CONSTRUCTION

Sector Workforce Study:

Bay Region

Centers of Excellence

Fall 2022

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

KCCD KERN COMMUNITY COLLEGE DISTRICT

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BACCC BAY AREA COMMUNITY COLLEGE CONSORTIUM

Prepared by: Bay Region Center of Excellence for Labor Market Research • John Carrese, Director • jcarrese@ccsf.edu

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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**.

The COE gratefully acknowledges the assistance of Carlos Santamaria, Regional Director for Energy Construction and Utilities, who played an important role in providing subject matter expertise throughout the study.

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

Courtney Farrell, Project Manager

Haley Stone, Project Manager

Melissa Kovacs, Senior Research Analyst

The COE would like to especially thank the employers who took the time to complete the workforce survey, which provided critical information about the workforce needs and requirements of employers in the construction sector. This information will be vital for community colleges in developing and strengthening training and education programs

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, Far North (FN), South Central Coast (SCC), and Central Valley/Mother Lode (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 Bay region. 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, 2020, and March 10, 2022. Email followed by phone call outreach were utilized to obtain responses from 109 construction businesses in the Bay region, a response rate of 2.14%.

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. All responses included in this analysis are from businesses within the Bay region *(Section 1.1 in Appendix A summarizes counts for counties in the Bay region).*

Recruitment Locations

Survey question six asked respondents to identify the California county or counties from which their company recruits and hires its construction employees.

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.***

The Bay region in this report is based on those delineated by the California Community College Chancellor's Office with slight adjustments made to follow county lines. Some counties are split between regions; therefore, all of Monterey County was included in the Bay. Below is a map of the 11 counties in the Bay region included in the survey and the total number of respondents.

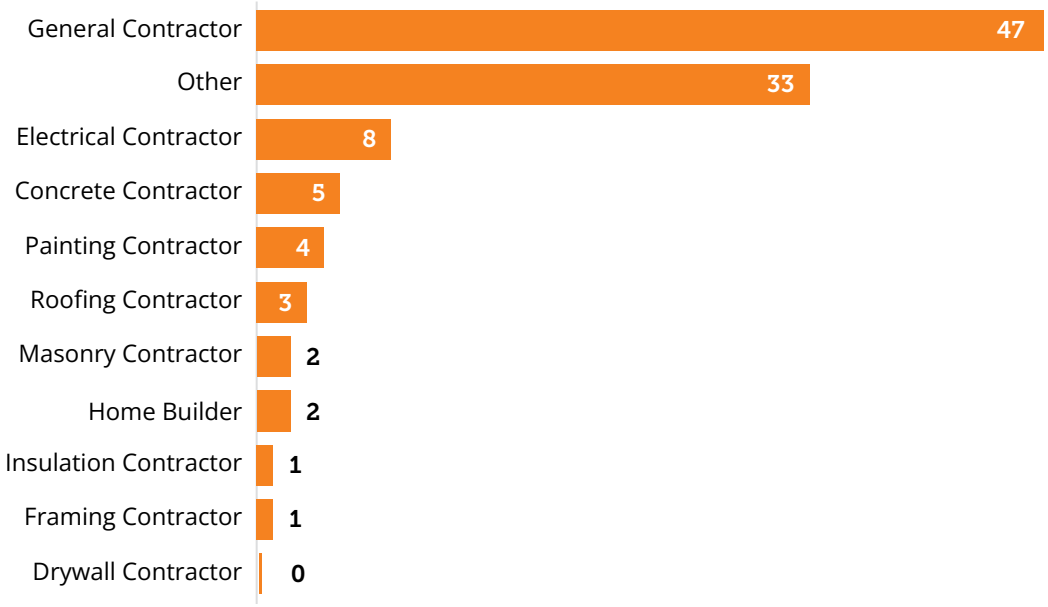
Figure 1. Map of the California Counties included in the Bay Area and its respective count.

Number of responses = 109

Company Classification

Survey question two prompted respondents to classify their company into one of ten categories (Figure 2). Most businesses categorized themselves as either "General Contractor" or "Other." The top "Other" responses include: HVAC contractors (7 responses), glazing contractors (4 responses), and landscape contractors (2 responses). *(Section 2.1 in Appendix A displays "Other" responses).*

Figure 2: How would you classify your company?



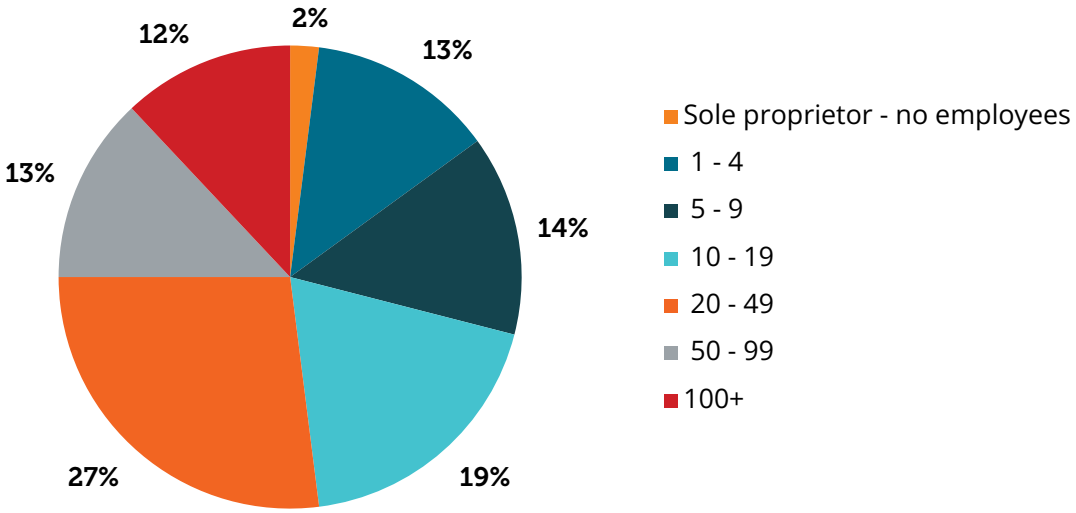
Number of responses = 106

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 29 percent of the respondents having under 10 employees, and 75 percent having under 50 employees (Figure 3). The vast majority of respondents (88 percent) have under 100 employees. *(Table 2 in Appendix A displays the current number of employees).*

Figure 3: Approximately how many employees do you have?



Number of responses = 106

Aggregated small business data (those firms having less than 50 employees) across the Bay region was obtained from a secondary source for comparative analysis. This analysis revealed an overall small business rate of 82 percent (Table 1).

Table 1: Small business rate and businesses with less than 50 employees in the Bay region.[1]

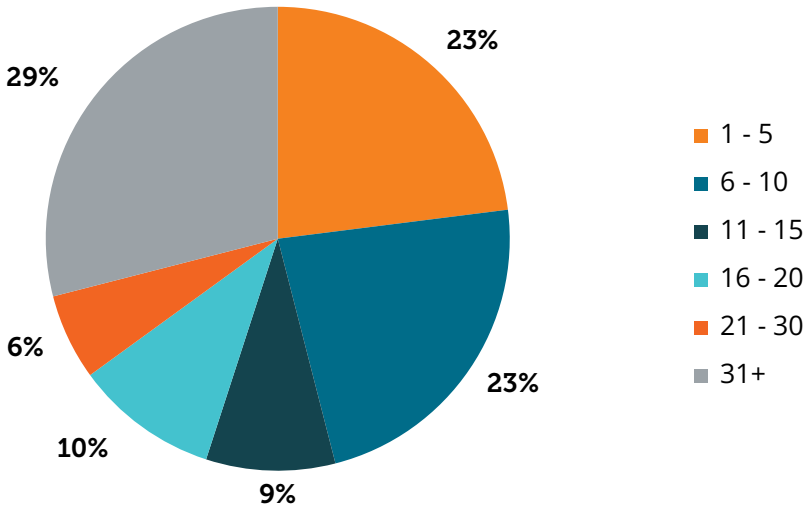
Region	Firms		
	Total	<=49	Rate
Bay	488,424	399,681	82%

[1] This data was obtained from InfoUSA/Data Axle. 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 29 percent of respondents have 31 or more of their workers participating directly in construction work, and 46 percent have 10 or fewer. Figure 4 depicts the results of the analysis. *(Table 3 in Appendix A displays the breakdown of these results).*

