CONSTRUCTION

Sector Workforce Study

Centers of Excellence

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

Central Mother Lode
Regional Consortium

POWERED BY
California
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SOUTH CENTRAL COAST REGIONAL CONSORTIUM

Prepared by the Centers of Excellence for Labor Market Research: Bay Area, Central Valley/Mother Lode, Far North, South Central Coast

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About this Report

The Centers of Excellence (COE) for Labor Market Research deliver regional workforce research and technical expertise to California Community Colleges for program decision making and resource development. The COE aspires to be the leading source of regional workforce information and insight for California Community Colleges. The COE is funded in part by the Chancellor's Office, California Community Colleges, Economic and Workforce Development Program. More information about the Centers of Excellence is available at **www.coeccc.net**.

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The COE wishes to thank the following Center for Economic Development staff members for all their work on this study:

Courtney Farrell	**Project Manager**
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Melissa Kovacs	**Senior Research Analyst**

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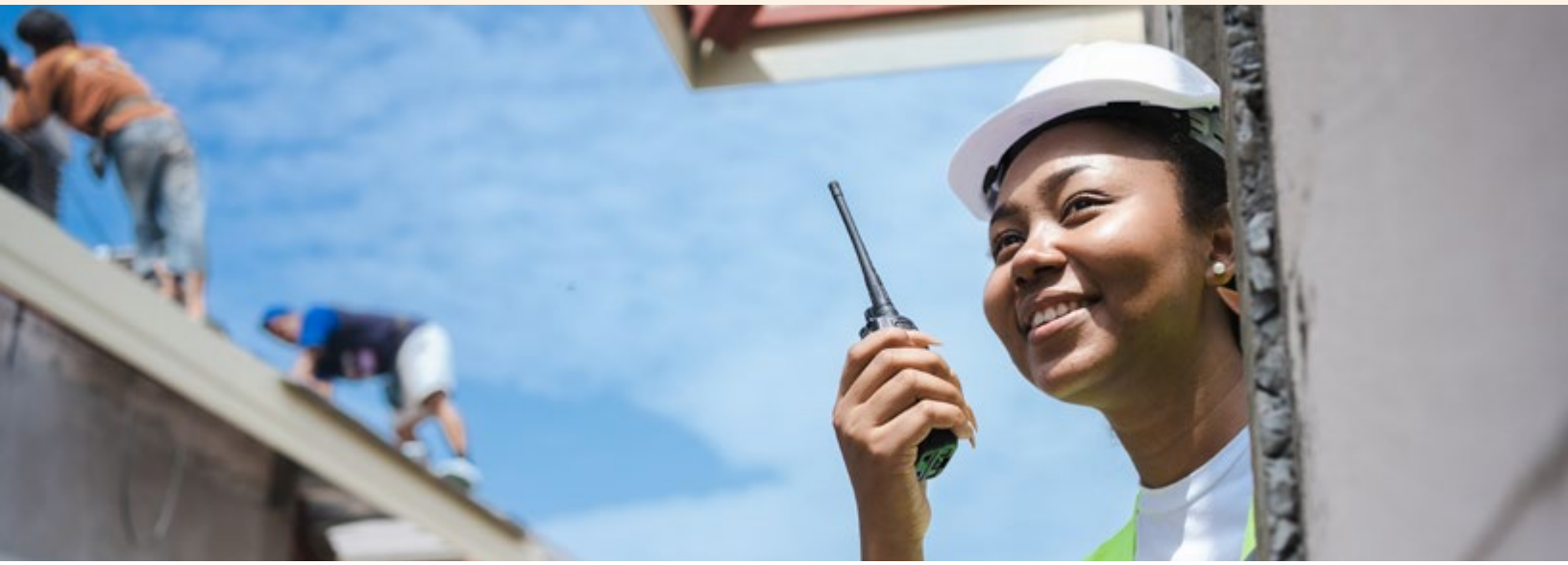
The COE wishes to thank Karin Odell from Venus Designs for her expertise with the graphic design of this report.



Executive Summary

This report is the result of a multi-region project conducted by the Centers of Excellence (COE) in the Bay Area (BA), Far North (FN), South Central Coast (SCC), and Central Valley/Motherlode (CVML). This report covers the results of a COE survey administered by the Center for Economic Development (CED) at Chico State University, to California construction sector employers and stakeholders. The findings of this study are analyzed and reported for the four participating regions. The study results may be used to help shape policy and guide industry leaders and stakeholders in addressing the workforce needs of the construction sector. This report consists of an analysis of the survey results, comparative secondary data with analysis, and recommendations for future uses of the findings.

The list of businesses surveyed was provided by the COE and the survey was administered over a seven-month period by the CED. The survey was administered and distributed by various means to 8,480 businesses throughout the participating regions. The survey asked the targeted employers general questions about their business characteristics, workforce challenges, hiring processes, community college partnership opportunities, and other business needs and challenges.

"This study found that the construction sector is facing significant workforce challenges."

This study found that the construction sector is facing significant workforce challenges. It is recommended that the findings of this study be used by stakeholders and industry leaders to inform the planning process for workforce resiliency within the construction sector. The overall findings of this study include:

- Businesses are impacted by an insufficient pool of qualified job candidates.
- Most businesses expect their need for qualified employees to increase in coming years.
- A majority of businesses only require a minimum of a year or less of related work experience for candidates who are at an education level of high school diploma or higher.
- Many businesses are interested in working with community colleges to develop programs that could help fill training gaps.

Methodology

To collect data from primary sources, a 17-question survey was administered to construction sector businesses via Constant Contact. Survey recipients were identified using 25 NAICS construction codes. The survey was piloted in Fresno County in order to ascertain the response rates. The full survey was open for just over seven months between August 2, 2021, and March 10, 2022. Email followed by phone call outreach were utilized to obtain responses from 209 construction businesses, a response rate of 2.46 percent. According to Dun & Bradstreet Hoovers, there are currently 111,054 firms whose primary industry is "Residential and Commercial Building Construction" in California, this means that the sample size for the survey represents less than 19 percent of California's construction businesses.

There were 8,480 entities contacted using the following methods:

- **8,148 emails and calls** from the Centers of Excellence call list
- **332 emails** from the Valley Contractors Exchange (VCE) call list

"...there are currently 111,054 firms whose primary industry is 'Residential and Commercial Building Construction' in California."

Survey Results

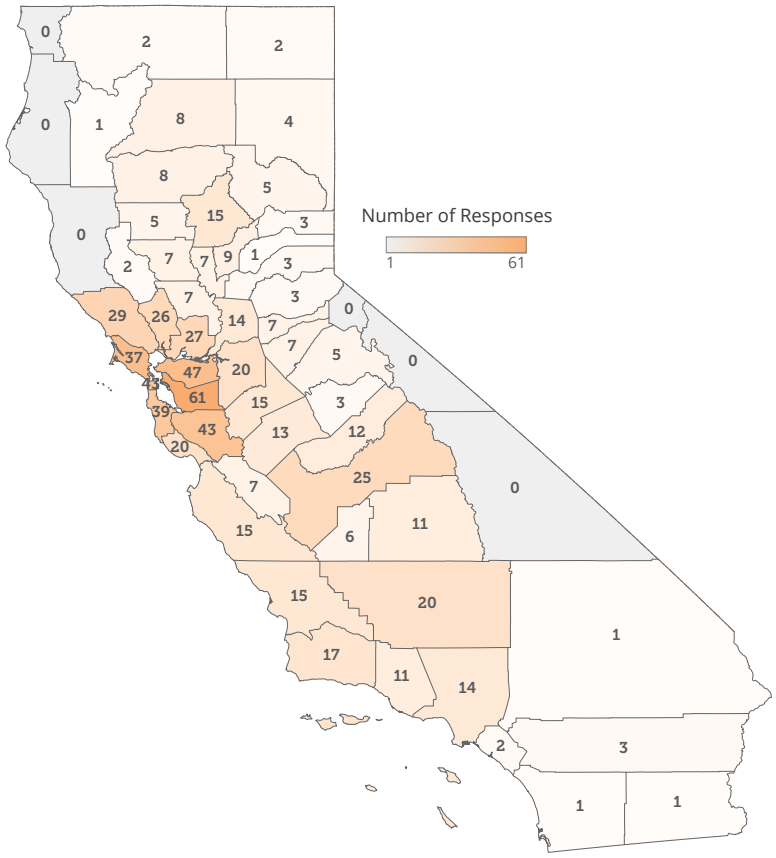
Business Characteristics

The initial survey questions explored business characteristics prompting respondents to provide information such as classification, number of employees, and recruiting location. The first survey question asked respondents to confirm that their business is in California (Figure 1).

Recruitment Locations

Survey question six asked respondents to identify the California county or counties from which their company recruits and hires its construction employees. The largest portion of respondents recruit and hire their new employees from the San Francisco Bay area. Respondents also hire a number of employees from the South Central Coast region. *Responses outnumber respondents due to the option to select all that apply.*

Figure 1 . Map of responses for survey question six. Responses outnumber respondents due to the option to select all that apply. Respondents by the counties where they recruit new employees.



The following represents the number of responses: n = 178

(Data in Appendix A.)

Participant responses that identified the counties where new construction workers are recruited was also used to organize firms by region. Businesses were counted in every region that *included a county they identified as one from which they recruit new employees. Regardless of the number of counties within a region identified by a respondent, they were only counted within that region's data once.* This means that data provided by some individuals businesses are represented in multiple region due to the option for individual respondents to select all counties throughout the four regions where their firm recruits new construction workers. As a result, individual counts of regional responses may exceed the aggregated responses total.

The regions in this report are based on those delineated by the California Community College Chancellor's Office with slight adjustments made to follow county lines. The report focuses on the following four regions: Bay Area, Far North, South Central Coast, and Central Valley/ Motherlode. Some counties are split between regions; therefore, all of Monterey County was included in the Bay Area region and all of Los Angeles County was included in the South Central Coast (Figure 2). Below is a breakdown of the number of respondents per region. *The sum of regional respondents exceeds the total number of responses due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions.*

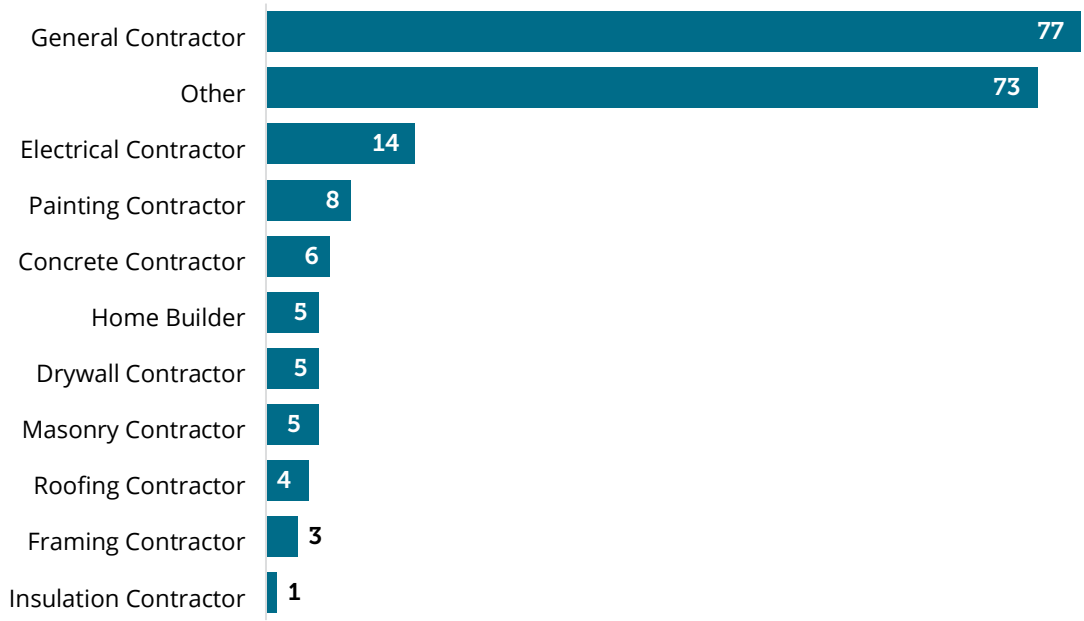
Figure 2. Map of California Counties included within each study region and their respective count.

Regions	Number of Respondents
Bay Area	109
Far North	20
South Central Coast	35
Central Valley/Mother Lode	78

Company Classification

Survey question two prompted respondents to classify their company into one of ten categories (Figure 3). Most businesses classified their organization as either General Contractors or Other. The top "Other" responses include HVAC contractors 14 responses, glazing contractors 4, and plumbing contractors 4. (Table 1 in Appendix A displays a regional breakdown of these results).

Figure 3: How would you classify your company?



The following represents the total of responses: n = 201

Employee Data

Number of Employees

The third survey question asked respondents to approximate the number of employees at their business. Most of the businesses who responded to the survey are small to medium sized businesses, with 32 percent having under 10 employees, and 75 percent having under 50 employees. The vast majority of respondents (88 percent) have under 100 employees. (Table 2 in Appendix A displays a regional breakdown of these results).

Aggregated small business data (those firms having less than 50 employees) across the four regions was obtained from a secondary source for comparative analysis. This analysis revealed an overall small business rate of 84 percent (Table 1.1). A second data pull was then executed from the same source using only the 25 identified construction NAICS codes. Analysis of this latter data revealed that 97 percent of these firms had fewer than 50 employees (Table 1.2).[1]

Table 1.1:[2]

Region	Firms		
	Total	<=49	Rate
Bay Area	488,424	399,681	82%
Central Valley/Mother Lode	176,452	152,181	86%
Far North	54,159	47,203	87%
South Central Coast	115,953	98,259	85%
Overall	**834,988**	**697,324**	**84%**

Table 1.2:[3]

Range	Firms	
	Number	Percent
1 - 4	22,203	72%
<= 9	26,964	87%
<= 19	28,936	94%
<= 49	30,102	97%
Total	**30,932**	**100%**

[1] This data was obtained from InfoUSA/Data Axle

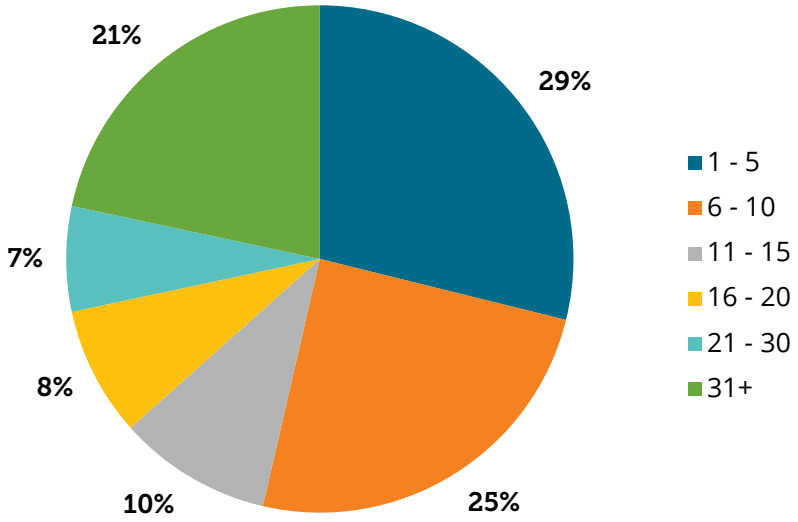
[2] Source: DataAxle

[3] Source: DataAxle

Direct Participants

Survey question four prompted respondents to identify how many of their workers physically participate in construction work. It was determined that 21 percent of respondents have 31 or more of their workers participating directly in construction work, and over 50 percent have 10 or fewer. Figure 4 depicts the results of the analysis. (Table 1.2 in Appendix A displays a regional breakdown of these results).

Figure 4: Of the workers you currently have, how many physically participate in construction work?

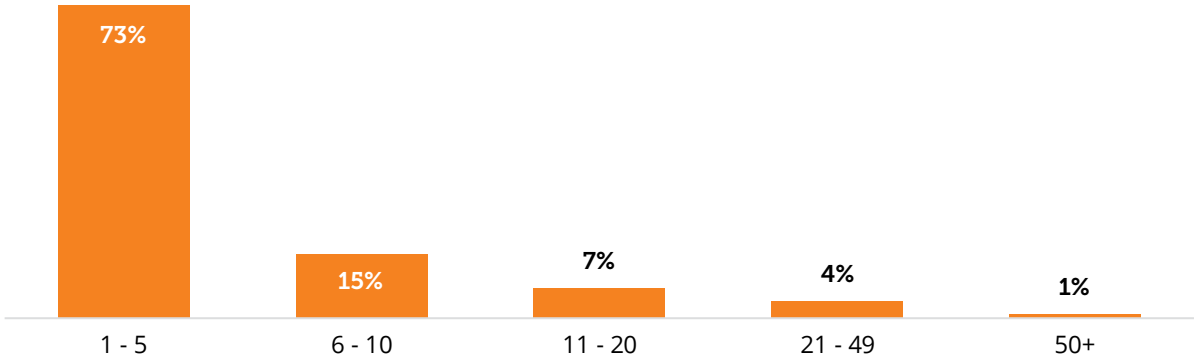


The following represents the total number of workers: n = 194

Annual Worker Replacement

Survey question seven sought to identify the number of construction workers that need to be replaced each year due to retirement or leaving employment for other reasons. As displayed in Figure 5, a majority of the respondents (73 percent) indicated a need to replace one to five construction workers annually. (Table 4 in Appendix A displays a regional breakdown of these results).

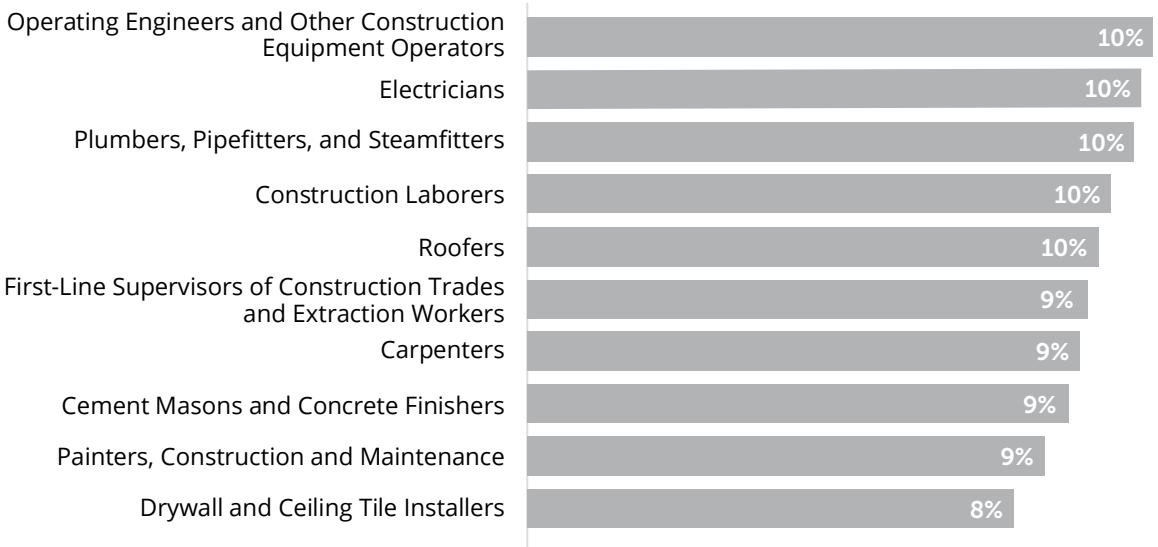
Figure 5: On average, how many of your construction workers will you need to replace each year?



