

Computer-Aided Design and Drafting (CADD)

Inland Empire/Desert Region (Riverside and San Bernardino counties combined)

Summary

- Employment for the computer-aided design and drafting (CADD) occupational group is expected to **increase by 7% between 2018 and 2023** in the Inland Empire/Desert Region. A total of **985 job openings, or 197 annual job openings** will be available over the five-year timeframe.
- The **entry-level wage** for the CADD occupational group is **above the MIT Living Wage estimate of \$12.39 per hour** for a single adult living in the Inland Empire/Desert Region.
- **There appears to be an opportunity for program growth** based on the annual average number of program credentials issued for the selected community college programs in the region (**52 annual average community college credentials, 3 other educational institution credentials, 55 total**), and the annual openings for the CADD occupational group across the region (**197 average annual openings**).

Introduction

This report provides data on occupations related to the California Community College drafting technology (TOP 0953.00), architectural drafting (TOP 0953.10), civil drafting (0953.20), electrical, electronic, and electro-mechanical drafting (TOP 0953.30), and mechanical drafting (TOP 0953.40) programs. These programs prepare students for employment as drafters. Program descriptions are available on page 5 of this report. The occupations included in the CADD occupational group are the following:

- Architectural and Civil Drafters
- Drafters, All Other
- Electrical and Electronics Drafters
- Mechanical Drafters

Job Opportunities

In 2018, there were 1,952 jobs in the CADD occupational group in the Inland Empire/Desert region. This occupational group is projected to increase employment by 7% by 2023. Employers in the region will need to hire 985 workers over the next five years to fill new jobs and backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). Exhibit 1 displays five-year projections for the CADD occupational group in the Inland Empire/Desert region.

Exhibit 1: Five-year projections for the CADD occupational group

2018 Jobs	2023 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
1,952	2,088	7%	985	197	25%

Source: EMSI 2018.4

Earnings

The entry-level wage for the CADD occupational group is above the MIT Living Wage estimate of \$12.39 per hour for a single adult living in the Inland Empire/Desert region (Glasmeier, 2019). These wages are also sufficient for two working adults and one child (\$14.75 per hour, per adult, or \$30,680 annually for each adult). Exhibit 2 displays wage information for the CADD occupational group in the Inland Empire/Desert region.

Exhibit 2: Earnings, 25th to 75th percentile, Median, and Annual Average

CADD Occupational Group	Entry to Experienced Hourly Wage Range*	Median Wage*	Average Annual Earnings
Electrical and Electronics Drafters	\$26.97 to \$38.75	\$32.10	\$67,700
Drafters, All Other	\$22.68 to \$34.61	\$28.69	\$59,000
Architectural and Civil Drafters	\$19.95 to \$32.37	\$25.45	\$55,400
Mechanical Drafters	\$18.23 to \$27.58	\$22.23	\$48,900

Source: EMSI 2018.4

*Entry Hourly is 25th percentile wage, the median is 50th percentile wage, and experienced is 75th percentile wage.

Job Postings, Employers, Skills, and Education

Exhibit 3 displays the number of job ads posted during the last 12 months along with the regional and statewide average time to fill for the CADD occupational group in the Inland Empire/Desert region. On average, local employers fill online job postings for the CADD occupational group with 44 days. This regional average is six days longer than the national average, indicating that it is more difficult for local employers to find qualified candidates.

Exhibit 3: Job ads and time to fill, Apr 2018 – Mar 2019

CADD Occupational Group	Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
Drafters, All Other	252	43	49
Mechanical Drafters	141	42	48
Architectural and Civil Drafters	62	49	57
Electrical and Electronics Drafters	57	47	52
Total	512	44	50

Source: Burning Glass – Labor Insights

Exhibit 4 displays the employers posting the most job ads for the CADD occupational group during the last 12 months in the Inland Empire/Desert region.

Exhibit 4: Employers posting the most job ads, Apr 2018 – Mar 2019

CADD Occupational Group	Employers
Drafters, All Other (n=159)	<ul style="list-style-type: none"> Edison International Triage Partners LLC
Mechanical Drafters (n=69)	<ul style="list-style-type: none"> Complete Coach Works Champion Homes
Architectural and Civil Drafters (n=37)	<ul style="list-style-type: none"> AECOM Empire Built, Inc.
Electrical and Electronics Drafters (n=29)	<ul style="list-style-type: none"> Crown Technical Systems Edison International

Source: Burning Glass – Labor Insights

Exhibit 5 displays a sample of specialized, employability, and software and programming skills that employers are seeking when looking for workers to fill positions in the CADD occupational group. Specialized skills are occupation-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is commonly referred to as “soft skills.”

The skills requested in job postings may be utilized as a helpful guide for curriculum development. All drafting occupations are displaying high demand for communication, AutoCAD and Microsoft Office skills.

