

# LABOR MARKET OVERVIEW: NORTH CENTRAL VALLEY/ NORTHERN MOTHER LODGE SUBREGION

Prepared by the  
Central Valley/Mother Lode Subregion  
Center of Excellence

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**Contents**

Introduction..... 4

Methodology ..... 4

Subregional Overview..... 5

Agriculture, Water & Environmental Technologies..... 11

Energy, Construction & Utilities ..... 19

Global Trade & Logistics ..... 25

Retail, Hospitality & Tourism..... 31

Protective Services..... 41

ICT/Digital Media ..... 47

Health Care ..... 53

Manufacturing ..... 62

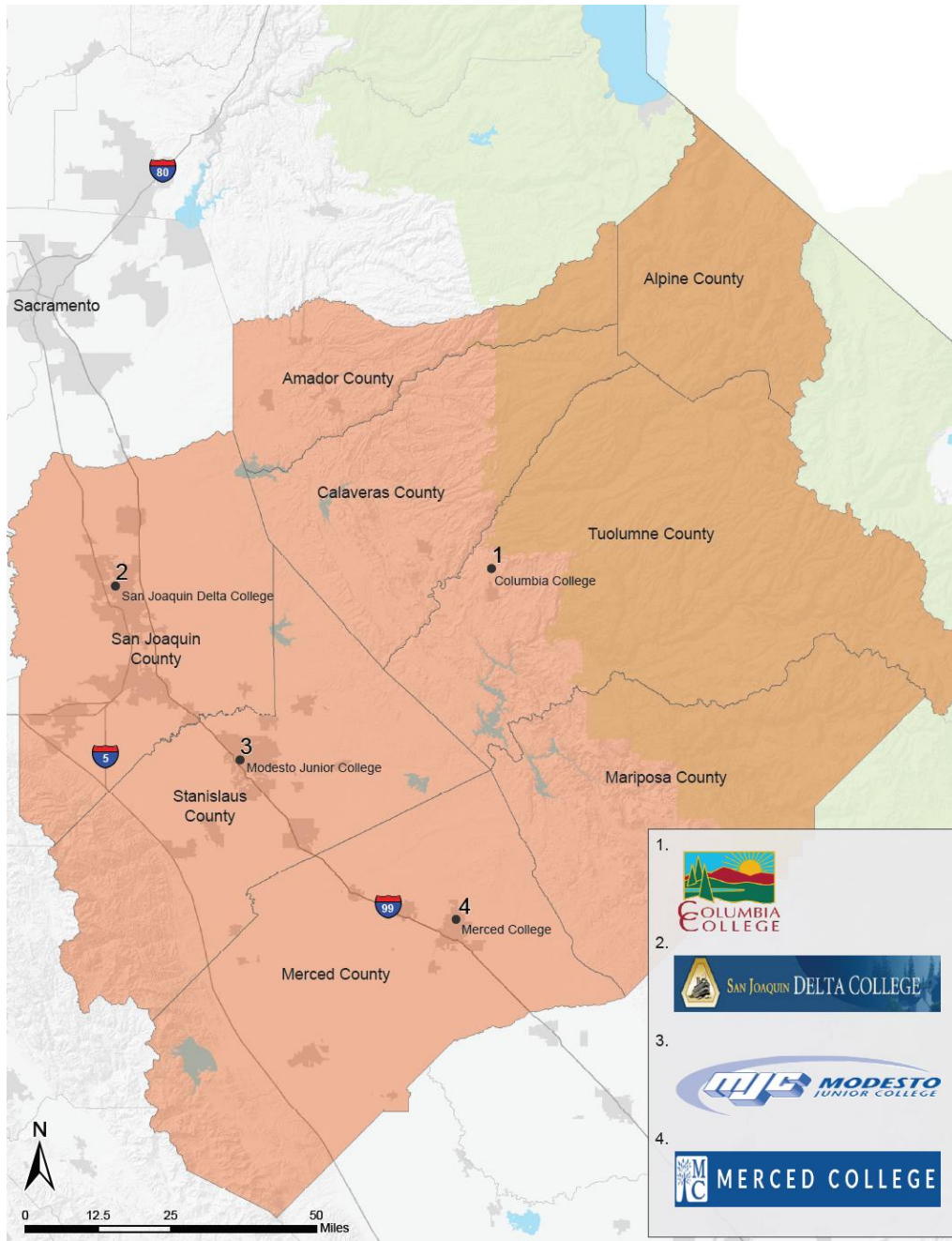
Conclusion & Recommendations ..... 71

APPENDIX A: Methodology & Data Sources..... 73

APPENDIX B: Business Occupational Data ..... 75

APPENDIX C: Multi-sector Occupational Data ..... 81

APPENDIX D: All Other Occupational Data ..... 83



**Exhibit 1: Map of community colleges in the North Central Valley/Northern Mother Lode Subregion**

## INTRODUCTION

The Center of Excellence conducted a labor market analysis focusing on the North Central Valley/Northern Mother Lode Subregion. This subregion is served by four community colleges—Columbia College, San Joaquin Delta College, Modesto Junior College and Merced College (Exhibit 1). The following report details current employment numbers, projected employment, job postings for in-demand occupations, the most sought-after skills by employers for each of the industries analyzed, five-year demand projections, entry-level and median wages, typical-entry level education, work experience, typical on-the-job training, current population survey results for those workers in the occupation having at least some college to an associate degree, and three-year average supply of degrees and certificates from two-year higher education institutions.

This report is organized by eight top industries in the subregion:

- Agriculture, water and environmental technologies;
- Energy, construction and utilities;
- Global trade and logistics;
- Retail, hospitality and tourism;
- Protective services;
- Information and communication technologies (ICT)/digital media;
- Health care; and
- Manufacturing.

## METHODOLOGY

Quantitative and qualitative data collection and analysis were conducted for this report. Labor market data, particularly primary and secondary data related to industry workforce demands and occupational employment, informed the report's findings. The North American Industry Classification System (NAICS) and the Standard Occupational Classification (SOC) System were used to source data. Burning Glass, an online job posting aggregation tool, was employed to identify job titles with the most openings in the North Central Valley/Northern Mother Lode Subregion.<sup>1</sup>

Job postings were selected for inclusion in the analysis based on four criteria: The five-year change from the industry staffing patterns contained 10 or more jobs; the minimum education requirement was a high school diploma or vocational training,\* or associate degree; the job posting was listed within the last 12 months; and, the job posting indicated the position was physically located in one of the eight service counties of Alpine, Amador Calaveras, Mariposa, Merced, San Joaquin, Stanislaus or Tuolumne. The study analyzed business types within the eight industries that are projected to add jobs over the next five years.

The skills data were analyzed using two lenses to provide a more comprehensive understanding of skills desired by employers: skills were analyzed by industry and by analyzing occupations collectively that are associated with that specific industry, referred to in this report as occupational clusters. Plugging these occupations into Burning Glass independent of industry provides an understanding of what skill sets all businesses, regardless of sector, desire in new hires.

The criteria for the staffing patterns occupations were pre-determined by the Central Valley/Mother Lode Center of Excellence based on consortium discussions and recommendations. The occupational demand

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<sup>1</sup> Burning glass is an online job posting aggregation tool that uses intelligent "spidering" programs to search the Internet for job listings and integrates the information into a searchable database. While efforts have been made to remove duplication, it is possible that a posting removed and re-entered over the 12-month period is counted more than once.

\*Selection option is high school diploma or vocational training; these two can no longer be isolated from one another.

data include only those jobs directly related to the industry having 10 or more annual openings. However, a few exceptions were made in cases of emerging or complementary occupations where there were fewer than 10 jobs. The tables under the occupational demand sections have different five-year projections from the preceding projected employment tables because the occupational data provide projections for the entire occupation, which may span more than one industry.

For more information on the data sources employed by this study, please refer to Appendix A. Living wages were determined using the MIT Living Wage Calculator. Business occupations and maintenance occupations are relevant to every industry; therefore, these occupations along with their wages, educational attainment and community college supply data are shown in Appendix B through Appendix D to avoid duplication and over-estimation of projected demand.

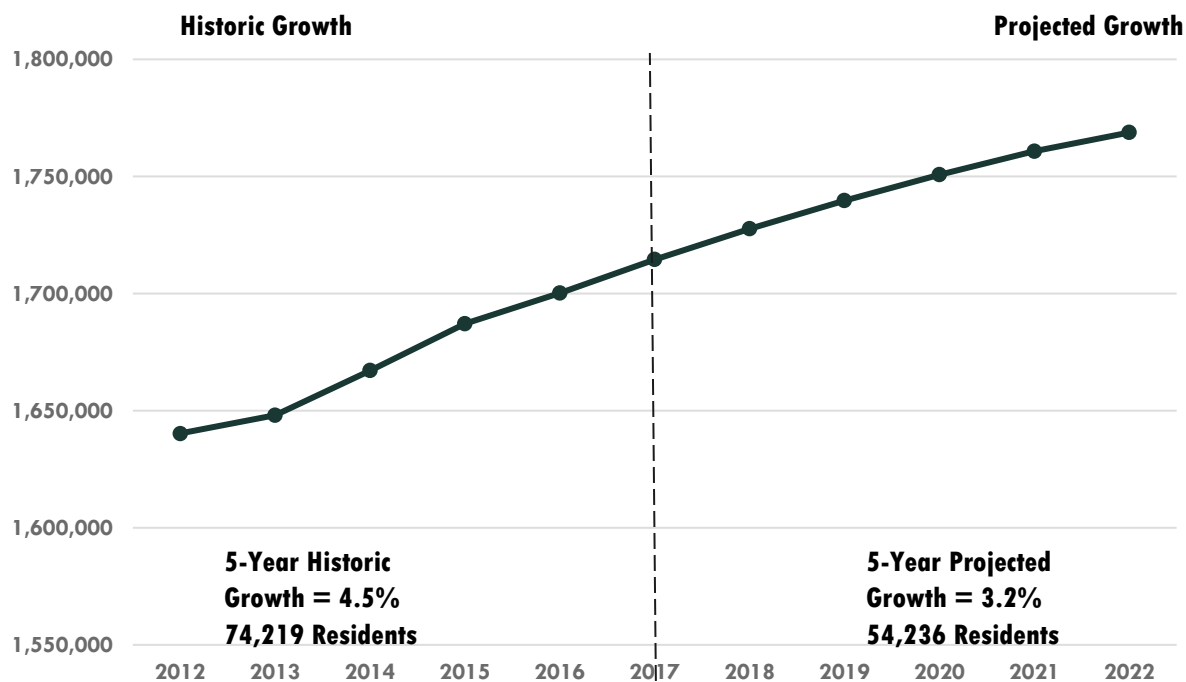
## SUBREGIONAL OVERVIEW

### Residential Population

The North Central Valley/Northern Mother Lode Subregion’s population currently totals more than 1.7 million residents. By 2022, the subregion is projected to add more than 54,000 new residents (Exhibit 2). Over the last five years, the subregion grew by 4.5%, somewhat slower than the state’s growth of 5%. The projected growth rate of 3.2% is lower than in the previous five years, but is slightly greater than the projected 3% growth rate for the state.

Each year, the subregion is expected to add from 8,000 to 13,000 new residents, with the most rapid growth occurring between 2017 and 2020.

**Exhibit 2: Population estimates and projections in the subregion**



## Demographics

Exhibit 3 shows projected changes in the North Central Valley/Northern Mother Lode Subregion's demographics by 2022. Populations identifying as Hispanic are all projected to increase over the next five years. There will be growth in individuals identifying as:

- White, Hispanic, representing an increase of 42,348 residents;
- Asian, non-Hispanic, an increase of 10,598 residents; and
- Two or more races, non-Hispanic, an increase of 3,375 residents.

The subregion's white, non-Hispanic population is expected to decrease by 2%, a decline of 13,900 by 2022.

**Exhibit 3: Projected changes in race/ethnicity in the subregion**

Race/Ethnicity	2017	2022	Change	% Change
White, Hispanic	648,029	690,377	42,348	7%
White, Non-Hispanic	670,284	656,384	(13,900)	(2%)
Asian, Non-Hispanic	161,872	172,470	10,598	7%
Black, Non-Hispanic	76,358	78,821	2,463	3%
Two or More Races, Non-Hispanic	48,216	51,591	3,375	7%
Two or More Races, Hispanic	27,739	30,832	3,093	11%
American Indian or Alaskan Native, Hispanic	26,526	28,908	2,382	9%
Asian, Hispanic	17,301	18,658	1,357	8%
Black, Hispanic	15,884	17,288	1,404	9%
American Indian or Alaskan Native, Non-Hispanic	9,920	9,837	(83)	(1%)
Native Hawaiian or Pacific Islander, Non-Hispanic	8,992	9,892	900	10%
Native Hawaiian or Pacific Islander, Hispanic	3,396	3,693	297	9%
<b>Total</b>	<b>1,714,515</b>	<b>1,768,751</b>	<b>54,236</b>	<b>3%</b>

## Living Wage Data

Exhibit 4 shows living wages for the subregion and by county. The average living wage for the subregion is \$11.02/hour for one adult. The highest living wage is attributed to Tuolumne County, \$11.68/hour, while the lowest is Merced County, \$10.26/hour.

**Exhibit 4: Living wages for the subregion by county**

County	Living Wage: 1 Adult
Alpine	\$10.90
Amador	\$11.12
Calaveras	\$11.10
Mariposa	\$11.18
Merced	\$10.26
San Joaquin	\$10.91
Stanislaus	\$11.03
Tuolumne	\$11.68
<b>Average</b>	<b>\$11.02</b>

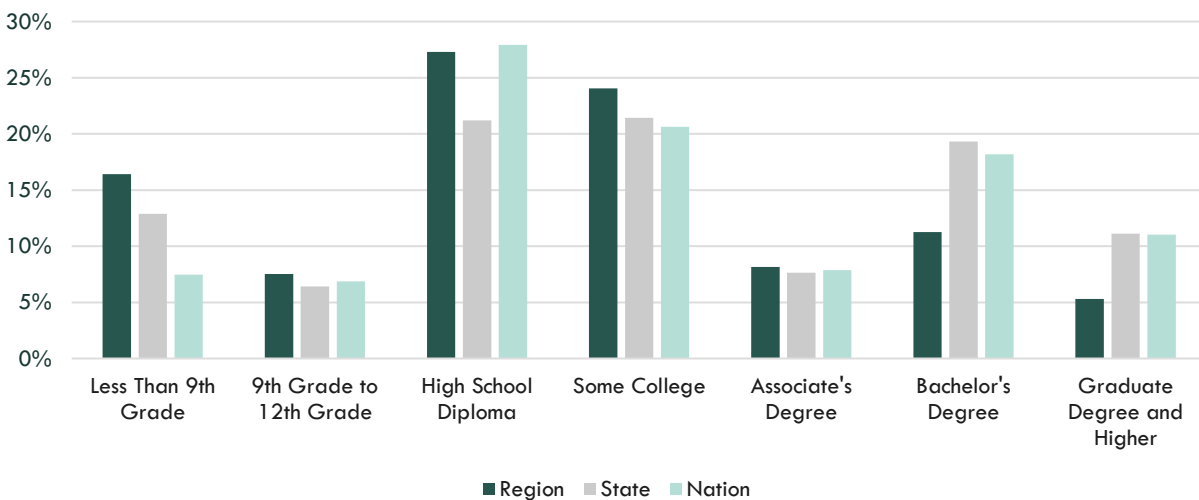
## Educational Attainment

The subregion trails both the nation and the state for bachelor's and graduate degree attainment, with only 11% of the adult population holding a bachelor's degree, compared to 19% statewide and 18% nationwide (Exhibit 5).

Regarding associate degree attainment, the subregion, state and nation are the same, 8%. The subregion slightly leads the state in the completion of some college or a high school diploma.

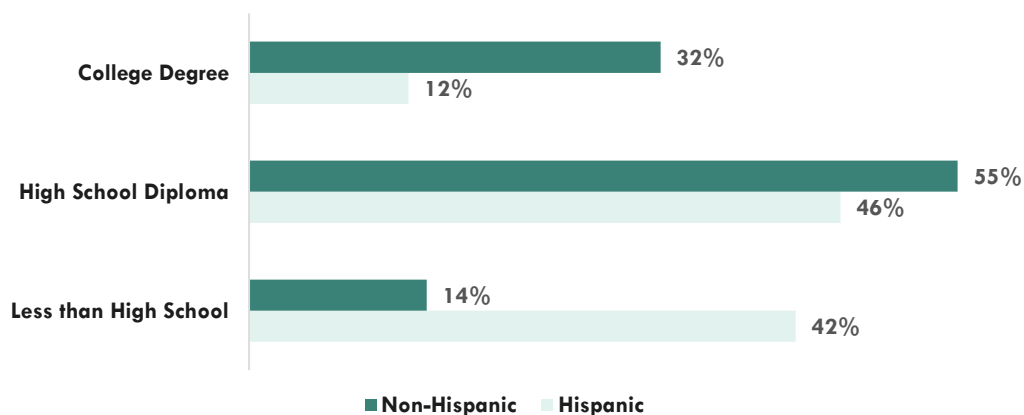
In the North Central Valley/Northern Mother Lode subregion, 24% of the population has completed some college, compared to 21% of the state. Similarly, 27% of the population has obtained a high school diploma, above the state's 21% of the population.

**Exhibit 5: Educational attainment comparison of the nation, state and subregion**



Hispanic educational attainment in the North Central Valley/Northern Mother Lode Subregion is lower than non-Hispanic educational attainment. Only 12% of the Hispanic population holds a college degree (associate degree or higher) compared to 32% of the non-Hispanic population (Exhibit 6). In addition, 42% of the Hispanic population did not complete high school, compared to 14% of the non-Hispanic population.

**Exhibit 6: 2017 Hispanic/non-Hispanic educational attainment**



## Labor Force & Employment

The size and characteristics of a subregion's labor force are important considerations in workforce planning. Labor force, employment and unemployment data are based upon "place of residence" – where people live, regardless of where they work. Individuals who have more than one job are counted only once. These data elements differ from industry employment estimates that are "place-of-work" based – where the employer/workplace is located, regardless of where the employee resides. For terms and definitions, see Appendix A.

Since 2011, the labor force in the North Central Valley/Northern Mother Lode Subregion has grown from 736,150 to 744,230 workers, an increase of more than 8,000 workers. Total employment increased by 65,590 persons (Exhibit 7).

In 2011, more than 120,000 individuals were unemployed. By 2016, this number had declined by nearly half, to 62,520 individuals. Because total employment increased more than the labor force, the unemployment rate decreased from 16% in 2011 (compared to 11.5% statewide) to 8% in 2016 (compared to 5.2% statewide).

**Exhibit 7: Labor force size, employment and unemployment, 2011-2016**

	2011	2016	5-Year Change
Labor Force	736,150	744,230	8,080
Employment	616,190	681,780	65,590
Unemployment	120,060	62,540	(57,520)
Unemployment Rate	16.3%	8.4%	-7.9%



# INDUSTRY OVERVIEW

## Employment Composition

According to 2016 data, the eight industries of focus for this report employed 453,685 workers in the North Central Valley/Northern Mother Lode Subregion. Exhibit 8 shows how employment is distributed among the eight major industrial groups. The largest shares of employment are attributed to retail, hospitality and tourism (114,543 jobs); health care (74,959 jobs); and global trade and logistics (71,262).

