

City of Seattle Construction Industry Labor Market Assessment

March 2014

Submitted to:

City of Seattle Purchasing and Contracting Services

Submitted by:





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

Chris Mefford, President & CEO

Analysts:
Spencer Cohen
Erin Gengo
Elliot Weiss

Community Attributes Inc.
1411 Fourth Ave, Suite 770
Seattle, WA 98115
206.523.6683
www.communityattributes.com

EXECUTIVE SUMMARY

Background and Purpose

City of Seattle contracting leaders desire to expand access to economic opportunity for those historically facing barriers to construction industry jobs (women, people of color and otherwise disadvantaged individuals, particularly those who are also Seattle residents). The City wishes to increase construction employment and optimize career ladders to improve access to these jobs. This report provides an evaluation of the Construction labor market and workforce availability, to increase understanding of availability and barriers for hiring of "target workers", for City of Seattle Public Works contracts. Target workers include local women, people of color, and the economically and socially disadvantaged. The report seeks to serve the City Council, Mayor, City staff, and the City Construction Careers Advisory Committee (CCAC) which was established by Council Resolution in 2013. The Resolution tasked the CCAC to recommend to City Council and the Mayor any policies, methods or programs appropriate for the City, which would enhance private contractor hiring of local target workers.

This study evaluates the workforce in the Construction industry and identifies the current and projected supply of labor that is willing and motivated to work on the City of Seattle's Capital Improvement Program (CIP). Employment in the construction industry is made up of a migratory workforce. The labor market analysis focuses on Seattle's residential workforce as well as the broader labor market which includes King, Pierce, and Snohomish counties. This analysis estimates the quantity and demographic composition of the region's Construction labor force to understand opportunities for the City to hire target workers for Capital Improvement Program (CIP).

This analysis establishes supply and demand of the region's Construction workforce through 2019 and a baseline scenario for the existing labor pool absent any policy intervention. The model then analyzes the outcome of different target hiring scenarios for City of Seattle Public Works projects on the projected Construction workforce for local women, people of color, and the economically and socially disadvantaged.

Findings

The gap between the supply and demand is the surplus or deficit of regional workers needed to satisfy forecasted local Construction employment. The analysis measures the workforce gap for all Construction employment, including workers in administrative and managerial positions, as well as for sector workers in trades only found in Construction, such as framers.

For both the overall Construction industry and the Construction trades alone, economic forecasts suggest a surplus of workers will exist through 2019. The surplus is projected to decline from 8.0% in 2013 to 4.9% in 2019 for the former segment of Construction labor, and from 9.4% in 2013 to 5.8% in 2019 for the latter population (**Exhibit E1**).

Exhibit E1. Gap Analysis for Construction Supply and Demand

Segment of Labor Force	Measure	2013 (est.)	2014	2019
Total Construction Employment	Demand	95,400	97,800	110,500
	Supply	103,700	104,300	116,200
	Difference	8,300	6,500	5,700
	Surplus	8.0%	6.2%	4.9%
Construction Trades Only (non-baccalaureate)	Demand	67,600	69,500	79,300
	Supply	74,600	74,900	84,200
	Difference	7,000	5,400	4,900
	Surplus	9.4%	7.2%	5.8%

Sources: Puget Sound Regional Council; Conway Pedersen Economics; IPEDs; Washington State Employment Security Department; Washington State Department of Labor & Industries; Community Attributes, 2014.

Forecasts from the Puget Sound Regional Council and from Conway Pedersen Economics (evaluated independently and analyzed together) suggest demand for workers in Construction trades in the tri-county region is 97,800 in 2014 and will increase by 13% through 2019 to 110,500. Regional public works projects will require between 13,200 and 14,900 workers annually, and, on average, 400 FTEs each year will be required to complete work associated with the City of Seattle's Capital Improvement Program. Because construction workers often are not on the job site full-time for a year, this does not necessarily equate to 400 workers annually.

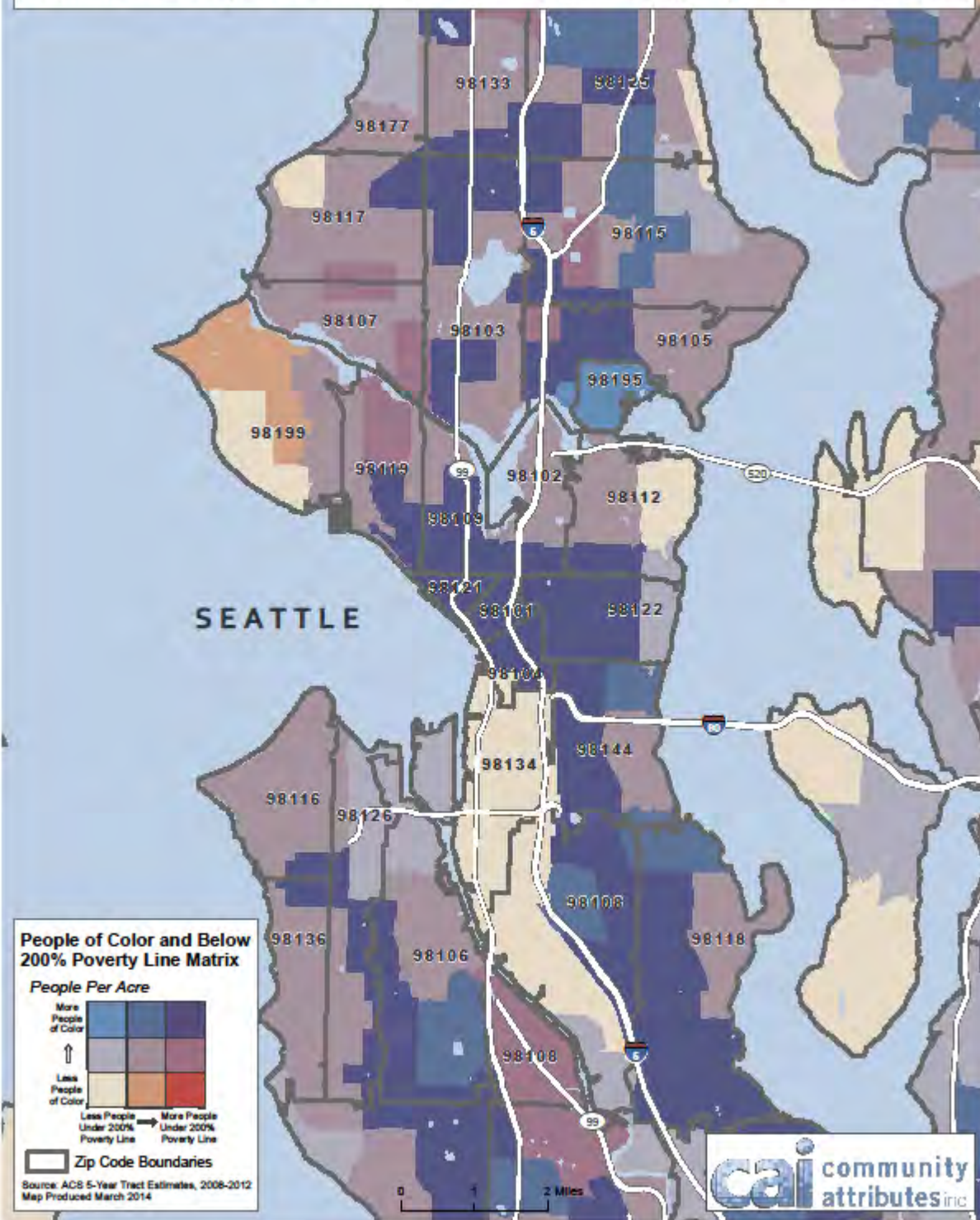
Demographic Composition of Construction Workers

In 2014, 77% of all workers in Construction in King, Snohomish, and Pierce counties are white males, and the remaining 23% comprises people of color and women. Representation of women and people of color is higher among new entrants to the labor force through apprenticeships and accredited completions than the overall workforce, the latter including both 2-year and 4-year degreed programs. However, women and people of color also have higher rates of apprenticeship cancellations than do their white male counterparts.

In the absence of policy interventions, the infusion of new workers coming from apprenticeships and educational programs will gradually change the existing demographic composition over time to a workforce that is slightly more racially diverse, with higher female composition.

In addition to the known supply of workers for the Construction industry, the City is also interested understanding and targeting the potential supply of workers who are qualified and motivated to work in Construction, but who are not engaged in any training pipeline. **Exhibit E2** combines City criteria into a single map of potential areas of targeted outreach to that population.

Exhibit E2. People of Color and Poverty per Acre, City of Seattle 2012



Blank.

CONTENTS

Executive Summary i

Introduction 1

Construction Sector Employment and Workforce Profile..... 3

Supply and Demand for Construction Workers..... 19

Gap Analysis 50

Opportunities for Discussion 51

Next Steps 53

Glossary..... 55

Appendices..... 56

Blank

INTRODUCTION

Background and Purpose

This study evaluates the Construction labor market and workforce availability for King, Pierce, and Snohomish counties combined, in an effort to understand the sources of demand and supply for the regional Construction workforce. This analysis focuses on the regional Construction workforce, reflecting the labor market. Where possible, this analysis attempts to provide data for the city of Seattle to provide more local context for policy consideration.

The City of Seattle is interested in expanding access to economic opportunity by increasing construction employment and providing career ladders for those historically facing barriers to jobs in the construction industry (women, people of color and otherwise disadvantaged individuals, and particularly those who are also Seattle residents). This project provides an evaluation of the Construction labor market and workforce availability, in order to increase understanding of availability and barriers for hiring of target workers including local women, people of color, and the economically and socially disadvantaged, for City of Seattle Public Works contracts.

This report serves the City Council, Mayor, City staff, and the City Construction Careers Advisory Committee (CCAC) which was established by Council Resolution in 2013. The Resolution tasked CCAC to recommend to City Council and the Mayor any policies, methods or programs appropriate for the City, which would enhance private contractor hiring of local target workers.

The analysis provides an understanding of the current availability of such Construction trade workers; the potential availability of such workers given effective recruitment and training strategies; how much future work is likely to be generated by regional public agencies and for which trades; and the degree that the City might be able to influence hiring based on those data. The study provides a platform for additional agency coordination and cooperation to foster regional collaboration on municipal contracting to support target workers.

Methods

This analysis uses available secondary data, stakeholder interviews, and data from the City of Seattle Purchasing and Contracting Services to estimate current and projected labor supply and demand in the Construction Industry for King, Snohomish, and Pierce counties. The study includes analysis of the City's Capital Improvement Program (CIP), and contract labor requirements. Other sources of data include Employment Security Division employment and unemployment claims data, U.S. Census Bureau demographic data, Washington State

Department of Labor & Industries apprenticeship data, and National Center for Education Statistics completions data.

Organization of Report

The report includes the following sections:

- **Construction Sector Employment and Workforce Profile.** An introduction to the size of employment, occupations, and workforce pathways in the Construction sector for King, Pierce, and Snohomish counties.
- **Supply and Demand for Construction Workers.** The study employs Construction forecasts to examine demand, supply, and forecasted gap for the labor force.
- **Opportunities for Discussion.** An assessment of the potential impact of targeted hiring criteria.
- **Glossary.** A reference guide for definitions and key terms used throughout the report.
- **Appendix of Supporting Analytics.** A compendium of exhibits produced from interim analysis that supported development of this report.

CONSTRUCTION SECTOR EMPLOYMENT AND WORKFORCE PROFILE

Sector Employment

This section establishes context for the Construction sector for King, Pierce and Snohomish counties, and for the City of Seattle where possible, including a Construction sector definition and trends in sector jobs.

Exhibit 1 displays the NAICS (North American Industry Classification System¹) codes that this study considers *core* to the Construction industry. NAICS codes were developed by the U.S. Census Bureau and are used to classify business establishments for the purpose of economic data collection and analysis. While this study primarily focuses on non-residential Construction because that is where most public works activity is reflected, firms who are prime contractors for the City are also sometimes found in residential NAICS categories.

Exhibit 1. NAICS Codes in the Construction Industry

NAICS Code	Description	NAICS Code	Description
23	Construction		
236	Construction of Buildings	238	Specialty Trade Contractors (Residential and Non-residential)
	New single-family general contractors		Poured foundation contractors
	New multifamily general contractors		Structural steel contractors
	New housing for-sale builders		Framing contractors
	Residential remodelers		Masonry contractors
	Industrial building construction		Glass and glazing contractors
	Commercial building construction		Roofing contractors
	Other industries		Siding contractors
237	Heavy and Civil Engineering Construction		Other exterior contractors
	Water and sewer system construction		Electrical contractors
	Oil and gas pipeline construction		Plumbing and hvac contractors
	Power and communication system construction		Other equipment contractors
	Land subdivision		Drywall contractors
	Highway, street, and bridge construction		Painting contractors
	Other heavy construction		Flooring contractors
	Other industries		Tile and terrazzo contractors
			Finish carpentry contractors
			Other finishing contractors
			Site preparation contractors
			All other trade contractors

Source: WA Employment Security Department QCEW, 2012.

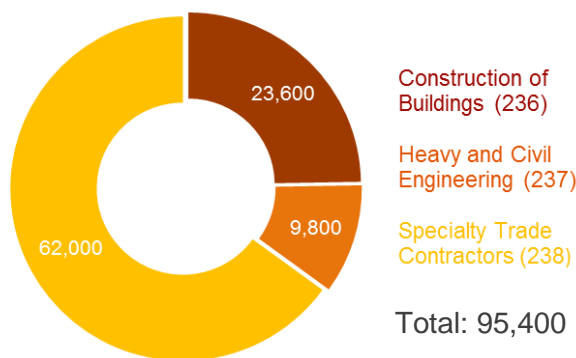
Exhibit 2 presents a snapshot of total employment in King, Pierce, and Snohomish counties in 2013. In Construction subsectors, Specialty Trade Contractors (NAICS 238) employ the most workers of all Construction subsectors. Construction of Buildings (NAICS 236) employs the second-most workers, with Heavy and Civil Engineering (NAICS 237) employing the fewest.

¹ See **Glossary** for more information and other definitions.

In total, Construction employed an estimated 95,400 jobs in King, Pierce, and Snohomish counties in 2013. None of these sources of employment includes jobs in the informal labor economy, which is a significant source of employment in the Construction industry. Workers in this category include day-laborers, undocumented immigrants, and others who work in the cash economy. Because these workers have no permanent place of work, they are not counted in any of these sources of data.

In assessing the construction industry’s labor, mobility of workers is a consideration of the Construction industry in particular. In addition to the mobility within the region that occurs when construction contractors are headquartered in one city but working on site in a different city or even county, demand for workers may also entice workers to work outside of the region. Recent booms for construction in the energy sector require an increase of skilled tradesmen from the Gulf Coast to the Great Lakes regions², a portion of which could come from the pool of construction labor in Puget Sound. While it is likely that the source of construction labor supply stemming from apprenticeship completions in the region retains nearly their entire workforce due to the significant training investment on the part of the worker, as well as because employment is concurrent with apprenticeships, it is less clear for other sources of labor supply how much of the region’s workforce is retained during a demand spike.

Exhibit 2. King, Pierce, and Snohomish Counties Estimated Total Construction Employment by Subsector, 2013

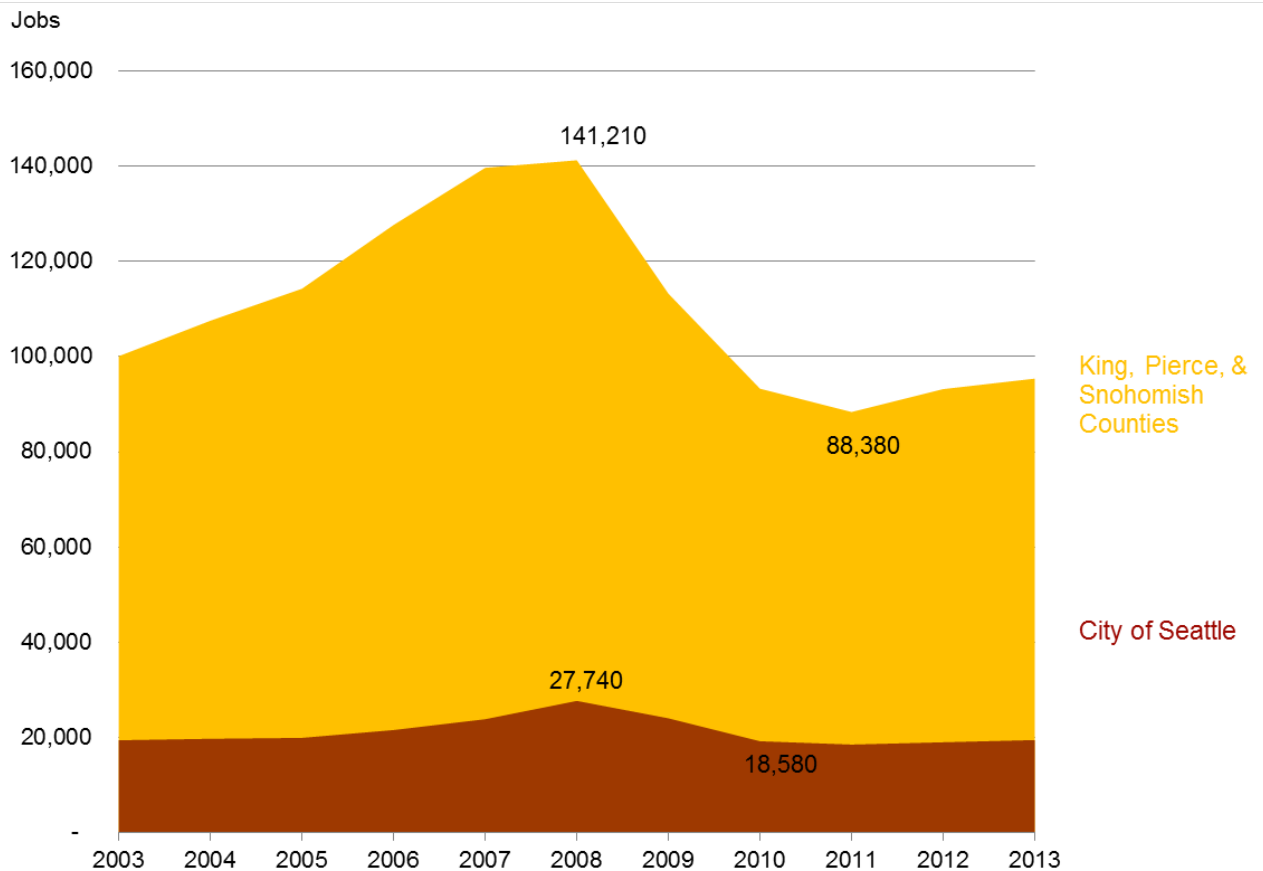


Sources: Puget Sound Regional Council, 2013; WA Employment Security Department, QCEW 2013. This estimate applies subsector percentage from WA ESD jobs totals to Construction jobs forecasted by PSRC to arrive at the most recent estimate of employment.

² Armistead, Thomas. Planned Projects Could Drive Up Craft Demand in Great Lakes and Midwest, *Engineering News-Record*, February 2014.

Exhibit 3 shows Seattle employment in the Construction industry from 2003-2013 (in NAICS 23), compared with employment in the larger area of King, Pierce, and Snohomish counties. The City of Seattle lost 33% of its Construction jobs between 2008 and 2011; King, Pierce, and Snohomish counties lost slightly more (37%) during that time period. However, employment has increased by 5.1% in the City of Seattle and by 7.9% in King, Pierce, and Snohomish counties from 2011 into 2013.

Exhibit 3. Construction Jobs in Seattle, King, Pierce, and Snohomish Counties, 2003-2013

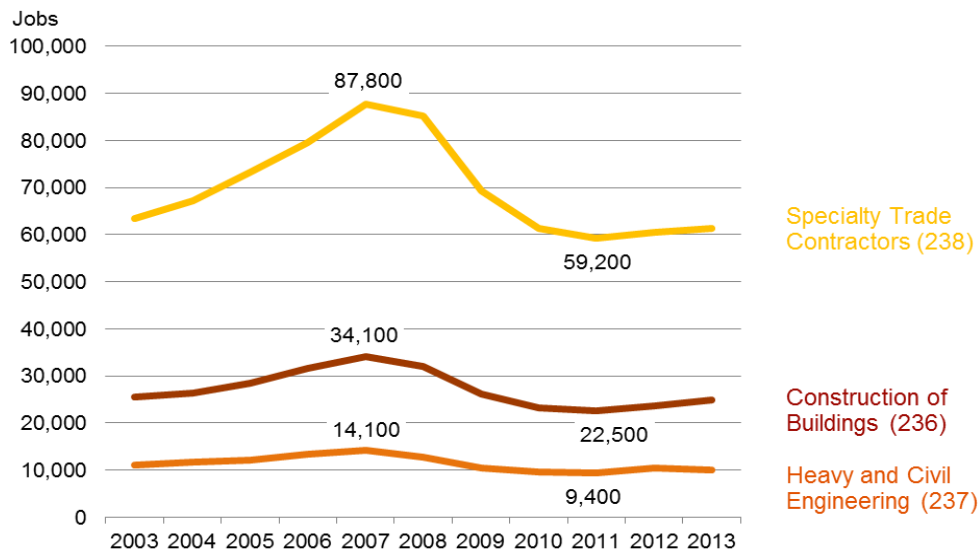


Sources: Puget Sound Regional Council 2013; WA Employment Security Department, QCEW 2013; U.S. Census Bureau Non-employer Statistics, 2013; Community Attributes, 2014. Estimates for the City of Seattle sum actual values of covered employment as reported by PSRC with estimated non-employer jobs, calculated based on the relationship between non-employers to covered employment for the Seattle MSA.

Exhibit 4 disaggregates jobs by subsector within Construction for 2003-2013. For all three subsectors, total post-recession employment in that subsector in 2013 was still lower than the pre-recession levels of employment. Between 2007 and 2011 both subsectors of Specialty Trade Contractors, and Heavy and Civil

Engineering Construction, experienced a decline of nearly 33%; the Construction of Buildings employment subcategory lost slightly more during that time (34%). Jobs increased for all three subsectors beginning in 2011, by 10% for Construction of Buildings, by 5% for Heavy and Civil Engineering Construction, and by 4% for Specialty Trade Contractors. Heavy and Civil Engineering Construction lost fewer jobs, suggesting the demand for that subsector fluctuates less than other subsectors of Construction; this is the subsector employed the most for Seattle public works.

Exhibit 4. Construction Jobs by Subsector, King, Pierce and Snohomish Counties, 2003-2013



Sources: U.S. Census Bureau Non-employer Statistics, 2013; WA Employment Security Department, QCEW 2013.

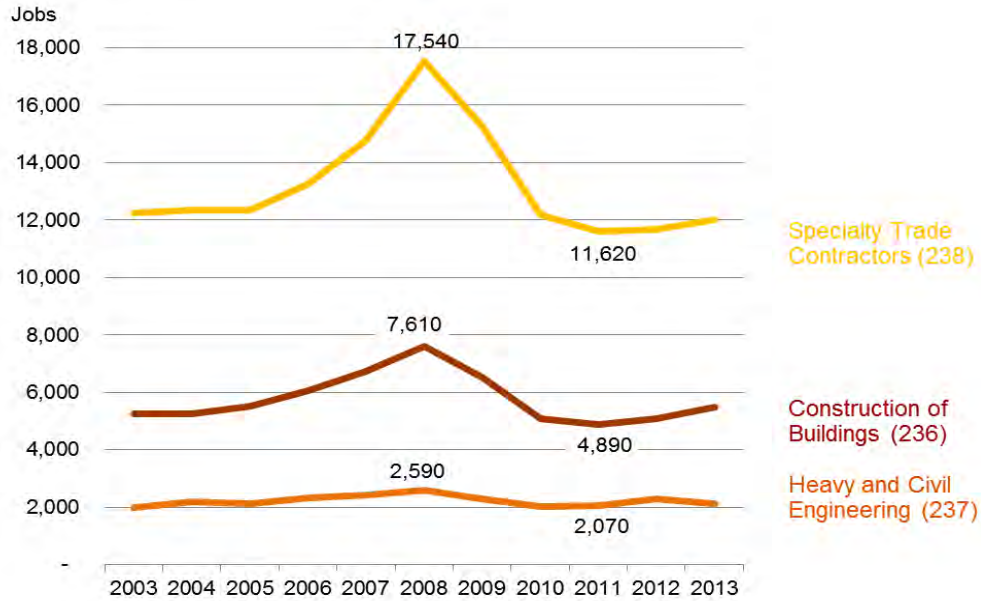
Exhibit 5 estimates subsector activity within the City of Seattle from 2003 to 2013. Between 2008 and 2011, Construction of Buildings and Specialty Trade Contractors lost 36% and 34% of their construction jobs, respectively. Heavy and Civil Engineering Construction experienced a significantly smaller relative loss of jobs (20%) during the same time period. The increase of jobs beginning in 2011 was largest for Construction of Buildings, with a 12% increase between 2011 and 2013. Heavy and Civil Engineering and Specialty Trade Contractors experienced a smaller relative increase in jobs during that time period with a 2% and 3% respective increase.