Exhibit 5: Sample of in-demand skills from employer job ads, Apr 2018 – Mar 2019

CADD Occupational Group	Specialized Skills	Employability Skills	Software and Programming Skills
Drafters, All Other (n=218)	<ul style="list-style-type: none"> Engineering Design Telecommunications Calculation 	<ul style="list-style-type: none"> Communication Skills Detail-Oriented Teamwork/ Collaboration 	<ul style="list-style-type: none"> AutoCAD Microsoft Office SolidWorks
Mechanical Drafters (n=111)	<ul style="list-style-type: none"> Project Management Mechanical Design 3D Modeling/ Design 	<ul style="list-style-type: none"> Communication Skills Organizational Skills Research 	<ul style="list-style-type: none"> AutoCAD Microsoft Office SolidWorks
Architectural and Civil Drafters (n=54)	<ul style="list-style-type: none"> Plumbing Systems Budgeting Project Management 	<ul style="list-style-type: none"> Communication Skills Multi-Tasking Problem Solving 	<ul style="list-style-type: none"> AutoCAD Microsoft Office Revit
Electrical and Electronics Drafters (n=55)	<ul style="list-style-type: none"> Calculation Electrical Design Project Management 	<ul style="list-style-type: none"> Communication Skills Planning Detail-Oriented 	<ul style="list-style-type: none"> AutoCAD Microsoft Office Revit

Source: Burning Glass – Labor Insights

Exhibit 6 displays the work experience and entry-level education typically required to enter each occupation according to the Bureau of Labor Statistics (BLS), educational attainment for incumbent workers with “some college, no degree” and an “associate degree” according to the U.S. Census (2016-17), and the minimum advertised education requirement from employer job ads.

Exhibit 6: Work experience, typical entry-level education, educational attainment, and minimum advertised education requirements for the CADD occupational group, Apr 2018 – Mar 2019

Occupation	Typical Entry-Level Education Requirement	Educational Attainment*	Minimum Advertised Education Requirement from Job Ads			
			Number of Job Ads (n=)	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Drafters, All Other	Associate degree	61%	115	33%	41%	26%
Mechanical Drafters	Associate degree	61%	53	32%	26%	42%
Architectural and Civil Drafters	Associate degree	61%	24	46%	29%	25%

Occupation	Typical Entry-Level Education Requirement	Educational Attainment*	Minimum Advertised Education Requirement from Job Ads			
			Number of Job Ads (n=)	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Electrical and Electronics Drafters	Associate degree	61%	31	13%	64%	23%

Source: EMSI 2018.4, Burning Glass – Labor Insights

*Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework

Student Completions and Program Outcomes

Exhibits 7, 9, and 12 display the average annual regional California Community College (CCC) credentials conferred during the three academic years between 2014 and 2017, from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, along with the headcount from the most recent year available on LaunchBoard. Credentials are the combined total of associate degrees and certificates issued during the timeframe, divided by three in order to calculate an annual average. This is done to minimize the effect of atypical variation that might be present in a single year. Headcount is the unduplicated number of students who enrolled in one or more courses in the program. The relevant TOP code is from the Taxonomy of Programs manual, and the corresponding program titles used at each college (in *italics*) are sourced from the Chancellor's Office Curriculum Inventory (COCI). Please note, a credential is not always equal to a single person in search of a job opening since a student may earn more than one credential, such as an associate degree in addition to a certificate.

Community college student outcome information is sourced from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from records provided by California's Employment Development Department's Unemployment Insurance database. Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS), administered by Santa Rosa Junior College (LaunchBoard, 2017). Data from the latest academic year for each metric is provided in Exhibits 8, 10, 11, and 13.

Program completion and Strong Workforce student outcome data in this section are organized by TOP code. Please note that Civil Drafting (TOP 0953.20) does not have any reported programs award completions or Strong Workforce programs metrics in the region. Electrical, Electronic, and Electro-Mechanical Drafting (TOP 0953.30) does not have any reported programs completions but does display Strong Workforce course metrics.

Drafting Technology (TOP 0953.00): Planning, preparation, and interpretation of various engineering sketches for design and drafting duties, for circuits, machines, structures, weldments, or architectural plans. Includes the application of advanced computer software and hardware (Computer Assisted Drafting and Computer Assisted Design) to the creation of graphic representations and simulations in support of engineering projects.

