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Labor Market Analysis

Cybersecurity/Network Defense



Prepared by Central Valley/Mother Lode Center of Excellence



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Summary

The Central Valley/Mother Lode Center of Excellence developed this report for Reedley College to determine whether there is demand in the local labor market that is not being met by the supply from postsecondary programs. This report summarizes labor market demand, wages, skills, and postsecondary supply for *cybersecurity-related* occupations, which include:

- Information Security Analysts (SOC 15-1212)
- Computer Network Support Specialists (SOC 15-1231)
- Computer User Support Specialists (SOC 15-1232)
- Network and Computer Systems Administrators (SOC 15-1244)

Key Findings

- **Occupational Demand** — *Cybersecurity-related* occupations have a labor market demand of 394 annual job openings in the South Central Valley/Southern Mother Lode (SCV/SML) subregion. Between 2022 and 2027, *Computer User Support Specialists* are projected to have the most demand with 217 annual job openings – 10% growth in the SCV/SML region.
- **Wages** — The average entry-level wage for the occupations studied in this report is \$25.40/hour, which is \$11.91/hour for a single adult.¹ *Information Security Analysts* earn the highest entry-level wage, \$41.57/hour.
- **Employers and Job Titles** — Employers in the SCV/SML subregion include T-Mobile US, Lockheed Martin, and Creative Financial Staffing. The most common job title is *System Administrators*.
- **Skills and Certifications**— The top baseline skill is communication; the top specialized skill is help desk support; and the top software skill is Operating Systems. The most in-demand certification is a CompTIA Security+ Certification.
- **Education** — A bachelor's degree is typically required for two of the four occupations included in this report: *Information Security Analysts* and *Network and Computer Systems Administrators*. An associate degree is typically required for *Computer Network Support Specialists*; and some college, no degree is typically required for *Computer User Support Specialists*.
- **Supply and Demand Analysis** — Based on 394 annual openings (i.e., demand) and 292 postsecondary awards conferred (i.e., supply), an analysis of supply and demand suggests there is an undersupply of 102 workers in the SCV/SML subregion. In the CVML region, 352 awards were conferred suggesting an undersupply of 238 workers (based on 590 annual openings in the CVML region).

Recommendation

Based on a comparison of demand and supply, there is an undersupply of trained workers in the SCV/SML subregion and the CVML region. The Center of Excellence recommends that Reedley College work with the regional directors, the college's advisory board, and local industry in the creation or expansion of programs to address the shortage of *cybersecurity* workers.

¹ The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: <https://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Introduction

The Central Valley/Mother Lode Center of Excellence developed this report to provide Reedley College with labor market information for *cybersecurity-related* occupations. The geographical focus for this report is the South Central Valley/Southern Mother Lode (SCV/SML) subregion, but regional demand and supply data has been included for broader applicability and use. Analysis of the program and occupational data related to *cybersecurity-related* occupations is included in the report. The Standard Occupational Classification (SOC) System codes and occupational titles used in this report from the Bureau of Labor Statistics and O*NET OnLine are shown below.

Information Security Analysts (SOC 15-1212)

- **Job description:** Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. Assess system vulnerabilities for security risks and propose and implement risk mitigation strategies. May ensure appropriate security controls are in place that will safeguard digital files and vital electronic infrastructure. May respond to computer security breaches and viruses.
- **Knowledge:** Computers and Electronics, English Language, Administration and Management, Engineering and Technology, Telecommunications
- **Skills:** Reading Comprehension, Critical Thinking, Active Listening, Complex Problem Solving, Speaking

Computer Network Support Specialists (SOC 15-1231)

- **Job description:** Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption.
- **Knowledge:** Computers and Electronics, Telecommunications, Customer and Personal Service, Engineering and Technology, English Language
- **Skills:** Critical Thinking, Active Listening, Judgment and Decision Making, Reading Comprehension, Active Learning

Computer User Support Specialists (SOC 15-1232)

- **Job description:** Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, via telephone, or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.
- **Knowledge:** Computer and Electronics, Customer and Personal Service, Telecommunications, English Language, Education and Training
- **Skills:** Active Listening, Reading Comprehension, Speaking, Critical Thinking, Complex Problem Solving

