



Construction Careers



STATE OF CALIFORNIA
LABOR AND WORKFORCE DEVELOPMENT AGENCY
EMPLOYMENT DEVELOPMENT DEPARTMENT

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Construction Careers

**Employment Development Department
Labor Market Information Division
Information Services Group
Occupational Research Unit**

**Arturo Mantecon, Research Analyst
Scott Slotterbeck, Research Analyst
Janet Peters, Research Manager**

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Note to readers: The occupational wages and growth trends cited in the Construction Careers section of this report have been updated and are current as of March 2010.

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Living in a cave or in a simple shelter isn't what we are used to, but thousands of years ago, that's all people had to live in. Over time that has definitely changed.

People left their caves and built houses and other structures to protect themselves and their possessions from the rain, snow, and cold weather. Some of those houses were permanent, made of stone and rock, mud bricks, or wood from the abundant forest. Some were temporary, built quickly from tree branches leaning against a big boulder. And some were truly portable, made of wood and animal skins that could be put up quickly and taken down just as fast.



Today, our buildings are larger and stronger than ever—the US Bank Tower in Los Angeles is the tallest building west of Chicago and can withstand an 8.3 magnitude earthquake on the Richter scale!

Why Consider a Career in Construction?

Moving from a cave to a house or a modern office building demands skilled workers!

Think of the buildings and houses, highways and bridges that are all around you. There is no end to the man-made structures that you live in, work in, and travel on every day of your life. The workers involved in construction projects, big or small, residential or commercial, public or private, make a big difference to our everyday landscape and the way we live our lives.

Do you like to work with your hands? Do you find yourself trying to build or put things together? Do you like to tinker with plumbing? Do you like working with wood, putting up fences, setting tile? Are you fascinated by how electrical systems work? There are many things to consider when choosing a career. Would it make your day to be out and about, see something, and know, "I was a part of building that?"

Getting to Know Yourself

Does a career in construction interest you? It can be rewarding. It can give you a very good living. However, remember that different things interest different people. Think first about what you enjoy doing, what you're good at, and the things you'd do even if no one in the world praised you for them.

One of the most important first steps in a career search is to get to know yourself well. People find the greatest job satisfaction in occupations that match their personalities. You may want to take an interest assessment as one of your first steps when investigating career choices. Interests usually refer to the like or dislike of certain tasks or activities. An interest assessment will help you to relate your personal interests to career opportunities. This information will help you to select the best personal job match before investing time and effort in an education or training program.

Ask your school counselor or advisor to schedule an interest assessment. There are a wide variety of interest assessment tools available. Or, try the on-line self-assessment at the California Career Zone: www.cacareerzone.org.

Introduction

Facts about Today's Construction Careers

Construction in California is an industry that has been declining for a couple of years. However, career opportunities still exist in construction in “green collar” jobs. Opportunities will arise from the movement toward greening the construction industry with new construction design, and weatherization and retrofit activities on existing buildings to achieve Leadership in Energy and Environmental Design (LEED) certification. Also, experienced trades workers will be needed to install and maintain specialized environmental equipment such as photovoltaic panels, or wind turbine equipment.

Construction employers face few recruitment difficulties. Union apprenticeship programs turn out numbers of skilled workers attracted to the construction trades because of lucrative, union-negotiated wages and the opportunity to go into business as self-employed trades persons.

Anatomy of the Construction Careers

The following headings describe the individual sections within each of the *Construction Careers*. When a career video is available for the occupation, an icon, like this one , only larger, will appear in the *Table of Contents* at the top of the page.

What They Do

Are you curious about what duties construction workers perform all day? *What They Do* provides a brief job description that outlines the assignments and routines for the occupation. Does this job appeal to you? If so, review the *Construction Career* profile in more detail.

Tasks

This section describes the routine daily tasks performed by workers in this occupation. Review the list of tasks. Does this job sound like a job that you would enjoy? Are you interested in researching this occupation further? Detailed occupational descriptions are available in the *Career Information* section of the www.labormarketinfo.edd.ca.gov Web site.

Important Skills, Knowledge, and Abilities

This list outlines the key skills, knowledge, and abilities needed to succeed in the occupation. Think about your own skills, knowledge, and abilities. Then think about the skills, knowledge, and abilities required for different jobs in construction. This activity will help you to identify skills that you may need to develop or acquire to pursue your career goals.

Note: When the *Construction Careers* include more than one occupational title, the skills, knowledge, and abilities are combined in one list.

Work Environment

The *Work Environment* describes the general daily working conditions that you may expect to find when you report to work each day. Does the job involve heavy lifting? Do construction workers work alone, or with the public? Are there potential safety hazards? If so, are safety precautions explained or is protective equipment available? What shifts and hours are employees usually expected to work? What union opportunities are available to construction workers?

Job Outlook

There are many important issues to consider when exploring career choices. Does the job pay well? Will the job meet your cost of living requirements? Will you be able to find a job easily? Is the job secure? What is the future job growth expected for the occupation?

The *Construction Careers* provide the California statewide hourly wages paid for the occupation from the 25th to 75th percentile. The 25th percentile wage means 25 percent of the workers in the occupation earn wages below the first wage listed, and 75 percent of the workers earn wages above the first wage listed (\$9.12 in the example below). The 75th percentile wage means 75 percent of the workers in the occupation earn below the second wage listed, and 25 percent of the workers in the occupation earn above the second wage listed (\$14.62 in the example below).

Also, you want reassurance there will be adequate future job openings before undertaking a job-training program. The *Job Outlook* lists the estimated number of job openings through 2016 and the estimated annual openings in California.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Packaging and Filling Machine Operators and Tenders				
51-9111	47,200	49,200	1,080	\$9.12 to \$14.62

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

What are the latest developments affecting the growth or decline of the occupation? Technological advances may reduce the need for workers in one area or increase the need for employees in other related occupations. This section also discusses the current rate of occupational growth. For example, the occupation may be growing faster than average, or about average, or at a slower than average rate in comparison to all California occupations over the 2006 through 2016 period. This information helps you to determine if you will find it challenging or fairly easy to find employment in future years.

Training/Requirements/Apprenticeships

Where do you get the necessary training? Will you be able to work your way up? Possibly. But remember, the more knowledge and education you can get up front, the greater your options. There are many places to get general training and education in California. The *Training/Requirements/Apprenticeships* section displays the typical entry-level training path for construction occupations. This section also provides **Recommended High School Course Work** that will build helpful foundations for students interested in pursuing construction careers.