Construction employment is highly seasonal, as evidenced by **Exhibit 6**, which displays seasonally and non-seasonally adjusted data from 2010 to 2012.

Generally, employment is lower in the beginning and the end of the year and

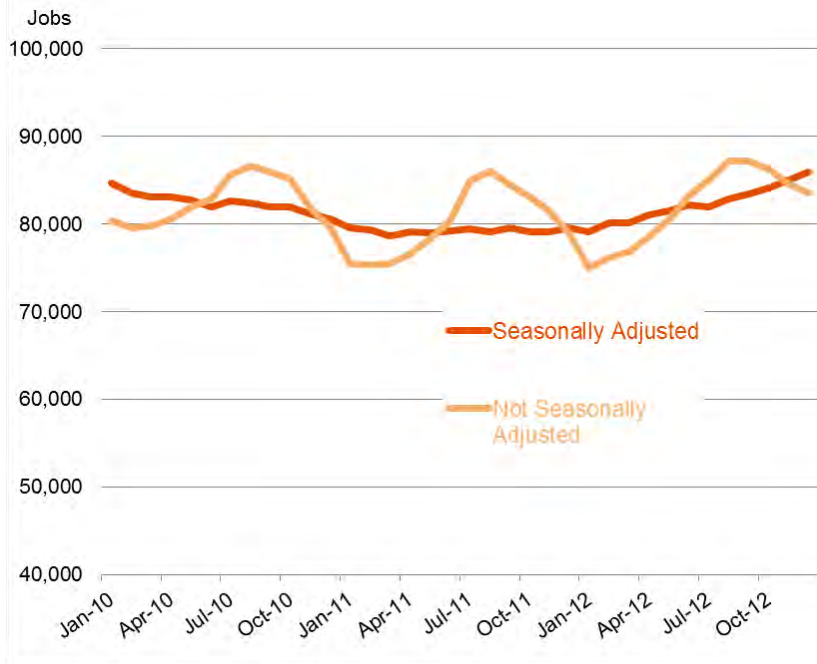
higher during the summer. In an attempt to smooth out this seasonality, this report either uses seasonally adjusted data, or creates a moving average.

Exhibit 5. Construction Jobs by Subsector, City of Seattle, 2003-2013



Sources: WA Employment Security Department; Community Attributes Inc. 2014.

Exhibit 6. Seasonally Adjusted vs. Not Seasonally Adjusted Construction Employment: King, Pierce, and Snohomish Counties, 2010-2012



Source: WA Employment Security Department CES, 2013.

Occupations in Construction

Occupational data provides additional insight into the Construction industry.

Exhibit 7 presents a list of occupations which this analysis considers to be *core* to the industry. Occupations help estimate workforce size at a more granular level than industry-level data (which is what the previous section has done). This section of the report includes a definition of Construction occupations; compensation within the industry; top ten occupations within the Construction industry and for women in the Construction industry; and a demographic analysis of workers in Construction industry occupations.

The Construction sector employment and workforce profile section of this report uses occupational and industry codes to set the background for the Construction industry in King, Pierce, and Snohomish counties. The model underlying the study considers supply and demand for two segments of Construction labor: 1) All Construction employment, including workers in administrative and managerial positions, and 2) Only those workers in Construction trades, such as carpenters and framers.

Exhibit 7. Occupational Codes for Construction Trades

SOC 2010	Description of SOC		
11-9021	Construction Managers	47-2151	Pipelayers
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	47-2152	Plumbers, Pipefitters, and Steamfitters
47-2011	Boilermakers	47-2171	Reinforcing Iron and Rebar Workers
47-2021	Brickmasons and Blockmasons	47-2181	Roofers
47-2022	Stonemasons	47-2211	Sheet Metal Workers
47-2031	Carpenters	47-2221	Structural Iron and Steel Workers
47-2041	Carpet Installers	47-3011	Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters
47-2044	Tile and Marble Setters	47-3012	Helpers--Carpenters
47-2051	Cement Masons and Concrete Finishers	47-3013	Helpers--Electricians
47-2053	Terrazzo Workers and Finishers	47-3014	Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons
47-2061	Construction Laborers	47-3015	Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters
47-2071	Paving, Surfacing, and Tamping Equipment Operators	47-3016	Helpers--Roofers
47-2072	Pile-Driver Operators	47-3019	Helpers, Construction Trades, All Other
47-2073	Operating Engineers and Other Construction Equipment Operators	47-4011	Construction and Building Inspectors
47-2081	Drywall and Ceiling Tile Installers	47-4021	Elevator Installers and Repairers
47-2082	Tapers	47-4031	Fence Erectors
47-2111	Electricians	47-4041	Hazardous Materials Removal Workers
47-2121	Glaziers	47-4051	Highway Maintenance Workers
47-2131	Insulation Workers, Floor, Ceiling, and Wall	47-4061	Rail-Track Laying and Maintenance Equipment Operators
47-2141	Painters, Construction and Maintenance	47-4071	Septic Tank Servicers and Sewer Pipe Cleaners
47-2142	Paperhangers	47-4099	Construction and Related Workers, All Other

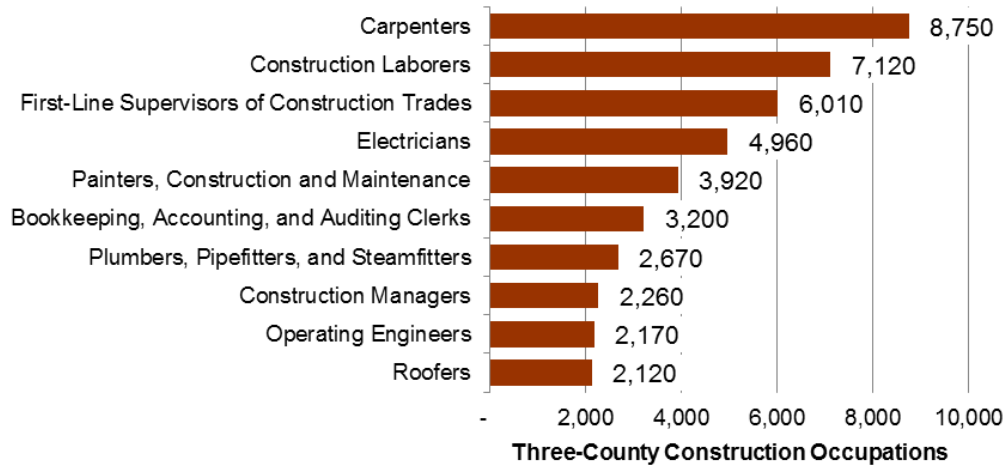
Source: US Bureau of Labor Statistics, 2010.

This analysis primarily focuses on trades in Construction while recognizing that positions in support, management, and administration play an important part in the upward mobility of those already within Construction occupations. **Exhibit 7** shows a list of core occupations suitable for Construction activity.

Occupations in this list contain trades such as sheet metal workers and pipe layers, to supervisory and management activities such as Construction managers and supervisors, to “helpers”, and laborers. Occupations are known by their “SOC” Codes (see the **Glossary** for more definitions).

Within the Construction industry, occupational concentration differs according to the unit of geography or industry subsector analyzed. Carpenters, Laborers, and Supervisors are among the largest Construction occupations by number of employees for the three-county area in 2012. **Exhibit 8** displays the top ten occupations employed in NAICS code 23³.

Exhibit 8. Ten Most Prevalent Occupations in the Construction Industry; King, Pierce and Snohomish Counties, 2012

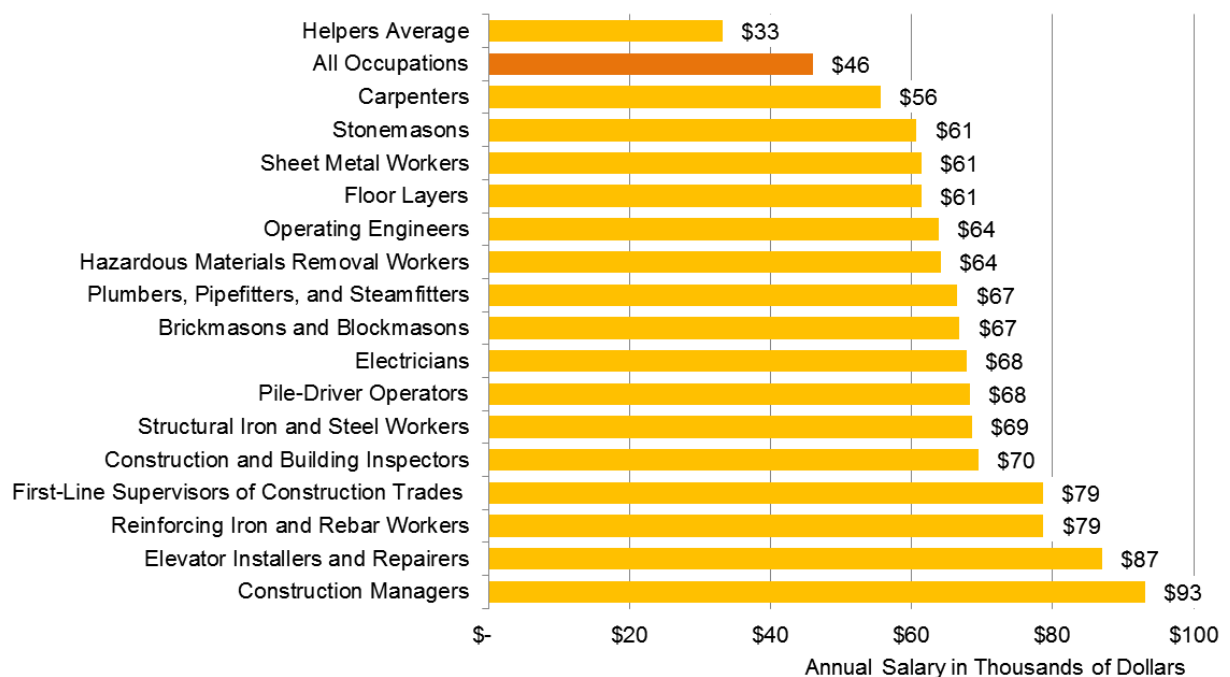


Source: WA Employment Security Department, 2012; US Bureau of Labor Statistics, 2013.

³ Occupational concentration by subsector of Construction is included in **Appendix A**.

Occupations in the Construction industry pay higher wages than the overall median annual wage, as evidenced by **Exhibit 9**, which displays the 15 highest-paying occupations in Construction (NAICS 23). Seattle’s Construction managers and other supervisory positions are the highest paid positions. However, trades such as electricians and sheet metal workers also pay good wages. On average, the median annual wage of the occupations in this analysis is \$53,000—nearly \$7,000 higher than the median annual wage for all construction occupations combined. For context, an average median annual wage of all Helpers (laborers) is included.

Exhibit 9. Selected Construction Occupations by Median Annual Wage; King, Pierce, and Snohomish Counties, 2012

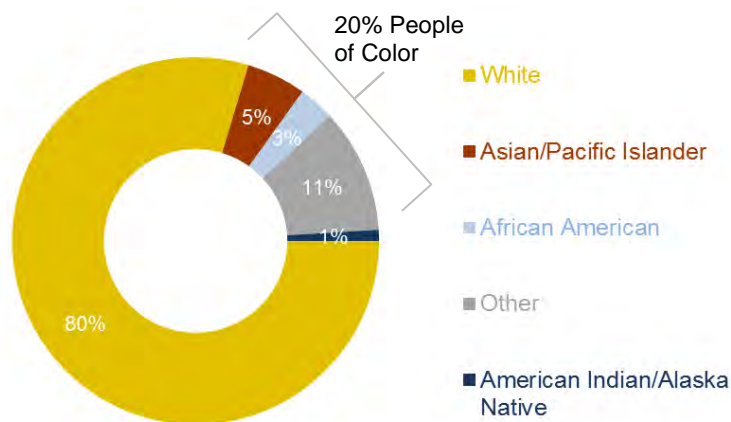


Source: US Bureau of Labor Statistics Occupational Employment Statistics, 2012.

Exhibits 10 and 11 show the composition of the workforce engaged in Construction occupations for the three-county area, as well as for the City of Seattle (based on place of work) by race in 2012. A majority (80%) of the Construction workforce is white, while 20% are people of color. Compared to the larger population of King, Pierce, and Snohomish counties, where 70% of the population is white and 30% are people of color, the Construction

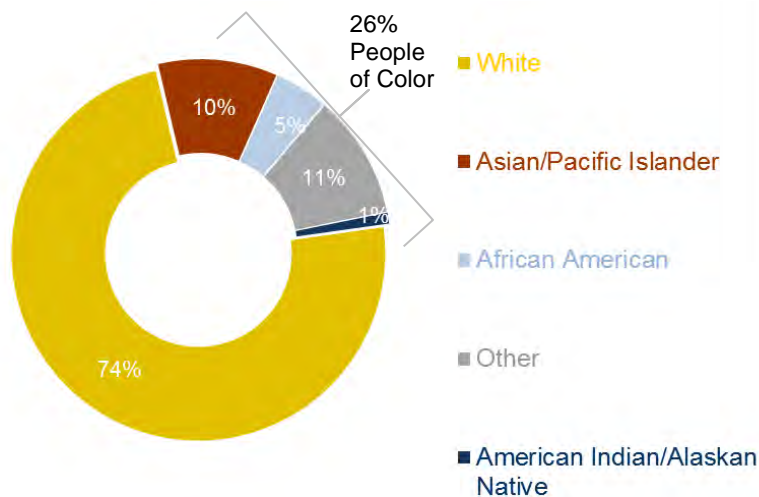
workforce is less diverse⁴. See **Appendix A, Exhibit 16** for racial composition of the three-county area.

Exhibit 10. Composition of Workforce by Workplace Geography in Construction Occupations by Race: Workplace in King, Pierce, and Snohomish Counties, 2012



Source: US Census Bureau EEO Tabulation 2006-2010 by Workplace Geography, 2013, Community Attributes, 2014. 'Other' includes Hispanic, Pacific Islander, More than one Race, and all others not listed.

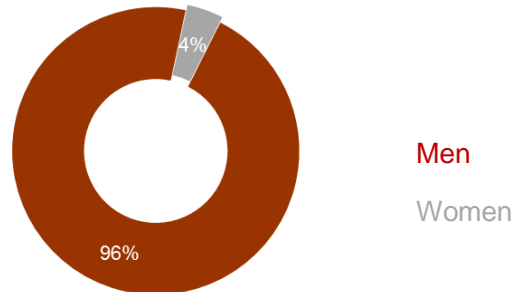
Exhibit 11. Composition of Workforce by Workplace Geography in Construction Occupations by Race: Workplace in City of Seattle, 2012



Sources: US Census Bureau American Community Survey, 2013; Puget Sound Regional Council, 2014; Community Attributes, 2014. 'Other' includes Hispanic, Pacific Islander, More than one Race, and all others not listed.

⁴ Source: U.S. Census Bureau, ACS 5-year estimates, 2012.

Exhibit 12. Composition of Workforce by Workplace Geography in Construction Occupations by Gender: Workplace in King, Pierce, and Snohomish Counties, 2012



Source: US Census Bureau EEO Tabulation 2006-2010 by Workplace Geography, 2013.

Exhibit 12 displays the Construction workforce by sex in King, Pierce, and Snohomish counties; 96% of the workforce is male. The Supply Model section of this report contains a further breakdown of gender and race for each source of new entrants into the workforce. **Exhibit 13** displays the top ten Construction occupations in which women are employed for King, Pierce, and Snohomish counties in 2010. These occupations span from management and supervisory roles, such as Construction managers, to the trades which are typically more male-dominated, like carpenters and electricians.

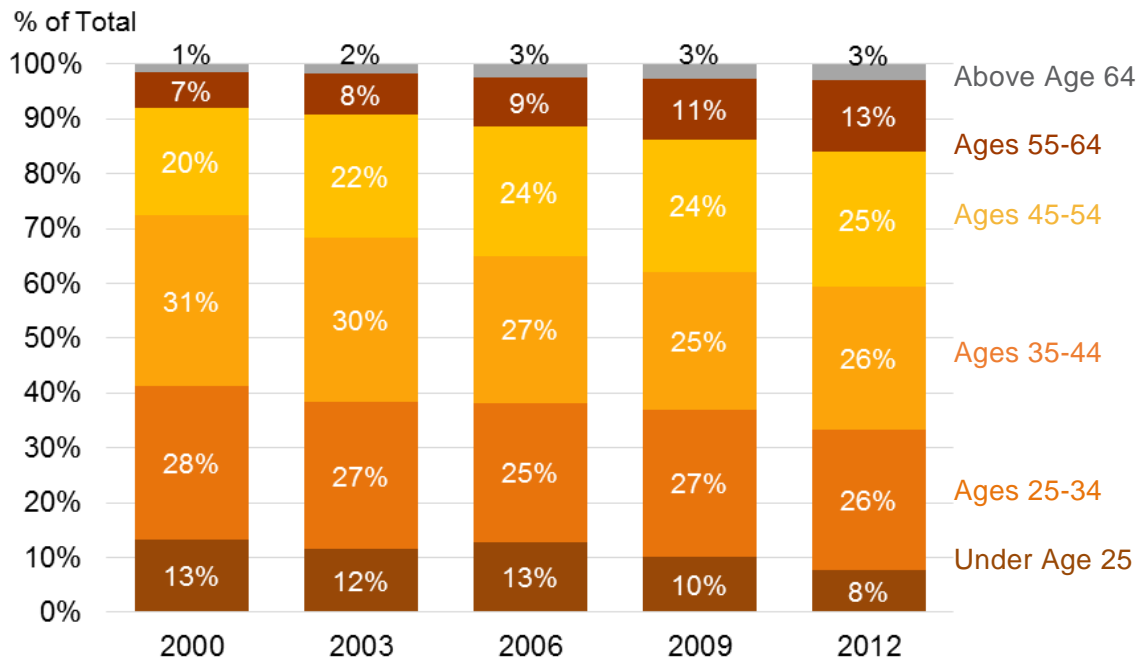
Exhibit 13. Top Ten Construction Occupations for Women by Workplace Geography: King, Pierce, and Snohomish Counties, 2010

Occupation	Total Women in Occupation
Construction managers	1,110
Construction laborers	710
First-line supervisors of construction trades and extraction workers	510
Painters, construction and maintenance	380
Carpenters	375
Electricians	355
Construction equipment operators except paving, surfacing, and tamping equipment operators	220
Construction and building inspectors	200
Pipelayers, plumbers, pipefitters, and steamfitters	135
Sheet metal workers	120

Source: US Census Bureau EEO Tabulation 2006-2010 by Workplace Geography, 2013.

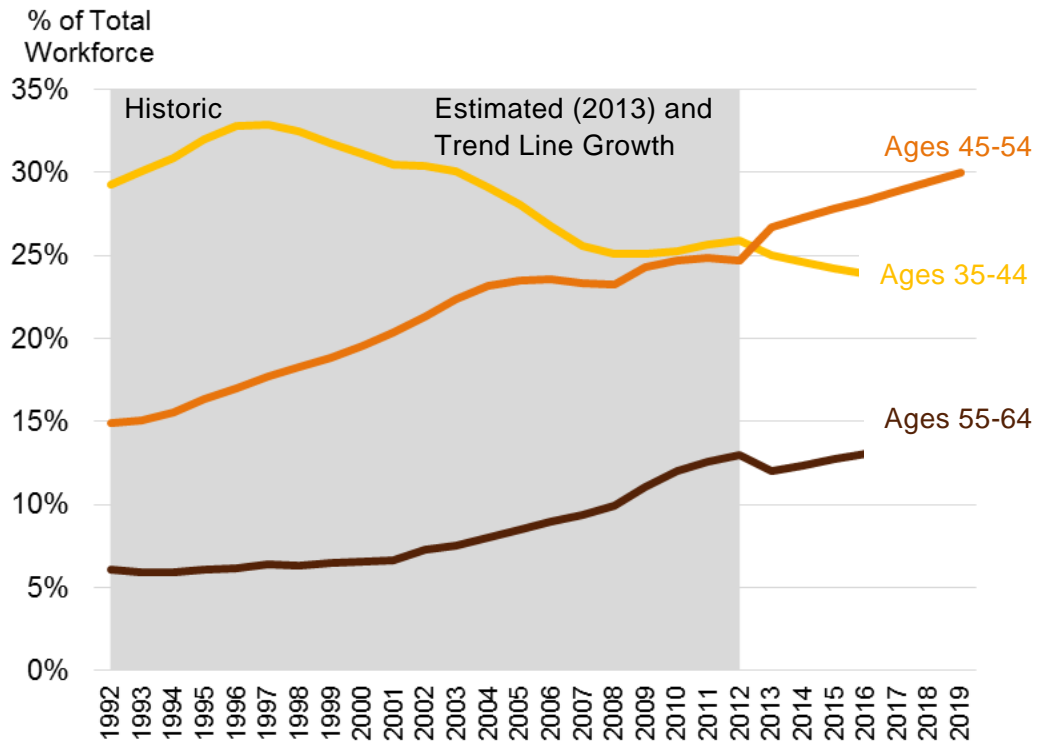
The construction sector workforce is aging. Between 2000 and 2012, the share of construction workers in King County between the ages of 55 to 64 nearly doubled, increasing from 6% to 13% (**Exhibit 14**). The share of workers between the ages 25 and 34 fell from 28% in 2000 to 26% of total construction employment, in 2012. Going further back in time, this age group's share of construction employment has declined from a high of more than two thirds of all workers in the early 1990s. Based on historic trends, by 2019 this share of construction employment will fall to 20% of all workers, while workers between 55 and 64 will increase to 14.1% within King County (**Exhibit 15**).

Exhibit 14. Distribution of King County Construction Workforce by Age Group, 2000-2012



Sources: Washington State Employment Security Department, 2013; Community Attributes, 2014.

Exhibit 15. Historic and Predicted (Trend Line) Growth in Shares of Construction Workforce by Select Age Groups, 1992-2019



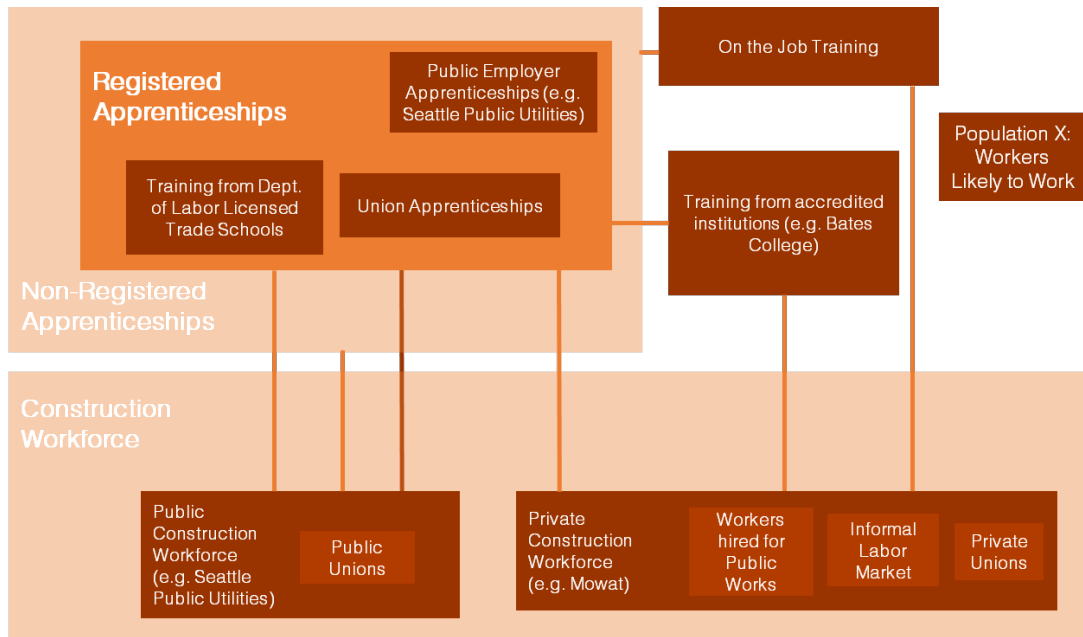
Sources: Washington State Employment Security Department, 2013; Community Attributes, 2014.

Workforce Training Avenues

The Workforce Training Avenues section of this report establishes context for the subsequent supply model to better understand the career pathways for new workers entering the workforce in Construction, as well as ways in which existing workers can change careers. This section clarifies pathways into the Construction workforce; distinguishes those occupations within the sector which require less or more training; outlines the union role in the Construction workforce; and gives an overview of selected registered apprenticeships in Construction.