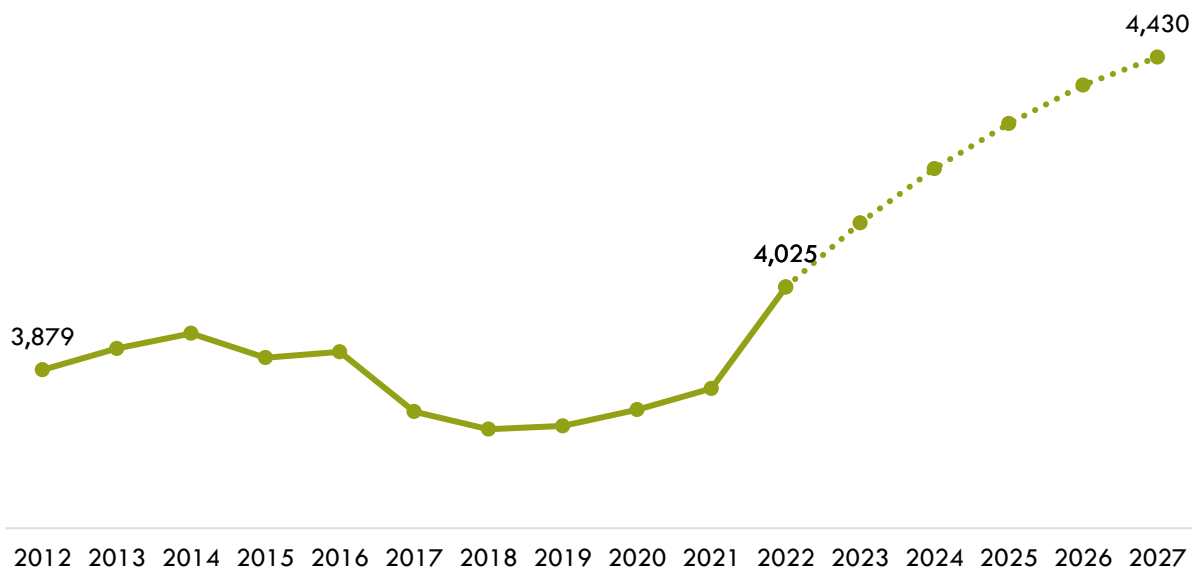
Network and Computer Systems Administrators (SOC 15-1244)

- **Job description:** Install, configure, and maintain an organization's local area network (LAN), wide area network (WAN), data communications network, operating systems, and physical and virtual servers. Perform system monitoring and verify the integrity and availability of hardware, network, and server resources and systems. Review system and application logs and verify completion of scheduled jobs, including system backups. Analyze network and server resource consumption and control user access. Install and upgrade software and maintain software licenses. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software.
- **Knowledge:** Computers and Electronics, English Language, Customer and Personal Service, Engineering and Technology, Mathematics
- **Skills:** Critical Thinking, Judgment and Decision Making, Reading Comprehension, Systems Analysis, Active Listening

Employment

Exhibit 1a shows employment trends for *cybersecurity-related* occupations in the SCV/SML subregion. Between 2022 to 2027, the number of jobs for occupations related to *cybersecurity* is projected to increase by 405, growing by 10%.

Exhibit 1a. Historical employment and projected demand for *cybersecurity-related* occupations in the SCV/SML subregion, 2012-2027



Occupations related to *cybersecurity* in the SCV/SML subregion employed 4,025 workers in 2022 (Exhibit 1b). *Computer User Support Specialists* are projected to have the highest number of annual openings, 217.

Exhibit 1b. Current employment and projected occupational demand for *cybersecurity-related* occupations in the SCV/SML subregion, 2022-2027

Occupation	2022 Jobs	2027 Jobs	5-Year Change	5-Year % Change	Annual Openings
Information Security Analysts	250	305	56	22%	31
Computer Network Support Specialists	637	689	52	8%	61
Computer User Support Specialists	2,135	2,357	222	10%	217
Network and Computer Systems Administrators	1,003	1,079	76	8%	85
TOTAL	4,025	4,430	405	10%	394