Also training and apprenticeship programs provide re-skilling opportunities to enable current

Introduction

workers to move into emerging green occupations. For example, roofers may train to become solar panel installers, while electricians may become wind turbine technicians.

To further explore local education, training, and apprenticeship programs access:

- ▶ www.labormarketinfo.edd.ca.gov.
- ▶ Select the *Career Information* Tab.
- ▶ Scroll down to the *Training or an Apprenticeship* link.
- ▶ Select the training directory that interests you the most.

Where Do I Find the Job?

Where do I find the job provides tips geared to specific occupations to help you start your job search. This section also provides industry information to apply to find employers on-line. This information is from a nonconfidential employer database through the LaborMarketInfo Web site. The Department of Labor has a license agreement with InfoUSA to provide this information.

- ▶ Access www.labormarketinfo.edd.ca.gov, then
- ▶ Select the *Career Information* tab from the menu bar at the top of the page.
- ▶ Select *Find Employers* under the *Job Search Tools* section on the right hand side (scroll down).
- ▶ Select the search feature that interests you the most.

When using the search feature *Employers by Industry*, enter a keyword or an industry name (as provided in each *Construction Career*). Follow the step-by-step prompts to obtain employer addresses for the occupations, industries, and local areas that interest you.

This section includes a list of **yellow page** headings that will lead you to listings of private firms.

Where Can the Job Lead?

Are you interested in seeking promotions in your selected career field? *Where Can the Job Lead* provides information about the usual career moves, advancement, or promotional opportunities that are possible for specific construction occupations.

Other Sources of Information

Other Sources of Information helps you research an occupation in more depth. Generally, this section provides the name of professional associations for the occupation. These associations may offer further career information about requirements, training, and certification.

Do You Need a Little Extra Help Beginning Your Work Search?

Can you benefit from tips about how to:

- ▶ Prepare for a job interview
- ▶ Fill out an application
- ▶ Write a résumé?

Log on to WorkSmart for job search tips at www.worksmart.ca.gov.

Do you want to know how the job market is in your area?

Are you curious about labor market information for your local area? What is the pay rate or job demand for Carpenters or Painters (or other work) in your county? To find out, access the Labor Market Information Division's Web site www.labormarketinfo.edd.ca.gov, select the *Career Information* tab, then select the *Occupation Profile* link in the *Salaries and Benefits* section. Complete the step-by-step information in the *Occupation Profile*. This Web site provides a bounty of labor market information for your career research. You can set up your own MyLMI page to save your research findings as you explore career options. You can even save your job search preferences and check back to see if new job openings are available.

Getting Started

Think about what you excel at and your personal likes and dislikes. Examine the *Construction Careers* to explore information on a variety of construction careers. Select a few occupations that interest you the most.

Speak to a few people who work in the field to find out about what their jobs are really like. What do they like about this type of work? How did they get where they are? If they had the opportunity to select a career all over again would they select the same career? What are their reasons? Also, ask if there are volunteer positions or job shadowing opportunities available. Such activities will allow you to observe the daily tasks of the construction occupations that interest you. This will help you decide what type of job suits you the best before you invest time and money in training.

Factors in a Career Choice

This table is a worksheet that helps you compare occupations. The first column lists factors to consider when making a career choice. Begin by reviewing the occupations in the *Construction Careers*. Select up to three occupations that interest you the most. Enter the names of the occupations in columns two through four. Review each factor in column one. Enter either a "+" or "-" sign to indicate if the occupation satisfies your liking for each factor. (Refer to the example in column five.) Add the total number of positive answers (+) for each occupation. The occupation totaling the highest number of positive answers is the best match for the criteria you chose. If more than three occupations appeal to you, make a copy of the sheet and repeat the process. After you have narrowed your choice to one or two occupations you want to investigate further, use the resources suggested in the *Construction Careers* for further exploration.

Factors in a Career Choice

Listed below are aspects of a career or job choice that can make the difference between your satisfaction and dissatisfaction. Select three occupations you are thinking about and fill in the blanks in the column headings below. Now, consider each factor in relation to your preferences and needs. Use career center staff and resources to help you find the information. Talk to people in the fields you are considering. Indicate with a "+" or "-" sign whether an occupation satisfies your preferences for each factor.	Occupation #1	Occupation #2	Occupation #3	Example
Specific Work Performed What tasks are performed in the job? Would I be primarily working with people, information, or things? Is that what I want to do? Are these the kind of people I like to help or serve?				+
Skills, Knowledge, and Abilities Do I possess the skills and abilities needed to enter the occupation? Do I have the potential to develop them? Do I enjoy using these skills?				+
Work Setting Where would I work? Is this a setting I would like? What are the conditions (indoors, outdoors, noisy, etc.)?				+
Physical Capability Am I physically able to do this kind of work?				+
Employment Opportunity What are my chances for finding work in this field? Are there job openings now? In the future? Where are they? Will I be competitive?				+
Compensation What salary could I expect at the entry level? What do experienced workers earn? Are there opportunities for overtime or bonuses? What benefits could I expect in this field? Does the salary meet my needs?				-
Hours What are the usual hours? Full-time or part-time? Is shift work required?				-
Preparation Am I willing and able to get the training required? Do I have the time and money needed for training? Are there different ways to enter the occupation?				+
Licenses and Certificates Are certificates or licenses required? Can I qualify for them?				n/a
Opportunity for Advancement What are my chances of moving up in the field? What is the typical way to advance? Am I willing and able to do what it takes to advance?				+
Values Is this work compatible with my values? Will this kind of work help me reach my long-range goals?				+
Interests Would I like this type of work enough to make it a career?				+
Other				n/a
Results Total the number of positive responses (+) for each occupation under consideration. Which occupation is the best match for you?				9