Exhibit 7: Annual average community college credentials and headcount for the drafting technology program in the Inland Empire/Desert Region

0953.00 Drafting Technology – local program title	CCC Headcount, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2014-17
Chaffey	118	
Desert – General Drafting	112	
Associate Degree		1
Certificate 30 to < 60 semester units		1
Mt. San Jacinto – Engineering: Drafting Technology	71	
Associate Degree		3
Certificate 30 to < 60 semester units		1
Norco College – Drafting Technology	267	
Associate Degree		4
Certificate 18 to < 30 semester units		6
Certificate 6 to < 18 semester units		16
Victor Valley – Drafting	320	
Associate Degree		17
Total CCC Headcount, Academic Year 2016-17	886	
Total Annual Average CCC Credentials, Academic Years 2014-17		50

Source: LaunchBoard, MIS Data Mart, COCI

Exhibit 8: Drafting technology strong workforce program outcomes

Strong Workforce Program Metrics: 0953.00 Drafting Technology Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	1,114	189
Completed 12+ units in one year (2016-17)	150	36
Transferred to a 4-year institution	60	19
Employed in the fourth fiscal quarter after exit	65%	72%
Median annual earnings*	\$27,694	\$35,977
Job closely related to the field of study (2014-15)	92%	94%
Median change in earnings	36%	44%
Attained a living wage	62%	65%
Economically disadvantaged students* (2016-17)	71%	65%

Source: LaunchBoard

*Data for these metrics is available in Community College Pipeline. All others are available in Strong Program Workforce Metrics.

Architectural Drafting (TOP 0953.10): Preparation of working drawings and electronic simulations for architectural and related construction projects.

Exhibit 9: Annual average community college credentials and headcount for the architectural drafting program in the Inland Empire/Desert Region

0953.10 Architectural Drafting – local program title	CCC Headcount, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2014-17
Chaffey – Drafting: Architectural	28	
Associate Degree		1*
Victor Valley – Architectural CADD Technician	21	
Total CCC Headcount, Academic Year 2016-17	49	
Total Annual Average CCC Credentials, Academic Years 2014-17		1*

Source: LaunchBoard, MIS Data Mart, COCI

*Chaffey awarded one associate degree in 2016-17

Exhibit 10: Architectural drafting strong workforce program outcomes

Strong Workforce Program Metrics: 0953.10 Architectural Drafting Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	59	48
Completed 12+ units in one year (2016-17)	N/A	25
Transferred to a 4-year institution	N/A	10
Employed in the fourth fiscal quarter after exit	N/A	68%
Median annual earnings*	N/A	\$28,635
Job closely related to the field of study (2014-15)	N/A	100%
Median change in earnings	N/A	71%
Economically disadvantaged students* (2016-17)	67%	64%

Source: LaunchBoard

*Data for these metrics is available in Community College Pipeline. All others are available in Strong Program Workforce Metrics.

Civil Drafting (TOP 0953.20): Preparation of working drawings and electronic simulations in support of civil engineers, geologic engineers, and related professionals.

The Inland Empire/Desert region does not have any reported program completions or Strong Workforce metrics for this program.

Electrical, Electronic, and Electro-Mechanical Drafting (TOP 0953.30): Development of working schematics and representations in support of electrical/electronic engineers, computer engineers, electro-mechanical engineers, and related professionals.

The Inland Empire/Desert region does not have any reported program completions for this program.

Exhibit 11: Electrical, electronic, and electro-mechanical drafting strong workforce program outcomes

Strong Workforce Program Metrics: 0953.30 Electrical, Electronic, and Electro-Mechanical Drafting Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	36	36
Completed 12+ units in one year (2016-17)	21	21
Median annual earnings*	N/A	\$47,789
Economically disadvantaged students* (2016-17)	89%	89%

Source: LaunchBoard

*Data for these metrics is available in Community College Pipeline. All others are available in Strong Program Workforce Metrics.

Mechanical Drafting (TOP 0953.40): Development of working drawings and electronic simulations in support of mechanical and industrial engineers and related professionals.

Exhibit 12: Annual average community college credentials and headcount for the mechanical drafting program in the Inland Empire/Desert Region

0953.40 Mechanical Drafting – local program title	CCC Headcount, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2014-17
Chaffey – Drafting: Mechanical	18	
Associate Degree		2
Mt. San Jacinto	14	
San Bernardino	10	
Total CCC Headcount, Academic Year 2016-17	42	
Total Annual Average CCC Credentials, Academic Years 2014-17		2

Source: LaunchBoard, MIS Data Mart, COCI

Exhibit 13: Mechanical drafting strong workforce program outcomes

Strong Workforce Program Metrics: 0953.40 Mechanical Drafting Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	42	35
Completed 12+ units in one year (2016-17)	14	13
Transferred to a 4-year institution	N/A	0
Employed in the fourth fiscal quarter after exit	N/A	67%
Median annual earnings*	\$34,774	\$35,201
Job closely related to field of study (2014-15)	N/A	100%
Median change in earnings	N/A	65%
Economically disadvantaged students* (2016-17)	74%	66%

Source: LaunchBoard

*Data for these metrics is available in Community College Pipeline. All others are available in Strong Program Workforce Metrics.

