C·O·E CENTERS OF EXCELLENCE FOR LABOR MARKET RESEARCH

Geographic Information System Occupations

Labor Market Analysis: San Diego County

January 2021

Summary

The brief provides labor market information about *Geographic Information System Occupations* to assist the San Diego and Imperial Counties Community Colleges with program development and strategic planning. *Geographic Information System Occupations* include "Cartographers and Photogrammetrists" and "Surveying and Mapping Technicians." According to available labor market information, *Geographic Information System Occupations* in San Diego County have a labor market demand of 103 annual job openings (while average demand for a single occupation in San Diego County is 277 annual job openings), and four educational institutions in San Diego County supply 39 awards for these occupations, suggesting that there is a supply gap in the labor market. Entry-level and median wages for all occupations are above the living wage. This brief recommends proceeding with developing a new program because 1) these occupations' entry-level and median earnings are above the living wage and 2) a supply gap exists for these positions. Colleges should note that **employers typically require a bachelor's degree as the minimum educational requirement for these occupations.**

Introduction

This report provides labor market information in San Diego County for the following occupational codes in the Standard Occupational Classification (SOC)[1] system:

- **Cartographers and Photogrammetrists** (SOC 17-1021): Research, study, and prepare maps and other spatial data in digital or graphic form for one or more purposes, such as legal, social, political, educational, and design purposes. May work with Geographic Information Systems (GIS). May design and evaluate algorithms, data structures, and user interfaces for GIS and mapping systems. May collect, analyze, and interpret geographic information provided by geodetic surveys, aerial photographs, and satellite data.
- **Surveying and Mapping Technicians** (SOC 17-3031): Perform surveying and mapping duties, usually under the direction of an engineer, surveyor, cartographer, or photogrammetrist, to obtain data used for construction, mapmaking, boundary location, mining, or other purposes. May calculate mapmaking information and create maps from source data, such as surveying notes, aerial photography, satellite data, or other maps to show topographical features, political boundaries, and other features. May verify accuracy and completeness of maps.

While this brief primarily focuses on *Cartographers and Photogrammetrists* and *Surveying and Mapping Technicians*, it also provides additional information from online job postings for occupations that are not commonly analyzed in labor market research.[2] These occupations include:

- **Geographic Information Systems Technologists and Technicians** (15-1299.02): Assist scientists or related professionals in building, maintaining, modifying, or using geographic information systems (GIS) databases. May also perform some custom application development or provide user support.
- **Remote Sensing Scientists and Technologists** (19-2099.01): Apply remote sensing principles and methods to analyze data and solve problems in areas such as natural resource management, urban planning, or homeland security. May develop new sensor systems, analytical techniques, or new applications for existing systems.

For the purpose of this report, these occupations are referred to as *Geographic Information System Occupations*.

[1] The Standard Occupational Classification (SOC) system is used by federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating or disseminating data. bls.gov/soc.
[2] The Centers of Excellence for Labor Market Research (COE) and other labor market researchers typically analyze six-digit occupational codes from the SOC-O*NET system (onetonline.org/help/online/search#code). Six-digit codes are more common and have more data, whereas eight-digit codes are less common and typically have insufficient data to analyze. However, data for eight-digit codes exist in online job postings and were included in this brief.

Projected Occupational Demand

Between 2019 and 2024, *Geographic Information System Occupations* are projected to increase by 48 net jobs or six percent (Exhibit 1a). During this period, employers in San Diego County are projected to hire 103 workers annually to fill new jobs and backfill jobs due to attrition caused by turnover and retirement, for example.