Construction at a Glance

Occupation	Minimum Training*	Median Hourly Wage 2009	Average Annual Openings
Construction Managers	B	\$48.72	1,540
Civil Engineers	B	\$41.46	1,410
Surveyors	B	\$36.36	260
Mechanical Drafters	VOC	\$25.21	140
Electrical and Electronic Drafters	VOC	\$25.40	130
Security and Fire Alarm Systems Installers	VOC	\$19.13	210
First-Line Supervisors/Managers of Construction Trades and Extraction Workers	WE	\$34.25	2,240
Construction and Building Inspectors	WE	\$32.37	490
Electricians	OJT-LT	\$25.63	2,460
Carpenters	OJT-LT	\$24.92	5,410
Brickmasons and Blockmasons	OJT-LT	\$23.58	420
Plumbers, Pipefitters, and Steamfitters	OJT-LT	\$24.34	1,850
Stonemasons	OJT-LT	\$20.76	140
Glaziers	OJT-LT	\$20.67	210
Cement Masons and Concrete Finishers	OJT-LT	\$23.37	1,330
Tile and Marble Setters	OJT-LT	\$22.30	660
Plasterers and Stucco Masons	OJT-LT	\$20.37	680
Cabinetmakers and Bench Carpenters	OJT-LT	\$15.00	660
Operating Engineers and Other Construction Equipment Operators	OJT-M	\$30.65	1,210
Surveying and Mapping Technicians	OJT-M	\$27.39	130
Drywall and Ceiling Tile Installers	OJT-M	\$23.20	1,120
Sheet Metal Workers	OJT-M	\$23.61	630
Highway Maintenance Workers	OJT-M	\$23.52	150
Roofers	OJT-M	\$22.09	970
Carpet Installers	OJT-M	\$18.97	260
Floor Layers (except Carpet, Wood, and Hard Tiles)	OJT-M	\$18.84	120
Painters, Construction and Maintenance	OJT-M	\$18.98	2,330
Construction Trades Helpers, All Other	OJT-ST	\$14.50	70

Source: EDD/LMID Projections of Employment, 2006-2016; Occupational Employment Statistics Wage Survey, 1st Quarter 2009.

*Minimum Training Key

Occupations are arranged by highest minimum training level within Design, Production, and Logistics. Within the training level, occupations are ordered by wage—highest to lowest. Note that the training levels show the least amount of training required by the occupation.

- B+** Work experience, plus a **Bachelor's** degree or **higher**
- B** **Bachelor's** degree
- A** **Associate** degree
- VOC** Post-secondary **vocational** training
- WE** **Work** experience
- OJT-LT** Long-term **on-the-job** training, more than 12 months
- OJT-M** Moderate **on-the-job** training, 1 to 12 months
- OJT-ST** Short-term **on-the-job** training, less than 30 days

The following trade or professional associations offer valuable information about current developments in construction and related fields and skill certification programs.*

American Society of Home Inspectors (ASHI)

ASHI is a one-stop source for information about the home inspection profession, from technical information and Consumer Product Safety Commission recalls to home inspection business resources, services, and products.

www.ashi.org

California Department of Industrial Relations (DIR), Division of Apprenticeship Standards (DAS)

The Division of Apprenticeship Standards Web site hosts a search engine for apprenticeship programs by occupational group and by county location.

www.dir.ca.gov/das

California State Department of Consumer Affairs (DCA), Bureau of Security and Investigative Services (BSIS)

The BSIS licenses private patrol operators, private investigators, alarm company operators, repossession agencies, and locksmiths, and certifies their training facilities and instructors. Firearms and baton training facilities, as well as their instructors, also fall under BSIS' jurisdiction. Licensing and certification ensures that the business operator and specific employees have passed a criminal background check and have met DCA requirements.

www.dca.ca.gov/bsis

International Brotherhood of Electrical Workers (IBEW)

The IBEW represents approximately 750,000 workers throughout the United States and Canada in a wide variety of fields, including utilities, construction, telecommunications, broadcasting, manufacturing, railroads, and government.

www.ibew.org

International Code Council (ICC)

The International Code Council (ICC) was established in 1994 as a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes.

www.iccsafe.org

Laborers' International Union of North America (LIUNA)

The LIUNA is one of the fastest-growing unions in North America. The mission of LIUNA is implemented through nine regions, 55 district councils, and more than 500 local unions.

www.liuna.org

National Burglar and Fire Alarm Association (NBFAA)

Founded in 1948, more than 2,400 electronic life safety, security, and systems businesses in all 50 states and 4 U.S. territories hold membership in NBFAA. The NBFAA promotes and protects the industry while providing a constant source of information and training to its members.

www.alarm.org

**The Employment Development Department (EDD) is providing the above links for information only. The inclusion of an organization on this list does not imply endorsement of the organization by EDD.*

Helpful Construction Links

Northern California Surveyors Joint Apprenticeship Committee (NCSJAC)

The NCSJAC Training Program was established in 1963 to work to provide a field surveyor workforce comprised of well-trained and highly skilled employees.

www.ncsjac.org

Sheet Metal Workers International Association (SMWIA)

The SMWIA represents more than 150,000 skilled crafts persons in the unionized sheet metal industry throughout the United States, Canada, and Puerto Rico.

www.smwia.org

California Department of Consumer Affairs, Contractors State Licensing Board (CSLB)

The CSLB licenses and regulates contractors in 43 classifications that constitute the construction industry. Currently there are approximately 280,000 licensed contractors in California. The CSLB also registers home improvement salespersons.

www.cslb.ca.gov

International Brotherhood of Painters and Allied Trades (IUPAT)

The IUPAT is a labor organization representing over 140,000 members in the construction industry, such as Painters, Drywall Finishers, Glaziers, Floor Coverers, and Sign and Display workers.

www.iupat.org

United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry (UA)

The UA is a multi-craft union whose members are engaged in the fabrication, installation, and servicing of piping systems. There are approximately 326,000 UA members who belong to 321 individual local unions across North America. Apprentices learn through both classroom and on-the-job training through the UA construction industry apprentice program.

www.ua.org

United Brotherhood of Carpenters and Joiners of America (UBC)

The UBC represents more than 520,000 carpenters, cabinetmakers, millwrights, piledrivers, lathers, framers, floorlayers, roofers, drywallers, and workers in forest-products and related industries. The UBC is also involved in apprenticeship training in California.

www.carpenters.org

Associated Builders and Contractors

Associated Builders and Contractors (ABC) is a national association representing 23,000 merit shop construction and construction-related firms in 79 chapters across the United States. ABC's membership represents all specialties within the U.S. construction industry and is comprised primarily of firms that perform work in the industrial and commercial sectors of the industry.

www.abc.org

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Construction Occupations

Brickmasons, Blockmasons, and Stonemasons
Cabinetmakers and Bench Carpenters
Carpenters
Cement Masons and Concrete Finishers
Civil Engineer
Construction and Building Inspectors
Construction Laborers
Construction Managers
Construction Trades Helpers (All Other)
Drywall and Ceiling Tile Installers
Electrical, Electronic, and Mechanical Drafters
Electricians
First-Line Supervisors/Managers of Construction Trades and Extraction Workers
Floor Covering Installers
Glaziers
Highway Maintenance Workers
Operating Engineers and Other Construction Equipment Operators
Painters, Construction and Maintenance
Plasterers and Stucco Masons
Plumbers, Pipefitters, and Steamfitters
Roofers
Security and Fire Alarm Systems Installers
Sheet Metal Workers
Surveyors
Tile and Marble Setters

Brickmasons, Blockmasons, and Stonemasons

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View Career Video

What They Do

The handsome look of a brick facade on an expensive home, the rustic look of a river cobble fireplace, or the shell of an upscale boutique is the work of the Brick, Block, and Stonemason.