Exhibit 16 displays potential pathways into the Construction workforce, from apprenticeships registered by Washington’s Department of Labor and Industries, to on the job training, to educational programs (many of which apply credit for apprenticeship completion towards an Associate Degree) in Construction trades. Non-registered apprenticeships are not regulated by the State of Washington Labor and Industries, and the awarding source of their credential varies.

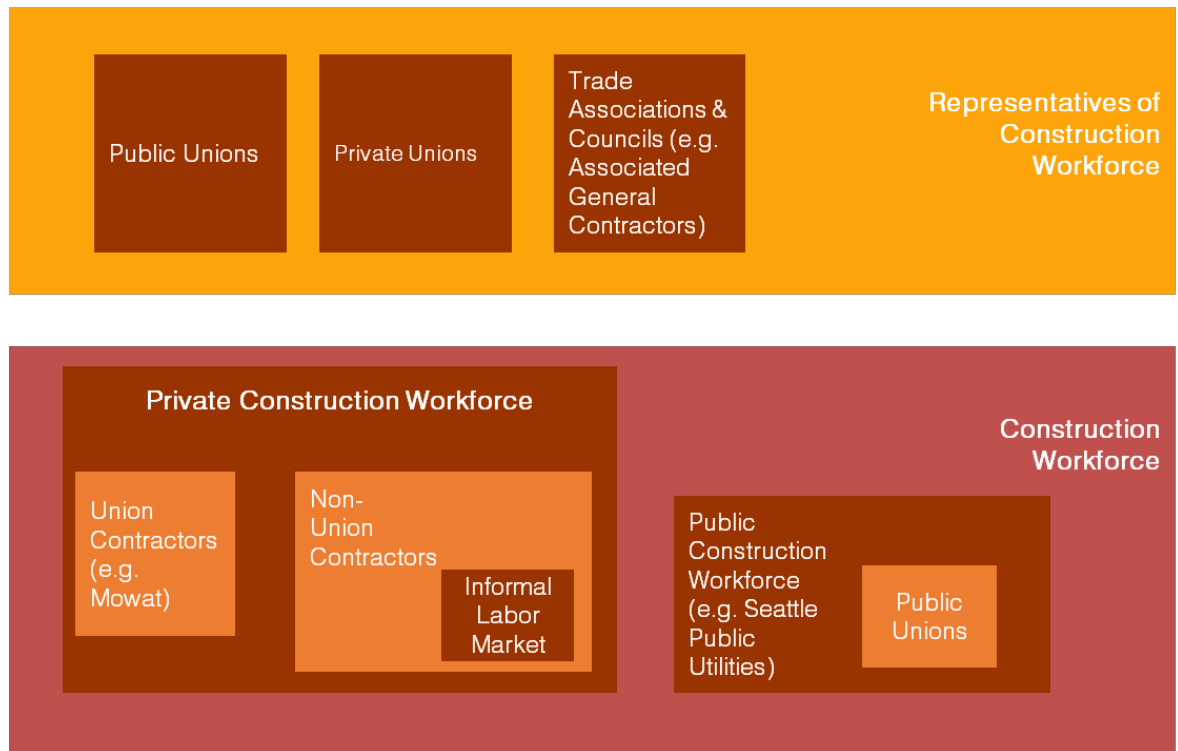
Exhibit 16. Construction Workforce Pipeline



Source: *Community Attributes*, 2014.

Exhibit 17 is a schematic of the Construction workforce and the role unions and trade associations play in representing and providing workers for the industry. According to Washington’s Department of Labor and Industries, apprenticeship is “a combination of on-the-job training (OJT) & related classroom instruction under the supervision of a journey-level craft person or trade professional in which workers learn the practical & theoretical aspects of a highly skilled occupation”. After completing an apprenticeship program, the worker's journey-level status provides an additional benefit of nationwide mobility at journey level scale. Apprenticeships are paid until journey-level status is achieved.

Exhibit 17. Construction Workforce and Representatives of the Construction Workforce



Source: Community Attributes, 2014.

Exhibit 18 displays an overview of selected registered apprenticeships including the sponsors of the apprenticeships, the occupations trained for, and the term of the apprenticeship. Most registered apprenticeships are sponsored by multiple agencies, such as unions in conjunction with public and private employers. Excluding statewide programs which cover all counties, King County has 23 registered apprenticeship programs in Construction trades; Snohomish County has 22; Pierce County has 23.

Exhibit 18. Overview of Selected Registered Apprenticeship Programs; King, Pierce, and Snohomish Counties

Apprenticeship	Occupations Trained	Term
Seattle Area Plumbers, Housing Plumbers, Pipefitters, HVAC/Refrigeration	Housing Plumber; HVAC/Refrigeration Mechanic; Maintenance Plumber/Steamfitter; Marine Pipefitter; Pipefitter; Plumber; Residential Service Mechanic	6,000-10,000 hours
Western Washington Sheet Metal Joint Apprenticeship Training Committee (JATC)	HVAC Service Technician; HVAC Test, Adjust and Balance Technician; Marine Sheet Metal Worker; Sheet Metal Worker	4,000-9,000 hours
Washington State UBC Joint Apprenticeship Training Committee (JATC)	Acoustical Applicator; Boat Builder; Bridge Carpenter; Cabinet Maker; Carpenter; Carpenter, Piledriver; Carpenter, Scaffold Erector; Dock and Wharf Builder; Drywall Finisher; Insulation Applicator; Millwright; Lather,	2,600-8,000 hours
INC/Associated General Contractors	Heavy Equipment Operators; Carpenters Apprenticeship	6,000-8,000 hours
Western Washington Masonry Trades Apprenticeship Committee	Tilesetter; Brick and Block Finisher; Bricklayer; Marble Setter; Pointer, Cleaner and Caulker; Terrazzo Worker; Tile, Terrazzo and Marble Finisher	
Inland Empire Roofers & Employers	Roofer	4,200 hours

Source: Washington Department of Labor & Industries, 2013.

Exhibit 19 presents an overview of selected occupations in the core Construction industry, grouped by level of training. Most occupations require moderate on-the-job training. Construction Managers are the only occupation in our analysis which require a Bachelor’s Degree or higher as educational training. High skill occupations include carpenters, brick and stone masons, and plumbers. The Bureau of Labor Statistics defines moderate-term-on-the-job training as training that takes more than one month and up to 12 months; they define long-term-on-the-job training as training that takes more than 12 months.

Exhibit 19. Level of Training Required for Construction Occupations

Work experience in a related occupation	Moderate-term on-the-job training	Long-term on-the-job training
First-Line Supervisors of Construction Trades	Carpet Installers	Boilermakers
Construction and Building Inspectors	Floor Layers, Except Carpet, Wood, and Hard Tiles	Brickmasons and Blockmasons
	Floor Sanders and Finishers	Stonemasons
	Cement Masons and Concrete Finishers	Carpenters
	Construction Laborers	Tile and Marble Setters
	Operators	Terrazzo Workers and Finishers
	Pile-Driver Operators	Electricians
	Operating Engineers and Other Construction Equipment Operators	Glaziers
	Drywall and Ceiling Tile Installers	Plumbers, Pipefitters, and Steamfitters
	Tapers	Plasterers and Stucco Masons
	Painters, Construction and Maintenance	Reinforcing Iron and Rebar Workers
	Paperhangers	Structural Iron and Steel Workers
	Pipelayers	Elevator Installers and Repairers
	Roofers	
	Sheet Metal Workers	
	Fence Erectors	
	Hazardous Materials Removal Workers	
	Highway Maintenance Workers	
	Cleaners	
	Segmental Pavers	

Source: US Bureau of Labor Statistics, 2013.

SUPPLY AND DEMAND FOR CONSTRUCTION WORKERS

Forecasted Demand

Jobs forecasts for construction represent the realized intersection of supply and theoretical demand for Construction workers. In the case of Construction, demand reflects broader growth of the regional economy; the need for buildings and other physical capital investments; and builders' ability and willingness to implement construction projects. Demand for Construction comes primarily from three sectors of the regional economy:

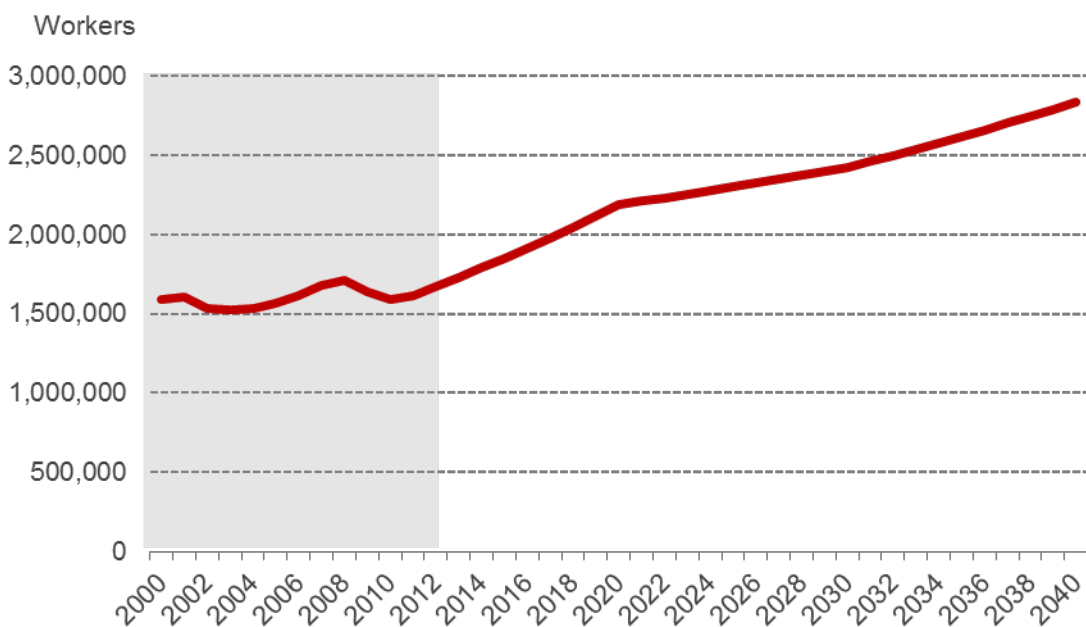
1. Commercial and industrial growth and need for space and facilities;
2. Public sector capital investments, for example, new regional investments by school districts, cities, and state and federal agencies; and
3. Household demand for new housing stock.

These three sources of demand are not mutually exclusive—private sector demand for housing can reflect an increase in commercial jobs as the economy grows. Likewise, increases in the regional population create added pressure on the existing housing inventory and infrastructure, eventually resulting in new investments in both. Each type of investment has a varying distribution of subcontractors by subsector and activity (e.g., engineering firms, wholesalers, builders) with implications for required employment.

In this analysis, demand for Construction jobs is derived primarily from the Puget Sound Regional Council's (PSRC) long-term regional forecast. **Exhibit 20** is the observed and projected growth in the construction and resources sector as forecasted by PSRC.

In 2012, there were an estimated 93,200 total construction jobs across the counties of King, Pierce, and Snohomish, of which roughly 78% were covered jobs.⁵ In 2013, total construction jobs across the three-county region are estimated to have increased to 95,400, including 74,200 covered jobs.

Exhibit 20. Observed and Projected Growth in Total Employment in King, Pierce and Snohomish Counties, 2000-2040



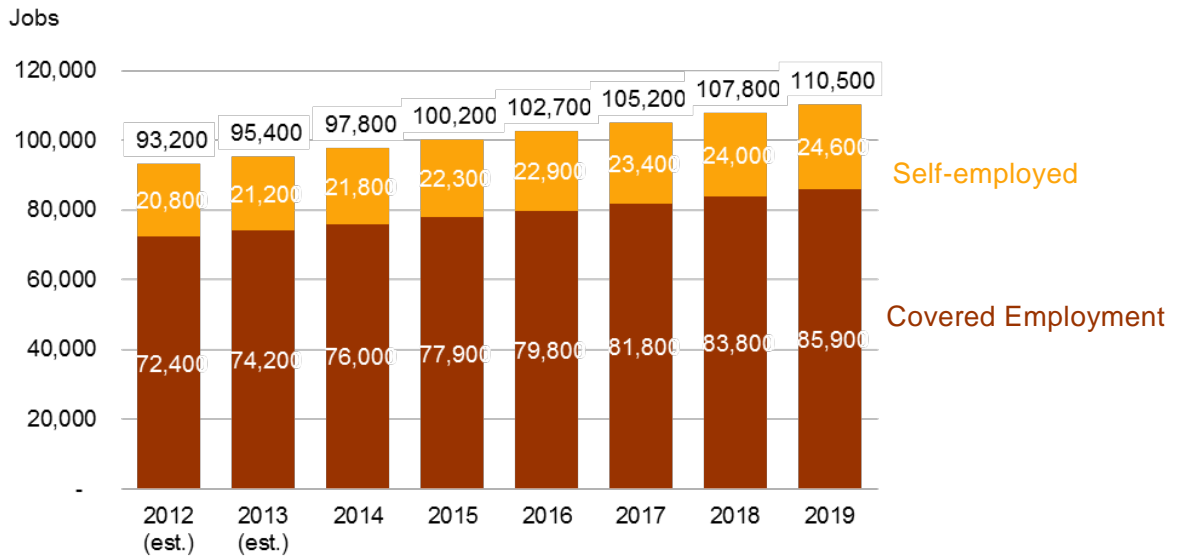
Source: Puget Sound Regional Council, 2013.

⁵ See **Glossary** for definition of covered work.

To estimate future total employment in the Construction sector, PSRC’s compound annual growth rate (CAGR) for years 2013 to 2019 for the construction and resources sector is applied to a base year of 2013. Projections of construction employment broken out by covered and self-employed workers are presented in **Exhibit 21**. The long-term employment forecast for the region reflects jobs by place of business location.

In the Construction industry, where workers move from site to site, jobs based in the three-county region can include projects done in other parts of Washington or elsewhere. Similarly, construction projects in the three-county region can be completed by businesses located outside the region—these workers, belonging to an outside firm, would thus not be included in these forecast totals. This may be more acute in areas along the fringe of the delimited three-county region, like construction firms from Skagit County that complete work in Snohomish County. Nevertheless, long-term estimates provide important insight into Construction demand and the extent to which the local supply of qualified and available workers can compete for these jobs.

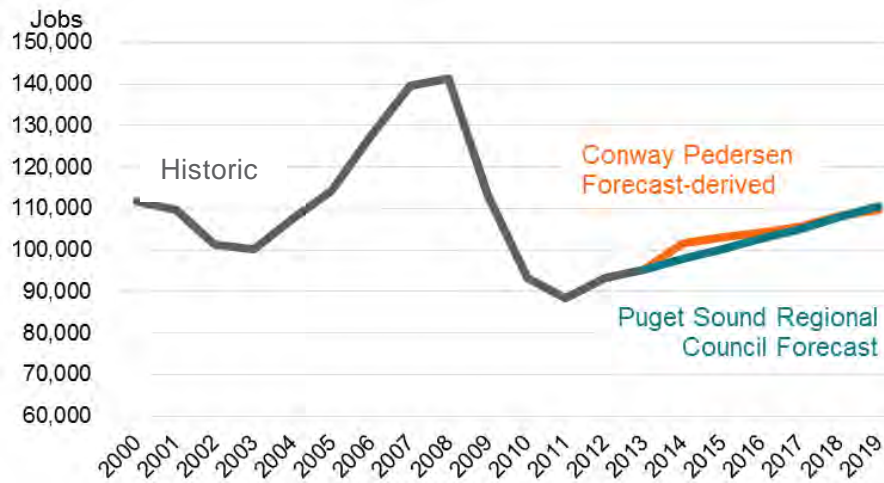
Exhibit 21. Construction Employment by Classification, 2012-2019, King, Pierce and Snohomish Counties



Sources: Puget Sound Regional Council, 2014; Community Attributes, 2014.

Conway Pedersen provides independent economic forecasts for the Puget Sound Region. **Exhibit 22** presents historic Construction employment and compares the Conway Pedersen with the PSRC forecast. By 2019, employment in Construction is estimated to reach 110,500 workers. Construction employment in neither the PSRC nor Conway Pedersen forecasts is projected to come close to a recent peak of more than 141,000 workers as late as 2008 during the crest of the real estate bubble in the region.

Exhibit 22. Construction Employment across King, Pierce and Snohomish Counties, 2000-2019



Sources: Puget Sound Regional Council, 2013; Conway Pedersen Economics, 2014; Community Attributes, 2014.

Demand by Type of Investment and Source

This portion of the analysis divides the forecasts of Construction activity into sources of demand, primarily distinguishing demand from private investment from demand for municipal and public sector capital projects, such as those projects in the City of Seattle Capital Improvement Plan.

The PSRC long-term economic forecast drives estimates of Construction employment in this analysis and represents employment required to fulfill Construction demand.⁶ The analysis in this study disaggregates Construction jobs forecasts into jobs supporting public and private development to understand and to compare public sector demand with City of Seattle CIP demand.

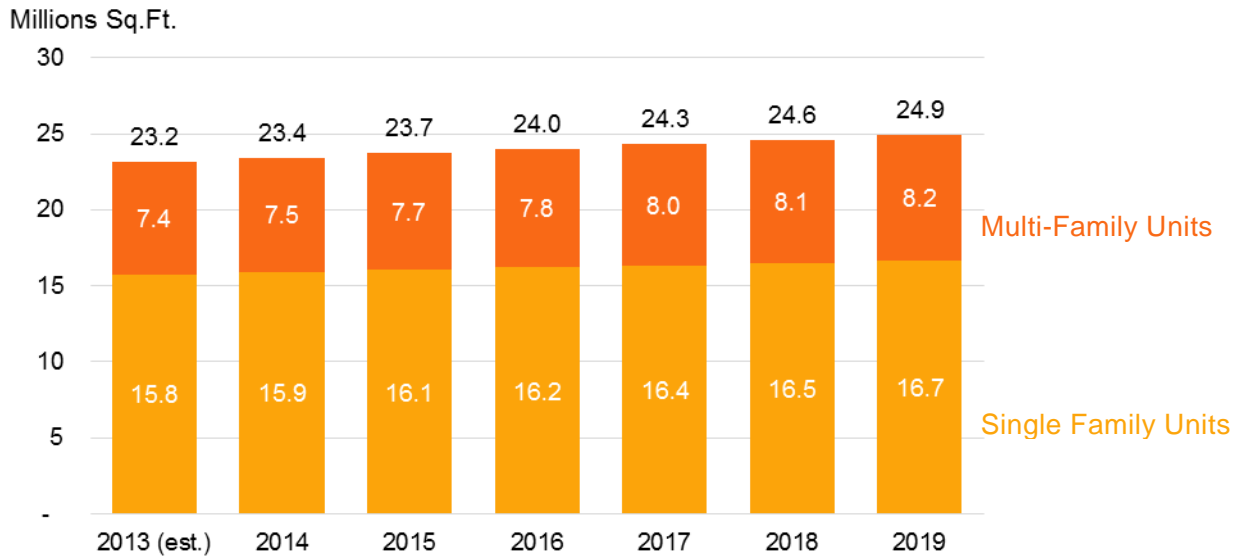
⁶ The jobs forecasts exclude undocumented labor hours and the informal labor market; provided that share of Construction labor remains consistent over time, the jobs forecast should reflect changes in Construction activity.

Private Sector Construction Demand

Regional growth in population and employment generally drives private sector demand for Construction, which will hire construction workers otherwise suited for public works construction projects. Between 2014 and 2019 the number of households across King, Pierce and Snohomish counties is forecast to grow 1.2% per year. This growth is expected to translate in 0.9% annual growth in single-family households per year and 1.3% for multifamily households. To accommodate this growth, an estimated 106,900 new housing units will be built across the three-county region, which means that more than 145 million square feet of new construction space will be required (**Exhibit 23**).

Growth in commercial, industrial, and retail space is another important driver of construction demand. More than 53 million square feet of new construction are forecast to be built over the 2014-2019 period. For example, between 2015 and 2017, approximately 380,000 square feet of new retail and office space will be built for Amazon in downtown Seattle. Other major sources of commercial demand for construction include the Spring District in Bellevue and the Overlake developments in Redmond.

Exhibit 23. Forecast New Residential Construction, King, Pierce, and Snohomish Counties, 2013-2019



Sources: Puget Sound Regional Council, 2013; RS Means, 2013; CoStar, 2013; CBRE, 2013, *Community Attributes*, 2014.

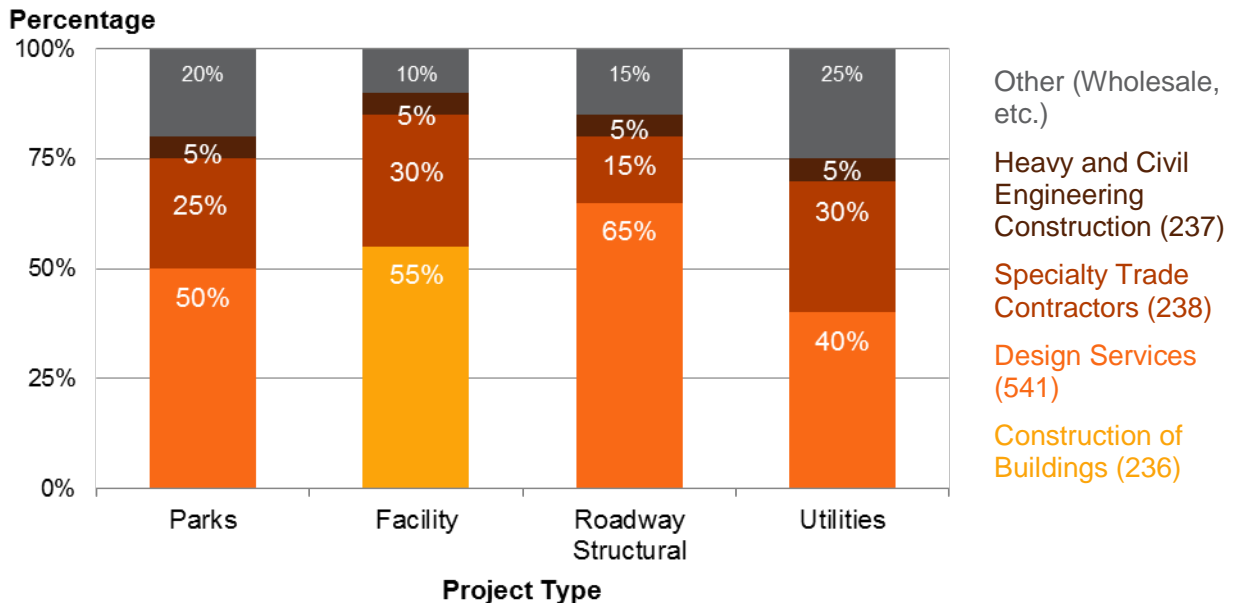
Public Sector Construction Demand

Between 2010 and 2013, City of Seattle public works payments averaged approximately \$200 million per year, adjusted to 2013 dollars. Over this period, each worker was associated with \$530,000 in contract value⁷.

Seattle CIP contracts are distributed across both prime contractors and subcontractors. This latter category includes carpenters, framers, wholesalers of materials, architects, engineers, and other related support activities and services. Distribution of contract value across sectors is not uniform, and varies according to the nature of the work.

Past City of Seattle CIP administrative records, Building Construction firms (NAICS 236) do 55% of the necessary work by contract value, whereas Design Services (NAICS 541), which are primarily engineering firms, do an average of 65% of contract value for roadway construction. Contract value does *not* uniformly correlate with jobs needed, since levels of output per worker vary by industry (e.g., a worker employed in a building construction firm will likely be associated with less contract value than an engineer in a design firm). **Exhibit 24** illustrates these contract value distributions.

Exhibit 24. Estimated Contract Value Distribution by Industry (NAICS Code) and Project Type, City of Seattle Public Works Projects



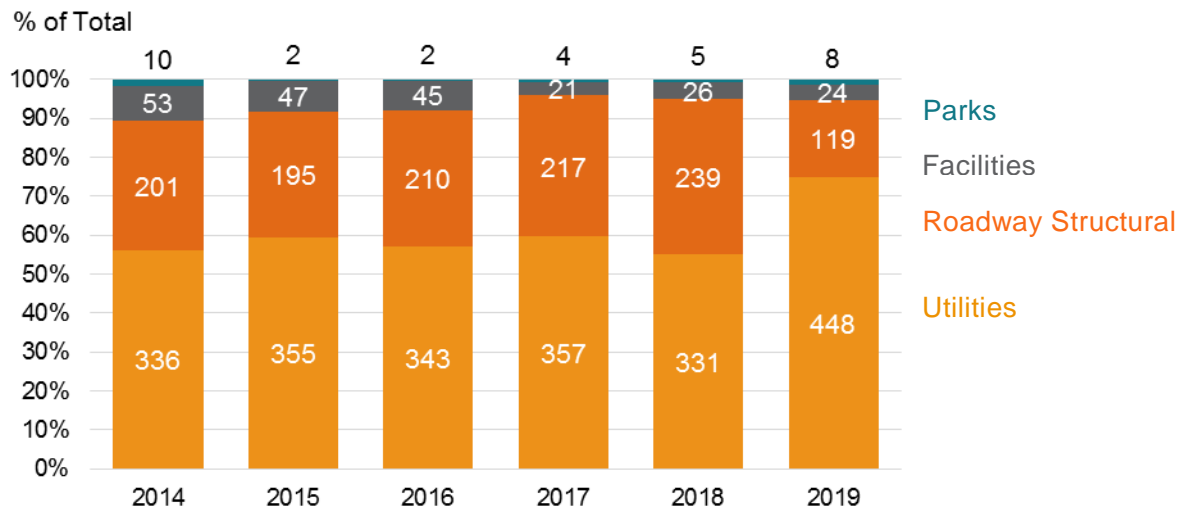
Sources: City of Seattle Department of Finance and Administrative Services, 2014; Community Attributes, 2014.

