related occupation  | \$ 94,326  | 40%                   | 60                                     | 133                          | 149                | 222                          |
| 12 Reservation and Transportation Ticket Agents and Travel Clerks                | Short-term on-the-job training           | \$ 29,336  | 78%                   | 55                                     | 0                            | 33                 | (22)                         |
| 13 Dispatchers, Except Police, Fire, and Ambulance                               | Moderate-term on-the-job training        | \$ 37,660  | 40%                   | 48                                     | 0                            | 59                 | 11                           |
| 14 Captains, Mates, and Pilots of Water Vessels                                  | Work experience in a related occupation  | \$ 83,291  | 66%                   | 45                                     | 3                            | 26                 | (16)                         |
| 15 First-Line Supervisors/Managers of Helpers, Laborers, and Material Move       | Work experience in a related occupation  | \$ 49,185  | 34%                   | 43                                     | 0                            | 26                 | (17)                         |
| <i>Occupations that require an Associate's degree or post-secondary award</i>    |  |            |                       |  |                              |                    |                              |
| 1 Aircraft Mechanics and Service Technicians                                     | Postsecondary vocational award           | \$ 63,417  | 48%                   | 63                                     | 0                            | 38                 | (25)                         |
| 2 Commercial Pilots  | Postsecondary vocational award           | \$ 89,601  | 43%                   | 16                                     | 97                           | 5                  | 86                           |
| 3 Avionics Technicians   | Postsecondary vocational award           | \$ 46,253  | 50%                   | 15                                     | 0                            | 10                 | (5)                          |
| <i>Occupations that require a Bachelor's degree</i>                              |  |            |                       |  |                              |                    |                              |
| 1 Airline Pilots, Copilots, and Flight Engineers                                 | Bachelor's degree                        | \$ 124,141 | 100%                  | 20                                     | 0                            | 7                  | (13)                         |
| <i>Occupations that require a Master's, first professional, or higher degree</i> |  |            |                       |  |                              |                    |                              |
| 1 [None]   |  |            |                       |  |                              |                    |                              |

## DATA EVALUATION

The Talent Pipeline Study, in addition to producing concrete data, has revealed issues and trends relevant to the development of future workforce strategies. Some of these insights are highlighted below as a springboard for future dialogue and action. The concluding section which follows outlines potential next steps to respond to these issues.

### Issues and Trends

#### Workforce Development Impact

These are areas in which the workforce development system can have direct impact:

- **Career pathways:** Several of the high-demand jobs identified in each sector are in an entry-level, lower-wage category. Health Care and Manufacturing, fortunately, offer education and career pathways for workers to achieve job advancement and wage progression. But such pathways are not as defined in the Transportation and Logistics sector. This is an aspect that could merit further development.
- **Competitive training programs:** Workforce training programs should make graduates competitive in the job market and able to successfully perform once on the job. Some employers in the Health Care and Manufacturing sectors express a concern that training content may not be sufficiently current, in-depth, or skill-based. If this situation occurs, it places graduates at a competitive disadvantage, particularly with larger employers, and can later impact job retention.
- **Low-growth, high-retirement patterns:** Health Care is in the strongest growth mode of the three sectors studied, adding more new jobs. However, the pattern projected for Manufacturing and Transportation and Logistics is one of lower growth and higher retirements. Employers have observed that this pattern challenges their ability both to attract new workers and to retain the experience and skills needed to train and mentor new workers. These challenges and how to best meet them is another aspect to be explored.
- **Unemployed—but re-employable?** There is a pool of experienced, unemployed candidates for most occupations in all three sectors studied. However, for a variety of reasons, some of these candidates may not be re-employable in the same occupation. Concerns noted most frequently by employers are a declining or a lack of technology skills and essential and portable employability skills, such as communication, problem solving, and work ethic. This issue leads to questions of how to

identify the unemployed in these situations and what more the workforce system can do to address the barriers.

- **Training investments:** A number of organizations fund workforce training locally. This study offers a tool to help invest training dollars in ways that align with and respond to market demand by sector. An additional possibility that emerges is extending the study's use to develop county-wide investment priorities.

### **Opportunities for Alignment**

These are areas which will require partnerships extending outside of the workforce development system to shape initiatives and outcomes:

- **Data modeling:** Some features of workforce data modeling could be further studied and refined. For instance, a discount factor is currently used to estimate, statewide, the number of graduates who are not entering the workforce because they are migrating out of the area or continuing their education. A question which could be addressed further is whether this factor is equally appropriate for King County. A related question is whether a discount factor could be developed to apply to the pool of unemployed workers who may also leave the area for employment or return to school.
- **Increasing education requirements:** Some employers in the Health Care sector express interest in increased education requirements for occupations such as Medical Assistants and Registered Nurses, a trend with several implications. Higher education requirements could translate to fewer job opportunities for lower- and middle-skill candidates. This raises the question of whether higher education requirements are necessary and whether the workforce system should work with employers to preserve more middle-skill opportunities. On the other hand, if this trend is deepening, it's possible that workforce preparation professionals should more actively move students and job seekers onto higher education tracks.
- **Technical education pipeline:** Shortages of local candidates for technical occupations, such as engineers in Manufacturing, underscore a continuing need to further expand the technical education pipeline. This issue encompasses both the need for more STEM emphasis in the K-12 system, as well as more capacity at the four-year level.
- **Job creation:** Job creation is needed across all sectors to absorb the unemployed pool and add new workers. This connects to the question of how workforce development can best support local economic growth. The ongoing partnerships between workforce and economic

development organizations in Seattle and King County might provide a platform for deeper consideration of this issue.

## Next Steps

The Workforce Development Council of Seattle-King County intends this study as a planning tool for a broad audience of stakeholders, including workforce agencies, local governments, education providers, economic development groups, youth service organizations and more. Thus, the first step is to share this report widely among these stakeholders.

Secondly, in fall 2011, this research will be extended to additional sectors which have a significant economic presence in Seattle-King County and offer growth potential. Studies of other sectors may provide insights into broad-based interventions which can affect change across sectors and educational programs.

Finally, a research study can serve as a guidepost pointing to new opportunities. The following are potential next steps to help convert the study's data on market trends and issues into actionable items for the workforce preparation community.

- **Initiate a process to prioritize and further define the nine issues and trends identified during the study.** This process would include the selection of high-priority areas and recommended interventions and implementation plans for those areas.
- **Explore a pilot program in a selected sector** with the local community college system and the Centers of Excellence to create a new model for industry's role in developing, approving, and updating workforce training content.
- **Address data modeling issues that emerged from this study.** One example, as discussed above, is determining the best discount factors to account for the in- and out-migration of graduates and workers. The results of this effort would further standardize a workforce research methodology for the county.

Through these steps and related efforts, the Workforce Development Council of Seattle-King County and its partners can continue to pursue the combination of analysis and action needed to align local workforce demand and supply, promoting a strong economy and the ability of each person to share in its prosperity.