Brickmasons use bricks, concrete block, and stones to construct homes, fireplaces, warehouses, commercial and other structures. They also construct sound-reflecting walls along freeways, driveways, retaining walls, walkways, patio floors, and a variety of other outdoor installations. Stonemasons use natural or artificial stone in similar construction projects. Blockmasons use precast concrete blocks.

Both Brick and Stonemasons begin construction only after carefully planning their project or by using detailed blueprints.

Stonemasons often work from a set of drawings, in which each stone has been numbered for identification. Helpers may locate and carry these prenumbered stones to the masons. A derrick operator using a hoist may be needed to lift large stone pieces into place.

Some Brickmasons and Blockmasons now install structural insulated wall panels and masonry accessories used in many high-rise buildings.

Blockmasons use blueprints to tell them where windows and door are located, the exterior dimensions, and other features the building will have.

Tasks

Brickmasons and Blockmasons

- ▶ Interpret blueprints and drawings to determine specifications and to calculate the materials required.
- ▶ Measure distance from reference points and mark guidelines to lay out work, using plumb bobs and levels.
- ▶ Calculate angles and courses and determine vertical and horizontal alignment of courses.
- ▶ Construct corners by fastening in plumb position a corner pole or building a corner pyramid of bricks, then filling in between the corners using a line from corner to corner to guide each course, or layer, of brick.

Brickmasons, Blockmasons, and Stonemasons

- ▶ Break or cut bricks, tiles, or blocks to size, using trowel edge, hammer, or power saw.
- ▶ Fasten or fuse brick or other building material to structure with wire clamps, anchor holes, torch, or cement.
- ▶ Mix specified amounts of sand, clay, dirt, or mortar powder with water to form refractory mixtures.
- ▶ Apply and smooth mortar or other mixture over work surface.
- ▶ Remove excess mortar with trowels and hand tools, and finish mortar joints with jointing tools, for a sealed, uniform appearance.
- ▶ Examine brickwork or structure to determine need for repair.

Stonemasons

- ▶ Dig trench for foundation of monument, using pick and shovel.
- ▶ Lay out wall patterns or foundations, using straight edge, rule, or staked lines.
- ▶ Shape, trim, face and cut marble or stone preparatory to setting, using power saws, cutting equipment, and hand tools.
- ▶ Set stone or marble in place, according to layout or pattern.
- ▶ Drill holes in marble or ornamental stone and anchor brackets in holes.
- ▶ Smooth, polish, and bevel surfaces, using hand tools and power tools.
- ▶ Mix mortar or grout and pour or spread mortar or grout on marble slabs, stone, or foundation.
- ▶ Line interiors of molds with treated paper and fill molds with composition-stone mixture.
- ▶ Remove wedges, fill joints between stones, finish joints between stones, using a trowel, and smooth the mortar to an attractive finish, using a tuck pointer.
- ▶ Clean excess mortar or grout from surface of marble, stone, or monument, using sponge, brush, water, or acid.

Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

Brickmasons, Blockmasons, and Stonemasons

- ▶ Time Management — Managing one’s own time and the time of others.
- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Trunk Strength — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without ‘giving out’ or fatiguing.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ▶ Wrist-Finger Speed — The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.
- ▶ Dynamic Strength — The ability to exert muscle force repeatedly or continuously over time. This involves muscular endurance and resistance to muscle fatigue.
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

Work Environment

Brickmasons, Blockmasons, and Stonemasons usually work outdoors and are exposed to the elements. They stand, kneel, and bend for long periods and often have to lift heavy materials. Common hazards include injuries from tools and falls from scaffolds, but these can often be avoided when proper safety equipment is used and safety practices are followed. Workers customarily provide their own hand tools while the employer provides the larger equipment.

Due to the seasonal nature of the work, Brickmasons, Blockmasons, and Stonemasons rarely work steadily. In rainy or cold weather, there is little construction work. Most work 35 to 40 hours per week on a day shift. Sometimes, evening or night shifts are required for emergency repairs, to avoid peak traffic times, or to work overtime to bring a building in on schedule. Some Brickmasons, Blockmasons, and Stonemasons are members of the International Union of Bricklayers and Allied Craftworkers.

California’s Job Outlook and Wage

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Brickmasons and Blockmasons				
47-2021.....	13,400.....	14,800.....	420.....	\$16.22 to \$32.38.....
Stonemasons				
47-2022.....	4,500.....	5,000.....	140.....	\$15.10 to \$27.30.....

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Brickmasons, Blockmasons, and Stonemasons

Trends

Employment for this occupation will grow slower than average through 2016. However, employment opportunities will still exist for both commercial and residential construction due to the need to replace workers who transfer to other occupations, or who retire, or leave the labor force for other reasons.

The use of bricks and stones in construction dates back to prehistoric times. Techniques have not changed greatly; Brickmasons and Stonemasons still lay one brick, block, or stone at a time. However, new products and procedures have changed the trade somewhat.

One of the greatest changes in recent years is the development of the precast masonry panel. These structures come in a variety of sizes, and can be fairly small when used in residential building or small-scale commercial operation. They may also be so large they must be installed with the help of a crane.

Training/Requirements/Apprenticeships

Brickmasons, Blockmasons, and Stonemasons usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Most people enter this trade through long-term on-the-job training, first assisting Brick, Block, and Stonemasons by carrying materials from pallets to the installation location. They generally do other unskilled work until they learn enough to assist the journey-level worker in the more highly skilled aspects of the job.

Some Masons go through a formal apprenticeship program, by receiving classroom training and practical, on-site education. The training period lasts from three to four years, depending upon the program. Information on apprenticeships can be found at www.dir.ca.gov. The formal nature of an apprenticeship program covers all aspects of the occupation, whereas those working with a Mason, who constructs only light residential structures or landscaping, will only be exposed to that type of work.

Recommended High School Course Work

Persons interested in this career should begin preparing in high school, if possible. Classes that can help a new worker find a job include basic mathematics, as well as wood and metal shop.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Union Brick, Block, or Stonemasons can find work through their local union office. Nonunion workers can contact others in the trade, supply houses, construction companies, residential, and commercial builders, or at construction sites.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

Brickmasons, Blockmasons, and Stonemasons

- ▶ Commercial Building
- ▶ Concrete Block and Brick Manufacturing
- ▶ Employment Placement Agencies
- ▶ Industrial Building
- ▶ Landscaping Services
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Other Concrete Product Manufacturing
- ▶ Professional Employer Organizations
- ▶ Ready-Mix Concrete Manufacturing
- ▶ Residential Remodelers
- ▶ Temporary Help Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Contractors, Commercial/Industrial
- ▶ Building Contractors, General
- ▶ Masonry Contractors

Where Can The Job Lead?