These are followed by agriculture, water and environmental technologies (52,553 jobs); manufacturing (52,350 jobs); protective services (47,806 jobs); and energy, construction and utilities (34,384). ICT/digital media is the smallest industry, with only 5,828 jobs in the subregion.

The industries shown in Exhibit 8 are each discussed in detail—including current and projected employment, job postings and in-demand skills—in the following sections.

**Exhibit 8: Employment by industry in the subregion**

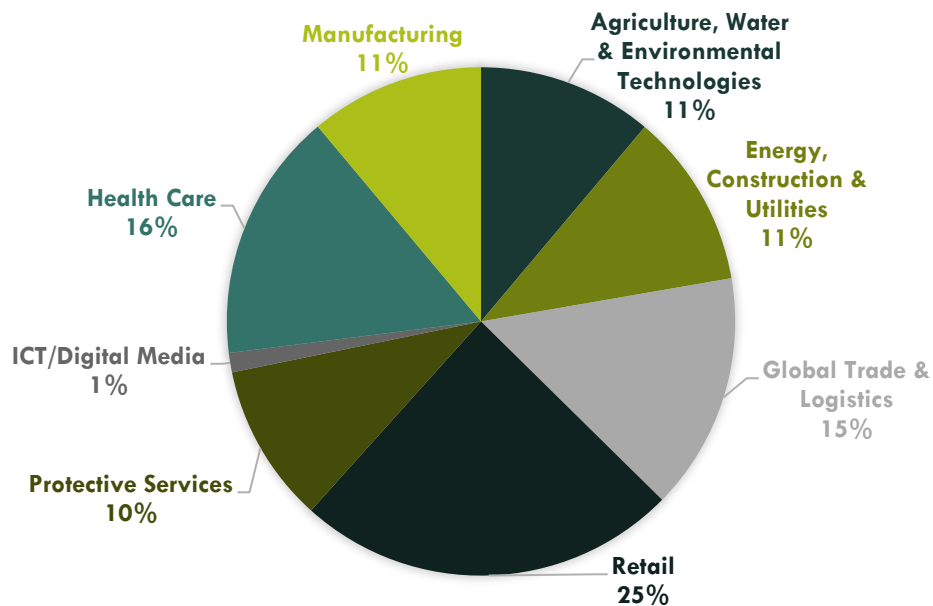


Exhibit 9 details the current and projected employment for each industry analyzed for this study. More than 35,098 new jobs are projected across the eight industries.

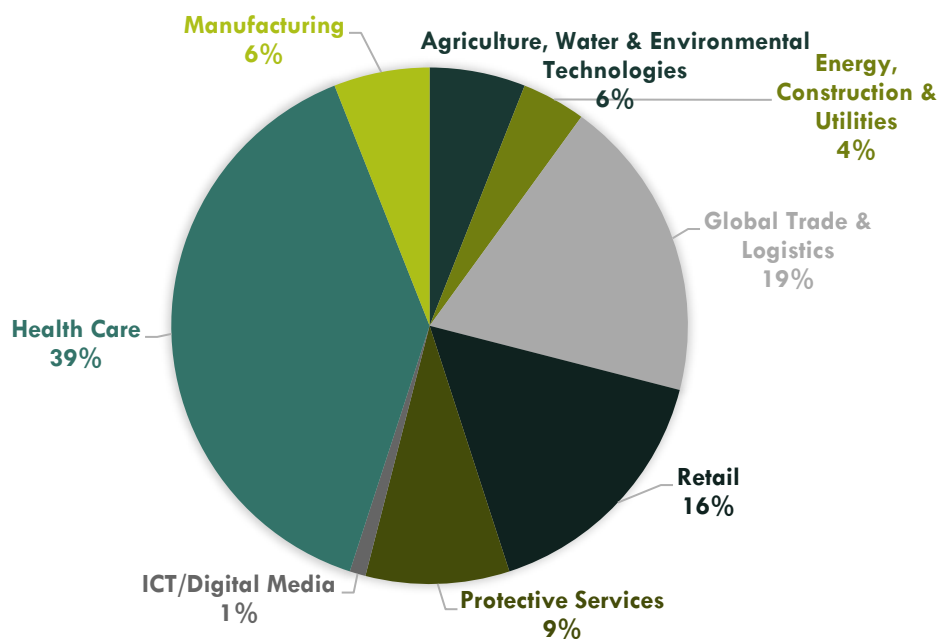
**Exhibit 9: Current and projected employment by industry in the subregion**

Industry	2016 Employment	Projected New Jobs by 2021
Retail, hospitality and tourism	114,543	5,813
Health care	74,959	13,549
Global trade & logistics	71,262	6,646
Agriculture, water and environmental technologies	52,553	2,282
Manufacturing	52,350	2,058
Protective services	47,806	3,077
Energy, construction and utilities	34,384	1,285
ICT/digital media	5,828	388
<b>TOTAL</b>	<b>453,685</b>	<b>35,098</b>

Exhibit 10 shows the industries that will produce the greatest percentage of new jobs in the next five years. Of the eight industries analyzed, the health care industry accounts for 39% of projected job growth by 2021. Other industries where substantial job growth is expected are global trade and logistics; retail, hospitality and tourism; and to a lesser degree protective services. The smallest amount of job growth will occur in ICT/digital media, which overall employs the fewest workers in the subregion; however, the ability to use and manipulate software is becoming an integral skill set for most occupations across all industries.

In summary, the largest job growth projections are in health care, which will generate 13,549 new jobs; global trade and logistics, 6,646; retail, hospitality and tourism, 5,813; and protective services, 3,077. Agriculture, water and environmental technologies will add 2,282 new jobs; manufacturing, 2,058; energy, construction and utilities, 1,285; and ICT/digital media, 388.

**Exhibit 10: Percent of new jobs by industry in the subregion**



## AGRICULTURE, WATER & ENVIRONMENTAL TECHNOLOGIES

### Current & Projected Employment

Business types adding the most jobs will be support activities for crop production, crop production and commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance. Support activities for crop production will add more than 1,900 jobs over the next five years, and crop production will add 550 jobs (Exhibit 11). It should be noted that the animal production and aquaculture business type (NAICS 1120) is expected to undergo a significant decline in coming years. This occupation is expected to shrink 4% by 2021, a loss of 387 jobs during that period.

**Exhibit 11: Agriculture, water and environmental technologies current and projected employment**

Description (NAICS)	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Support Activities for Crop Production (1151)	20,550	22,453	1,903	9%	520
Crop Production (1110)	19,345	19,895	550	3%	1,548
Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance (8113)	1,476	1,695	219	15%	130
Remediation and Other Waste Management Services (5629)	339	369	30	9%	31
Logging (1133)	210	233	23	11%	23
Forest Nurseries and Gathering of Forest Products (1132)	33	44	11	33%	6

### Industry Staffing Patterns

The industry staffing patterns data for occupations in agriculture, water and environmental technologies that indicate an addition of 10 or more jobs in the next five years are shown in Exhibit 12. With 2,577 workers currently employed, agricultural equipment operators is the largest occupation in the agriculture, water and environmental technologies industry and is adding the largest number of jobs over the five-year period, 290 positions.

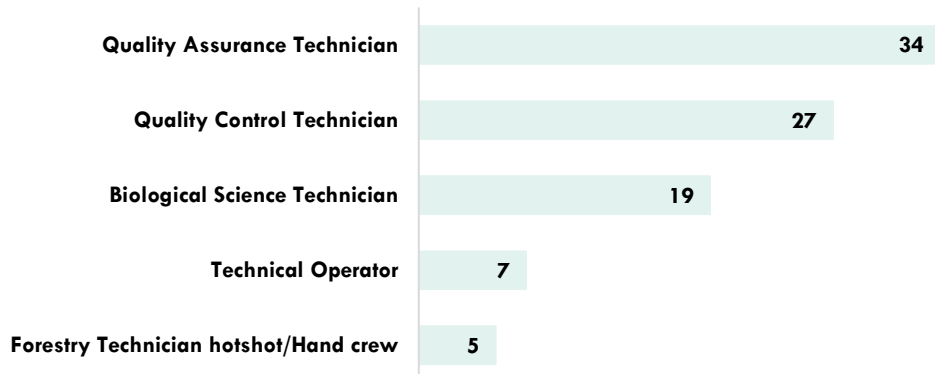
**Exhibit 12: Agriculture, water and environmental technologies staffing patterns**

SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
45-2091	Agricultural Equipment Operators	2,577	2,867	290	11%
45-2041	Graders and Sorters, Agricultural Products	1,405	1,474	69	5%
53-7051	Industrial Truck and Tractor Operators	447	493	46	10%
45-4022	Logging Equipment Operators	138	153	15	11%
37-3012	Pesticide Handlers, Sprayers, and Applicators, Vegetation	111	125	14	13%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	1,038	1,051	13	1%
49-3041	Farm Equipment Mechanics and Service Technicians	152	165	13	9%

## Job Postings

An analysis of job posting data for the seven staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 13 details the top five occupations requiring less than a bachelor's degree advertised by employers.

**Exhibit 13: Agriculture, water and environmental technologies job postings**



## Skills

English, physical demand and work area maintenance are the most commonly listed baseline skills (Exhibit 14). The industry-level skills data provides a slightly different picture with the latter two of the three top skills being soft skills related to communication as opposed to the business-related hard skills.

**Exhibit 14: Agriculture, water and environmental technologies baseline skills**

Occupational Cluster		Industry: Farming, Fishing & Forestry	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
English	53	English	20
Physical Demand	50	Physical Demand	13
Work Area Maintenance	34	Communication Skills	12
Mathematics	33	Writing	11
Organizational Skills	30	Spanish	10

Exhibit 15 shows specialized skills commonly listed in job ads. Forklift operation, inspection and labeling are highly ranked. The industry perspective on specialized skills mirrors the value placed on forklift operation, but also shows machinery and food safety as two top skills.

**Exhibit 15: Agriculture, water and environmental technologies specialized skills**

<b>Occupational Cluster</b>		<b>Industry: Farming, Fishing &amp; Forestry</b>	
<b>Specialized Skills</b>	<b>Job Postings</b>	<b>Specialized Skills</b>	<b>Job Postings</b>
Forklift Operation	183	Forklift Operation	14
Inspection	44	Machinery	13
Labeling	42	Food Safety	11
Scheduling	30	Supervisory Skills	10
Scanners	27	Inspection	8

Top software skills for jobs related to agriculture, water and environmental technologies are shown in Exhibit 16. In comparing the two datasets, it is evident that the Microsoft Office suite of products are the preferred software skills. However, software skills appear to be far less in demand at the industry level.

**Exhibit 16: Agriculture, water and environmental technologies software skills**

<b>Occupational Cluster</b>		<b>Industry: Farming, Fishing &amp; Forestry</b>	
<b>Software Skills</b>	<b>Job Postings</b>	<b>Software Skills</b>	<b>Job Postings</b>
Microsoft Excel	15	Microsoft Excel	6
Microsoft Word	4	Microsoft PowerPoint	4
SAP	4	Microsoft Word	4
Microsoft Office	3	Microsoft Office	3
Microsoft PowerPoint	3	Microsoft Access	1

## Occupational Demand Projections

Analysis of the agriculture, water and environmental technologies industry shows that the occupation of industrial truck and tractor operators has the largest growth projection (Exhibit 17). This occupation is anticipating 693 new jobs overall with 301 annual openings over the five-year period. This is followed by agricultural equipment operators adding 305 new jobs by 2021 with 139 annual openings.

There are three agriculture-related occupations emerging within the occupation of life, physical and social science technicians:

- Quality control analysts,
- Precision agriculture technicians, and
- Remote sensing technicians.

**Exhibit 17: Agriculture, water and environmental technologies occupational projections**

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Industrial Truck and Tractor Operators	6,012	6,705	693	12%	301
Agricultural Equipment Operators	2,737	3,042	305	11%	139
Graders and Sorters, Agricultural Products	2,289	2,335	46	2%	51
First-Line Supervisors of Farming, Fishing and Forestry Workers	1,140	1,157	17	1%	33
Water and Wastewater Treatment Plant and System Operators	748	789	41	5%	29
Life, Physical and Social Science Technicians, All Other	370	418	48	13%	27
Compliance Officers	648	712	64	10%	23
Veterinary Assistants and Laboratory Animal Caretakers	482	532	50	10%	21
Farm Equipment Mechanics and Service Technicians	469	512	43	9%	20
Veterinary Technologists and Technicians	438	513	75	17%	20
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	818	829	11	1%	17
Agricultural and Food Science Technicians	363	379	16	4%	15
Agricultural Inspectors	279	294	15	5%	10
Pesticide Handlers, Sprayers and Applicators, Vegetation	303	323	20	7%	10
Logging Equipment Operators	172	192	20	12%	9

## Wages

Compliance officers have the highest entry-level wages, \$20.84/hour, followed by water and wastewater treatment plant and system operators, \$17.31/hour, and life, physical and social science technicians (all other), \$16.36/hour (Exhibit 18).

The entry-level wages of the six occupations that fall below the subregion's average living wage of \$11.02/hour are: veterinary technologists and technicians; agricultural and food science technicians; farm equipment mechanics and service technicians; agricultural equipment operators; veterinary assistants and laboratory animal caretakers; and graders and sorters (agricultural products).

**Exhibit 18: Agriculture, water and environmental technologies wages**

Occupation	Entry-level Wages	Median Hourly Wages
Compliance Officers	\$20.84	\$29.43
Water and Wastewater Treatment Plant and System Operators	\$17.31	\$26.89
Life, Physical, and Social Science Technicians, All Other	\$16.26	\$21.23
Logging Equipment Operators	\$15.36	\$19.03
First-Line Supervisors of Landscaping, Lawn Service and Groundskeeping Workers	\$13.63	\$18.06
Agricultural Inspectors	\$13.57	\$18.57
Pesticide Handlers, Sprayers and Applicators, Vegetation	\$12.78	\$19.25
Industrial Truck and Tractor Operators	\$12.25	\$19.13
First-Line Supervisors of Farming, Fishing and Forestry Workers	\$11.13	\$15.66
Veterinary Technologists and Technicians	\$10.54	\$15.21
Agricultural and Food Science Technicians	\$10.53	\$15.91
Farm Equipment Mechanics and Service Technicians	\$10.34	\$16.57
Agricultural Equipment Operators	\$9.98	\$12.66
Veterinary Assistants and Laboratory Animal Caretakers	\$9.25	\$11.05
Graders and Sorters, Agricultural Products	\$9.15	\$9.40

## Education Level

The typical education level for compliance officers is a bachelor's degree. This occupation falls just under the required 33% of the Census Bureau's Current Population Survey (CPS) to be relevant to community-college education. Only two of the occupations—life, physical and social science technicians (all other) and agricultural food science and technicians—have a typical entry-level education that is at the community college level (Exhibit 19).

For the remaining occupations that fall below the community college education level, nearly all require work experience and/or typically require some level of on-the-job-training. Local community college programs designed to address these upskilling needs and other occupational training gaps can increase the odds of job seeker employment.

**Exhibit 19: Agriculture, water and environmental technologies education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Industrial Truck and Tractor Operators	No formal credential	None	Short-term	24.2%
Agricultural Equipment Operators	No formal credential	None	Short-term	12.7%
Graders and Sorters, Agricultural Products	No formal credential	None	Short-term	11.7%
First-Line Supervisors of Farming, Fishing and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	22.8%
Water and Wastewater Treatment Plant and System Operators	High school diploma or equivalent	None	Long-term	45.4%
Life, Physical and Social Science Technicians, All Other	Associate degree	None	None	33.9%
Compliance Officers	Bachelor's degree	None	Moderate-term	28.3%
Veterinary Assistants and Laboratory Animal Caretakers	High school diploma or equivalent	None	Short-term	47.1%
Farm Equipment Mechanics and Service Technicians	High school diploma or equivalent	None	Long-term	37%
Veterinary Technologists and Technicians	Associate degree	None	None	56.4%
First-Line Supervisors of Landscaping, Lawn Service and Groundskeeping Workers	High school diploma or equivalent	Less than 5 years	None	32.9%
Agricultural and Food Science Technicians	Associate degree	None	Moderate-term	36.3%
Agricultural Inspectors	Bachelor's degree	None	Moderate-term	28.7%
Pesticide Handlers, Sprayers and Applicators, Vegetation	High school diploma or equivalent	None	Moderate-term	19.7%
Logging Equipment Operators	High school diploma or equivalent	None	Moderate-term	14.9%



## Community College Supply

Exhibit 20 shows annual job openings and corresponding program titles with student completion data.

**Exhibit 20: Agriculture, water and environmental technologies community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Industrial Truck and Tractor Operators (53-7051)	301	No corresponding programs		
Agricultural Equipment Operators (45-2091)	139	No corresponding programs		
Graders and Sorters, Agricultural Products (45-2041)	51	No corresponding programs		
First-Line Supervisors of Farming, Fishing and Forestry Workers (45-1011)	33	Animal Science - 010200	21	1
		Dairy Science - 010230	3	-
		Plant Science - 010300	13	1
		Agricultural Pest Control Adviser and Operator (Licensed) - 010310	-	-
		Viticulture, Enology, and Wine Business - 010400	-	-
		Forestry - 011400	4	1
		Natural Resources - 011500	8	5
Water and Wastewater Treatment Plant and System Operators (51-8031)	29	Water and Wastewater Technology - 095800	-	-
Life, Physical and Social Science Technicians, All Other (19-4099)	27	Biotechnology and Biomedical Technology - 043000	2	0
		Electron Microscopy - 093470	0	19
		Ocean Technology - 192000	-	-
Compliance Officers (13-1041)	23	No corresponding programs		
Veterinary Assistants and Laboratory Animal Caretakers (31-9096)	21	No corresponding programs		
Farm Equipment Mechanics and Service Technicians (49-3041)	20	Agricultural Power Equipment Technology - 011600	6	52
Veterinary Technologists and Technicians (29-2056)	20	Veterinary Technician (Licensed) - 010210	47	24
First-Line Supervisors of Landscaping, Lawn Service and Groundskeeping Workers (37-1012)	17	Horticulture - 010900	12	2
		Landscape Design and Maintenance - 010910	-	-
		Nursery Technology - 010930	-	-

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
		Turfgrass Technology - 010940	-	-
		Parks and Outdoor Recreation - 011510	0	0
Agricultural and Food Science Technicians (19-4011)	15	Agriculture Technology and Sciences, General - 010100	11	-
		Viticulture, Enology, and Wine Business - 010400	-	-
		Food Processing and Related Technologies - 011300	-	-
Agricultural Inspectors (45-2011)	10	No corresponding programs		
Pesticide Handlers, Sprayers and Applicators, Vegetation (37-3012)	10	Plant Science - 010300	13	1
		Agricultural Pest Control Adviser and Operator (Licensed) - 010310	-	-
		Landscape Design and Maintenance - 010910	-	-
		Nursery Technology - 010930	-	-
		Turfgrass Technology - 010940	-	-
Logging Equipment Operators (45-4022)	9	No corresponding programs		

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC



## ENERGY, CONSTRUCTION & UTILITIES

### Current & Projected Employment

While the energy, construction and utilities industry accounts for a substantial share of employment in the North Central Valley/Northern Mother Lode Subregion, some of the largest business types are projected to undergo only moderate growth (1%-3%), such as building and finishing contractors, residential building construction, other specialty trade contractors, nonresidential building construction and natural gas distribution (Exhibit 21).