# APPENDIX A. DEMAND AND SUPPLY TABLES

## Health Care Occupations Studied

| Occupation Name  | Educational Requirements                | Employment Estimates |                  |                |             | Average Annual Growth Rate |              | Average Total Annual Openings |  | Projected Talent Supply                         |              | Projected Annual Demand and Supply (2014 - 2019) |                     |     |
|--|---|----------------------|------------------|----------------|-------------|----------------------------|--------------|-------------------------------|--|---|--------------|--|---------------------|-----|
|  |   | 2009                 | 2014             | 2019           | 2009 - 2014 | 2014 - 2019                | 2009 - 2014  | 2014-2019                     | Annual Unemployed (Avg. of April 2007, April 2011) | Annual Newly Trained Candidates (Class of 2010) | Demand       | Supply   | Surplus or Shortage |     |
|  |   | 1 Registered Nurses  | Associate degree | 19,922         | 22,105      | 25,249                     | 2.1%         | 2.7%                          | 733  | 1,111   | 112          | 821  | 1,111               | 933 |
| 2 Personal and Home Care Aides                         | Short-term on-the-job training          | 9,054                | 10,953           | 12,398         | 3.9%        | 2.5%                       | 484          | 454                           | 315  | 0   | 454          | 315  | (139)               |     |
| 3 Home Health Aides                                    | Short-term on-the-job training          | 5,128                | 5,808            | 6,829          | 2.5%        | 3.3%                       | 181          | 276                           | 44   | 0   | 276          | 44   | (232)               |     |
| 4 Medical Scientists, Except Epidemiologists           | Doctoral degree                         | 3,844                | 4,347            | 4,938          | 2.5%        | 2.6%                       | 170          | 224                           | 26   | 63  | 224          | 89   | (135)               |     |
| 5 Medical Secretaries                                  | Moderate-term on-the-job training       | 6,729                | 7,107            | 7,691          | 1.1%        | 1.6%                       | 169          | 215                           | 116  | 422   | 215          | 538  | 323                 |     |
| 6 Nursing Aides, Orderlies, and Attendants             | Postsecondary vocational award          | 7,202                | 7,398            | 8,005          | 0.5%        | 1.6%                       | 99           | 210                           | 144  | 208   | 210          | 352  | 142                 |     |
| 7 Medical and Health Services Managers                 | Bachelor's or higher degree + work exp. | 3,414                | 3,661            | 4,070          | 1.4%        | 2.1%                       | 104          | 168                           | 88   | 70  | 168          | 158  | (10)                |     |
| 8 Massage Therapists                                   | Postsecondary vocational award          | 2,508                | 2,885            | 3,393          | 2.8%        | 3.3%                       | 106          | 149                           | 14   | 152   | 149          | 166  | 17                  |     |
| 9 Medical Assistants                                   | Moderate-term on-the-job training       | 4,265                | 4,558            | 4,969          | 1.3%        | 1.7%                       | 100          | 143                           | 127  | 203   | 143          | 330  | 187                 |     |
| 10 Social and Human Service Assistants                 | Moderate-term on-the-job training       | 3,096                | 3,341            | 3,613          | 1.5%        | 1.6%                       | 112          | 133                           | 40   | 11  | 133          | 51   | (82)                |     |
| 11 Licensed Practical and Licensed Vocational Nurses   | Postsecondary vocational award          | 2,626                | 2,674            | 2,827          | 0.4%        | 1.1%                       | 91           | 117                           | 44   | 144   | 117          | 188  | 71                  |     |
| 12 Pharmacy Technicians                                | Moderate-term on-the-job training       | 2,365                | 2,504            | 2,685          | 1.1%        | 1.4%                       | 79           | 111                           | 30   | 90  | 111          | 120  | 9                   |     |
| 13 Physicians and Surgeons, All Other                  | Master's degree                         | 2,532                | 2,674            | 2,890          | 1.1%        | 1.6%                       | 70           | 96                            | 4  | 105   | 96           | 109  | 13                  |     |
| 14 Medical Records and Health Information Technicians  | Associate degree                        | 1,868                | 2,006            | 2,208          | 1.4%        | 1.9%                       | 62           | 88                            | 45   | 23  | 88           | 68   | (20)                |     |
| 15 Pharmacists   | First professional degree               | 2,168                | 2,268            | 2,415          | 0.9%        | 1.3%                       | 65           | 85                            | 14   | 56  | 85           | 70   | (15)                |     |
| 16 Physical Therapists                                 | Master's degree                         | 1,568                | 1,721            | 1,955          | 1.9%        | 2.6%                       | 47           | 72                            | 0  | 11  | 72           | 11   | (61)                |     |
| 17 Medical and Clinical Laboratory Technologists       | Bachelor's degree                       | 1,540                | 1,641            | 1,795          | 1.3%        | 1.8%                       | 46           | 68                            | 15   | 9   | 68           | 24   | (44)                |     |
| 18 Healthcare Support Workers, All Other               | Short-term on-the-job training          | 1,831                | 1,952            | 2,148          | 1.3%        | 1.9%                       | 42           | 65                            | 46   | 402   | 65           | 448  | 383                 |     |
| 19 Medical and Public Health Social Workers            | Bachelor's degree                       | 1,202                | 1,268            | 1,386          | 1.1%        | 1.8%                       | 43           | 58                            | 13   | 48  | 58           | 61   | 3                   |     |
| 20 Radiologic Technologists and Technicians            | Associate degree                        | 1,396                | 1,478            | 1,621          | 1.1%        | 1.9%                       | 32           | 56                            | 23   | 47  | 56           | 70   | 14                  |     |
| 21 Mental Health Counselors                            | Associate degree                        | 1,511                | 1,558            | 1,636          | 0.6%        | 1.0%                       | 37           | 51                            | 25   | 50  | 51           | 75   | 24                  |     |
| 22 Medical and Clinical Laboratory Technicians         | Master's degree                         | 1,095                | 1,170            | 1,282          | 1.3%        | 1.8%                       | 33           | 49                            | 26   | 3   | 49           | 29   | (20)                |     |
| 23 Speech-Language Pathologists                        | Master's degree                         | 974                  | 1,059            | 1,181          | 1.7%        | 2.2%                       | 33           | 48                            | 0  | 12  | 48           | 12   | (36)                |     |
| 24 Health Technologists and Technicians, All Other     | Postsecondary vocational award          | 1,085                | 1,143            | 1,243          | 1.0%        | 1.7%                       | 32           | 47                            | 23   | 16  | 47           | 39   | (8)                 |     |
| 25 Clinical, Counseling, and School Psychologists      | Doctoral degree                         | 936                  | 1,003            | 1,091          | 1.4%        | 1.7%                       | 42           | 46                            | 0  | 32  | 46           | 32   | (14)                |     |
| 26 Physician Assistants                                | Master's degree                         | 805                  | 919              | 1,049          | 2.7%        | 2.7%                       | 36           | 46                            | 13   | 0   | 46           | 13   | (33)                |     |
| 27 Surgical Technologists                              | Postsecondary vocational award          | 684                  | 755              | 858            | 2.0%        | 2.6%                       | 29           | 44                            | 7  | 13  | 44           | 20   | (24)                |     |
| 28 Social and Community Service Managers               | Bachelor's degree                       | 1,087                | 1,150            | 1,218          | 1.1%        | 1.2%                       | 36           | 44                            | 85   | 78  | 44           | 163  | 119                 |     |
| 29 Emergency Medical Technicians and Paramedics        | Postsecondary vocational award          | 1,042                | 1,117            | 1,197          | 1.4%        | 1.4%                       | 34           | 42                            | 11   | 24  | 42           | 35   | (7)                 |     |
| 30 Child, Family, and School Social Workers            | Bachelor's degree                       | 1,009                | 1,080            | 1,147          | 1.4%        | 1.2%                       | 39           | 42                            | 27   | 35  | 42           | 62   | 20                  |     |
| 31 Medical Transcriptionists                           | Postsecondary vocational award          | 1,038                | 1,177            | 1,304          | 2.5%        | 2.1%                       | 38           | 41                            | 13   | 5   | 41           | 18   | (23)                |     |
| 32 Community and Social Service Specialists, All Other | Bachelor's degree                       | 1,120                | 1,193            | 1,255          | 1.3%        | 1.0%                       | 37           | 40                            | 27   | 3   | 40           | 30   | (10)                |     |
| 33 Respiratory Therapists                              | Associate degree                        | 564                  | 622              | 716            | 2.0%        | 2.9%                       | 21           | 33                            | 3  | 11  | 33           | 14   | (19)                |     |
| 34 Medical Equipment Repairers                         | Associate degree                        | 546                  | 598              | 659            | 1.8%        | 2.0%                       | 26           | 31                            | 5  | 4   | 31           | 9  | (22)                |     |
| 35 Occupational Therapists                             | Master's degree                         | 644                  | 687              | 760            | 1.3%        | 2.0%                       | 19           | 30                            | 3  | 5   | 30           | 8  | (22)                |     |
| 36 Pediatricians, General                              | Master's degree                         | 556                  | 615              | 696            | 2.0%        | 2.5%                       | 21           | 29                            | 0  | 0   | 29           | 0  | (29)                |     |
| 37 Medical Equipment Preparers                         | Short-term on-the-job training          | 809                  | 828              | 910            | 0.5%        | 1.9%                       | 11           | 27                            | 3  | 36  | 27           | 39   | 12                  |     |
| 38 Chiropractors                                       | First professional degree               | 364                  | 418              | 495            | 2.8%        | 3.4%                       | 17           | 24                            | 3  | 0   | 24           | 3  | (21)                |     |
| 39 Substance Abuse and Behavioral Disorder Counselors  | Bachelor's degree                       | 568                  | 604              | 648            | 1.2%        | 1.4%                       | 18           | 22                            | 21   | 0   | 22           | 21   | (1)                 |     |
| 40 Dietitians and Nutritionists                        | Bachelor's degree                       | 374                  | 396              | 433            | 1.1%        | 1.8%                       | 16           | 22                            | 3  | 20  | 22           | 23   | 1                   |     |
| 41 Surgeons  | Doctoral degree                         | 550                  | 586              | 635            | 1.3%        | 1.6%                       | 16           | 21                            | 0  | 0   | 21           | 0  | (21)                |     |
| 42 Mental Health and Substance Abuse Social Workers    | Master's degree                         | 520                  | 543              | 571            | 0.9%        | 1.0%                       | 17           | 20                            | 16   | 11  | 20           | 27   | 7                   |     |
| <b>TOTAL</b>   |   | <b>102,139</b>       | <b>111,570</b>   | <b>124,069</b> |             |                            | <b>3,443</b> | <b>4,698</b>                  | <b>1,574</b>                                       | <b>3,243</b>                                    | <b>4,698</b> | <b>4,817</b>                                     | <b>119</b>          |     |