Exhibit 1a: Number of Jobs for *Geographic Information System Occupations* (2009-2024)[3]

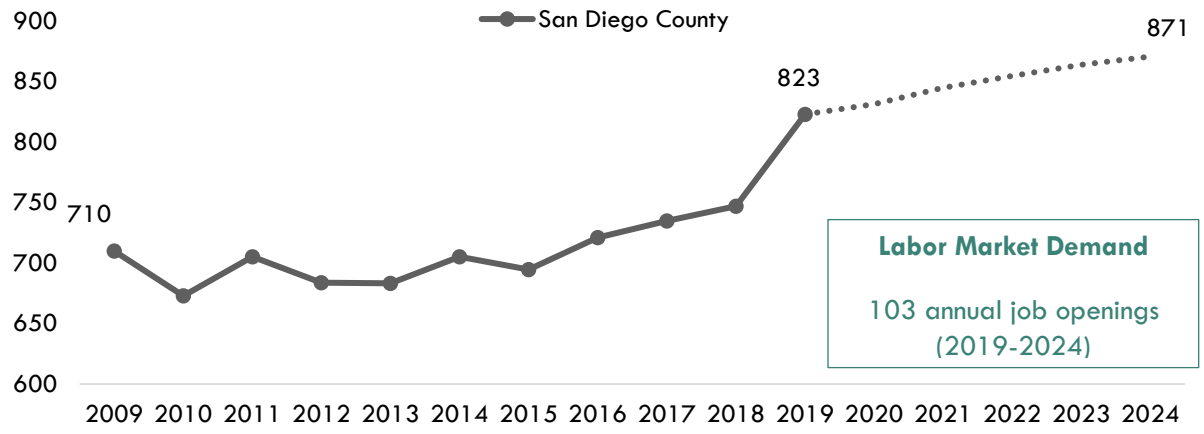


Exhibit 1b breaks down the projected number of annual job openings by occupation more specifically: *Surveying and Mapping Technicians* are projected to have the most labor market demand between 2019 and 2024, with 91 annual job openings.

Exhibit 1b: Number of Jobs for *Geographic Information System Occupations* in San Diego County (2019-2024)[4]

Occupational Title	2019 Jobs	2024 Jobs	2019 - 2024 Net Jobs Change	2019-2024 % Net Jobs Change	Annual Job Openings (Demand)
Surveying and Mapping Technicians	687	726	39	6%	91
Cartographers and Photogrammetrists	136	145	9	6%	12
Total	823	871	48	6%	103

[3] EMSI 2020.04; QCEW, Non-QCEW, Self-Employed.
[4] EMSI 2020.04; QCEW, Non-QCEW, Self-Employed

Earnings

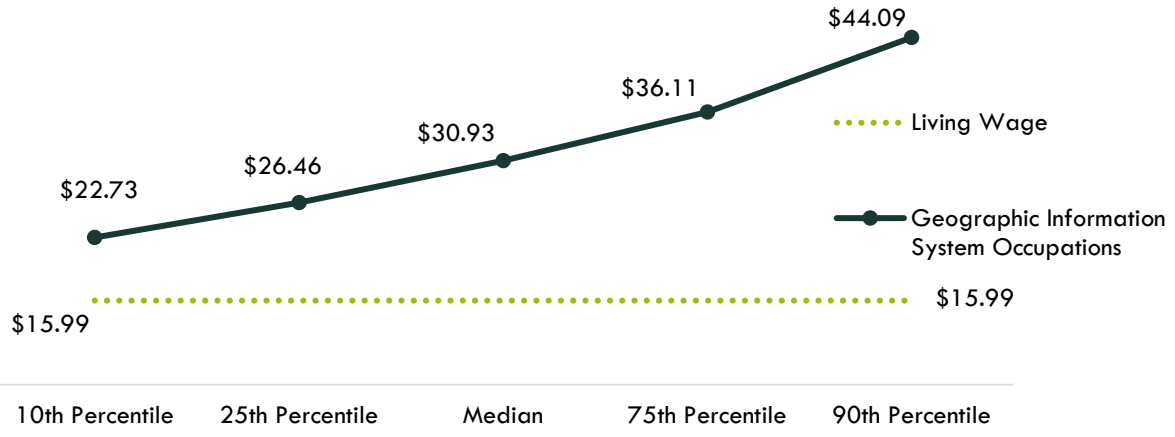
The entry-level hourly earnings for *Geographic Information System Occupations* range from $24.33 to $28.60 (Exhibit 2a).