The business type comprising building equipment contractors will experience robust growth of 9%, representing the addition of 654 jobs in the North Central Valley/Northern Mother Lode subregion. Utility system construction will expand by 32%, adding 413 jobs.

Not shown in Exhibit 21 is the foundation, structure and building exterior contractors business type (NAICS 2381) which is projected to contract by 3%, shedding 122 jobs.

**Exhibit 21: Energy, construction and utilities current and projected employment**

Description (NAICS)	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Building Equipment Contractors (2382)	7,460	8,114	654	9%	619
Building Finishing Contractors (2383)	5,836	5,931	95	2%	457
Residential Building Construction (2361)	5,624	5,779	155	3%	648
Other Specialty Trade Contractors (2389)	3,875	3,951	76	2%	255
Nonresidential Building Construction (2362)	2,302	2,382	80	3%	149
Natural Gas Distribution (2212)	1,719	1,741	22	1%	8
Utility System Construction (2371)	1,300	1,713	413	32%	72
Water, Sewage and Other Systems (2213)	256	287	31	12%	33
Electric Power Generation, Transmission and Distribution (2211)	184	205	21	11%	9
Metal Ore Mining (2122)	58	80	22	38%	2

### Industry Staffing Patterns

The staffing patterns data for energy, construction and utilities that indicated an addition of 10 or more jobs in the next five years as shown in Exhibit 22.

The largest occupation in the energy, construction and utilities industry is plumbers, pipefitters and steamfitters having 1,363 jobs in 2016 and the largest growth rate, with 157 new jobs projected over the next five years. This is followed by heating, air conditioning and refrigeration mechanics and installers, adding 114 new jobs over the next five years, and brickmasons and blockmasons, adding 93 new jobs.

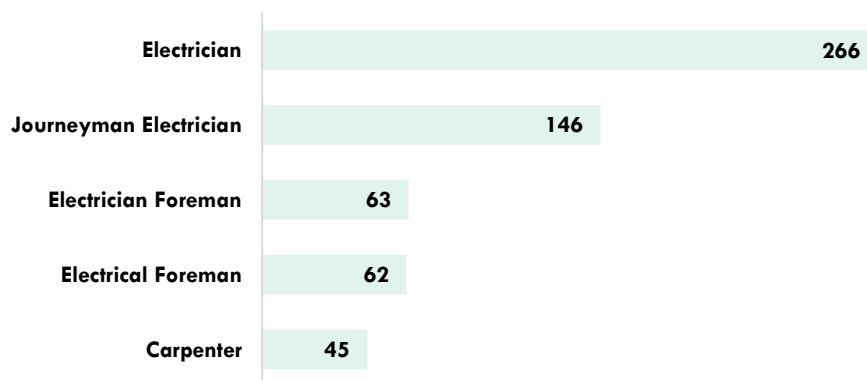
### Exhibit 22: Energy, construction and utilities staffing patterns

SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
47-2152	Plumbers, Pipefitters, and Steamfitters	1,363	1,520	157	12%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	851	965	114	13%
47-2021	Brickmasons and Blockmasons	442	535	93	21%
47-2141	Painters, Construction and Maintenance	1,714	1,800	86	5%
47-2111	Electricians	1,545	1,604	59	4%
47-2073	Operating Engineers and Other Construction Equipment Operators	797	854	57	7%
49-9051	Electrical Power-Line Installers and Repairers	135	173	38	28%
13-1051	Cost Estimators	645	680	35	5%
47-2161	Plasterers and Stucco Masons	587	614	27	5%
49-9052	Telecommunications Line Installers and Repairers	117	143	26	22%
47-2211	Sheet Metal Workers	360	382	22	6%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	173	194	21	12%
47-2022	Stonemasons	81	95	14	17%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	1,574	1,587	13	1%

### Job Postings

An analysis of job posting data for the 14 staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 23 details the top five occupations requiring less than a bachelor's degree advertised by employers.

### Exhibit 23: Energy, construction and utilities job postings



## Skills

Troubleshooting, communication skills and writing are the most commonly listed baseline skills (Exhibit 24). Planning and detail-oriented skills are complementary, whereas, preventative maintenance requires more specific skill sets.

**Exhibit 24: Energy, construction and utilities baseline skills**

Occupational Cluster		Industry: Construction & Extraction	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Troubleshooting	216	Troubleshooting	132
Preventive Maintenance	155	Communication Skills	78
Communication Skills	134	Writing	76
Writing	134	Physical Demand	67
Planning	124	Detail-Oriented	41

Exhibit 25 shows specialized skills commonly listed in job ads. Repair, electrical work and electrical system installation are highly ranked in both tables.

**Exhibit 25: Energy, construction and utilities specialized skills**

Occupational Cluster		Industry: Construction & Extraction	
Specialized Skills	Job Postings	Specialized Skills	Job Postings
Repair	375	Repair	210
Electrical Work	164	Electrical Work	161
Supervisory Skills	162	Electrical System Installation	139
Scheduling	141	Screwdrivers	130
Electrical System Installation	139	Hacksaws	124

Top software skills for jobs related to energy, construction and utilities are shown in Exhibit 26. The two tables share four of the five same skills, with the top three being Microsoft Office, Excel and Word.

**Exhibit 26: Energy, construction and utilities software skills**

Occupational Cluster		Industry: Construction & Extraction	
Software Skills	Job Postings	Software Skills	Job Postings
Microsoft Office	85	Microsoft Office	47
Microsoft Excel	73	Microsoft Excel	24
Microsoft Word	39	Microsoft Word	13
SAP	28	Word Processing	6
Microsoft Outlook	24	SAP	5

## Occupational Demand Projections

The occupation of painters (construction and maintenance) is the largest, with 102 new jobs projected by 2021 and the greatest number of projected annual openings, 61 (Exhibit 27).

**Exhibit 27: Energy, construction and utilities occupational projections**

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Painters, Construction and Maintenance	1,911	2,013	102	5%	61
Plumbers, Pipefitters and Steamfitters	1,552	1,723	171	11%	58
Electricians	1,894	1,986	92	5%	54
Heating, Air Conditioning and Refrigeration Mechanics and Installers	1,106	1,243	137	12%	47
Operating Engineers and Other Construction Equipment Operators	1,297	1,396	99	8%	44
First-Line Supervisors of Construction Trades and Extraction Workers	1,889	1,935	46	2%	39
Brickmasons and Blockmasons	457	551	94	21%	26
Cabinetmakers and Bench Carpenters	585	656	71	12%	21
Plasterers and Stucco Masons	623	651	28	4%	20
Electrical Power-Line Installers and Repairers	240	284	44	18%	20
Highway Maintenance Workers	329	368	39	12%	17
Construction and Building Inspectors	247	262	15	6%	11

## Wages

Electrical power-line installers and repairers earn the highest wages, followed by construction and building inspectors (Exhibit 28).

**Exhibit 28: Energy, construction and utilities wages**

Occupation	Entry-level Wages	Median Hourly Wages
Electrical Power-Line Installers and Repairers	\$23.86	\$43.64
Construction and Building Inspectors	\$19.87	\$32.25
Highway Maintenance Workers	\$18.03	\$23.27
Brickmasons and Blockmasons	\$17.92	\$23.99
Operating Engineers and Other Construction Equipment Operators	\$17.34	\$25.75
First-Line Supervisors of Construction Trades and Extraction Workers	\$17.34	\$26.72
Electricians	\$17.00	\$25.54
Plumbers, Pipefitters and Steamfitters	\$15.24	\$20.92
Plasterers and Stucco Masons	\$13.95	\$20.88
Heating, Air Conditioning and Refrigeration Mechanics and Installers	\$13.10	\$19.47
Painters, Construction and Maintenance	\$11.42	\$16.43
Cabinetmakers and Bench Carpenters	\$10.12	\$14.20



## Education Level

For those occupations that fall within the energy, construction and utilities industry, only the occupation of heating, air conditioning and refrigeration mechanics and installers requires a community college education. However, three occupations below require apprenticeships, and eight require moderate- to long-term on-the-job training. See Exhibit 29.

**Exhibit 29: Energy, construction and utilities education levels**

Occupation	Typical Entry-Level Education	Work Experience Required	Typical On-The-Job Training	CPS
Painters, Construction and Maintenance	No formal educational credential	None	Moderate-term	20.5%
Plumbers, Pipefitters and Steamfitters	High school diploma or equivalent	None	Apprenticeship	31.4%
Electricians	High school diploma or equivalent	None	Apprenticeship	47.3%
Heating, Air Conditioning and Refrigeration Mechanics and Installers	Postsecondary nondegree award	None	Long-term	43.9%
Operating Engineers and Other Construction Equipment Operators	High school diploma or equivalent	None	Moderate-term	24.3%
First-Line Supervisors of Construction Trades and Extraction Workers	High school diploma or equivalent	5 years or more	None	32.8%
Brickmasons and Blockmasons	High school diploma or equivalent	None	Apprenticeship	20%
Cabinetmakers and Bench Carpenters	High school diploma or equivalent	None	Moderate-term	25.7%
Plasterers and Stucco Masons	No formal educational credential	None	Long-term	14.5%
Electrical Power-Line Installers and Repairers	High school diploma or equivalent	None	Long-term	49.8%
Highway Maintenance Workers	High school diploma or equivalent	None	Moderate-term	27.1%
Construction and Building Inspectors	High school diploma or equivalent	5 years or more	Moderate-term	44.5%

## Community College Supply

Exhibit 30 shows annual job openings and corresponding program titles with student completion data. There appears to be an under supply of students in many areas, including plumbers, pipefitters and steamfitters, and operating engineers and other construction equipment operators.

**Exhibit 30: Energy, construction and utilities community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Painters, Construction and Maintenance (47-2141)	61	Painting, Decorating, and Flooring - 095270	-	-
Plumbers, Pipefitters and Steamfitters (47-2152)	58	Plumbing, Pipefitting and Steamfitting - 095230	-	-
Electricians (47-2111)	54	Electrical - 095220	3	15
Heating, Air Conditioning and Refrigeration Mechanics and Installers (49-9021)	47	Environmental Control Technology - 094600	6	22
		Energy Systems Technology - 094610	-	-
Operating Engineers and Other Construction Equipment Operators (47-2073)	44	Heavy Equipment Operation - 094730	-	-
First-Line Supervisors of Construction Trades and Extraction Workers (47-1011)	39	Construction Crafts Technology - 095200	-	-
		Carpentry - 095210	-	1
		Electrical - 095220	3	15
		Glazing - 095240	-	-
		Masonry, Tile, Cement, Lath and Plaster - 095260	-	-
		Painting, Decorating, and Flooring - 095270	-	-
		Drywall and Insulation - 095280	-	-
		Roofing - 095290	-	-
		Civil and Construction Management Technology - 095700	1	1
		Public Works - 210210	-	-
Brickmasons and Blockmasons (47-2021)	26	Masonry, Tile, Cement, Lath and Plaster - 095260	-	-
Cabinetmakers and Bench Carpenters (51-7011)	21	Mill and Cabinet Work - 095250	-	-
Plasterers and Stucco Masons (47-2161)	20	Masonry, Tile, Cement, Lath and Plaster - 095260	-	-
Electrical Power-Line Installers and Repairers (49-9051)	20	Electrical Systems and Power Transmission - 093440	-	-
Highway Maintenance Workers (47-4051)	17	Heavy Equipment Operation - 094730	-	-
		Public Works - 210210	-	-
Construction and Building Inspectors (47-4011)	11	Construction Inspection - 095720	-	-

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC



## GLOBAL TRADE & LOGISTICS

### Current & Projected Employment

Business types comprising the largest percentage of global trade and logistics jobs in the North Central Valley/Northern Mother Lode Subregion include warehousing and storage, general freight trucking and grocery and related product merchant wholesalers (Exhibit 31). Warehousing and storage has a growth projection of 24%, adding more than 3,400 jobs by 2021. General freight trucking will grow by 9%, adding 811 jobs. Specialized freight trucking will experience 9% growth, increasing by 352 jobs, and the business type comprising agencies, brokerages and other insurance will add 301 jobs, 8% growth.

It should be noted that the offices of real estate agents and brokers (NAICS 5312) falls within this industry grouping. However, this business type is not shown because it is projected to decline by 15% over the next five years, eliminating 252 jobs in the subregion.

**Exhibit 31: Global trade and logistics current and projected employment**

Description (NAICS)	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Warehousing and Storage (4931)	14,581	18,044	3,463	24%	135
General Freight Trucking (4841)	9,410	10,221	811	9%	430
Grocery and Related Product Merchant Wholesalers (4244)	6,528	6,715	187	3%	149
Specialized Freight Trucking (4842)	3,817	4,169	352	9%	230
Agencies, Brokerages and Other Insurance Related Activities (5242)	3,753	4,054	301	8%	435
Machinery, Equipment and Supplies Merchant Wholesalers (4238)	2,579	2,796	217	8%	184
Activities Related to Real Estate (5313)	2,087	2,266	179	9%	309
Miscellaneous Nondurable Goods Merchant Wholesalers (4249)	1,812	1,881	69	4%	121
Wholesale Electronic Markets and Agents and Brokers (4251)	1,688	1,951	263	16%	123
Couriers and Express Delivery Services (4921)	1,179	1,293	114	10%	21

### Industry Staffing Patterns

The occupation of heavy and tractor-trailer truck drivers is the largest with the greatest growth projection in both the global trade and logistics industry and the subregion, with 10,795 current jobs and 1,000 new jobs projected over the next five years. The next largest occupation in the industry is industrial truck and tractor operators, with 501 new jobs projected, followed by wholesale and manufacturing sales representatives (except technical and scientific products), with 230 new jobs projected by 2021 (Exhibit 32).

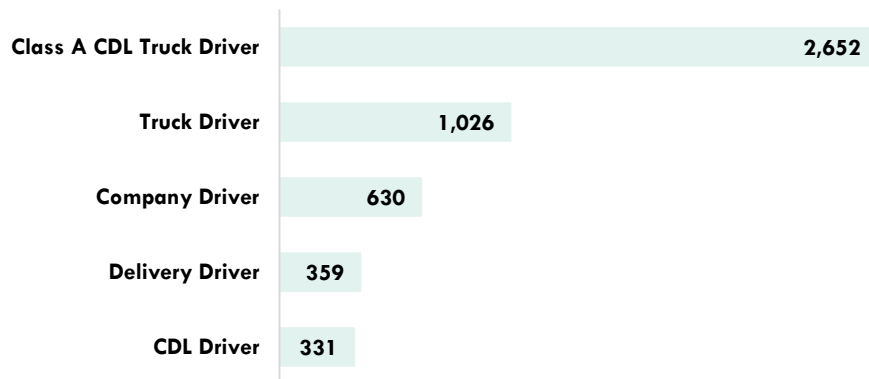
**Exhibit 32: Global trade and logistics staffing patterns**

SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
53-3032	Heavy and Tractor-Trailer Truck Drivers	10,795	11,859	1,064	10%
53-7051	Industrial Truck and Tractor Operators	3,215	3,716	501	16%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	2,238	2,468	230	10%
53-1021	First-Line Supervisors of Helpers, Laborers and Material Movers, Hand	771	892	121	16%
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	573	655	82	14%
11-3071	Transportation, Storage and Distribution Managers	394	458	64	16%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	430	479	49	11%
43-5061	Production, Planning and Expediting Clerks	209	249	40	19%
49-3043	Rail Car Repairers	118	139	21	18%
43-5011	Cargo and Freight Agents	103	123	20	19%
13-1022	Wholesale and Retail Buyers, Except Farm Products	171	188	17	10%
13-1081	Logisticians	60	73	13	22%
53-4013	Rail Yard Engineers, Dinkey Operators and Hostlers	58	68	10	17%
53-4031	Railroad Conductors and Yardmasters	146	156	10	7%

### Job Postings

An analysis of job posting data for the 14 staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 33 details the top five occupations requiring less than a bachelor’s degree advertised by employers.

**Exhibit 33: Global trade and logistics job postings**



## Skills

Communication skills, organizational skills and physical demand are three of the most commonly listed baseline skills in both the occupational and industry tables (Exhibit 34). Problem solving and mathematics are complementary skills as are writing and English.

**Exhibit 34: Global trade and logistics baseline skills**

Occupational Cluster		Industry: Transportation & Warehousing	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Communication Skills	1091	Physical Demand	728
Organizational Skills	522	Communication Skills	464
Physical Demand	480	English	360
Writing	436	Organizational Skills	310
Problem Solving	394	Mathematics	242

Exhibit 35 shows specialized skills most commonly listed. Sales ranks highest among the top job titles, whereas, customer service and forklift operation are desired skills across the two perspectives. Inspection and repair are also highly valued skills in the transportation and warehousing industry.

**Exhibit 35: Global trade and logistics specialized skills**

Occupational Cluster		Industry: Transportation & Warehousing	
Specialized Skills	Job Postings	Specialized Skills	Job Postings
Sales	1313	Forklift Operation	789
Customer Service	623	Inspection	514
Forklift Operation	419	Repair	483
Customer Contact	416	Customer Service	291
Microsoft Excel	381	Scheduling	267

Top software skills for jobs related to global trade and logistics are shown in Exhibit 36. The Microsoft Office suite of tools are the dominate software skills desired by employers.

**Exhibit 36: Global trade and logistics software skills**

Occupational Cluster		Industry: Transportation & Warehousing	
Software Skills	Job Postings	Software Skills	Job Postings
Microsoft Excel	381	Microsoft Excel	100
Microsoft Office	372	Microsoft Office	84
Microsoft Word	176	Microsoft Word	40
Microsoft PowerPoint	147	SAP	39
Microsoft Outlook	134	Microsoft PowerPoint	28

## Occupational Demand Projections

Heavy and tractor-trailer drivers is the largest occupation across all sectors in the subregion. It also has the greatest five-year growth projection of 1,303 new jobs with 516 annual openings (Exhibit 37). The next few occupations are significantly smaller across all three metrics, but do indicate sizeable growth and moderate annual openings in the next five years.

**Exhibit 37: Global trade and logistics occupational projections**

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Heavy and Tractor-Trailer Truck Drivers	14,023	15,326	1303	9%	516
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	3,792	4,145	353	9%	156
First-Line Supervisors of Helpers, Laborers and Material Movers, Hand	1,267	1,427	160	13%	76
First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	972	1,089	117	12%	57
Transportation, Storage and Distribution Managers	659	733	74	11%	30
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	723	790	67	9%	29
Wholesale and Retail Buyers, Except Farm Products	471	499	28	6%	22

## Wages

The highest earning global trade and logistics occupations are shown in Exhibit 38. The wages for the occupations shown below are higher than the average living wage for a single adult in the subregion.