Occupations selected based on 1% or greater CAGR and at least 20 total annual openings per year (2014-2019)

# Manufacturing Occupations – Part 1

Appendix 1: Top 25 Manufacturing Occupations by Average Annual Job Openings

| Occupation Name  | Educational Requirements                | Employment Estimates |       | Average Annual Growth |             | Average Total Annual |             | Projected Talent Supply |  | Projected Annual Demand and                           |        |        |                          |
|--|---|----------------------|-------|-----------------------|-------------|----------------------|-------------|-------------------------|--|---|--------|--------|--------------------------|
|  |   | 2009                 | 2014  | 2019                  | 2009 - 2014 | 2014 - 2019          | 2009 - 2014 | 2014-2019               | Annual Unemployed<br>(Avg. of April 2007,<br>April 2011) | Annual Newly Trained<br>Candidates<br>(Class of 2010) | Demand | Supply | Surplus or<br>(Shortage) |
| 1 Shipping, Receiving, and Traffic Clerks                                  | On-the-job training                     | 6,599                | 6,883 | 7,119                 | 0.8%        | 0.7%                 | 222         | 221                     | 164  | 0   | 221    | 164    | (57)                     |
| 2 Team Assemblers  | On-the-job training                     | 3,926                | 4,426 | 4,765                 | 2.4%        | 1.5%                 | 191         | 173                     | 18   | 0   | 173    | 18     | (155)                    |
| 3 Purchasing Agents, Except Wholesale, Retail, and Franchise Sales         | On-the-job training                     | 3,813                | 4,068 | 4,321                 | 1.3%        | 1.2%                 | 146         | 169                     | 67   | 0   | 169    | 67     | (102)                    |
| 4 Logisticians   | Bachelor's degree                       | 3,338                | 3,529 | 3,704                 | 1.1%        | 1.0%                 | 106         | 123                     | 29   | 0   | 123    | 29     | (94)                     |
| 5 Assemblers and Fabricators, All Other                                    | On-the-job training                     | 2,634                | 2,878 | 3,144                 | 1.8%        | 1.8%                 | 109         | 122                     | 209  | 0   | 122    | 209    | 87                       |
| 6 Meat, Poultry, and Fish Cutters and Trimmers                             | On-the-job training                     | 1,850                | 2,012 | 2,260                 | 1.7%        | 2.4%                 | 93          | 118                     | 218  | 0   | 118    | 218    | 100                      |
| 7 Mechanical Engineers   | Bachelor's degree                       | 2,715                | 2,931 | 3,098                 | 1.5%        | 1.1%                 | 111         | 114                     | 50   | 39  | 114    | 89     | (25)                     |
| 8 Production, Planning, and Expediting Clerks                              | On-the-job training                     | 2,639                | 2,794 | 2,958                 | 1.1%        | 1.1%                 | 92          | 109                     | 114  | 0   | 109    | 114    | 5                        |
| 9 Industrial Engineers   | Bachelor's degree                       | 2,607                | 2,823 | 2,917                 | 1.6%        | 0.7%                 | 107         | 98                      | 20   | 17  | 98     | 37     | (61)                     |
| 10 Engineering Managers  | Master's, first professional, or higher | 2,873                | 3,002 | 3,122                 | 0.9%        | 0.8%                 | 80          | 91                      | 45   | 152   | 91     | 197    | 106                      |
| 11 Production Workers, All Other   | On-the-job training                     | 1,334                | 1,586 | 1,833                 | 3.5%        | 2.9%                 | 82          | 90                      | 198  | 0   | 90     | 198    | 108                      |
| 12 Engineers, All Other  | Bachelor's degree                       | 2,628                | 2,775 | 2,850                 | 1.1%        | 0.5%                 | 79          | 80                      | 46   | 3   | 80     | 49     | (31)                     |
| 13 Electrical Engineers  | Bachelor's degree                       | 2,011                | 2,127 | 2,243                 | 1.1%        | 1.1%                 | 67          | 77                      | 41   | 52  | 77     | 93     | 16                       |
| 14 Welders, Cutters, Solderers, and Brazers                                | Associate's degree or vocational award  | 1,838                | 1,937 | 1,975                 | 1.1%        | 0.4%                 | 76          | 69                      | 184  | 146   | 69     | 330    | 261                      |
| 15 Helpers--Production Workers   | On-the-job training                     | 1,403                | 1,640 | 1,857                 | 3.2%        | 2.5%                 | 78          | 68                      | 645  | 0   | 68     | 645    | 577                      |
| 16 Electrical and Electronic Equipment Assemblers                          | On-the-job training                     | 1,507                | 1,749 | 1,948                 | 3.0%        | 2.2%                 | 74          | 67                      | 54   | 0   | 67     | 54     | (13)                     |
| 17 First-Line Supervisors/Managers of Production and Operations            | On-the-job training                     | 3,500                | 3,607 | 3,673                 | 0.6%        | 0.4%                 | 69          | 62                      | 158  | 1   | 62     | 159    | 97                       |
| 18 Aerospace Engineers   | Bachelor's degree                       | 2,915                | 3,030 | 2,993                 | 0.8%        | -0.2%                | 77          | 62                      | 23   | 89  | 62     | 112    | 50                       |
| 19 Inspectors, Testers, Sorters, Samplers, and Weighers                    | On-the-job training                     | 2,855                | 2,959 | 2,997                 | 0.7%        | 0.3%                 | 71          | 56                      | 143  | 0   | 56     | 143    | 87                       |
| 20 Computer Hardware Engineers   | Bachelor's degree                       | 768                  | 885   | 1,010                 | 2.9%        | 2.7%                 | 45          | 52                      | 48   | 1   | 52     | 49     | (3)                      |
| 21 Bakers  | On-the-job training                     | 1,504                | 1,548 | 1,583                 | 0.6%        | 0.4%                 | 47          | 48                      | 60   | 27  | 48     | 87     | 39                       |
| 22 Operations Research Analysts  | Master's, first professional, or higher | 869                  | 940   | 1,009                 | 1.6%        | 1.4%                 | 35          | 47                      | 23   | 0   | 47     | 23     | (24)                     |
| 23 Aircraft Structure, Surfaces, Rigging, and Systems Assemblers           | On-the-job training                     | 2,628                | 2,758 | 2,691                 | 1.0%        | -0.5%                | 81          | 45                      | 15   | 0   | 45     | 15     | (30)                     |
| 24 Printing Machine Operators  | On-the-job training                     | 1,499                | 1,487 | 1,535                 | -0.2%       | 0.6%                 | 26          | 44                      | 108  | 0   | 44     | 108    | 64                       |