Exhibit 2a: Hourly Earnings for *Geographic Information System Occupations* in San Diego County[5]

Occupational Title	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Cartographers and Photogrammetrists	$28.60	$33.77	$38.89
Surveying and Mapping Technicians	$24.33	$28.08	$33.33

On average, entry-level hourly earnings for *Geographic Information System Occupations* are $26.46; this is more than the living wage for a single adult in San Diego County, which is $15.99 per hour (Exhibit 2b).[6]

Exhibit 2b: Average Hourly Earnings[7] for *Geographic Information System Occupations* in San Diego County[8]



[5] EMSI 2020.04; QCEW, Non-QCEW, Self-Employed
[6] "California Family Needs Calculator (formerly the Self-Sufficiency Standard)," Insight: Center for Community Economic Development, last updated 2018. insightcced.org/2018-self-sufficiency-standard.
[7] 10th and 25th percentiles could be considered entry-level wages, and 75th and 90th percentiles could be considered experienced wages for individuals who may have been in the occupation longer, received more training than others, etc.
[8] EMSI 2020.04; QCEW, Non-QCEW, Self-Employed.

Educational Supply

Educational supply for an occupation can be estimated by analyzing the number of awards in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes.[9] There are two TOP codes and two CIP codes related to *Geographic Information System Occupations* (Exhibit 3).

Exhibit 3: Related TOP and CIP Codes for *Geographic Information System Occupations*

Geographic Information System Occupations
TOP 0957.30: Surveying
TOP 2206.10: Geographic Information Systems
CIP 15.1102: Surveying Technology/Surveying
CIP 45.0702: Geographic Information Science and Cartography

According to TOP data, four community colleges supply the region with awards for this occupation: Cuyamaca College, Palomar College, San Diego Mesa College, and Southwestern College. According to CIP data, no non-community-college institution supplies the region with awards (Exhibit 4).

Exhibit 4: Number of Awards (Certificates and Degrees) Conferred by Postsecondary Institutions (Program Year 2014-15 through PY2018-19 Average)

TOP6 or CIP	TOP6 or CIP Title	3-Yr Annual Average CC Awards (PY16-17 to PY18-19)	Other Educational Institutions 3-Yr Annual Average Awards (PY14-15 to PY16-17)	3-Yr Total Average Supply (PY14-15 to PY18-19)
0957.30	Surveying	**3**	**0**	**3**
	• Cuyamaca	3	0	
2206.10	Geographic Information Systems	**36**	**0**	**36**
	• Palomar	20	0	
	• San Diego Mesa	13	0	
	• Southwestern	3	0	
			Total	**39**

[9] TOP data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP data comes from the Integrated Postsecondary Education Data System (nces.ed.gov/ipeds/use-the-data).

Demand vs. Supply

Comparing labor demand (annual openings) with labor supply[10] suggests that there is a supply gap for these occupations in San Diego County, with 103 annual openings and 39 awards. Comparatively, there are 766 annual openings in California and 177 awards, suggesting that there is a supply gap across the state[11] (Exhibit 5).

Exhibit 5: Labor Demand (Annual Openings) Compared with Labor Supply (Average Annual Awards)

	Demand (Annual Openings)	**Supply** (Total Annual Average Supply)	**Supply Gap or Oversupply**
San Diego	103	39	**64**
California	766	177	**589**

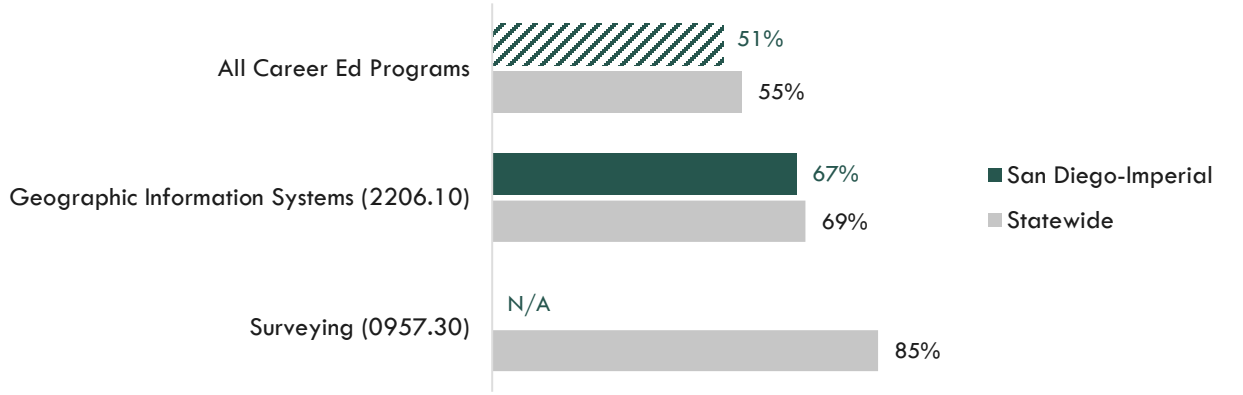
Please note: This is a basic analysis of supply and demand of labor. The data does not include workers currently in the labor force who could fill these positions or workers who are not captured by publicly available data. This data should be used to discuss the potential gaps or oversupply of workers; however, it should not be the only basis for determining whether or not a program should be developed.