⁷ This assumes 1,800 labor hours for a full-time equivalent (FTE), is weighted, and is in 2013 dollars.

The types of projects included in a CIP shape the amount of employment demand. Projects with greater ratios of output (revenues)-to-worker will require fewer employees for each \$1 million of city investments. For example, statewide between 2009 and 2012 the average job in Heavy and Civil Engineering Construction was associated with \$251,000 in business revenues, compared with an average of \$157,600 among Specialty Trade Contractors. For any given project, the greater share of the contract going to Specialty Trade Contractors compared with Heavy and Civil Engineering Construction, the more actual FTEs would be needed to complete the project; alternatively, for the same size of contract (by dollar value), if a larger share is awarded to Heavy and Civil Engineering Construction firms, the less FTEs will be associated with the project.

Based on Capital Improvement Plans through 2019 for the City of Seattle, parks have the smallest share by contract value, whereas utilities and roadway construction represent the largest shares by dollar value. These totals translate into the largest sources of CIP employment demand through 2019. **Exhibit 25** presents these employment estimated demand breakouts for forecast CIP spending.

Exhibit 25. Estimated Employment Demand Distribution for City of Seattle Public Works Projects, 2014-2019



Sources: City of Seattle Department of Finance and Administrative Services; Washington State Department of Revenue; Washington State Employment Security Department; U.S. Bureau of Economic Analysis; Community Attributes, 2014.

In 2012, City of Seattle public works contracts supported an estimated 322 Full-time Equivalents (FTE), including workers from both prime contractors and subcontractors. Federal, state, and county public works expenditures support

many more jobs, including many large, multi-year infrastructure projects. Assuming the City of Seattle spends an average of \$200 million per year (2013 dollars) on public works projects between 2014 and 2019, this spending would support 400 FTEs per year, based on 1,800 labor hours per year. Disaggregated components of construction demand are presented in **Exhibit 26** below.

Exhibit 26. Construction Employment by Source of Demand, Historic and Forecast

Source of Employment Demand	2013	2014	2015	2016	2017	2018	2019
Public Works	13,200	13,400	13,700	14,000	14,300	14,600	14,900
State & County	8,500	8,700	8,800	9,000	9,200	9,400	9,600
Cities	1,300	1,300	1,300	1,400	1,400	1,400	1,500
Seattle	400	400	400	400	400	400	400
All other jurisdictions*	900	900	900	900	900	900	900
Federal	3,400	3,500	3,500	3,600	3,700	3,800	3,900
Employment from Private Sector Development**	82,200	84,400	86,500	88,700	90,900	93,200	95,600
Total Construction Employment	95,400	97,800	100,200	102,700	105,200	107,800	110,500
City of Seattle share of regional Public Works Employment Demand	3.0%	3.0%	2.9%	2.9%	2.8%	2.7%	2.7%

Sources: City of Seattle Department of Finance and Administrative Services, 2014; Puget Sound Regional Council, 2013; RS Means, 2013; CoStar, 2013; CBRE, 2013, Community Attributes, 2014.

*All other towns and cities in King, Pierce, and Snohomish counties.

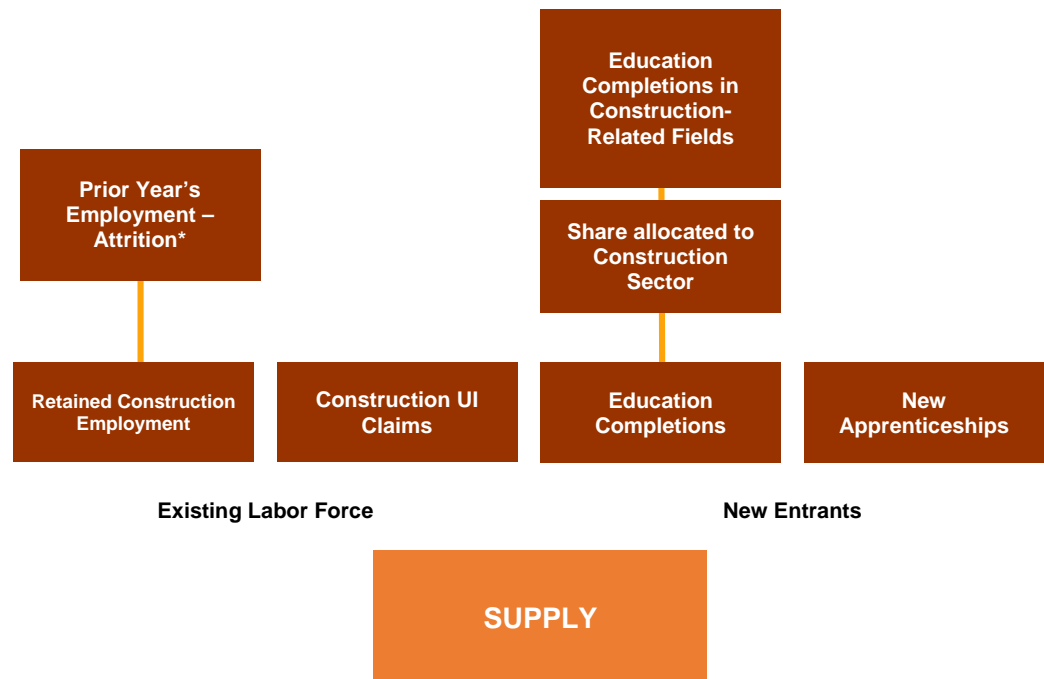
**Private Sector Development includes the construction of space associated with employment in Manufacturing/WTU, Retail/Food Services, FIRE/Services, Construction and Resources, as well as single-family and multifamily housing.

Note: Estimated City of Seattle CIP-supported employment is rounded to the nearest 100th.

Supply of Construction Workers

The supply of construction workers includes both those who are currently employed in Construction and those actively seeking work in the Construction sector. Supply forecasts of construction workers includes the sum of 1) currently employed workers; 2) forecasted unemployment claims made by construction workers, and 3) new entrants to the workforce, including new apprentices and the previous year's graduates from Construction-specific post-secondary education programs from institutions within the three-county region. **Exhibit 27** is a conceptual model for how this analysis defines supply for construction workers, including both those employed and seeking employment in the construction sector. **Appendix D** provides a more detailed discussion of how Construction labor supply is estimated.

Exhibit 27. Conceptual Model for Construction Worker Supply



Source: *Community Attributes, 2014.*

*Attrition is the share of remaining employment growth, net of growth, due to retirements, career changers, out-migration, and other forms of labor force exiting.

The analysis in this section assesses the components of the workforce that make up the supply of the Construction sector labor market. The data presented are broken out by race and gender to establish context for the analysis in subsequent sections, which assesses the opportunities to increase participation of women and people of color in Seattle Construction hiring.

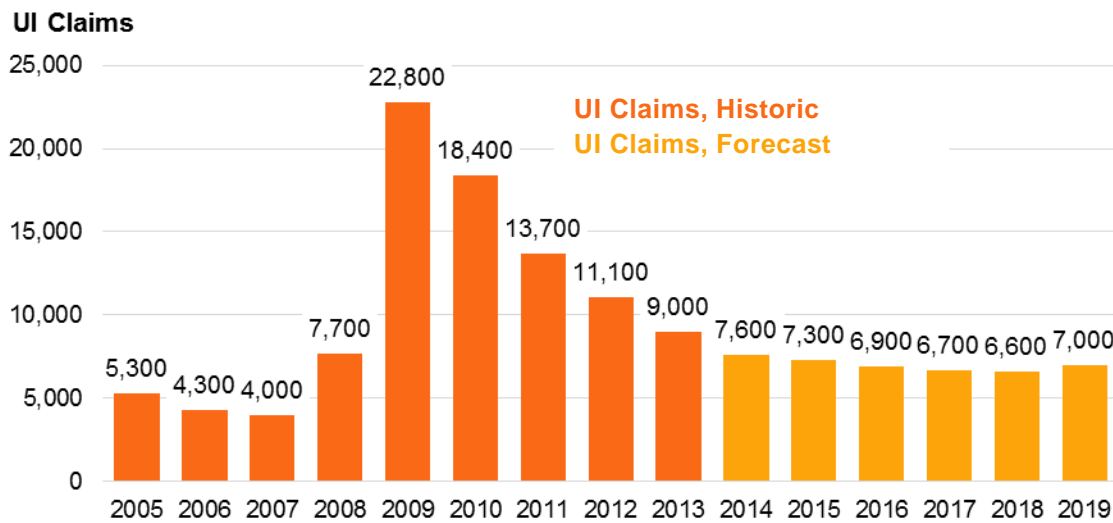
Existing Construction Workforce

This analysis utilizes the Washington State Employment Security Department’s (ESD) annual occupational employment forecast for the first supply source, which is treated as the carry-over, or “retained” workforce. This segment of the workforce represents those workers who were employed in the prior year and remained employed in construction in the current year, net of employment exits such as retirements, career changes, and out-migration.

Unemployment Claimants

Unemployment insurance (UI) claimants per year are estimated based on the historic, statistical relationship between regional unemployment and Construction-specific UI claims, divided by construction employment. This correlation is then applied to a forecast of annual regional unemployment to estimate future construction unemployment insurance claims⁸. Estimates are then added to supply totals. In 2013 the regional unemployment rate was 5.9%, and within the three-county region, the average number of UI claims made by construction workers summed to 9,000 (**Exhibit 28**).⁹

Exhibit 28. Historic and Forecast Construction Sector Unemployment Claims



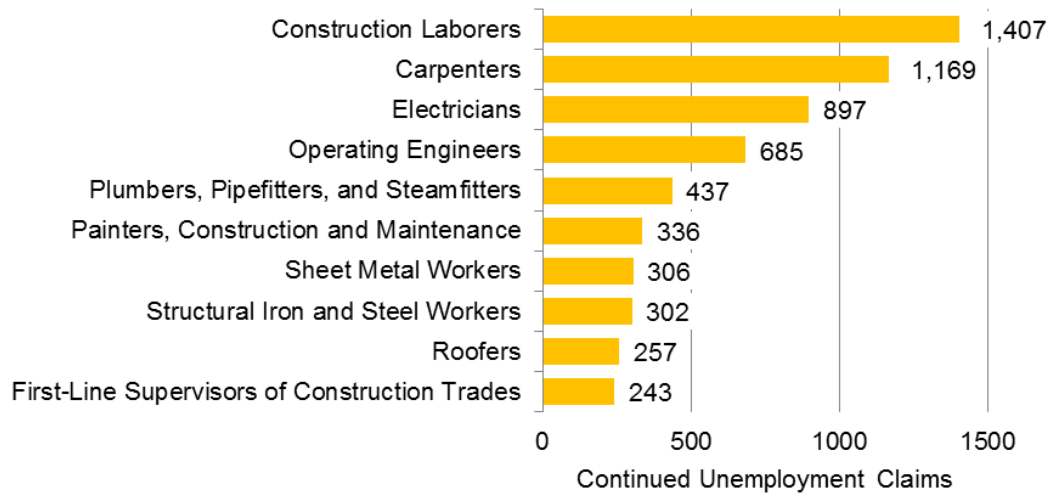
Sources: Puget Sound Regional Council, 2013; Conway Pedersen Economics, 2014; Washington State Employment Security Department, 2014; Community Attributes, 2014.

⁸ Conway Pedersen Economics is the source for the unemployment rate forecasts.

⁹ UI claims are reported monthly and by the categories “initial,” “continued,” “exhausted,” and “first payments.” To estimate annual claims for construction workers (those who previously worked in construction before losing employment), first payments are subtracted from the sum of initial and continued claims (to avoid double-counting) by month and then averaged over the 12-month period.

Unemployment claims in construction largely comprise non-management positions, as seen in **Exhibit 29**. Construction Laborers, Carpenters, and Electricians are the top three occupations in construction that are unemployed in the three-counties. A claimant can receive state unemployment benefits for up to 26 weeks, so these data do not reflect the long-term unemployed in construction.

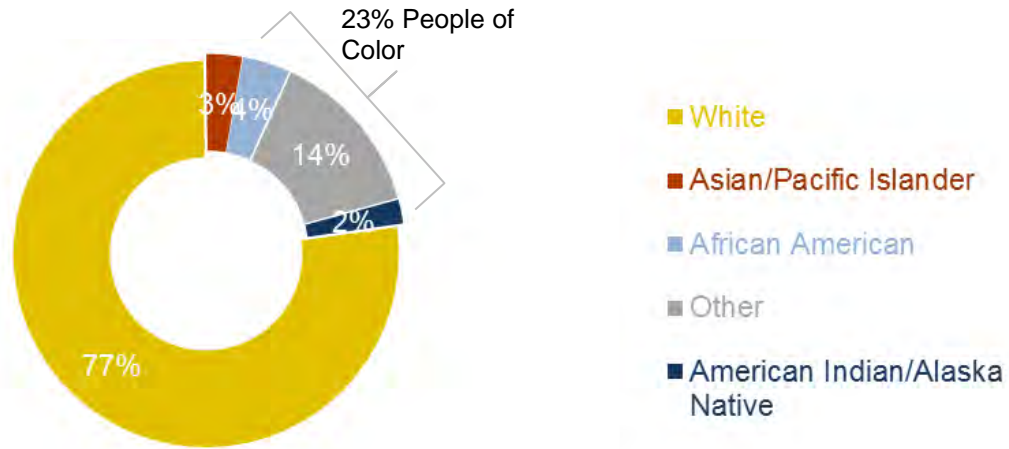
Exhibit 29. Top 10 Construction Occupations in Continued Unemployment Claims, King, Pierce and Snohomish Counties, December 2013



Source: ESD, 2013.

Racial composition of unemployment claims for Construction trades mirrors that of the greater tri-county workforce in Construction occupations, displayed in **Exhibit 30**. As of December 2013, 23% of the unemployment claims in Construction are from people of color, compared with 20% people of color in the overall construction workforce. **Exhibit A16 in Appendix A** shows racial composition of the general population of the three-county area for reference, where 70% of the population is white, and 30% are people of color. Additionally, **Exhibit 42** in the Supply Summary compiles all racial profiles of all populations in this analysis for ease of comparison.

Exhibit 30. Racial Composition of Unemployment Claimants, King, Pierce and Snohomish Counties, December 2013



Source: ESD, 2013. 'Other' includes Hispanic, Pacific Islander, More than one Race, and all others not listed.

Educational Completions

In order to assess the implications of current-state talent production on future supply, 2012 post-secondary completions in construction curriculum programs are used as a constant throughout the forecast years. Completers allocated to the construction industry are done so by way of the share of each associated completion occupation in the construction industry; **Appendix D** provides further explanation of these calculations.

Most workers in construction trades who graduate from accredited educational institutions are in management and supervisory roles (**Exhibit 31**). The analysis that follows assesses the construction employment demand and supply across the entire construction workforce and focuses on positions requiring less than a baccalaureate degree.

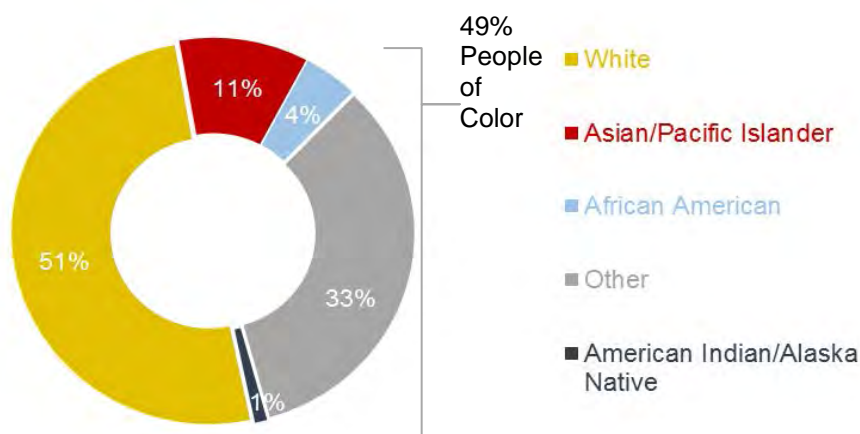
Exhibit 31. Completions in Accredited Training Programs Related to Construction, King, Pierce, and Snohomish Counties, 2012

Summary of Allocated Completions by Occupational Code	2012 Completions
Construction Managers	1,988
Carpenters	132
Solar Photovoltaic Installers	129
First-Line Supervisors of Construction Trades and Extraction Workers	107
Operating Engineers and Other Construction Equipment Operators	12
Elevator Installers and Repairers	6
Electricians	4
Highway Maintenance Workers	3
Paving, Surfacing, and Tamping Equipment Operators	2
Pile-Driver Operators	1
Sheet Metal Workers	1
Total	2,385

Source: IPEDS, 2012; Community Attributes, 2014.

In 2012, an estimated nearly 2,400 students completed Construction-related degrees among three-county educational institutions and pursued employment in the Construction sector. The racial composition of completers from construction related degree programs is the most diverse of any other source of supply, as well as representing more women than any other source of potential labor supply¹⁰ (**Exhibit 32**). Among completers, more than half were white, while 49% were people of color.

Exhibit 32. Racial Composition of Educational Completions, King, Pierce and Snohomish Counties, 2012



Source: IPEDS, 2012. Other' includes Hispanic, Pacific Islander, More than one Race, and all others not listed.

¹⁰ See **Exhibit 36** for gender breakdown

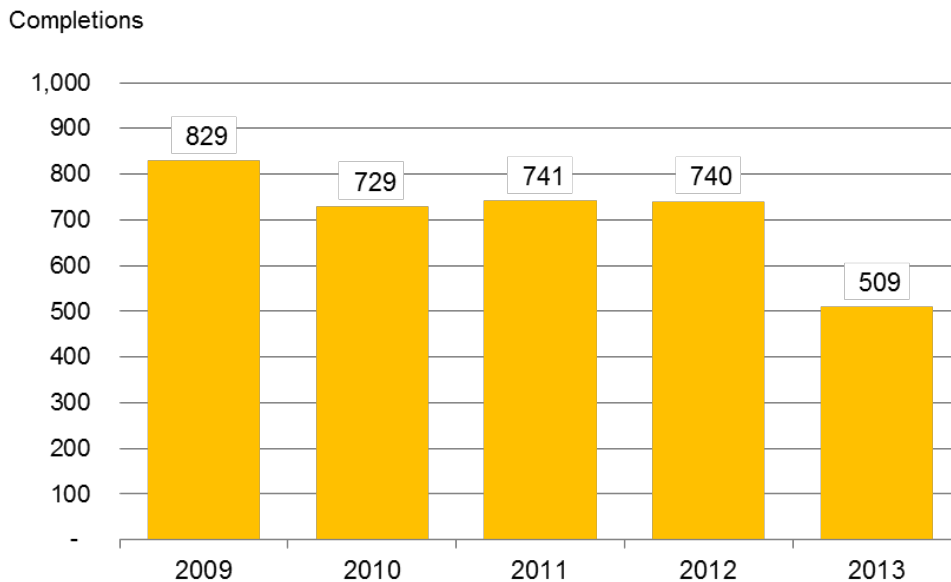
Apprenticeships

Workers completing apprenticeships in the construction industry must finish their program in order to attain journey-level status, but many do not. Instead, some cancel out, transfer to another program, or suspend the program entirely. Apprenticeship completions represent the workforce immediately available to work in construction, and the first three exhibits of the Apprenticeship section analyzes only those who complete apprenticeship programs. Because the City is also interested in understanding the barriers of hiring people of color and women face in construction work, the latter portion of this section quantifies how much of this population cancels, transfers, and suspends apprenticeship programs, relative to white males.

Apprenticeship Completions

The supply of workforce from apprenticeship completions has totaled around 750 completions each year for the core occupations in Construction (**Exhibit 33**). However, because completions data are updated continuously for the following year, the total number of completions for 2013 can be considered incomplete.

Exhibit 33. Registered Apprenticeship Completions in Construction Occupations, King, Pierce and Snohomish Counties, 2009 to 2013



Source: Washington Department of Labor and Industries, 2013.

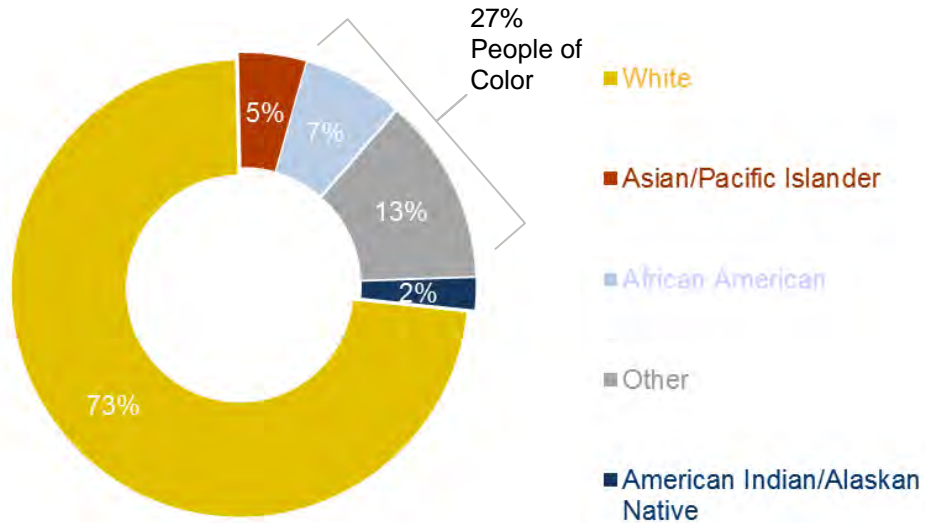
Exhibit 34 shows apprenticeship completions by occupation for King, Pierce, and Snohomish Counties, from 2009 to 2013. Electricians comprise the largest number of completions over the time period, with Carpenters second, and Laborers third. Electricians, Plumbers, Pipefitters, and Steamfitters, and Sheet Metal Workers are occupations in which the completion counts have generally increased over this period; Carpenter and Construction Laborer completion counts have generally decreased over this period.

Exhibit 34. Apprenticeship Completion Count in Construction Trades by Occupation, King, Pierce, and Snohomish Counties, 2009-2013

SOC Code	Occupation	2009	2010	2011	2012	2013	Total
47-2132	Insulation Workers, Mechanical					1	1
47-2022	Stonemasons	1				1	2
47-3013	Helpers--Electricians		8				8
47-2044	Tile and Marble Setters	3	1		3	2	9
47-3011	Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters	2	4	1	3		10
47-2161	Plasterers and Stucco Masons Construction and Related		3	4	3	1	11
47-4099	Workers, All Other		2	5	5	1	13
47-2151	Pipelayers	10		6			16
47-2041	Carpet Installers	3	2	8	4		17
47-2011	Boilermakers	2	7	7	10	1	27
47-2021	Brickmasons and Blockmasons	12	5	6	5	6	34
47-2082	Tapers	17	11	7	2		37
47-2131	Insulation Workers, Floor, Ceiling, and Wall	16	10	7	5	2	40
47-2181	Roofers	9	11	16	13	12	61
47-2051	Cement Masons and Concrete Finishers	26	18	3	15	7	69
47-2141	Painters, Construction and Maintenance	31	14	18	7	6	76
47-2073	Operating Engineers and Other Construction Equipment Operators	25	15	19	18	8	85
47-2121	Glaziers	25	13	18	27	12	95
47-4021	Elevator Installers and Repairers	38	37	7	14	15	111
47-2081	Drywall and Ceiling Tile Installers	72	55	51	31	16	225
47-2211	Sheet Metal Workers	37	46	42	60	48	233
47-2221	Workers	59	42	46	77	30	254
47-2152	Plumbers, Pipefitters, and Steamfitters	56	42	63	69	63	293
47-2061	Construction Laborers	101	96	78	82	48	405
47-2031	Carpenters	148	166	158	114	42	628
47-2111	Electricians	136	121	171	173	187	788
Total		829	729	741	740	509	3,548

Source: Washington Department of Labor & Industries, 2013.