**Exhibit 38: Global trade and logistics wages**

Occupation	Entry-level Hourly Wages	Median Hourly Wages
Transportation, Storage and Distribution Managers	\$23.23	\$41.01
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	\$20.81	\$33.97
First-Line Supervisors of Helpers, Laborers and Material Movers, Hand	\$16.83	\$24.60
First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	\$15.26	\$26.53
Wholesale and Retail Buyers, Except Farm Products	\$15.17	\$25.87
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	\$14.13	\$27.39
Heavy and Tractor-Trailer Truck Drivers	\$12.61	\$18.12

## Education Level

Exhibit 39 shows education levels required for occupations that fall within the global trade and logistics industry. Sales representatives (wholesale and manufacturing, except technical and scientific products) and wholesale and retail buyers (except farm products) indicate a bachelor's degree level of education, but have 32% and 37% CPS results, indicating these are middle-skill occupations.

The occupation of heavy and tractor-trailer truck drivers typically requires community college education, whereas, the remaining occupations require only a high school diploma. However, supervisorial positions are viewed as relevant to community colleges because of the need for management skills.

**Exhibit 39: Global trade and logistics education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Heavy and Tractor-Trailer Truck Drivers	Postsecondary nondegree award	None	Short-term	28.3%
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	High school diploma or equivalent	None	Moderate-term	31.6%
First-Line Supervisors of Helpers, Laborers and Material Movers, Hand	High school diploma or equivalent	Less than 5 years	None	39.5%
First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	High school diploma or equivalent	Less than 5 years	None	39.5%
Transportation, Storage and Distribution Managers	High school diploma or equivalent	5 years or more	None	34.5%
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Bachelor's degree	None	Moderate-term	31.6%
Wholesale and Retail Buyers, Except Farm Products	Bachelor's degree	None	Long-term	36.7%



## Community College Supply

Exhibit 40 shows annual job openings and corresponding program titles with student completion data. Occupations where there is a potential undersupply include heavy and tractor-trailer truck drivers, and sales representatives (wholesale and manufacturing, except technical and scientific products).

**Exhibit 40: Global trade and logistics community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Heavy and Tractor-Trailer Truck Drivers (53-3032)	516	Truck and Bus Driving - 094750	0	1
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products (41-4012)	156	International Business and Trade - 050800	-	2
		Marketing and Distribution - 050900	4	5
		Display - 050920	-	-
First-Line Supervisors of Helpers, Laborers and Material Movers, Hand (53-1021)	76	No corresponding programs		
First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators (53-1031)	57	Logistics and Materials Transportation - 051000	0	1
Transportation, Storage and Distribution Managers (11-3071)	30	Logistics and Materials Transportation - 051000	0	1
		Aviation and Airport Management and Services - 302000	-	-
		Aviation and Airport Management - 302010	-	-
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products (41-4011)	29	International Business and Trade - 050800	-	2
		Sales and Salesmanship - 050940	-	-
Wholesale and Retail Buyers, Except Farm Products (13-1022)	22	International Business and Trade - 050800	-	2
		Marketing and Distribution - 050900	4	5
		Purchasing - 050920	-	-

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC



## RETAIL, HOSPITALITY & TOURISM

### Current & Projected Employment

Analysis of the retail, hospitality and tourism industry employment data reveals that restaurants and other eating places are projected to experience a significant expansion by 2021 with a growth rate of 9% translating to 3,393 new jobs (Exhibit 41).

Other business types adding employment include building material and supplies dealers, other amusement and recreation industries, and gasoline stations.

Department stores represent the third largest business type within the industry and in 2016 employed nearly 9,000 workers in the subregion. However, this business type, which is not shown in the table below, is projected to decline by 10% over the next five years, shedding 904 jobs.

**Exhibit 41: Retail, hospitality and tourism current and projected employment**

Description	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Restaurants and Other Eating Places (7225)	38,768	42,161	3,393	9%	2,089
Grocery Stores (4451)	11,103	11,147	44	0%	488
Building Material and Supplies Dealers (4441)	5,706	6,029	323	6%	225
Other Amusement and Recreation Industries (7139)	5,507	6,097	590	11%	224
Automobile Dealers (4411)	4,605	4,806	201	4%	167
Traveler Accommodation (7211)	4,437	4,692	255	6%	194
Health and Personal Care Stores (4461)	4,329	4,484	155	4%	367
Clothing Stores (4481)	3,364	3,481	117	3%	251
Gasoline Stations (4471)	3,269	3,566	297	9%	359
Automotive Parts, Accessories and Tire Stores (4413)	2,836	3,034	198	7%	291



## Industry Staffing Patterns

The staffing patterns data for the retail, hospitality and tourism industry is shown in Exhibit 42. Cooks (restaurant) has the largest five-year, industry-level job change, 377, followed by first-line supervisors of food preparation and serving workers, 335 new jobs by 2021.

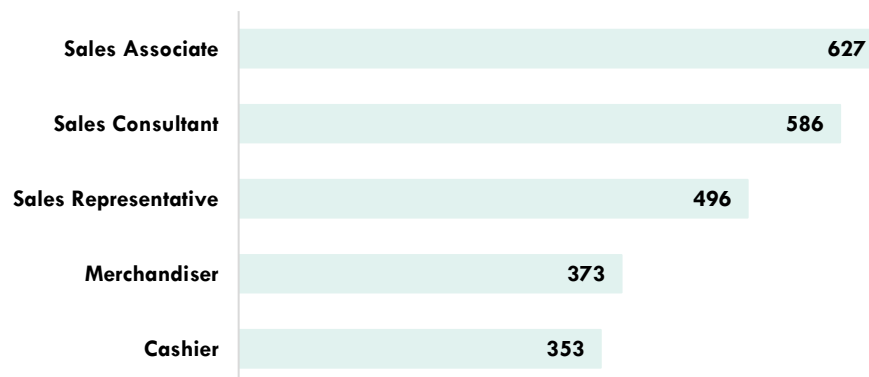
**Exhibit 42: Retail, hospitality and tourism staffing patterns**

SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
35-2014	Cooks, Restaurant	3,701	4,078	377	10%
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	2,772	3,107	335	12%
39-9031	Fitness Trainers and Aerobics Instructors	873	1,011	138	16%
11-9051	Food Service Managers	1,492	1,566	74	5%
41-2022	Parts Salespersons	979	1,038	59	6%
43-4051	Customer Service Representatives	935	994	59	6%
29-2052	Pharmacy Technicians	1,041	1,078	37	4%
41-3099	Sales Representatives, Services, All Other	434	463	29	7%
51-3011	Bakers	305	325	20	7%
25-3021	Self-Enrichment Education Teachers	151	167	16	11%
27-2042	Musicians and Singers	281	297	16	6%
41-2012	Gaming Change Persons and Booth Cashiers	48	62	14	29%
43-3041	Gaming Cage Workers	52	66	14	27%
49-3091	Bicycle Repairers	78	91	13	17%
41-1011	First-Line Supervisors of Retail Sales Workers	5,003	5,014	11	0%

## Job Postings – Retail, Hospitality and Tourism Selected Occupations

An analysis of job posting data for the 15 staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 43 details the top five occupations requiring less than a bachelor's degree advertised by employers.

**Exhibit 43: Retail, hospitality and tourism job postings for selected occupations**





## Skills

Skills data for retail, hospitality and tourism skills data were pulled for the dominant occupations and then by each of three industry-related areas: arts, design, entertainment, sports and media; food preparation and serving related; and sales and related. The comparison of these perspectives reveals that communication skills, writing, organization skills and physical demand are the most commonly sought baseline skills (Exhibit 44).

**Exhibit 44: Retail, hospitality and tourism baseline skills**

Occupational Cluster		Industry: Arts, Design, Entertainment, Sports and Media	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Communication Skills	1536	Communication Skills	334
Writing	833	Physical Demand	282
Physical Demand	778	Writing	212
Organizational Skills	740	Organizational Skills	182
Problem Solving	618	Building Effective Relationships	133

Industry: Food Preparation & Serving Related		Industry: Sales & Related	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Communication Skills	621	Communication Skills	2750
Physical Demand	385	Writing	1298
Organizational Skills	296	Physical Demand	1192
Writing	281	Organizational Skills	1141
Mathematics	178	Team Work/ Collaboration	861

Exhibit 45 shows specialized skills most commonly sought by employers, including customer service and retail setting, which are present in three of the four tables. Store management, scheduling, sales and merchandising were each reflected in two of the four perspectives.

**Exhibit 45: Retail, hospitality and tourism specialized skills**

Occupational Cluster		Industry: Arts, Design, Entertainment, Sports and Media	
Specialized Skills	Job Postings	Specialized Skills	Job Postings
Customer Service	1655	Merchandising	431
Retail Setting	1092	Retail Setting	280
Store Management	964	Customer Service	197
Scheduling	885	Sales	120
Supervisory Skills	787	Scheduling	118

**Industry: Food Preparation & Serving Related**

<b>Specialized Skills</b>	<b>Job Postings</b>
Cleaning	476
Food Preparation	353
Customer Service	318
Cooking	313
Food Service Experience	253

**Industry: Sales & Related**

<b>Specialized Skills</b>	<b>Job Postings</b>
Sales	4433
Customer Service	2779
Retail Setting	2359
Store Management	1232
Merchandising	1159

Top software skills for jobs related to retail are shown in Exhibit 46. Microsoft Office tools were the highest in demand across all the perspectives except for arts, design, entertainment, sports and media where the Adobe product line was most prevalent.

**Exhibit 46: Retail, hospitality and tourism software skills****Occupational Cluster**

<b>Software Skills</b>	<b>Job Postings</b>
Microsoft Excel	385
Microsoft Office	280
Microsoft Word	215
Microsoft Outlook	102
Microsoft PowerPoint	92

**Industry: Arts, Design, Entertainment, Sports and Media**

<b>Software Skills</b>	<b>Job Postings</b>
Microsoft Office	98
Microsoft Excel	71
Adobe Photoshop	50
Adobe Illustrator	41
Adobe Acrobat	39

**Industry: Food Preparation & Serving Related**

<b>Software Skills</b>	<b>Job Postings</b>
Microsoft Excel	30
Microsoft Word	24
Microsoft Office	23
Microsoft Outlook	9
Microsoft PowerPoint	7

**Industry: Sales & Related**

<b>Software Skills</b>	<b>Job Postings</b>
Microsoft Excel	552
Microsoft Office	525
Microsoft Word	275
Palm OS	186
Microsoft Outlook	177

## Occupational Demand Projections

The occupation of first-line supervisors of retail sales workers has the largest employment pool, 5,923 jobs, with the greatest number of annual openings, 211 (Exhibit 47). First-line supervisors of food preparation and serving workers has the largest five-year change, adding 394 new jobs by 2021. Cooks (restaurant) will add 391 new jobs. These two occupations each have annual projected openings of 188.

**Exhibit 47: Retail, hospitality and tourism occupational projections**

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
First-Line Supervisors of Retail Sales Workers	5,923	6,178	255	4%	211
Cooks, Restaurant	3,889	4,280	391	10%	188
First-Line Supervisors of Food Preparation and Serving Workers	3,387	3,781	394	12%	188
Hairdressers, Hairstylists and Cosmetologists	2,651	2,895	244	9%	122
Sales Representatives, Services, All Other	2,547	2,776	229	9%	103
Cooks, Institution and Cafeteria	1,426	1,574	148	10%	71
Fitness Trainers and Aerobics Instructors	1,178	1,337	159	13%	56
Food Service Managers	1,699	1,787	88	5%	53
Self-Enrichment Education Teachers	1,333	1,448	115	9%	52
Parts Salespersons	1,315	1,396	81	6%	47
First-Line Supervisors of Personal Service Workers	706	834	128	18%	44
Manicurists and Pedicurists	1,158	1,270	112	10%	32
Demonstrators and Product Promoters	721	762	41	6%	31
Butchers and Meat Cutters	1,096	1,113	17	2%	25
Bakers	655	703	48	7%	25
Musicians and Singers	554	586	32	6%	24
Interpreters and Translators	556	625	69	12%	23
Merchandise Displayers and Window Trimmers	321	340	19	6%	12
Gaming Change Persons and Booth Cashiers	118	135	17	14%	9

## Wages

The highest hourly wages are earned by: interpreters and translators; fitness trainers and aerobics instructors; and first-line supervisors of retail sales workers (Exhibit 48). More than two-thirds of these occupations have entry-level wages below the \$11.02 average living wage for one adult in the subregion.

**Exhibit 48: Retail, hospitality and tourism wages**

Occupation	Entry-level Hourly Wages	Median Hourly Wages
Interpreters and Translators	\$14.92	\$18.44
Fitness Trainers and Aerobics Instructors	\$12.18	\$20.29
First-Line Supervisors of Retail Sales Workers	\$12.07	\$16.93
Food Service Managers	\$11.85	\$15.73
Self-Enrichment Education Teachers	\$11.29	\$19.38
Musicians and Singers	\$11.24	\$17.34
Cooks, Institution and Cafeteria	\$10.99	\$14.90
First-Line Supervisors of Personal Service Workers	\$10.85	\$16.92
Butchers and Meat Cutters	\$10.49	\$14.63
Hairdressers, Hairstylists and Cosmetologists	\$10.37	\$11.31
Sales Representatives, Services, All Other	\$10.22	\$19.90
First-Line Supervisors of Food Preparation and Serving Workers	\$10.14	\$14.66
Demonstrators and Product Promoters	\$9.92	\$11.49
Merchandise Displayers and Window Trimmers	\$9.88	\$14.11
Gaming Change Persons and Booth Cashiers	\$9.71	\$10.55
Bakers	\$9.46	\$11.98
Cooks, Restaurant	\$9.38	\$11.04
Parts Salespersons	\$9.29	\$13.03
Manicurists and Pedicurists	\$8.76	\$9.63

## Education Level

Exhibit 49 shows education levels required for occupations that fall within the retail, hospitality and tourism industry. One of the occupations, interpreters and translators, typically requires a bachelor's degree, but meets the CPS requirement for being relevant to community college education. Only two occupations have community college educational expectations; however, 10 of the occupations requiring lower educational attainment are relevant to community college training due to specialized or managerial training needs.

**Exhibit 49: Retail, hospitality and tourism education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
First-Line Supervisors of Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	38.1%
Cooks, Restaurant	No formal educational credential	Less than 5 years	Moderate-term	23.4%
First-Line Supervisors of Food Preparation and Serving Workers	High school diploma or equivalent	Less than 5 years	None	37.9%
Hairdressers, Hairstylists and Cosmetologists	Postsecondary nondegree award	None	None	41.6%
Sales Representatives, Services, All Other	High school diploma or equivalent	None	Moderate-term	34.3%
Cooks, Institution and Cafeteria	No formal educational credential	None	Short-term	23.4%
Fitness Trainers and Aerobics Instructors	High school diploma or equivalent	None	Short-term	34.1%
Food Service Managers	High school diploma or equivalent	Less than 5 years	None	37.7%
Self-Enrichment Education Teachers	High school diploma or equivalent	Less than 5 years	None	26.7%
Parts Salespersons	No formal educational credential	None	Moderate-term	36.6%
First-Line Supervisors of Personal Service Workers	High school diploma or equivalent	Less than 5 years	None	37.6%
Manicurists and Pedicurists	Postsecondary nondegree award	None	None	30.2%
Demonstrators and Product Promoters	High school diploma or equivalent	None	Short-term	36.4%
Butchers and Meat Cutters	No formal educational credential	None	Long-term	20.5%
Bakers	No formal educational credential	None	Long-term	27.8%
Musicians and Singers	No formal educational credential	None	Long-term	27.4%
Interpreters and Translators	Bachelor's degree	None	Short-term	36%
Merchandise Displayers and Window Trimmers	High school diploma or equivalent	None	Moderate-term	30.3%
Gaming Change Persons and Booth Cashiers	High school diploma or equivalent	None	Short-term	33%

## Community College Supply

Exhibit 50 shows annual job openings and corresponding program titles with student completion data.

**Exhibit 50: Retail, hospitality and tourism community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
First-Line Supervisors of Retail Sales Workers (41-1011)	211	Retail Store Operations and Management - 050650	15	0
		Sales and Salesmanship - 050940	-	-
		Display - 050960	-	-
Cooks, Restaurant (35-2014)	188	Culinary Arts - 130630	23	33
First-Line Supervisors of Food Preparation and Serving Workers (35-1012)	188	Nutrition, Foods and Culinary Arts - 130600	-	-
		Dietetic Services and Management - 130620	-	-
		Culinary Arts - 130630	23	33
		Hospitality - 130700	-	1
		Restaurant and Food Services and Management - 130710	4	20
Hairdressers, Hairstylists and Cosmetologists (39-5012)	122	Cosmetology and Barbering - 300700	2	615
Sales Representatives, Services, All Other (41-3099)	103	Sales and Salesmanship - 050940	-	-
Cooks, Institution and Cafeteria (35-2012)	71	Dietetic Services and Management - 130620	-	-
		Culinary Arts - 130630	23	33
Fitness Trainers and Aerobics Instructors (39-9031)	56	Physical Education - 083500	-	-
		Physical Fitness and Body Movement - 083510	-	-
		Fitness Trainer - 083520	-	5
		Intercollegiate Athletics - 083550	-	-
		Health Education - 083700	-	-
		Athletic Training and Sports Medicine - 122800	18	-
Food Service Managers (11-9051)	53	Dietetic Services and Management - 130620	-	-
		Hospitality - 130700	-	1
		Restaurant and Food Service and Management - 130710	4	20
		Lodging Management - 130720	-	-

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Self-Enrichment Education Teachers (25-3021)	52	No Corresponding Programs		
Parts Salespersons (41-2022)	47	Sales and Salesmanship - 050940	-	-
First-Line Supervisors of Personal Service Workers (39-1021)	44	No Corresponding Programs		
Manicurists and Pedicurists (39-5092)	32	Cosmetology and Barbering - 300700	2	615
Demonstrators and Product Promoters (41-9011)	31	No Corresponding Programs		
Butchers and Meat Cutters (51-3021)	25	No Corresponding Programs		
Bakers (51-3011)	25	No Corresponding Programs		
Musicians and Singers (27-2042)	24	Music - 100400	-	-
Interpreters and Translators (27-3091)	23	Sign Language - 085000	-	-
		Sign Language Interpreting - 085010	-	-
		Foreign Languages, General - 110100	-	-
		French - 110200	-	-
		German - 110300	-	-
		Italian - 110400	-	-
		Spanish - 110500	-	-
		Russian - 110600	-	-
		Chinese - 110700	-	-
		Japanese - 110800	-	-
		Latin - 110900	-	-
		Greek - 111000	-	-
		Hebrew and Semitic - 111100	-	-
		Arabic - 111200	-	-
		African Languages (Non-Semitic) - 111600	-	-
		Asian, South Asian and Pacific Islands (Chinese and Japanese excluded)	-	-
		Filipino (Tagalog) - 111710	-	-
Vietnamese - 111720	-	-		
Korean - 111730	-	-		
Portuguese - 111900	-	-		

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
		Other Foreign Languages - 119900	-	-
		Linguistics - 150110	-	-
		Classics - 150400	-	-
		Legal and Community Interpretation - 214000	-	-
Merchandise Displayers and Window Trimmers (27-1026)	12	Display - 050960	-	-
		Fashion Merchandising - 130320	3	3
Gaming Change Persons and Booth Cashiers (41-2012)	9	No Corresponding Programs		

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC





## PROTECTIVE SERVICES

### Current & Projected Employment

In the North Central Valley/Northern Mother Lode Subregion, the business type comprising state government (excluding education and hospitals) is projected to rapidly expand, adding more than 2,000 jobs by 2021, a 20% growth rate (Exhibit 51). Local government (excluding education and hospitals) will add more than 1,500 jobs, and investigation and security services will increase by 351 jobs. Not shown below is data indicating the federal government (civilian) business type will shrink by 800 jobs, a 13% decline in employment over the next five years.