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

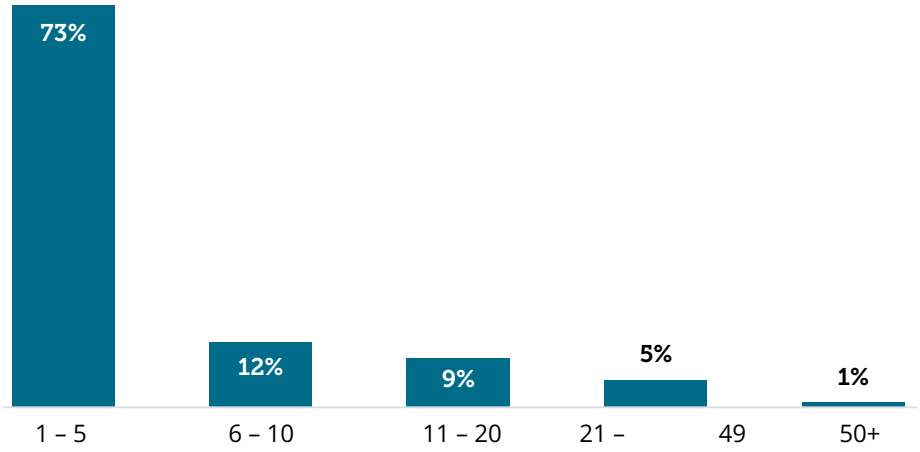


Number of responses = 106

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 5 in Appendix A displays the breakdown of these results).*

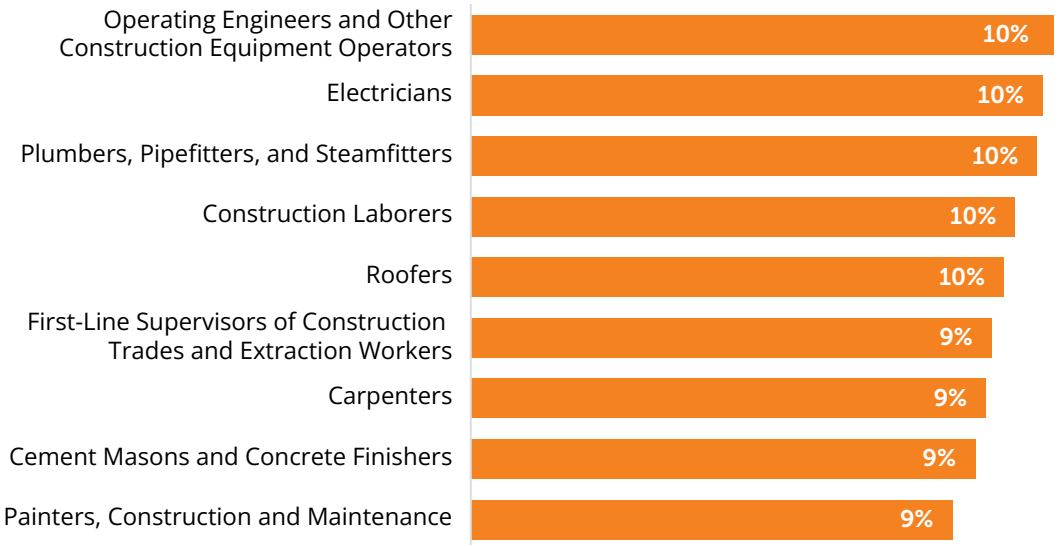
Figure 5: On average, how many of your construction workers will you need to replace each year due to retirement or leaving your employment for other reasons?



Number of responses = 107

To provide context to survey question seven results, the COE evaluated the construction occupations considered to be pertinent to this report. Figure 6 shows the top construction occupations with the most annual job openings from 2020 – 2025. The percentage represents the replacement rate for each occupation, which ranges from 9 – 10%.

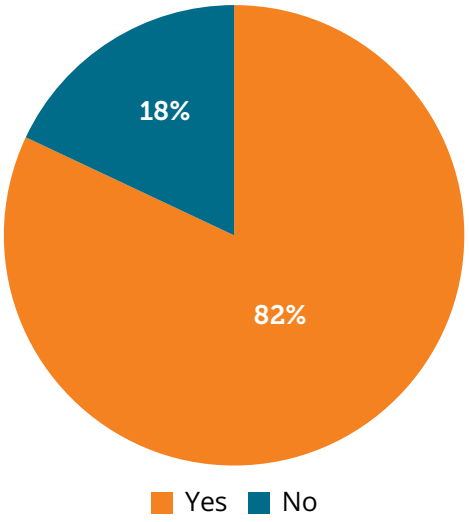
Figure 6: Percentage of total annual openings for the top construction occupations in the Bay region.



Anticipated Worker Change

Respondents were then asked if they plan to have more construction workers two years from now. A follow up question asked respondents to provide the anticipated number of additional workers. A large majority of respondents, 82 percent, plan to have an increase in construction workers two years from now (Figure 7).

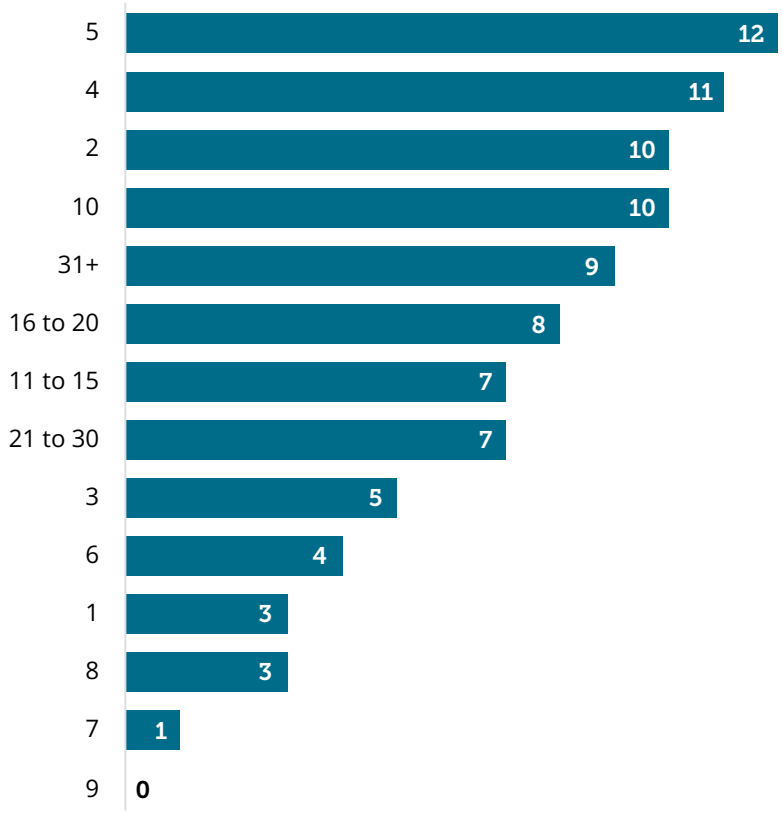
Figure 7: Do you plan to have more construction workers 2 years from now?



Number of responses = 107

While the number of the anticipated worker increases varied between respondents, most anticipated an increase of five workers (Figure 8). Even a conservative estimation suggests that survey respondents alone will hire at least 928 new construction workers over the next two years.

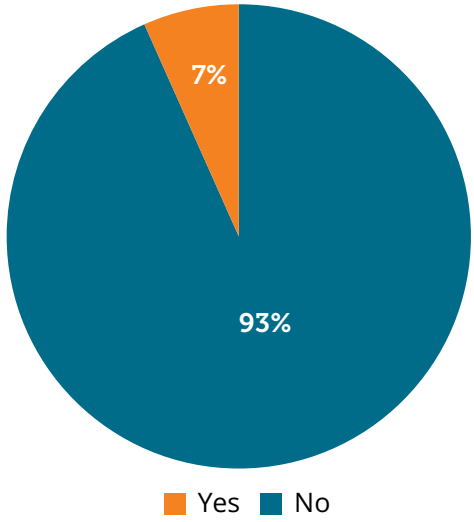
Figure 8: If yes, how many more construction workers do you plan to employ two years from now?



Number of responses = 90

Survey question nine asks 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?

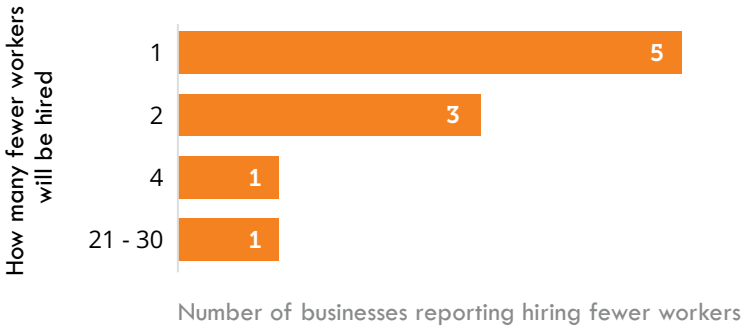


Number of responses = 107

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

Of the seven percent that do anticipate fewer construction workers, most indicated a reduction of only one or two workers *(Table 7 in Appendix A contains a breakdown of the results).*

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



Occupational Demand

In order to contextualize the survey responses described in the previous section on "Anticipated Worker Change", secondary employment and projections data were pulled for comparison. The top 10 construction industry occupations are displayed in Table 2. Construction laborers are projected to have the greatest number of annual openings at 3,852.