Exhibit 35. Racial Composition of Apprenticeship Completers in Construction Occupations, King, Pierce and Snohomish Counties, 2012



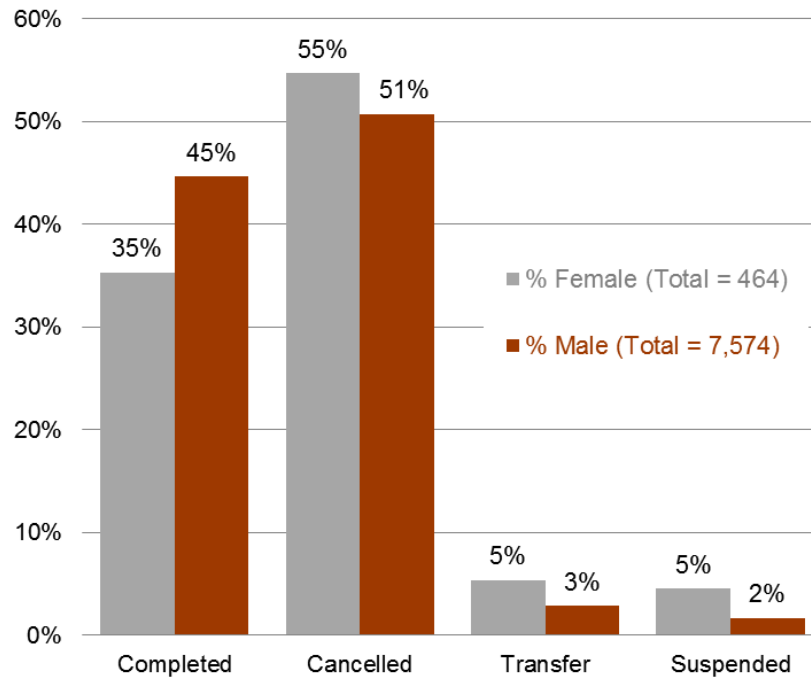
Source: Washington Department of Labor and Industries, 2013; Community Attributes, 2014. 'Other' includes Hispanic, Pacific Islander, More than one Race, and all others not listed.

Exhibit 35 maps the racial composition of apprenticeship completers in core Construction occupations in 2012. Compared with the racial composition of those completing educational programs which are suitable for Construction, those completing apprenticeships in the Construction workforce are less diverse (27% people of color, compared with 49% people of color in educational completions).

Apprenticeship Cancellations, Transfers, and Suspensions

Fewer people of color and women complete apprenticeship programs related to construction, and more cancel out of their apprenticeship programs. The subsequent exhibits examine this by sex and by race.

Exhibit 36. Construction Apprenticeship Status by Sex: King, Pierce and Snohomish Counties, 2009-2013

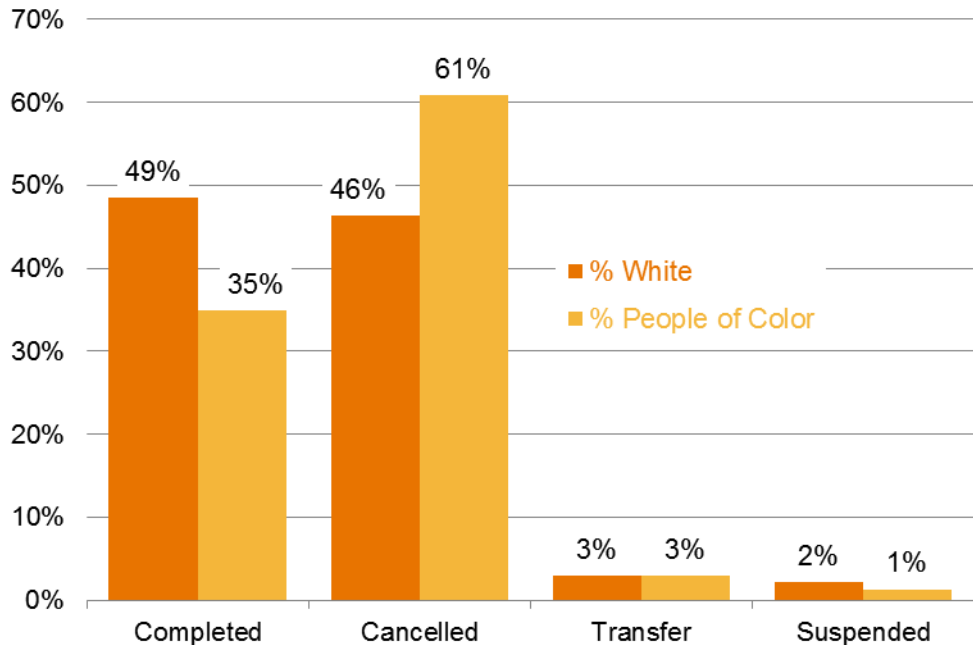


Source: Washington Department of Labor and Industries, 2013; Community Attributes, 2014.

Exhibit 36 is a count of all construction apprenticeships by sex and status of apprenticeship between 2009 and 2013. The subsequent Supply Summary shows the composition of males and females who completed their apprenticeships between 2009 and 2013.

Exhibit 37 is a deeper analysis into status of apprenticeship (not simply looking at completions) showing that in the three-counties from 2009-2013, fewer women attained journey-level status when compared to men. Among construction apprenticeships, females cancelled, transferred, or suspended their construction apprenticeship programs more than males. Females also completed their apprenticeship programs at lower rates than did males.

Exhibit 37. Construction Apprenticeship Status by Race: King, Pierce and Snohomish Counties, 2009-2013



Source: Washington Department of Labor and Industries, 2013; Community Attributes, 2014.

Exhibit 38 disaggregates the percentage of completions, cancellations, transfers, and suspensions by race in construction apprenticeships between 2009 and 2013 for the three-county area. African Americans and Hispanics had the highest percentage of cancellations, as well as the lowest percentage of completions.

Exhibit 38. Construction Apprenticeship Status by Disaggregated Race: King, Pierce and Snohomish Counties, 2009-2013

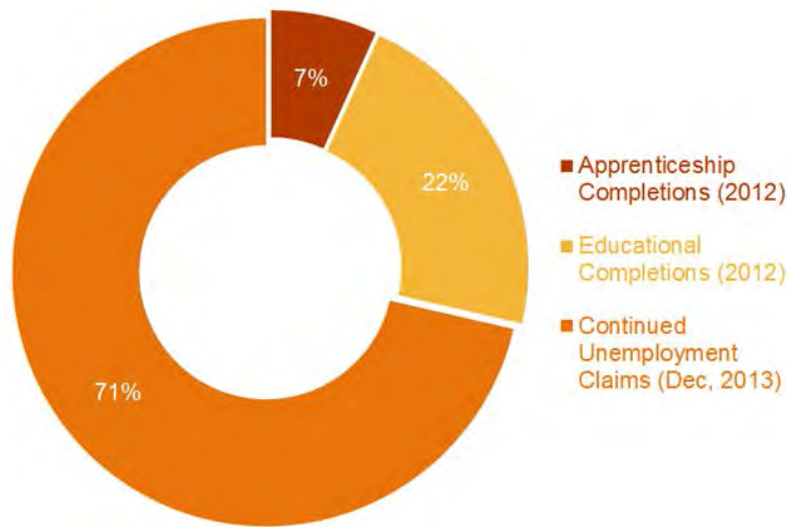
	White	African American	Hispanic	Native American	More than one Race	Not Classified	Not Specified	Pacific Islander	Asian
Completed	49%	31%	33%	35%	36%	39%	48%	39%	50%
Cancelled	46%	65%	64%	59%	61%	48%	45%	54%	46%
Transfer	3%	3%	3%	4%	1%	12%	6%	4%	2%
Suspended	2%	2%	1%	2%	2%	0%	0%	3%	1%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Washington Department of Labor and Industries, 2013; Community Attributes, 2014.

Supply Summary

Exhibit 39 combines the three components of Construction workforce supply for King, Pierce, and Snohomish counties. Unemployment Claims comprise over 70% of potential Construction workforce, though claims are highly seasonal. Educational completions account for nearly a quarter of potential supply, and apprenticeship completions account for a relatively small portion of potential supply (about 7%).

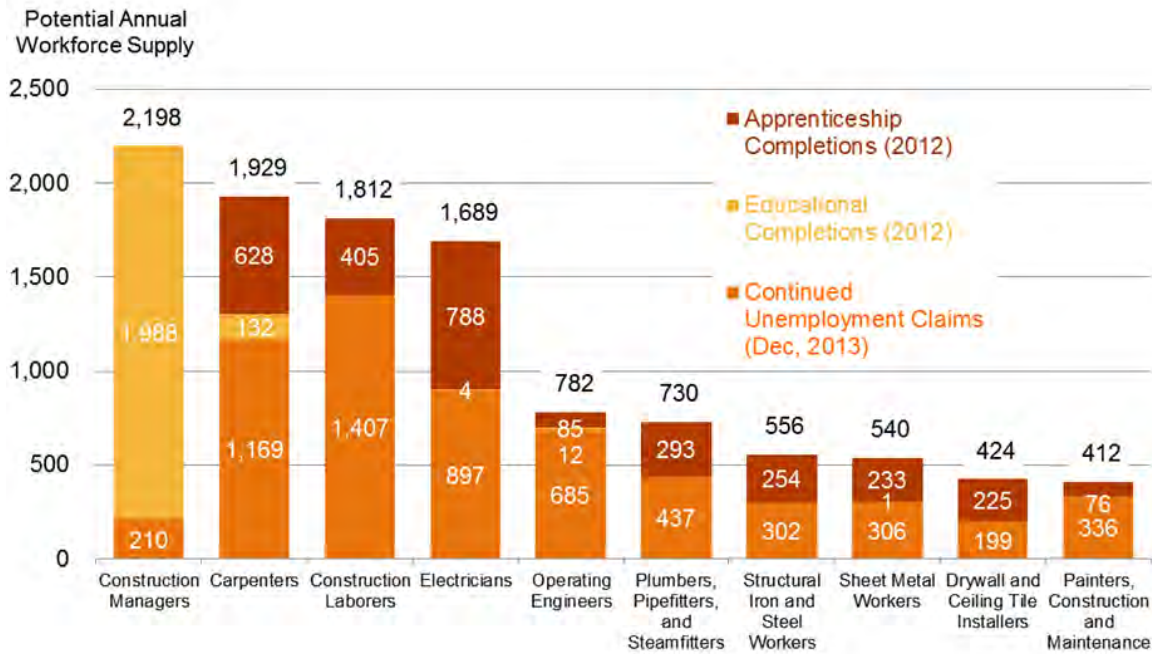
Exhibit 39. Potential Composition of Annual Entrants to the Construction Workforce



Sources: Washington Department of Labor and Industries, 2013; IPEDS, 2013; Washington State ESD, 2013; Community Attributes, 2014.

Exhibit 40 disaggregates the sources of supply by occupation, and ranks them by the ten most numerous. The most numerous occupations for potential supply include Construction Managers, Carpenters, Laborers, and Electricians.

Exhibit 40. Potential Composition of Annual Entrants to the Construction Workforce by Occupation: Ten Most Numerous Occupations



Sources: Washington Department of Labor and Industries, 2013; IPEDS, 2013; Washington State ESD, 2013; Community Attributes, 2014.

Exhibit 41. Summary of all Racial Profiles in this Analysis by Population and Geography

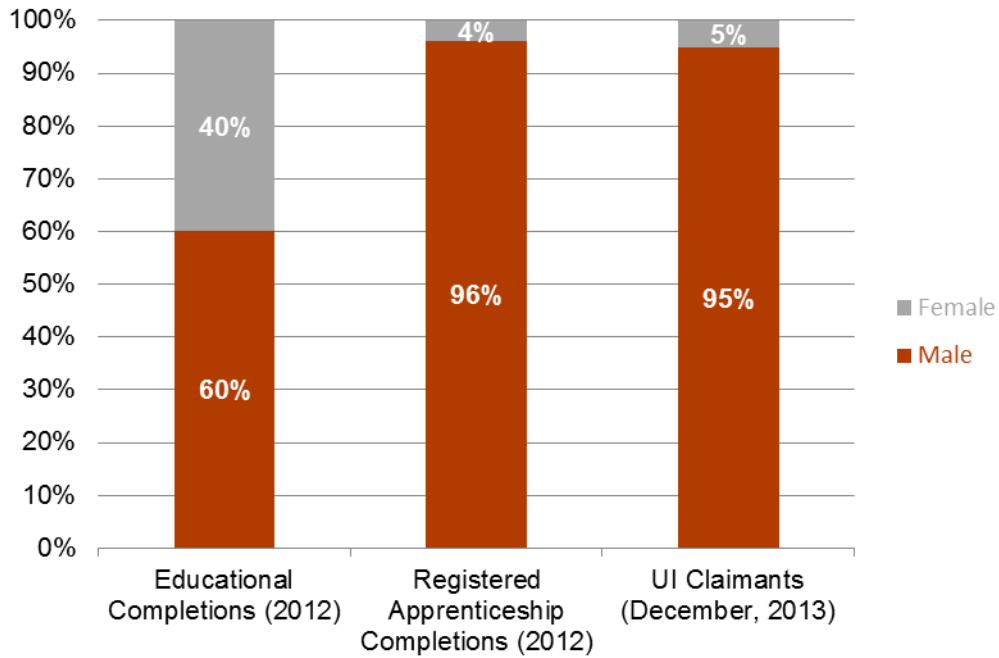
Population	Geography	White	Asian/ Pacific Islander	African American	Other	American Indian/Alaska Native	Source
General Population	King, Pierce, Snohomish Counties	70%	11%	5%	13%	1%	U.S. Census Bureau, 2012 ACS 5-year estimates
General Population	City of Seattle	70%	14%	8%	7%	1%	U.S. Census Bureau, 2010 Decennial Census
Construction Workers	King, Pierce, Snohomish Counties	80%	5%	3%	11%	1%	2006-2010 by Workplace Geography, 2013
Construction Workers	City of Seattle	74%	10%	5%	11%	1%	U.S. Census Bureau, 2012 ACS 5-year estimates
Construction UI Claimants	King, Pierce, Snohomish Counties	77%	3%	4%	14%	2%	ESD, 2013
Educational Completions	King, Pierce, Snohomish Counties	51%	11%	4%	33%	1%	IPEDS, 2012
Apprenticeship Completions	King, Pierce, Snohomish Counties	73%	5%	7%	13%	2%	Washington Department of Labor and Industries, 2013

Source: Community Attributes, 2014. 'Other' includes Hispanic, Pacific Islander, More than one Race, and all others not listed.

Exhibit 41 summarizes all racial composition reported in this report by population and geography for ease of comparison, including the general population in the three-county area and the City of Seattle, construction workers in the three-county area and the City of Seattle, and the three sources of added supply to the Construction Industry.

Exhibit 42 charts gender composition of the three potential sources of Construction labor supply for the three-county area. In addition to being the most racially diverse source of supply, potential supply from educational completions also has the highest composition of females, with 40% of the total number of completions in courses of study suitable for the Construction industry being female. The other two potential supply sources reflect a more typically heavily male composition in the Construction industry.

Exhibit 42. Gender Composition of Potential Construction Workforce Supply, King, Pierce, and Snohomish Counties



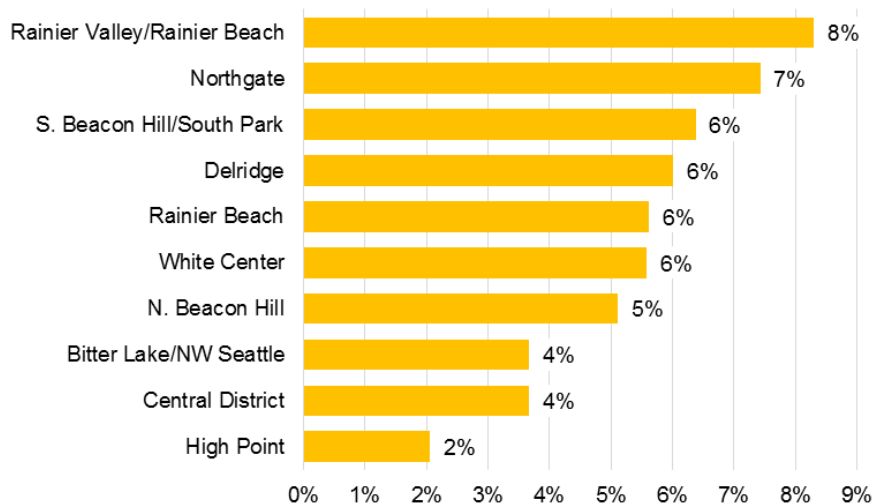
Sources: Washington Department of Labor and Industries, 2013; IPEDS, 2013; Washington State ESD, 2013; Community Attributes, 2014.

Targeting Potential Workers

In addition to the known supply of workers for the Construction industry, the City is also interested understanding and targeting the potential supply of workers who are qualified and motivated to work in Construction, but who are not engaged in any training pipeline. This section of the analysis explores this population, which is defined as those living in the City of Seattle who are people of color, who are living below 200% of the federal Poverty Line¹¹, and who are between the working ages of 18 and 64 years old.

The City of Seattle has developed a list of distressed zip codes intended for targeted recruiting on the Seawall Replacement Project based on the above criteria. The 15 zip codes in Seattle (with several extending outside the city limits) are home to approximately 43% of all construction workers living within Seattle; among women and people of color who are employed in Construction, 57% of those living in Seattle reside in these zip codes. The largest estimated number of Construction workers who are women or people of color in 2014 live in Rainier Valley/Rainier Beach (zip code 98118, 8% of all targeted demographic Construction workers), Northgate (zip code 98125, 7%), and South Beacon Hill/South Park (zip code 98108, 6%). **Exhibit 43** below presents the ten largest distressed zip codes by share of Seattle-based women and people of color employed in Construction in 2014 (estimated).

Exhibit 43. Ten Largest Distressed Zip Codes by Share of Total (Employed) Women and People of Color Construction Workers, 2014



Sources: U.S. Census Bureau American Community Survey, 2013; Puget Sound Regional Council, 2013; Community Attributes, 2014.

¹¹ For a family of two, the 200% 2014 poverty line is \$31,460.

Exhibits 44 and **45** map these criteria for the City of Seattle by acre for 2012. While those living under the 200% federal poverty line are dispersed across the city, people of color are more concentrated in the southern portion of Seattle. **Exhibit 46** combines both criteria into a single map of potential areas of targeted outreach. When combined, the map shows pockets of those who meet both criteria scattered across the city, as well as in South Seattle.

Exhibit 47 looks at the unemployed population in the city. Unemployment is another criterion for workers who are motivated to work in Construction. General unemployment is concentrated in Downtown Seattle. **Exhibit 48** maps only unemployment claims in the Construction Industry for 2013. Magnolia (zip code 98199) and Rainier Valley/Columbia City (98118) have the highest concentration of construction unemployment claims in the city. **Appendix E** contains these analyses on a per capita basis.