The following represents the total number of annual replacement of construction workers: n =194

To provide context to survey question seven results, the COE evaluated the construction occupations considered to be pertinent to this report. This resulted in the identification of the top ten occupations by number of replacements (Figure 6). Analysis of the top ten occupations revealed replacement rates that range from eight to ten percent.

Figure 6: Percentage of annual replacement openings for the top 10 occupations for all the regions

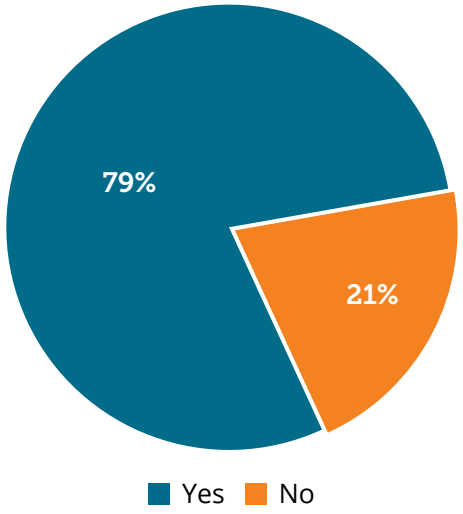


The following represents the total percentage of annual openings for each occupation in the order presented: n = 5,762, n= 5,285, n = 3,279, n = 2,410, n= 2,029, n = 1,980, n = 1,446, n = 1,069, 1,013, n = 923

Anticipated Worker Change

Respondents were then asked if they plan to have more construction workers two years from now. This question was followed up that asked the respondents to provide the anticipated number of additional workers. A large majority of respondents, 79 percent, plan to have an increase in construction workers (Figure 7).

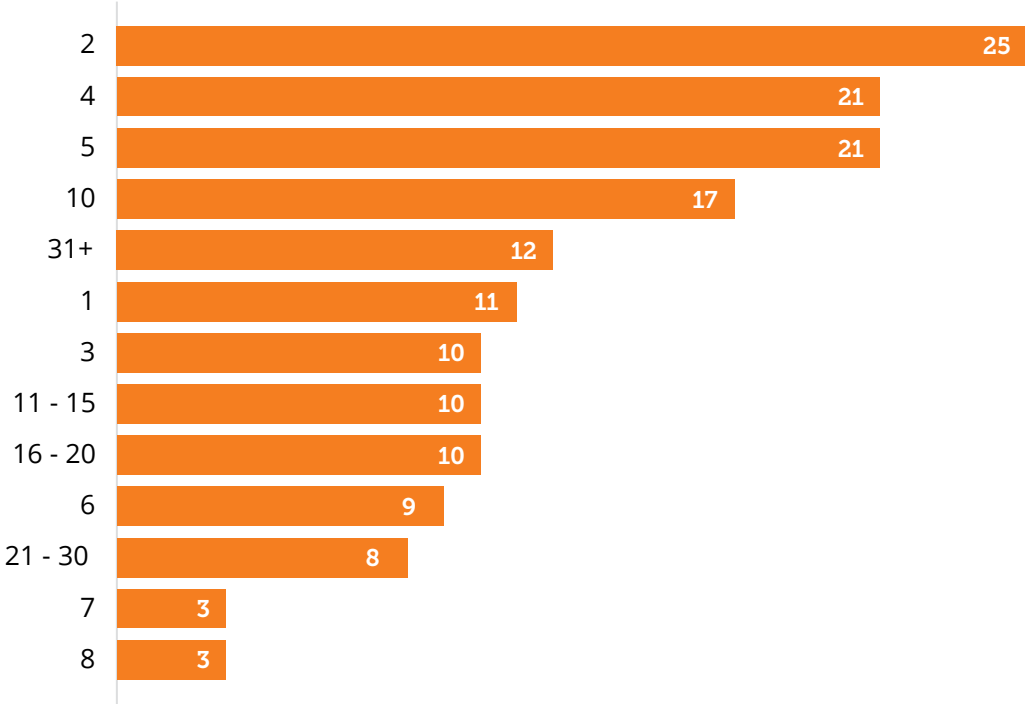
Figure 7: Do you plan to have more construction workers two years from now?



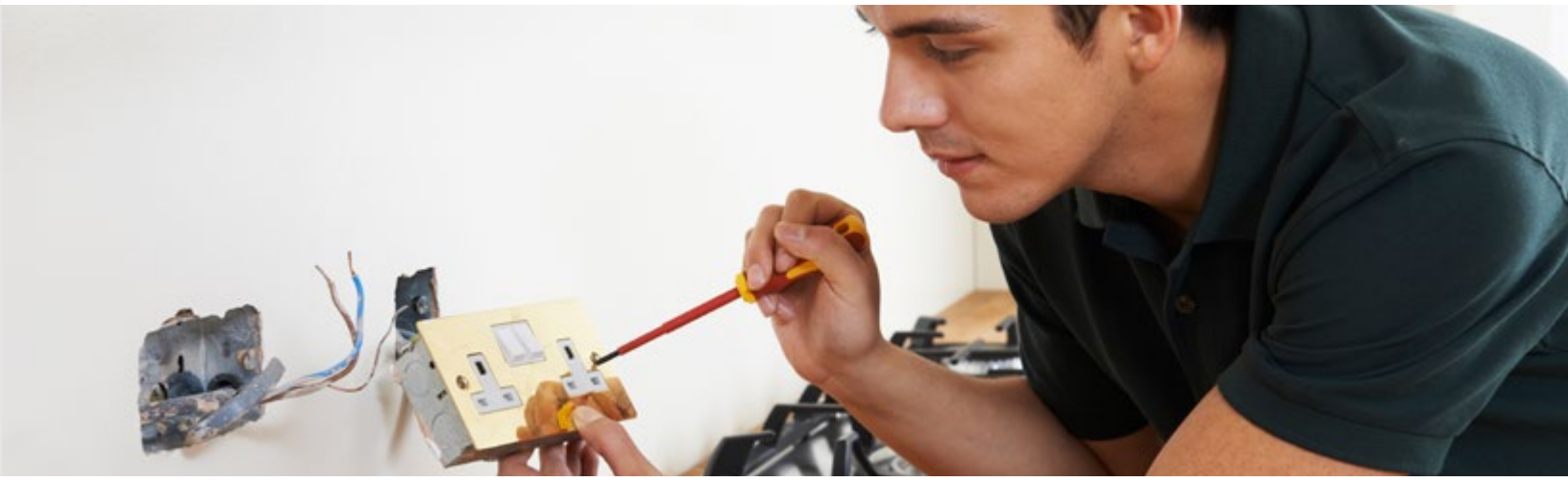
The following represents the total number of responses: n = 196

While the number of the anticipated worker increases varied between respondents, most anticipated an increase of two workers (Figure 8). Even a conservative estimate suggests that survey respondents alone will hire at least 1,359 new construction workers over the next two years. If these survey results are taken as a proportional representation of California's construction sector as a whole, this would translate into a statewide expectation to hire approximately 715,263 new construction workers over the next two years, or roughly 357,631 employees annually. According to the U.S. Bureau of Labor Statistics' Job Openings and Labor Turnover News Release, nationwide, the construction sector hired approximately 2,254,000 employees between February 2021 and February 2022. If nationwide construction hires remain static and survey results are taken as a proportionate representation of California, then new construction worker hires will account for approximately 16 percent of all new construction sector hires nationwide. These factors clearly display California's need to produce and maintain a healthy and skilled construction workforce.

Figure 8: If yes, how many more construction workers do you plan to employ two years from now?

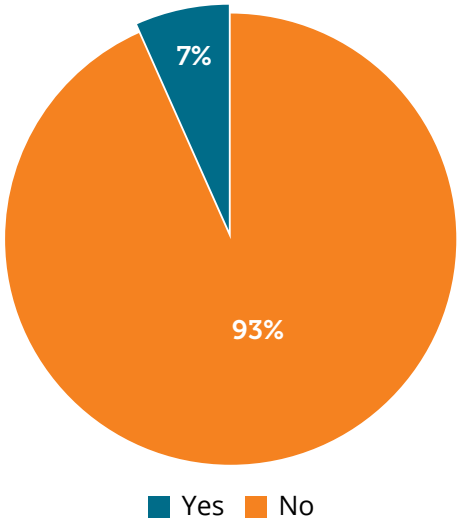


The following represents the total number of responses: n = 160



Survey question nine asked respondents if they plan to have fewer construction workers two years from now (Figure 9).

Figure 9: Do you plan to have fewer construction workers 2 years from now?

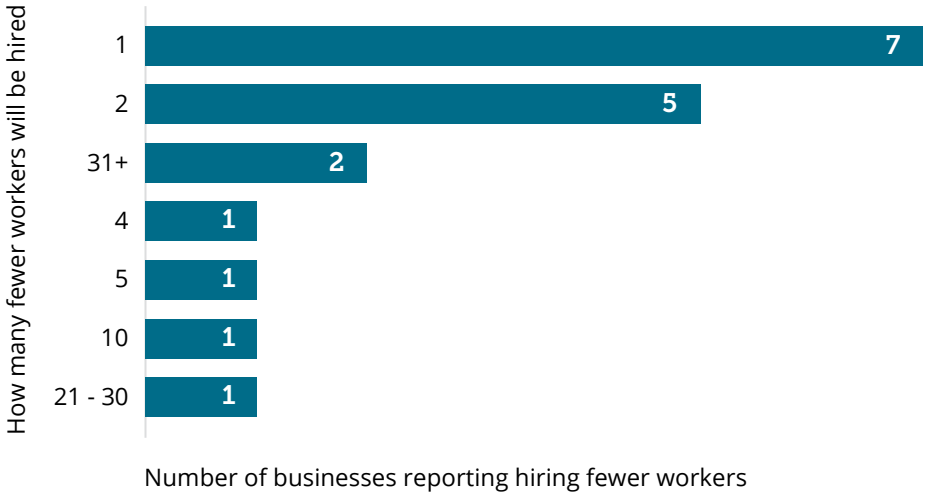


The following represents the number of responses: n = 195

A follow-up to question nine asked for the number of workers respondent organizations anticipated to lose over the next two years (Figure 10).

Of the seven percent that do anticipate construction worker losses, most indicated a reduction of only one or two workers. (Tables 5 and 6 in Appendix A contain regional breakdowns of these results).

Figure 10: If yes, how many fewer construction workers do you plan to employ 2 years from now?



The following represents the number of total fewer workers: n =18

Occupational Demand

In order to better frame this information, secondary employment and projections data were pulled for comparison. The top 10 construction sector occupations are displayed in Table 2.1. Construction laborers are projected to have the greatest number of annual openings at 6,598. This is followed by carpenters at 5,653 and electricians at 4,166. Electricians has the greatest projected growth rate at 14 percent. (Table 13 in Appendix A demonstrates the occupational demand for the survey relevant construction occupations).

Table 2.1: Top 10 construction occupations employment and occupational projections in the four regions.[4]

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Construction Laborers	57,615	61,233	3,619	6%	6,598
Carpenters	57,025	57,770	745	1%	5,653
Electricians	30,068	34,240	4,172	14%	4,166
First-Line Supervisors of Construction Trades and Extraction Workers	25,332	26,504	1,172	5%	2,783
Painters, Construction and Maintenance	22,890	24,251	1,361	6%	2,370
Plumbers, Pipefitters, and Steamfitters	18,651	20,477	1,827	10%	2,360
Operating Engineers and Other Construction Equipment Operators	13,388	14,376	988	7%	1,668
Cement Masons and Concrete Finishers	11,626	11,974	347	3%	1,216
Drywall and Ceiling Tile Installers	12,521	12,646	125	1%	1,174
Roofers	9,519	9,913	394	4%	1,066
TOTAL	**258,635**	**273,385**	**14,750**	**5%**	**29,055**

The construction laborers occupation represents 23 percent of the top ten occupations' projected growth rates. (Table 2.2). When all 33 relevant occupations are taken into consideration the percentage rate for this occupation shrinks to 19 percent.

Table 2.2: Top 10 construction occupations annual openings and percentages overall.[5]

Occupation	Annual Openings	Percentage of Annual Openings
Construction Laborers	6,598	19%
Carpenters	5,653	16%
Electricians	4,166	12%
First-Line Supervisors of Construction Trades and Extraction Workers	2,783	8%
Painters, Construction and Maintenance	2,370	7%
Plumbers, Pipefitters, and Steamfitters	2,360	7%
Operating Engineers and Other Construction Equipment Operators	1,668	5%
Cement Masons and Concrete Finishers	1,216	4%
Drywall and Ceiling Tile Installers	1,174	3%
Roofers	1,066	3%
Total of Top 10 Occupations	**29,055**	**84%**
Total of 33 Occupations	**34,401**	**100%**

[4] Source: Emsi

[5] Source: Emsi

Postsecondary Supply

Top Codes for Community College Construction Programs

Table 3.1 shows the college supply of graduates from the TOP codes that align with the nine occupations in Table 4.1 used for the supply/demand gap analysis in this study. Construction labors, carpenters, electricians, and first-line supervisors of construction trades and extraction workers are included in the TOP code and title: 095200 – Construction Crafts Technology, 095210 – Carpentry, and 095220 – Electrical (Table 4.2).

Table 3.1: Postsecondary supply in the four regions by TOP/ CIP Code.

TOP/ CIP Code	Title	Supply
47.0201	Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology	595
095220	Electrical	306
094600	Environmental Control Technology	272
095200	Construction Crafts Technology	117
095700	Civil and Construction Management Technology	104
46.0415	Building Construction Technology	77
095230	Plumbing, Pipefitting and Steamfitting	71
095720	Construction Inspection	39
094730	Heavy Equipment Operation	34
095640	Sheet Metal and Structural Metal	34
094610	Energy Systems Technology	27
095210	Carpentry	20
095250	Mill and Cabinet Work	15
Total		**1,711**

As presented in the 2022 Central Valley/ Mother Lode Region Sector Profile Reports, the construction of the high-speed rail and other state and local infrastructure projects are expected to spur demand for more construction workers, especially those in the unionized building trades. In addition, state legislation, such as AB 32 which fights against global warming, will create more workforce opportunities across the regions as California moves away from natural gases and petroleum production and integrates more renewable energy. As demonstrated in Table 3.2, there is an undersupply of workers in energy systems technology, which prepares students to work in the field of renewable energy. Although TOP code/title 094610 - Energy Systems Technology appears to currently be a low priority for employers across the four regions, recent federal and state policy changes are anticipated to significantly change this scenario. The enacted Inflation Reduction Act will expedite this process.

A similar scenario exists with automation and artificial intelligence (AI) in that the construction industry is beginning to prioritize the integration of these technological advancements into many of their work processes. However, construction crews currently still have to assemble a variety of building types, even prefabricated ones. Software, a precursor to, and intertwined with AI, is also playing an increasingly important role in the construction trades. A few examples are the benefits being realized through the digitalization of drawings, increased precision in construction cost estimates, and the ability to more efficiently manage water and energy consumption.

Even though technology will alleviate some construction workforce demand, employers are still suffering from a significant work shortage compounded by an aging workforce that is retiring at greater rates than previously anticipated; a suspected and highly probable outcome of the pandemic. The results of this study combined with several COE occupational demand and supply analyses confirm these findings. There is a large undersupply of workers that can be trained under TOP and CIP codes/titles: 095200 - Construction Crafts Technology and 46.0415 – Building Construction Technology (Table 3.2). The results of this study along with the anticipated impacts of legislative priorities clearly show that construction workers need hands-on construction skills, and face a growing need to be proficient in advanced technologies. It appears that mastery of these latter skills will quickly lead to advancement or direct employment into supervisory and management positions. Future opportunities will be better for workers with expertise in energy auditing and energy management along with civil and construction management.

Table 3.2: Gap analysis in the four regions.

TOP/ CIP Code	Title	Demand	Supply	Gap
095200	Construction Crafts Technology and 46.0415 - Building Construction Technology	9,749	193	9,556
095210	Carpentry	8,650	20	8,630
095220	Electrical	7,187	306	6,881
095250	Mill and Cabinet Work	5,866	15	5,851
095720	Construction Inspection	3,374	39	3,335
095700	Civil and Construction Management Technology	2,783	104	2,679
095230	Plumbing, Pipefitting and Steamfitting	2,764	71	2,693
094730	Heavy Equipment Operation	1,810	34	1,776
095640	Sheet Metal and Structural Metal	1,052	34	1,018
094600 and 47.0201	Environmental Control Technology and Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology	578	867	(289)
094610	Energy Systems Technology	382	27	355

TOP and CIP codes: 095200 - Construction Crafts Technology, 46.0415 - Building Construction Technology, and 095210 – Carpentry demonstrated in figure 11, but the following five TOP codes: 095240 – Glazing, 095260 - Masonry, Tile, Cement, Lath and Plaster, 095270 - Painting, Decorating, and Flooring, 095280 - Drywall and Insulation, and 095290 – Roofing may also need greater enrollment promotion across the four regions as there was no available supply for these TOP codes.

Figure 11: Top 6 TOP/ CIP code gap analysis in the four regions.

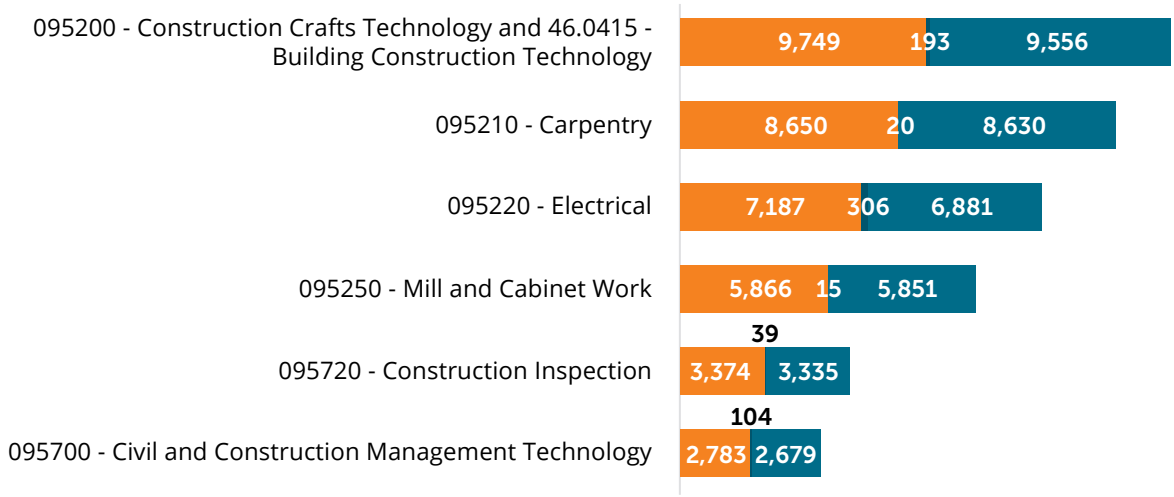


Table 4.1: Nine construction industry occupations used for postsecondary supply in the four regions.