| 25 Machinists  | On-the-job training                     | 1,948                | 2,103 | 2,166                 | 1.5%        | 0.6%                 | 56          | 42                      | 103  | 17  | 42     | 120    | 78                       |
| 26 Packaging and Filling Machine Operators and Tenders                     | Short-term on-the-job training          | 1,228                | 1,299 | 1,399                 | 1.1%        | 1.5%                 | 36          | 42                      | 36   | 0   | 42     | 36     | (6)                      |
| 27 Industrial Machinery Mechanics  | Long-term on-the-job training           | 1,638                | 1,721 | 1,804                 | 1.0%        | 0.9%                 | 40          | 42                      | 19   | 2   | 42     | 21     | (21)                     |
| 28 Computer-Controlled Machine Tool Operators, Metal and Plastic           | Moderate-term on-the-job training       | 1,525                | 1,656 | 1,695                 | 1.7%        | 0.5%                 | 56          | 41                      | 72   | 0   | 41     | 72     | 31                       |
| 29 Industrial Production Managers  | Work experience in a related occupation | 1,022                | 1,051 | 1,059                 | 0.6%        | 0.2%                 | 41          | 40                      | 64   | 46  | 40     | 110    | 70                       |
| 30 Electrical and Electronic Engineering Technicians                       | Associate degree                        | 944                  | 1,015 | 1,080                 | 1.5%        | 1.2%                 | 32          | 33                      | 64   | 48  | 33     | 112    | 79                       |
| 31 Budget Analysts   | Bachelor's degree                       | 1,477                | 1,514 | 1,511                 | 0.5%        | 0.0%                 | 29          | 32                      | 13   | 20  | 32     | 33     | 1                        |
| 32 Materials Engineers   | Bachelor's degree                       | 743                  | 811   | 829                   | 1.8%        | 0.4%                 | 32          | 23                      | 9  | 3   | 23     | 12     | (11)                     |
| 33 Molders, Shapers, and Casters, Except Metal and Plastic                 | Moderate-term on-the-job training       | 305                  | 307   | 317                   | 0.1%        | 0.6%                 | 12          | 21                      | 16   | 0   | 21     | 16     | (5)                      |
| 34 Engine and Other Machine Assemblers                                     | Short-term on-the-job training          | 530                  | 584   | 619                   | 2.0%        | 1.2%                 | 22          | 20                      | 7  | 0   | 20     | 7      | (13)                     |
| 35 Cabinetmakers and Bench Carpenters                                      | Long-term on-the-job training           | 645                  | 621   | 645                   | -0.8%       | 0.8%                 | 9           | 19                      | 73   | 3   | 19     | 76     | 57                       |
| 36 Structural Metal Fabricators and Fitters                                | Moderate-term on-the-job training       | 586                  | 618   | 644                   | 1.1%        | 0.8%                 | 19          | 19                      | 38   | 0   | 19     | 38     | 19                       |
| 37 Engineering Technicians, Except Drafters, All Other                     | Associate degree                        | 1,217                | 1,239 | 1,215                 | 0.4%        | -0.4%                | 27          | 19                      | 18   | 3   | 19     | 21     | 2                        |
| 38 Mixing and Blending Machine Setters, Operators, and Tenders             | Moderate-term on-the-job training       | 487                  | 517   | 568                   | 1.2%        | 1.9%                 | 15          | 19                      | 8  | 0   | 19     | 8      | (11)                     |
| 39 Cutting, Punching, and Press Machine Setters, Operators, and Tenders    | Moderate-term on-the-job training       | 669                  | 718   | 742                   | 1.4%        | 0.7%                 | 24          | 18                      | 31   | 9   | 18     | 40     | 22                       |
| 40 Graders and Sorters, Agricultural Products                              | Work experience in a related occupation | 364                  | 394   | 438                   | 1.6%        | 2.1%                 | 13          | 18                      | 5  | 0   | 18     | 5      | (13)                     |
| 41 Mechanical Drafters   | Postsecondary vocational award          | 960                  | 985   | 961                   | 0.5%        | -0.5%                | 25          | 17                      | 22   | 26  | 17     | 48     | 31                       |
| 42 Jewelers and Precious Stone and Metal Workers                           | Postsecondary vocational award          | 493                  | 508   | 535                   | 0.6%        | 1.0%                 | 13          | 16                      | 15   | 8   | 16     | 23     | 7                        |
| 43 Painters, Transportation Equipment                                      | Moderate-term on-the-job training       | 773                  | 757   | 727                   | -0.4%       | -0.8%                | 16          | 14                      | 61   | 23  | 14     | 84     | 70                       |
| 44 Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders | Postsecondary vocational award          | 289                  | 316   | 337                   | 1.8%        | 1.3%                 | 14          | 14                      | 14   | 30  | 14     | 44     | 30                       |
| 45 Cutting and Slicing Machine Setters, Operators, and Tenders             | Moderate-term on-the-job training       | 427                  | 425   | 445                   | -0.1%       | 0.9%                 | 8           | 14                      | 21   | 0   | 14     | 21     | 7                        |
| 46 Mechanical Engineering Technicians                                      | Associate degree                        | 574                  | 611   | 623                   | 1.3%        | 1.3%                 | 18          | 14                      | 14   | 1   | 14     | 15     | 1                        |
| 47 Paper Goods Machine Setters, Operators, and Tenders                     | Moderate-term on-the-job training       | 460                  | 465   | 477                   | 0.2%        | 0.5%                 | 9           | 14                      | 9  | 0   | 14     | 9      | (5)                      |
| 48 Food Batchmakers  | Short-term on-the-job training          | 330                  | 350   | 373                   | 1.2%        | 1.3%                 | 12          | 14                      | 7  | 0   | 14     | 7      | (7)                      |
| 49 Industrial Engineering Technicians                                      | Associate degree                        | 681                  | 707   | 705                   | 0.8%        | -0.1%                | 18          | 13                      | 13   | 1   | 13     | 14     | 1                        |
| 50 Painting, Coating, and Decorating Workers                               | Short-term on-the-job training          | 407                  | 418   | 428                   | 0.5%        | 0.5%                 | 13          | 13                      | 12   | 0   | 13     | 12     | (1)                      |