**Exhibit 51: Protective services current and projected employment**

Description (NAICS)	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Local Government, Excluding Education and Hospitals (9039)	29,113	30,615	1,502	5%	403
State Government, Excluding Education and Hospitals (9029)	9,922	11,945	2,023	20%	317
Investigation and Security Services (5616)	2,627	2,978	351	13%	102

### Industry Staffing Patterns

Compliance officers, forensic science technicians and emergency medical technicians, and paramedics show robust growth (Exhibit 52). Data related to compliance officers can be found in the Agriculture, Water and Environmental Technologies section.

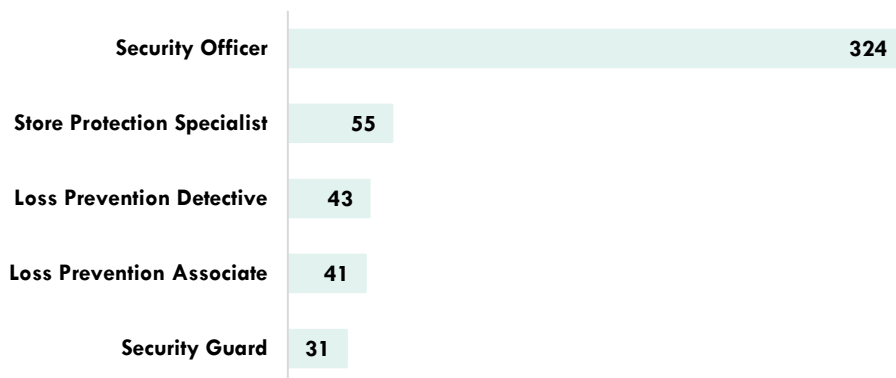
**Exhibit 52: Protective services staffing patterns**

SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
33-3012	Correctional Officers and Jailers	3,141	3,501	360	11%
33-3051	Police and Sheriff's Patrol Officers	2,083	2,267	184	9%
33-2011	Firefighters	1,527	1,612	85	6%
33-1011	First-Line Supervisors of Correctional Officers	391	435	44	11%
13-1041	Compliance Officers	392	424	32	8%
33-3021	Detectives and Criminal Investigators	256	281	25	10%
33-1012	First-Line Supervisors of Police and Detectives	197	219	22	11%
33-9099	Protective Service Workers, All Other	276	293	17	6%
19-4092	Forensic Science Technicians	72	89	17	24%
29-2041	Emergency Medical Technicians and Paramedics	122	136	14	11%
33-1021	First-Line Supervisors of Fire Fighting and Prevention Workers	127	139	12	9%
33-1099	First-Line Supervisors of Protective Service Workers, All Other	117	129	12	10%
33-9021	Private Detectives and Investigators	171	183	12	7%
33-9092	Lifeguards, Ski Patrol and Other Recreational Protective Service Workers	163	175	12	7%

## Job Postings

An analysis of job posting data for the 14 staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 53 details the top five occupations requiring less than a bachelor's degree advertised by employers.

**Exhibit 53: Protective services job postings**



## Skills

Communication skills, writing, physical demand and building effective relationships are the most commonly listed baseline skills from both perspectives (Exhibit 54).

**Exhibit 54: Protective services baseline skills**

Occupational Cluster		Industry: Protective Services	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Communication Skills	207	Writing	528
Writing	202	Communication Skills	479
Physical Demand	120	Physical Demand	474
Building Effective Relationships	104	English	329
Team Work/ Collaboration	90	Building Effective Relationships	322

Exhibit 55 shows specialized skills commonly listed in job ads. Loss prevention, asset protection and surveillance are those most highly ranked skills in the two tables.

**Exhibit 55: Protective services specialized skills**

Occupational Cluster		Industry: Protective Services	
Specialized Skills	Job Postings	Specialized Skills	Job Postings
Loss Prevention	241	Loss Prevention	250
Asset Protection	190	Handling of Crisis or Emergency Situations	214
Surveillance	165	Asset Protection	201
CPR	124	Surveillance	190
Customer Service	117	Law Enforcement or Criminal Justice Experience	180

Top software skills for jobs related to protective services are shown in Exhibit 56. The top four requested skills shared between the two perspectives are Microsoft Office, Excel, Word and PowerPoint.

**Exhibit 56: Protective services software skills**

Occupational Cluster		Industry: Protective Services	
Software Skills	Job Postings	Software Skills	Job Postings
Microsoft Office	48	Notepad	163
Microsoft Excel	41	Microsoft Office	57
Microsoft PowerPoint	30	Microsoft Excel	48
Microsoft Word	20	Microsoft Word	34
Microsoft Access	8	Microsoft PowerPoint	15

### Occupational Demand Projections

Corrections officers and jailers is the largest occupation in the industry and will add the greatest number of new jobs by 2021, 364, with 167 annual openings (Exhibit 57). This is followed by police and sheriff's patrol officers, 199 new jobs and 117 annual openings; and firefighters, 88 new jobs and 67 annual openings.

**Exhibit 57: Protective services occupational projections**

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Correctional Officers and Jailers	3,159	3,523	364	12%	167
Police and Sheriff's Patrol Officers	2,193	2,392	199	9%	117
Firefighters	1,553	1,641	88	6%	67
Emergency Medical Technicians and Paramedics	722	804	82	11%	38
Protective Service Workers, All Other	943	1021	78	8%	30
First-Line Supervisors of Correctional Officers	393	438	45	11%	21
Lifeguards, Ski Patrol and Other Recreational Protective Service Workers	319	356	37	12%	13
Police, Fire and Ambulance Dispatchers	389	399	10	3%	12
First-Line Supervisors of Police and Detectives	200	223	23	12%	12
Detectives and Criminal Investigators	259	284	25	10%	12
First-Line Supervisors of Protective Service Workers, All Other	180	202	22	12%	9
Private Detectives and Investigators	221	235	14	6%	9
First-Line Supervisors of Fire Fighting and Prevention Workers	128	140	12	9%	9
Forensic Science Technicians	75	93	18	24%	7

## Wages

The highest occupational hourly wages are earned by: first-line supervisors of police and detectives; detectives and criminal investigators; and first-line supervisors of correctional officers (Exhibit 58).

Only two occupations have entry-level wages that fall below the subregion's average living wage for one adult: emergency medical technicians and paramedics; and lifeguards, ski patrol and other recreational service workers.

**Exhibit 58: Protective services wages**

Occupation	Entry-level Hourly Wages	Median Hourly Wages
First-Line Supervisors of Police and Detectives	\$34.92	\$57.89
Detectives and Criminal Investigators	\$32.61	\$45.51
First-Line Supervisors of Correctional Officers	\$32.41	\$49.70
First-Line Supervisors of Fire Fighting and Prevention Workers	\$25.59	\$37.87
Police and Sheriff's Patrol Officers	\$24.71	\$37.81
Forensic Science Technicians	\$22.93	\$32.60
Correctional Officers and Jailers	\$22.36	\$35.40
First-Line Supervisors of Protective Service Workers, All Other	\$16.34	\$25.82
Private Detectives and Investigators	\$15.88	\$27.38
Police, Fire and Ambulance Dispatchers	\$15.70	\$24.36
Firefighters	\$15.51	\$24.23
Protective Service Workers, All Other	\$11.54	\$16.05
Emergency Medical Technicians and Paramedics	\$10.61	\$16.64
Lifeguards, Ski Patrol and Other Recreational Protective Service Workers	\$9.42	\$11.75



## Education Level

Exhibit 59 shows education levels required for occupations that fall within the protective services industry. Only three of the occupations typically require a community college education; however, all but two require formal (academy) training certifications.

**Exhibit 59: Protective services education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Correctional Officers and Jailers	High school diploma or equivalent	None	Moderate-term	52.4%
Police and Sheriff's Patrol Officers	High school diploma or equivalent	None	Moderate-term	51.6%
Firefighters	Postsecondary nondegree award	None	Long-term	63.6%
Emergency Medical Technicians and Paramedics	Postsecondary nondegree award	None	None	68.3%
Protective Service Workers, All Other	High school diploma or equivalent	None	Short-term	36.4%
First-Line Supervisors of Correctional Officers	High school diploma or equivalent	Less than 5 years	Moderate-term	46.3%
Lifeguards, Ski Patrol and Other Recreational Protective Service Workers	No formal educational credential	None	Short-term	36.4%
Police, Fire and Ambulance Dispatchers	High school diploma or equivalent	None	Moderate-term	47.6%
First-Line Supervisors of Police and Detectives	High school diploma or equivalent	Less than 5 years	Moderate-term	43.4%
Detectives and Criminal Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	35.2%
First-Line Supervisors of Protective Service Workers, All Other	High school diploma or equivalent	Less than 5 years	None	43.1%
Private Detectives and Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	32.1%
First-Line Supervisors of Fire Fighting and Prevention Workers	Postsecondary nondegree award	Less than 5 years	Moderate-term	59.2%
Forensic Science Technicians	Bachelor's degree	None	Moderate-term	33.9%

## Community College Supply

Exhibit 60 shows annual job openings and corresponding program titles with student completion data.

**Exhibit 60: Protective services community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Correctional Officers and Jailers (33-3012)	167	Corrections - 210510	22	11
		Probation and Parole - 210520	-	-
Police and Sheriff's Patrol Officers (33-3051)	117	Administration of Justice - 210500	284	13
		Police Academy - 210550	-	-
Firefighters (33-2011)	67	Fire Technology - 213300	36	37
		Wildland Fire Technology - 213310	-	-
		Fire Academy - 213350	-	14
Emergency Medical Technicians and Paramedics (29-2041)	38	Emergency Medical Services - 125000	0	15
		Paramedic - 125100	-	-
Protective Service Workers, All Other (33-9099)	30	No corresponding programs		
First-Line Supervisors of Correctional Officers (33-1011)	21	Corrections - 210510	22	11
		Probation and Parole - 210520	-	-
Lifeguards, Ski Patrol and Other Recreational Protective Service Workers (33-9092)	13	No corresponding programs		
Police, Fire and Ambulance Dispatchers (43-5031)	12	No corresponding programs		
First-Line Supervisors of Police and Detectives (33-1012)	12	Corrections - 210510	22	11
Detectives and Criminal Investigators (33-3021)	12	Administration of Justice - 210500	284	13
		Police Academy - 210550	-	-
First-Line Supervisors of Protective Service Workers, All Other (33-1099)	9	No corresponding programs		
Private Detectives and Investigators (33-9021)	9	Administration of Justice - 210500	284	13
		Police Academy - 210550	-	-
First-Line Supervisors of Fire Fighting and Prevention Workers (33-1021)	9	Fire Technology - 213300	36	37
Forensic Science Technicians (19-4092)	7	Forensics, Evidence, and Investigation - 210540	-	-

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC

## ICT/DIGITAL MEDIA

### Current & Projected Employment

The wired telecommunications business type is projected to produce the most new jobs in the ICT/digital media industry in the next five years, resulting in 412 new positions, a 32% growth rate (Exhibit 61). The motion picture and video business type will expand by 8%, creating 169 new jobs. Computer design and related services will undergo moderate growth, 8%, adding 91 new jobs. While several other business types in ICT/digital media will experience rapid growth rates of 30% or higher, only a handful of new jobs will be created due to the small size of these business types. Examples include: software publishers; data processing, hosting and related services; and sound recording industries.

**Exhibit 61: ICT/digital media current and projected employment**

Description	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Wired Telecommunications Carriers (5171)	1,278	1,690	412	32%	55
Computer Systems Design and Related Services (5415)	1,154	1,245	91	8%	118
Motion Picture and Video Industries (5121)	949	1,118	169	18%	21
Specialized Design Services (5414)	575	613	38	7%	28
Software Publishers (5112)	79	104	25	32%	11
Other Information Services (5191)	56	59	3	5%	10
Data Processing, Hosting and Related Services (5182)	52	68	16	31%	8
Sound Recording Industries (5122)	37	48	11	30%	4

### Industry Staffing Patterns

The staffing patterns data for the ICT/digital media industry that indicated an addition of 10 or more jobs in the next five years are shown in Exhibit 62. Telecommunications equipment installers and repairers (except line installers) is the largest occupation with the greatest number of job gains projected at the industry level over the next five years.

**Exhibit 62: ICT/digital media staffing patterns**

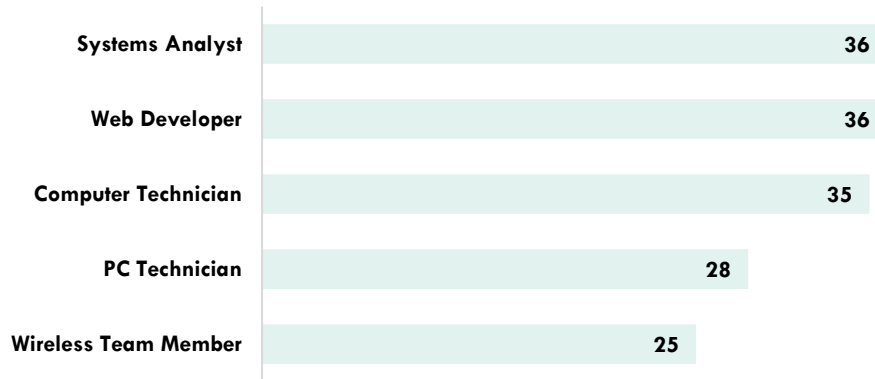
SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	483	579	96	20%
49-9052	Telecommunications Line Installers and Repairers	144	173	29	20%
15-1151	Computer User Support Specialists	140	157	17	12%
27-4011	Audio and Video Equipment Technicians	56	69	13	23%
15-1134	Web Developers	101	113	12	12%
15-1142	Network and Computer Systems Administrators	87	97	10	11%
15-1152	Computer Network Support Specialists	66	76	10	15%



## Job Postings

An analysis of job posting data for the seven staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 63 details the top five occupations requiring less than a bachelor's degree advertised by employers.

**Exhibit 63: ICT/digital media job postings**



## Skills

Troubleshooting, communication skills and writing are the three most commonly listed baseline skills from both perspectives (Exhibit 64).

**Exhibit 64: ICT/digital media baseline skills**

Occupational Cluster		Industry: Computers & Mathematical	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Troubleshooting	247	Communication Skills	612
Communication Skills	163	Troubleshooting	484
Writing	136	Writing	416
Problem Solving	130	Problem Solving	385
Team Work/Collaboration	89	Team Work/Collaboration	307

Exhibit 65 shows specialized skills commonly listed in job ads. Technical support, repair and customer service are highly ranked. From the industry perspective, however, Microsoft Excel, Word and Office are valued more highly than the skills shown in the occupational cluster table.

### Exhibit 65: ICT/digital media specialized skills

Occupational Cluster		Industry: Computers & Mathematical	
Specialized Skills	Job Postings	Specialized Skills	Job Postings
Technical Support	198	Microsoft Excel	287
Repair	163	Microsoft Word	264
Customer Service	134	Microsoft Office	215
Hardware and Software Installation	96	Word Processing	90
Microsoft Windows	86	Microsoft Windows	82

Top software skills for jobs related to ICT/digital media are shown in Exhibit 66. The top three requested skills are Microsoft Windows, Office and Excel. Microsoft Excel and Office are also highly valued from the industry perspective, as is SQL, the No. 1 valued specialized skill.

### Exhibit 66: ICT/digital media software skills

Occupational Cluster		Industry: Computers & Mathematical	
Software Skills	Job Postings	Software Skills	Job Postings
Microsoft Windows	86	SQL	413
Microsoft Office	72	Microsoft Excel	302
Microsoft Excel	58	Microsoft Office	216
SQL	58	Microsoft Word	173
JavaScript	45	JavaScript	136

## Occupational Demand Projections

Occupations of note in Exhibit 67 include: computer user support specialists, 121 new jobs, 42 annual openings; telecommunications equipment installers and repairers (except line installers), 112 new jobs, 30 annual openings; and network and system administrators, 59 new jobs, 22 annual openings.

### Exhibit 67: ICT/digital media occupational projections

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Computer User Support Specialists	1,262	1,383	121	10%	42
Telecommunications Equipment Installers and Repairers, Except Line Installers	698	810	112	16%	30
Network and Computer Systems Administrators	769	828	59	8%	22
Graphic Designers	631	654	23	4%	20
Computer Network Support Specialists	352	392	40	11%	13
Computer Occupations, All Other	533	553	20	4%	11
Web Developers	211	243	32	15%	9
Audio and Video Equipment Technicians	215	238	23	11%	9

## Wages

The highest hourly wages are earned by network and computer systems administrators and computer occupations (all other) (Exhibit 68). All of the listed occupations have wages above the subregion's average living wage for a single adult.

**Exhibit 68: ICT/digital media wages**

Occupation	Entry-Level Hourly Wages	Median Hourly Wages
Network and Computer Systems Administrators	\$22.61	\$36.36
Computer Occupations, All Other	\$21.08	\$32.67
Computer Network Support Specialists	\$18.42	\$30.42
Telecommunications Equipment Installers and Repairers, Except Line Installers	\$16.16	\$24.92
Web Developers	\$15.31	\$26.25
Computer User Support Specialists	\$14.67	\$22.03
Graphic Designers	\$13.90	\$20.11
Audio and Video Equipment Technicians	\$13.37	\$18.20

## Education Level

Exhibit 69 shows education levels required for occupations that fall within the ICT/digital media industry. Network and computer systems administrators, graphic designers and computer occupations (all other) have a typical entry-level education of a bachelor's degree. However, two of these occupations meet the 33% CPS threshold for being relevant to community college training. All remaining ICT/digital media occupations typically require community college education.

**Exhibit 69: ICT/digital media education levels**

Occupation	Typical Entry-Level Education	Work Experience Required	Typical On-the-Job Training	CPS
Computer User Support Specialists	Some college, no degree	None	None	45.2%
Telecommunications Equipment Installers and Repairers, Except Line Installers	Postsecondary nondegree award	None	Moderate-term	52.8%
Network and Computer Systems Administrators	Bachelor's degree	None	None	39.5%
Graphic Designers	Bachelor's degree	None	None	30.3%
Computer Network Support Specialists	Associate degree	None	None	45.2%
Computer Occupations, All Other	Bachelor's degree	None	None	36.9%
Web Developers	Associate degree	None	None	27.2%
Audio and Video Equipment Technicians	Postsecondary nondegree award	None	Short-term	44.6%

## Community College Supply

Exhibit 70 shows annual job openings and corresponding program titles with student completion data. There appears to be an undersupply for a number of occupations, notably: computer user support specialists; telecommunications equipment installers and repairers (except line installers); and network and computer systems administrators.

In addition, there may be an oversupply of students to fill graphic designer positions, computer network support specialist positions, computer occupations (all other) and web developer positions.