Exhibit 44. People Under 200% Poverty per Acre, City of Seattle 2012

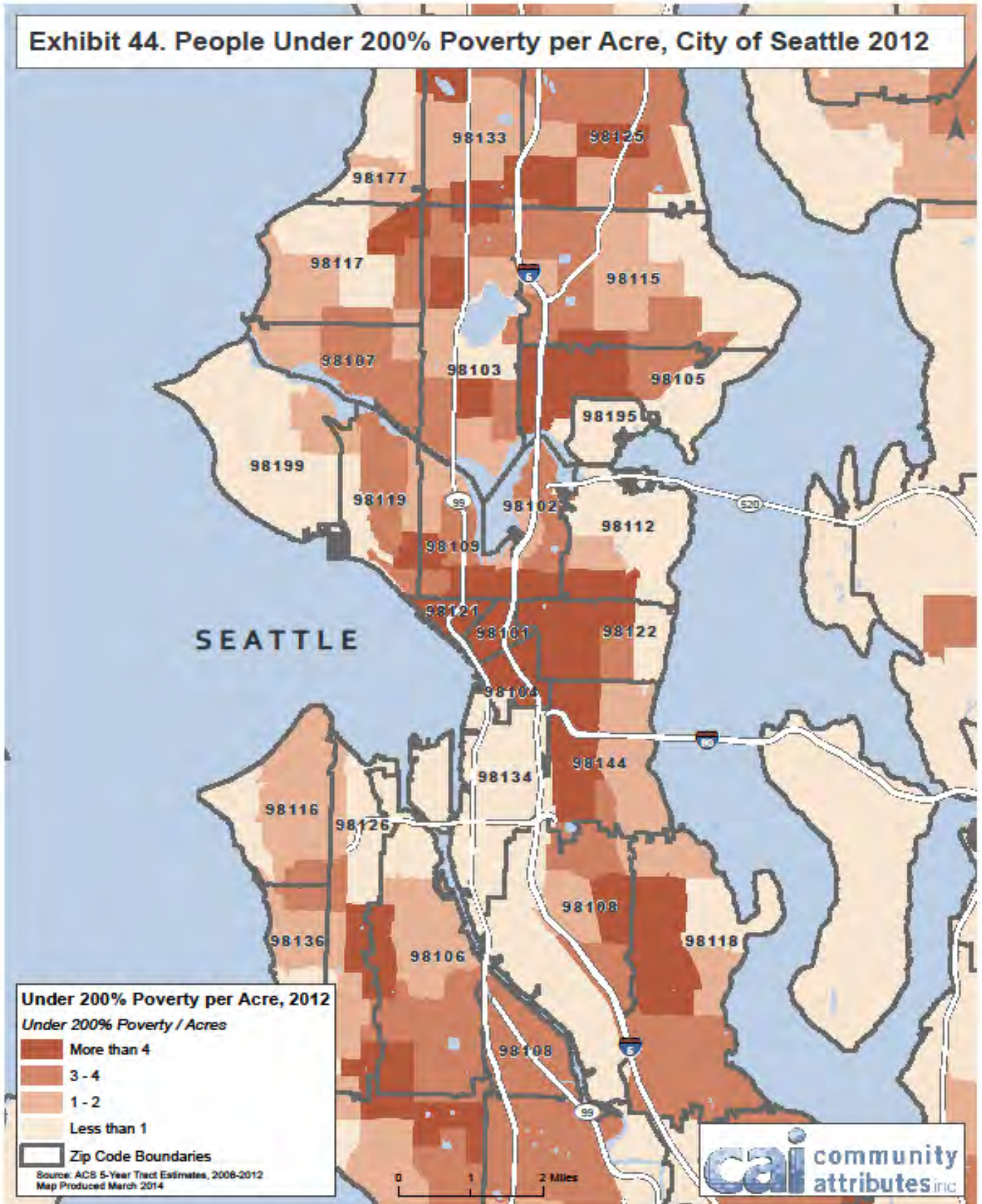


Exhibit 45. People of Color per Acre, City of Seattle 2012



Exhibit 46. People of Color and Poverty per Acre, City of Seattle 2012

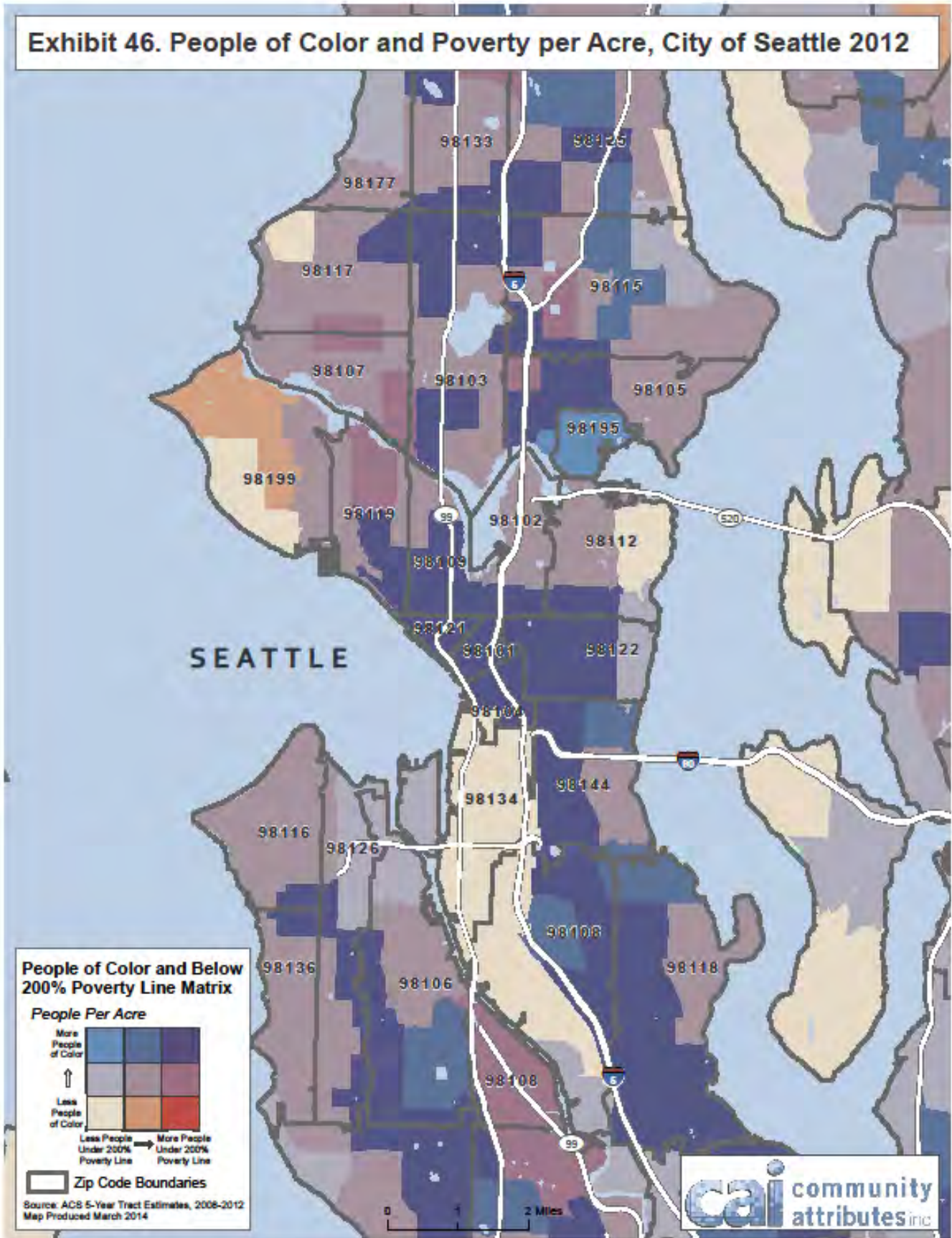


Exhibit 47. Unemployment per Acre, City of Seattle 2012

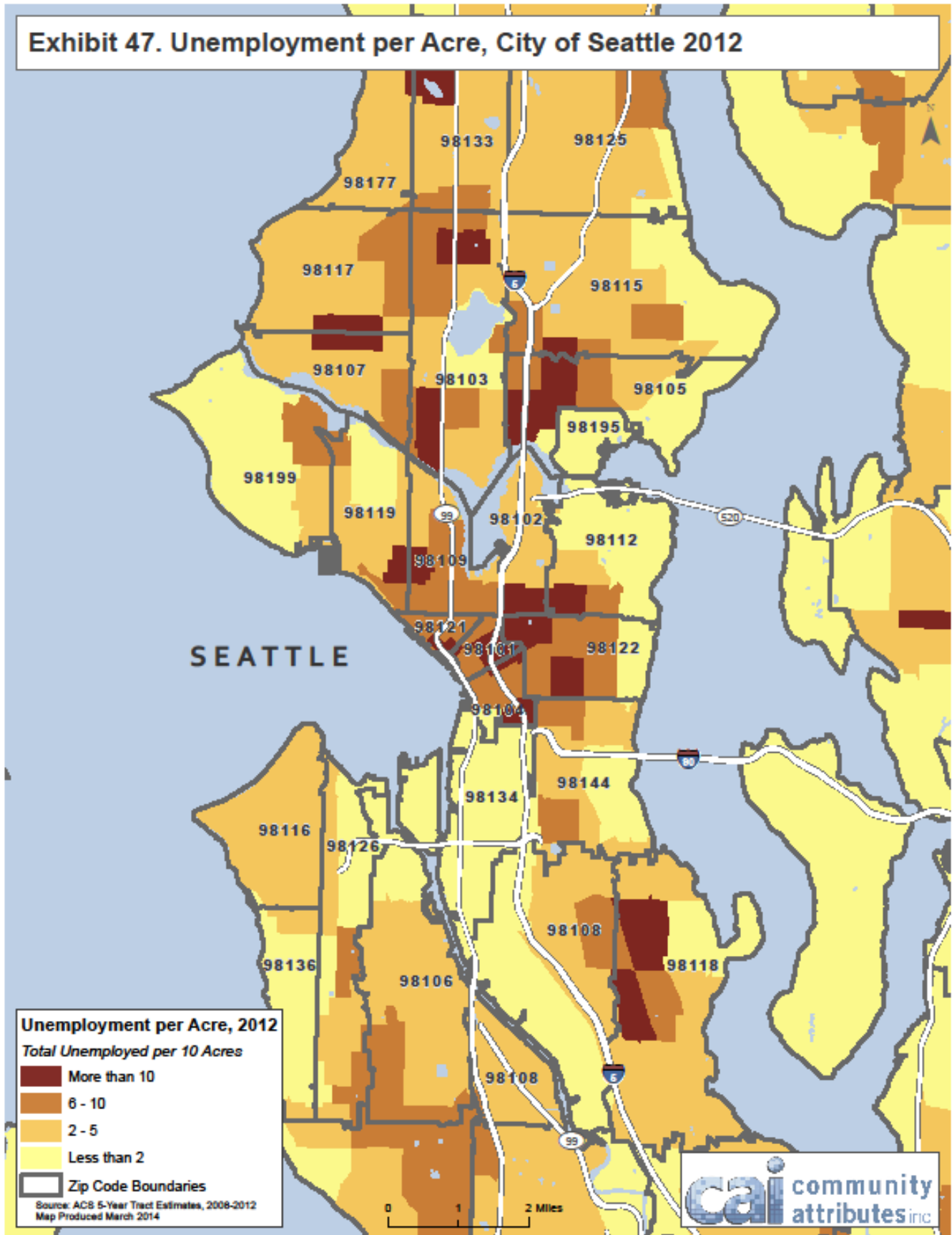


Exhibit 48. Construction Unemployment Claims by Women and People of Color, 2013



In 2013, an estimated 193,500 residents of the City of Seattle population were people of color, of which 63,200 were of low income status. Within this group, roughly two thirds (40,400 individuals) were between the working ages of 18 to 64, equal to 6.4% of the total City of Seattle population in 2013.

Broken out by zip code, the largest number of individuals that meet the above criteria are estimated to be in zip code 98118 (Rainier Valley, with 4,600 individuals). The seven largest zip codes by number of individuals meeting these criteria are presented in **Exhibit 49**.

Exhibit 49. Targeted Recruitment Demographic Population Citywide and by Zip Codes, City of Seattle, 2013

	People of Color	People of Color AND Low Income	People of Color, Low Income, AND Appropriate Age	Share of Total Pop
City-wide, 2013	193,500	63,200	40,400	6.4%
<i>By Zip Code (Top 7 by Targeted Group)</i>				
98118	21,300	8,400	4,600	14.1%
98105	7,700	3,600	3,400	12.3%
98178	12,500	4,700	2,600	14.0%
98108	11,900	4,200	2,300	13.0%
98122	7,500	2,700	2,100	9.5%
98144	10,300	3,300	2,000	10.2%
98133	10,300	3,200	2,000	6.1%

Sources: American Community Survey, 2014; Community Attributes, 2014.

GAP ANALYSIS

Once supply and demand forecasts are derived, the two are compared each year to assess the relative surplus of deficit of regional workers needed to satisfy forecast construction employment. Two measures of the workforce are assessed:

- All construction employment, including workers in non-construction positions, such as administrative and accounting positions; and
- Only those workers in occupations deemed construction-specific, such as carpenters and framers.

In 2013, there were an estimated 95,400 construction jobs in the three-county region, compared with a total estimated workforce of 103,700 (**Exhibit 50**). The differences between the two—8,300 full-time equivalent (FTE) positions—was equal to 8.0% of total estimated labor supply, considered a labor surplus.¹² Over time, the difference between demand for jobs and available workforce will converge as demand for jobs increases, though in 2019 jobs demand are expected to grow slightly less than overall construction supply.

Exhibit 50. Gap Analysis for Construction Supply and Demand

Segment of Labor Force	Measure	2013 (est.)	2014	2015	2016	2017	2018	2019
Total Construction Employment	Demand	95,400	97,800	100,200	102,700	105,200	107,800	110,500
	Supply	103,700	104,300	106,600	108,900	110,900	113,200	116,200
	Difference	8,300	6,500	6,400	6,200	5,700	5,400	5,700
	Surplus	8.0%	6.2%	6.0%	5.7%	5.1%	4.8%	4.9%
Construction Trades Only (non-baccalaureate)	Demand	67,600	69,500	71,600	73,600	75,500	77,400	79,300
	Supply	74,600	74,900	76,800	78,700	80,200	82,000	84,200
	Difference	7,000	5,400	5,200	5,100	4,700	4,600	4,900
	Surplus	9.4%	7.2%	6.8%	6.5%	5.9%	5.6%	5.8%

Sources: Puget Sound Regional Council, 2013; Conway Pedersen Economics, 2014; IPEDs, 2014; Washington State Employment Security Department, 2014; Washington State Department of Labor & Industries, 2014; Community Attributes, 2014.

¹² The surplus is not the same as an unemployment rate. The former measure, used in this analysis, counts all jobs as FTEs and compares FTEs utilized versus excess FTEs, and is thus different from the unemployment rate, which considers any work as employed. For reference, nationally in December 2013 the unemployment rate for construction and extraction workers was 12.1%. No similar measure at the county or state-level is made available.

OPPORTUNITIES FOR DISCUSSION

The hiring criteria set by the City of Seattle for Capital Improvement Program (CIP) projects can have implications for the pipeline of qualified workers to fill these positions. In 2013, an estimated 23% of the construction labor force were women and/or people of color. Among new entrants to the workforce, women and people of color composed 27% of apprenticeships and 34% of new completions from local two-year accredited educational institutions in construction-related programs.

A targeted hiring policy for the Capital Improvement Program would directly impact City construction employment positions. The City of Seattle is estimated to support the equivalent of 400 full time workers through CIP spending, but the City's leadership in hiring will have broader impacts to the labor force through expanding apprenticeships to satisfy these criteria. For example, in 2014, if the City of Seattle were to establish hiring criteria requiring that 50% of workers on CIP projects come from the target demographics, then the City would hire an additional 106 target workers more than the baseline scenario across the entire construction workforce. In other words, if 400 workers were randomly selected for CIP work, 94 workers in this group would be expected to be either female and/or people of color, requiring another 106 workers of the same demographic background to satisfy a hiring criteria of 50%.

These 106 workers would need to come from either the existing labor force, or through apprenticeship programs via targeted recruiting or expansion of existing programs. In 2014, an estimated 509 workers will complete construction sector apprenticeships. In the baseline scenario, an estimated 27% of apprenticeships each year are either female and/or people of color. If all these apprentices are employed in businesses that participate in Seattle CIP projects, then there would be no need to recruit additional workers. However, this would imply that the pool of businesses participating in CIP projects is not representative of the entire construction labor force.

Forecasts of new apprentices vary from year to year. In 2017, new apprenticeships are expected grow to 895 positions. Assuming a 50% hiring criteria each year and a slight increase in the share of the target demographic in the overall labor supply, an additional 104 new female and/or non-white workers would be needed above the baseline, workforce-wide level. In this scenario, assuming all apprenticeship programs participate in City of Seattle CIP projects, either: 1) the recruitment of target workers into apprenticeship programs would need to increase from 27% to 38%; 2) apprenticeship programs would need to recruit an additional 104 women and/or people of color from the population at large; or 3) apprenticeship programs, with no change in the

baseline recruitment rate, would need to expand overall recruitment from 895 positions to at least 1,277 positions.

Over time, the size of the overall labor pool will increase due to construction demand throughout the economy. If the labor demand from City of Seattle CIP projects remains constant at 400 workers per year, then maintaining labor hiring criteria will require continual efforts to meet goals. However, while the annual number of new recruits may be small, the cumulative effect through 2019 can be substantial. For instance, in the baseline scenario (no policy intervention), an estimated 950 women and/or people of color would either be participating in or have completed a construction-related apprenticeship between 2014 and 2019. If the City of Seattle sustains hiring criteria of 50% women and/or people of color and pursues a targeted apprenticeship recruitment effort to achieve this level, the number of new targeted demographic apprentices would cumulatively sum to 1,580, representing an overall increase from 27% to 46% (**Exhibit 51**).

Exhibit 51. New Apprenticeships among Target Demographic, Baseline and 50% Hiring Criteria Scenario

Targeted Demographic Apprenticeships	2014	2015	2016	2017	2018	2019	Cumulative, '14-'19
Baseline	140	90	160	240	160	160	950
Total with intervention (50% hiring criteria)	250	200	270	340	260	260	1,580
All apprenticeships, no expansion of programs	510	330	570	900	580	580	3,470
New share of apprenticeships to targeted demographic	49.1%	61.0%	47.0%	38.0%	45.1%	45.1%	45.5%

Source: Community Attributes, 2014.

Note: cumulative amounts may not sum exactly due to rounding.

The net increase in apprenticeships necessary to satisfy hiring criteria will vary widely, based on the target level. If the City of Seattle maintains a hiring criteria of 35% through 2019 and supports apprenticeship programs as the sole source of new workers to satisfy this level, there would be a net increase of 280 new apprentices belonging to the target demographic. If the City sets the criteria at 75%, the cumulative net increase would reach 1,220 participants (**Exhibit 52**).

Exhibit 52. Additional Apprenticeships among Target Demographic above Baseline Scenario, 2014-2019

City of Seattle Hiring Criteria	2014	2019	Cumulative, 2014-2019
35%	50	40	280
50%	110	100	630
75%	210	200	1,220

Source: Community Attributes, 2014.

Increasing Diversity in the Construction Industry

The baseline scenario established by this study projects that even with an absence of policy interventions, the infusion of new workers coming from apprenticeship and educational programs will change the existing demographic composition over time to a more racially diverse and more female workforce.

Among apprenticeship completions, demographic composition is already more racially diverse when compared with the existing Construction workforce (27% people of color completed Construction apprenticeships in 2012, in **Exhibit 33**, compared with 20% people of color in the 2012 existing Construction workforce, in **Exhibit 8**). However, the low percentage of women in apprenticeship completions (4%) mirrors that of the 2012 existing Construction workforce. Thus, there is room for improving female participation in Construction apprenticeships.

Apprenticeship completions have a relatively larger impact on labor supply in the Construction industry than do educational completions. Because of this, policy interventions focusing on increasing target worker participation in educational programs suitable for Construction trades may not be as impactful as those aimed at increasing target worker participation in apprenticeships.

NEXT STEPS

This report presents data and working draft analysis intended to frame on-going conversations about demographic hiring criteria for Seattle Capital Improvement Plan projects. The data suggest ample supply of workers exists to meet Construction demand in total. With that understanding, decision-makers might choose to focus on increasing the supply of trained workers, knowing they will enter a competitive labor market.

Additional analysis should include the following:

- Detailed review of the assumptions and City-owned data that drive the analysis in this draft report
- Discussions of strategies based on the theory that an overall labor shortage does not exist, but rather that trained workers will enter a competitive market
- Additional modeling of training programs, with more complete understanding of training available and program capacity
- Assessment of the City's ability to influence workforce training participation
- Examination into construction firm hiring practices to understand if increasing the diversity of the workforce does lead to increased worker hours on city projects, or if other hiring barriers exist

GLOSSARY

Covered Employment – all employees working in a firm and protected by the unemployment insurance system. Covered employment includes all employment except self-employed workers, unpaid family workers, workers in certain not-for-profit organizations, and several other small (primarily seasonal) worker categories. Roughly 90% of workers in Washington are classified as covered employment, though this percentage varies by industry sector. Source: U.S. Bureau of Labor Statistics.

CIP- stands for Capital Improvement Plan/Program. A Capital Improvement Plan or Program is a short-range plan which identifies capital projects and equipment purchases for a municipality.

Crosswalk – a reference table that identifies the kinds of occupations in different industry sector. Washington State Employment Security Department publishes an annual crosswalk by county.

Employment Security Department (ESD) – primary state agency for gathering employment data. ESD publishes four resources utilized in this study: 1) covered employment estimates, as reported in the Quarterly Census of Employment and Wages (QCEW) series; 2) current employment statistics, based on monthly surveys of employers; 3) occupational employment estimates by industry; and 4) occupational employment forecasts.

Full-Time Equivalent (FTE) – A full-time equivalent employee. This is the definition of a workload of an employed person to allow for comparison. In this analysis, an FTE is equated with 1,800 annual labor hours.

Non-Employer – A non-employer business is one that has no paid employees, has annual business receipts of \$1,000 or more (\$1 or more in the Construction industries), and is subject to federal income taxes. The business may include more than one owner, working as partners. Source: US Census Bureau.

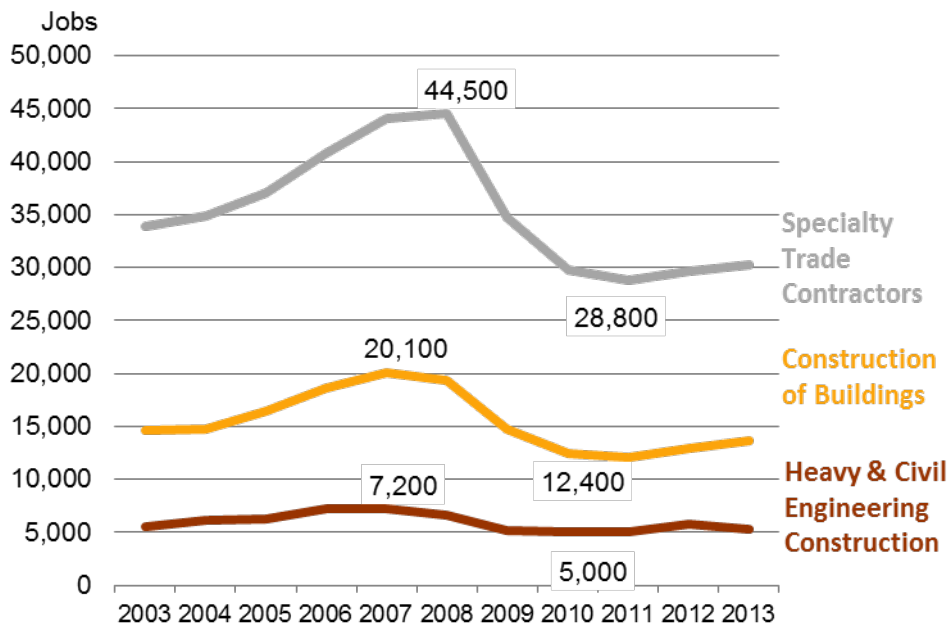
North American Industry Classification System (NAICS) – System of industry codes used to collect and organize important economic data, such as employment, number of businesses, and wages.

Standard Occupational Classification (SOC) – System of codes used to collect and organize employment and wage data by occupation.

APPENDIX A: CONSTRUCTION EMPLOYMENT BY COUNTY AND CONSTRUCTION SUBSECTOR

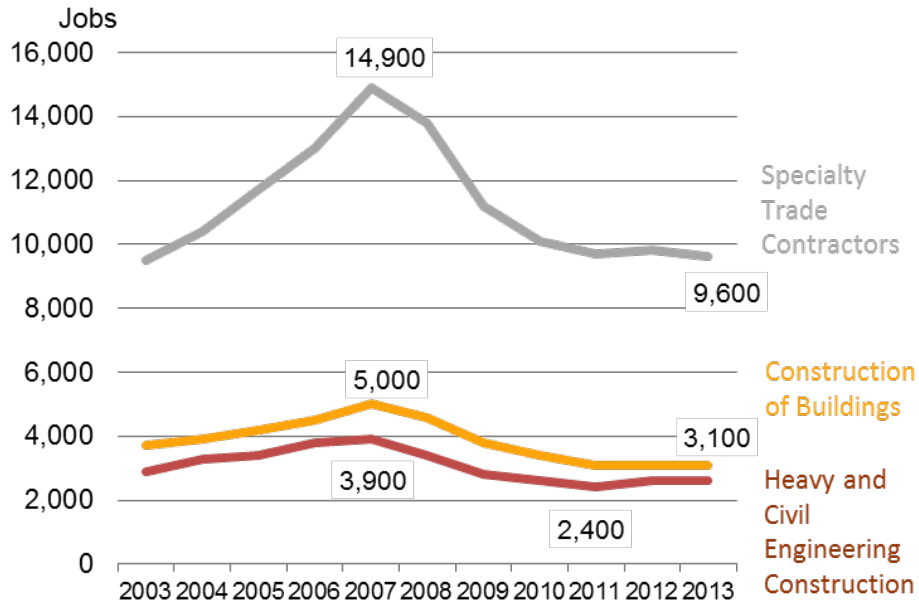
Appendix A contains employment data in the Construction sector, broken out by county, and by subsector of construction, and by source of data. Previously in the report, where employment totals are reported, they include both sources of employment (covered and non-employer counts). These exhibits disaggregate that total employment by source of data. **Exhibits A1** through **A3** show Construction jobs by subsector, and by county, for 2003 through 2013.

Exhibit A1. King County Construction Jobs by Subsector, 2003-2013



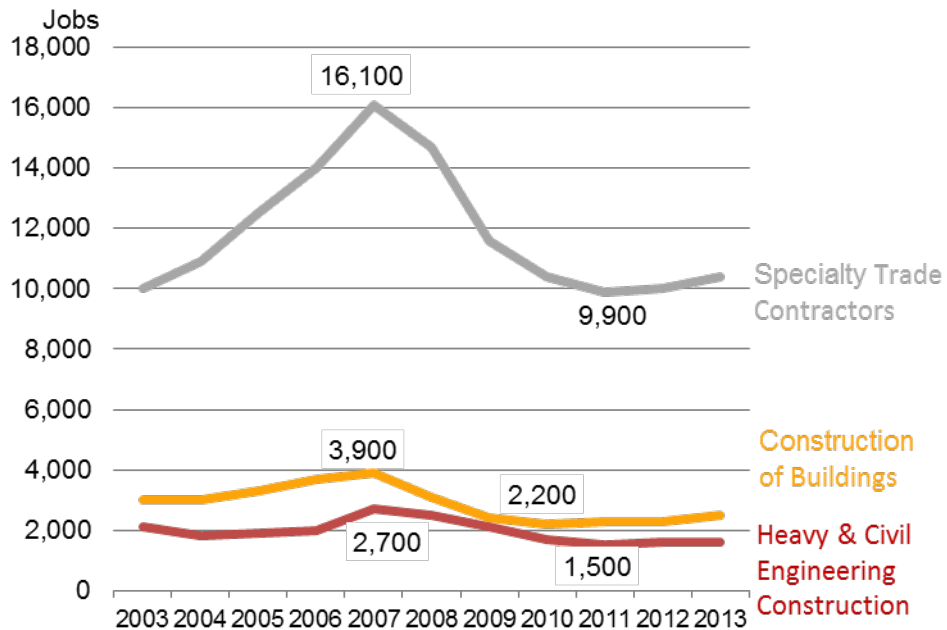
Source: WA Employment Security Department, QCEW, 2013; only includes covered jobs.

Exhibit A2. Pierce County Construction Jobs by Subsector, 2003-2013



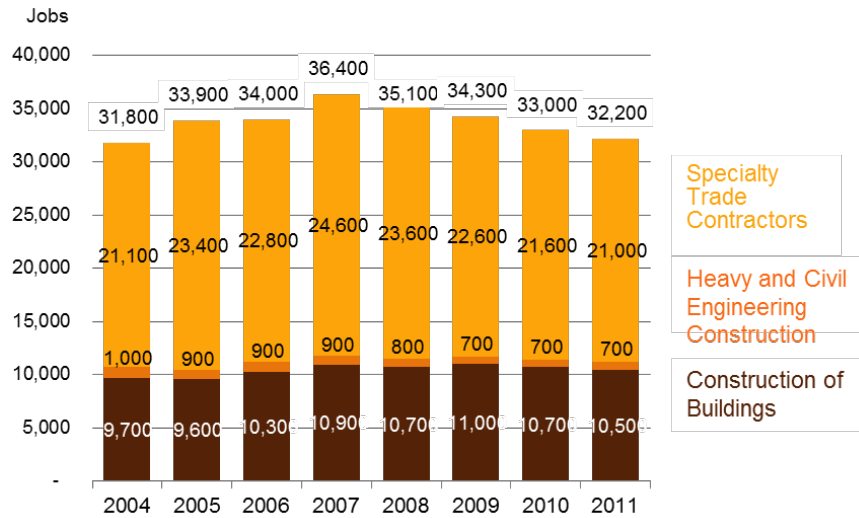
Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

Exhibit A3. Snohomish County Construction Jobs by Subsector, 2003-2013



Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

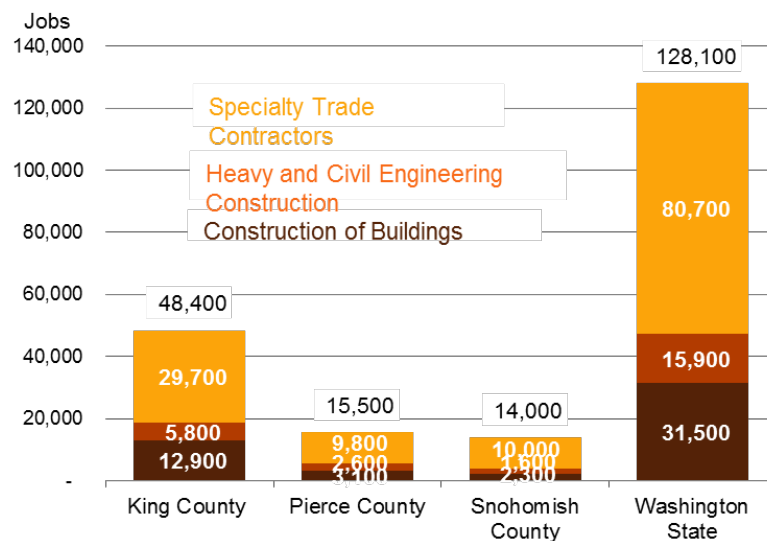
Exhibit A4. Washington State Non-employer Construction Employment by Construction Subsector, 2004-2011



Source: U.S. Census Bureau Non-employer Statistics, 2013; only includes non-employer jobs which are not eligible for unemployment insurance (non-covered jobs).