SOC	Occupation	Demand	Total Demand	Total Gap
47-2061	Construction Laborers	6,598	20,020	19,620
47-2031	Carpenters	5,653		
47-2111	Electricians	4,166		
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	2,783		
47-3012	Helpers – Carpenters	213		
47-3013	Helpers – Electricians	238		
47-3019	Helpers, Construction Trades, All Other	158		
47-4098	Miscellaneous Construction and Related Workers	152		
47-5081	Helpers – Extraction Workers	59		

Table 4.2: Postsecondary supply for the top 3 TOP codes with the largest gap analysis in the four regions.

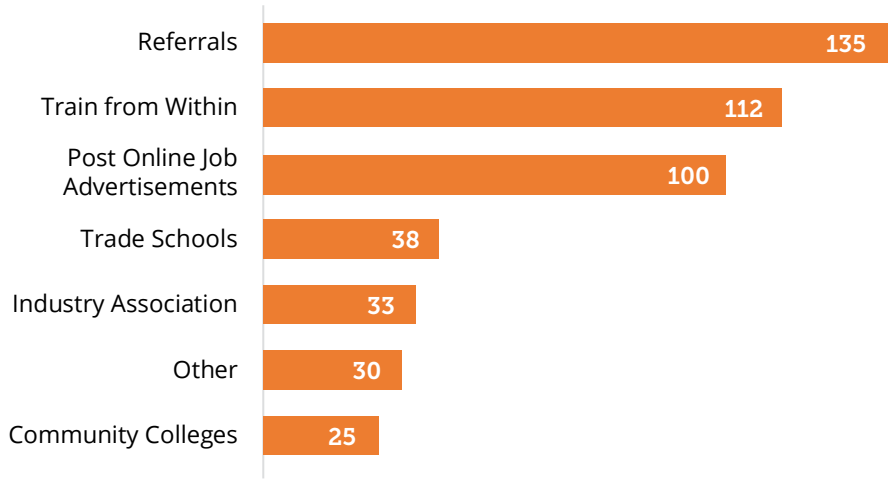
TOP/CIP Code- Title	College	Associate Degree	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Certificate 8 < 16 Semester Units	Credit Award, < 6 Semester Units	Noncredit Award 144 < 192 Hours	Noncredit Award 48 < 96 Hours	Noncredit Award 96 < 144 Hours	Subtotal
095200 - Construction Crafts Technology	Bakersfield	1				2							3
	Butte			2			4						6
	Cuesta								0				0
	Diablo Valley	0		7	1		7						15
	Fresno City	1				1							2
	Hartnell					0							0
	Redwoods	4			3	3							11
	San Francisco						4						4
	San Jose City	9	6	7	9	12		6					48
	Santa Barbara	2		3						0	11		17
	Santa Rosa											1	1
	Sequoias	2				3	4						9
095210 - Carpentry	Laney	3		3		4	0						10
	Redwoods	3		3	1	3							10
095220 - Electrical	Bakersfield	2				22							24
	Cuesta	9				7							15
	Foothill	4		113			31						148
	Merced	4				20							25
	Modesto					2							2
	Redwoods			0	1		1						2
	San Francisco						3						3
	San Joaquin Delta	9		8		8							25
	San Mateo	0											0
	Sequoias		16	1				2					19
Total		**55**	**22**	**146**	**16**	**87**	**53**	**8**	**0**	**0**	**11**	**1**	**400**

(Table 14 in Appendix B demonstrates the Postsecondary supply for all TOP/CIP codes related to the construction industry occupations in the four regions.)

Recruitment Method

Respondents were prompted to identify where their company finds qualified construction workers. The top three recruitment methods are referrals, train from within, and Online job advertisements. Additionally, among the 30 "Other" responses, 17 participants identified unions as a place where they find qualified candidates. The option that had the lowest choice frequency for method of finding qualified candidates was community colleges (Figure 13). The results of this survey question speak to the need for community colleges to explore expanding their marketing efforts, and a potential need to adjust curricula to provide more training and courses that increase students' preparation for high job high quality employment in the construction sector. (Table 7 in Appendix A displays a regional breakdown of these results).

Figure 13: Where do you find qualified candidates to fill vacancies for construction worker positions?[6]



The following represents the number of locations to find qualified candidates: n = 185

[6] Source: Esmi

Skills, Training, and Education

Work Experience Required for Different Education Levels

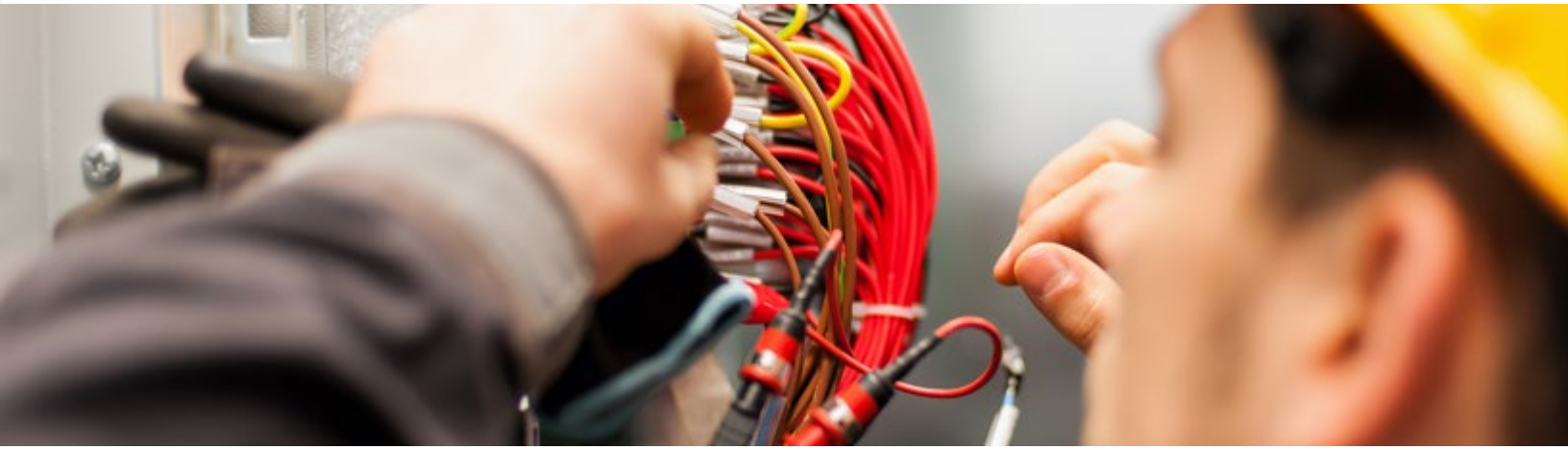
In survey questions 10.1 through 10.6, respondents were asked to identify the minimum work experience required for candidates at each education level. A potential survey error was noted with question 10.6 with 13 percent of respondents indicating a four-year degree or higher does not meet their minimum education requirements. This could also be an outcome of employers' position that this is an excessive level of education. In any case there is always the potential for respondents to misinterpret Online survey questions, resulting in faulty data.

Despite this concern, the responses to questions 10.1-10.6 reveal that for workers who have a high school diploma or higher, a majority of the respondents require a minimum of one year or less of related work experience. Work experience is prioritized by construction sector employers. What these results appear to convey is that beyond a high school diploma, higher levels of education have little impact on the hiring potential of construction workers. This suggests that many construction firms across the four regions do not view academic training and work experience as interchangeable. This outcome reinforces the perception that work experience is more important than academic training for new hires in the construction sector.

Considering these outcomes, community colleges are encouraged to magnify their efforts of educating construction employers about community college training offerings and their subsequent experience replacement value combined with intensified outreach efforts to increase internships and work-based learning opportunities.

"What these results more accurately display is that beyond a high school diploma, further levels of education have little impact on the work experience the construction industry requires of new hires."

Overall the majority of respondents indicated their preference for 0 to 2 years of work experience, which is a similar outcome observed in the aggregated job postings data. Table 5 demonstrates that 43 percent of the surveyed employer prefer construction workers that have a high school or vocational training combined with 0 to 2 years of experience, and 38 percent prefer a high school or vocational training with 3 to 5 years of experience. Comparatively, evaluation of the job postings data revealed that five percent of construction employers favor an associate's degree with 0 to 2 years of experience, and another five percent listed 3 to 5 years of experience. Only three percent of employers listed a bachelor's degree with 0 to 2 years of experience, and seven percent indicated 3 to 5 years of experience. The listed preference for the two higher education degrees suggest an employer need to hire construction workers that can quickly assume a supervisorial and management role.



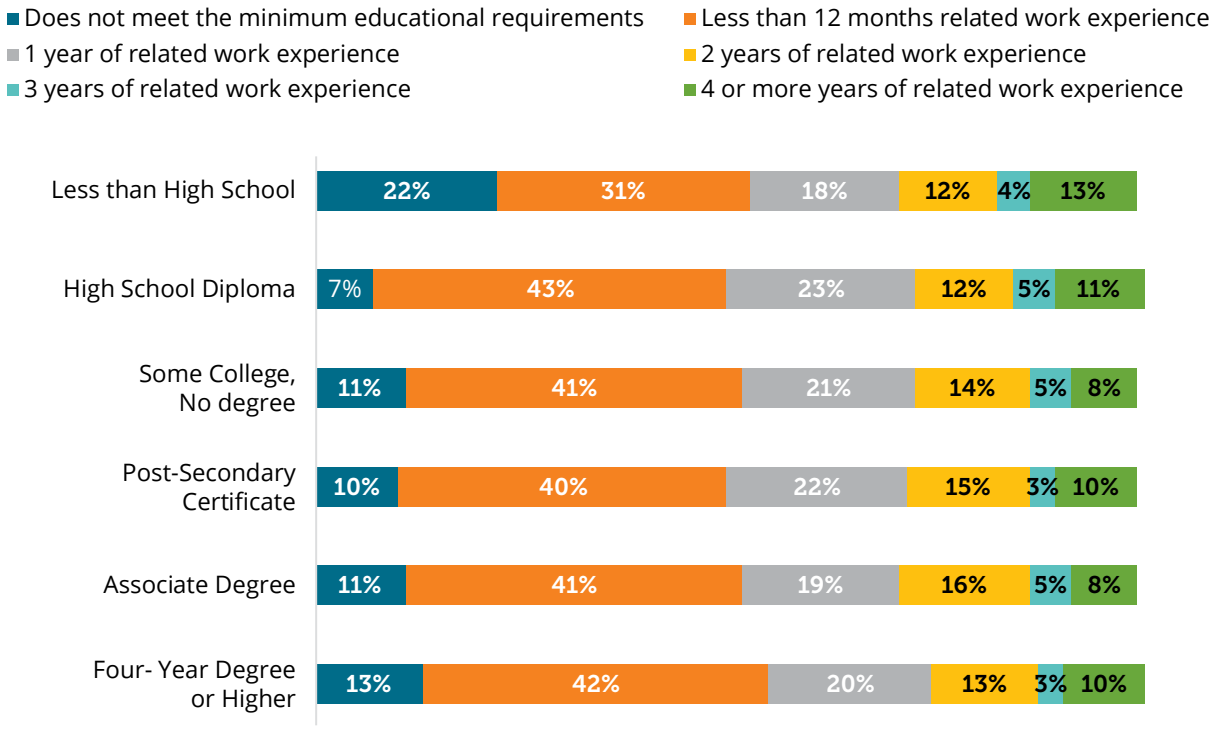
Minimum Work Experience by Education Level, Total Survey Responses

Table 5: Experience by education noted in job postings across all four regions.[7]

Experience	High school or vocational training	Bachelor's degree	Associate's degree	Master's degree	Doctoral degree
0 to 2 years of experience	43%	3%	5%	0%	1%
3 to 5 years of experience	38%	7%	5%	1%	0%
6 to 8 years of experience	3%	3%	1%	0%	0%
9+ years of experience	2%	3%	0%	0%	0%

Figure 14 displays the aggregated data from all responses and figure 15 displays the aggregated data by region.

Figure 14: What is the minimum related work experience required for the following education levels?

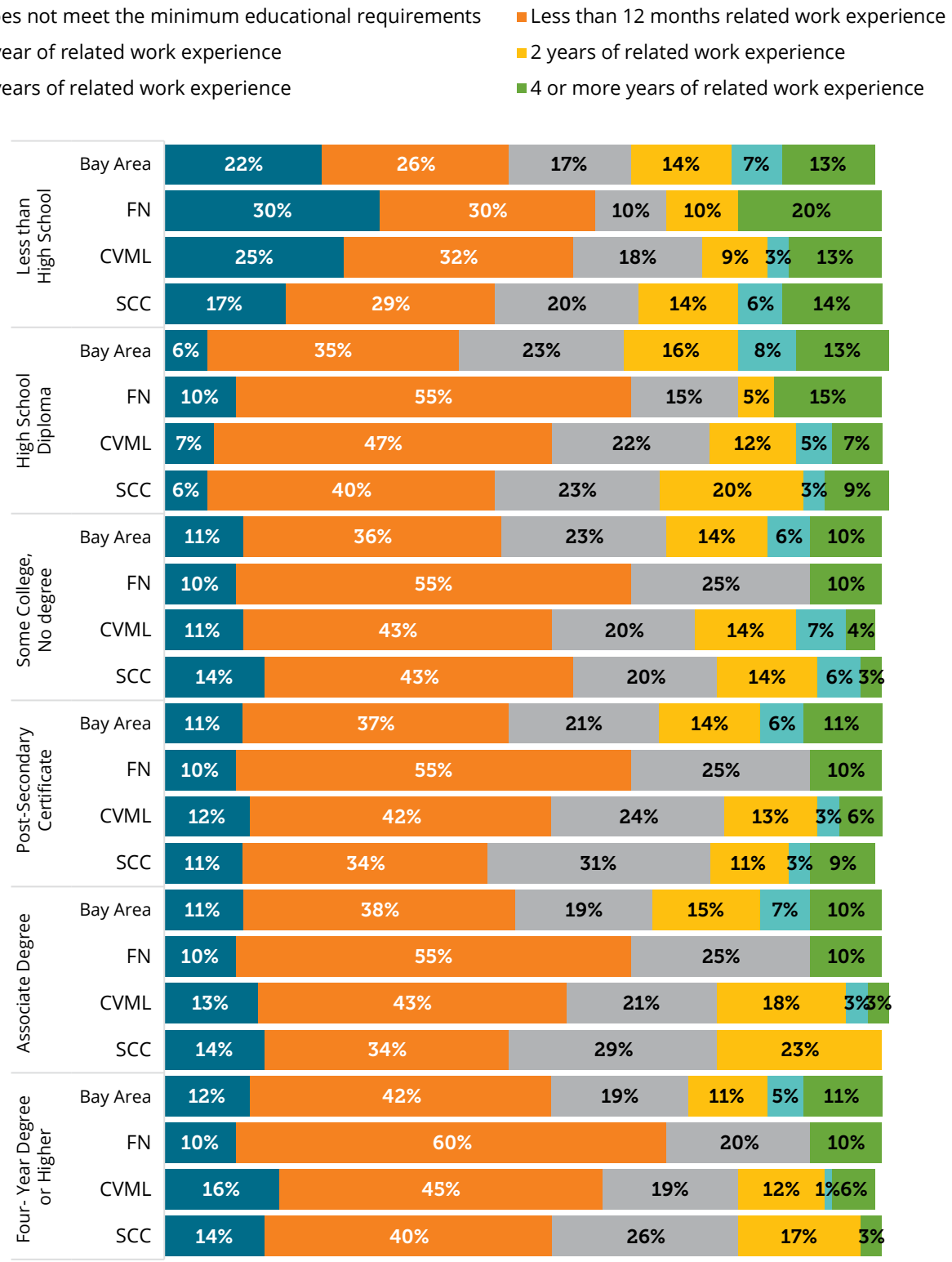


The following represents the total number of minimum related work experience in the order presented: n = 186; n = 190; n = 187; n = 184; n = 186; n = 184.

[7] Source: Burning Glass

Minimum Work Experience by Education Level, By Region

Figure 15: What is the minimum related work experience required for the following education levels?

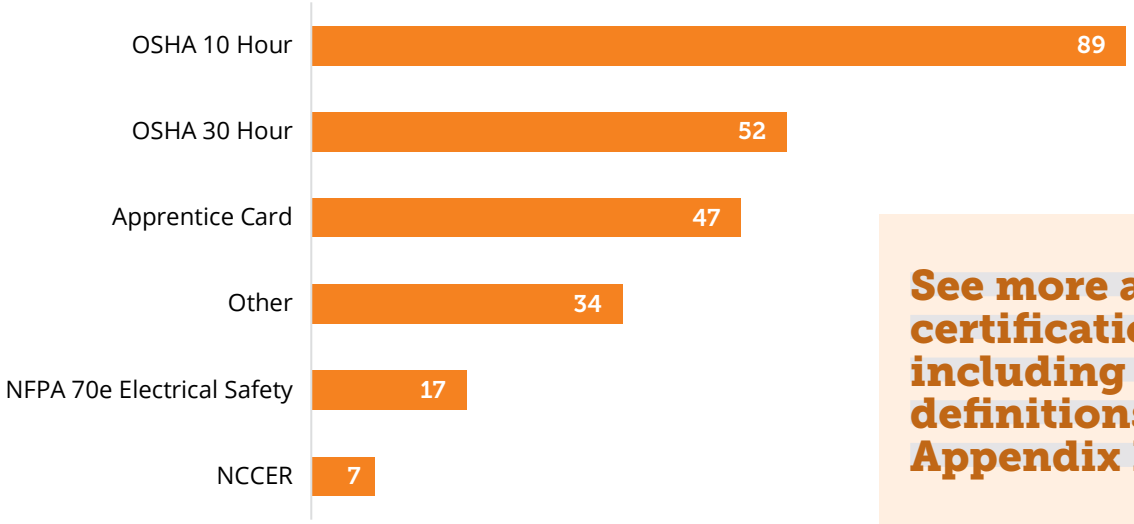


Certifications

In survey question twelve, respondents were asked to identify the certifications required for construction workers. The largest portion of participants indicated an Occupational Safety and Health Administration (OSHA) 10-hour certification requirement. OSHA 30-hour and Apprentice Card certifications were also required by a substantial number of respondents. These findings can be used by community colleges and other training providers to better understand the specific certifications that are valued by the construction sector, and tailor their curricula to provide these certifications.

An OSHA 30-hour training is generally required by construction workers in supervisory roles, and an OSHA 10-hour training is required for non-supervisory roles. The survey results suggest that a greater number of non-supervisory occupations need to be filled within the construction sector. Further evaluation of these results indicate that the surveyed employers need to fill one supervisory or leadership position for roughly two non-supervisory positions that employers are attempting to fill. (Table 8 in Appendix A displays a regional breakdown of these results.)

Figure 16: Which certifications should a qualified construction worker possess? (Select all that apply.)



See more about certifications, including definitions, in Appendix B.

The following represents the total number of certifications for qualified construction workers: n = 122

In a follow-up to survey question 12, respondents were asked to identify the most important certification for their construction workers to have from the previously provided list. Many of the firms responded with items in the provided list (Figure 16). This reinforces the need for these certifications. An "Other" response was Environmental Protection Agency (EPA) certification. This is a refreshing response in light of the low affirmation rate for construction workers to have energy efficiency knowledge outlined in the skills section of this report.