**Exhibit 70: ICT/digital media community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Computer User Support Specialists (15-1151)	42	Computer Information Systems - 070200	25	0
		Computer Support - 070820	-	2
Telecommunications Equipment Installers and Repairers, Except Line Installers (49-2022)	30	Telecommunications Technology - 093430	-	-
Network and Computer Systems Administrators (15-1142)	22	Computer Infrastructure and Support - 070800	-	1
Graphic Designers (27-1024)	20	Digital Media - 061400	-	4
		Computer Graphics and Digital Imagery - 061460	9	2
		Applied Design - 100900	-	-
		Commercial Art - 101300	-	-
		Graphic Art and Design - 103000	17	5
Computer Network Support Specialists (15-1152)	13	Computer Science (transfer) - 070600	27	-
		Computer Systems Analysis - 070730	-	-
		Computer Infrastructure and Support - 070800	-	1
		Computer Networking - 070810	50	25
		Computer Support - 070820	-	2
Computer Occupations, All Other (15-1199)	11	Electronic Game Design - 061420	-	-
		Information Technology, General - 070100	34	2
		Computer Information Systems - 070200	25	0
		Computer Science (transfer) - 070600	27	-

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
		Other Information Technology - 079900	-	-
		Geographic Information Systems - 220610	-	9
Web Developers (15-1134)	9	Website Design and Development - 061430	-	2
		Computer Science (transfer) - 070600	27	-
		Computer Software Development - 070700	-	-
		Computer Programming - 070710	-	7
		World Wide Web Administration - 070900	-	-
		E-Commerce (technology emphasis) - 070910	-	-
		Commercial Music	-	2
Audio and Video Equipment Technicians (27-4011)	9	Commercial Music	-	2

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC



## HEALTH CARE

### Current & Projected Employment

Of all the industries analyzed, the health care industry is expected to offer the most employment opportunities in the North Central Valley/Northern Mother Lode Subregion over the next five years. Overall, more than 13,500 new jobs are anticipated.

Only one business type is projected to contract, general medical and surgical hospitals (NAICS 6221), which is expected to shed 202 jobs, 1% of total employment in this business type, by 2021.

Individual and family services will create the most new jobs, 5,887, with a growth rate of 31% (Exhibit 71).

Another job generator will be outpatient care centers. This business type also has a 31% growth rate and will add more than 2,000 positions. Offices of physicians and nursing care facilities (skilled nursing facilities) will each add more than 1,100 jobs. Home health care services will grow by 53%, resulting in 1,410 new positions.

**Exhibit 71: Health care current and projected employment**

Description (NAICS)	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Individual and Family Services (6241)	19,286	25,173	5,887	31%	12,856
Offices of Physicians (6211)	8,688	9,818	1,130	13%	982
Nursing Care Facilities (Skilled Nursing Facilities) (6231)	7,064	8,220	1,156	16%	83
Outpatient Care Centers (6214)	6,548	8,580	2,032	31%	155
Offices of Dentists (6212)	4,446	4,932	486	11%	609
Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly (6233)	3,186	3,741	555	17%	129
Offices of Other Health Practitioners (6213)	2,803	3,205	402	14%	390
Home Health Care Services (6216)	2,677	4,087	1,410	53%	65
Residential Intellectual and Developmental Disability, Mental Health and Substance Abuse Facilities (6232)	1,794	1,988	194	11%	101
Other Ambulatory Health Care Services (6219)	1,474	1,602	128	9%	27
Vocational Rehabilitation Services (6243)	953	975	22	2%	31
Medical and Diagnostic Laboratories (6215)	728	876	148	20%	78
Other Residential Care Facilities (6239)	473	502	29	6%	37
Psychiatric and Substance Abuse Hospitals (6222)	231	339	108	47%	3
Specialty Hospitals (except Psychiatric and Substance Abuse) (6223)	146	210	64	44%	3

## Industry Staffing Patterns

The staffing patterns data for the health care industry that indicated an addition of 10 or more jobs in the next five years are shown in Exhibit 72. The registered nurses occupation is the largest and has the greatest projected five-year change, 1,046 new jobs, followed by nursing assistants, which employed 4,567 workers in 2016 and has a projected increase of 860 new jobs by 2021. Home health aides has the next greatest growth projection, 860 new jobs.

**Exhibit 72: Health care staffing patterns**

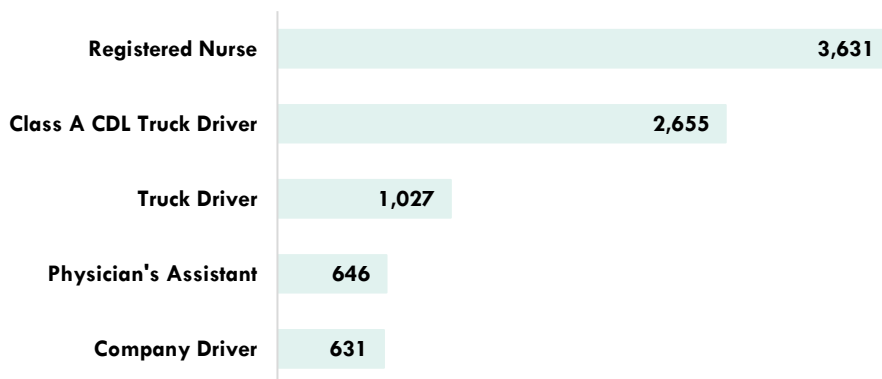
SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
29-1141	Registered Nurses	7,321	8,367	1,046	14%
31-1014	Nursing Assistants	4,567	5,427	860	19%
31-1011	Home Health Aides	1,240	2,008	768	62%
31-9092	Medical Assistants	3,414	3,863	449	13%
29-2061	Licensed Practical and Licensed Vocational Nurses	1,905	2,322	417	22%
43-6013	Medical Secretaries	2,272	2,550	278	12%
31-9091	Dental Assistants	1,714	1,908	194	11%
29-2021	Dental Hygienists	726	824	98	13%
29-2071	Medical Records and Health Information Technicians	512	579	67	13%
31-9097	Phlebotomists	561	624	63	11%
29-2041	Emergency Medical Technicians and Paramedics	570	630	60	11%
29-2012	Medical and Clinical Laboratory Technicians	371	421	50	13%
31-2021	Physical Therapist Assistants	154	202	48	31%
29-2034	Radiologic Technologists	509	551	42	8%
31-2022	Physical Therapist Aides	225	266	41	18%
29-2055	Surgical Technologists	269	308	39	14%
29-2011	Medical and Clinical Laboratory Technologists	332	362	30	9%
31-9099	Healthcare Support Workers, All Other	287	315	28	10%
29-2053	Psychiatric Technicians	211	236	25	12%
29-2032	Diagnostic Medical Sonographers	178	202	24	13%
29-2081	Opticians, Dispensing	197	219	22	11%
29-2052	Pharmacy Technicians	324	345	21	6%
31-9093	Medical Equipment Preparers	326	347	21	6%
29-2057	Ophthalmic Medical Technicians	140	160	20	14%
31-2011	Occupational Therapy Assistants	40	59	19	48%
31-1013	Psychiatric Aides	31	49	18	58%
29-1126	Respiratory Therapists	402	418	16	4%
29-2031	Cardiovascular Technologists and Technicians	144	157	13	9%
29-9099	Healthcare Practitioners and Technical Workers, All Other	116	129	13	11%
29-2051	Dietetic Technicians	146	158	12	8%



## Job Postings

An analysis of job posting data for the 30 staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 73 details the top five occupations requiring less than a bachelor's degree advertised by employers.

**Exhibit 73: Health care job postings**



## Skills

Communication skills, English, writing and computer skills are the most commonly listed baseline skills from both perspectives (Exhibit 74).

**Exhibit 74: Health care baseline skills**

Occupational Cluster		Industry: Health Care	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Communication Skills	1593	Communication Skills	2118
English	1103	Writing	1320
Writing	929	English	1312
Computer Skills	867	Team Work/ Collaboration	1030
Planning	774	Computer Skills	1010

Exhibit 75 shows specialized skills commonly listed by health care employers. Patient care, advanced cardiac life support, acute care and cardiopulmonary resuscitation are the most highly ranked among the selected occupations and across the industry.

**Exhibit 75: Health care specialized skills**

<b>Occupational Cluster</b>		<b>Industry: Health Care</b>	
<b>Specialized Skills</b>	<b>Job Postings</b>	<b>Specialized Skills</b>	<b>Job Postings</b>
Patient Care	2052	Patient Care	2634
Advanced Cardiac Life Support (ACLS)	1565	Treatment Planning	1761
Acute Care	1236	Advanced Cardiac Life Support (ACLS)	1671
Cardiopulmonary Resuscitation (CPR)	1231	Cardiopulmonary Resuscitation (CPR)	1660
Treatment Planning	1034	Acute Care	1445

Top software skills for jobs related to health care are shown in Exhibit 76. The top three requested skills are Microsoft Excel, Word and Office. The industry-level software skills data mirrors that contained in the occupational cluster table.

**Exhibit 76: Health care software skills**

<b>Occupational Cluster</b>		<b>Industry: Health Care</b>	
<b>Software Skills</b>	<b>Job Postings</b>	<b>Software Skills</b>	<b>Job Postings</b>
Microsoft Excel	252	Microsoft Excel	287
Microsoft Word	248	Microsoft Word	264
Microsoft Office	169	Microsoft Office	215
Word Processing	64	Word Processing	90
Microsoft Windows	61	Microsoft Windows	82

## Occupational Demand Projections

The occupation of registered nurses had the largest employment in the health care sector, with 8,945 jobs in 2016 (Exhibit 77). This occupation also has the greatest projected gain by 2021, 1,247 new jobs, as well as the most annual openings, 481. This is followed by nursing assistants, 922 new jobs and 313 annual openings, and home health aides, 779 new jobs and 200 annual openings.

**Exhibit 77: Health care occupational projections**

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Registered Nurses	8,945	10,192	1,247	14%	481
Nursing Assistants	5,040	5,962	922	18%	313
Home Health Aides	1,307	2,086	779	60%	200
Medical Assistants	3,642	4,119	477	13%	178
Licensed Practical and Licensed Vocational Nurses	2,240	2,691	451	20%	163
Medical Secretaries	2,526	2,830	304	12%	90
Dental Assistants	1,786	1,989	203	11%	88
Pharmacy Technicians	1,585	1,701	116	7%	40
Dental Hygienists	742	844	102	14%	34
Medical Records and Health Information Technicians	663	744	81	12%	32
Phlebotomists	630	700	70	11%	28
Medical and Clinical Laboratory Technicians	440	501	61	14%	24
Radiologic Technologists	573	622	49	9%	21
Opticians, Dispensing	354	400	46	13%	20
Medical and Clinical Laboratory Technologists	400	440	40	10%	18
Healthcare Support Workers, All Other	457	496	39	9%	18
Respiratory Therapists	478	505	27	6%	17
Physical Therapist Aides	243	287	44	18%	17
Physical Therapist Assistants	166	218	52	31%	16
Psychiatric Technicians	382	438	56	15%	15
Massage Therapists	495	550	55	11%	15
Medical Equipment Preparers	370	395	25	7%	13
Surgical Technologists	297	340	43	14%	12
Diagnostic Medical Sonographers	194	222	28	14%	10

## Wages

The highest hourly wages are earned by registered nurses, diagnostic medical sonographers, and medical and clinical laboratory technologists (Exhibit 78). However, five occupations have entry-level wages that fall below the subregion's average living wage for one adult, \$11.02/hour: medical assistants, nursing assistants, massage therapists, physical therapy aides and home health aides.

**Exhibit 78: Health care wages**

Occupation	Entry-level Wages	Median Hourly Wages
Registered Nurses	\$34.39	\$49.09
Diagnostic Medical Sonographers	\$32.05	\$45.56
Medical and Clinical Laboratory Technologists	\$28.56	\$38.98
Respiratory Therapists	\$27.51	\$38.61
Dental Hygienists	\$26.76	\$41.30
Radiologic Technologists	\$22.27	\$38.96
Psychiatric Technicians	\$21.20	\$27.38
Surgical Technologists	\$20.89	\$31.15
Licensed Practical and Licensed Vocational Nurses	\$18.54	\$24.96
Physical Therapist Assistants	\$16.14	\$29.77
Medical and Clinical Laboratory Technicians	\$14.29	\$21.28
Healthcare Support Workers, All Other	\$13.74	\$18.72
Phlebotomists	\$13.64	\$19.20
Medical Equipment Preparers	\$13.28	\$18.84
Medical Records and Health Information Technicians	\$13.14	\$19.93
Opticians, Dispensing	\$12.64	\$16.93
Pharmacy Technicians	\$12.04	\$18.09
Medical Secretaries	\$11.83	\$16.42
Dental Assistants	\$11.75	\$15.96
Medical Assistants	\$10.51	\$15.14
Nursing Assistants	\$10.40	\$13.89
Massage Therapists	\$10.16	\$14.45
Physical Therapist Aides	\$9.97	\$12.77
Home Health Aides	\$9.41	\$11.46

## Education Level

Exhibit 79 shows education levels required for occupations that fall within the health care industry. Although the occupation of registered nurses at the national level has a typical education level of a bachelor's degree, California only requires an associate degree. Nearly two-thirds of the health care occupations below typically require community college education. Most of the remaining occupations that indicate no formal educational credential or a high school diploma/equivalent do require some formal training and accompanying third-party certification.

**Exhibit 79: Health care education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical OTJ Training</b>	<b>CPS</b>
Registered Nurses	Bachelor's degree	None	None	42.1%
Nursing Assistants	Postsecondary nondegree award	None	None	41.7%
Home Health Aides	No formal educational credential	None	Short-term	41.7%
Medical Assistants	Postsecondary nondegree award	None	None	65%
Licensed Practical and Licensed Vocational Nurses	Postsecondary nondegree award	None	None	74.1%
Medical Secretaries	High school diploma or equivalent	None	Moderate-term	47.5%
Dental Assistants	Postsecondary nondegree award	None	None	58.3%
Pharmacy Technicians	High school diploma or equivalent	None	Moderate-term	56.4%
Dental Hygienists	Associate degree	None	None	60.8%
Medical Records and Health Information Technicians	Postsecondary nondegree award	None	None	54.9%
Phlebotomists	Postsecondary nondegree award	None	None	61.1%
Medical and Clinical Laboratory Technicians	Associate degree	None	None	36.2%
Radiologic Technologists	Associate degree	None	None	66.1%
Opticians, Dispensing	High school diploma or equivalent	None	Long-term	56.1%
Medical and Clinical Laboratory Technologists	Bachelor's degree	None	None	36.2%
Healthcare Support Workers, All Other	High school diploma or equivalent	None	None	38.1%
Respiratory Therapists	Associate degree	None	None	69.9%
Physical Therapist Aides	High school diploma or equivalent	None	Short-term	70.9%
Physical Therapist Assistants	Associate degree	None	None	70.9%
Psychiatric Technicians	Postsecondary nondegree award	Less than 5 years	Short-term	56.4%
Massage Therapists	Postsecondary nondegree award	None	None	54%
Medical Equipment Preparers	High school diploma or equivalent	None	Moderate-term	38.1%
Surgical Technologists	Postsecondary nondegree award	None	None	56.4%
Diagnostic Medical Sonographers	Associate degree	None	None	66.1%

## Community College Supply

Exhibit 80 shows annual job openings and corresponding program titles with student completion data.

**Exhibit 80: Health care community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Registered Nurses (29-1141)	481	Nursing - 123000	-	-
		Registered Nursing - 123010	262	1
Nursing Assistants (31-1014)	313	Health Occupations, General - 120100	31	-
		School Health Clerk - 122400	-	-
		Nursing - 123000	-	-
		Certified Nurse Assistant - 123030	-	98
Home Health Aides (31-1011)	200	Health Occupations, General - 120100	31	-
		Nursing - 123000	-	-
		Home Health Aide - 123080	-	-
		Gerontology - 130900	-	2
Medical Assistants (31-9092)	178	Medical Assisting - 120800	209	329
		Clinical Medical Assisting - 120810	-	-
Licensed Practical and Licensed Vocational Nurses (29-2061)	163	Nursing - 123000	-	-
		Licensed Vocational Nursing - 123020	15	76
Medical Secretaries (43-6013)	90	Medical Office Technology - 051420	55	125
		Administrative Medical Assisting - 120820	-	-
Dental Assistants (31-9091)	88	Dental Occupations - 124000	-	-
		Dental Assistant - 124010	51	136
Pharmacy Technicians (29-2052)	40	Pharmacy Technology - 122100	49	10
Dental Hygienists (29-2021)	34	Dental Occupations - 124000	-	-
		Dental Hygienist - 124020	-	-
Medical Records and Health Information Technicians (29-2071)	32	Health Information Technology - 122300	-	-
		Health Information Coding - 122310	-	0
Phlebotomists (31-9097)	28	Phlebotomy - 120510	-	-
Medical and Clinical Laboratory Technicians (29-2012)	24	Biotechnology and Biomedical Technology - 043000	2	0
		Laboratory Science Technology - 095500	0	-

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
		Medical Laboratory Technology - 120500	-	-
Radiologic Technologists (29-2034)	21	Radiologic Technology - 122500	23	14
Opticians, Dispensing (29-2081)	20	No corresponding programs		
Medical and Clinical Laboratory Technologists (29-2011)	18	Electron Microscopy - 093470	-	19
Healthcare Support Workers, All Other (31-9099)	18	Health Facility Unit Coordinator - 120830	-	-
		Speech/Language Pathology and Audiology - 122000	16	1
Respiratory Therapists (29-1126)	17	Respiratory Care/Therapy - 121000	73	-
Physical Therapist Aides (31-2022)	17	No corresponding programs		
Physical Therapist Assistants (31-2021)	16	Physical Therapist Assistant - 122200	-	-
Psychiatric Technicians (29-2053)	15	Psychiatric Technician - 123900	25	63
Massage Therapists (31-9011)	15	Massage Therapy - 126200	-	48
Medical Equipment Preparers (31-9093)	13	Hospital Central Service Technician - 120900	-	-
Surgical Technologists (29-2055)	12	Surgical Technician - 121700	-	-
Diagnostic Medical Sonographers (29-2032)	10	Diagnostic Medical Sonography - 122700	-	3

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC



## MANUFACTURING

### Current & Projected Employment

With the manufacturing industry projected to generate approximately 2,000 new jobs by 2021 in the subregion, beverage manufacturing will account for a significant portion of the industry's job creation.

Beverage manufacturing will grow by 11%, adding 755 jobs (Exhibit 81). Converted paper product manufacturing is projected to add 381 jobs, growing by 18%.

Other business types that will each create more than 200 new jobs over the next five years in the subregion include: dairy product manufacturing; household and institutional furniture and kitchen cabinet manufacturing; and agriculture, construction and mining machinery manufacturing.

Business types that are expected to contract in the subregion include animal slaughtering and processing (the loss of 100 jobs), glass and glass product manufacturing (the loss of 135 jobs), and plastics product manufacturing (the loss of 99 jobs).