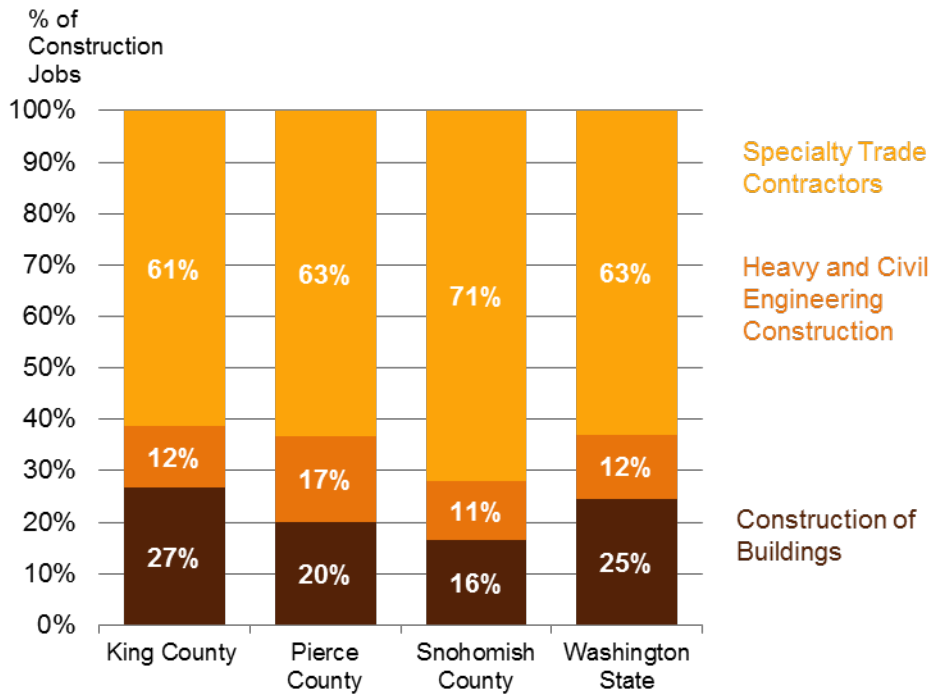
Exhibit A4 displays non-employer jobs in the Construction subsectors in Washington State, for 2004-2011. **Exhibit A5** is a snapshot of 2012 employment by the three-county region, and by Washington State for comparison. **Exhibit A6** shows the relative composition of each Construction subsector to the total Construction workforce, by county and by state.

Exhibit A5. Construction Jobs by Subsector, Three-County Region & WA State, 2012



Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

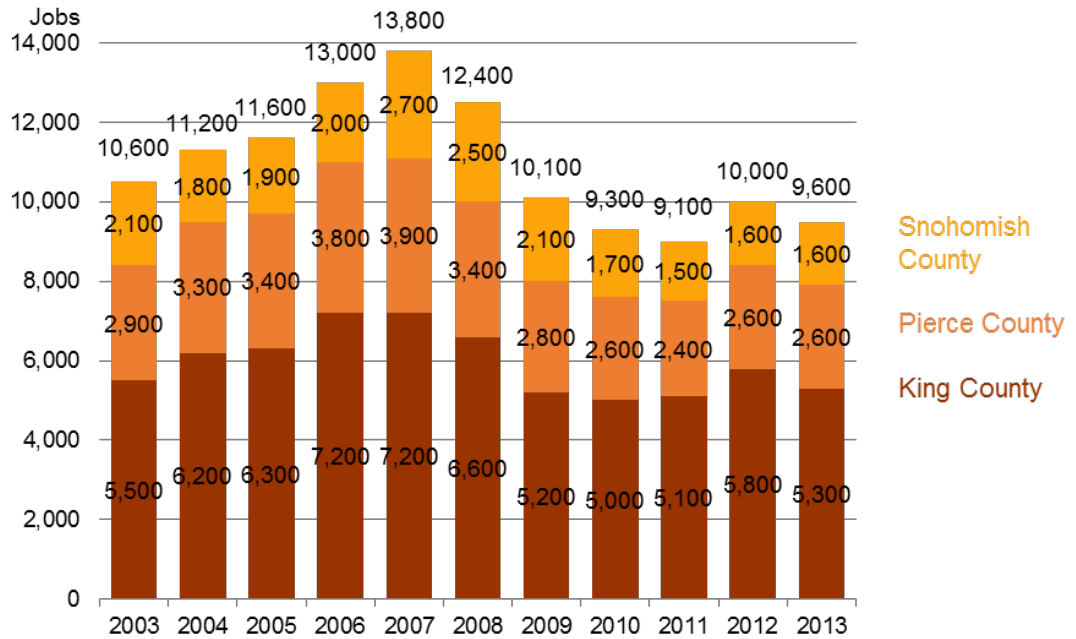
Exhibit A6. Construction Jobs by Subsector, 3-County Region & WA State, 2012



Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

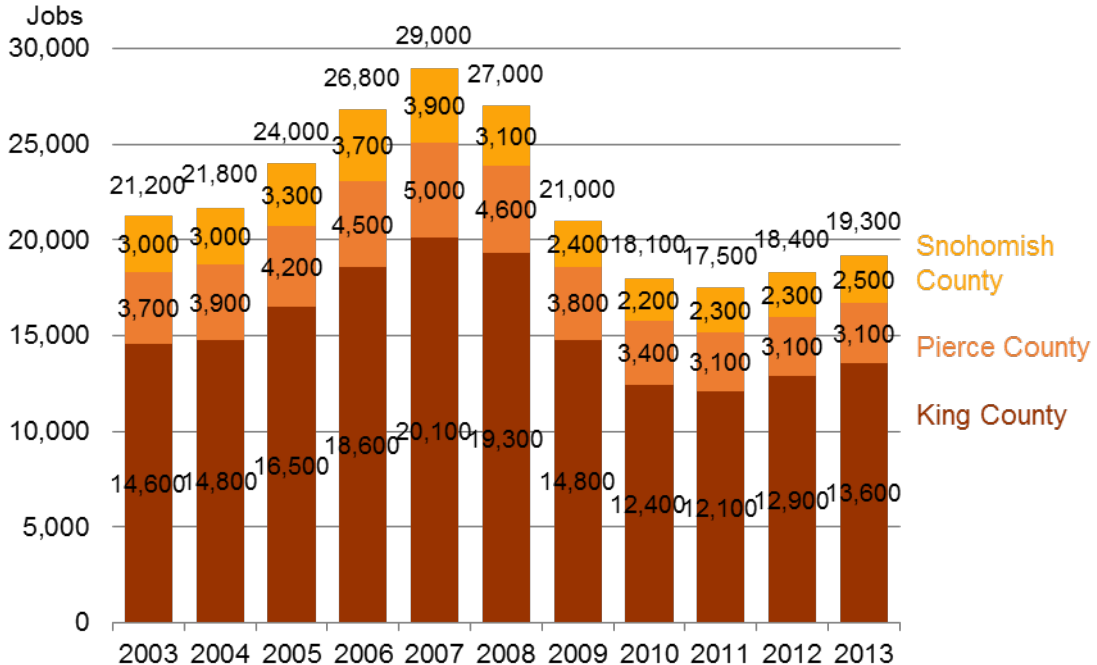
Exhibits A7, A8, and A9 show jobs in Construction by subsector and county for 2003-2013, for comparison. **Exhibits A10, A11, and A12** break out Construction subsectors by further subsector, for Washington State, from 2003-2012.

Exhibit A7. Heavy & Civil Engineering Employment, by County, 2003-2013



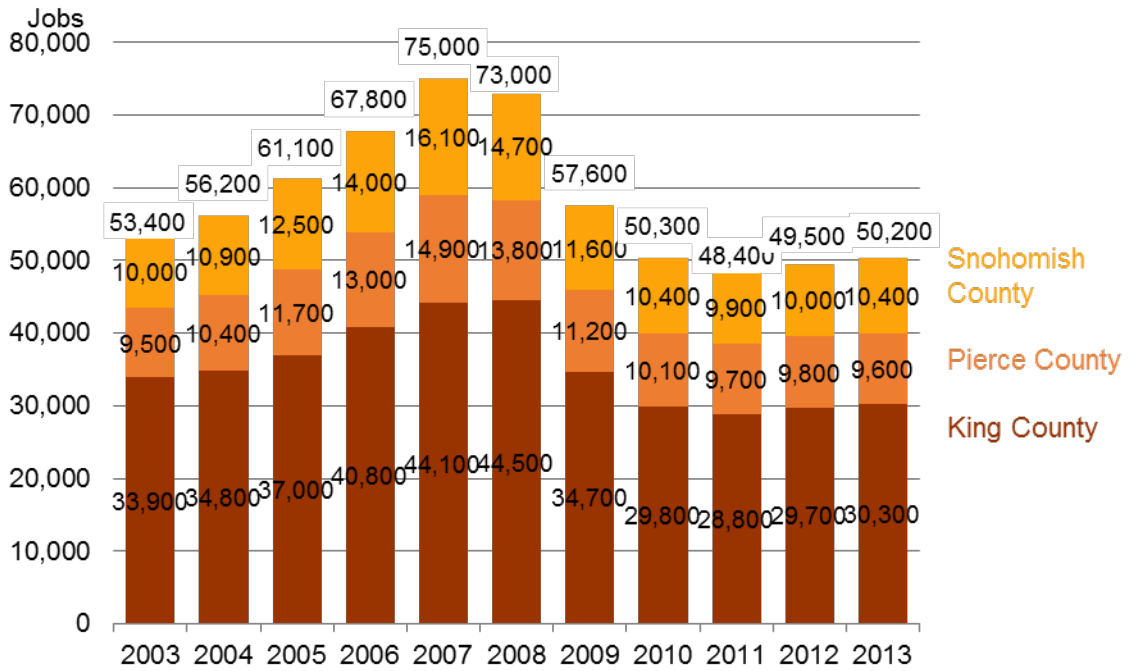
Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

Exhibit A8. Construction of Buildings, by County, 2003-2013



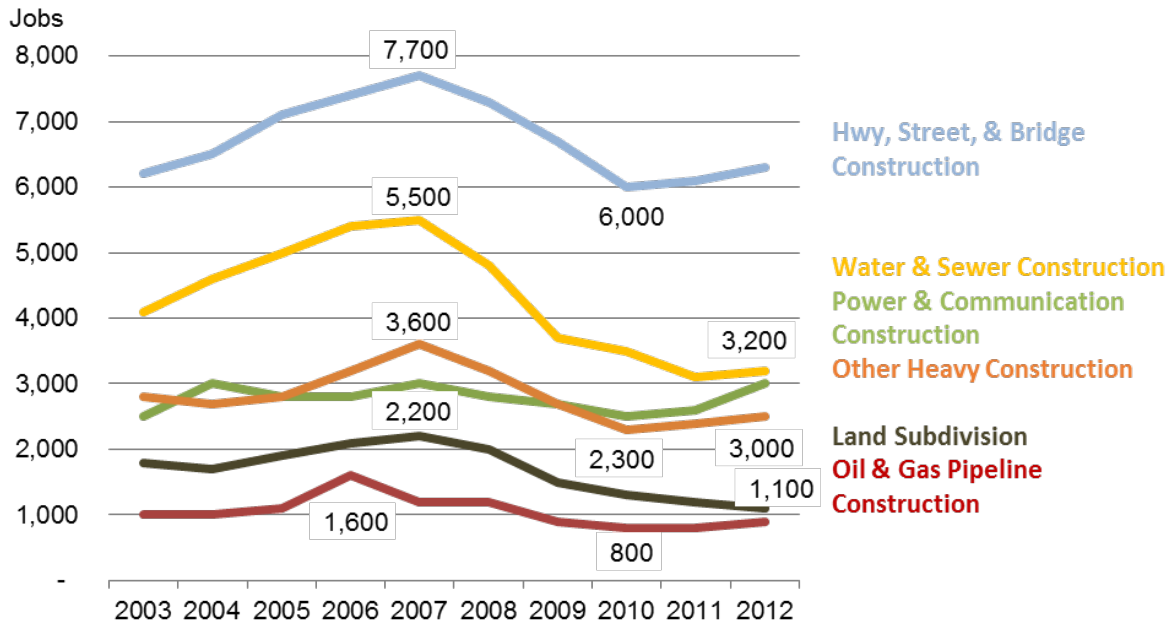
Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

Exhibit A9. Specialty Trade Contractor Jobs, by County, 2003-2013



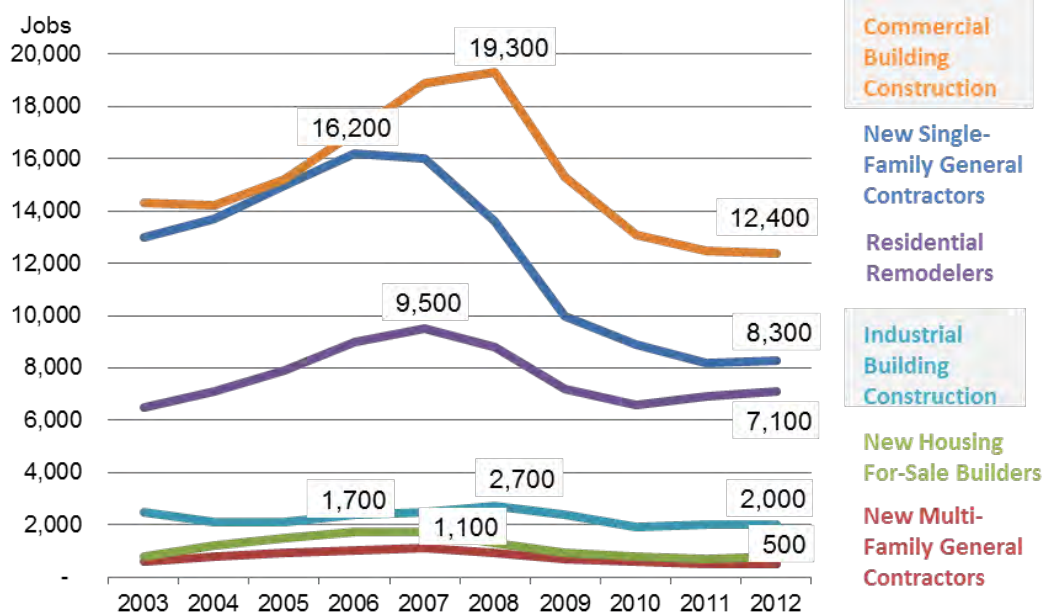
Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

Exhibit A10. WA State Construction Jobs in NAICS 237: Heavy & Civil Engineering Construction, 2003-2012



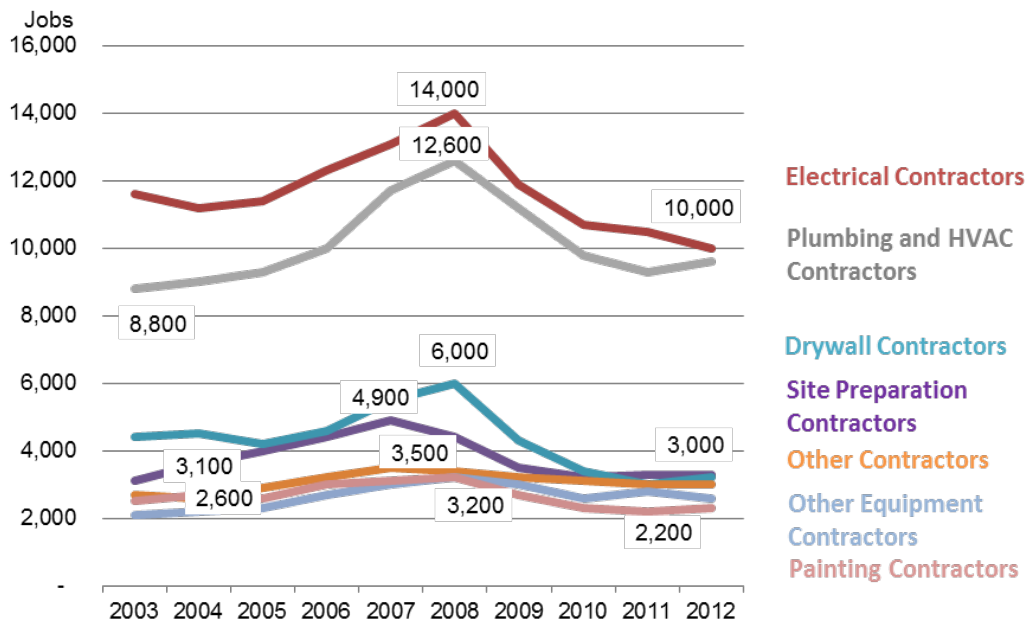
Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

Exhibit A11. WA State Construction Jobs in NAICS 236: Construction of Buildings, 2003-2012



Source: WA Employment Security Department QCEW, 2013; Sectors highlighted are those most relevant for CIP contracting; only includes covered jobs.

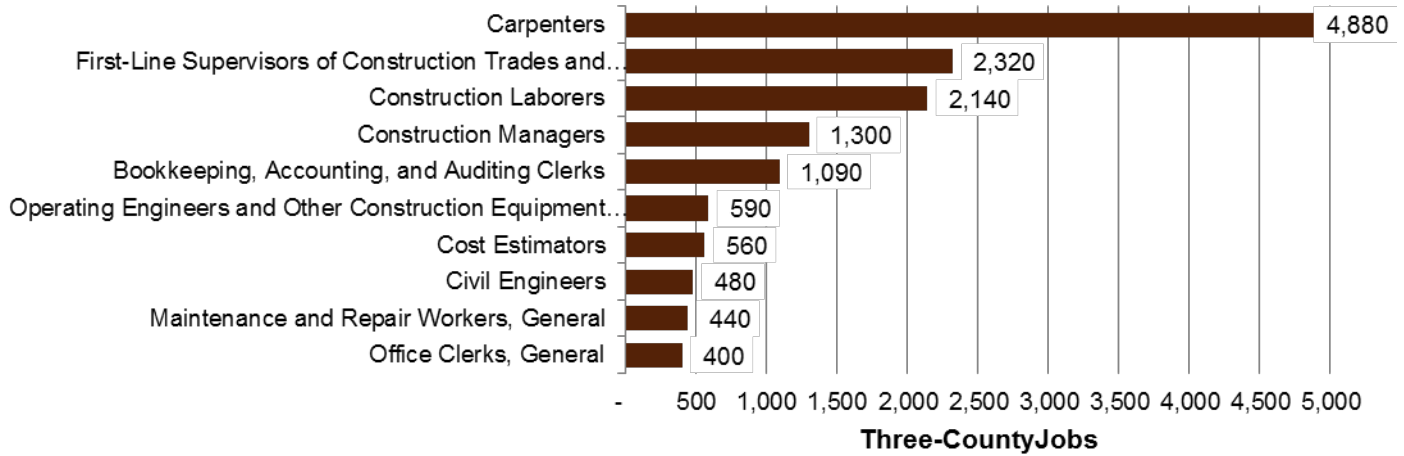
Exhibit A12. WA State Construction Jobs in NAICS 238: Selected Nonresidential Specialty Trade Contractors 2003-2012



Source: WA Employment Security Department QCEW, 2013; only includes covered jobs.

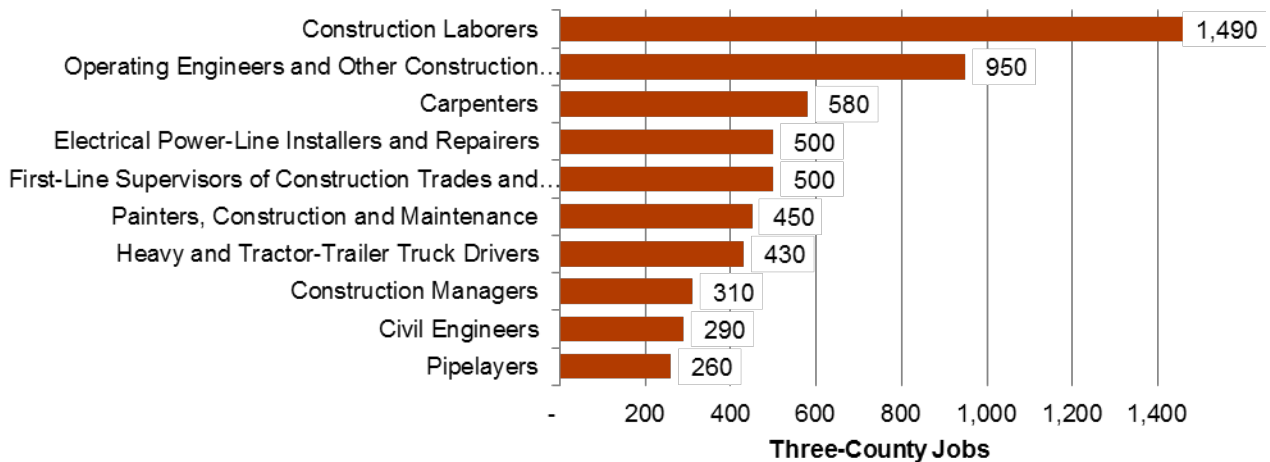
Exhibit A 13 shows the top ten occupations in each subsector of Construction for King, Pierce, and Snohomish counties in 2012. Each subsector of Construction has its own composition of occupations visible in these exhibits.

Exhibit A13. Top 10 Occupations Employed in NAICS 236- Construction of Buildings: King, Pierce and Snohomish Counties, 2012



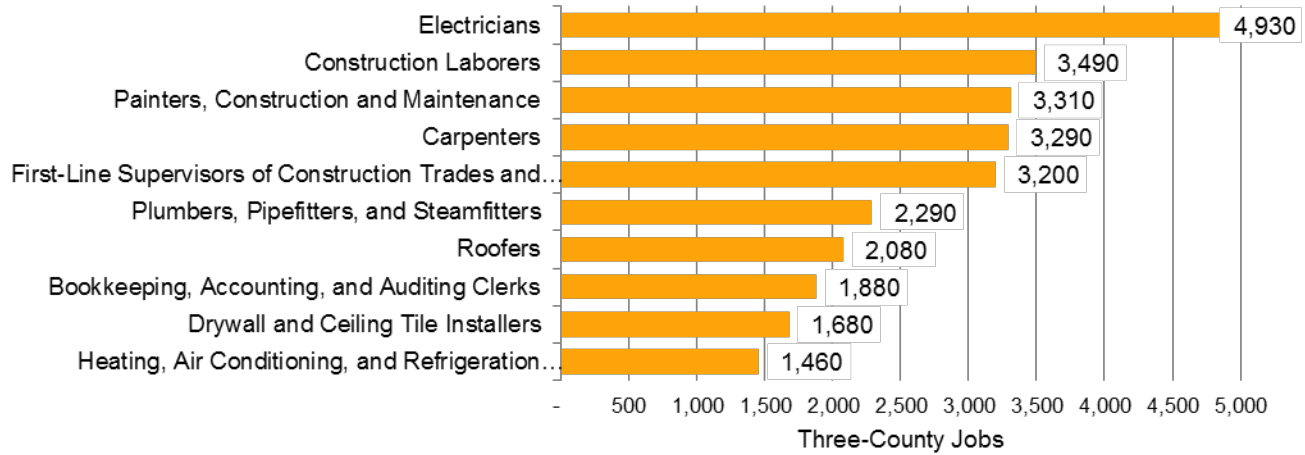
Source: ESD Occupations by NAICS Matrix, 2012; only includes covered jobs.