[10] Labor supply can be found from two different sources: EMSI or the California Community Colleges Chancellor's Office MIS Data Mart. EMSI uses CIP codes while MIS uses TOP codes. Different coding systems result in differences in the supply numbers.
[11] "Supply and Demand," Centers of Excellence Student Outcomes, coeccc.net/Supply-and-Demand.aspx.

Student Outcomes and Regional Comparisons

According to the California Community Colleges LaunchBoard, 67 percent of students in the San Diego-Imperial region earned a living wage after completing a program related to *Geographic Information System Occupations*, compared to 69 to 85 percent statewide and 55 percent of students in Career Education programs in general across the state (Exhibit 6a).

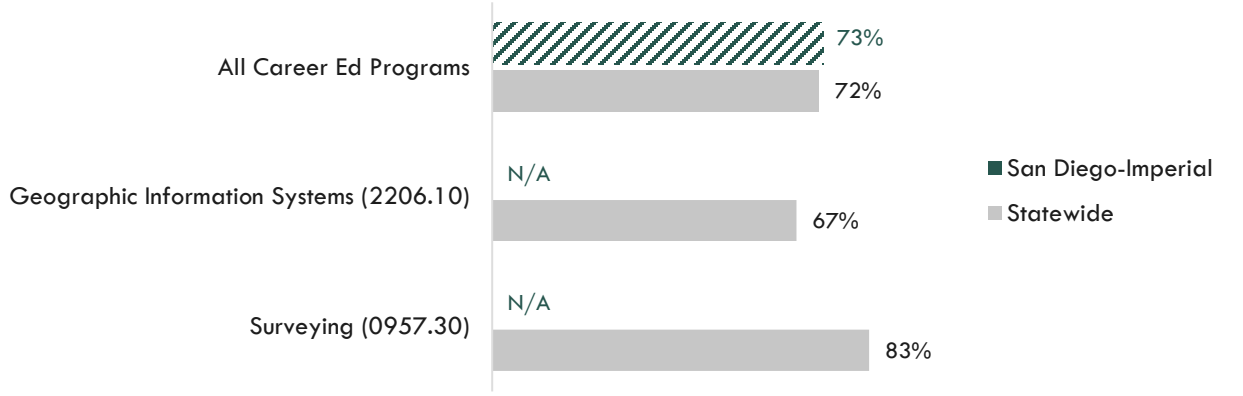
Exhibit 6a: Proportion of Students Who Earned a Living Wage, PY2017-18[12]



"N/A" indicates insufficient data

According to the California Community Colleges LaunchBoard, between 67 and 83 percent of students statewide obtained a job closely related to their field of study after completing a related program, compared to 72 percent of students in Career Education programs in general across the state (Exhibit 6b).