**Exhibit 81: Manufacturing current and projected employment**

Description (NAICS)	2016 Jobs	2021 Jobs	5-Year Change	5-Year % Change	# of Firms
Beverage Manufacturing (3121)	6,672	7,427	755	11%	134
Dairy Product Manufacturing (3115)	3,443	3,697	254	7%	28
Other Food Manufacturing (3119)	2,578	2,605	27	1%	23
Architectural and Structural Metals Manufacturing (3323)	2,147	2,282	135	6%	71
Converted Paper Product Manufacturing (3222)	2,140	2,521	381	18%	18
Cement and Concrete Product Manufacturing (3273)	1,352	1,488	136	10%	36
Household and Institutional Furniture and Kitchen Cabinet Manufacturing (3371)	1,246	1,451	205	16%	56
Animal Food Manufacturing (3111)	1,245	1,254	9	1%	42
Machine Shops; Turned Product; and Screw, Nut and Bolt Manufacturing (3327)	968	1,054	86	9%	88
Agriculture, Construction, and Mining Machinery Manufacturing (3331)	955	1,234	279	29%	20



## Industry Staffing Patterns

The staffing patterns data for the manufacturing industry that indicated an addition of 10 or more jobs in the next five years are shown in Exhibit 82.

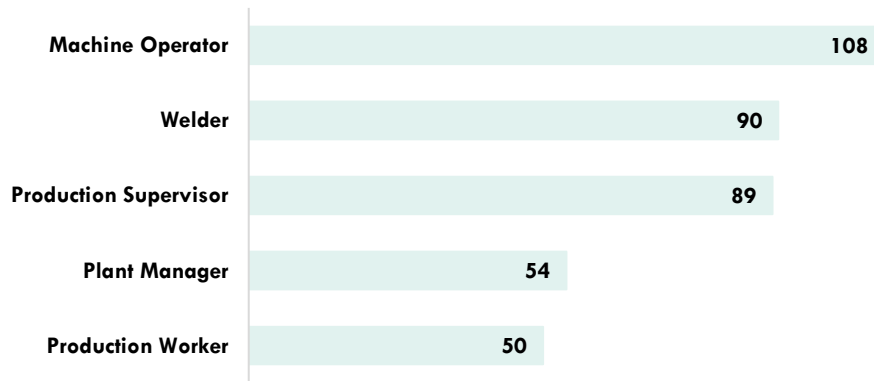
**Exhibit 82: Manufacturing staffing patterns**

SOC	Description	Employment		5-Year Change	5-Year % Change
		2016	2021		
49-9041	Industrial Machinery Mechanics	1,106	1,257	151	14%
51-9111	Packaging and Filling Machine Operators and Tenders	4,070	4,184	114	3%
51-9196	Paper Goods Machine Setters, Operators and Tenders	695	792	97	14%
51-9012	Separating, Filtering, Clarifying, Precipitating and Still Machine Setters, Operators and Tenders	930	1,007	77	8%
51-1011	First-Line Supervisors of Production and Operating Workers	1,864	1,930	66	4%
51-4041	Machinists	674	732	58	9%
51-4121	Welders, Cutters, Solderers and Brazers	969	1,021	52	5%
51-2092	Team Assemblers	1,629	1,678	49	3%
51-9061	Inspectors, Testers, Sorters, Samplers and Weighers	1,366	1,403	37	3%
49-9071	Maintenance and Repair Workers, General	838	874	36	4%
51-3092	Food Batchmakers	1,023	1,057	34	3%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	227	261	34	15%
49-9043	Maintenance Workers, Machinery	377	404	27	7%
51-9023	Mixing and Blending Machine Setters, Operators and Tenders	844	871	27	3%
11-3051	Industrial Production Managers	653	677	24	4%
51-2041	Structural Metal Fabricators and Fitters	336	357	21	6%
51-9121	Coating, Painting and Spraying Machine Setters, Operators and Tenders	236	256	20	8%
51-9199	Production Workers, All Other	481	495	14	3%
43-5061	Production, Planning and Expediting Clerks	338	350	12	4%
51-2099	Assemblers and Fabricators, All Other	148	160	12	8%
51-9191	Adhesive Bonding Machine Operators and Tenders	150	162	12	8%
51-4081	Multiple Machine Tool Setters, Operators and Tenders, Metal and Plastic	82	93	11	13%
47-2211	Sheet Metal Workers	135	145	10	7%
49-1011	First-Line Supervisors of Mechanics, Installers and Repairers	211	221	10	5%

## Job Postings

An analysis of job posting data for the 24 staffing pattern occupations shows the positions employers most sought to fill in the last 12 months. Exhibit 83 details the top five occupations requiring less than a bachelor's degree advertised by employers.

**Exhibit 83: Manufacturing job postings**



## Skills

Physical demand, communication skills and writing are the most commonly listed baseline skills across both perspectives (Exhibit 84). The remaining two of the top five occupational baseline skills include troubleshooting and maintenance, whereas, English and mathematics are dominant in the industry perspective.

**Exhibit 84: Manufacturing baseline skills**

Occupational Cluster		Industry: Production	
Baseline Skills	Job Postings	Baseline Skills	Job Postings
Physical Demand	563	Communication Skills	339
Communication Skills	558	Physical Demand	314
Troubleshooting	544	English	265
Preventive Maintenance	509	Writing	219
Writing	434	Mathematics	202

Repair, inspection, scheduling and supervisory skills are the most commonly listed specialized skills by the subregion's employers (Exhibit 85).

### Exhibit 85: Manufacturing specialized skills

Occupational Cluster		Industry: Production	
Specialized Skills	Job Postings	Specialized Skills	Job Postings
Repair	1029	Inspection	285
Inspection	483	Scheduling	248
Scheduling	482	Supervisory Skills	234
Supervisory Skills	465	Repair	199
Machinery	373	Packaging	183

The top five software skills for jobs related to manufacturing are shown in Exhibit 86. The skills listed in each table are identical. Once again, the Microsoft suite of tools dominates, along with SAP.

### Exhibit 86: Manufacturing software skills

Occupational Cluster		Industry: Production	
Software Skills	Job Postings	Software Skills	Job Postings
Microsoft Excel	288	Microsoft Excel	134
Microsoft Office	272	Microsoft Office	108
Microsoft Word	137	Microsoft Word	67
SAP	93	SAP	42
Microsoft PowerPoint	80	Microsoft PowerPoint	35

## Occupational Demand Projections

The largest occupation is packaging and filling machine operators and tenders, which has the greatest projected gain, 267 new jobs by 2021 with 256 annual openings (Exhibit 87). The second largest occupation is industrial machinery mechanics, 282 new jobs with 109 annual openings, followed by team assemblers, 169 new jobs and 87 annual openings.

**Exhibit 87: Manufacturing occupational projections**

<b>Occupation</b>	<b>2016</b>	<b>2021</b>	<b>5-Yr Change</b>	<b>5-Yr % Change</b>	<b>Annual Openings</b>
Packaging and Filling Machine Operators and Tenders	5,482	5,749	267	5%	256
Industrial Machinery Mechanics	1,826	2,108	282	15%	109
Team Assemblers	2328	2497	169	7%	87
Inspectors, Testers, Sorters, Samplers and Weighers	2159	2283	124	6%	82
First-Line Supervisors of Production and Operating Workers	2631	2748	117	4%	67
First-Line Supervisors of Mechanics, Installers and Repairers	1653	1800	147	9%	64
Separating, Filtering, Clarifying, Precipitating and Still Machine Setters, Operators and Tenders	1032	1116	84	8%	52
Production, Planning and Expediting Clerks	915	1002	87	10%	44
Production Workers, All Other	1089	1172	83	8%	41
Food Batchmakers	1134	1174	40	4%	33
Paper Goods Machine Setters, Operators and Tenders	748	848	100	13%	32
Industrial Production Managers	824	858	34	4%	31
Mixing and Blending Machine Setters, Operators and Tenders	945	982	37	4%	29
Assemblers and Fabricators, All Other	394	453	59	15%	21
Maintenance Workers, Machinery	590	643	53	9%	21
Computer-Controlled Machine Tool Operators, Metal and Plastic	235	272	37	16%	15
Food Processing Workers, All Other	424	443	19	4%	13
Molders, Shapers and Casters, Except Metal and Plastic	261	271	10	4%	12
Coating, Painting and Spraying Machine Setters, Operators and Tenders	269	293	24	9%	10

## Wages

The highest hourly wages are earned by industrial production managers and first-line supervisors of mechanics, installers and repairers (Exhibit 88). One-third of the occupations, however, have entry-level wages below the subregion's average living wage for a single adult.

**Exhibit 88: Manufacturing wages**

Occupation	Pct. 10 Hourly Wages	Median Hourly Wages
Industrial Production Managers	\$26.40	\$40.83
First-Line Supervisors of Mechanics, Installers and Repairers	\$19.53	\$31.49
Industrial Machinery Mechanics	\$18.30	\$26.01
First-Line Supervisors of Production and Operating Workers	\$15.15	\$25.22
Production, Planning and Expediting Clerks	\$14.57	\$22.97
Maintenance Workers, Machinery	\$12.70	\$18.67
Separating, Filtering, Clarifying, Precipitating and Still Machine Setters, Operators and Tenders	\$12.27	\$18.45
Computer-Controlled Machine Tool Operators, Metal and Plastic	\$11.48	\$19.33
Molders, Shapers and Casters, Except Metal and Plastic	\$11.43	\$13.91
Coating, Painting and Spraying Machine Setters, Operators and Tenders	\$11.24	\$16.13
Inspectors, Testers, Sorters, Samplers and Weighers	\$11.14	\$17.80
Assemblers and Fabricators, All Other	\$10.37	\$12.87
Food Batchmakers	\$10.00	\$15.40
Food Processing Workers, All Other	\$9.99	\$12.03
Mixing and Blending Machine Setters, Operators and Tenders	\$9.94	\$14.77
Production Workers, All Other	\$9.91	\$11.76
Team Assemblers	\$9.71	\$13.38
Packaging and Filling Machine Operators and Tenders	\$9.66	\$14.65
Paper Goods Machine Setters, Operators and Tenders	\$9.35	\$12.03

## Education Level

Exhibit 89 shows education levels required for occupations that fall within the manufacturing industry. The typical entry-level education of industrial production managers is a bachelor's degree, and this occupation falls only minutely short of meeting the 33% CPS threshold. The remaining occupations have education requirements below the community college level. However, nearly three-quarters of them have moderate-term to long-term on-the-job training requirements or upskilling needs that are addressed by many local community college programs.

**Exhibit 89: Manufacturing education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Packaging and Filling Machine Operators and Tenders	High school diploma or equivalent	None	Moderate-term	18.6%
Industrial Machinery Mechanics	High school diploma or equivalent	None	Long-term	41.7%
Team Assemblers	High school diploma or equivalent	None	Moderate-term	29.2%
Inspectors, Testers, Sorters, Samplers and Weighers	High school diploma or equivalent	None	Moderate-term	37.7%
First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent	Less than 5 years	None	35.3%
First-Line Supervisors of Mechanics, Installers and Repairers	High school diploma or equivalent	Less than 5 years	None	42.9%
Separating, Filtering, Clarifying, Precipitating and Still Machine Setters, Operators and Tenders	High school diploma or equivalent	None	Moderate-term	41.0%
Production, Planning and Expediting Clerks	High school diploma or equivalent	None	Moderate-term	40.1%
Production Workers, All Other	High school diploma or equivalent	None	Moderate-term	26.7%
Food Batchmakers	High school diploma or equivalent	None	Moderate-term	27.0%
Paper Goods Machine Setters, Operators and Tenders	High school diploma or equivalent	None	Moderate-term	30.4%
Industrial Production Managers	Bachelor's degree	5 years or more	None	32.7%
Mixing and Blending Machine Setters, Operators and Tenders	High school diploma or equivalent	None	Moderate-term	26.8%
Assemblers and Fabricators, All Other	High school diploma or equivalent	None	Moderate-term	29.2%
Maintenance Workers, Machinery	High school diploma or equivalent	None	Moderate-term	34.5%
Computer-Controlled Machine Tool Operators, Metal and Plastic	High school diploma or equivalent	None	Moderate-term	43.6%
Food Processing Workers, All Other	No formal educational credential	None	Moderate-term	18.7%
Molders, Shapers and Casters, Except Metal and Plastic	High school diploma or equivalent	None	Long-term	24.4%
Coating, Painting and Spraying Machine Setters, Operators and Tenders	High school diploma or equivalent	None	Moderate-term	27.1%

## Community College Supply

Exhibit 90 shows annual job openings and corresponding program titles with student completion data.

**Exhibit 90: Manufacturing community college supply**

Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Packaging and Filling Machine Operators and Tenders (51-9111)	256	No corresponding programs		
Industrial Machinery Mechanics (49-9041)	109	No corresponding programs		
Team Assemblers (51-2092)	87	No corresponding programs		
Inspectors, Testers, Sorters, Samplers and Weighers (51-9061)	82	Biotechnology and Biomedical Technology - 043000	2	0
		Laboratory Science Technology - 095500	0	-
		Manufacturing and Industrial Technology - 095600	-	-
		Industrial Quality Control - 095680	-	-
First-Line Supervisors of Production and Operating Workers (51-1011)	67	No corresponding programs		
First-Line Supervisors of Mechanics, Installers and Repairers (49-1011)	64	Electrical Systems and Power Transmission - 093440	-	-
		Recreational Vehicle Service - 094850	-	-
Separating, Filtering, Clarifying, Precipitating and Still Machine Setters, Operators and Tenders (51-9012)	52	No corresponding programs		
Production, Planning and Expediting Clerks (43-5061)	44	Logistics and Materials Transportation - 051000	0	1
Production Workers, All Other (51-9199)	41	No corresponding programs		
Food Batchmakers (51-3092)	33	No corresponding programs		
Paper Goods Machine Setters, Operators and Tenders (51-9196)	32	No corresponding programs		
Industrial Production Managers (11-3051)	31	Business and Commerce, General - 050100	243	4
		Business Administration - 050500	255	-
		Business Management - 050600	16	6



Occupation	Annual Openings (2016-21)	Program - TOP6	Total Annual Avg Degrees (2013-16)	Total Annual Avg Certificates (2013-16)
Mixing and Blending Machine Setters, Operators and Tenders (51-9023)	29	No corresponding programs		
Assemblers and Fabricators, All Other (51-2099)	21	No corresponding programs		
Maintenance Workers, Machinery (49-9043)	21	No corresponding programs		
Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)	15	Manufacturing and Industrial Technology - 095600	-	-
		Machining and Machine Tools - 095630	1	15
Food Processing Workers, All Other (51-3099)	13	No corresponding programs		
Molders, Shapers and Casters, Except Metal and Plastic (51-9195)	12	No corresponding programs		
Coating, Painting and Spraying Machine Setters, Operators and Tenders (51-9121)	10	No corresponding programs		

Source: EMSI, MIS, Data Mart, Center of Excellence TOP-CIP-SOC





## CONCLUSION & RECOMMENDATIONS

The North Central Valley/Northern Mother Lode's population currently totals more than 1.7 million residents and is projected to add more than 54,000 new residents by 2022.

This study focused on eight industries: agriculture, water and environmental technologies; energy, construction and utilities; global trade and logistics; retail and hospitality; protective services; ICT/digital media; health care; and manufacturing.

Collectively, these industries employ approximately 454,000 workers and are projected to offer 35,098 new jobs by 2021 in the North Central Valley/Northern Mother Lode Subregion.

Of the eight industries analyzed, the health care industry accounts for 39% of projected job growth by 2021 in the subregion. Community colleges are strongly encouraged to take into consideration the rapid expansion that the health care industry will undergo over the next five years. Other industries where substantial job growth is expected to occur are retail, hospitality and tourism, and global trade and logistics.

Retail, hospitality and tourism will generate more than 5,800 new jobs while global trade and logistics will create 6,646 new jobs. ICT/digital media represents the smallest industry analyzed by the study and is projected to offer only 388 new jobs in the subregion by 2021.

Across all industries, software skills most highly in demand revolve around Microsoft Office, with employers frequently seeking workers who are skilled in Microsoft Word, Excel and PowerPoint.

### Key findings and recommendations:

- **AGRICULTURE, WATER & ENVIRONMENTAL TECHNOLOGIES**—Community college programs focusing on agriculture and the life sciences may want to tailor programs toward business types in the subregion that will be adding the most jobs over the next five years: support activities for crop production (1,900 jobs), crop production (550 jobs), and commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance (219 jobs). The animal production and aquaculture business type is expected to lose nearly 400 jobs.
- **ENERGY, CONSTRUCTION & UTILITIES**—The building equipment contractors business type is projected to add 654 jobs in the North Central Valley/Northern Mother Lode Subregion by 2021. Meanwhile, utility system construction will expand rapidly by 32%, adding 413 jobs. Community college programs may want to focus on preparing students to enter these business types. In addition, the industry's top job postings in the region revolve around the skilled trades. Job postings for electricians (including journeyman electricians and electrician foremen) are the most common job ads related to this industry.
- **GLOBAL TRADE & LOGISTICS**—Global trade and logistics will be a major driver of employment in the subregion over the next five years. Warehousing and storage is expected to add more than 3,400 jobs, and general freight trucking will add 811 jobs. Community college programs may want to consider expanding or revising programs to incorporate these areas, and should work with employers now to start building pipelines to jobs in these business types. The top five job postings (nearly 5,000) related to global trade and logistics are for a variety of drivers. Colleges may to prepare for a decline in employment related to offices of real estate agents and brokers (NAICS 5312), which is expected to shed 252 jobs in the subregion.

- **RETAIL, HOSPITALITY & TOURISM**—The greatest number of new jobs related to this industry will be created by restaurants and other eating places, which have a growth rate of 9%, representing the addition of 3,393 jobs. Job postings in the subregion are most commonly for sales associates, sales consultants and sales representatives.
- **PROTECTIVE SERVICES**—Job postings in the subregion most frequently sought security officers in the last 12 months. While protective services occupations associated with the federal government are expected to shrink by 2021, with a projected loss of 800 jobs, state government (excluding education and hospitals) and local government (excluding education and hospitals) are projected to rapidly expand, adding more than 3,500 jobs by 2021. Students majoring in programs related to protective services should have strong job outlooks.
- **ICT/DIGITAL MEDIA**—While ICT/digital media is the smallest of the eight industries studied, this industry contains one business type that will grow by a third over the next five years. Wired telecommunications is projected to create 412 new positions by 2021. Community colleges may want to evaluate whether current programs sufficiently address the projected need for workers in this business type.
- **HEALTH CARE**—Of all the industries analyzed, the health care industry is expected to offer the most employment opportunities, more than 13,500 new jobs, in the North Central Valley/Northern Mother Lode Subregion over the next five years. Business types with the most projected growth include: individual and family services, 5,887 new jobs; outpatient care centers, 2,000 new jobs; home health care services 1,410 new jobs; and offices of physicians and nursing care facilities (skilled nursing facilities), 1,100 new jobs. The most common job posting is for registered nurses. In the last 12 months, there were 3,631 job postings for this occupation in the subregion.
- **MANUFACTURING**—Two business types within the manufacturing industry are projected to be significant job generators over the next five years in the North Central Valley/Northern Mother Lode Subregion. Beverage manufacturing will grow by 11%, adding 755 jobs, and converted paper product manufacturing will grow by 18%, adding 381 jobs. CTE programs at the community colleges in the subregion may want to partner with firms in these business types to connect students with jobs, and may want to tailor or update programs to incorporate curriculum or work experience opportunities related to these business types. The most common job posting related to manufacturing in last 12 months was for machine operators (more than 100 job postings). Repair, inspection and scheduling are in-demand specialized skills in the subregion.