This is followed by carpenters at 3,025 and first-line supervisors of construction trades and extraction workers at 2,459. First-line supervisors of construction trades and extraction workers have the greatest projected growth rate over the five year period at 18 percent. *(Table 4 in Appendix A contains the occupational demand for the survey relevant construction occupations).*

Table 2: Top 10 construction occupations – employment and occupational projections in the Bay region.[2]

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Construction Laborers	34,522	36,113	1,591	5%	3,852
Carpenters	34,832	31,789	-3,043	-9%	3,025
First-Line Supervisors of Construction Trades and Extraction Workers	17,074	20,108	3,034	18%	2,459
Electricians	19,145	20,725	1,580	8%	2,457
Painters, Construction and Maintenance	14,748	15,173	425	3%	1,441
Plumbers, Pipefitters, and Steamfitters	11,512	12,247	735	6%	1,378
Operating Engineers and Other Construction Equipment Operators	6,492	6,758	266	4%	754
Drywall and Ceiling Tile Installers	7,973	7,482	-491	-6%	670
Roofers	5,851	5,801	-50	-1%	608
Cement Masons and Concrete Finishers	5,866	5,269	-597	-10%	502
TOTAL	**158,015**	**161,465**	**3,450**	**2%**	**17,146**

[2] Source: Emsi

Construction laborers represents 22 percent of the top ten occupations' projected annual openings (Table 3). When all 33 relevant construction occupations are taken into consideration the percentage rate for this occupation shrinks to 19 percent.

Table 3: Top 10 construction occupations - annual openings and percentage of total annual openings.[3]

Occupation	Annual Openings	Percentage of Annual Openings
Construction Laborers	3,852	22%
Carpenters	3,025	18%
First-Line Supervisors of Construction Trades and Extraction Workers	2,459	14%
Electricians	2,457	14%
Painters, Construction and Maintenance	1,441	8%
Plumbers, Pipefitters, and Steamfitters	1,378	8%
Operating Engineers and Other Construction Equipment Operators	754	4%
Drywall and Ceiling Tile Installers	670	4%
Roofers	608	4%
Cement Masons and Concrete Finishers	502	3%
Total of Top 10 Occupations	**17,146**	**83%**
Total of 33 Occupations	**20,718**	**100%**

[3] Source: Emsi

Postsecondary Supply

Top Codes for Community College Construction Programs

Table 4 shows the college supply of graduates from the TOP codes that align with the nine occupations in Table 6 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 6).

Table 4: Annual Postsecondary supply in the Bay region by TOP/ CIP code.

TOP/ CIP Code	Title	Supply
095220	Electrical	151
094600	Environmental Control Technology	139
47.0201	Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology	114
095700	Civil and Construction Management Technology	92
095200	Construction Crafts Technology	69
095230	Plumbing, Pipefitting and Steamfitting	64
46.0415	Building Construction Technology	51
095640	Sheet Metal and Structural Metal	28
095720	Construction Inspection	28
094610	Energy Systems Technology	25
095210	Carpentry	10
095250	Mill and Cabinet Work	5
094730	Heavy Equipment Operation	0
	Total	**776**

State legislation, such as AB 32 which fights against global warming, will create more construction job opportunities in the Bay region as California moves away from natural gas and petroleum production and integrates more renewable energy. As demonstrated in Table 5, there is an undersupply of graduates in Energy Systems Technology programs, which prepares students to work in the field of renewable energy. Although Energy Systems Technology appears to currently be a low priority for employers in the Bay region, 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 5). 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 5: Gap analysis in the Bay region.

TOP/ CIP Code	Title	Demand	Supply	Gap
0952.00 46.0415	Construction Crafts Technology and Building Construction Technology	6,519	120	6,399
0952.10	Carpentry	5,646	10	5,636
0952.20	Electrical	5,025	151	4,874
0952.50	Mill and Cabinet Work	3,187	5	3,182
0957.20	Construction Inspection	2,916	28	2,888
0957.00	Civil and Construction Management Technology	2,459	92	2,367
0952.30	Plumbing, Pipefitting and Steamfitting	1,588	64	1,524
0947.30	Heavy Equipment Operation	791	0	791
0956.40	Sheet Metal and Structural Metal	644	28	616
0946.10	Energy Systems Technology	442	25	417
0946.00 47.0201	Environmental Control Technology and Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology	390	253	137

Figure 11: Top 6 supply/demand gaps by TOP/CIP code in the Bay region.

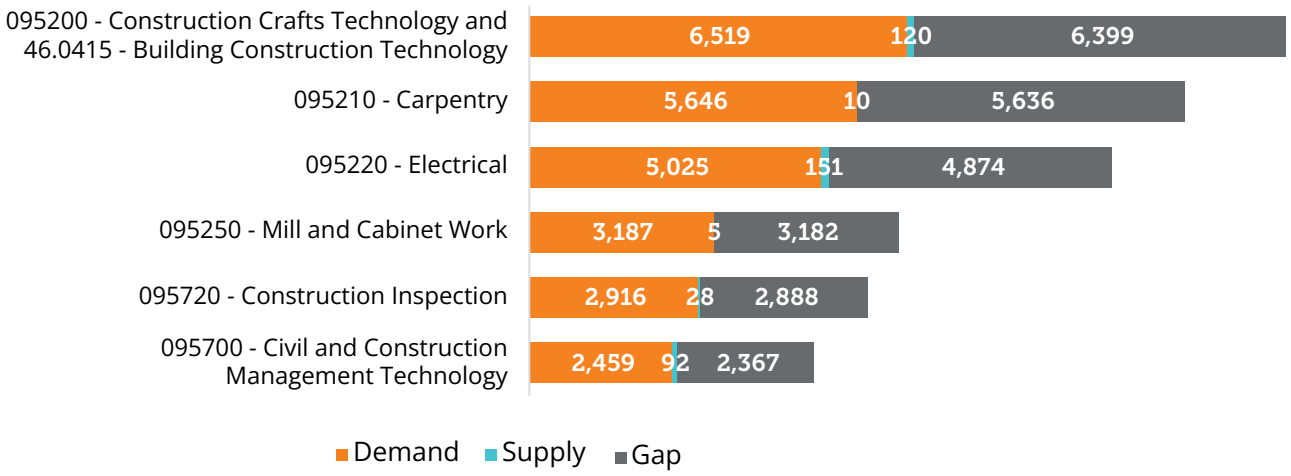


Table 6: Total demand for 9 construction industry occupations compared to total supply for 3 TOP codes with the largest supply/demand gaps in the Bay region.

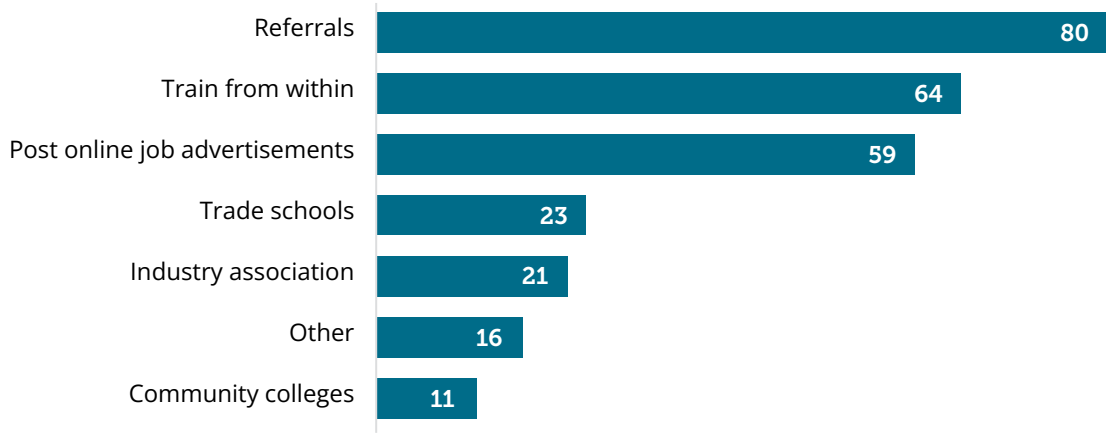
Occupation	Annual Demand	Program of Study	Annual Supply	Gap
Construction Laborers	3,852	Construction Crafts Technology	69	**6,450**
Helpers, Construction Trades, All Other	112			
Miscellaneous Construction and Related Workers	89			
Helpers – Extraction Workers	7			
First-Line Supervisors of Construction Trades and Extraction Workers	2,459			
Carpenters	3,025	Carpentry	10	**3,177**
Helpers – Carpenters	162			
Electricians	2,457	Electrical	151	**2,415**
Helpers – Electricians	109			
	12,272		**230**	**12,042**

(Table 13 in Appendix B contains the postsecondary supply for all TOP/CIP codes related to the construction industry occupations in the Bay region).