## Manufacturing Occupations – Part 2

Appendix 1: Top 25 Manufacturing Occupations by Average Annual Job Openings

| Occupation Name   | Educational Requirements                | Employment Estimates |                |                |             | Average Annual Growth |              | Average Total Annual |  | Projected Talent Supply                               |              |              | Projected Annual Demand and |  |
|---|---|----------------------|----------------|----------------|-------------|-----------------------|--------------|----------------------|--|---|--------------|--------------|-----------------------------|--|
|   |   | 2009                 | 2014           | 2019           | 2009 - 2014 | 2014 - 2019           | 2009 - 2014  | 2014-2019            | Annual Unemployed<br>(Avg. of April 2007,<br>April 2011) | Annual Newly Trained<br>Candidates<br>(Class of 2010) | Demand       | Supply       | Surplus or<br>(Shortage)    |  |
| 51 <b>Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic</b>                                      | Moderate-term on-the-job training       | 324                  | 356            | 373            | 1.9%        | 0.9%                  | 16           | 13                   | 6  | 0   | 13           | 6            | (7)                         |  |
| 52 Sewing Machine Operators   | Moderate-term on-the-job training       | 1,501                | 1,503          | 1,525          | 0.0%        | 0.3%                  | 10           | 12                   | 59   | 0   | 12           | 59           | 47                          |  |
| 53 Coating, Painting, and Spraying Machine Setters, Operators, and Tenders, Metal and Plastic                                 | Moderate-term on-the-job training       | 343                  | 375            | 384            | 1.8%        | 0.5%                  | 16           | 12                   | 38   | 0   | 12           | 38           | 26                          |  |
| 54 <b>Maintenance Workers, Machinery</b>  | Moderate-term on-the-job training       | 451                  | 469            | 486            | 0.8%        | 0.7%                  | 10           | 12                   | 7  | 0   | 12           | 7            | (5)                         |  |
| 55 Electrical and Electronics Drafters  | Postsecondary vocational award          | 402                  | 417            | 425            | 0.7%        | 0.4%                  | 11           | 11                   | 13   | 12  | 11           | 25           | 14                          |  |
| 56 Electrical and Electronics Repairers, Commercial and Industrial  | Postsecondary vocational award          | 516                  | 536            | 541            | 0.8%        | 0.2%                  | 12           | 11                   | 6  | 5   | 11           | 11           | 0                           |  |
| 57 Plasterers and Stucco Masons   | Long-term on-the-job training           | 601                  | 595            | 585            | -0.2%       | -0.3%                 | 7            | 9                    | 20   | 0   | 9            | 20           | 11                          |  |
| 58 Dental Laboratory Technicians  | Moderate-term on-the-job training       | 345                  | 362            | 369            | 1.0%        | 0.4%                  | 10           | 9                    | 20   | 0   | 9            | 20           | 11                          |  |
| 59 Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic                                | Moderate-term on-the-job training       | 484                  | 491            | 487            | 0.3%        | -0.2%                 | 12           | 9                    | 18   | 0   | 9            | 18           | 9                           |  |
| 60 Prepress Technicians and Workers   | Postsecondary vocational award          | 660                  | 635            | 640            | -0.8%       | 0.2%                  | 4            | 8                    | 28   | 3   | 8            | 31           | 23                          |  |
| 61 <b>Grinding and Polishing Workers, Hand</b>  | Moderate-term on-the-job training       | 380                  | 397            | 404            | 0.9%        | 0.4%                  | 10           | 8                    | 6  | 0   | 8            | 6            | (2)                         |  |
| 62 <b>Machine Feeders and Offbearers</b>  | Short-term on-the-job training          | 641                  | 632            | 648            | -0.3%       | 0.5%                  | 8            | 8                    | 5  | 0   | 8            | 5            | (3)                         |  |
| 63 <b>Slaughtering and Meat Packers</b>   | Moderate-term on-the-job training       | 158                  | 164            | 174            | 0.7%        | 1.2%                  | 6            | 8                    | 0  | 0   | 8            | 0            | (8)                         |  |
| 64 Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic   | Moderate-term on-the-job training       | 319                  | 334            | 337            | 0.9%        | 0.2%                  | 9            | 7                    | 5  | 4   | 7            | 9            | 2                           |  |
| 65 <b>Ophthalmic Laboratory Technicians</b>   | Moderate-term on-the-job training       | 294                  | 308            | 313            | 0.9%        | 0.3%                  | 8            | 7                    | 4  | 0   | 7            | 4            | (3)                         |  |
| 66 Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders, Metal and Plastic                    | Moderate-term on-the-job training       | 162                  | 166            | 176            | 0.5%        | 1.2%                  | 4            | 6                    | 13   | 0   | 6            | 13           | 7                           |  |
| 67 Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic   | Moderate-term on-the-job training       | 252                  | 250            | 257            | -0.2%       | 0.6%                  | 4            | 6                    | 5  | 4   | 6            | 9            | 3                           |  |
| 68 Separating, Filtering, Clarifying, Precipitating, and Straining Machine Setters, Operators, and Tenders, Metal and Plastic | Moderate-term on-the-job training       | 192                  | 204            | 222            | 1.2%        | 1.7%                  | 4            | 6                    | 192  | 0   | 6            | 7            | 1                           |  |
| 69 Grinding, Lapping, Polishing, and Buffing Machine Setters, Operators, and Tenders, Metal and Plastic                       | Moderate-term on-the-job training       | 279                  | 295            | 299            | 1.1%        | 0.3%                  | 7            | 5                    | 12   | 2   | 5            | 14           | 9                           |  |
| 70 Woodworking Machine Setters, Operators, and Tenders, Metal and Plastic   | Moderate-term on-the-job training       | 250                  | 276            | 275            | 2.0%        | -0.1%                 | 11           | 5                    | 10   | 1   | 5            | 11           | 6                           |  |
| 71 Metal Workers and Plastic Workers, All Other   | Moderate-term on-the-job training       | 418                  | 436            | 435            | 0.8%        | 0.0%                  | 9            | 5                    | 7  | 2   | 5            | 9            | 4                           |  |
| 72 Electromechanical Equipment Assemblers   | Short-term on-the-job training          | 168                  | 181            | 191            | 1.5%        | 1.1%                  | 5            | 5                    | 7  | 0   | 5            | 7            | 2                           |  |
| 73 Cutters and Trimmers, Hand   | Short-term on-the-job training          | 172                  | 169            | 172            | -0.4%       | 0.4%                  | 3            | 4                    | 8  | 0   | 4            | 8            | 4                           |  |
| 74 Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders  | Moderate-term on-the-job training       | 134                  | 139            | 142            | 0.7%        | 0.4%                  | 4            | 4                    | 134  | 0   | 4            | 8            | 4                           |  |