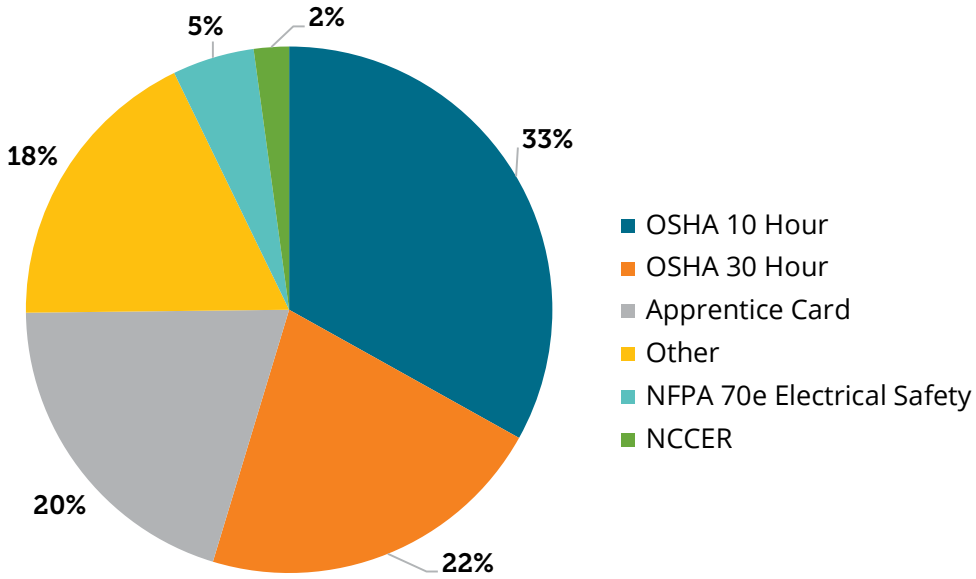
Two survey respondents from the South-Central Coast region mentioned a preference for their employees to have a technical or trade school education which is not a certification. Similarly, the Far North and Central Valley/Mother Lode regions had two respondents (overall two total employers represented in both regions) that indicated a preference for their workers to have equipment or general training/ experience. Finally, a Bay Area respondent noted a preference for their employees to have a four-year or university degree. As previously noted, this suggests a greater need for supervisors. (Table 9 in Appendix A displays a regional breakdown of these results. The complete list of entries in the follow-up to question 12 "Other" responses are also contained in Appendix A).

Table 7: Other responses.[8]

Certification required	Bay Area	Far North	South Central Coast	Central Valley/ Motherlode
EPA Certification	2	1	1	2
Safety skills or CPR	2	0	1	1
NATE Certification	2	0	0	1
Journey man card	1	0	0	0
Union member	0	0	1	1
Electricians State Certification	1	1	1	1
Forklift Certification	0	1	0	0
NESHAP	0	0	0	1
C-54 License	1	0	0	1
Ardex CTEF Certification	1	0	0	1
CA Fire	1	0	0	0
FGIA/AAMA Master Installer	1	0	0	0
CSLB C-17	1	0	0	0
NCCCO	1	0	0	1
Total Responses	**14**	**3**	**4**	**10**

Please note respondents replied with more than one answer and for more than one region. Additionally, this table does not contain all written responses as those that were duplicates of the responses in the primary question 12 were removed. (Section 2.2 in Appendix A demonstrates the complete list of entries.)

Figure 17: Which of the above certifications are the most important certification for a construction worker to possess?



The following represents the number of responses: n = 139

[8] Source: Burning Glass

Importance of Skills

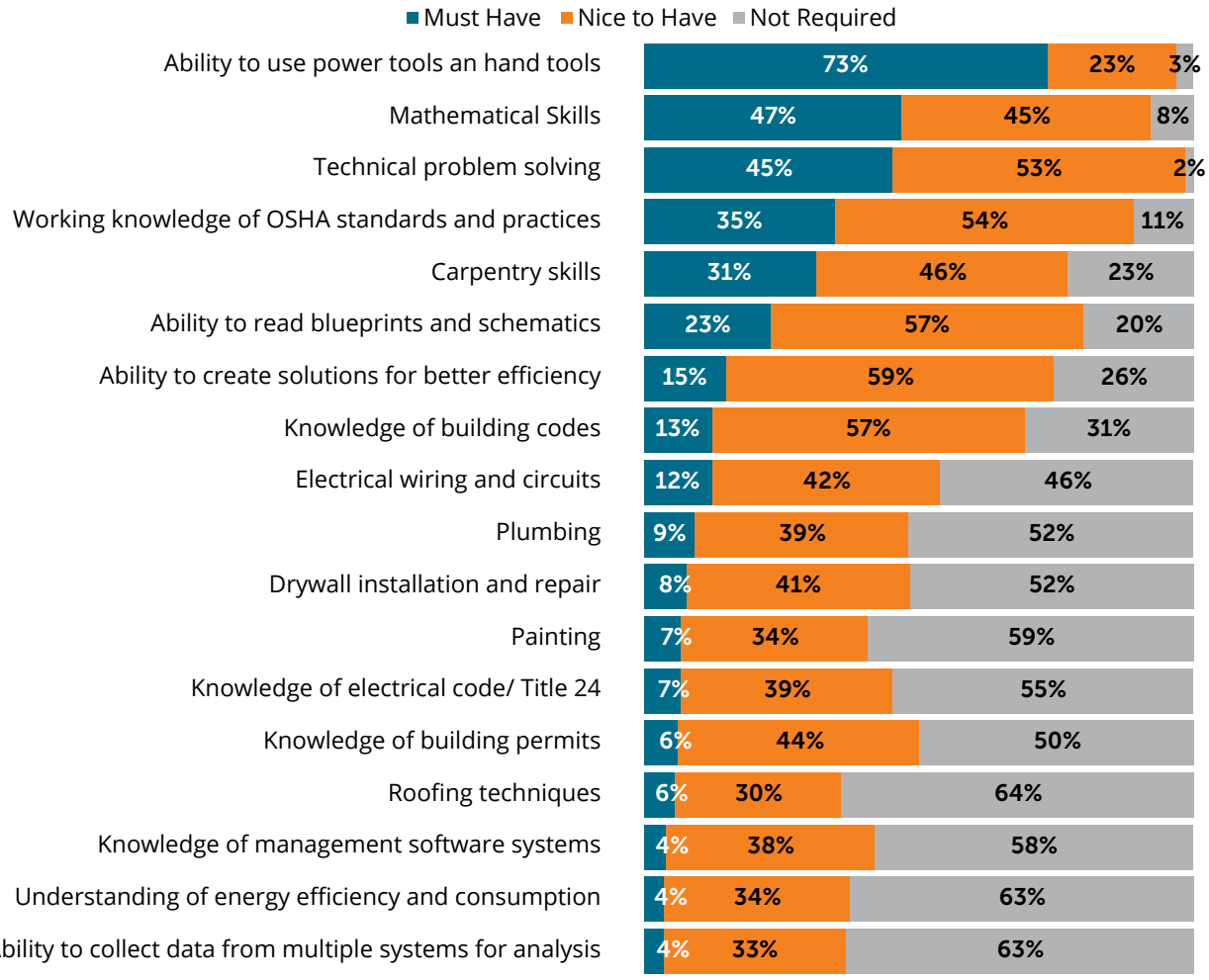
In a series of 18 sub questions (Q 13.1-13.18), respondents were prompted to identify the importance of particular skills using a scale of "Must Have", "Nice to Have", and "Not Required." A majority of respondents identified an "Ability to use power tools and hand tools" as a "Must Have" skill. This was followed by Mathematical skills" and "Technical problem solving". Figure 18 displays the aggregated survey results, while figures 20, 21, 22, and 23 display the Bay Area, Far North, South Central Coast, and Central Valley/ Mother Lode regions, respectively.

A notable result in both the aggregated results and each regional analysis is the lack of importance and priority given to the skill "Understanding of energy efficiency and consumption." Analysis of the aggregated results revealed that 63 percent of respondents acknowledged that the skill of understanding energy efficiency and consumption was not a qualified construction workers requirement.

The skills identified as being most important help paint a clearer picture of employer workforce training needs. These results also suggest that, beyond construction supervisors, skilled craftspeople and laborers are also in high demand within California's construction sector. Conversely, if community colleges are focusing on skills that respondents indicated are not required, perhaps this is an opportunity to 1) refine course and program offerings and 2) educate employers about state and federal environmental priorities (Figure 10).

Aggregate of all Results

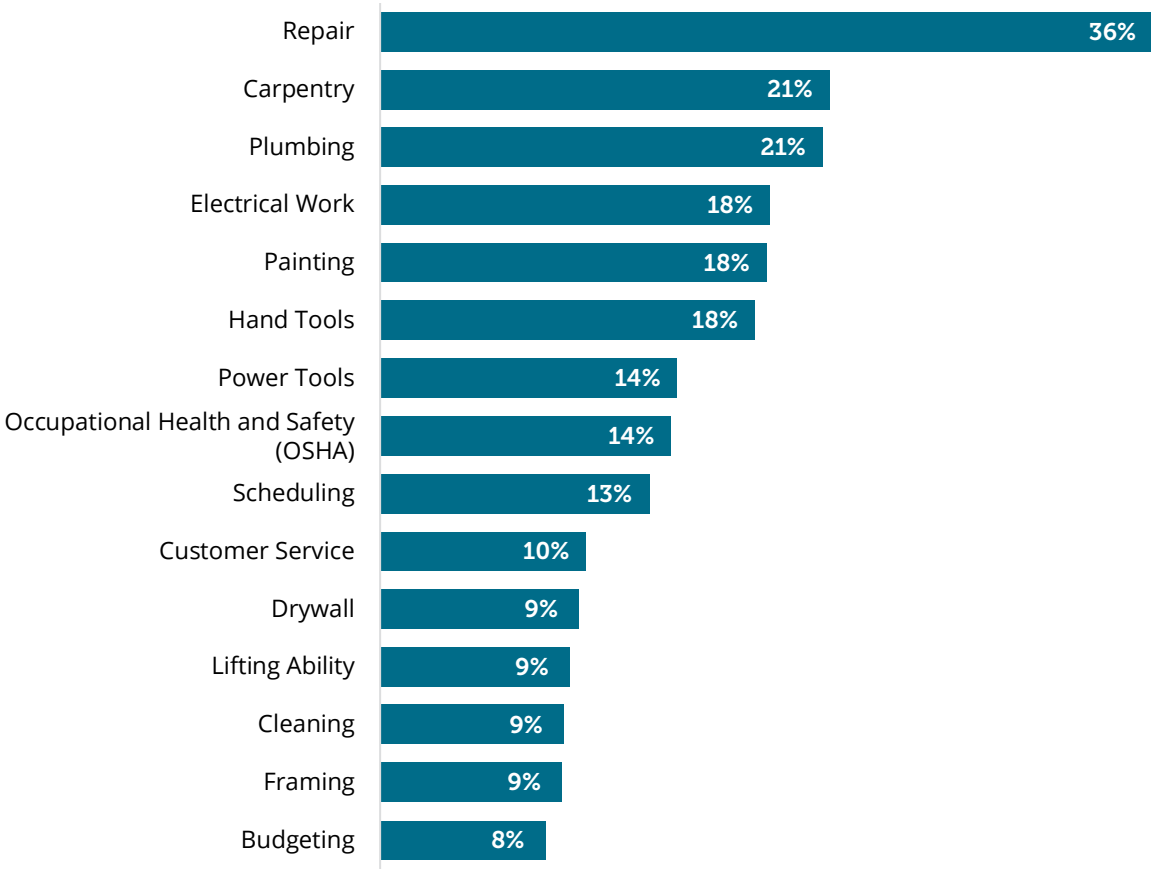
Figure 18: Importance of skills for a qualified construction worker to possess.



The following represents the total number of important skills for all the regions in the order presented: n = 106; n = 106; n = 107; n = 106; n = 106; n = 106; n = 106; n = 106; n = 107; n = 106; n = 106; n = 106; n = 106; n = 106; n = 106; n = 106; n = 106

In order to provide context to survey skills question results, the COE evaluated those skills associated with the 33 construction occupations considered to be pertinent to this report. Figure 19 contains the top 15 specialized skills by percentage noted by employers over the last twelve months in job postings. The skill most noted by survey participants was repair at 36 percent. A comparative analysis revealed that over two-thirds of the skills listed as must have or nice to have by employers are also those listed in the job postings data.

Figure 19: Top 15 skills noted in job postings across all four regions.[9]



The following represents the number of job posting for each skill in the order presented. n = 7,176; n = 4,183; n = 4,120; n = 3,627; n = 3,595; n = 3,486; n = 2,764; n = 2,705; n = 2,507; n = 1,912; n = 1,849; n = 1,763; n = 1,709; n = 1,691; n = 1,538

Implications of the Inflation Reduction Act (IRA)

The following information was taken directly from a new analysis commissioned by the BlueGreen Alliance from the Political Economy Research Institute (PERI) at the University of Massachusetts Amherst.[10] The analysis findings are as follows: "more than 100 climate, energy, and environmental investments in the Inflation Reduction Act will create more than 9 million good jobs over the next decade—an average of nearly 1 million jobs each year. That includes more than 6 million jobs created over the next 10 years by grants, loans, and tax credits and nearly 3 million jobs stimulated by new loan guarantee authority for the U.S. Department of Energy. The bill's broad investments will also help sustain the millions of existing jobs in the clean economy.

Few pieces of legislation this century have come close to such sweeping potential for good job creation. With robust application of the bill's strong labor standards, many of these jobs in growing sectors like clean energy, clean manufacturing, and efficient buildings will offer workers good wages and benefits. To advance economic and racial justice, registered apprenticeship programs, targeted investments, and equitable hiring practices should be used to prioritize job access for

[9] Source: Burning Glass

[10] https://www.bluegreenalliance.org/site/9-million-good-jobs-from-climate-action-the-inflation-reduction-act/

low-income workers, workers of color, and workers in environmental justice, deindustrialized, and energy transition communities.

In short, the bill's unprecedented investments offer an unparalleled opportunity for workers and communities to capture the economic gains of the growing clean economy. Below is a synopsis of some of the jobs that the Inflation Reduction Act will create."

According to the PERI analysis, "the IRA bill's investments to make homes and offices more energy efficient, healthier, and more climate-resilient will create more than 900,000 jobs over the next decade.

That includes:

- **Energy efficient buildings tax credits:** Nearly 720,000 jobs from tax credits to support residential and commercial building retrofits and new home construction that boosts energy efficiency;
- **Home energy rebates:** More than 170,000 jobs from rebates that will make energy efficiency upgrades more affordable for households so as to cut energy costs and pollution; and
- **Affordable housing:** Nearly 10,000 jobs from investments to retrofit affordable housing units to be more water and energy efficient and climate resilient."

Inflation Reduction Act total job estimates – summary figures.[11]

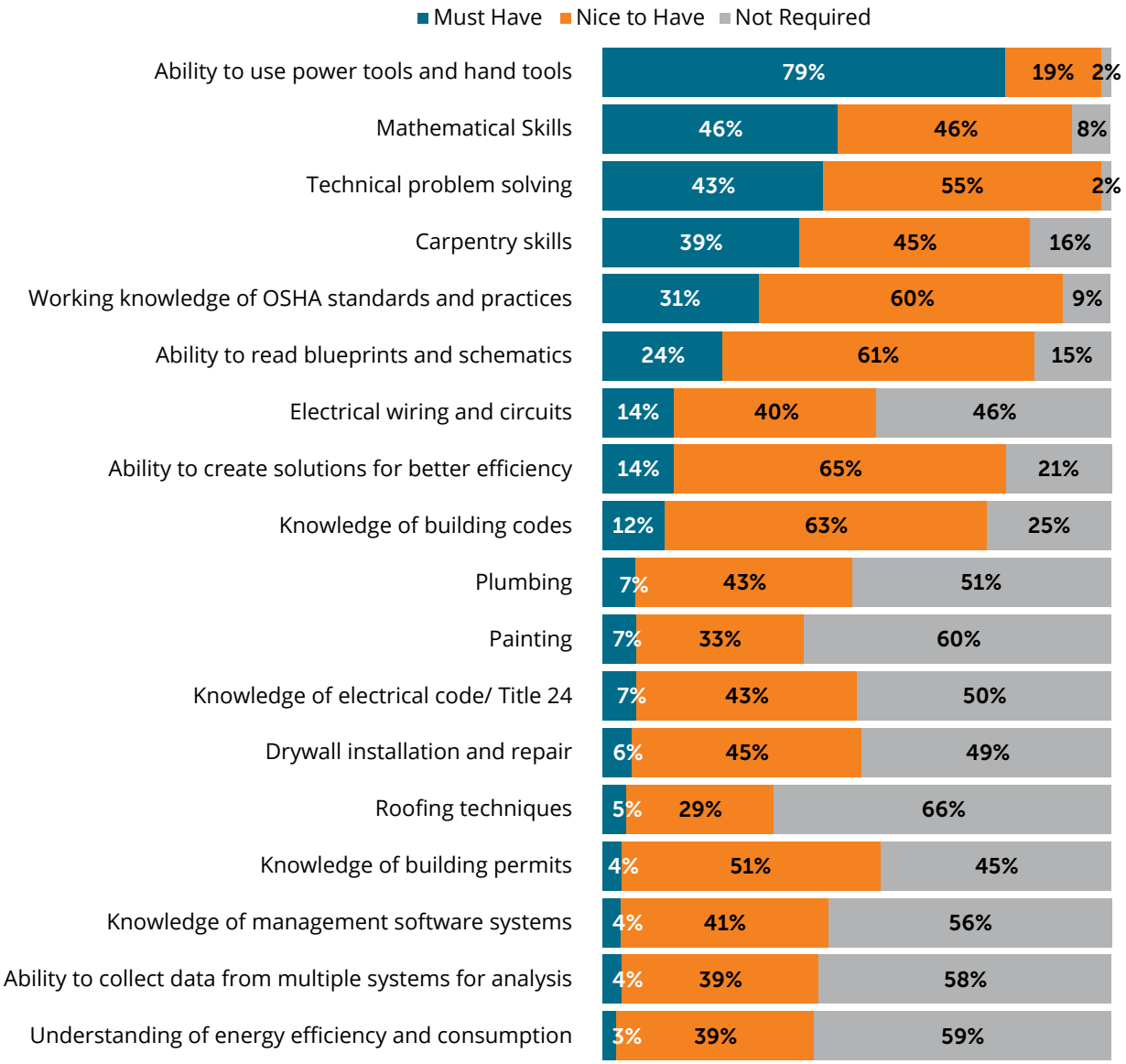
	Average Annual Budget and Job Creation Figures over 10 Years			Total Budget and Job-Years Figures	
	Public Spending	**Total Spending** *(= public + private spending)*	**Annual Job Creation**	**Total Spending**	**Total Job Creation, Job-Years**
Electricity Programs	$21.4 billion	$66.3 billion	573,177	$663 billion	5,731,771
Transportation Programs	$3.3 billion	$5.6 billion	65,821	$56 billion	658,212
Building Programs	$4.8 billion	$9.4 billion	91,082	$94 billion	910,819
Manufacturing Programs	$6.7 billion	$12.8 billion	106,032	$127.7 billion	1,060,320
Environmental Justice and Community Resilience Programs	$1.1 billion	$1.1 billion	14,892	$11 billion	148,916
Lands Programs	$1.1 billion	$1.1 billion	22,582	$10.9 billion	225,817
Agriculture Programs	$2.2 billion	$2.2 billion	38,573	$22 billion	385,732
Totals	**$40.6 billion**	**$9 8.4 billion**	**912,159**	**$984 billion**	**9,121,587**

[11] The preceding narrative and table were copied from the PERI analysis and https://www.bluegreenalliance.org/site/9-million-good-jobs-from-climate-action-the-inflation-reduction-act/

Bay Area Region

For the Bay Area region, the top three "Must Have" skills are: Ability to use power tools and hand tools (79 percent), mathematical skills (46 percent), and technical problem solving (43 percent).