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 16 "Other" responses, 13 respondents 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 12). The results of this survey question speak to the need for community colleges to increase their marketing efforts to local employers and/or the need for community colleges to adjust curricula to provide more training and courses that better prepare students for work in the construction industry. *(Table 8 in Appendix A displays a breakdown of these results).*

Figure 12: Where do you find qualified candidates to fill vacancies for construction worker positions?



Number of responses = 109

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 12 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.

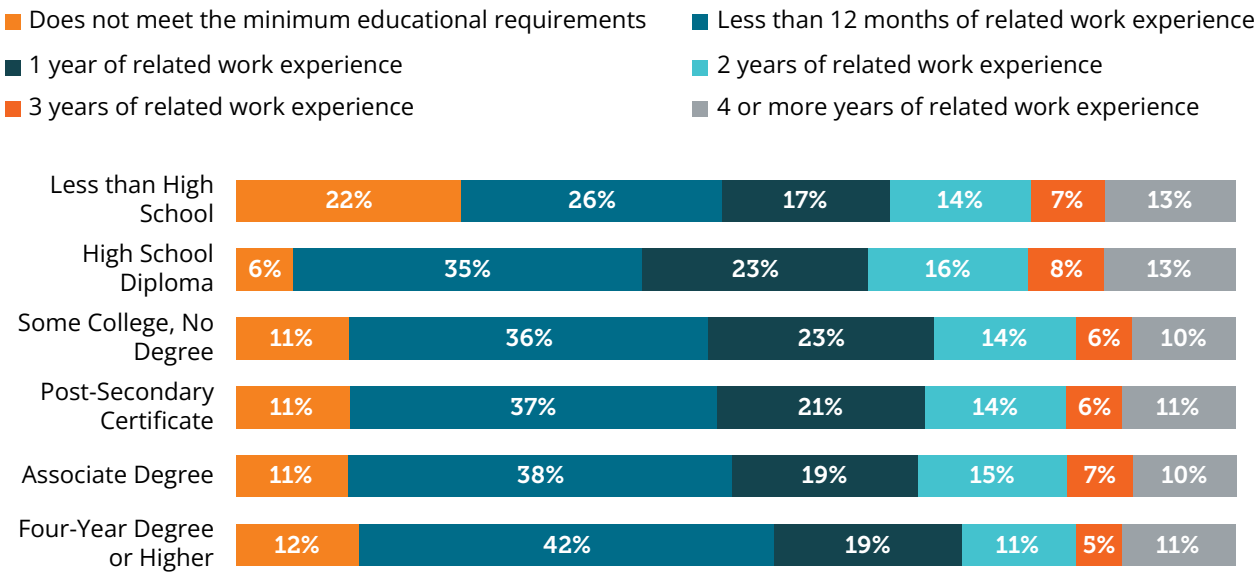
Despite this concern, the responses to questions 10.1–10.6 reveal that for workers who have a high school diploma or higher, a majority of the respondents require a minimum of one year or less of related work experience. Work experience is prioritized by construction sector employers. What these results appear to convey is that beyond a high school diploma, higher levels of education have little impact on the employability of construction workers (Figure 13).

"What these results appear to convey is that beyond a high school diploma, higher levels of education have little impact on the employability of construction workers."

This suggests that many construction firms across the Bay region 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 increase their efforts to educate 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.

Figure 13: What is the minimum related work experience required for the following education levels?



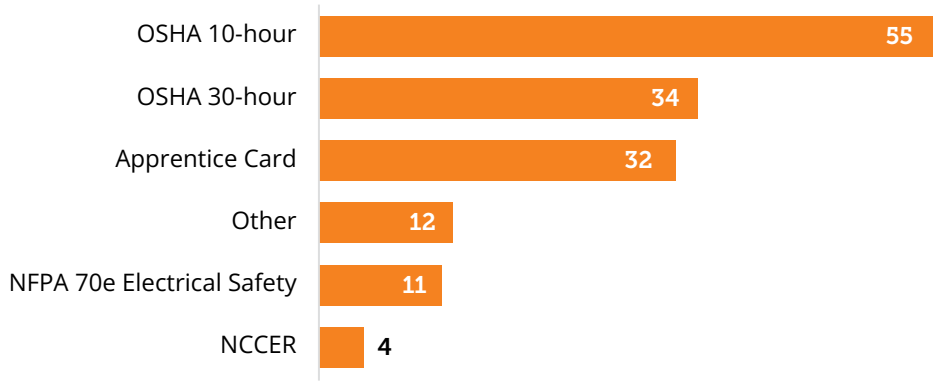
Number of responses for each education level: n=107; n=106; n=106; n=106; n=107; n=106

Certifications

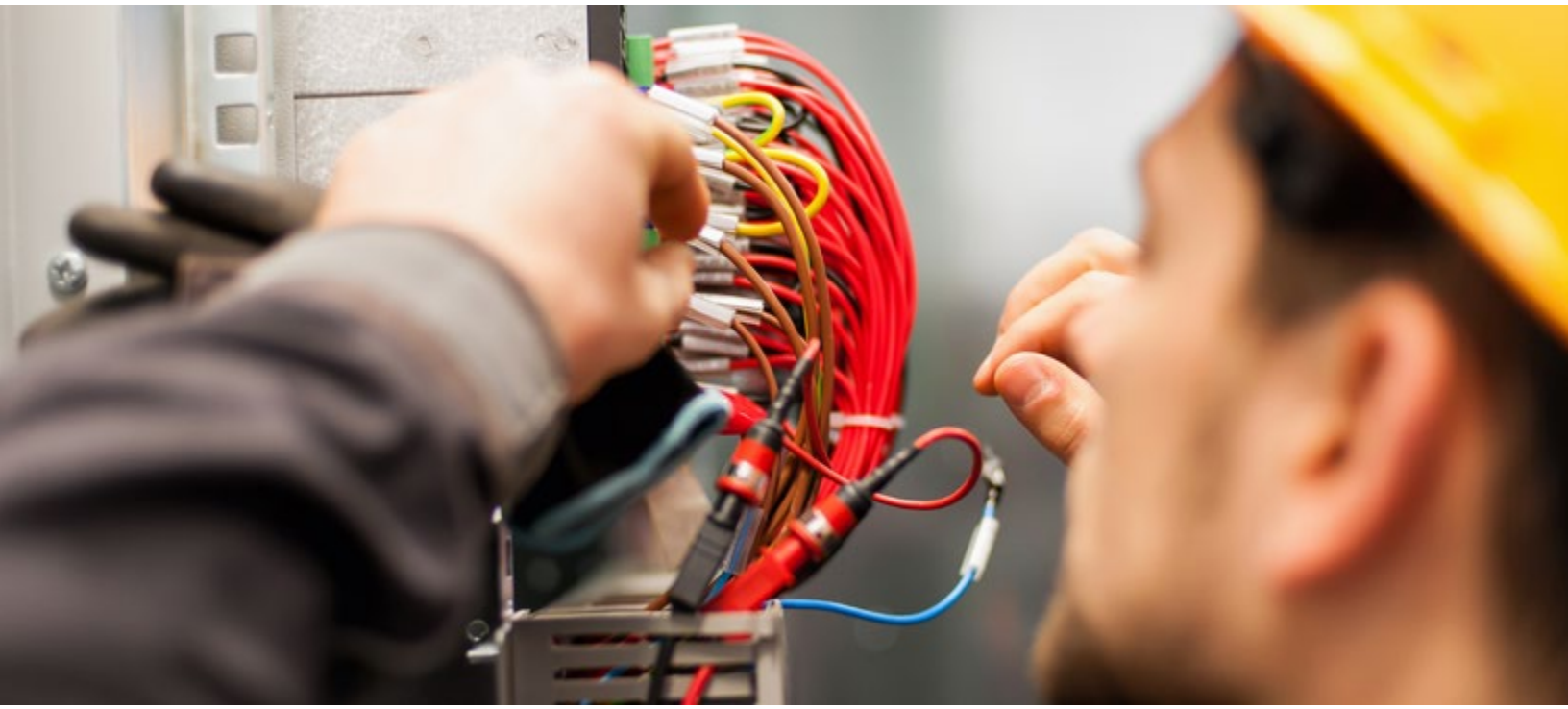
In survey question twelve, respondents were asked to identify the certifications required for construction workers. The largest portion of participants indicated an Occupational Safety and Health Administration (OSHA) 10-hour certification requirement. OSHA 30-hour and Apprentice Card certifications 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 9 in Appendix A displays a breakdown of these results).*

Figure 14: Which certifications should a qualified construction worker possess? (Select all that apply).