Exhibit 6b: Percentage of Students in a Job Closely Related to Field of Study, PY2016-17[13]



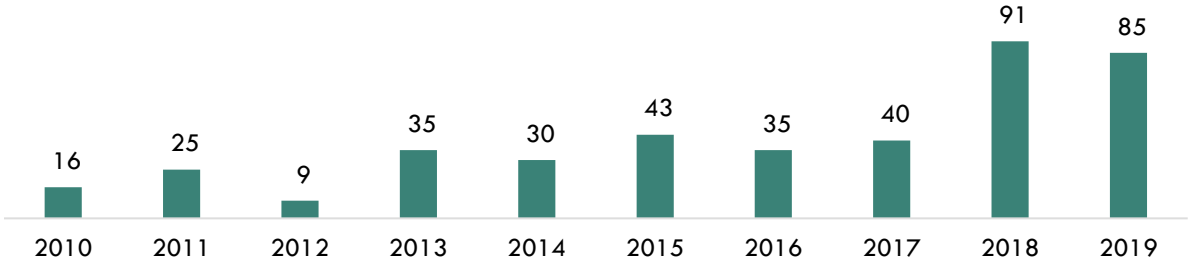
"N/A" indicates insufficient data

[12] Among completers and skills builders who exited, the proportion of students who attained a living wage.
[13] Most recent year with available data is Program Year 2016-17. Percentage of Students in a Job Closely Related to Field of Study: Among students who responded to the CTEOS, the percentage reporting employment in the same or similar field as their program of study.

Online Job Postings

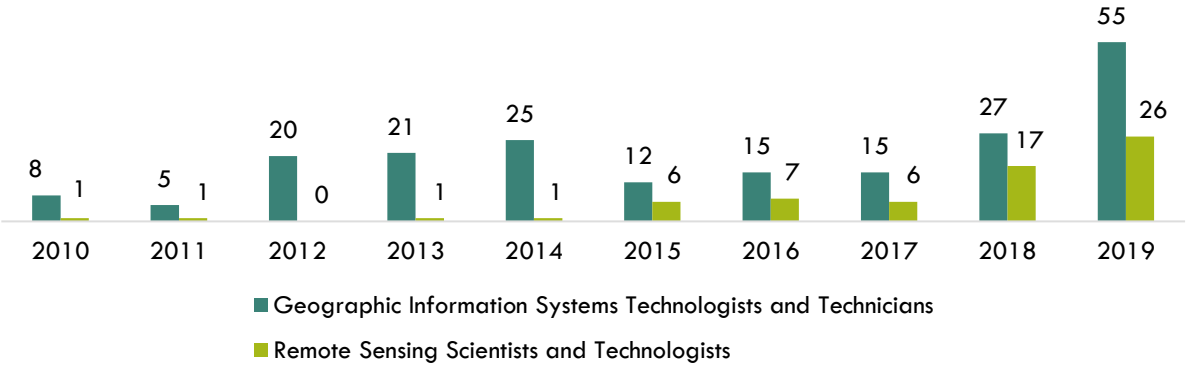
This report analyzes not only historical and projected data (traditional labor market information or LMI), but also recent data from online job postings (real-time LMI). Online job postings may provide additional insight about recent changes in the labor market that are not captured by historical data. Between 2010 and 2019, there was an average of 41 online job postings per year in San Diego County for *Geographic Information System Occupations* (Exhibit 7a). Please note that online job postings do not equal labor market demand; demand is represented by annual job openings (see Exhibit 1b above). Employers may post a position multiple times for various reasons, such as increasing the pool of applicants, for example.

Exhibit 7a: Number of Online Job Postings for *Geographic Information System Occupations* in San Diego County (2010-2019)[14]



Similarly, during this period, there was an average of 27 online job postings for *Search Marketing Strategists*, *Web Administrators*, and *Web Content Producers* (Exhibit 7b).

Exhibit 7b: Number of Online Job Postings for *Geographic Information Systems Technologists and Technician* and *Remote Sensing Scientists and Technologists* in San Diego County (2010-2019)



[14] Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2010-2019.

Top Employers

Between January 1, 2017 and December 31, 2019, the top five employers in San Diego County for these occupations were Nv5, City San Diego, Boston Scientific Corporation, Tritech Systems Incorporated, and Rick Engineering Company (Exhibit 8).

Exhibit 8: Top Employers in San Diego County for *Geographic Information System Occupations*[15]

Top Employers	
• NV5 • City San Diego • Boston Scientific • TriTech Systems Incorporated • Rick Engineering Company	• International Humanity Foundation • Morris Hebert Incorporated • Kappa Surveying And Engineering • Henkels Mccoy • Vscenario

Education, Skills and Certifications

Geographic Information System Occupations have a national educational attainment ranging from a high school diploma or equivalent to a bachelor's degree (Exhibit 9a).