If they work in a large operation, experienced Brick, Block, and Stonemasons may supervise other workers. More often, fully-skilled workers may begin their own businesses, and either employ a few or many workers. If they work for themselves, they must have a contractor's license. The California Contractors State License Board at www.cslb.ca.gov issues a specialty contractor's license for masonry workers. Other areas they may move into include construction estimating, building or home inspection, construction manager, or work in public service.

Other Sources of Information

National Concrete Masonry Association
www.ncma.org

Mason Contractors Association of America
www.masoncontractors.org

International Masonry Institute
www.imiweb.org

The Masonry Society
www.masonrysociety.org

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

California Department of Industrial Relations
www.dir.ca.gov

Cabinetmakers and Bench Carpenters

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What They Do

Despite the development of plastics and other high-tech materials, the demand for wood products continues to be strong. Helping to meet this demand are Cabinetmakers and Bench Carpenters. These workers often work in small or medium-sized shops, but some work in large companies producing high-volume products.

These workers use power and hand tools to cut, shape, and attach wood to make durable, attractive wood cabinets and other products. They may work with similar products such as solid surface countertops that behave much like wood and employ the same or similar tools.

Some of the tools Cabinetmakers and Bench Carpenters use include portable power saws, routers, drills, and screwdrivers. They also frequently use large, stationary tools such as table saws, radial-arm saws, drill presses, routers, joiners, and lathes.

Before or after a wooden product is assembled, some woodworkers finish by sanding, taping off sections if necessary, and staining or painting the product. Sometimes, the wood is sealed after the stain or paint dries.

While equipment has had a great impact on workers in the largest, most efficient firms, precision or custom woodworkers—who generally work in smaller firms—have continued to employ the same production techniques they have used for many years. Cabinetmakers and Bench Carpenters and those in other woodworking occupations work on a customized basis, often building one-of-a-kind items. These highly skilled precision woodworkers usually perform a complete cycle of tasks—cutting, shaping, and preparing surfaces, and assembling prepared parts of complex wood components into a finished wood product. For this reason, these workers normally need substantial training and an ability to work from detailed instructions and specifications. In addition, they often are required to exercise independent judgment when undertaking an assignment.

Tasks

- ▶ Study blueprints, drawings, and written specifications of articles to be constructed or repaired and plans sequence of performing such operations.
- ▶ Mark dimensions of parts on paper or lumber stock, following blueprints, and match lumber for color, grain, and texture.

Cabinetmakers and Bench Carpenters

- ▶ Set up and operate machines, including power saws, jointers, mortisers, tenoners, molders, and shapers, to cut and shape woodstock.
- ▶ Trim component parts of joints to ensure snug fit, using hand tools, such as planes, chisels, or wood files.
- ▶ Bore holes for insertion of screws or dowel by hand or using boring machine.
- ▶ Glue, fit, and clamp parts and subassemblies together to form complete unit.
- ▶ Drive nails or other fasteners to joints of articles to prepare articles for finishing.
- ▶ Sand and scrape surfaces and joints of articles to prepare articles for finishing.
- ▶ Dip, brush, or spray assembled articles with protective or decorative materials, such as stain, varnish, or lacquer.
- ▶ Install hardware, such as hinges, catches, and drawer pulls, using hand tools.

Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ▶ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

Work Environment

Most cabinet shops are adequately lighted and ventilated, although not all shops are heated or air-conditioned. The locations where the finished products are installed are usually clean, although they may not be heated or air-conditioned. Working conditions include machine and tool noise, and the presence of wood dust and possible finishing vapors. Cabinetmakers and Bench Carpenters

Cabinetmakers and Bench Carpenters

must often wear protective equipment for ear, eye, skin, and lung hazards. Workers must also follow operating safety instructions and use safety shields or guards when operating equipment to prevent accidents.

Cabinetmakers and Bench Carpenters normally work 40 hours in a five-day week but may work overtime on certain jobs, especially in the summer. Some belong to the United Brotherhood of Carpenters and Joiners of America. However, most of these workers in California are not members of a trade union.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Cabinetmakers and Bench Carpenters				
51-7011	17,800	19,100	660	\$11.80 to \$19.15

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment for Cabinetmakers and Bench Carpenters is expected to grow slower than average for all occupations in California through 2016. Employment in this occupation is highly sensitive to economic cycles. During economic downturns, workers are subject to layoffs or reductions in hours. However, employment opportunities will still exist due to the need to replace workers who transfer to other occupations, retire, or leave the labor force for other reasons.

Although the cabinetmaking trade has a long tradition, change has come to some of the larger shops in California. One of the critical aspects of making cabinets and other manufactured products is correctly estimating the material needed for making the cabinets, thus providing accurate bids for jobs. In recent years, computer software has been created that helps in this crucial part of the industry. This has allowed cabinet making shops to closely manage materials and cut down on mistakes in estimating costs.

Demand for Cabinetmakers and Bench Carpenters will stem from increases in population, personal income, and business expenditures, in addition to the continuing need for repair and renovation of residential and commercial properties. Therefore, opportunities should be available for workers who specialize in such items as moldings, cabinets, stairs, and windows.

Due to increasingly automated manufacturing processes, job prospects will be best for highly skilled Cabinetmakers and Bench Carpenters with knowledge of computerized numerical control (CNC) machine tool operation. This technology has raised worker productivity by allowing one operator to simultaneously tend a greater number of machines. With computerized numerical controls, an operator can program a machine to perform a sequence of operations automatically, resulting in greater precision and reliability.

Technological advances, such as robots and CNC machinery, will continue to increase productivity

Cabinetmakers and Bench Carpenters

among woodworkers, preventing employment from rising as fast as the demand for wood products, particularly in the mills and manufacturing plants where many processes can be automated. In addition, more jobs in the United States will be lost as imports continue to grow and as U.S. firms move some production to other countries. Also, the demand for wood may be reduced somewhat, as materials such as metal, plastic, and fiberglass continue to be used in many products as alternatives to wood. Environmental measures designed to control various pollutants used in, or generated by, woodworking processes also may adversely impact employment.