Wages

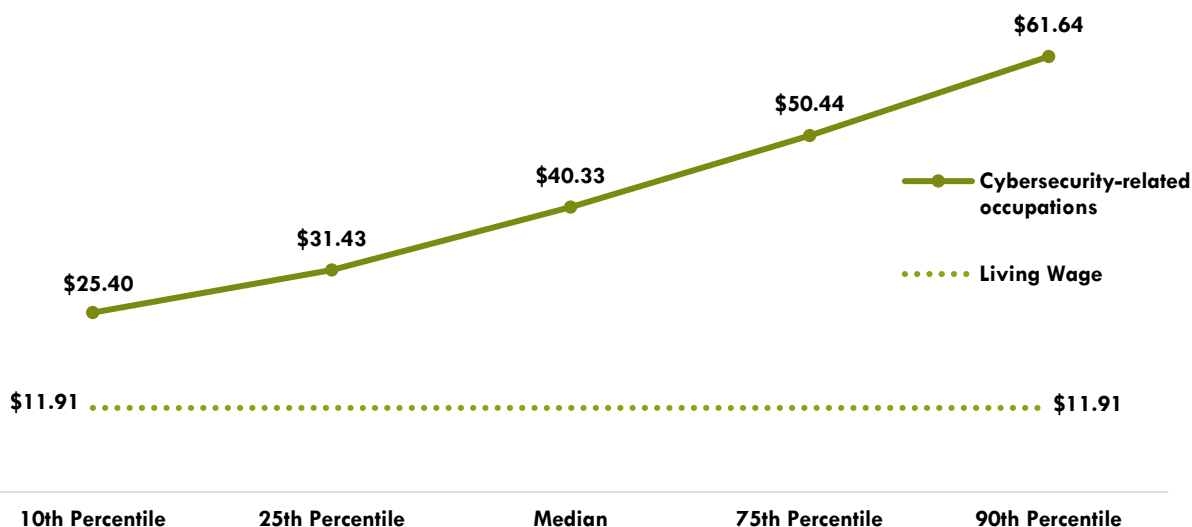
The average living wage for a single adult in the SCV/SML subregion is \$11.91/hour.² Exhibit 2a shows the hourly wages for the four occupations included in this report. Of the four occupations included in this report, *Information Security Analysts* have the highest entry-level wage, \$41.57/hour.³

Exhibit 2a. Hourly wages for cybersecurity-related occupations in the SCV/SML subregion

Occupation	25 th Percentile Hourly Earnings	Median Hourly Earnings	75 th Percentile Hourly Earnings
Information Security Analysts	\$41.57	\$58.97	\$75.10
Computer Network Support Specialists	\$26.71	\$31.58	\$38.88
Computer User Support Specialists	\$22.25	\$27.84	\$36.15
Network and Computer Systems Administrators	\$35.20	\$42.91	\$51.62

Exhibit 2b shows the average hourly wages for *cybersecurity-related* occupations; all four average wages are well above the living wage for the SCV/SML subregion.

Exhibit 2b. Average hourly wages for cybersecurity-related occupations in the SCV/SML subregion



² The term “living wage” in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center’s California Family Needs Calculator for each county in the subregion: <https://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

³ Note: 10th and 25th percentiles are considered entry-level wages while 75th and 90th are considered experienced wages, which may be obtained through long-term employment or extra training, etc.

Job Postings

There were 1,891 unique job postings for *cybersecurity-related* occupations in the SCV/SML subregion from January 2023 to December 2023.⁴

Top Employers

The top employers with the most job postings are listed in Exhibit 3. The top employers in online job postings were T-Mobile US, Lockheed Martin, and Creative Financial Staffing.

Exhibit 3. Top employers of *cybersecurity-related* occupations

Employer
T-Mobile US
Lockheed Martin
Creative Financial Staffing
Delaware North
Kern Community College District
Leidos
CTG
California State University
Naval Air Systems Command
Randstad

Top Job Titles

Exhibit 4 shows the most common job titles for *cybersecurity-related* occupations in the SCV/SML subregion.

Exhibit 4. Top job titles in job postings for *cybersecurity* occupations

Job Title
Systems Administrators
IT Specialists
IT Technicians
IT Support Technicians
Outside Sales Representatives
Network Administrators
Help Desk Technicians
Help Desk Specialists
IT Support Specialists
Desktop Support Technicians

⁴ Other than occupational titles and job titles, the categories below can be counted one or multiple times per job posting, and across several areas in a single posting. For example, a skill can be counted in two different skill types, and an employer can indicate more than one education level.

Salaries

Exhibit 5 shows the “Market Salaries” for *cybersecurity-related* occupations. These are calculated by Lightcast using a machine learning model built from millions of job postings every year. This accounts for adjustments based on location, industry, skills, experience, education, among other variables.