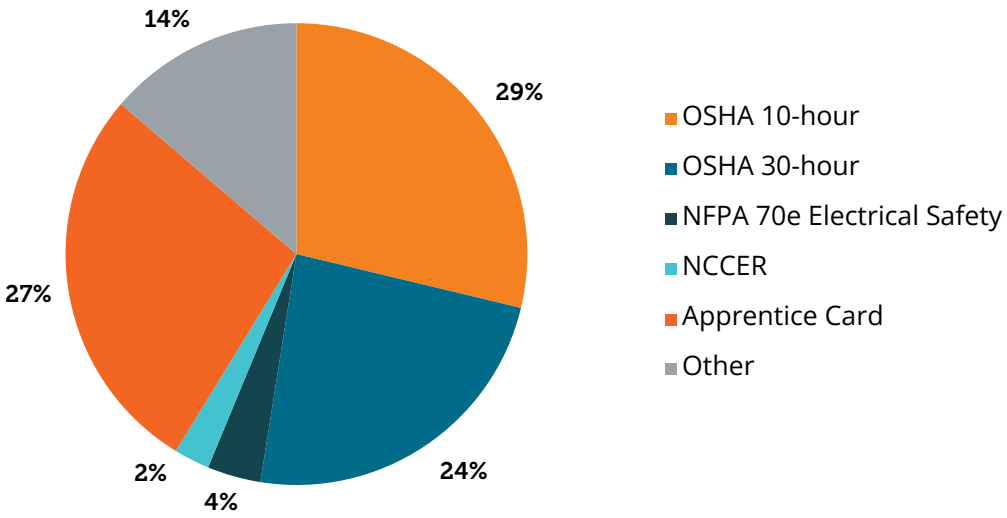


Number of responses = 86



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. Figure 15 displays the survey results.

Figure 15: Which of the above certifications are the most important certification for a construction worker to possess?



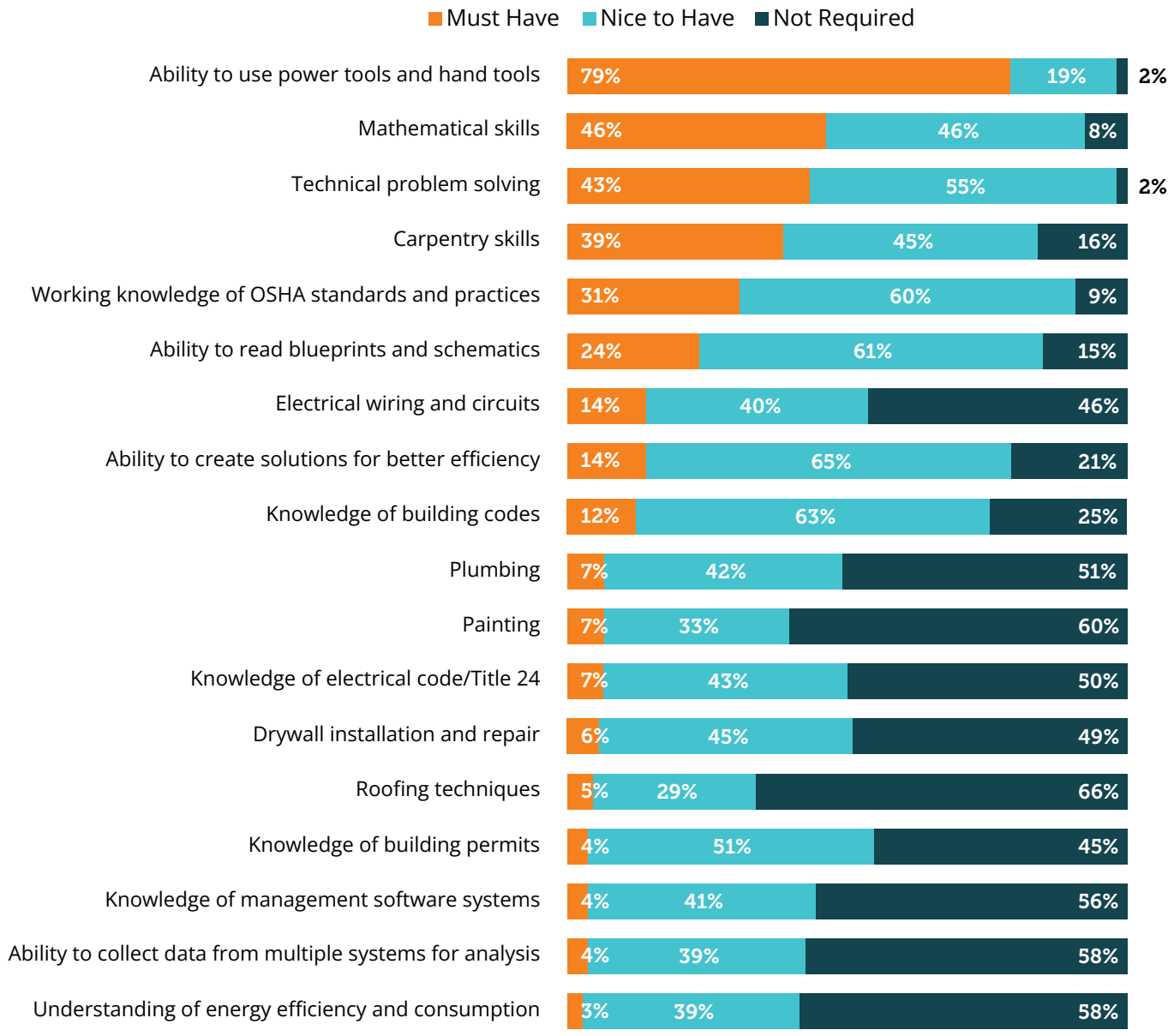
Number of responses = 80

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

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 "Ability to use power tools and hand tools" as a "Must Have" skill. This was followed by "Mathematical skills" and "Technical problem solving." Figure 16 displays the survey results.

Figure 16: Importance of skills for a qualified construction worker to possess.



Number of responses = 109

A notable result is the lack of importance and priority given to the skill "Understanding of energy efficiency and consumption." In the Bay region, results revealed that 58 percent of respondents acknowledged that the skill of understanding energy efficiency and consumption was not a requirement for a qualified construction worker.

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 the Bay region'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/or 2) educate employers about state and federal environmental priorities.

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.[4] 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 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."

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

Table 9. Inflation Reduction Act total job estimates – summary figures.[5]

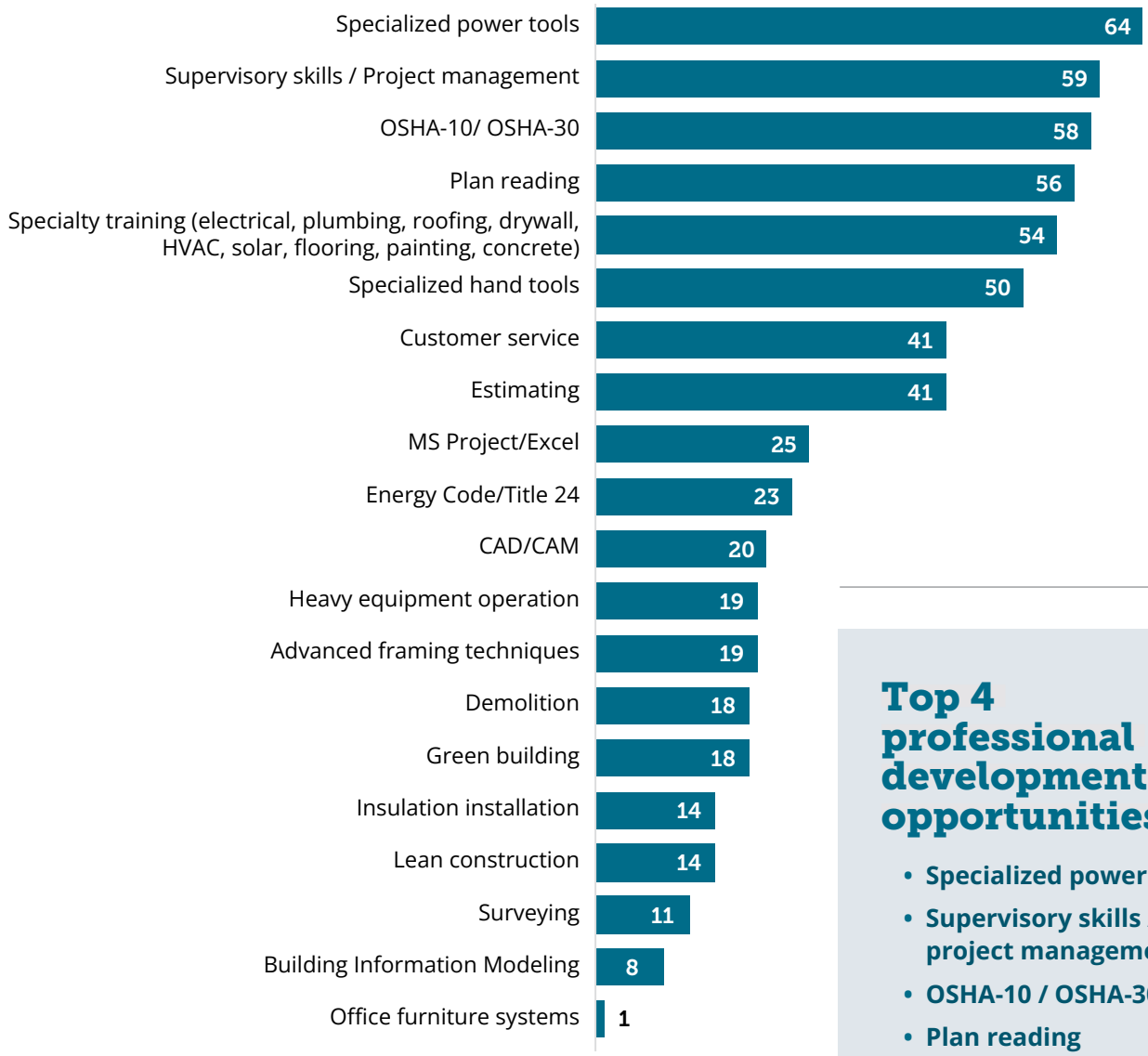
	Average Annual Budget and Job Creation Figures over 10 Years			Total Budget and Job-Years Figures	
	Public Spending	**Total Spending** *(= public + private spending)*	**Annual Job Creation**	**Total Spending**	**Total Job Creation, Job-Years**
Electricity Programs	$21.4 billion	$66.3 billion	573,177	$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**