Training/Requirements/Apprenticeships

Most Cabinetmakers and Bench Carpenters learn their trade on the job. Starting with simple tasks, a beginning Cabinetmaker can progress to more and more complicated jobs as they learn the trade. They can sometimes start doing basic machine operations in a few weeks or months, but learning all aspects of the job can take several years.

That process can be shortened somewhat by taking woodworking classes in high school or a community college. These classes emphasize the safe operation of machines, understanding the differences in types of wood, basic shop mathematics, construction techniques, and finish techniques. A background in construction can be helpful, though there are many aspects of cabinetmaking that are unique to that industry.

There are no specific apprenticeship programs for Cabinetmakers and Bench Carpenters, although a general program for carpenters is offered. This consists of four years of classroom and on-the-job training. Programs are offered at various places throughout California, and are overseen by the California Department of Industrial Relations.

Some Cabinetmakers and Bench Carpenters acquire skills through vocational education or by doing carpentry work on construction jobs. Others may attend colleges or universities that offer training in areas including wood technology, furniture manufacturing, wood engineering, and production management. These programs prepare students for positions in production, supervision, engineering, and management.

Due to the growing sophistication of machinery and a subsequent need for retraining, employers increasingly seek applicants with a high school diploma or the equivalent. Other important qualities for entrants in this occupation include mechanical ability, manual dexterity, and the ability to pay attention to detail.

No specific schooling is required to obtain a contractor's license. One of the specialty licenses issued by the California State Contractor's License Board is for Cabinet, Millwork, and Finish Carpentry.

Recommended High School Course Work

Employers look for applicants who have at least a high school diploma. High school preparation should include courses in carpentry, wood shop, basic mathematics, science, computer applications, drafting, and English.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Employers include companies that make kitchen and bath cabinets, general building contractors (commercial and industrial), and lumber and sawmills.

Cabinetmakers and Bench Carpenters

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Custom Architectural Woodwork & Millwork
- ▶ Upholstered Household Furniture Mfg.
- ▶ Institutional Furniture Manufacturing
- ▶ Wood Container and Pallet Manufacturing
- ▶ Manufactured/Mobile Home Manufacturing
- ▶ Wood Kitchen Cabinets and Countertops
- ▶ Miscellaneous Wood Product Manufacturing
- ▶ Wood Office Furniture Manufacturing
- ▶ Nonupholstered Wood Household Furniture
- ▶ Wood TV, Radio, & Sewing Mach. Housing
- ▶ Other Millwork (including Flooring)
- ▶ Wood Window and Door Manufacturing

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Cabinetmakers
- ▶ Wood Specialties
- ▶ Furniture
- ▶ Wood Turning
- ▶ Wood Carving
- ▶ Wood Workers
- ▶ Wood Finishing, Refinishing and Repairs

Where Can The Job Lead?

Advancement opportunities often are limited and depend upon availability, seniority, and a worker's skills and initiative. Sometimes experienced woodworkers become inspectors or supervisors responsible for the work of a group of woodworkers. Production workers often can advance into these positions by assuming additional responsibilities and by attending workshops, seminars, or college programs. Those who are highly skilled may set up their own woodworking shops. A contractor's specialty license for Cabinet, Millwork and Finish Carpentry is offered by the California Contractors State Licensing Board (www.cslb.ca.gov).

Other Sources of Information

Cabinet Makers Association
www.cabinetmakers.org

Woodworking Machinery Industry Association
www.wmia.org

United Brotherhood of Carpenters and Joiners of America
www.carpenters.org

Department of Industrial Relations
www.dir.ca.gov

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

Associated Builders and Contractors
www.abc.org

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What They Do

Carpenters work in almost every type of construction. The jobs they do depend on the type of construction, the type of company, and the particular skills of the Carpenter. Working for a small home builder, a Carpenter might be involved in every part of a project, such as putting up the framework, walls, and roofs, and installing doors, windows, flooring, cabinets, paneling, and molding. In a larger operation, where there is more opportunity for specialized work, a Carpenter might do only one thing, such as roof framing or installing doors and windows. Carpenters working for a special trade contractor might specialize in one or two areas, such as the installation of hardwood flooring. In other types of construction, Carpenter jobs can be as different as constructing wooden forms for pouring concrete; building wooden bridges, piers, and trestles; and installing tunnel bracing.

Most Carpenter's work involves certain basic steps: They read plans, identify and find the materials they need, determine the sizes of the parts required, and measure and mark the materials for cutting. Working with hand tools and power equipment, Carpenters cut and shape the material and assemble or then install it following the plans.

Tasks

- ▶ Read blueprints and plans.
- ▶ Identify and find the materials they need.
- ▶ Determine the size of the lumber, and cut timbers to length.
- ▶ Measure and mark lumber.
- ▶ Measure and mark cutting lines on materials, using ruler, pencil, chalk, and marking gauge.
- ▶ Follow established safety rules and regulations and maintain a safe and clean environment.
- ▶ Verify trueness of structure, using plumb bob and level.
- ▶ Shape or cut materials to specified measurements, using hand tools, machines, or power saw.
- ▶ Study specifications in blueprints, sketches or building plans to prepare project layout and determine dimensions and materials required.
- ▶ Assemble and fasten materials to make framework or props, using hand tools and wood screws, nails, dowel pins, or glue.
- ▶ Build or repair cabinets, doors, frameworks, floors, and other wooden fixtures used in buildings, using woodworking machines, carpenter's hand tools, and power tools.

Carpenters

- ▶ Erect scaffolding and ladders for assembling structures above ground level.
- ▶ Remove damaged or defective parts or sections of structures and repair or replace, using hand tools.
- ▶ Install structures and fixtures, such as windows, frames, floorings, and trim, or hardware, using carpenter's hand and power tools.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Time Management — Managing one's own time and the time of others.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ▶ Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ▶ Management of Material Resources — Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.
- ▶ Quality Control Analysis — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Multilimb Coordination — The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
- ▶ Trunk Strength — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).

Work Environment

Carpenters usually work as part of a crew. The work can be indoors or outdoors, at floor level, or on ladders or scaffolding, often in dusty, noisy places. Carpenter training stresses working safely and wearing protective equipment and clothing because Carpenters can be injured by falling objects, sharp tools, and power equipment, or from falling from high places. Carpenters provide their own hand tools and work clothing. The employer provides ladders, scaffolding, and any heavy equipment needed on the job. Jobs vary in length, from one-day house repairs to industrial projects that last years. In the winter when it's cold and rainy there aren't as many jobs for Carpenters so they may take on small indoor jobs.