Exhibit 5. Market salaries for *cybersecurity-related* occupations

Market Salary	Job Postings
\$30,000-\$35,999	38
\$36,000-\$41,999	104
\$42,000-\$47,999	120
\$48,000-\$53,999	152
\$54,000-\$59,999	168
\$60,000-\$65,999	88
\$66,000-\$71,999	120
\$72,000-\$77,999	65
\$78,000-\$83,999	53
\$84,000-\$89,999	50
\$90,000+	226

Education

Of the 1,891 unique job postings, 63% listed a preferred or minimum educational requirement for the position being filled. Among those, 41% requested a high school diploma or GED, 19% requested an associate degree, 38% requested a bachelor’s degree, and 2% requested a master’s degree or higher (Exhibit 6).

Exhibit 6. Education levels requested in job postings for *cybersecurity-related* occupations

Education Level	Job Postings
High school diploma or GED	489
Associate degree	220
Bachelor's degree	449
Master's degree or higher	27

Baseline, Specialized, and Software Skills

Exhibit 7 shows the top baseline, specialized, and software skills in job postings. The most requested baseline skill is communication. The most requested specialized skill is help desk support. The most requested software skill is operating systems.

Exhibit 7. In-demand baseline, specialized, and software skills for cybersecurity-related occupations in job postings

Baseline Skills	Specialized Skills	Software Skills
Communication	Help Desk Support	Operating Systems
Troubleshooting (Problem Solving)	Technical Support	Active Directory
Management	Computer Science	Microsoft Office
Customer Service	Operating Systems	Firewall
Operations	Information Systems	Microsoft Excel

Certifications

Of the job postings listing a desired certification, 12% indicated a need for a CompTIA Security+ Certification, followed by a CompTIA A+ Certification (10%) (Exhibit 8).

Exhibit 8. Top certifications requested in job postings for cybersecurity-related occupations

Certifications	Job Postings
CompTIA Security+	168
CompTIA A+	146
Cisco Certified Network Associate	77
IAT Level II Certification	74
CompTIA Network+	71

Education, Work Experience, & Training

A bachelor's degree is typically required for two of the four occupations included in this report: *Information Security Analysts* and *Network and Computer Systems Administrators*. An associate degree is typically required for *Computer Network Support Specialists*; and some college, no degree is typically required for *Computer User Support Specialists* (Exhibit 9).

Exhibit 9. Education, work experience, training, and Current Population Survey results for occupations related to *Natural Resources*⁵

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Information Security Analysts	Bachelor's degree	Less than 5 years	None	27%
Computer Network Support Specialists	Associate degree	None	None	39%
Computer User Support Specialists	Some college, no degree	None	None	39%
Network and Computer Systems Administrators	Bachelor's degree	None	None	37%

⁵ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Supply

An analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) for the last three program years shows that, on average, 352 awards were conferred in the CVML region (Exhibits 10 and 11).

Exhibit 10. TOP and CIP codes for Cybersecurity-related occupations

TOP Titles	CIP Titles
0702.00 – Computer Information Systems	11.0101 – Computer and Information Sciences, General
0708.00 – Computer Infrastructure and Support	
0708.10 – Computer Networking	11.0103 – Information Technology
0708.20 – Computer Support	

Exhibit 11. Community College awards conferred in the CVML region

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
0702.00	Computer Information Systems	Merced	3	3	10	5
		San Joaquin Delta	12	16	19	16
		NCV/NML Subtotal	15	19	29	21
		Bakersfield	-	1	-	0
		Cerro Coso	56	68	72	65
		Clovis	1	1	1	1
		Fresno City	10	34	21	22
		Porterville	8	8	2	6
		Reedley	45	6	3	18
		Sequoias	4	12	10	9
		SCV/SML Subtotal	124	130	109	121
Supply Subtotal/Average			139	149	138	142
0708.00	Computer Infrastructure and Support	Bakersfield	8	7	7	7
		Fresno City	3	1	-	1
		SCV/SML Subtotal	11	8	7	9
Supply Subtotal/Average			11	8	7	9
0708.10	Computer Networking	Modesto	4	4	8	5
		San Joaquin Delta	24	33	42	33
		NCV/NML Subtotal	28	37	50	38

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
		Cerro Coso	34	27	44	35
		Clovis	5	8	5	6
		Fresno City	63	23	24	37
		Reedley	29	8	4	14
		Sequoias	7	13	8	9
		West Hills Lemoore	1	2	3	2
		SCV/SML Subtotal	139	81	88	103
Supply Subtotal/Average			167	118	138	141
0708.20	Computer Support	Clovis	1	1	1	1
		Madera	-	-	1	0
		Reedley	5	9	6	7
		SCV/SML Subtotal	6	10	8	8
Supply Subtotal/Average			6	10	8	8
Supply Total/Average			323	285	291	300