Figure 20: Importance of skills for a qualified construction worker to possess.

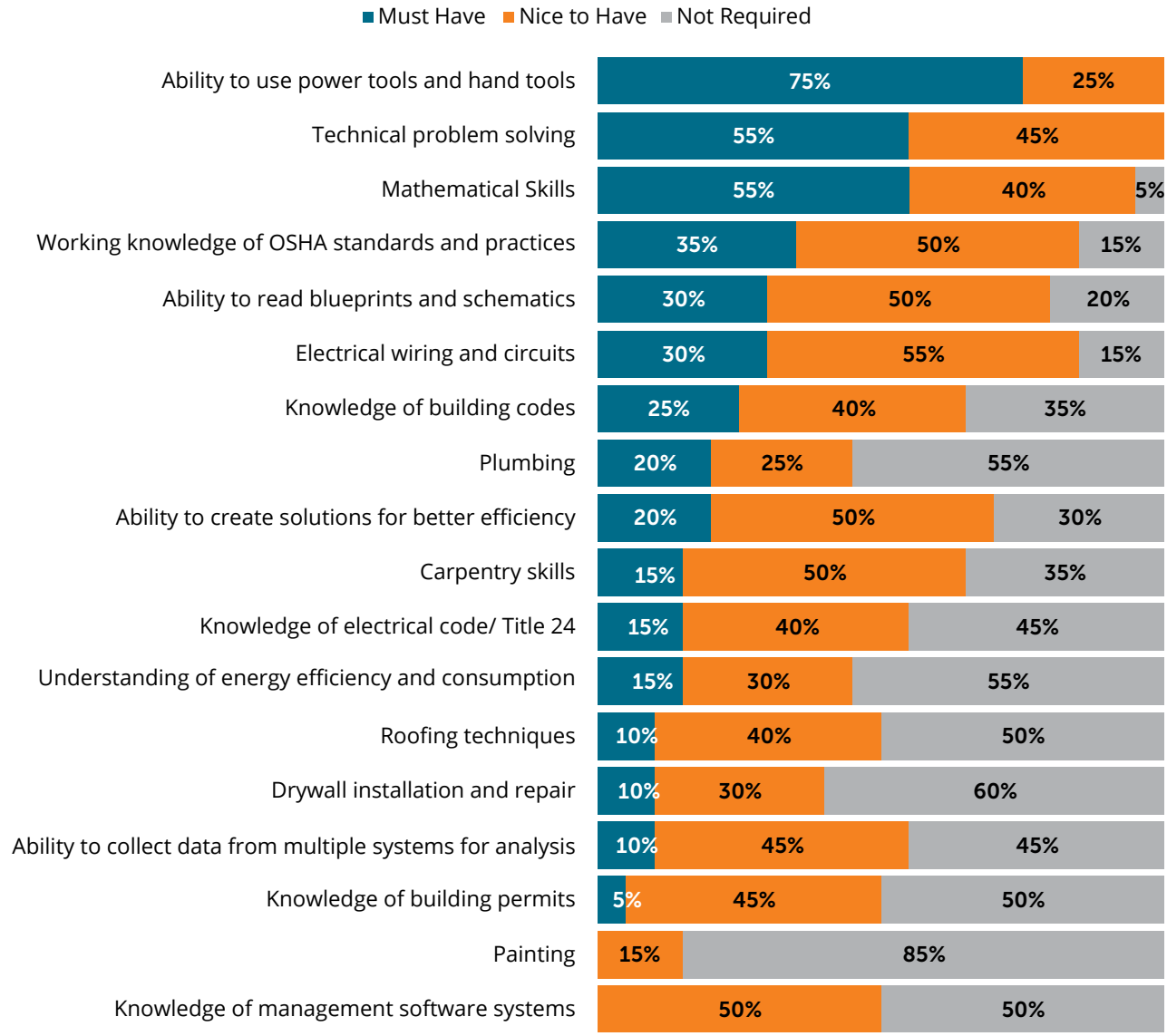


The following represents the total number of important skills for the Bay Area region: n = 107

Far North Region

For the Far North region, the top three "Must Have" skills are: Ability to use power tools and hand tools (75 percent), technical problem solving (55 percent), and mathematical skills (55 percent).

Figure 21: Importance of skills for a qualified construction worker to possess.

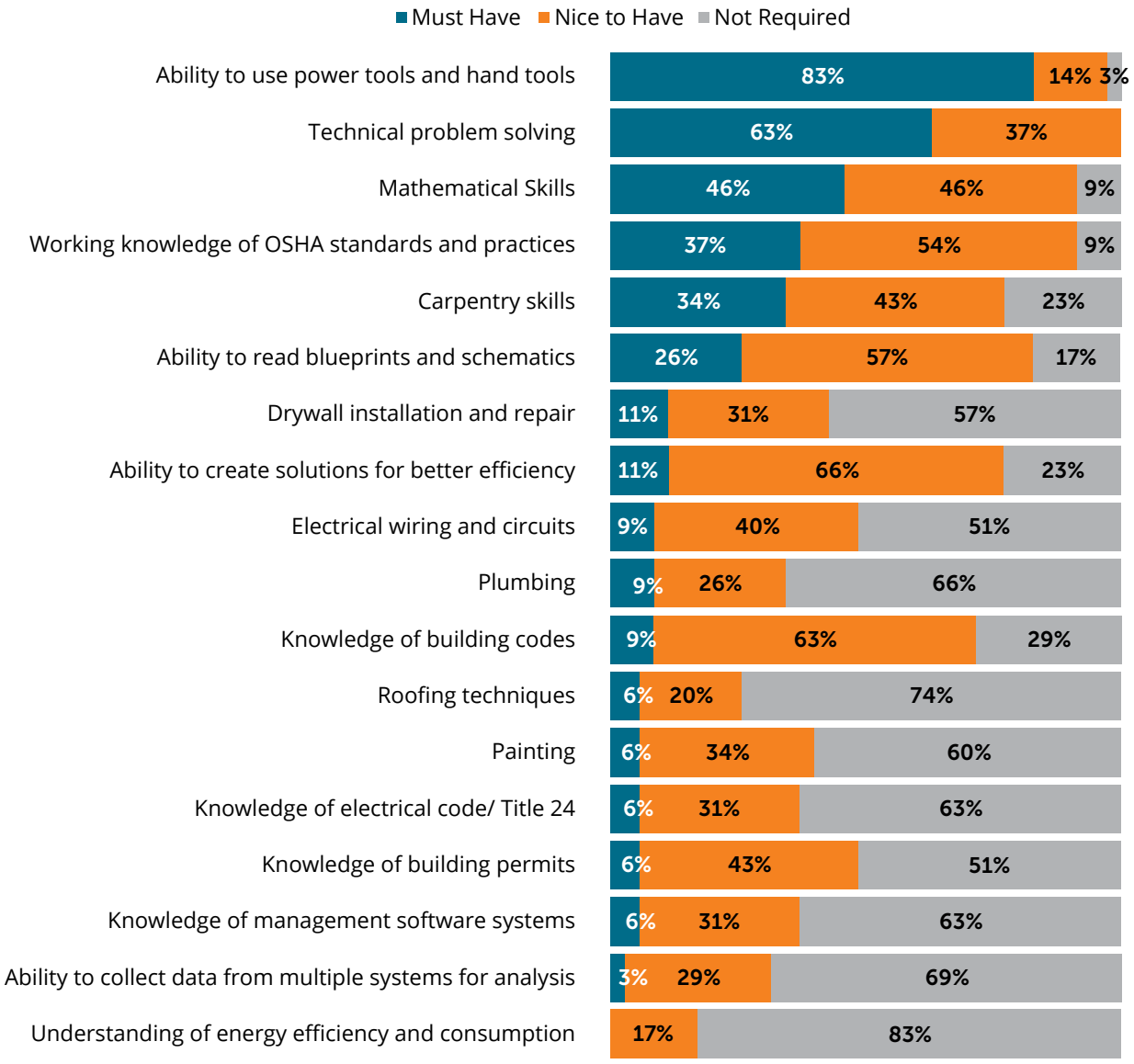


The following represents the total number of important skills for the Far North region: n = 20

South Central Coast Region

For the South Central Coast region, the top three "Must Have" skills are: Ability to use power tools and hand tools (83 percent), technical problem solving (63 percent), and mathematical skills (46 percent).

Figure 22: Importance of skills for a qualified construction worker to possess.

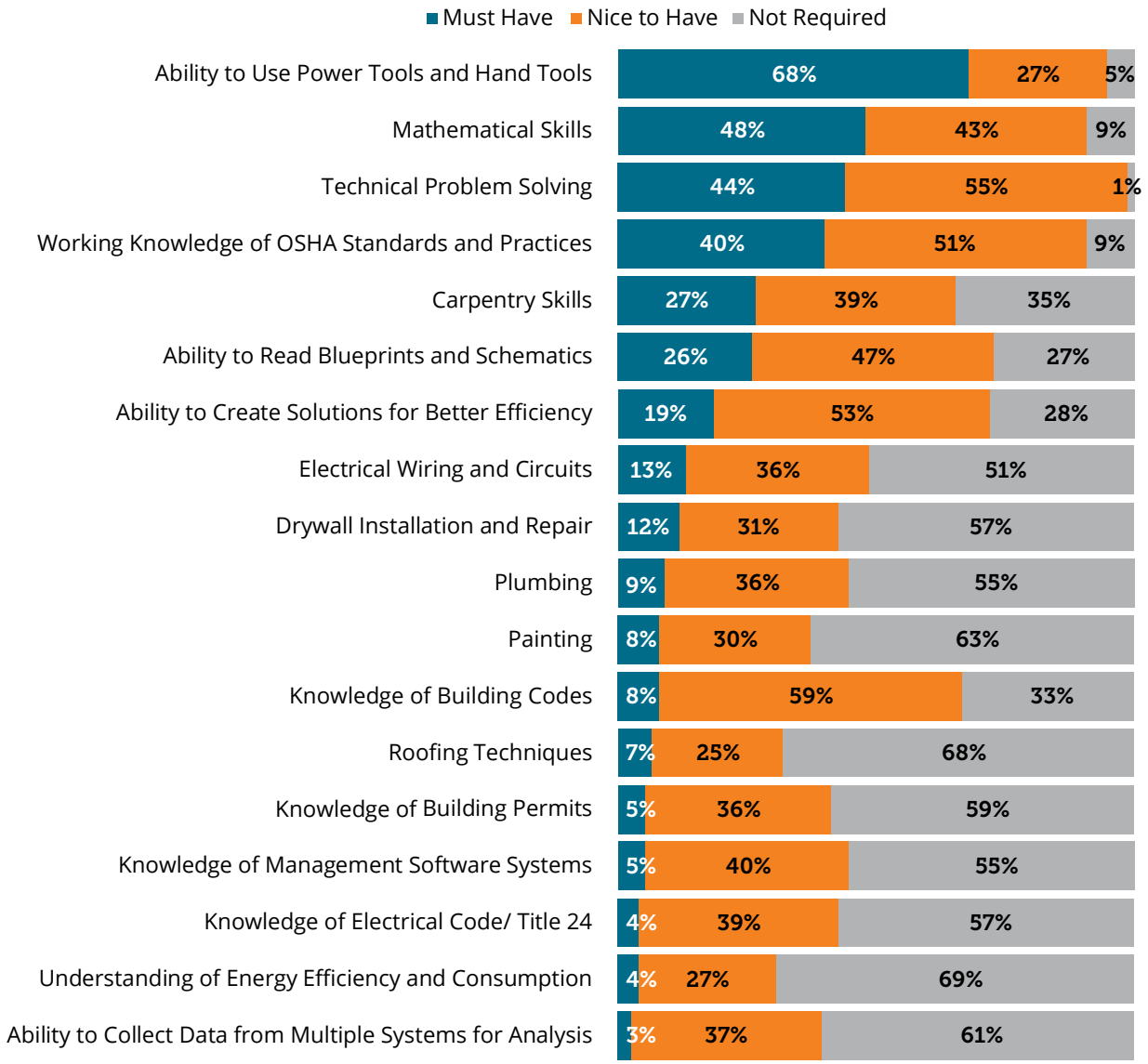


The following represents the total number of important skills for the South Central Coast region: n = 35

Central Valley / Motherlode Region

And finally, for the Central Valley Motherlode region, the top three "Must Have" skills are: Ability to use power tools and hand tools (68 percent), mathematical skills (48 percent), and technical problem solving (44 percent).

Figure 23: Importance of skills for a qualified construction worker to possess.



The following represents the total number of important skills for the Central Valley/ Motherlode Region: n = 78

Professional Development Opportunities

Respondents were provided a list of 20 professional development opportunities that requested their interest in each for their existing workers. (Table 10 in Appendix A contains these complete results).

As displayed in Figure 24, the greatest number of respondents expressed interest in a using specialized power tools professional development opportunities for their workers. This was followed closely by supervisory/project management, plan reading, and specialty training (electric, plumbing, roofing, drywall, HVAC, solar, flooring, painting, and concrete).

Figure 24: Which of the following professional development opportunities would you be interested in for your existing workers? (Select all that apply.)

Top 4 professional development opportunities:

- **Specialized power tools**
- **Supervisory/project management**
- **Plan reading**
- **Specialty training in electric, plumbing, roofing, drywall, HVAC, solar, flooring, painting, and concrete**

The following represents the total number of professional development opportunity responses: n = 143

Workforce Challenges and Opportunities

In survey questions 16.1-16.5, respondents were prompted to identify how much their company was being impacted by five given scenarios using the following scale: A lot, A little, or None. A majority of the respondents (63 percent) indicated that the insufficient pool of qualified candidates outside of the company was affecting their company a lot. None of the other scenarios had a majority response rate.

Figure 25 illustrates this outcome with rates of 23 or lower. Specifically, only 23 percent of the respondents indicated internal workers did not have the necessary technical/technology skills, 20 percent indicated internal workers do not have the required years of work experience, 19 percent indicated a negative impact of current worker retirements in the next two years, and 11 percent have internal workers do not have required years of educational attainment.

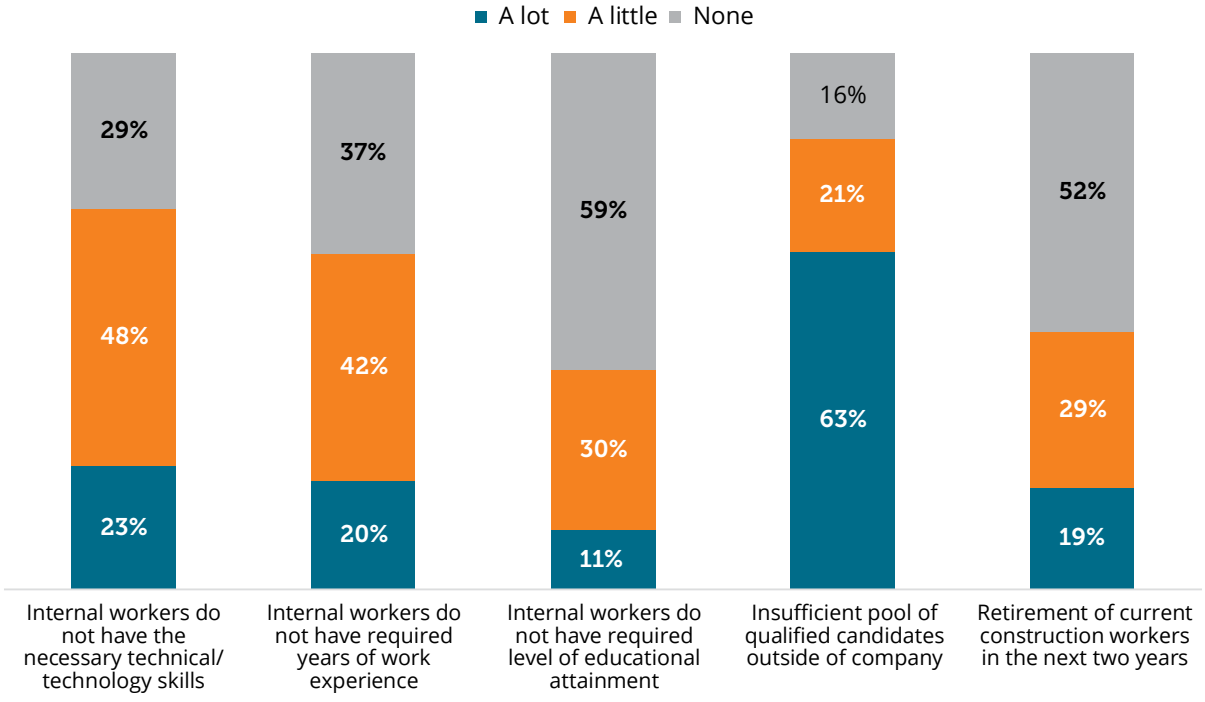
The low percentage rates of these scenarios seem to be in conflict with many findings in this report with two exceptions, required educational attainment and worker retirements. Worker status or company image may have influenced the participants. Worker status in this report is defined as new hires or current employees. The majority of the survey questions were new hire inquires; whereas, this question was potentially interpreted as a current employee inquiry. There are multiple interpretations for the "Internal workers do not have the required level of educational attainment" response rate.

This result warrants several points for consideration including:

1. Employers prioritize experience over education.
2. Employers do not correlate education with actual construction experience,
3. Most survey participants believe their employees have the necessary education levels, and perceive that this issue is not impacting their company, and
4. Employers within the construction industry perceive relevant skills to be acquired via work experience as opposed to an education opportunity.

(Figure 1 in Appendix A demonstrates a more detailed chart.)

Figure 25: How much are the following affecting the operation of your company?

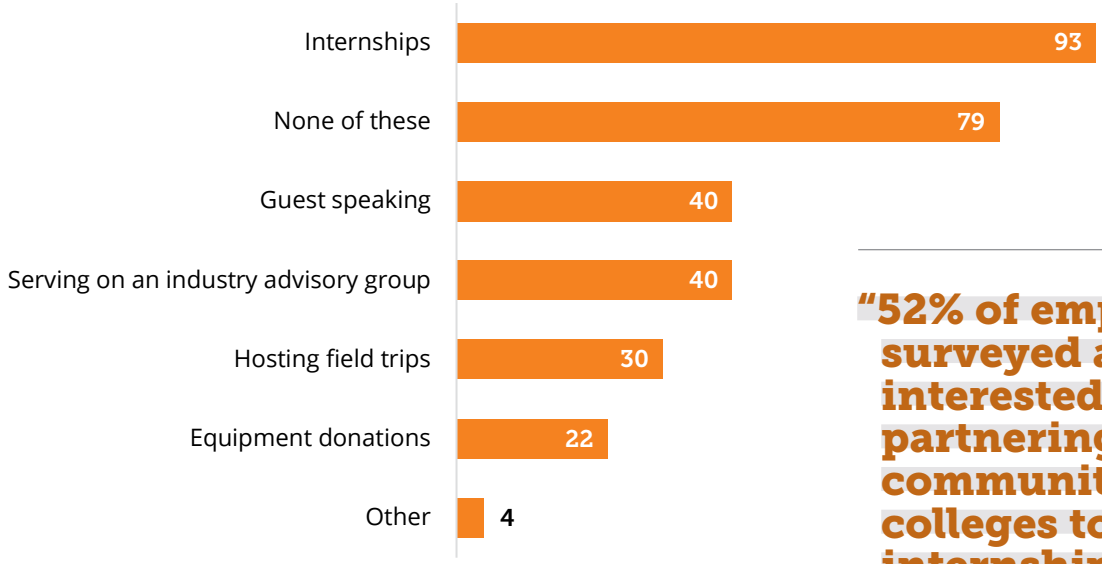


The following represents the number what is affecting the operation of the company int the order presented: n = 106, n = 106, n = 107, n = 106, n = 106

Partnership Opportunities

The final question of the survey prompted respondents to identify their interest in seven community college partnership opportunities. Of the 178 participants who responded to this question; 52 percent indicated the most interest in internships, 44 percent indicated none of these, 22 percent indicated serving on an industry advisory group, and 22 percent indicated guest speaking. Interest in hosting field trips was noted by 17 percent of the respondents. (Table 11 in the Appendix A displays a regional breakdown of these results).