Credentials granted from other educational providers outside of the California Community College system are displayed in Exhibit 14, along with the relevant CIP code. This is the final release data compiled from the Integrated Postsecondary Education Data System (IPEDS) for the most recent three years available.

Exhibit 14: Annual average other educational providers credentials awarded for CAD/CADD drafting and/or design technology/technician programs

15.1302 CAD/CADD Drafting and/or Design Technology/Technician	Other Educational Providers Annual Average Credentials, Academic Years 2013-16
Westech College	
Award 1<2 academic yrs	3
Total Annual Average Other Credentials, Academic Years 2013-16	3

Source: IPEDS



References

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Appendix: Occupation definitions, sample job titles, five-year projections for CADD occupations

Occupation Definitions (SOC) code), Education and Training Requirement, Community College Educational Attainment

Architectural and Civil Drafters (17-3011)

Prepare detailed drawings of architectural and structural features of buildings or drawings and topographical relief maps used in civil engineering projects, such as highways, bridges, and public works. Use knowledge of building materials, engineering practices, and mathematics to complete drawings.

Sample job titles: Architect, Architectural Designer, Architectural Drafter, Architectural Draftsman, Architectural Intern, CAD Technician (Computer-Aided Design Technician), Drafter, Draftsman, Intern Architect, Project Manager, Civil Designer, Civil Drafter, Computer-Aided Design Designer (CAD Designer), Computer-Aided Design Operator (CAD Operator), Computer-Aided Design Technician (CAD Technician), Computer-Aided Drafting and Design Drafter (CADD Drafter), Computer-Aided Drafting Designer (CAD Designer), Drafting Technician, Draftsman, Draftsperson

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 61%

Electrical and Electronics Drafters (17-3012)

Prepare wiring diagrams, circuit board assembly diagrams, and layout drawings used for the manufacture, installation, or repair of electrical equipment.

Sample job titles: Circuit Board Drafter, Electrical Computer Aided Design and Drafting Technician, Electrical Drafter, Electrical Systems Drafter, Electronic Drafter, Printed Circuit Board Drafter

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 61%

Mechanical Drafters (17-3013)

Prepare detailed working diagrams of machinery and mechanical devices, including dimensions, fastening methods, and other engineering information.

Sample job titles: CAD Designer (Computer Aided Design Designer), CAD Operator (Computer Aided Design Operator), Design Drafter, Designer, Drafter, Drafting Technician, Mechanical Designer, Mechanical Drafter, Product Designer, Project Designer

Entry-Level Educational Requirement: Associate degree

Training Requirement: None



Incumbent workers with a Community College Award or Some Postsecondary Coursework: 61%

Drafters, All Other (17-3019)

All drafters not listed separately.

Sample job titles: AutoCAD Technician, Blueprint Engineer, Blueprint Tracer, CAD Designer (Computer-Aided Design Designer), CAD Draftsman (Computer-Aided Design Draftsman), CAD Operator (Computer-Aided Design Operator), Chief Design Drafter, Chief Drafter, Commercial Drafter, Computer Drafter, Detail Drafter, Detailer, Drafter Apprentice, Drafting Detailer, Drafting Engineer, Drafting Layout Man, Drafting Layout Worker, Draughtsman, Drawing Checker, Drawing Tracer, Engineering Drafter, Engineering Technician, Form Designer, Geological Drafter, Hull Drafter, Job Captain, Laboratory Worker, Marine Drafter, Steel Detailer, Tracer, Utilities Estimator and Drafter

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 61%

Table 1: 2018 to 2023 job growth, wages, education, training, and work experience required for the CADD occupational group, Inland Empire/Desert Region

Occupation (SOC)	2018 Jobs	5-Yr Change	5-Yr % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage*	Median Hourly Wage*	Average Annual Earnings	Typical Entry-Level Education & On-The-Job Training Required	Work Experience Required
Architectural and Civil Drafters (17-3011)	1,114	84	8%	114	\$19.95 to \$32.37	\$25.45	\$55,400	Associate degree & none	None
Mechanical Drafters (17-3013)	468	22	5%	45	\$18.23 to \$27.58	\$22.23	\$48,900	Associate degree & none	None
Electrical and Electronics Drafters (17-3012)	265	21	8%	27	\$26.97 to \$38.75	\$32.10	\$67,700	Associate degree & none	None
Drafters, All Other (17-3019)	104	10	10%	11	\$22.68 to \$34.61	\$28.69	\$59,000	Associate degree & none	None
Total	1,952	136	7%	197	-	-	-	-	-

Source: EMSI 2018.4

*Entry Hourly is 25th percentile wage, the median is 50th percentile wage, experienced is 75th percentile wage.