| 75 Food and Tobacco Roasting, Baking, and Drying Machine Setters, Operators, and Tenders, Metal and Plastic                   | Short-term on-the-job training          | 121                  | 121            | 126            | 0.0%        | 0.8%                  | 3            | 4                    | 8  | 0   | 4            | 8            | 4                           |  |
| 76 Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders, Metal and Plastic                               | Moderate-term on-the-job training       | 164                  | 167            | 173            | 0.4%        | 0.7%                  | 3            | 4                    | 7  | 0   | 4            | 7            | 3                           |  |
| 77 Forging Machine Setters, Operators, and Tenders, Metal and Plastic   | Moderate-term on-the-job training       | 176                  | 170            | 171            | -0.7%       | 0.1%                  | 2            | 4                    | 6  | 1   | 4            | 7            | 3                           |  |
| 78 Millwrights  | Long-term on-the-job training           | 192                  | 191            | 191            | -0.1%       | 0.0%                  | 3            | 4                    | 5  | 0   | 4            | 5            | 1                           |  |
| 79 Sawing Machine Setters, Operators, and Tenders, Metal and Plastic  | Moderate-term on-the-job training       | 167                  | 166            | 168            | -0.1%       | 0.2%                  | 3            | 3                    | 25   | 1   | 3            | 26           | 23                          |  |
| 80 Furniture Finishers  | Long-term on-the-job training           | 137                  | 133            | 135            | -0.6%       | 0.3%                  | 2            | 3                    | 25   | 0   | 3            | 25           | 22                          |  |
| 81 Aerospace Engineering and Operations Technicians   | Associate degree                        | 226                  | 233            | 226            | 0.6%        | -0.6%                 | 6            | 3                    | 9  | 0   | 3            | 9            | 6                           |  |
| 82 Numerical Tool and Process Control Programmers   | Work experience in a related occupation | 235                  | 243            | 235            | 0.7%        | -0.7%                 | 6            | 3                    | 7  | 0   | 3            | 7            | 4                           |  |
| 83 Food Cooking Machine Operators and Tenders   | Short-term on-the-job training          | 69                   | 69             | 73             | 0.0%        | 1.1%                  | 2            | 3                    | 7  | 0   | 3            | 7            | 4                           |  |
| 84 Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders, Metal and Plastic  | Moderate-term on-the-job training       | 162                  | 165            | 169            | 0.4%        | 0.5%                  | 2            | 3                    | 5  | 0   | 3            | 5            | 2                           |  |
| 85 Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic   | Moderate-term on-the-job training       | 58                   | 61             | 61             | 1.0%        | 0.0%                  | 3            | 3                    | 4  | 1   | 3            | 5            | 2                           |  |
| 86 Medical Appliance Technicians  | Long-term on-the-job training           | 118                  | 123            | 125            | 0.8%        | 0.3%                  | 3            | 3                    | 4  | 0   | 3            | 4            | 1                           |  |
| 87 Boilermakers   | Long-term on-the-job training           | 111                  | 120            | 121            | 1.6%        | 0.2%                  | 4            | 2                    | 25   | 0   | 2            | 25           | 23                          |  |
| 88 Lay-Out Workers, Metal and Plastic   | Moderate-term on-the-job training       | 349                  | 370            | 345            | 1.2%        | -1.4%                 | 11           | 2                    | 7  | 1   | 2            | 8            | 6                           |  |
| 89 Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic   | Moderate-term on-the-job training       | 212                  | 215            | 205            | 0.3%        | -0.9%                 | 5            | 2                    | 7  | 1   | 2            | 8            | 6                           |  |
| 90 Tool Grinders, Filers, and Sharpeners  | Moderate-term on-the-job training       | 118                  | 118            | 109            | 0.0%        | -1.6%                 | 4            | 2                    | 5  | 0   | 2            | 5            | 3                           |  |
| 91 <b>Electro-Mechanical Technicians</b>  | Associate degree                        | 206                  | 209            | 200            | 0.3%        | -0.9%                 | 5            | 2                    | 0  | 0   | 2            | 0            | (2)                         |  |
| 92 <b>Cooling and Freezing Equipment Operators and Tenders</b>  | Moderate-term on-the-job training       | 64                   | 65             | 67             | 0.3%        | 0.6%                  | 2            | 2                    | 0  | 0   | 2            | 0            | (2)                         |  |
| 93 Fiberglass Laminators and Fabricators  | Moderate-term on-the-job training       | 180                  | 192            | 175            | 1.3%        | -1.8%                 | 6            | 1                    | 13   | 0   | 1            | 13           | 12                          |  |
| 94 Riggers  | Short-term on-the-job training          | 109                  | 112            | 106            | 0.5%        | -1.1%                 | 2            | 1                    | 11   | 0   | 1            | 11           | 10                          |  |
| 95 Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic  | Moderate-term on-the-job training       | 174                  | 179            | 174            | 0.6%        | -0.6%                 | 4            | 1                    | 5  | 0   | 1            | 5            | 4                           |  |
| 96 <b>Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic</b>                                 | Moderate-term on-the-job training       | 180                  | 188            | 186            | 0.9%        | -0.2%                 | 3            | 1                    | 0  | 0   | 1            | 0            | (1)                         |  |
| 97 <b>Rolling Machine Setters, Operators, and Tenders, Metal and Plastic</b>  | Moderate-term on-the-job training       | 99                   | 102            | 97             | 0.6%        | -1.0%                 | 2            | 1                    | 0  | 0   | 1            | 0            | (1)                         |  |
| 98 <b>Manufactured Building and Mobile Home Installers</b>  | Moderate-term on-the-job training       | 64                   | 70             | 74             | 1.8%        | 1.1%                  | 2            | 1                    | 0  | 0   | 1            | 0            | (1)                         |  |
| 99 Tool and Die Makers  | Long-term on-the-job training           | 511                  | 515            | 496            | 0.2%        | -0.7%                 | 4            | 0                    | 7  | 0   | 0            | 7            | 7                           |  |
| 100 Model Makers, Metal and Plastic   | Long-term on-the-job training           | 137                  | 139            | 136            | 0.3%        | -0.4%                 | 1            | 0                    | 0  | 0   | 0            | 0            | 0                           |  |
| <b>TOTAL Top 25</b>   |   | <b>94,760</b>        | <b>100,210</b> | <b>104,151</b> |             |                       | <b>3,066</b> | <b>3,044</b>         | <b>3,948</b>   | <b>805</b>  | <b>3,044</b> | <b>4,753</b> | <b>1,709</b>                |  |

Occupations anticipated having annual openings and at least 50 total jobs in King County in 2009.