Most Carpenters work an eight-hour day, Monday through Friday but there can be a lot of overtime. In larger areas, most journey-level workers and apprentices belong to unions but smaller communities have a lot of nonunion workers.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Carpenters				
47-2031	210,000	235,700	5,410	\$18.93 to \$31.31

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment for Carpenters is expected to grow slower than average for all occupations in California. During economic downturns, workers are subject to layoffs or reductions in hours. Also, carpentry work is seasonal in nature. Inclement weather can bring jobs to a standstill. However, employment opportunities will still continue due to a significant turnover rate that creates a need to replace workers who transfer to other occupations, retire, or leave the labor force for other reasons.

Also, technological improvements in the building industry will work to reduce the need for skilled Carpenters. For example, the increasing use of premanufactured components such as wall panels, and roof trusses will help keep construction costs under control. Sometimes an entire home can be made in a factory and delivered and assembled on-site. Tools have also made real improvements with the advent of laser leveling tools, battery-powered equipment, construction calculators, and even computers that can generate a list of required materials from digital blueprints.

There is a bright spot on the horizon. The movement toward greening the construction industry may increase the need for Carpenters in the future. New construction and retrofit projects on existing buildings in an effort to achieve Leadership in Energy and Environmental Design (LEED) certification will require the skills of experienced Carpenters.

Training/Requirements/Apprenticeships

Carpenters usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Many Carpenters learn the trade through informal on-the-job training. Starting out as a helper, these workers can gain skills by observing and assisting journey-level workers on the construction site. Sometimes, beginning carpenters can gain skills through vocational education classes or in classes given by employers. They can also enter a formal apprenticeship program sponsored by employers and unions, though these programs may offer a limited number of openings each year.

The training offered can vary depending upon the size of the employer. A small builder might not have time to train a new Carpenter in every aspect of the job, preferring to teach a new skill as it is required. A larger employer may offer on- or off-site training in a variety of carpentry skills.

Recommended High School Course Work

Most employers prefer applicants who have at least a high school diploma or equivalent. High school preparation should include courses in shop, basic mathematics, and English.

Carpenters

Where Do I Find the Job?

Apply at the job site or the union hall. Direct application to employers remains one of the most effective job search methods. Word of mouth, or contacting a former employer to see if work is available is also a good way to see if jobs are opening up.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Employment Placement Agencies
- ▶ Industrial Building
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Professional Employer Organizations
- ▶ Residential Remodelers
- ▶ Temporary Help Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Contractors, Commercial/Industrial
- ▶ Building Contractors, General
- ▶ Framing Contractors
- ▶ Home Improvements
- ▶ Housing Authorities
- ▶ Local Governments

Where Can The Job Lead?

Increasing skill makes a Carpenter more valuable to the employer, and greater responsibility may be offered to the employee. In a larger firm, positions as a construction supervisor or estimator may be available. Another career path might be to become a self-employed carpenter, perhaps supervising a small crew of carpenters. Good business sense and an ability to accurately estimate construction material and labor costs is very important if the Carpenter desires to run his or her own business.

Some carpenters become independent contractors. To advance, these workers should be able to identify and estimate the quantity of materials needed to properly complete a job. In addition, they must be able to accurately estimate how long a job should take to complete and what it will cost.

Other Sources of Information

Associated Builders and Contractors
www.abc.org

Associated General Contractors of America, Inc.
www.agc.org

Home Builders Institute
www.hbi.org

National Association of Home Builders
www.nahb.org

United Brotherhood of Carpenters and Joiners of America
www.carpenters.org

Cement Masons and Concrete Finishers

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What They Do

Cement Masons pour, smooth, and finish concrete surfaces such as floors, walls, sidewalks, and curbs using hand and power tools. Their work encompasses small projects, such as backyard patios, as well as large jobs such as bridges and interstate highways.

Before concrete is poured, Cement Masons (also called Concrete Finishers) check the forms that hold the concrete to see that they are properly constructed. During the pour, laborers spread the concrete to the desired depth using shovels and rakes. On small jobs, Cement Masons mix, pour, spread, and smooth the concrete. On larger jobs, Masons work in concert with cement trucks, which bring the wet concrete as close to the pour as possible. Sometimes, wheelbarrows or concrete pumping trucks are used to transfer the mix from the cement truck to the jobsite. On larger jobs, Masons work as part of a crew.

Cement Masons level, smooth, finish, and shape the concrete surfaces, using a variety of hand tools such as straightedges, jointers, edgers, tamps, floats, and trowels. Power trowels may be used on large-scale projects, but corners, edges, and hard-to-reach places must still be finished by hand. They remove rough spots from surfaces with power grinders, hammers, and chisels, and patch holes with a fresh cement mixture. Cement Masons can create desired textures and colors using a variety of brushes, belts, coloring powders, and terrazzo (marble) chips. Crew leaders may also direct the preliminary work such as setting forms or grading soil. Cement Masons must be familiar with the characteristics of various cements and concrete mixes and be knowledgeable about the effects of weather upon the curing rate of concrete.

Tasks

- ▶ Apply hardening and sealing compounds to cure surface of concrete, and waterproof or restore surface.
- ▶ Apply muriatic acid to clean surface, and rinse with water.
- ▶ Check the forms that hold the concrete to see that they are properly constructed.
- ▶ Chip, scrape, and grind high spots, ridges, and rough projections to finish concrete, using pneumatic chisels, power grinders, or hand tools.
- ▶ Clean chipped area, using wire brush, and feel and observe surface to determine if it is rough or uneven.

Cement Masons and Concrete Finishers

- ▶ Mix cement, sand, and water to produce concrete, grout, or slurry, using hoe, trowel, tamper, scraper, or concrete-mixing machine.
- ▶ Mold expansion joints and edges, using edging tools, jointers, and straightedge.
- ▶ Monitor how the wind, heat, or cold affect the curing of the concrete throughout the entire process.
- ▶ Set the forms that hold concrete to the desired pitch and depth, and align them.
- ▶ Spread, level, and smooth concrete, using rake, shovel, hand or power trowel, hand or power screed, and float.

Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Monitoring — Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Operations Analysis — Analyzing needs and product requirements to create a design.
- ▶ Operation and Control — Controlling operations of equipment or systems.
- ▶ Quality Control Analysis — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Multilimb Coordination — The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
- ▶ Trunk Strength — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without ‘giving out’ or fatiguing.
- ▶ Wrist-Finger Speed — The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Stamina — The ability to exert yourself physically over long periods of time without getting winded or out of breath.
- ▶ Extent Flexibility — The ability to bend, stretch, twist, or reach with your body, arms, and/or legs.