For a comprehensive regional supply analysis, it is also important to consider the supply from other institutions in the region that provide training programs for the four occupations. Exhibit 12 shows the annual and two-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes:

- Computer and Information Sciences, General (11.0101)
- Information Technology (11.0103)

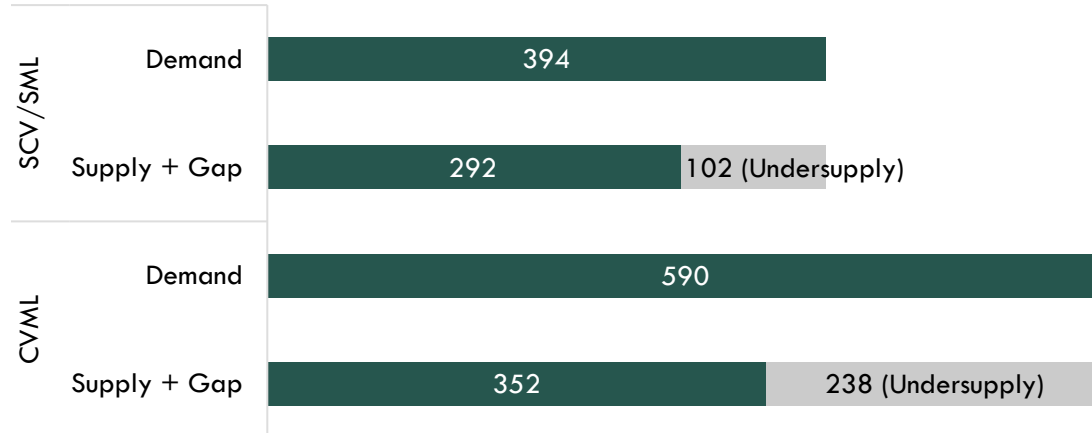
Due to different data collection periods, the most recent two-year period of available data is from 2019 to 2021. Between 2019 and 2021, non-community colleges in the region conferred an average of 52 awards annually in related training programs.

Exhibit 12. Non-Community College Awards in the CVML region

CIP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2-Year Award Average
11.0101	Computer and Information Sciences, General	Milan Institute-Visalia	10	8	9
Supply Subtotal/Average			10	8	9
11.0103	Information Technology	California State University-Stanislaus	-	1	1
		San Joaquin Valley College-Visalia	36	49	43
Supply Subtotal/Average			36	50	43
Supply Total/Average			46	58	52

There is an undersupply of 102 *cybersecurity* workers in the SCV/SML subregion and an undersupply of 238 workers in the CVML region (Exhibit 13).

Exhibit 13. *Cybersecurity* workforce demand (annual job openings), postsecondary awards (supply), and additional students needed to fill gap in the SCV/SML subregion and region



Recommendation

This report suggests there is a shortage of 102 workers in the SCV/SML subregion and a shortage of 238 workers in the CVML region for *cybersecurity*. Based on these findings, it is recommended that Reedley College work with the regional directors, the college’s advisory board, and local industry in the creation or expansion of programs to address the shortage of workers in the region.

Appendix: 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. (Lightcast). Lightcast occupational employment data are based on final Lightcast industry data and final Lightcast 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 Lightcast earnings by industry: economicmodeling.com.
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: https://www.bls.gov/emp/tables/educational-attainment.htm .
LaunchBoard	Chancellor’s LaunchBoard. https://www.calpassplus.org/LaunchBoard/SWP.aspx
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov .
Job Posting and Skills Data	Lightcast: https://lightcast.io/ .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org .

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. (LIGHTCAST) formula that includes historical employment and economic indicators along with national, state and local trends.

LaunchBoard (Attained the Living Wage): Among SWP students who exited college and did not transfer to any postsecondary institution, the proportion who attained the district county living wage for a single adult measured immediately following academic year of exit.

LaunchBoard (Median Annual Earnings): Among SWP students who exited the community college system and who did not transfer to any postsecondary institution, median earnings following the academic year of exit.

LaunchBoard (Median Change in Earnings): Among SWP students who exited and who did not transfer to any postsecondary institution, median change in earnings between the second quarter prior to the beginning of the academic year of entry and the second quarter after the end of the academic year of exit from the last college attended.

LaunchBoard (Job Closely Related to Field of Study): Among SWP students who responded to the CTE Outcomes Survey and did not transfer to any postsecondary institution, the proportion who reported that they are working in a job very closely or closely related to their field of study.

Living Wage: The cost of living in a specific community or region 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.