## APPENDIX A: METHODOLOGY & DATA SOURCES

### Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: <a href="http://economicmodeling.com">economicmodeling.com</a> .
Living Wage	A living wage calculator that estimates the cost of living in a specific community or subregion: <a href="http://livingwage.mit.edu">livingwage.mit.edu</a> .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: <a href="http://www.bls.gov/emp/ep_education_tech.htm">www.bls.gov/emp/ep_education_tech.htm</a> .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division, <a href="http://labormarketinfo.edd.ca.gov">labormarketinfo.edd.ca.gov</a>
Job Posting and Skills Data	Burning Glass, <a href="http://www.burning-glass.com/">http://www.burning-glass.com/</a>
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledges, work activities and interests associated with specific occupations: <a href="http://www.onetonline.org">www.onetonline.org</a>

### Key Terms and Concepts

**Annual Job Openings:** Annual openings are calculated by dividing the number of years in the projection period by total job openings.

**Education Attainment Level:** The highest education attainment level of workers age 25 years or older.

**Employment Estimate:** The total number of workers currently employed.

**Employment Projections:** Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

**Living Wage:** The cost of living in a specific community or subregion for one adult and no children. The cost increases with the addition of children.

**Occupation:** An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

**Percent Change:** Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

**Replacements:** Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

**Total Job Openings (New + Replacements):** Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs or retain the current employment level, number of openings will equal replacements.

**Typical Education Requirement:** represents the typical education level most workers need to enter an occupation.

**Typical On-The-Job Training:** indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

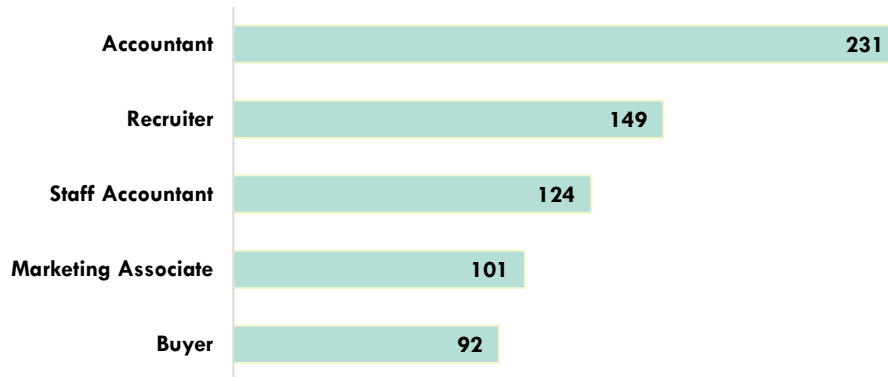
**Wages Family Compositions:** The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time child care for the family's children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a 'young child' (4 years old). Families with two children are assumed to have a 'young child' and a 'child' (9 years old). Families with three children are assumed to have a 'young child,' a 'child,' and a 'teenager' (15 years old).

## APPENDIX B: BUSINESS OCCUPATIONAL DATA

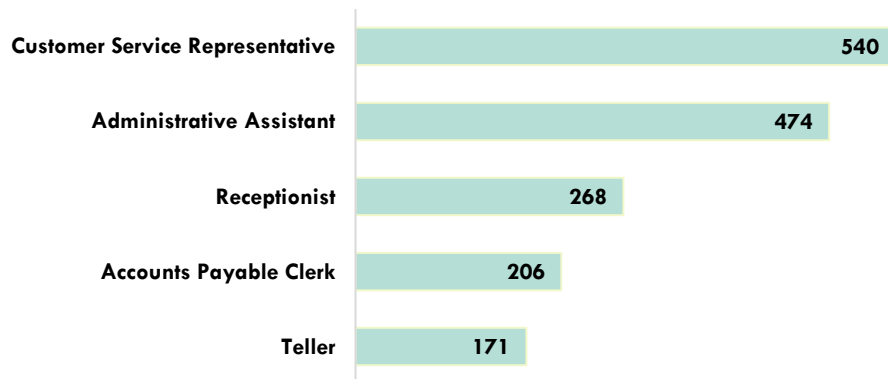
Exhibit 1B: Business occupational demand projections

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Customer Service Representatives	5,353	5,840	487	9%	237
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	8,159	8,762	603	7%	213
First-Line Supervisors of Office and Administrative Support Workers	5,437	5,898	461	8%	180
Billing and Posting Clerks	2,284	2,510	226	10%	96
Office and Administrative Support Workers, All Other	1,835	1,995	160	9%	85
Insurance Sales Agents	1,699	1,846	147	9%	79
Bookkeeping, Accounting, and Auditing Clerks	6,111	6,148	37	1%	77
Business Operations Specialists, All Other	2,002	2,166	164	8%	58
Cost Estimators	965	1,020	55	6%	40
Executive Secretaries and Executive Administrative Assistants	1,877	1,942	65	3%	35
Payroll and Timekeeping Clerks	980	1,014	34	3%	34
Administrative Services Managers	854	933	79	9%	33
Purchasing Agents, Except Wholesale, Retail, and Farm Products	711	753	42	6%	29
First-Line Supervisors of Housekeeping and Janitorial Workers	877	945	68	8%	28
Interviewers, Except Eligibility and Loan	699	740	41	6%	25
Eligibility Interviewers, Government Programs	623	708	85	14%	25
First-Line Supervisors of Non-Retail Sales Workers	1,210	1,247	37	3%	23
Data Entry Keyers	838	861	23	3%	16
Human Resources Assistants, Except Payroll and Timekeeping	495	529	34	7%	13
Court, Municipal, and License Clerks	468	508	40	9%	11

### Exhibit 2B: Business and financial job postings



### Exhibit 3B: Office and administrative support job postings



**Exhibit 4B: Business industry baseline skills**

<b>Business &amp; Financial</b>		<b>Office Administration &amp; Support</b>	
<b>Baseline Skills</b>	<b>Job Postings</b>	<b>Baseline Skills</b>	<b>Job Postings</b>
Communication Skills	780	Communication Skills	2,180
Writing	611	Organizational Skills	1,329
Organizational Skills	491	Detail-Oriented	1,327
Planning	357	Writing	1,290
Research	322	Typing	1,248

**Exhibit 5B: Business industry specialized skills**

<b>Business &amp; Financial</b>		<b>Office Administration &amp; Support</b>	
<b>Specialized Skills</b>	<b>Job Postings</b>	<b>Specialized Skills</b>	<b>Job Postings</b>
Microsoft Excel	785	Customer Service	2,040
Accounting	658	Microsoft Excel	1,878
Budgeting	386	Data Entry	1,304
Microsoft Office	386	Scheduling	1,177
Customer Service	361	Administrative Support	1,126

**Exhibit 6B: Business industry software skills**

<b>Business &amp; Financial</b>		<b>Office Administration &amp; Support</b>	
<b>Software Skills</b>	<b>Job Postings</b>	<b>Software Skills</b>	<b>Job Postings</b>
Microsoft Excel	785	Microsoft Excel	1,878
Microsoft Office	386	Microsoft Office	897
Microsoft Word	325	Microsoft Word	886
Microsoft PowerPoint	237	Microsoft PowerPoint	286
Microsoft Access	96	Word Processing	286

**Exhibit 7B: Business occupational wages**

<b>Occupation</b>	<b>Entry-level Wages</b>	<b>Median Hourly Wages</b>
Customer Service Representatives	\$11.14	\$16.63
Secretaries and Administrative Assistants, Except Legal, Medical and Executive	\$10.69	\$17.07
First-Line Supervisors of Office and Administrative Support Workers	\$15.90	\$24.76
Billing and Posting Clerks	\$10.95	\$15.38
Office and Administrative Support Workers, All Other	\$9.98	\$12.98
Insurance Sales Agents	\$15.60	\$23.46
Bookkeeping, Accounting and Auditing Clerks	\$11.17	\$17.86
Business Operations Specialists, All Other	\$16.58	\$31.10
Cost Estimators	\$15.61	\$27.00
Executive Secretaries and Executive Administrative Assistants	\$16.94	\$24.99
Payroll and Timekeeping Clerks	\$14.06	\$19.89
Administrative Services Managers	\$22.97	\$40.87
Purchasing Agents, Except Wholesale, Retail, and Farm Products	\$18.49	\$28.54
First-Line Supervisors of Housekeeping and Janitorial Workers	\$12.31	\$18.02
Interviewers, Except Eligibility and Loan	\$10.61	\$16.96
Eligibility Interviewers, Government Programs	\$17.27	\$23.81
First-Line Supervisors of Non-Retail Sales Workers	\$14.96	\$22.99
Data Entry Keyers	\$10.97	\$14.97
Human Resources Assistants, Except Payroll and Timekeeping	\$11.11	\$19.54
Court, Municipal and License Clerks	\$15.29	\$19.54



### Exhibit 8B: Business education levels

Occupation	Typical Entry-Level Education	Work Experience Required	Typical On-The-Job Training	CPS
Customer Service Representatives	High school diploma or equivalent	None	Short-term	43.7%
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	High school diploma or equivalent	None	Short-term	47.5%
First-Line Supervisors of Office and Administrative Support Workers	High school diploma or equivalent	Less than 5 years	None	40.8%
Billing and Posting Clerks	High school diploma or equivalent	None	Moderate-term	49.6%
Office and Administrative Support Workers, All Other	High school diploma or equivalent	None	Short-term	42.7%
Insurance Sales Agents	High school diploma or equivalent	None	Moderate-term	35.6%
Bookkeeping, Accounting, and Auditing Clerks	Some college, no degree	None	Moderate-term	48.8%
Business Operations Specialists, All Other	Bachelor's degree	None	None	27.9%
Cost Estimators	Bachelor's degree	None	None	40.8%
Executive Secretaries and Executive Administrative Assistants	High school diploma or equivalent	Less than 5 years	None	47.5%
Payroll and Timekeeping Clerks	High school diploma or equivalent	None	Moderate-term	51.3%
Administrative Services Managers	Bachelor's degree	Less than 5 years	None	42%
Purchasing Agents, Except Wholesale, Retail, and Farm Products	Bachelor's degree	None	Long-term	36.5%
First-Line Supervisors of Housekeeping and Janitorial Workers	High school diploma or equivalent	Less than 5 years	None	35.2%
Interviewers, Except Eligibility and Loan	High school diploma or equivalent	None	Short-term	49.5%
Eligibility Interviewers, Government Programs	High school diploma or equivalent	None	Moderate-term	38.4%
First-Line Supervisors of Non-Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	32.2%
Data Entry Keyers	High school diploma or equivalent	None	Moderate-term	46.3%
Human Resources Assistants, Except Payroll and Timekeeping	Associate degree	None	None	46.7%

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Court, Municipal, and License Clerks	High school diploma or equivalent	None	Moderate-term	47.5%
Tax Examiners and Collectors, and Revenue Agents	Bachelor's degree	None	Moderate-term	35%
Compensation, Benefits, and Job Analysis Specialists	Bachelor's degree	Less than 5 years	None	33%

## APPENDIX C: MULTI-SECTOR OCCUPATIONAL DATA

Exhibit 1C: Multi-sector occupational demand projections

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Bus and Truck Mechanics and Diesel Engine Specialists	1,409	1,564	155	11%	57
Installation, Maintenance and Repair Workers, All Other	892	937	45	5%	23
Mobile Heavy Equipment Mechanics, Except Engines	577	609	32	6%	21
Security and Fire Alarm Systems Installers	200	231	31	16%	12
Structural Metal Fabricators and Fitters	416	438	22	5%	12
Aircraft Mechanics and Service Technicians	146	159	13	9%	6
Control and Valve Installers and Repairers, Except Mechanical Door	92	101	9	10%	6
Welders, Cutters, Solderers and Brazers	1,730	1,814	84	5%	71
Machinists	924	1,021	97	10%	49
Sheet Metal Workers	535	570	35	7%	19
Telecommunications Line Installers and Repairers	279	336	57	20%	17
Wind Turbine Service Technicians	125	156	31	25%	9
Crane and Tower Operators	142	158	16	11%	9

Exhibit 2C: Multi-sector occupational wages

Occupation	Entry-level Wages	Median Hourly Wages
Bus and Truck Mechanics and Diesel Engine Specialists	\$15.80	\$21.55
Installation, Maintenance and Repair Workers, All Other	\$11.17	\$16.05
Mobile Heavy Equipment Mechanics, Except Engines	\$16.02	\$24.25
Security and Fire Alarm Systems Installers	\$13.37	\$19.32
Structural Metal Fabricators and Fitters	\$14.80	\$20.91
Aircraft Mechanics and Service Technicians	\$15.87	\$25.30
Control and Valve Installers and Repairers, Except Mechanical Door	\$18.54	\$30.56
Welders, Cutters, Solderers and Brazers	\$13.07	\$18.74
Machinists	\$11.98	\$18.89
Sheet Metal Workers	\$13.43	\$20.24
Telecommunications Line Installers and Repairers	\$19.71	\$31.02
Wind Turbine Service Technicians	\$16.37	\$22.14
Crane and Tower Operators	\$17.88	\$34.76

**Exhibit 2C: Multi-sector education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Bus and Truck Mechanics and Diesel Engine Specialists	High school diploma or equivalent	None	Long-term	34.8%
Installation, Maintenance and Repair Workers, All Other	High school diploma or equivalent	None	Moderate-term	35%
Mobile Heavy Equipment Mechanics, Except Engines	High school diploma or equivalent	None	Long-term	37%
Security and Fire Alarm Systems Installers	High school diploma or equivalent	None	Moderate-term	47.2%
Structural Metal Fabricators and Fitters	High school diploma or equivalent	None	Moderate-term	34.7%
Aircraft Mechanics and Service Technicians	Postsecondary nondegree award	None	None	60%
Control and Valve Installers and Repairers, Except Mechanical Door	High school diploma or equivalent	None	Moderate-term	49.1%
Medical Equipment Repairers	Associate degree	None	Moderate-term	54.4%
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary nondegree award	None	Long-term	56.8%
Welders, Cutters, Solderers and Brazers	High school diploma or equivalent	None	Moderate-term	28.2%
Machinists	High school diploma or equivalent	None	Long-term	38.8%
Sheet Metal Workers	High school diploma or equivalent	None	Apprenticeship	34.4%
Telecommunications Line Installers and Repairers	High school diploma or equivalent	None	Long-term	47.2%
Wind Turbine Service Technicians	Some college, no degree	None	Long-term	35%
Crane and Tower Operators	High school diploma or equivalent	Less than 5 years	Moderate-term	26.6%
Electrical and Electronics Engineering Technicians	Associate degree	None	None	55.1%
Chemical Technicians	Associate degree	None	Moderate-term	35.8%
Millwrights	High school diploma or equivalent	None	Apprenticeship	42.3%

## APPENDIX D: ALL OTHER OCCUPATIONAL DATA

Exhibit 1D: All other occupational demand projections

Occupation	2016	2021	5-Yr Change	5-Yr % Change	Annual Openings
Teacher Assistants	6,997	7,598	601	9%	301
Automotive Service Technicians and Mechanics	2,770	2,904	134	5%	105
Bus Drivers, School or Special Client	1,685	1,952	267	16%	78
Kindergarten Teachers, Except Special Education	1,191	1,273	82	7%	53
Dispatchers, Except Police, Fire and Ambulance	1,050	1,148	98	9%	48
Bus Drivers, Transit and Intercity	681	787	106	16%	31
Weighers, Measurers, Checkers and Samplers, Recordkeeping	736	775	39	5%	31
Automotive Body and Related Repairers	761	809	48	6%	29
Library Technicians	424	460	36	8%	29
Training and Development Specialists	555	622	67	12%	28
Paralegals and Legal Assistants	1,053	1,074	21	2%	28
Library Assistants, Clerical	404	438	34	8%	20
Photographers	334	345	11	3%	13
Painters, Transportation Equipment	307	325	18	6%	10
Career/Technical Education Teachers, Secondary School	160	185	25	16%	9

**Exhibit 2D: All other occupational wages**

<b>Occupation</b>	<b>Entry-level Wages</b>	<b>Median Hourly Wages</b>
Automotive Service Technicians and Mechanics	\$10.31	\$17.06
Teacher Assistants	\$10.96	\$15.26
Bus Drivers, School or Special Client	\$11.28	\$16.44
Kindergarten Teachers, Except Special Education	\$21.82	\$32.14
Dispatchers, Except Police, Fire, and Ambulance	\$12.21	\$19.90
Bus Drivers, Transit and Intercity	\$11.16	\$19.60
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	\$9.52	\$13.07
Automotive Body and Related Repairers	\$12.60	\$18.60
Library Technicians	\$14.35	\$17.22
Training and Development Specialists	\$14.80	\$23.06
Paralegals and Legal Assistants	\$18.30	\$25.13
Library Assistants, Clerical	\$10.17	\$14.20
Photographers	\$12.31	\$16.04
Painters, Transportation Equipment	\$15.50	\$20.45
Career/Technical Education Teachers, Secondary School	\$22.17	\$30.71

**Exhibit 3D: All other education levels**

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Teacher Assistants	Some college, no degree	None	None	43.7%
Automotive Service Technicians and Mechanics	Postsecondary nondegree award	None	Short-term	33.4%
Bus Drivers, School or Special Client	High school diploma or equivalent	None	Short-term	36.1%
Kindergarten Teachers, Except Special Education	Bachelor's degree	None	Internship/residency	37.8%
Dispatchers, Except Police, Fire and Ambulance	High school diploma or equivalent	None	Moderate-term	47.6%
Bus Drivers, Transit and Intercity	High school diploma or equivalent	None	Moderate-term	36.1%
Weighers, Measurers, Checkers and Samplers, Recordkeeping	High school diploma or equivalent	None	Short-term	33.9%

<b>Occupation</b>	<b>Typical Entry-Level Education</b>	<b>Work Experience Required</b>	<b>Typical On-The-Job Training</b>	<b>CPS</b>
Automotive Body and Related Repairers	High school diploma or equivalent	None	Long-term	26.1%
Library Technicians	Postsecondary nondegree award	None	None	26.1%
Training and Development Specialists	Bachelor's degree	Less than 5 years	None	33.7%
Paralegals and Legal Assistants	Associate degree	None	None	42.6%
Library Assistants, Clerical	High school diploma or equivalent	None	Short-term	37.6%
Photographers	High school diploma or equivalent	None	Long-term	33%
Painters, Transportation Equipment	High school diploma or equivalent	None	Moderate-term	27.1%
Career/Technical Education Teachers, Secondary School	Bachelor's degree	Less than 5 years	Internship/residency	4.8%
Civil Engineering Technicians	Associate degree	None	None	55.1%
Electrical and Electronic Equipment Assemblers	High school diploma or equivalent	None	Moderate-term	30.1%
Special Education Teachers, Preschool	Bachelor's degree	None	Internship/residency	9.7%
Bicycle Repairers	High school diploma or equivalent	None	Moderate-term	21.8%