Figure 26: Community college partnership opportunities that you or your organization would be interested in.



The following represents the total number of responses to partnership opportunities: n = 178

"52% of employers surveyed are interested in partnering with community colleges to provide internships."

Recommendations

Key Findings

The survey results presented in this report may be used to help guide stakeholders and industry leaders within the construction sector in workforce resiliency planning. The survey responses presented in this study identify many characteristics of the construction sector's workforce and workforce needs. With a clear picture of the sector's current workforce and their workforce needs, gaps in the available workforce can be identified. By identifying these gaps, further research can be conducted into both the reason these workforce gaps exist and how they might be filled. Additional research efforts may include developing an educational inventory of relevant training programs in the region or research innovative workforce resiliency strategies implemented by similar industry leaders.

Industry stakeholders can also use the data presented in this document to help lobby for greater education and training programs in their region, or to identify skills that are best taught in house. The survey results displayed in figures 18 and 25 can serve as a foundation for these efforts and conversations. For example, community colleges should adjust their curricula to include instruction in the top four skills desired by employers: 1) ability to use power tools and hand tools, 2) mathematical skills, 3) technical problem solving and 4) working knowledge of OSHA standards and practices. Figure 25 shows that construction industry representatives view the insufficient pool of qualified workers as a major if not the greatest challenge facing the sector. Many factors can contribute to a lack of qualified job candidates in a region, including a lack of available training for those jobs in that region. Using the data presented in figure 18 stakeholders can determine the most sought-after skills in the sector and then use this data to identify regional training gaps. Further efforts could include partnerships with regional community colleges, technical schools, or other applicable educational institutions to develop curricula to address any apparent training gaps.

Finally, stakeholders can use the survey data to form partnerships with construction businesses. Survey questions 14 and 17 identify the respondents' interest in professional development opportunities and community college partnerships. While the interest levels in such partnerships varied between survey respondents, a large portion of respondents did express interest in pursuing internship opportunities with local educational institutions. However, 44 percent of respondents selected "None of these opportunities to partner with community colleges, which may present an opportunity for colleges to explore with local employers how community colleges can better address their workforce needs. Question 14 can be used to identify the types of certifications most valued by industry leaders. Industry leaders and educational institutions can use this information to implement new courses that provide the requisite training for these certifications.

"Construction industry representatives view the insufficient pool of qualified workers as a major if not the greatest challenge facing the sector."

Top 4 skills:

- Ability to use power tools...
- Mathematical skills
- Technical Problem Solving
- Working knowledge of OSHA...

"...a large portion of respondents did express interest in pursuing internship opportunities with local educational institutions"

Recommendations for Community Colleges

The survey findings suggest several takeaways for community colleges. When asked about their methods of recruitment, respondents chose the option "Community Colleges" least frequently. Community colleges can use the result to inform their decision to increase marketing and outreach efforts to local employers.

Community colleges can also use the results of survey to inform their decisions on certification offerings. Question 12 asks respondents to identify the most important certification for their construction workers. Because respondents indicated that the most important certifications are OSHA 10-hour, Apprentice Card, and OSHA 30-hour, community colleges can adjust their curricula to fill this certification need in the construction industry or inform students on how to complete these certifications. Three "Must Have" skills were listed in the importance of skills section.

Community colleges can integrate and prioritize these skill findings in their construction related courses. The top three skills include the ability to use power tools and hand tools, mathematical skills, and technical problem solving. By developing and prioritizing curricula that train for these skills, community colleges can more adequately support the construction sector's need for more skilled workers. The professional development opportunities section of this report can be used as a basis for continued outreach to local employers for specialized training or contract education for specialized power and hand tool instruction, supervisory/project management education, and plan reading training. Community colleges can also better meet the needs of employers by prioritizing these and other known professional development opportunities in their program change and development processes.

A Note on Energy Efficiency

A notable result from the skills question in both the aggregated and regional analysis was the lack of importance and priority given to "Understanding of energy efficiency and consumption" skill. The aggregated qualified construction worker outcome for this skill inquiry was similar with 63 percent of respondents signifying the same response. This percentage increased to 83 percent when regional results were evaluated. These results speaks to the need for environmental literacy, as legislation will push regulations to prioritize energy efficient and sustainable building techniques for the construction sector. Two examples of these new regulations are in California's AB 32 and the Nation's Inflation Reduction Act.

Appendix A

1. Respondent Counts per region and county
2. "Other" Responses
3. Definitions
4. Survey Questions
5. Center for Economic Development (CED)

1. Respondent Counts per Region and County

1.1 Total Number of Responses and percent of total in each county.

County	Responses by County	Percent of Total
Alameda	61	34.27%
Alpine	0	0.00%
Amador	7	3.93%
Butte	15	8.43%
Calaveras	7	3.93%
Colusa	7	3.93%
Contra Costa	47	26.40%
Del Norte	0	0.00%
El Dorado	3	1.69%
Fresno	25	14.04%
Glenn	5	2.81%
Humboldt	0	0.00%
Imperial	1	0.56%
Inyo	0	0.00%
Kern	20	11.24%
Kings	6	3.37%
Lake	2	1.12%
Lassen	4	2.25%
Los Angeles	14	7.87%
Madera	12	6.74%
Marin	37	20.79%
Mariposa	3	1.69%
Mendocino	0	0.00%
Merced	13	7.30%
Modoc	2	1.12%
Mono	0	0.00%
Monterey	15	8.43%
Napa	26	14.61%
Nevada	1	0.56%

County	Responses by County	Percent of Total
Orange	2	1.12%
Placer	3	1.69%
Plumas	5	2.81%
Riverside	3	1.69%
Sacramento	14	7.87%
San Benito	7	3.93%
San Bernardino	1	0.56%
San Diego	1	0.56%
San Francisco	43	24.16%
San Joaquin	20	11.24%
San Luis Obispo	15	8.43%
San Mateo	39	21.91%
Santa Barbara	17	9.55%
Santa Clara	43	24.16%
Santa Cruz	20	11.24%
Shasta	8	4.49%
Sierra	3	1.69%
Siskiyou	2	1.12%
Solano	27	15.17%
Sonoma	29	16.29%
Stanislaus	15	8.43%
Sutter	7	3.93%
Tehama	8	4.49%
Trinity	1	0.56%
Tulare	11	6.18%
Tuolumne	5	2.81%
Ventura	11	6.18%
Yolo	7	3.93%
Yuba	9	5.06%

1.2 Bay Area Region Counts

Total Responses included in the Bay Area region: 109

Counties included in the Bay Area Region

- Alameda
- Contra Cost
- Marin
- Monterey
- Napa
- San Francisco
- San Mateo
- Santa Clara
- Santa Cruz
- Solano
- Sonoma

Number of respondents in each county and percent of total responses included in the Bay Area:

County	Responses by County	Percent of Total
Alameda	61	55.96%
Contra Costa	47	43.12%
San Francisco	43	39.45%
Santa Clara	43	39.45%
San Mateo	39	35.78%
Marin	37	33.94%
Sonoma	29	26.61%
Solano	27	24.77%
Napa	26	23.85%
Santa Cruz	20	18.35%
Monterey	15	13.76%

Some of the respondents included in the Bay Area region also hire employees in other counties/regions. Below is a table of the counties in which Bay Area businesses also hire employees. Table includes number of respondents and percent of total.

County	Responses by County	Percent of Total
San Joaquin	17	15.60%
Sacramento	13	11.93%
Stanislaus	11	10.09%
Fresno	10	9.17%
San Luis Obispo	9	8.26%
Merced	8	7.34%
Kern	6	5.50%
San Benito	6	5.50%
Yolo	6	5.50%
Amador	5	4.59%
Calaveras	5	4.59%
Los Angeles	5	4.59%
Yuba	5	4.59%
Butte	4	3.67%
Madera	4	3.67%
Santa Barbara	4	3.67%
Tulare	4	3.67%
El Dorado	3	2.75%
Placer	3	2.75%
Tuolumne	3	2.75%
Colusa	2	1.83%
Kings	2	1.83%
Lake	2	1.83%
Mariposa	2	1.83%
Plumas	2	1.83%
Shasta	2	1.83%
Sutter	2	1.83%
Lassen	1	0.92%
Modoc	1	0.92%
Nevada	1	0.92%
Riverside	1	0.92%
Sierra	1	0.92%
Siskiyou	1	0.92%
Trinity	1	0.92%
Ventura	1	0.92%

1.3 Far North Region Counts

Total Responses included in the Far North region: 20

Counties included in the Far North Region:

- Butte
- Colusa
- Del Norte
- Glenn
- Humboldt
- Lake
- Lassen
- Mendocino
- Modoc
- Plumas
- Shasta
- Sierra
- Siskiyou
- Tehama
- Trinity

Number of respondents per county and percent of total responses included in the Far North:

County	Responses by County	Percent of Total
Butte	15	75%
Shasta	8	40%
Tehama	8	40%
Colusa	7	35%
Glenn	5	25%
Plumas	5	25%
Lassen	4	20%

County	Responses by County	Percent of Total
Sierra	3	15%
Lake	2	10%
Modoc	2	10%
Siskiyou	2	10%
Trinity	1	5%
Del Norte	0	0%
Humboldt	0	0%
Mendocino	0	0%

Some of the respondents included in the Far North region also hire employees in other counties/regions. Below is a table of the counties in which Far North businesses also hire employees. Table includes number of respondents and percent of total.

County	Responses by County	Percent of Total
Yuba	8	40%
Sutter	6	30%
Napa	5	25%
Sacramento	5	25%
Amador	4	20%
Sonoma	4	20%
Yolo	4	20%
Alameda	3	15%
Contra Costa	3	15%
El Dorado	3	15%
Marin	3	15%
Merced	3	15%
Placer	3	15%
Santa Clara	3	15%
Santa Cruz	3	15%

County	Responses by County	Percent of Total
Solano	3	15%
Fresno	2	10%
Monterey	2	10%
San Francisco	2	10%
San Joaquin	2	10%
San Luis Obispo	2	10%
San Mateo	2	10%
Siskiyou	2	10%
Calaveras	1	5%
Mariposa	1	5%
Nevada	1	5%
San Benito	1	5%
Stanislaus	1	5%
Tulare	1	5%
Tuolumne	1	5%

1.4 South Central Coast Region Counts

Total Responses included in the South Central Coast region: 35

Counties included in the South Central Coast Region:

- Los Angeles
- San Luis Obispo
- Santa Barbara
- Ventura

Number of respondents per county and percent of total responses included in the South Central Region:

County	Responses by County	Percent of Total
Santa Barbara	17	49%
San Luis Obispo	15	43%

County	Responses by County	Percent of Total
Los Angeles	14	40%
Ventura	11	31%

Some of the respondents included in the Far North region also hire employees in other counties/regions. Below is a table of the counties in which Far North businesses also hire employees. Table includes number of respondents and percent of total.

County	Responses by County	Percent of Total
Kern	10	29%
Alameda	9	26%
Contra Costa	9	26%
Fresno	8	23%
Santa Clara	8	23%
Monterey	7	20%
San Francisco	7	20%
San Mateo	7	20%
Marin	6	17%
Merced	5	14%
Napa	5	14%
Santa Cruz	5	14%
Solano	5	14%
Sonoma	5	14%
San Joaquin	4	11%
Tulare	4	11%
Amador	3	9%
Calaveras	3	9%

County	Responses by County	Percent of Total
Madera	3	9%
Riverside	3	9%
Sacramento	3	9%
Stanislaus	3	9%
Tuolumne	3	9%
Butte	2	6%
Kings	2	6%
Mariposa	2	6%
Orange	2	6%
San Benito	2	6%
El Dorado	1	3%
Imperial	1	3%
Placer	1	3%
Plumas	1	3%
San Bernardino	1	3%
San Diego	1	3%
Yolo	1	3%
Yuba	1	3%

1.5 Central Valley Motherlode Region Counts

Total Responses included in the Central Valley Motherlode region: 78

Counties included in the Central Valley Motherlode Region:

- Alpine
- Amador
- Calaveras
- Fresno
- Inyo
- Kern
- Kings
- Madera
- Mariposa
- Merced
- Mono
- San Benito
- San Joaquin
- Stanislaus
- Tulare
- Tuolumne

Number of respondents per county and percent of total responses included in the Central Valley Motherlode:

County	Responses by County	Percent of Total
Fresno	25	32%
Kern	20	26%
San Joaquin	20	26%
Stanislaus	15	19%
Merced	13	17%
Madera	12	15%
Tulare	11	14%
Amador	7	9%

County	Responses by County	Percent of Total
Calaveras	7	9%
San Benito	7	9%
Kings	6	8%
Tuolumne	5	6%
Mariposa	3	4%
Alpine	0	0%
Inyo	0	0%
Mono	0	0%

Some of the respondents included in the Far North region also hire employees in other counties/regions. Below is a table of the counties in which Far North businesses also hire employees. Table includes number of respondents and percent of total.

County	Responses by County	Percent of Total
Alameda	23	29%
Contra Costa	22	28%
Santa Clara	19	24%
San Francisco	17	22%
San Mateo	17	22%
Solano	13	17%
Monterey	12	15%
Sacramento	12	15%
Marin	11	14%
Napa	10	13%
San Luis Obispo	10	13%
Santa Cruz	10	13%
Sonoma	9	12%
Los Angeles	7	9%
Butte	6	8%
Yolo	6	8%
Santa Barbara	5	6%
Yuba	5	6%
Ventura	4	5%

County	Responses by County	Percent of Total
El Dorado	3	4%
Placer	3	4%
Riverside	3	4%
Shasta	3	4%
Colusa	2	3%
Lassen	2	3%
Orange	2	3%
Plumas	2	3%
Sutter	2	3%
Imperial	1	1%
Lake	1	1%
Modoc	1	1%
Nevada	1	1%
San Bernardino	1	1%
San Diego	1	1%
Sierra	1	1%
Siskiyou	1	1%
Trinity	1	1%

2. Other Responses

2.1. Question 2: How would you classify our company? *Other Responses:*

- Alternative energy contractor (Solar)
- Asphalt paving
- Building component manufacturer, trusses, wall panels, and architectural timber trusses
- C-13 fence contractor and D-28 automatic gate contractor
- Cabinet maker, and architectural millwork
- Cabinet manufacturer
- Coating
- Commercial glass & glazing subcontractor
- Commercial landscape contractor
- Construction
- Construction inspection, special inspection, civil engineering
- Demolition
- Door shop
- Earthwork, asphalt paving and concrete contractor
- Electric and gas utility
- Environmental contractor
- Equipment operator
- Fence contractor (2 Responses)
- Fire alarm, electronic security, video surveillance
- Fire protection contractor
- Flooring contractor
- Garage door installation & services
- Glazing contractor (3 Responses)
- Granite and tile installation
- Heating and cooling contractor
- Heavy equipment rental
- HVAC (13 responses)
- Kitchen and bath/countertop remodelers
- Landscape construction and maintenance
- Landscape contractor
- Low voltage C7 specialty contractor
- Manufacturing
- Mechanical contractor
- Metal decking distributor
- Multifamily flooring company
- Oil and gas service company
- Oil, gas & geothermal well services
- Plastering
- Plumbing (4 Responses)
- Contractor
- Program/construction management firm.
- Restoration contractor (fire, water, mold, crime scene, etc.)
- Scaffolding, lath and stucco
- Structural engineering design and construction (design-build) firm, specializing in structural, drainage, waterproofing and related projects.
- Subcontractor
- Swimming pool
- Swimming pool and landscape contractor
- Tile and stone fabrication also polish concrete
- Tile contractor
- Underground utility contractor
- Wallcovering, painting and drywall
- Water operator
- Welding shop
- Window cleaning company
- Wood finishers

2.2. Questions 12. Which certificates should a qualified construction worker possess? *(Select all that apply) – Other*

- Again, not a certificate, but experience or knowledge of the following is helpful: CalCerts website and HERS, Storm Water Resource Control Board, SMARTS, and SWPPP.
- Certifications on tile with Ardex CTEF Certified or knowledge of C-54 license.
- CA fire/Life Safety
- CPR
- Varies from the type of job
- Does not apply
- Electricians state certification
- EPA certification
- EPA license
- EPA, NATE
- FGIA/AAMA Master Installer or CSLB C-17
- Forklift certified
- Ideally a degree from a four-year college or university
- If they are good enough to be worth $110.00 an hour they will have the safety skills. I personally watch to make sure it is a safe environment for them.
- A journey man card would be the best asset, but proof of an apprentice classes would be helpful as well. Also, an OSHA certification, apprentice card, equipment training, and certifications of various kinds would also be helpful.
- Knowledge of safety information
- NCCCO
- NESHAP and Lead EPA
- None needed at entry level
- None is needed, however if a certification is needed then the employee is sent to training.
- Oil field related knowledge
- Practical experience
- See above
- Technical and trade schools for topics such as geology, mechanical, and electrical are best,

despite their non-popularity in California.
- Trench and shoring competent person training
- Union member
- Water distribution operator water treatment operator

2.3. Question 12.5. Which of the above certificates is the most important certification for a construction worker to possess?

- CPR. In the private works market, there is no certification card for an apprentice or journeyman carpenter.
- CTEF certified
- Electricians state certification
- EPA
- FGIA/AAMA Master Installer or CSLB C-17
- Forklift certified
- Graduation certificate from an apprentice program
- I taught safety as well as product information and application methods when hiring employees
- ICC special inspector certifications, ACI technician, ASW-CWI, Caltrans, and OSHA
- Ideally a degree from a four-year college or university
- NESHAP Certification
- Oil field related knowledge
- Referral from other contractors or working professionals preferably verbally. To ensure the workers' work ethic and capabilities in a work-related environment.
- Trade/ technical schools for mechanics, electricians etc...
- Trench and shoring competent person training

2.4. Question 15. Where do you find qualified candidates to fill vacancies for construction worker positions within your company? – *Other*

- Anywhere we can find people. All of the above
- Apprenticeships
- Bricklayers and laborers unions
- Calls from job seekers
- Carpenters union
- Craigslist works for most of our openings. We also use employee referrals to other individuals they know.
- Directly from the union, and about another 10% come from recommendations. These recommended workers are field works (construction), and if you ask about office / project managers they aren't union but do possess different skill sets required.
- Currently not requiring additional workers, however when needed I post online
- Local union
- Local union halls
- LU #228
- Many times, a candidate will be a walk in. At that time a vetting conversation may be had to see if the candidate fits our needs as a qualified new hire.
- Potential employees come to the office to complete an application. If it is a specific job requirement, we will post online advertisements.
- Temp agencies
- Temp agency
- Temp agency
- Trade unions
- Union
- Union
- Union apprenticeship programs
- UNION Dispatches
- Union hall
- Union hall
- Union halls
- Unions
- Unions where we perform our work, high schools, company outreach, and radio advertisements.
- We are a union contractor that hires our craft personnel through local apprenticeship programs and hiring halls. Our need is for non-union project support staff to assist is the areas of project management, estimating, BIM modeling and CAD
- Word of mouth

2.5. Question 17. Please select any of the following community college partnership opportunities that you or your organization would be interested in. *(Select all that apply)* – *Other*

- I retired just before Covid intending on teaching my skills and knowledge gained in the past 50 years

3. Definitions

Apprenticeship Card

An Apprenticeship Card is similar to that of an Electrician Trainee Card or ET Card that provides proof that you are registered with the state as a trainee. In California, you also have to renew your trainee application every year to continue working.