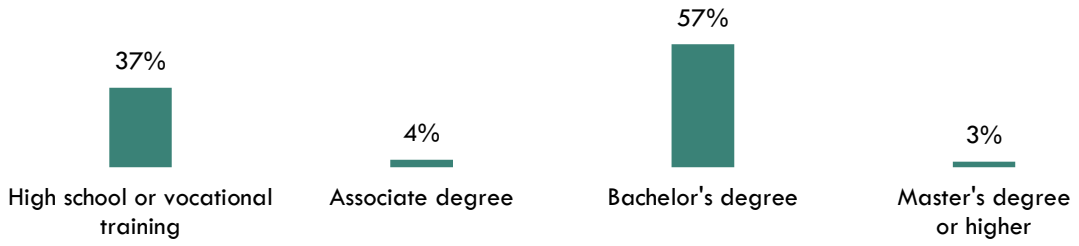
Exhibit 9a: National Educational Attainment for *Geographic Information System Occupations* [16]

Occupational Title	Typical Entry-Level Education
Cartographers and Photogrammetrists	Bachelor's degree
Surveying and Mapping Technicians	High school diploma or equivalent

Based on online job postings between January 1, 2017 and December 31, 2019 in San Diego County, the top listed educational requirement for *Geographic Information System Occupations* is a bachelor's degree (Exhibit 9b).[17]

[15] Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2017-2019.
[16] EMSI 2020.04; QCEW, Non-QCEW, Self-Employed.
[17] Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2017-2019.

Exhibit 9b: Educational Requirements for *Geographic Information System Occupations* in San Diego County[18]



*May not add to 100% due to rounding

Exhibit 10 lists the top specialized, soft and software skills that appeared in online job postings between January 1, 2017 and December 31, 2019.

Exhibit 10: Top Skills for *Geographic Information System Occupations* in San Diego County[19]

Specialized Skills	Soft Skills	Software Skills
• Surveys • Global Positioning System (GPS) • Calculation • Land Survey • Field Surveys • Information Systems • Budgeting • Customer Service • Data Entry • Project Management • Land Development • Topographic Surveys • 3D Modeling / Design • Scheduling • Customer Contact	• Communication Skills • Planning • Detail-Oriented • Research • Problem Solving • Writing • Physical Abilities • Time Management • Teamwork / Collaboration • Troubleshooting • Oral Communication • Organizational Skills • Editing • Building Effective Relationships • Written Communication	• Geographic Information System (GIS) • Civil 3D • Microsoft Excel • AutoCAD • ArcGIS • Python • Esri Software • SQL • Microsoft Word • Microstation • CADD • Computer Aided Drafting/Design (CAD) • JavaScript • Microsoft Outlook • Microsoft PowerPoint

[18] "Educational Attainment for Workers 25 Years and Older by Detailed Occupation," Bureau of Labor Statistics, last modified September 4, 2019. bls.gov/emp/tables/educational-attainment.htm.
[19] Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2017-2019.

Exhibit 11 lists the top certifications that appeared in online job postings between January 1, 2017 and December 31, 2019.

Exhibit 11: Top 15 Certifications for *Geographic Information System Occupations* in San Diego County[20]

Top Certifications in Online Job Postings
1. Licensed Professional Surveyor
2. CDL Class C
3. Security Clearance
4. L.S. Certificate
5. Certified Medical Technologist
6. SANS/GIAC Certification
7. Project Management Professional (PMP)
8. Project Management Certification
9. Information Technology Certification
10. Geographic Information Systems Professional (GISP)
11. Certified Survey Technician (CST)
12. ServSafe
13. Insurance License
14. Insurance Agent Certification
15. CompTIA CTT+

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[20] Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2017-2019.

Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.

This workforce demand report uses state and federal job projection data that was developed before the economic impact of COVID-19. The COE is monitoring the situation and will provide more information as it becomes available. Please consult with local employers to understand their current employment needs.