[5] 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/

Professional Development Opportunities

Respondents were provided a list of 20 professional development opportunities and asked to indicate their interest in each for their existing workers. *(Table 11 in Appendix A contains these complete results).* As displayed in Figure 17, the greatest number of respondents expressed interest in professional development focused on using specialized power tools for their workers. This was followed closely by supervisory skills/ project management, OSHA training, and plan reading as professional development opportunities.

Figure 17: 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 skills / project management**
- **OSHA-10 / OSHA-30**
- **Plan reading**

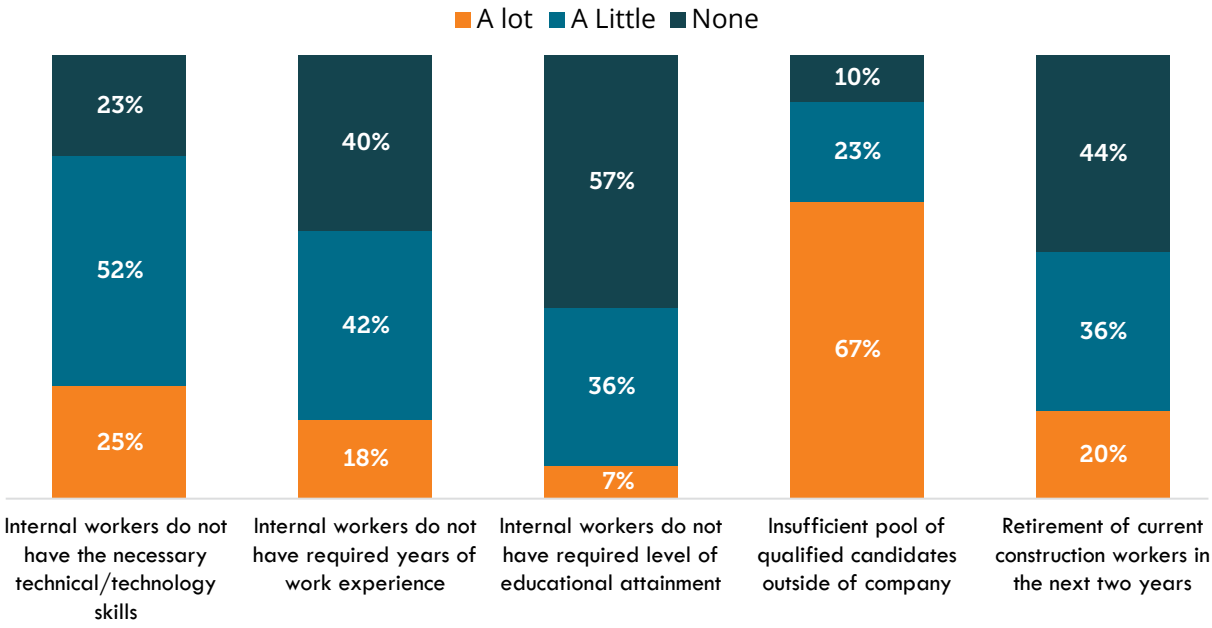
Number of responses = 109

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 (67 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 18 illustrates this outcome. 25 percent of respondents indicated internal workers did not have the necessary technical/technology skills, 20 percent indicated a negative impact of current worker retirements in the next two years, 18 percent indicated internal workers do not have the required years of work experience, and 7 percent indicated internal workers do not have required years of educational attainment.

Figure 18: How much are the following affecting the operation of your company?



Number of responses for each option: n=106; n=106; n=107; n=106; n=106

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 work experience. 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.

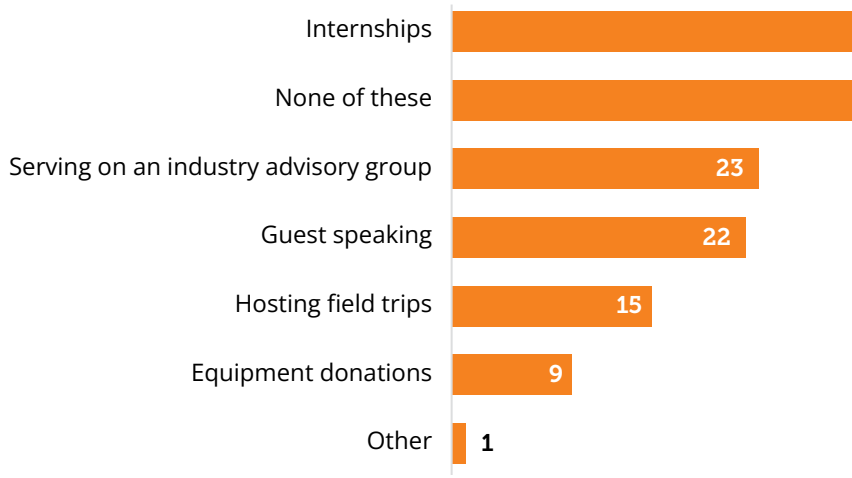
This result warrants several points for consideration including

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.

Partnership Opportunities

The final question of the survey prompted respondents to identify their interest in seven community college partnership opportunities. Of the 107 participants who responded to this question, 50 percent of employers surveyed are interested in partnering with community colleges to provide internships, 21 percent indicated "serving on an industry advisory group," and 21 percent indicated "guest speaking." Forty-one respondents indicated that they were not interested in any partnership opportunities. Figure 19 displays the survey results. *(Table 11 in the Appendix A displays a breakdown of these results).*

Figure 19: Community college partnership opportunities that you or your organization would be interested in.



Number of responses = 107

"50 percent 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 community colleges and industry leaders within the construction sector in workforce resiliency planning. The survey responses presented in this study identify a clear picture of the sector's current workforce, workforce needs, and gaps in the available workforce. 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 on innovative workforce resiliency strategies implemented by industry leaders.

Industry stakeholders can also use the data presented in this document to help lobby for greater education and training programs in the Bay region, or to identify skills that are best taught in house. The survey results displayed in Figure 16 and Figure 18 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) carpentry skills.

Figure 18 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 the Bay region, including a lack of available training for jobs in the region. Using the data presented in Figure 16, stakeholders can determine the most sought-after skills in the sector and then 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, community colleges can use the survey data to identify what level of interest construction and contracting businesses have in professional development opportunities and community college partnerships. The greatest number of respondents expressed interest in professional development focused on using specialized power tools for their workers, followed closely by supervisory skills/project management, OSHA training, and plan reading as professional development opportunities.

While the interest levels in partnerships varied between survey respondents, a large portion of respondents did express interest in pursuing internship opportunities with local educational institutions. However, 38 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.

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

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

Recommendations for Community Colleges

The survey findings provide several takeaways that should spur community colleges to act. When asked about their methods of recruitment, respondents chose the option "Community Colleges" least frequently. Community colleges can use this result as a "call to action" to increase marketing and outreach efforts to local employers.

Community colleges can integrate and prioritize the "Must Have" skills 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.