Exhibit A14. Top 10 Occupations Employed in NAICS 237- Heavy & Civil Engineering Construction: King, Pierce and Snohomish Counties, 2012



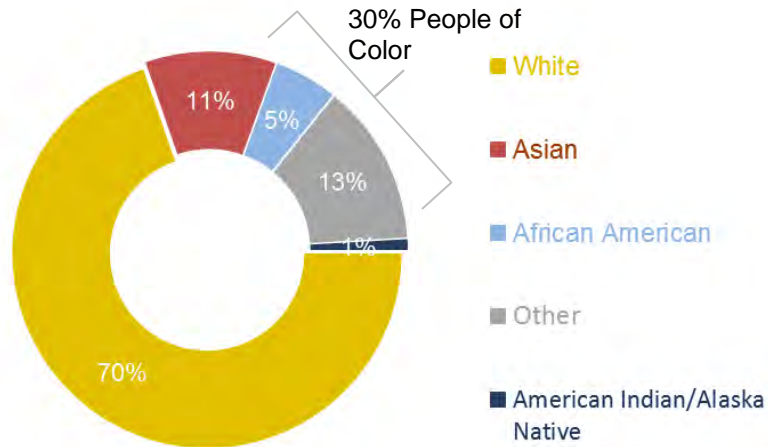
Source: ESD Occupations by NAICS Matrix, 2012; only includes covered jobs.

Exhibit A15. Top 10 Occupations Employed in NAICS 238- Specialty Trade Contractors: King, Pierce and Snohomish Counties, 2012



Source: ESD Occupations by NAICS Matrix, 2012; only includes covered jobs.

Exhibit A16. Composition of General Population by Race: King, Pierce, and Snohomish Counties, 2012



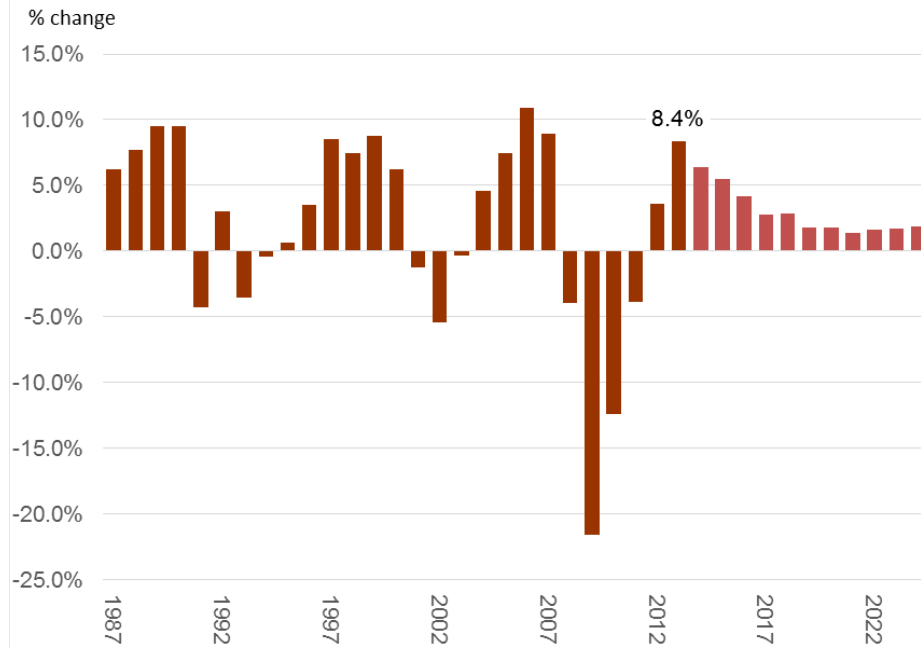
Source: U.S. Census Bureau, ACS 5-year estimates, 2012.

APPENDIX B: CONSTRUCTION EMPLOYMENT FORECASTS

Appendix B contains employment forecasts for the Construction Industry in the Puget Sound Region, as well as in King, Pierce, and Snohomish counties.

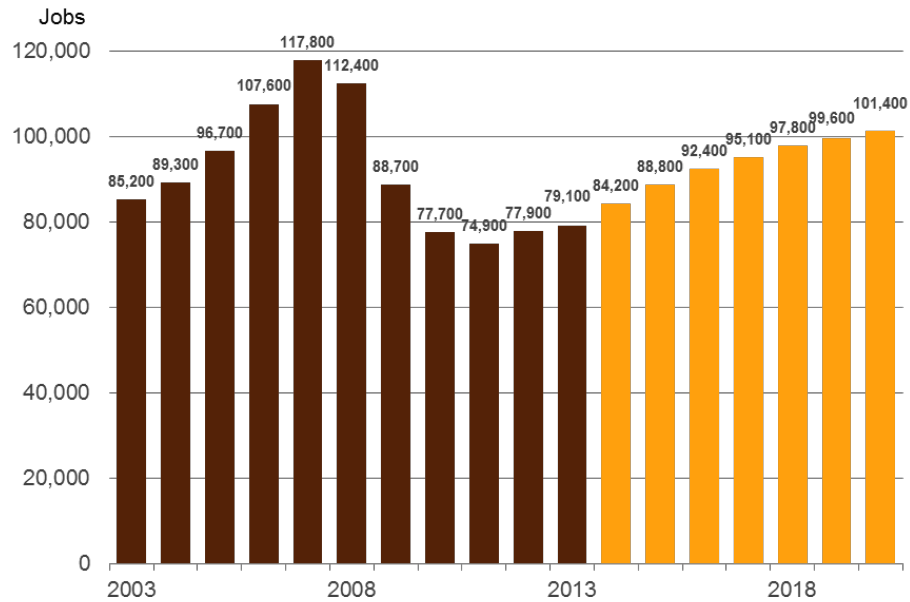
Exhibit B1 is from Conway Pedersen’s Puget Sound forecast, and **Exhibit B2** shows observed (actual) and projected covered employment in the Construction industry to 2020.

Exhibit B1. Puget Sound Percent Change in Construction Jobs, 1987-2024



Source: Conway Pedersen, 2013.

Exhibit B2. Observed and Projected Growth in Employment in the Construction Sector, King, Pierce and Snohomish Counties, 2003-2020



Source: Puget Sound Regional Council, 2013; Conway Pedersen, 2013.

APPENDIX C: DATA SOURCES

Exhibit C1. Data Sources Used

Type of Data Used	Source of Data
Covered job estimates	Washington State Employment Security Department
Occupational data; Wages by occupation	Bureau of Labor Statistics
Washington State Input-Output Table	Washington State Office of Financial Management
Non-employer job estimates	U.S. Census Bureau
Demographic data by occupation/industry	U.S. Census Bureau
Capital Improvement Program (CIP) Data	City of Seattle
Supply Model Data	Integrated Postsecondary Education Data System (for educational completions and demographic composition); Washington State Department of Labor & Industries (for apprenticeship completions and demographic composition); Washington State ESD (for unemployment claims and demographic composition); and the U.S. Census Bureau (for “workers likely to work”)
Construction Sector Forecasts	Conway Pedersen Economics, Inc. Regional Forecast; Puget Sound Regional Council long-term regional forecast

Source: Community Attributes, Inc., 2014.

APPENDIX D: METHODS

The Construction sector is defined through a list of core industry codes (see **Exhibit 1** for the list of codes), which is then quantified in terms of historical and current jobs, by the three-county area of King, Snohomish, and Pierce counties. For a more detailed analysis, the sector is also analyzed as a collection of occupations which gives insight into how to view the supply of labor for the industry, and helps give more detail about workforce details, like wages. Data sources are outlined in **Exhibit C1**.

Demand

Demand forecasts represent filled jobs, which in economic theory represents the intersection of supply and theoretical demand for employment. Construction jobs moreover reflect other key drivers in the regional economy, such as the growth in economic activity resulting in demand for new commercial and retail space, or population growth putting upward pressure on the existing inventory of housing stock. Construction employment is thus largely a function of other key elements of the economy.

The forecast totals in this analysis are derived from the Puget Sound Regional Council's (PSRC) long-term economic forecast. Importantly, there is a much greater degree of independent contracting and self-employment in construction relative to other sectors of the economy. The PSRC's forecast does not include a forecast specific to construction; instead, totals are reported by county for "construction and resources." However, within this larger category, construction jobs constitute on average 94% of all covered jobs; in this analysis, the growth rate for this category is then applied to the historic estimates of total jobs (covered and self-employed) for the construction sector to arrive at forecast estimates for years 2014 through 2019.

Sources of Demand

Public sector construction employment demand is the key driver of private sector demand—the latter is the remainder once public sector employment demand is calculated, controlled to the PSRC-derived forecast totals for construction job. Several sources are utilized in this approach, including gross business income and employment data and the 2007 Washington State Input-Output Model.

First, the ratio of gross business income (GBI) to construction worker (covered and self-employed) was calculated statewide, the denominator derived from the 2007 Washington State Input-Output Model transactions table. This ratio—\$215,200 per worker—was the multiplied by the PSRC-provided estimates of

total construction employment in the three-county region, resulting in estimated regional contracts in 2012 of nearly \$20.1 billion.

Next, the Washington State Input-Output Model was used to distribute this contract value by source of demand. Within the model, two construction sectors are included with estimated sales by source of demand. These include: 1) intermediate purchases, i.e. sales to other businesses; 2) households, e.g., contractor renovations to homes; 3) private investment, of which a large share represent contract work for developers; 4) state and local government; 5) federal government; 6) sales outside of Washington state; and 7) foreign exports. Construction sector sales to the state, local, and federal government were calculated as a percentage of total sales (or output). This percentage was then applied to the estimated contract value for 2012 to arrive at total construction sales (or gross receipts) to each level of government. For example, according to the model, the two construction sectors included in the model, on a weighted average basis, sell 10.5% of total output by value to state and local governments, with another 3.6% to the federal government, while 46.2% goes to private investment (e.g., developers) and 3.7% to households.

Once the above contract value is distributed by source, the statewide ratio of gross business income (GBI) per worker is applied to these totals to arrive at employment needed to satisfy these sales. For example, because 10.5% of total construction demand by value comes from state and local governments (including counties and cities), an estimated \$2.1 billion in sales are estimated to this source of demand in 2012. Applying the statewide GBI per worker average results in a demand for 9,800 workers need in the three-county region; added to this are another 3,400 jobs needed to satisfy federal contracts. Importantly, while these results are reported as jobs, the same worker can work on both private sector and public sector projects—estimates thus reflect full-time equivalents.

To calculate City of Seattle public works demand, a four-year weighted average of CIP contract value per worker was calculated, based on City of Seattle Department of Finance and Administrative Services administrative records. These data include labor hours for all workers participating in CIP projects, including prime contractors and subcontractors, and total contract value. Based on conversions with the City, an annual estimate of \$200 million in CIP spending was applied for each year between 2014 and 2019, resulting in an average count of 400 workers per year supported by City of Seattle public works projects.

To further estimate additional jobs supported by municipality-level public works across the three-county region, a per capita measure was introduced and

applied—the ratio of CIP contract value in Seattle per worker divided by the sum of jobs and people in Seattle. This approach, when extrapolated to all cities, provides additional weight to regions that are both populous and employment centers, two major factors driving maintenance, repair, and new investments in infrastructure.

To account for changes in public sector demand over time, projected growth in the sum of population and employment was applied to total public works employment demand, state & county, and federal sources. City of Seattle public works employment demand was held constant at 400 workers, and remaining municipality-sourced demand was treated as the remainder after accounting for all other public sector sources. Lastly, private sector employment demand was treated as the remainder after accounting for all types of public sector demand.

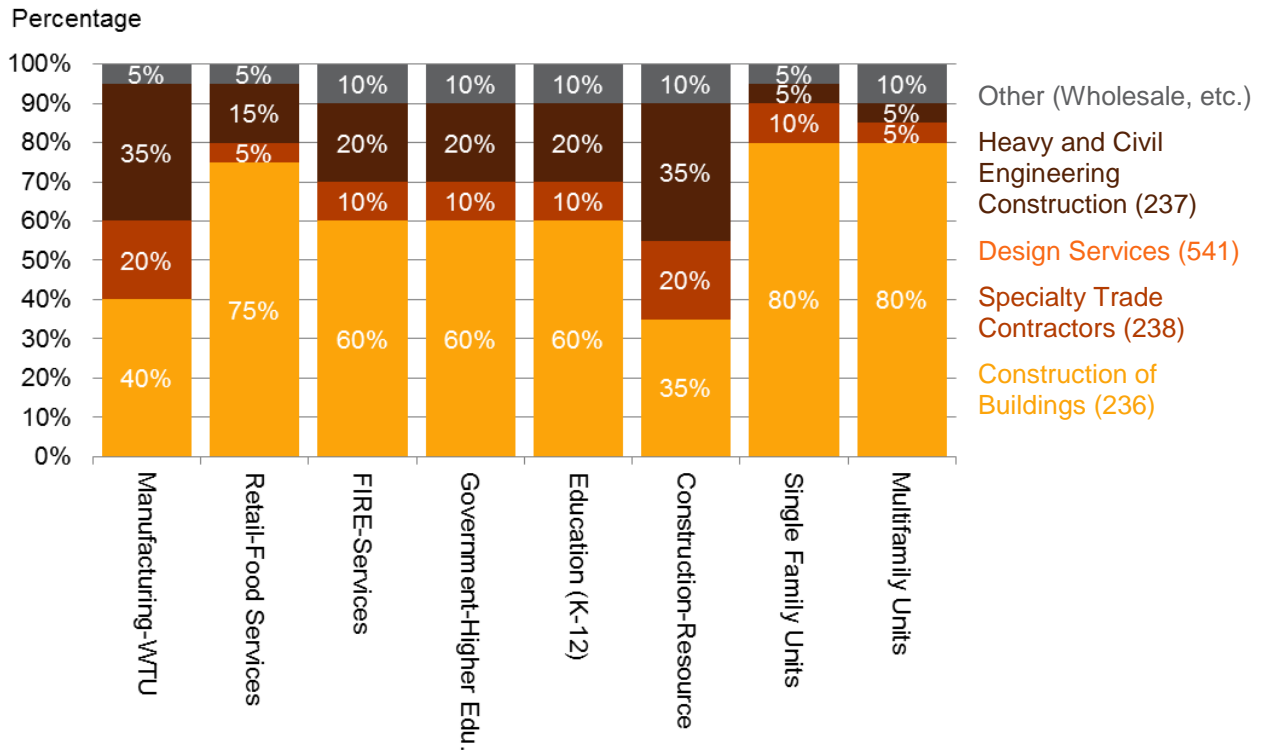
Alternative Approach to Forecasting Demand

In an alternative approach, private sector and public school-derived (higher education and K-12) demand is calculated by estimating demand for additional square footage needed to accommodate new workers by sector, and then priced out based on industry standards for cost per square foot by development type. To arrive at employment needed to satisfy project demand, the distribution of project costs by contractor type are then calculated and applied; estimated productivity per sector is then used to arrive at number of workers needed.¹³ The form of analysis also consults population forecasts, utilizing industry standards for single and multi-family housing square footage and costs calculated, and then used to estimate construction employment demand.

Exhibit D1 presents the estimated breakouts of contracts by value across construction and related sectors for different types of projects.

¹³ Costs represent those incurred by the developer, and are therefore below the actual retail sale price of a property denominated in square footage. Productivity in the construction sector is difficult to estimate due to the mobility of the construction workforce and due to seasonality. In this analysis, the Washington State Input-Output Model is used to develop such a measure.

Exhibit D1. Estimated Contract Value Distribution by Industry (NAICS Code) and Project Type



Source: *Community Attributes, 2014.*

Supply

Construction workforce supply includes both those who are currently employed in Construction and those actively seeking work in the Construction sector. The supply of Construction workers is defined as the sum of the following sources:

- Carry-over employed workers in Construction from the previous year, net of retirements, career changers, and out-migration—what is referred to as “churn and attrition”;
- Forecast unemployment claims made by Construction workers; and
- New entrants to the workforce, which includes new apprentices in Construction trades as well as the previous year’s graduates from Construction-specific post-secondary education programs from institutions within the three-county region.

Carry-over employed workers represent those workers who were employed the year before and remain in the construction employment base in the current year, while accounting for movement across businesses in the construction sector.

The Washington State Employment Security Department’s Occupation Employment Forecast is used to estimate the number of total openings per

occupation due net of growth. Each year, ESD projects total and growth-induced job openings per occupation. The difference between total and growth-induced openings represents openings created through attrition, which refers to out-migration, retirements, movement of workers from one employer to another, even if within the same industry, and other types of job separation. Among construction-specific occupations, this “churn and attrition” effect equals roughly 2.5% of total employment based on ESD occupational employment-industry crosswalks. Based on conversations with ESD and analysis of labor force ageing trends, half of this, or 1.25%, was applied as an estimate of job openings attributable to attrition, or labor force exiting. A retained, or carried-over, workforce is thus discounted by this attrition rate, which results in an annual retained workforce of employed workers of 98.75% of the projected total. These remaining workers represent participants in the labor force (i.e., supply) who remain employed. For each occupation, total forecast openings due to labor market exiting are allocated to the construction sector based on the share of total employment of each occupation in the construction sector, based on historic data.

Unemployment insurance claims represent those workers who remain in the construction labor force, are not employed, but are qualified and motivated to work in construction. Unemployment insurance claims are reported by sector and include initial claims, continued claims, and exhausted claims. The ratio of historic ratio of UI claims to total employment in construction and the regional unemployment rate are used to extrapolate forecast UI claims in construction into the future, using the forecast annual regional unemployment rates for years 2014 to 2019 by Conway Pedersen Economics.

New entrants to the workforce include accredited program completions in construction-related fields (e.g., construction management, community college programs related to construction) and new apprenticeships. For the latter, apprenticeship completions are treated as equivalent to new openings.

APPENDIX E: ADDITIONAL MAPS

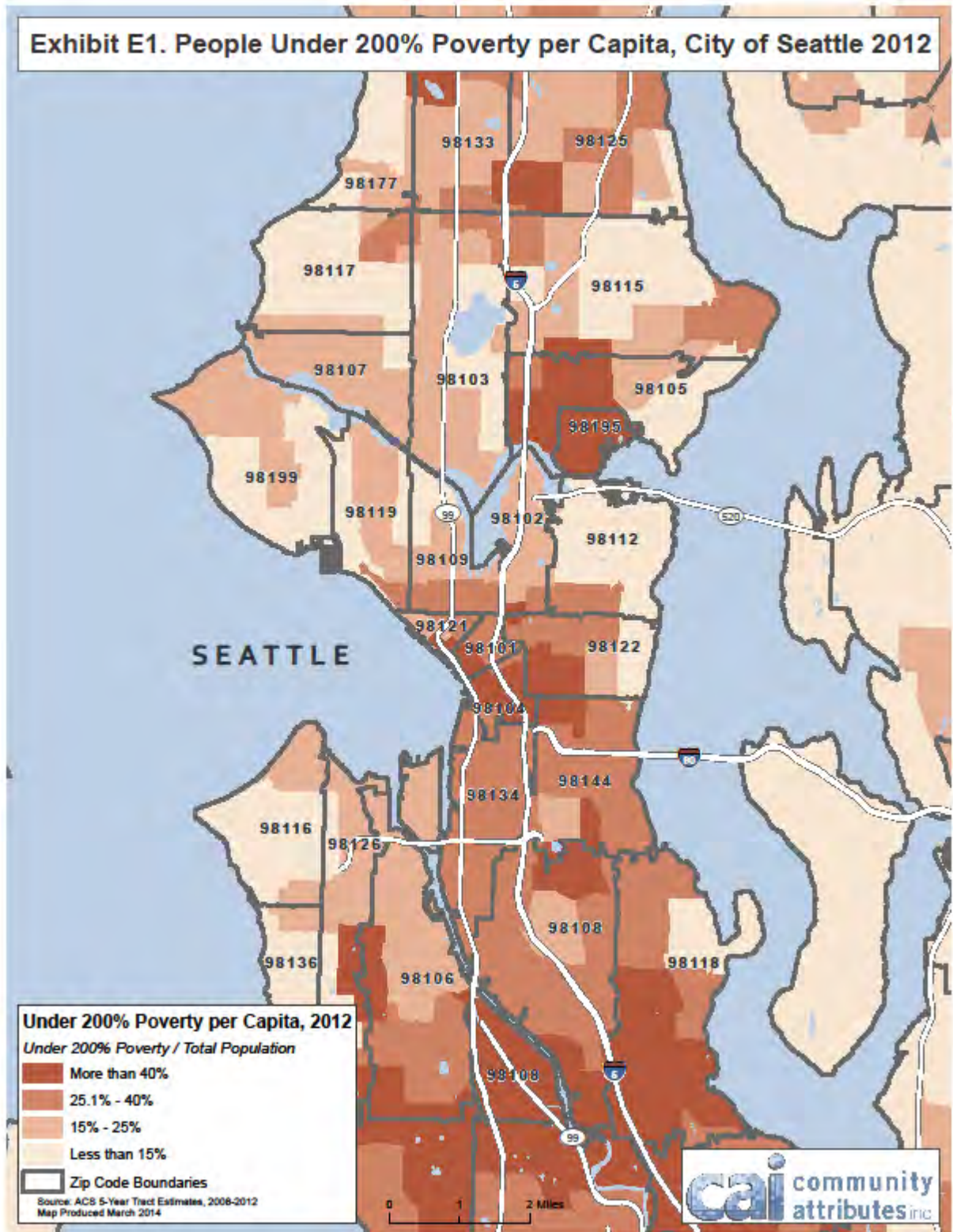


Exhibit E2. People of Color per Capita, City of Seattle 2012



Exhibit E3. People of Color and Poverty per Capita, City of Seattle 2012

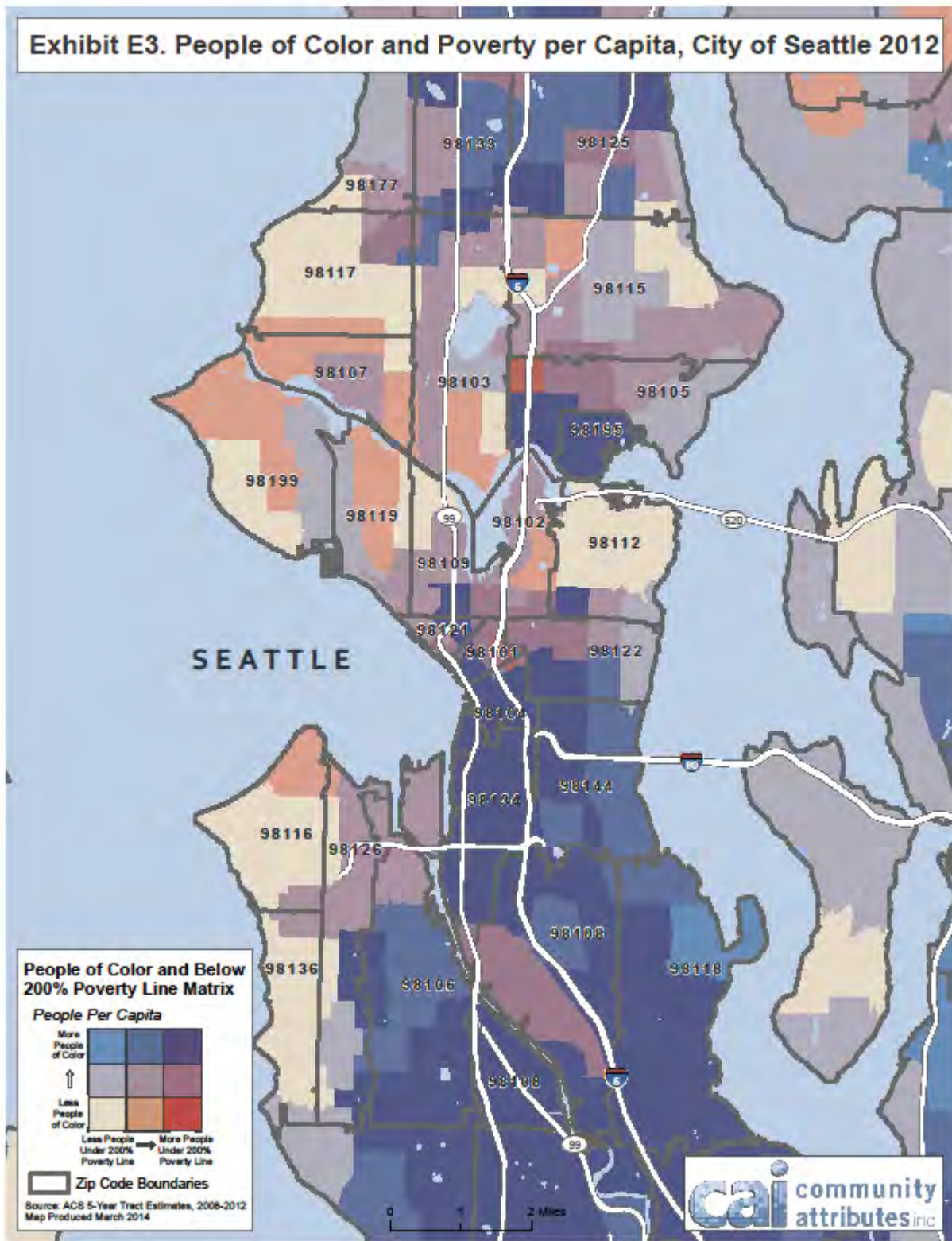


Exhibit E4. Unemployment Rate, City of Seattle 2012