## Transportation & Logistics Occupations

| Occupation Name  | Educational Requirements                | Employment Estimates |               |               |                            |              |                               |              |                                  | Projected Talent Supply |                      | Projected Annual Demand and Supply (2014 - 2019) |              |            |
|--|---|----------------------|---------------|---------------|----------------------------|--------------|-------------------------------|--------------|----------------------------------|-------------------------|----------------------|--|--------------|------------|
|  |   | Employment Estimates |               |               | Average Annual Growth Rate |              | Average Total Annual Openings |              |                                  | Annual Unemployed       | Annual Newly Trained | Demand   | Supply       | Surplus or |
|  |   | 2009                 | 2014          | 2019          | 2009 - 2014                | 2014 - 2019  | 2009 - 2014                   | 2014-2019    | (Avg. of April 2007, April 2011) | (Class of 2010)         |                      |  | (Shortage)   |            |
| 1 Laborers and Freight, Stock, and Material Movers, Hand                   | On-the-job training                     | 16,784               | 18,924        | 20,946        | 2.4%                       | 2.1%         | 1,022                         | 1,008        | 344                              | 0                       | 1,008                | 344  | (664)        |            |
| 2 Truck Drivers, Heavy and Tractor-Trailer                                 | On-the-job training                     | 9,657                | 10,169        | 10,689        | 1.0%                       | 1.0%         | 263                           | 306          | 531                              | 0                       | 306                  | 531  | 225          |            |
| 3 Truck Drivers, Light or Delivery Services                                | On-the-job training                     | 7,653                | 7,927         | 8,225         | 0.7%                       | 0.7%         | 181                           | 217          | 239                              | 0                       | 217                  | 239  | 22           |            |
| 4 Industrial Truck and Tractor Operators                                   | On-the-job training                     | 3,932                | 4,192         | 4,420         | 1.3%                       | 1.1%         | 171                           | 175          | 124                              | 0                       | 175                  | 124  | (51)         |            |
| 5 Taxi Drivers and Chauffeurs  | On-the-job training                     | 2,664                | 2,957         | 3,260         | 2.1%                       | 2.0%         | 102                           | 122          | 42                               | 0                       | 122                  | 42   | (80)         |            |
| 6 Bus Drivers, School  | On-the-job training                     | 2,732                | 2,922         | 3,095         | 1.4%                       | 1.2%         | 80                            | 95           | 167                              | 0                       | 95                   | 167  | 72           |            |
| 7 Postal Service Mail Carriers   | On-the-job training                     | 2,286                | 2,216         | 2,222         | -0.6%                      | 0.1%         | 51                            | 76           | 3                                | 0                       | 76                   | 3  | (73)         |            |
| 8 Cargo and Freight Agents   | On-the-job training                     | 1,426                | 1,637         | 1,808         | 2.8%                       | 2.0%         | 76                            | 74           | 64                               | 18                      | 74                   | 82   | 8            |            |
| 9 First-Line Supervisors/Managers of Transportation and Material-Moving    | On-the-job training                     | 2,657                | 2,733         | 2,780         | 0.6%                       | 0.3%         | 54                            | 65           | 28                               | 0                       | 65                   | 28   | (37)         |            |
| 10 Aircraft Mechanics and Service Technicians                              | Associate's degree or vocational award  | 3,518                | 3,582         | 3,524         | 0.4%                       | -0.3%        | 76                            | 63           | 38                               | 0                       | 63                   | 38   | (25)         |            |
| 11 Sailors and Marine Oilers   | On-the-job training                     | 1,246                | 1,262         | 1,269         | 0.3%                       | 0.1%         | 51                            | 62           | 41                               | 0                       | 62                   | 41   | (21)         |            |
| 12 Transportation, Storage, and Distribution Managers                      | On-the-job training                     | 1,647                | 1,696         | 1,749         | 0.6%                       | 0.6%         | 53                            | 60           | 149                              | 133                     | 60                   | 282  | 222          |            |
| 13 Reservation and Transportation Ticket Agents and Travel Clerks          | On-the-job training                     | 2,047                | 2,131         | 2,163         | 0.8%                       | 0.3%         | 63                            | 55           | 33                               | 0                       | 55                   | 33   | (22)         |            |
| 14 Dispatchers, Except Police, Fire, and Ambulance                         | On-the-job training                     | 1,502                | 1,567         | 1,630         | 0.9%                       | 0.8%         | 42                            | 48           | 59                               | 0                       | 48                   | 59   | 11           |            |
| 15 Captains, Mates, and Pilots of Water Vessels                            | On-the-job training                     | 833                  | 892           | 924           | 1.4%                       | 0.7%         | 46                            | 45           | 26                               | 3                       | 45                   | 29   | (16)         |            |
| 16 First-Line Supervisors/Managers of Helpers, Laborers, and Material Move | On-the-job training                     | 1,580                | 1,629         | 1,680         | 0.6%                       | 0.6%         | 33                            | 43           | 26                               | 0                       | 43                   | 26   | (17)         |            |
| 17 Installation, Maintenance, and Repair Workers, All Other                | On-the-job training                     | 1,580                | 1,635         | 1,666         | 0.7%                       | 0.4%         | 33                            | 35           | 43                               | 1                       | 35                   | 44   | 9            |            |
| 18 Couriers and Messengers   | On-the-job training                     | 789                  | 874           | 929           | 2.1%                       | 1.2%         | 36                            | 32           | 35                               | 0                       | 32                   | 35   | 3            |            |
| 19 Transportation Workers, All Other                                       | On-the-job training                     | 538                  | 593           | 637           | 2.0%                       | 1.4%         | 32                            | 30           | 20                               | 0                       | 30                   | 20   | (10)         |            |
| 20 Ship Engineers  | On-the-job training                     | 511                  | 526           | 535           | 0.6%                       | 0.3%         | 23                            | 27           | 15                               | 2                       | 27                   | 17   | (10)         |            |
| 21 Crane and Tower Operators   | On-the-job training                     | 606                  | 614           | 641           | 0.3%                       | 0.9%         | 15                            | 21           | 24                               | 0                       | 21                   | 24   | 3            |            |
| 22 Flight Attendants   | On-the-job training                     | 925                  | 948           | 937           | 0.5%                       | -0.2%        | 25                            | 20           | 8                                | 0                       | 20                   | 8  | (12)         |            |
| 23 Airline Pilots, Copilots, and Flight Engineers                          | Bachelor's degree                       | 601                  | 617           | 610           | 0.5%                       | -0.2%        | 23                            | 20           | 7                                | 0                       | 20                   | 7  | (13)         |            |
| 24 Baggage Porters and Bellhops  | On-the-job training                     | 544                  | 591           | 607           | 1.7%                       | 0.5%         | 23                            | 20           | 38                               | 0                       | 20                   | 38   | 18           |            |
| 25 Postal Service Mail Sorters, Processors, and Processing Machine Operato | On-the-job training                     | 1,643                | 1,592         | 1,596         | -0.6%                      | 0.1%         | 3                             | 17           | 7                                | 0                       | 17                   | 7  | (10)         |            |
| 26 Commercial Pilots   | Postsecondary vocational award          | 404                  | 416           | 424           | 0.6%                       | 0.4%         | 16                            | 16           | 5                                | 97                      | 16                   | 102  | 86           |            |
| 27 Avionics Technicians  | Postsecondary vocational award          | 625                  | 650           | 664           | 0.8%                       | 0.4%         | 15                            | 15           | 10                               | 0                       | 15                   | 10   | (5)          |            |
| 28 Tour Guides and Escorts   | Moderate-term on-the-job training       | 278                  | 280           | 289           | 0.1%                       | 0.6%         | 11                            | 15           | 6                                | 0                       | 15                   | 6  | (9)          |            |
| 29 Transportation Inspectors   | Work experience in a related occupation | 410                  | 413           | 423           | 0.1%                       | 0.5%         | 10                            | 12           | 13                               | 0                       | 12                   | 13   | 1            |            |
| 30 Postal Service Clerks   | Short-term on-the-job training          | 485                  | 470           | 471           | -0.6%                      | 0.0%         | 7                             | 11           | 0                                | 0                       | 11                   | 0  | (11)         |            |
| 31 Transportation Attendants, Except Flight Attendants and Baggage Porters | Short-term on-the-job training          | 287                  | 290           | 298           | 0.2%                       | 0.5%         | 7                             | 9            | 5                                | 0                       | 9                    | 5  | (4)          |            |
| 32 Railroad Brake, Signal, and Switch Operators                            | Moderate-term on-the-job training       | 186                  | 189           | 191           | 0.3%                       | 0.2%         | 6                             | 7            | 0                                | 0                       | 7                    | 0  | (7)          |            |
| 33 Material Moving Workers, All Other                                      | Moderate-term on-the-job training       | 460                  | 504           | 506           | 1.8%                       | 0.1%         | 14                            | 6            | 31                               | 0                       | 6                    | 31   | 25           |            |
| 34 Aircraft Cargo Handling Supervisors                                     | Work experience in a related occupation | 161                  | 173           | 184           | 1.4%                       | 1.2%         | 5                             | 6            | 14                               | 0                       | 6                    | 14   | 8            |            |
| 35 Control and Valve Installers and Repairers, Except Mechanical Door      | Moderate-term on-the-job training       | 182                  | 184           | 192           | 0.2%                       | 0.9%         | 3                             | 5            | 9                                | 0                       | 5                    | 9  | 4            |            |
| 36 Tank Car, Truck, and Ship Loaders                                       | Moderate-term on-the-job training       | 152                  | 171           | 174           | 2.4%                       | 0.3%         | 9                             | 5            | 10                               | 0                       | 5                    | 10   | 5            |            |
| 37 Railroad Conductors and Yardmasters                                     | Moderate-term on-the-job training       | 155                  | 155           | 155           | 0.0%                       | 0.0%         | 6                             | 5            | 0                                | 0                       | 5                    | 0  | (5)          |            |
| 38 Locomotive Engineers  | Work experience in a related occupation | 145                  | 143           | 141           | -0.3%                      | -0.3%        | 4                             | 5            | 0                                | 0                       | 5                    | 0  | (5)          |            |
| 39 Conveyor Operators and Tenders  | Short-term on-the-job training          | 181                  | 172           | 169           | -1.0%                      | -0.4%        | 3                             | 4            | 0                                | 0                       | 4                    | 0  | (4)          |            |
| 40 Petroleum Pump System Operators, Refinery Operators, and Gaugers        | Long-term on-the-job training           | 114                  | 121           | 123           | 1.2%                       | 0.3%         | 4                             | 3            | 0                                | 0                       | 3                    | 0  | (3)          |            |
| 41 Ambulance Drivers and Attendants, Except Emergency Medical Technicia    | Moderate-term on-the-job training       | 84                   | 97            | 102           | 2.9%                       | 1.0%         | 4                             | 3            | 0                                | 29                      | 3                    | 29   | 26           |            |
| 42 Rail Car Repairers  | Long-term on-the-job training           | 79                   | 81            | 83            | 0.5%                       | 0.5%         | 2                             | 2            | 0                                | 0                       | 2                    | 0  | (2)          |            |
| <b>TOTAL</b>   |   | <b>74,289</b>        | <b>78,935</b> | <b>83,131</b> | <b>34.9%</b>               | <b>24.0%</b> | <b>2,703</b>                  | <b>2,865</b> | <b>2,214</b>                     | <b>283</b>              | <b>2,865</b>         | <b>2,497</b>                                     | <b>(368)</b> |            |