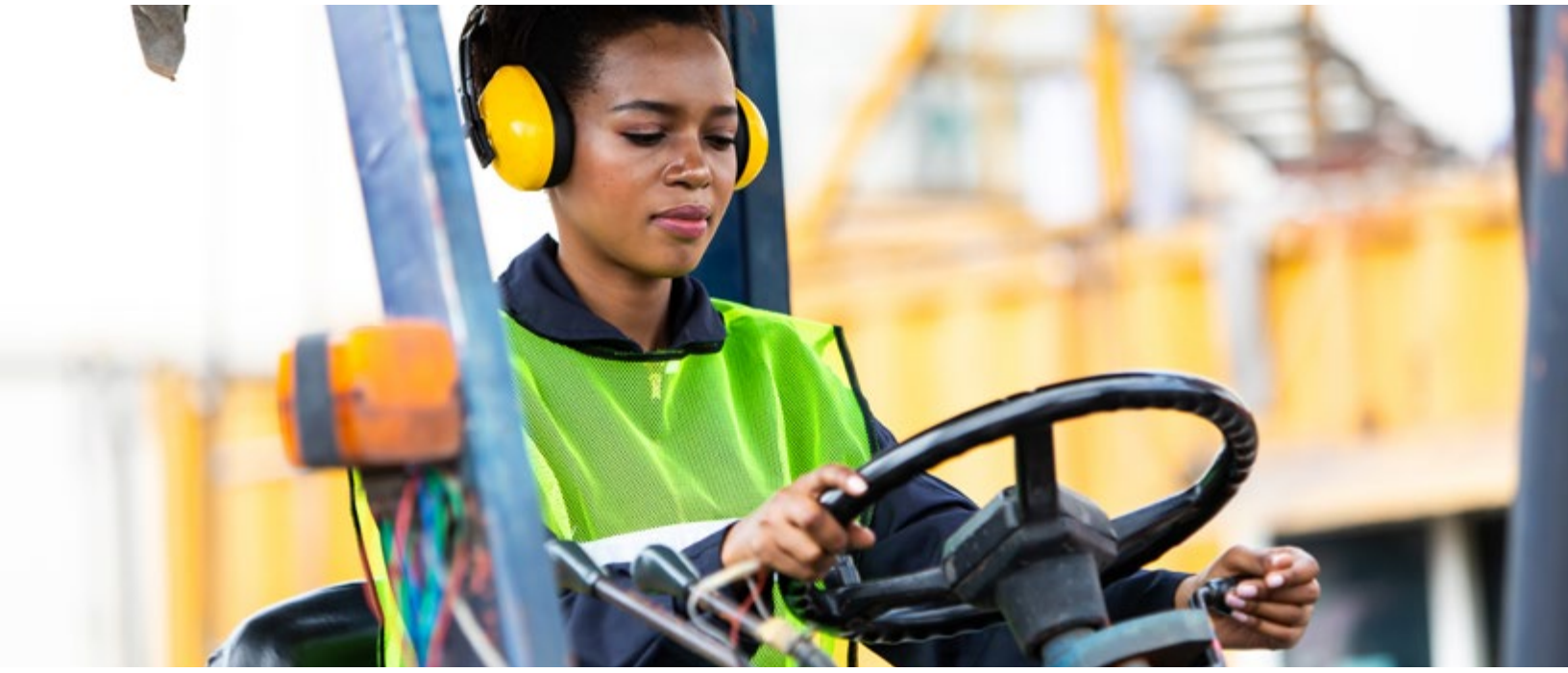
Community colleges can collaborate with industry to implement new courses that provide the requisite training for the certifications most valued by industry leaders. Respondents indicated that the most important certifications are OSHA 10-hour, OSHA 30-hour, and Apprentice Card. In addition, community colleges can adjust their curricula to prepare students on how to complete these certifications.

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 tool instruction, supervisory skills/project management education, and OSHA training. Community colleges can also better meet the needs of employers by prioritizing these and other known professional development opportunities in their program modification and development processes.

A Note on Energy Efficiency

A notable result from the skills question in the regional analysis was the lack of importance and priority given to "Understanding of energy efficiency and consumption" skill. In the Bay region, 58 percent identified the skill of understanding energy efficiency and consumption was not required for qualified construction workers.

These results speak 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 federal Inflation Reduction Act.



Appendix A

1. Respondent Counts for the Bay Region and Individual Counties

1.1 Total Number of Responses and Percent Total in the Bay Region.

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 region:

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%

County	Responses by County	Percent of Total
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 region also hire employees in other counties/regions. Below is a table of the counties in which Bay region 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%

County	Responses by County	Percent of Total
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%

2. Other Responses

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

- Asphalt paving
- Cabinet maker, architectural millwork
- Commercial glass & glazing subcontractor
- Construction inspection, special inspection, civil engineering
- Demolition
- Electric and gas utility
- Fence contractor
- Fire alarm, electronic security, video surveillance
- Fire protection contractor
- Flooring contractor
- Glazing contractor, window sales
- Glazing: windows glass and doors
- Heating and cooling contractor
- Heavy equipment rental
- HVAC – C46, Solar – C20, Electrical – C10
- HVAC contractor
- HVAC contractor
- HVAC contractor
- HVAC contractor
- Landscape construction and maintenance
- Mechanical contractor
- Multifamily flooring company
- Plumbing/HVAC/fire sprinkler 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 and landscape contractor
- Tile contractor
- Wallcovering, painting and drywall
- Windows
- Wood finishers

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

- 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.
- Does not apply
- FGIA/AAMA Master Installer or CSLB C-17
- Certifications on tile with Ardex CTEF Certified or knowledge of C-54 license.
- CA Fire/Life Safety
- CPR
- Electricians state certification
- EPA, NATE
- Ideally a degree from a four year college or university
- NCCCO
- None needed at entry level
- Practical experience
- See above

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
- Graduation certificate from an apprentice program
- ICC special inspector certifications, ACI technician, ASW-CWI, Caltrans, OSHA
- Ideally a degree from a four year college or university
- Referral from other contractors or working professionals preferably verbally. To ensure the workers' work ethic and capabilities in a work-related environment.
- Stated above
- Zero

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

- Apprenticeships
- Bricklayers and laborers unions
- 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.
- Local union
- Local union halls
- Temp agency
- Trade unions
- Union
- Union apprenticeship programs
- Union dispatches
- 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.

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
General Contractor	47
Other	33
Electrical Contractor	8
Painting Contractor	4
Concrete Contractor	5
Home Builder	2
Drywall Contractor	0
Masonry Contractor	2
Roofing Contractor	3
Framing Contractor	1
Insulation Contractor	1
Total Responses	**106**

Table 2. Responses for survey question 3. Respondents by number of employees.

Current Number of Employees	Bay Area
Sole proprietor – no employees	2
1 to 4	14
5 to 9	15
10 to 19	20
20 to 49	29
50 to 99	14
100 to 499	9
500+	3
Total Responses	**106**

Table 3. Responses for survey question 4. Respondents by number of construction workers.

Number of Construction Workers	Bay Area
1 worker	7
2 workers	6
3 workers	3
4 workers	4
5 workers	5
6 workers	5
7 workers	3
8 workers	5
9 workers	6
10 workers	4
11 to 15 workers	10
16 to 20 workers	11
21 to 30 workers	6
31+ workers	31
Total Responses	**106**

Table 4: All construction occupations employment and occupational projections in the Bay region from Emsi.

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Construction Laborers	34,522	36,113	1,591	5%	3,852
Carpenters	34,832	31,789	-3,043	-9%	3,025
First-Line Supervisors of Construction Trades and Extraction Workers	17,074	20,108	3,034	18%	2,459
Electricians	19,145	20,725	1,580	8%	2,457
Painters, Construction and Maintenance	14,748	15,173	425	3%	1,441
Plumbers, Pipefitters, and Steamfitters	11,512	12,247	735	6%	1,378
Operating Engineers and Other Construction Equipment Operators	6,492	6,758	266	4%	754
Drywall and Ceiling Tile Installers	7,973	7,482	-491	-6%	670
Roofers	5,851	5,801	-50	-1%	608
Cement Masons and Concrete Finishers	5,866	5,269	-597	-10%	502
Construction and Building Inspectors	3,326	3,550	224	7%	457
Solar Photovoltaic Installers	1,314	2,388	1,074	82%	442
Sheet Metal Workers	3,696	3,789	93	3%	390
Plasterers and Stucco Masons	2,063	2,498	435	21%	301
Tile and Stone Setters	2,195	2,449	254	12%	267
Glaziers	1,580	1,666	86	5%	203
Structural Iron and Steel Workers	1,808	1,643	-165	-9%	180
Helpers – Carpenters	1,343	1,292	-51	4%	162
Carpet Installers	1,386	1,206	-180	-13%	121
Tapers	1,695	1,249	-446	-26%	115
Helpers – Pipelayers, Plumbers, Pipefitters, and Steamfitters	799	796	-3	0%	113
Helpers, Construction Trades, All Other	678	761	83	12%	112
Helpers – Electricians	668	768	100	15%	109
Helpers – Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters	844	776	-68	-8%	102
Pipelayers	509	622	113	22%	97
Helpers – Painters, Paperhangers, Plasterers, and Stucco Masons	569	641	72	13%	90
Miscellaneous Construction and Related Workers	665	689	24	4%	89
Reinforcing Iron and Rebar Workers	613	651	38	6%	74
Helpers – Roofers	274	314	40	15%	52
Earth Drillers, Except Oil and Gas	316	286	-30	-10%	37
Stonemasons	231	220	-11	-4%	30
Insulation Workers, Mechanical	260	192	-68	-26%	23
Helpers – Extraction Workers	61	46	-15	-24%	7
Total	**184,908**	**189,957**	**5,049**	**3%**	**20,719**

Table 5. Responses for survey question 7. Respondents by worker replacement.