Lean Construction

Lean construction is a combination of operational research and practical development in design and construction with an adoption of lean manufacturing principles and practices to the end-to-end design and construction process. Unlike manufacturing, construction is a project-based production process.

Green Building

A 'green' building is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on the climate and natural environment. Green buildings preserve precious natural resources and improves quality of life.

4. Survey Questions

1. Is the company you work for located in California?
   a. Yes
   b. No
2. How would you classify your company?
   a. General Contractor
   b. Home Builder
   c. Framing Contractor
   d. Painting Contractor
   e. Drywall Contractor
   f. Concrete Contractor
   g. Insulation Contractor
   h. Electrical Contractor
   i. Masonry Contractor
   j. Roofing Contractor
   k. Other
3. Approximately how many employees do you have?
   a. Sole proprietor - no employees
   b. 1-4
   c. 5-9
   d. 10-19
   e. 20-49
   f. 50-99
   g. 100-499
   h. 500+
4. Of the workers you currently have, how many physically participate in construction work?
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10
   k. 11-15
   l. 16-20
   m. 21-30
   n. 31+
5. Are you familiar with your company's hiring and need for skilled employees?
   a. Yes
   b. No

6. From which of the following counties does your company recruit and hire its employees? *(Select all that apply)*

- Alameda
- Alpine
- Amador
- Butte
- Calaveras
- Colusa
- Contra Costa
- Del Norte
- El Dorado
- Fresno
- Glenn
- Humboldt
- Imperial
- Inyo
- Kern
- Kings
- Lake
- Lassen
- Los Angeles
- Madera
- Marin
- Mariposa
- Mendocino
- Merced
- Modoc
- Mono
- Monterey
- Napa
- Nevada
- Orange
- Placer
- Plumas
- Riverside
- Sacramento
- San Benito
- San Bernardino
- San Diego
- San Francisco
- San Joaquin
- San Luis Obispo
- San Mateo
- Santa Barbara
- Santa Clara
- Santa Cruz
- Shasta
- Sierra
- Siskiyou
- Solano
- Sonoma
- Stanislaus
- Sutter
- Tehama
- Trinity
- Tulare
- Tuolumne
- Ventura
- Yolo
- Yuba

Occupational Employment of Construction Workers

7. On average, how many of your construction workers will you need to replace each year due to retirement or leaving your employment for other reasons?
   a. 1-5
   b. 6-10
   c. 11-20
   d. 21-49
   e. 50+

8. Do you plan to have more construction workers 2 years from now?
   a. Yes
   b. No

8.5 If yes, how many more construction workers do you plan to employ 2 years from now?
   c. 1
   d. 2
   e. 3
   f. 4
   g. 5
   h. 6
   i. 7
   j. 8
   k. 9
   l. 10
   m. 11-15
   n. 16-20
   o. 21-30
   p. 31+

9. Do you plan to have fewer construction workers 2 years from now?
   a. Yes
   b. No

9.5 If yes, how many fewer construction workers do you plan to employ 2 years from now?
   c. 1
   d. 2
   e. 3
   f. 4
   g. 5
   h. 6
   i. 7
   j. 8
   k. 9
   l. 10
   m. 11-15
   n. 16-20
   o. 21-30
   p. 31+

10. When hiring a construction worker, what is the minimum related work experience required for the following education levels?

10.1. Less than High School
   a. Does not meet the minimum educational requirements
   b. Less than 12 months of related work experience
   c. 1 year of related work experience
   d. 2 years of related work experience
   e. 3 years of related work experience
   f. 4 or more years of related work experience

10.2. High School Diploma
   a. Does not meet the minimum educational requirements
   b. Less than 12 months of related work experience
   c. 1 year of related work experience
   d. 2 years of related work experience
   e. 3 years of related work experience
   f. 4 or more years of related work experience

10.3. Some College, No Degree
   a. Does not meet the minimum educational requirements
   b. Less than 12 months of related work experience
   c. 1 year of related work experience
   d. 2 years of related work experience
   e. 3 years of related work experience
   f. 4 or more years of related work experience

10.4. Post-Secondary Certificate
   a. Does not meet the minimum educational requirements
   b. Less than 12 months of related work experience
   c. 1 year of related work experience
   d. 2 years of related work experience
   e. 3 years of related work experience
   f. 4 or more years of related work experience

10.5. Associate Degree
   a. Does not meet the minimum educational requirements
   b. Less than 12 months of related work experience
   c. 1 year of related work experience
   d. 2 years of related work experience
   e. 3 years of related work experience
   f. 4 or more years of related work experience

10.6. Four-Year Degree or Higher
   a. Does not meet the minimum educational requirements
   b. Less than 12 months of related work experience
   c. 1 year of related work experience
   d. 2 years of related work experience
   e. 3 years of related work experience
   f. 4 or more years of related work experience

Certification and Skills

11. Please list the certifications that are important for construction workers to have:

12. Which certificates should a qualified construction worker possess? (Select all that apply)
   a. OSHA 10-hour
   b. OSHA 30-hour
   c. NFPA 70e Electrical Safety
   d. NCCER
   e. Apprentice Card
   f. Other

12.5 Which of the above certificates is the most important certification for a construction worker to possess?
   a. OSHA 10-hour
   b. OSHA 30-hour
   c. NFPA 70e Electrical Safety
   d. NCCER
   e. Apprentice Card
   f. Other

13. Importance of skills for a qualified construction worker to possess:

13.1. Ability to use power tools and hand tools
   a. Must Have
   b. Nice to Have
   c. Not Required

13.2. Technical problem solving
   a. Must Have
   b. Nice to Have
   c. Not Required

13.3. Working knowledge of OSHA standards and practices

a. Must Have
b. Nice to Have
c. Not Required

13.4. Ability to read blueprints and schematics

a. Must Have
b. Nice to Have
c. Not Required

13.5. Mathematical skills

a. Must Have
b. Nice to Have
c. Not Required

13.6. Carpentry skills

a. Must Have
b. Nice to Have
c. Not Required

13.7. Electrical wiring and circuits

a. Must Have
b. Nice to Have
c. Not Required

13.8. Plumbing

a. Must Have
b. Nice to Have
c. Not Required

13.9. Roofing techniques

a. Must Have
b. Nice to Have
c. Not Required

13.10. Drywall installation and repair

a. Must Have
b. Nice to Have
c. Not Required

13.11. Painting

a. Must Have
b. Nice to Have
c. Not Required

13.12. Knowledge of building codes

a. Must Have
b. Nice to Have
c. Not Required

13.13. Knowledge of electrical code/Title 24

a. Must Have
b. Nice to Have
c. Not Required

13.14. Knowledge of building permits

a. Must Have
b. Nice to Have
c. Not Required

13.15. Understanding of energy efficiency and consumption

a. Must Have
b. Nice to Have
c. Not Required

13.16. Knowledge of management software systems

a. Must Have
b. Nice to Have
c. Not Required

13.17. Ability to collect data from multiple systems for analysis

a. Must Have
b. Nice to Have
c. Not Required

13.18. Ability to create solutions for better efficiency

a. Must Have
b. Nice to Have
c. Not Required

14. Which of the following professional development opportunities would you be interested in for your existing workers? (Select all that apply)
    a. Specialized power tools
    b. Specialized hand tools
    c. Office furniture systems
    d. Building Information Modeling
    e. CAD/CAM
    f. OSHA-10/ OSHA-30
    g. Supervisory skills / Project management
    h. Energy Code/Title 24
    i. MS Project/Excel
    j. Green building
    k. Lean construction
    l. Advanced framing techniques
    m. Insulation installation
    n. Estimating
    o. Plan reading
    p. Customer service
    q. Surveying
    r. Demolition
    s. Heavy equipment operation
    t. Specialty training (electrical, plumbing, roofing, drywall, HVAC, solar, flooring, painting, concrete)

Recruitment

15. Where do you find qualified candidates to fill vacancies for construction worker positions within your company?
    a. Train from within
    b. Post online job advertisements
    c. Referrals
    d. Industry association
    e. Community colleges
    f. Trade schools
    g. Other

16. How much are the following affecting the operation of your company?

16.1. Internal workers do not have the necessary technical/technology skills
    a. 1 (A lot)
    b. 2 (A little)
    c. 3 (None)

16.2. Internal workers do not have required years of work experience
    a. 1 (A lot)
    b. 2 (A little)
    c. 3 (None)

16.3. Internal workers do not have required level of educational attainment
    a. 1 (A lot)
    b. 2 (A little)
    c. 3 (None)

16.4. Insufficient pool of qualified candidates outside of company
    a. 1 (A lot)
    b. 2 (A little)
    c. 3 (None)

16.5. Retirement of current construction workers in the next two years
    a. 1 (A lot)
    b. 2 (A little)
    c. 3 (None)

17. Please select any of the following community college partnership opportunities that you or your organization would be interested in. (Select all that apply)
    a. Internships
    b. Hosting field trips
    c. Guest speaking
    d. Equipment donations
    e. Serving on an industry advisory group
    f. None of these
    g. Other

    Would you like to receive a report detailing the findings of this research?

    a. Yes
    b. No

Thank you very much for your participation in this survey! Please provide your direct contact information below in order to receive a report detailing the findings of this research and so that we do not continue to send you future requests to complete the survey.

Most Sincerely,

- **Adele Hermann**, Director, Center of Excellence, South Central Coast
- **Carlos Santamaria**, Director, Employer Engagement - Energy, Construction and Utilities, Bay Area
- **David Teasdale**, Director, Prop 39, Energy, Construction and Utilities, South Central Coast & Central Valley/Mother Lode
- **John Caresse**, Director, Center of Excellence, Bay Area
- **Nora Seronello**, Director, Center of Excellence Central Valley/ Mother Lode

First Name _____

Last Name _____

Email Address _____

Street or P.O. Box Address _____

City _____

Zip Code _____

Tables of Survey Responses

Table 1. Responses for survey question 2. Respondents by business classification.

Business Type	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
General Contractor	47	4	11	27
Other	33	8	10	30
Electrical Contractor	8	6	3	4
Painting Contractor	4	0	1	5
Concrete Contractor	5	1	1	3
Home Builder	2	1	2	2
Drywall Contractor	0	0	3	1
Masonry Contractor	2	0	2	4
Roofing Contractor	3	0	2	0
Framing Contractor	1	0	0	1
Insulation Contractor	1	0	0	1
Total Responses	**106**	**20**	**35**	**78**

Table 2. Responses for survey question 3.

Respondents by number of employees. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions.

Current Number of Employees	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
Sole proprietor - no employees	2	0	1	5
1 to 4	14	3	6	9
5 to 9	15	5	7	9
10 to 19	20	2	4	13
20 to 49	29	5	7	16
50 to 99	14	4	2	12
100 to 499	9	0	5	11
500+	3	1	3	3
Total Responses	**106**	**20**	**35**	**78**

Table 13: Top 10 construction occupations employment and occupational projections in the four regions from Emsi.

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Construction Laborers	57,615	61,233	3,619	6%	6,598
Carpenters	57,025	57,770	745	1%	5,653
Electricians	30,068	34,240	4,172	14%	4,166
First-Line Supervisors of Construction Trades and Extraction Workers	25,332	26,504	1,172	5%	2,783
Painters, Construction and Maintenance	22,890	24,251	1,361	6%	2,370
Plumbers, Pipefitters, and Steamfitters	18,651	20,477	1,827	10%	2,360
Operating Engineers and Other Construction Equipment Operators	13,388	14,376	988	7%	1,668
Cement Masons and Concrete Finishers	11,626	11,974	347	3%	1,216
Drywall and Ceiling Tile Installers	12,521	12,646	125	1%	1,174
Roofers	9,519	9,913	394	4%	1,066
Construction and Building Inspectors	4,888	4,940	52	1%	591
Sheet Metal Workers	5,341	5,656	315	6%	578
Tile and Stone Setters	4,204	4,411	207	5%	426
Solar Photovoltaic Installers	2,061	2,631	570	28%	382
Structural Iron and Steel Workers	3,246	3,329	83	3%	374
Glaziers	2,278	2,356	79	3%	277
Plasterers and Stucco Masons	2,836	2,923	88	3%	272
Helpers—Pipelayers, Plumbers, Pipefitters, and Steamfitters	1,668	1,888	220	13%	254
Tapers	2,750	2,688	(62)	(2%)	248
Helpers—Electricians	1,409	1,675	266	19%	238
Helpers—Carpenters	1,655	1,708	53	3%	213
Helpers—Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters	1,463	1,524	61	4%	201
Carpet Installers	2,144	2,012	(132)	(6%)	187
Helpers, Construction Trades, All Other	1,163	1,240	76	7%	158
Miscellaneous Construction and Related Workers	1,075	1,154	79	7%	152
Pipelayers	1,321	1,346	25	2%	150
Earth Drillers, Except Oil and Gas; and Explosives Workers, Ordnance Handling Experts, and Blasters	1,083	1,116	32	3%	142
Stonemasons	1,275	1,294	19	1%	136
Helpers—Painters, Paperhangers, Plasterers, and Stucco Masons	707	776	69	10%	102
Reinforcing Iron and Rebar Workers	936	953	17	2%	100
Insulation Workers, Mechanical	889	912	23	3%	93
Helpers—Extraction Workers	459	433	(26)	(6%)	59
Helpers—Roofers	61	83	22	36%	13
Total	**303,547**	**320,432**	**16,885**	**6%**	**34,401**

Table 3. Responses for survey question 4.

Respondents by number of construction workers. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions.

Number of Construction Workers	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
1 worker	7	0	1	4
2 workers	6	1	1	4
3 workers	3	3	3	3
4 workers	4	1	4	5
5 workers	5	0	1	2
6 workers	5	2	1	3
7 workers	3	1	2	2
8 workers	5	0	0	2
9 workers	6	0	2	3
10 workers	4	1	1	4
11 to 15 workers	10	2	3	5
16 to 20 workers	11	1	2	5
21 to 30 workers	6	1	2	4
31+ workers	31	7	12	29
Total Responses	**106**	**20**	**35**	**75**

Table 4. Responses for survey question 7.

Respondents by worker replacement. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions.

Count of Annual Worker Replacement	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
1 to 5	78	12	20	45
6 to 10	13	4	6	14
11 to 20	10	2	5	10
21 to 49	5	2	3	5
50+	1	0	1	2
Total Responses	**107**	**20**	**35**	**76**

Table 5. Responses for survey questions 8 and 8.5.

Respondents by worker increase. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions. One respondent within the Far North region and two within the Central Valley/Motherlode region indicated that they did not plan on hiring new workers in question 8, but indicated they anticipate hiring one new worker in question 8.5. Each response is counted in the corresponding row, but the respondent is only counted once in the total respondents row due to this survey error.

Anticipated Worker Increase	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
1 more worker	3	2	2	6
2 more workers	10	2	5	5
3 more workers	5	1	2	1
4 more workers	11	3	3	9
5 more workers	12	0	4	9
6 more workers	4	0	0	4
7 more workers	1	0	1	2
8 more workers	3	0	0	0
9 more workers	0	0	0	0
10 more workers	10	3	5	6
11 to 15 more workers	7	2	2	5
16 to 20 more workers	8	0	3	3
21 to 30 more workers	7	1	2	4
31+ more workers	9	2	3	10
Not planning to have more construction workers	19	7	12	29
Total Responses	**109**	**20**	**35**	**77**

Table 6. Responses for survey questions 9 and 9.5.

Respondents by decrease in workers. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions. Three respondents within each the South Central Coast, Bay Area, and Central Valley/Motherlode regions indicated that they did not plan on hiring new workers in question 8, but indicated they anticipate hiring new workers in question 9.5. Each response is counted in the corresponding row, but the respondent is only counted once in the total respondents row due to this survey error.

Anticipated Worker Increase	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
1 fewer worker	5	0	1	2
2 fewer workers	3	0	1	1
3 fewer workers	0	0	0	0
4 fewer workers	1	0	0	1
5 fewer workers	0	0	0	0
6 fewer workers	0	0	0	0
7 fewer workers	0	0	0	0
8 fewer workers	0	0	0	0
9 fewer workers	0	0	0	0
10 fewer workers	0	0	0	1
11 to 15 fewer workers	0	0	0	0
16 to 20 fewer workers	0	0	0	0
21 to 30 fewer workers	1	0	1	0
31+ fewer workers	0	0	1	2
Not planning to have fewer construction workers	99	20	34	72
Total Responses	**106**	**20**	**35**	**76**

Table 7. Responses for survey question 15.

Respondents by recruitment methods. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions and when respondents were provided with the option to select multiple answers.

Required Certifications	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
Referrals	80	14	19	47
Train from within	64	16	21	41
Post online job advertisements	59	11	21	32
Trade schools	23	3	9	19
Industry association	21	4	3	15
Other	16	4	9	20
Community colleges	11	3	4	10
Total Responses	**109**	**20**	**35**	**77**

Table 8. Responses for survey question 12.

Respondents by required certifications. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions and when respondents were provided with the option to select multiple answers.

Required Certifications	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
OSHA 10-hour	55	9	18	38
OSHA 30-hour	34	6	13	26
Apprentice Card	32	6	9	26
Other	12	3	6	19
NFPA 70e Electrical Safety	11	4	3	11
NCCER	4	1	0	1
Total Responses	**86**	**16**	**25**	**64**

Table 9. Responses for survey question 12.5.

Respondents by most important certification. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions.

Most Important Certificate	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
OSHA 10-hour	23	5	9	17
OSHA 30-hour	19	4	6	14
Apprentice Card	22	3	5	13
Other	11	2	4	16
NFPA 70e Electrical Safety	3	1	0	4
NCCER	2	0	0	0
Total Responses	**86**	**16**	**25**	**64**

Table 10. Responses for survey question 14.

Respondents by professional development opportunity interest. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions and when respondents were provided with the option to select multiple answers.