Occupations anticipated having annual openings and at least 50 total jobs in King County in 2009.

## APPENDIX B. KING COUNTY HIGHER EDUCATION INSTITUTIONS

Note, all King County Institutions were used to support data collection efforts for IPEDS completions data. The institutions listed here are most applicable to Health Care, Manufacturing and Transportation and Logistics sectors.

| UNITID | Institution                                     | City        |
|--------|---|-------------|
| 234669 | Bellevue College                                | Bellevue    |
| 234784 | Everest College-Renton                          | Renton      |
| 234915 | City University of Seattle                      | Bellevue    |
| 235343 | Green River Community College                   | Auburn      |
| 235431 | Highline Community College                      | Des Moines  |
| 235510 | ITT Technical Institute-Seattle                 | Seattle     |
| 235547 | Bastyr University                               | Kenmore     |
| 235699 | Lake Washington Technical College               | Kirkland    |
| 236072 | Seattle Community College-North Campus          | Seattle     |
| 236133 | Northwest University                            | Kirkland    |
| 236382 | Renton Technical College                        | Renton      |
| 236504 | Seattle Community College-South Campus          | Seattle     |
| 236513 | Seattle Community College-Central Campus        | Seattle     |
| 236531 | Everest College-Seattle                         | Seattle     |
| 236559 | Seattle Midwifery School                        | Seattle     |
| 236577 | Seattle Pacific University                      | Seattle     |
| 236595 | Seattle University                              | Seattle     |
| 236610 | Shoreline Community College                     | Shoreline   |
| 236948 | University of Washington-Seattle Campus         | Seattle     |
| 245883 | Antioch University Seattle                      | Seattle     |
| 368629 | Pima Medical Institute                          | Seattle     |
| 377555 | University of Washington-Bothell Campus         | Bothell     |
| 381529 | Seattle Vocational Institute                    | Seattle     |
| 419411 | Cortiva Institute-Seattle                       | Seattle     |
| 432223 | University of Phoenix-Western Washington Campus | Tukwila     |
| 439057 | Argosy University-Seattle                       | Seattle     |
| 439190 | Cascadia Community College                      | Bothell     |
| 440545 | DeVry University-Washington                     | Federal Way |
| 443410 | DigiPen Institute of Technology                 | Redmond     |
| 446808 | International Academy of Design and Technology  | Seattle     |
| 449074 | Pima Medical Institute                          | Renton      |
| 450748 | Kaplan College-Renton                           | Renton      |

Source: NCES IPEDS

## APPENDIX C. MOST SIGNIFICANT EDUCATION CLASSIFICATIONS

Exhibit C-1 below provides the Bureau of Labor Statistics Most Significant Education classifications and the educational groupings applied in the Talent Pipeline Analysis. Note, educational groupings were further aggregated if few or no studied occupations were associated with a specific education level. For more information see: [http://www.bls.gov/emp/ep\\_education\\_tech.htm](http://www.bls.gov/emp/ep_education_tech.htm)

**Exhibit C-1**  
**Most Significant Education Classification**

| Talent Pipeline Analysis Education Groupings       | BLS Most Significant Education Classification     |
|--|---|
| On-the-Job Training                                | Work experience in a related occupation           |
| On-the-Job Training                                | Short-term on-the-job training                    |
| On-the-Job Training                                | Moderate-term on-the-job training                 |
| On-the-Job Training                                | Long-term on-the-job training                     |
| Associate degree or Postsecondary vocational award | Postsecondary vocational award                    |
| Associate degree or Postsecondary vocational award | Associate degree                                  |
| Bachelor's Degree                                  | Bachelor's degree                                 |
| Master's, first professional degree or higher      | Master's degree                                   |
| Master's, first professional degree or higher      | First professional degree                         |
| Master's, first professional degree or higher      | Bachelor's or higher degree, plus work experience |
| Master's, first professional degree or higher      | Doctoral degree                                   |

Source: Bureau of Labor Statistics





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