Count of Annual Worker Replacement	Bay Area
1 to 5	78
6 to 10	13
11 to 20	10
21 to 49	5
50+	1
Total Responses	**107**

Table 6.1 and 6.2. Responses for survey questions 8 and 8.5. Respondents by worker increase.

Anticipated Worker Increase	Bay Area
No, not planning to have more construction workers	19
Yes, planning to have more construction workers	88
Total Responses	**107**

Anticipated Worker Increase	Bay Area
1 more worker	3
2 more workers	10
3 more workers	5
4 more workers	11
5 more workers	12
6 more workers	4
7 more workers	1
8 more workers	3
9 more workers	0
10 more workers	10
11 to 15 more workers	7
16 to 20 more workers	8
21 to 30 more workers	7
31+ more workers	9
Total Responses	**107**

Table 7. Responses for survey questions 9 and 9.5. Respondents by decrease in workers.

Anticipated Worker Decrease	Bay Area
1 fewer worker	5
2 fewer workers	3
3 fewer workers	0
4 fewer workers	1
5 fewer workers	0
6 fewer workers	0
7 fewer workers	0
8 fewer workers	0
9 fewer workers	0
10 fewer workers	0
11 to 15 fewer workers	0
16 to 20 fewer workers	0
21 to 30 fewer workers	1
31+ fewer workers	0
Not planning to have fewer construction workers	99
Total Responses	**106**

Table 8. Responses for survey question 15. Respondents by recruitment methods. Counts may exceed the total number of respondents when respondents were provided with the option to select multiple answers.

Recruitment Method	Bay Area
Referrals	80
Train from within	64
Post online job advertisements	59
Trade schools	23
Industry association	21
Other	16
Community colleges	11
Total Responses	**109**

Table 9. Responses for survey question 12. Respondents by required certifications.

Required Certifications	Bay Area
OSHA 10-hour	55
OSHA 30-hour	34
Apprentice Card	32
Other	12
NFPA 70e Electrical Safety	11
NCCER	4
Total Responses	**86**

Table 10. Responses for survey question 12.5. Respondents by most important certification.

Most Important Certificate	Bay Area
OSHA 10-hour	23
OSHA 30-hour	19
Apprentice Card	22
Other	11
NFPA 70e Electrical Safety	3
NCCER	2
Total Respondents	**80**

Table 11. Responses for survey question 14. Respondents by professional development opportunity interest. Counts may exceed the total number of respondents when respondents were provided with the option to select multiple answers.

Professional Development Opportunities	Bay Area
Specialized power tools	64
Supervisory skills / Project management	59
OSHA-10/ OSHA-30	58
Plan reading	56
Specialty training (electrical, plumbing, roofing, drywall, HVAC, solar, flooring, painting, concrete)	54
Specialized hand tools	50
Customer service	41
Estimating	41
Heavy equipment operation	19
MS Project/Excel	25
Energy Code/Title 24	23
Advanced framing techniques	19
Demolition	18
CAD/CAM	20
Green building	18
Lean construction	14
Insulation installation	14
Surveying	11
Building information modeling	8
Office furniture systems	1
Total Responses	**109**

Table 12. Responses for survey question 17. Respondents by interest in community college partnership opportunities. Counts may exceed the total number of respondents when respondents were provided with the option to select multiple answers.

Partnership Opportunities	Bay Area
Internships	54
None of these	41
Guest speaking	22
Serving on an industry advisory group	23
Hosting field trips	15
Equipment donations	9
Other	1
Total Responses	**109**

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:

Courtney Farrell	**Project Manager**
Haley Stone	**Project Manager**
Melissa Kovacs	**Senior Research Analyst**
Jason Schwenkler	**Executive Director**
Courtney Farrell	**Project Manager**
Hayley Stone	**Project Manager**
Luke Scholl	**Production Coordinator**
Melissa Kovacs	**Senior Analyst**
Melissa Lindaman	**Research Assistant III**
Jonathan Murillo	**Research Assistant**
Kimly Lewis	**Research Assistant**
Kendra Cote	**Research Assistant**
Noble LeDuc	**Research Assistant**

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 13. Postsecondary supply for all TOP/CIP codes related to the construction industry occupations in the Bay region.

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	Laney	9				8	9	13	4							43
	Mission							5								5
	San Francisco								15							15
	San Jose City	6				21	27	22								76
	Subtotal	**15**	**0**	**0**	**0**	**29**	**36**	**40**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**139**
094610 – Energy Systems Technology	Cabrillo	1				0										1
	De Anza	6				6					9					21
	Diablo Valley	1				1										2
	Skyline	0					1									1
	Subtotal	**8**	**0**	**0**	**0**	**7**	**1**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**25**
095200 – Construction Crafts Technology	Diablo Valley	0				7	1		7							15
	Hartnell							0								0
	San Francisco								4							4
	San Jose City	9			6	7	9	12			6					49
	Santa Rosa														1	1
	Subtotal	**9**	**0**	**0**	**6**	**14**	**10**	**12**	**11**	**0**	**6**	**0**	**0**	**0**	**1**	**69**
095210 – Carpentry	Laney	3				3		4	0							10
	Subtotal	**3**	**0**	**0**	**0**	**3**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**
095220 – Electrical	Foothill	4				113			31							148
	San Francisco								3							3
	San Mateo	0														0
	Subtotal	**4**	**0**	**0**	**0**	**113**	**0**	**0**	**34**	**0**	**0**	**0**	**0**	**0**	**0**	**151**
095230 – Plumbing, Pipefitting and Steamfitting	Diablo Valley					2	1	1	13							17
	Foothill							20								20
	Mission							16								16
	San Francisco								11							11
	Subtotal	**0**	**0**	**0**	**0**	**2**	**1**	**37**	**24**	**0**	**0**	**0**	**0**	**0**	**0**	**64**
095250 – Mill and Cabinet Work	Laney	2					3									5
	Subtotal	**2**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**
095640 – Sheet Metal and Structural Metal	Foothill	0						28								28
	Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**28**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**28**
095700 – Civil and Construction Management Technology	Cabrillo	8				3	3		26							40
	Diablo Valley	6						3								9
	Hartnell	3						0								3
	Laney	5						7								12
	San Francisco	8				3		9	8							28
	Subtotal	**30**	**0**	**0**	**0**	**6**	**3**	**19**	**34**	**0**	**0**	**0**	**0**	**0**	**0**	**92**
095720 – Construction Inspection	Alameda								2							2
	Cabrillo								2							2
	Diablo Valley	3						3								6
	Laney								13							13
	San Mateo	2						1	2							5
	Subtotal	**5**	**0**	**0**	**0**	**0**	**0**	**4**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**28**
46.0415 – Building Construction Technology	CET-San Jose			19												19
	CET-Soledad			13												13
	CET-Watsonville			19												19
	Subtotal	**0**	**0**	**51**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**51**

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
47.0201 – Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/	CET-San Jose			22												22
	Institute for Business and Technology		68													68
	InterCoast Colleges-Fairfield			24												24
Subtotal		**0**	**68**	**46**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**114**
520201 – Business Administration and Management, General	Golden Gate University-San Francisco		0													0
	John F. Kennedy University			1												1
Subtotal		**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Total		**76**	**68**	**98**	**6**	**174**	**54**	**144**	**141**	**0**	**15**	**0**	**0**	**0**	**1**	**777**

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.

More information about the Centers of Excellence is available at www.coeccc.net.

Prepared by the Bay Region Center of Excellence for Labor Market Research

John Carrese, Director

jcarrese@ccsf.edu

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.

C·O·E CENTERS OF EXCELLENCE FOR LABOR MARKET RESEARCH — coeccc.net

KCCD KERN COMMUNITY COLLEGE DISTRICT — kccd.edu

CENTER FOR ECONOMIC DEVELOPMENT CED — nspdc.csuchico.edu

BACCC BAY AREA COMMUNITY COLLEGE CONSORTIUM — baccc.org