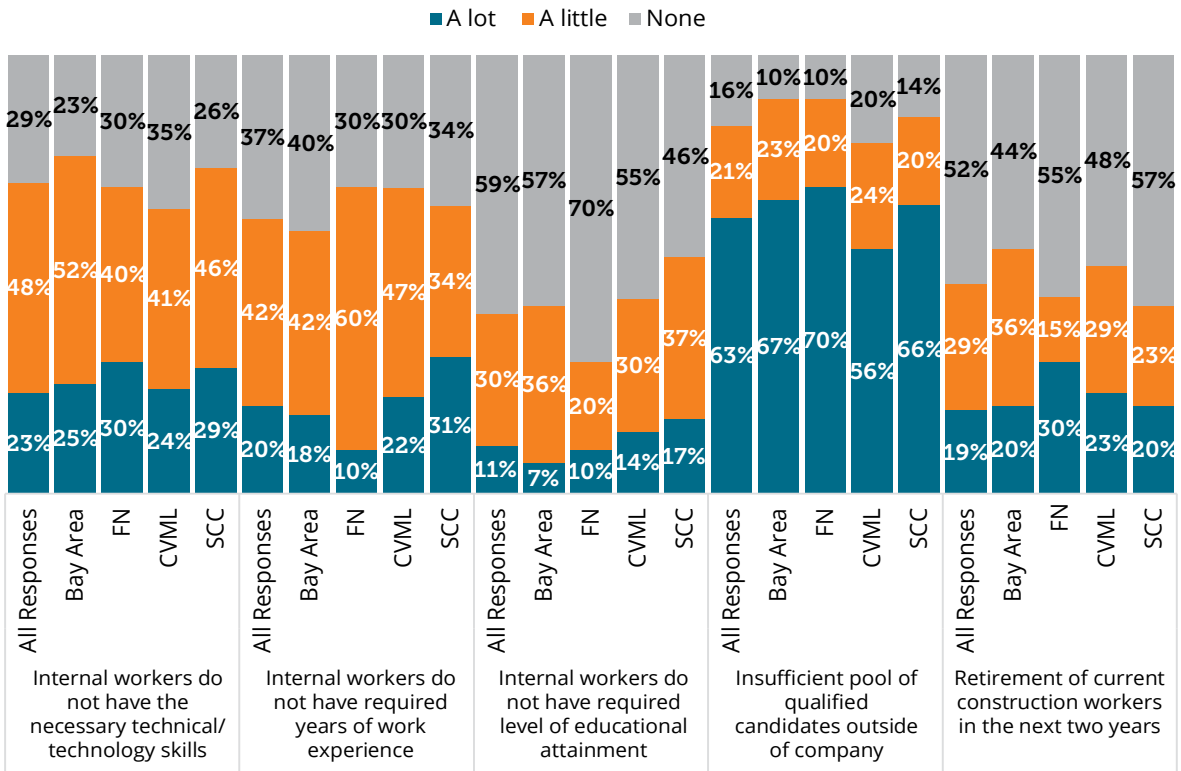
Professional Development Opportunities	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
Specialized power tools	64	13	22	33
Supervisory skills / Project management	59	12	21	37
Plan reading	56	13	20	37
Specialty training (electrical, plumbing, roofing, drywall, HVAC, solar, flooring, painting, concrete)	54	12	17	38
OSHA-10/ OSHA-30	58	12	17	43
Specialized hand tools	50	13	20	29
Customer service	41	7	11	26
Estimating	41	9	19	29
Heavy equipment operation	19	7	7	25
MS Project/Excel	25	6	9	17
Energy Code/Title 24	23	7	6	13
Advanced framing techniques	19	2	6	14
Demolition	18	2	4	15
CAD/CAM	20	5	8	17
Green building	18	2	3	9
Lean construction	14	3	5	15
Insulation installation	14	0	2	10
Surveying	11	3	7	10
Building information modeling	8	2	5	10
Office furniture systems	1	0	0	2
Total Responses	**109**	**20**	**35**	**76**

Table 11. Responses for survey question 17.

Respondents by interest in community college partnership opportunities. Regional breakdown and comparison. Individual counts of regional responses may exceed the total response count due to individual responses being counted in multiple regions when the respondent identified that they hire new employees from each of those regions and when respondents were provided with the option to select multiple answers.

Most Important Certificate	Bay Area	Far North	South Central Coast	Central Valley / Motherlode
Internships	54	12	22	34
None of these	41	6	11	39
Guest speaking	22	5	6	15
Serving on an industry advisory group	23	6	10	14
Hosting field trips	15	5	5	11
Equipment donations	9	3	2	10
Other	1	0	0	3
Total Responses	**109**	**20**	**35**	**77**

Figure 1: How much are the following affecting the operation of your company?



The following represents the number of responses: n = 106; 16.2, n = 106; 16.3, n = 107; 16.4, n = 106; 16.5, n = 106

5. Center for Economic Development (CED)

In the summer of 2021, the Center for Economic Development (CED) was contracted by Kern Community College District in partnership with the California Community Colleges Centers of Excellence for Labor Market Research in the South Central Coast, Bay Area, Far North and Central Valley/Mother Lode to perform a workforce study of California's construction sector.

The North State Planning and Development Collective (NSPDC) consists of the Center for Economic Development and its sister agency, the Geographical Information Center (GIC – established in 1988). The NSPDC provides services and resources to the region's businesses, governments, and residents by pairing GIS mapping services and broadband infrastructure support with economic development research, surveying, analysis, planning and implementation throughout the State of California. Additionally, the NSPDC is the lead agency for the Northeastern and Upstate California Connect Consortia providing support for broadband infrastructure projects and adoption and access initiatives in rural communities. The NSPDC's mission is academic, community-focused and service oriented.

CED wishes to acknowledge the work of the staff who produced this report:

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Appendix B

Included in Appendix B

1. Supply Table (Higher Education Supply)
2. Certifications Defined
3. Full Certification Titles

1. Supply Table (Higher Education Supply)

Table 14: Postsecondary supply for all TOP/CIP codes related to the construction industry occupations in the four regions.

TOP/CIP Code-Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Certificate 60+ Semester Units	Certificate 8 < 16 Semester Units	Credit Award, < 6 Semester Units	Noncredit Award 144 < 192 Hours	Noncredit Award 48 < 96 Hours	Noncredit Award 96 < 144 Hours	Subtotal
094600 - Environmental Control Technology	Bakersfield	1						3								4
	Butte					2			4							6
	Fresno City	7			34			11		1	1					54
	Laney	9				8	9	13	4							42
	Merced	2						2								4
	Mission							5								5
	Oxnard	5				5	9		3			3				26
	San Francisco								15							15
	San Joaquin Delta	1				3		8								12
	San Jose City	6				21	27	22								75
	Sequoias	2						24	2							28
	West Hills Coalinga					2										2
Subtotal		**34**	**0**	**0**	**34**	**40**	**44**	**87**	**29**	**1**	**1**	**3**	**0**	**0**	**0**	**272**
094610 - Energy Systems Technology	Cabrillo	1				0										2
	De Anza	6				6					9					20
	Diablo Valley	1				1										1
	Mendocino							0								0
	Oxnard											1				1
	Redwoods								1							1
	Skyline	0					1									1
Subtotal		**8**	**0**	**0**	**0**	**7**	**1**	**0**	**1**	**0**	**9**	**1**	**0**	**0**	**0**	**27**
094730 - Heavy Equipment Operation	Butte							29								29
	West Hills Coalinga					4										4
Subtotal		**0**	**0**	**0**	**0**	**4**	**0**	**29**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**34**
095200 - Construction Crafts Technology	Bakersfield	1						2								3
	Butte					2			4							6
	Cuesta											0				0
	Diablo Valley	0				7	1		7							15
	Fresno City	1						1								2
	Hartnell							0								0
	Redwoods	4					3	3								11
	San Francisco								4							4
	San Jose City	9			6	7	9	12			6					48
	Santa Barbara	2				3							0	11		17
	Santa Rosa														1	1
	Sequoias	2						3	4							9
Subtotal		**20**	**0**	**0**	**6**	**18**	**14**	**21**	**18**	**0**	**6**	**0**	**0**	**11**	**1**	**117**
095210 - Carpentry	Laney	3				3		4	0							10
	Redwoods	3				3	1	3								10
Subtotal		**6**	**0**	**0**	**0**	**6**	**1**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**
095220 - Electrical	Bakersfield	2						22								24
	Cuesta	9						7								15
	Foothill	4				113			31							148
	Merced	4						20								25
	Modesto							2								2
	Redwoods					0	1		1							2
	San Francisco								3							3
	San Joaquin Delta	9				8		8								25
	San Mateo	0														0
	Sequoias				16	1					2					19
Subtotal		**28**	**0**	**0**	**16**	**121**	**1**	**59**	**35**	**0**	**2**	**0**	**0**	**0**	**0**	**263**

TOP/CIP Code-Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Certificate 60+ Semester Units	Certificate 8 < 16 Semester Units	Credit Award, < 6 Semester Units	Noncredit Award 144 < 192 Hours	Noncredit Award 48 < 96 Hours	Noncredit Award 96 < 144 Hours	Subtotal
095230 - Plumbing, Pipefitting and Steamfitting	Bakersfield							7								7
	Diablo Valley					2	1	1	13							18
	Foothill							20								20
	Mission							16								16
	San Francisco								11							11
Subtotal		**0**	**0**	**0**	**0**	**2**	**1**	**44**	**24**	**0**	**0**	**0**	**0**	**0**	**0**	**71**
095250 - Mill and Cabinet Work	Bakersfield	0							1							1
	Laney	2					3									5
	Mendocino							6								6
	Redwoods					1	2									3
Subtotal		**3**	**0**	**0**	**0**	**1**	**5**	**6**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**15**
095640 - Sheet Metal and Structural Metal	Bakersfield							2								2
	Foothill	0						28								28
	Modesto								4							4
Subtotal		**0**	**0**	**0**	**0**	**0**	**0**	**30**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**34**
095700 - Civil and Construction Management Technology	Cabrillo	8				3	3		26							39
	Diablo Valley	6						3								9
	Hartnell	3						0								3
	Laney	5						7								12
	San Francisco	8				3		9	8							27
	San Joaquin Delta					0										0
	Ventura	6				0		7								13
Subtotal		**35**	**0**	**0**	**0**	**6**	**3**	**27**	**34**	**0**	**0**	**0**	**0**	**0**	**0**	**104**
095720 - Construction Inspection	Alameda								2							2
	Butte	0														0
	Cabrillo								2							2
	Diablo Valley	3						3								6
	Laney								13							13
	San Mateo	2						1	2							4
	Sequoias	1				1	1	1								4
	Ventura	2				1	3									6
Subtotal		**8**	**0**	**0**	**0**	**2**	**4**	**5**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**39**
46.0415 - Building Construction Technology	CET-Oxnard			15												15
	CET-San Jose			19												19
	CET-Santa Maria			11												11
	CET-Soledad			13												13
	CET-Watsonville			19												19
	Subtotal	**0**	**0**	**77**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**77**
47.0201 - Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/	California Aeronautical University			11												11
	CET-San Jose			22												22
	DeHart Technical School		32	9												41
	Institute for Business and Technology		68													68
	Institute of Technology			105												105
	Inter Coast Colleges-Fairfield			24												24
	San Joaquin Valley College-Visalia	54		157												211
	Santa Barbara Business College-Bakersfield			19												19
	Santa Barbara Business College-Santa Maria			5												5
	UEI College-Bakersfield			33												33
	UEI College-Fresno			29												29
	United Education Institute-UEI College Stockton			25												25
Subtotal		**54**	**100**	**440**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**595**
Total		**339**	**100**	**593**	**112**	**418**	**148**	**630**	**329**	**3**	**34**	**8**	**1**	**23**	**2**	**2,740**

2. Certifications Defined

What is a Certification?

Certifications are credentials that demonstrate a level of skill or knowledge needed to perform a specific type of job. Certifications are issued by a non-governmental body. People may have more than one certification.

A certification is endorsed by a third-party major industry association that creates a standardized assessment process to ensure that a candidate has met a set of standards that are relevant to perform a job or skill. Although certifications may include both education and exam requirements, the issuing entity may not necessarily offer the training directly. The assessment is standardized; however, even if the educational training is acquired through different institutions. This ensures that, while an employer may not recognize a candidate's education training, they will recognize a certification and its requirements. The credibility of a certification is dependent on the standards of the issuing industry association. Subsequently, some certifications may be perceived as challenging, whereas, others may necessitate few requirements.

There are three types of certifications:

- Core
- Advanced
- Product/Equipment Specific

Table 6 contains the full definitions for each certification level.

Table 15: Definition of certification types.

Type of Certificate	Definition
Core	d. The certification does not have a minimum education level or has an education level below a two-year Associates of Arts or Associates of Sciences degree and the certification does not have a minimum requirement for work experience or requires two or less years of work experience. e. The certification has an education level of an Associates of Arts or Associates of Sciences degree or higher but has a work experience requirement of less than 2 years of work experience. f. The certification has a work experience requirement of more than 2 years but does not require a two-year Associates of Arts or Associates of Sciences degree.
Advanced	a. The certification has an education level of an Associates of Arts or Associates of Sciences degree or higher and has a work experience requirement of more than 2 years or requires obtaining a 'core' level certification from the same organization.
Product/ Equipment Specific	a. A product/equipment certification tests for knowledge about the use of proprietary software or hardware products. This classification is used primarily for computer-related companies such as IBM, CISCO, HP, etc.

Table 16: Hyperlinked resource definitions.

Certification	Definition
Apprentice Card	Apprentices must have an identification (ID) card as part of their agreement to take part in a registered apprenticeship program which on-the-job training.
Ardex CTEF Certification	Certification identifies an installer as being a dedicated and knowledgeable professional whose competence in installing tile has been verified to meet specific tile industry standards.
C-54 License	A ceramic and mosaic tile contractor prepares surfaces as necessary and installs glazed wall, ceramic, mosaic, quarry, paver, faience, glass mosaic and stone tiles; thin tile that resembles full brick, natural or simulated stone slabs for bathtubs, showers and horizontal surfaces inside of buildings, or any tile units set in the traditional or innovative tile methods, excluding hollow or structural partition tile.
CPR Certification	A CPR certification is a credential that qualifies the holder to perform a life-saving procedure on someone who cannot breathe on their own due to a near-drowning incident, suffocation or another life-threatening event. The procedure that CPR certificate holders learn is cardiopulmonary resuscitation. It involves the use of rescue ventilation and chest compressions. Holders often use the procedure in hospitals and other medical settings, but they can also use it in public if necessary.
CSLB C-17	A glazing contractor selects, cuts, assembles and/or installs all makes and kinds of glass, glass work, mirrored glass, and glass substitute materials for glazing; executes the fabrication and glazing of frames, panels, sashes and doors; and/or installs these items in any structure.
Electricians State Certification	Existing law requires that persons performing work as electrician under a C-10 licensed contractor be certified pursuant to certification standards established by the Division of Labor Standards Enforcement. "Electricians" is defined as all persons who engage in the connection of electrical devices for electrical contractors licensed pursuant to Section 7058 of the Business and Profession Code, specifically, contractors classified as electrical contractors in the Contractors State License Board Rules and Regulations.
EPA Certification	An EPA certification, or 608 certification, is official recognition by the EPA that a technician is knowledgeable about the laws and regulations surrounding the use and handling of ozone-depleting substances, or ODS, such as refrigerants.
FGIA/AAMA Master Installer	There are currently three separate segments of the Installation Masters program available which are listed (**click here to get more information**), both of which address water management, installation materials and components, installation practices for various fenestration frame styles and shapes, job site safety, product performance and operator types, and more through classroom training. FGIA has created several programs to directly support the product performance and certification of fenestration and insulating glass products.
Forklift Certification	Forklift certification is a process by which a certificate is issued by the employer or an authorized training provider to a forklift operator upon successful completion of a course and examination. The certification signifies that he or she is qualified to operate a forklift safely in the workplace.
Journeyman Card	A journeyman is a person who has completed both an apprenticeship program and required vocational studies, and has passed an exam to be eligible for certification. This involves finding an established journeyman to train under and completing a set numbers of work hours.
NATE Certification	NATE Certification represents real-world working knowledge of HVACR systems and validates the professional competency of service and installation technicians. Designed for professional technicians with at least two years of experience, the certification exams consist of questions created by industry experts from across the country.
NCCCO	CCO currently offers an industry-leading range of personnel certifications that address crane and crane-related operations. The organization's 28 certification designations across 12 categories provide the industry's most comprehensive portfolio of personnel certifications available. Accredited by ANSI to the international standard ISO 17024, they are officially recognized by federal OSHA as meeting or exceeding ANSI/ASME requirements, and are endorsed by all leading insurance providers and industry membership associations. (**Click here** to see the list of certifications and how to obtain them.)
NCCER Certification	Certification is representative of the highest-level credential offered by NCCER. Certified indications that you have reached journey-level minimum competency through knowledge and performance.

NESHAP Certification	National Emission Standards for Hazardous Air Pollutants (NESHAP) are stationary source standards for hazardous air pollutants. Hazardous air pollutants (HAPs) are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.
NFPA 70E Electrical Safety	NFPA 70E requirements for safe work practices to protect personnel by reducing exposure to major electrical hazards. Originally developed at OSHA's request, NFPA 70E helps companies and employees avoid workplace injuries and fatalities due to shock, electrocution, arc flash, and arc blast, and assists in complying with OSHA 1910 Subpart S and OSHA 1926 Subpart K.
OSHA 10 Hour Certification	OSHA 10-hour training teaches basic safety and health information to entry-level workers in construction and general industry. It is part of the OSHA Outreach Training Program, which explains serious workplace hazards, workers' rights, employer responsibilities and how to file an OSHA complaint.
OSHA 30 Hour Certification	OSHA 30 is an outreach and voluntary training program provided by Occupational Safety Health Administration (OSHA), United States Department of Labor. It provides 30 hours of training to the mid-level employees and supervisors touching on appreciation, prevention, avoidance and reduction of safety and health hazards in the workplace. It also enriches the employees' knowledge on their rights, employer responsibilities and procedures for complaining and suggestions. OSHA 30 does not meet training requirements for any OSHA standard.

3. Full Certification Titles

Table 17: The full titles of certifications discussed in this report.

Certification acronym	Full Certification Name
CPR	Cardiopulmonary resuscitation
CSLB C-17	Contractors State License Board C-17
CTEF	Ceramic Tile Education Foundation
EPA	Environmental Protection Agency
FGIA	Fenestration and Glazing Industry Alliance
NATE	North American Technician Excellence
NCCCO	National Commission for the Certification of Crane Operators
NCCER	National Center for Construction Education and Research
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration

More About the Centers of Excellence

The Centers of Excellence (COE) for Labor Market Research deliver regional workforce research and technical expertise to California community colleges for program decision making and resource development. This assistance has proven valuable to colleges in beginning, revising, or updating economic development and career education (CE) programs; strengthening grant applications; facilitating the accreditation process; and supporting regional planning efforts.

The COE aspire to be the leading source of regional workforce information and insight for California community colleges. The COE is by the Chancellor's Office, California Community Colleges, Economic and Workforce Development Program.

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Sources

Demand data is pulled form Emsi/Lightcast, a software program that consolidates data from the California Employment Development Department (EDD), U.S. Bureau of labor statistics (bls), and other government agencies.

Program supply data is drawn from two systems:

Taxonomy of Programs (TOP) and Classification of Instructional Programs (CIP)

Skills and Certification data is pulled by Burning Glass

Important Disclaimer

All representations included in this report have been produced from primary research, secondary review of publicly and privately available data, and research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings. The Centers of Excellence for Labor Market Research and the California Community Colleges Chancellor's Office are not responsible for applications or decisions made by recipient community colleges or their representatives on the basis of this study.

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