Cement Masons and Concrete Finishers

Work Environment

Cement Masons typically work out-of-doors on construction sites. Cement Masons are exposed to most types of weather, except heavy rain or snow, and must work around wet concrete. Potential hazards include the possibility of falls, falling objects, back injuries, knee injuries, and cement poisoning. Protective equipment includes rubber boots, gloves, hard hats, knee pads, face masks (for cement dust), and safety glasses. This work is strenuous and involves much pushing and pulling, reaching and handling, bending and stooping, kneeling and crawling, and walking. The work may require climbing or working from scaffolds and may also involve lifting and carrying materials weighing up to 100 pounds. Some Cement Masons belong to the Cement Masons' Union. Some locals of this union provide their apprentices with a set of hand tools, boots, and knee pads.

Cement Masons usually work 8-hour shifts, Monday through Friday. Depending on the union contract, overtime pay is time and a half for the first 3 hours over an 8-hour shift and double time thereafter.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Cement Masons and Concrete Finishers				
47-2051	30,000	34,600	1,330	\$17.79 to \$29.63

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment for Cement Masons and Concrete Finishers is expected to grow at an average rate compared to all occupations in California. During economic downturns, workers are subject to layoffs or reductions in hours. However, employment opportunities will still continue due to a need to replace workers who transfer to other occupations, retire, or leave the labor force for other reasons.

Training/Requirements/Apprenticeships

Cement Masons usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Training for this occupation is through the apprenticeship program provided by the Cement Masons' Union. The apprenticeship consists of three years' on-the-job training and classroom instruction designed to give a broad, working knowledge of the trade. To become an apprentice a person must be at least 17 years of age and have a job offer from a contractor willing to take on an apprentice. There are no specific educational requirements for becoming an apprentice; however, high school drafting, mathematics, and shop courses may be helpful.

Cement Masons and Concrete Finishers

Recommended High School Course Work

Most employers prefer applicants who have at least a high school diploma or equivalent. High school preparation should include courses in drafting, shop, basic mathematics, and English.

Where Do I Find the Job?

Cement Masons and Concrete Finishers are employed primarily by general contractors and subcontractors; a few work for local governments. Contacting employers directly is a good way of finding employment. For members of a union, jobs can also be found through the union hall.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Employment Placement Agencies
- ▶ Highway, Street, and Bridge
- ▶ Industrial Building
- ▶ Landscaping Services
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Other Heavy Construction
- ▶ Residential Remodelers
- ▶ Temporary Help Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Contractors, Commercial/Industrial
- ▶ Building Contractors, General
- ▶ Concrete Contractors
- ▶ Concrete Products
- ▶ Foundation Contractors

Where Can The Job Lead?

Cement Masons can branch out into related fields, such as bricklayer, stucco mason, pool plasterer, and similar. They can also obtain a special trades contractor's license or a general contractor's license. This permits them to work unsupervised and to hire other workers.

Other Sources of Information

Associated General Contractors of America
www.agc.org

National Concrete Masonry Association
www.ncma.org

Operative Plasterers' and Cement Masons' International Association
www.opcmia.org

Portland Cement Association
www.cement.org

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

California Department of Industrial Relations
www.dir.ca.gov

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What They Do

Civil Engineers plan, design, and direct the construction and maintenance of roads, bridges, pipelines, subdivisions, airports, waste water systems, and many other types of facilities. They may work in a specific field such as construction, land development, structural or hydraulic design, soil mechanics, waste water treatment, or solid waste management. They may also work with specialists on problems such as soil or ground water contamination or energy development and conservation.

Civil Engineers may design the main features of a project, then direct the work of drawing plans, writing specifications, and preparing final cost estimates. They may prepare deeds, property descriptions, and right-of-way maps. In the field they usually do surveying, site investigation, construction inspection, or supervision. They may also sample and test soil or construction materials in the laboratory or the field.

In structural work, Civil Engineers may work on detailed calculations to be certain that design features meet all structural requirements. They may go into the field to make sure that work in progress conforms to the plans and specifications; they may also inspect existing structures for repair or replacement needs.

In transportation, Civil Engineers design streets and highways, and plan alterations to improve traffic flow. They do survey work, draw preliminary plans, or inspect and test materials to be used in construction. They may also prepare reports on environmental impact. Engineers may further specialize in a particular part of the work such as improving traffic signs, planning and designing impact devices, or studying pedestrian traffic. Others study population growth and industrial trends to determine future transportation needs.

Tasks

- ▶ Analyze survey reports, maps, drawings, blueprints, aerial photography, and other topographical or geologic data to plan projects.
- ▶ Plan and design transportation or hydraulic systems and structures, following construction and government standards, using design software and drawing tools.
- ▶ Compute load and grade requirements, water flow rates, and material stress factors to determine design specifications.
- ▶ Inspect project sites to monitor progress and ensure conformance to design specifications and safety or sanitation standards.

Civil Engineers

- ▶ Direct construction, operations, and maintenance activities at project site.
- ▶ Direct or participate in surveying to lay out installations and establish reference points, grades, and elevations to guide construction.
- ▶ Estimate quantities and cost of materials, equipment, or labor to determine project feasibility.
- ▶ Prepare or present public reports, such as bid proposals, deeds, environmental impact statements, and property and right-of-way descriptions.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Science — Using scientific rules and methods to solve problems.
- ▶ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.
- ▶ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ▶ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ▶ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ▶ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).

Work Environment

Civil Engineers work in many different settings, ranging from quiet, modern offices to job sites in remote areas. The majority of Civil Engineers spend most of their time working in the office. Some are required to work at remote sites where the environment can be very hot or very cold. They may travel frequently or relocate temporarily while working on a distant project. They may work with other professional and technical personnel on temporary project teams. Civil Engineers always seem to be in demand and can find work in their field all over the world.

Civil Engineers generally put in a standard 40-hour work week. Sometimes they work overtime hours to meet project deadlines. Self-employed Civil Engineers tend to work more irregular hours.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Civil Engineer				
17-2051	34,100	39,200	1,410	\$33.67 to \$50.08

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

The occupation of Civil Engineer will grow at an average rate compared to all occupations in California. Most job openings will occur to replace workers who retire or permanently leave the occupation for various reasons.

Civil Engineers will be needed to repair or replace existing roads, bridges, and other public structures. Additional opportunities exist within non-civil engineering firms such as management consulting or computer services firms.

With the greening of the construction industry, Civil Engineers will be in demand to design and construct higher capacity transportation, water supply and pollution control systems, and Leadership in Energy and Environmental Design (LEED) certified buildings and building complexes.

Training/Requirements/Apprenticeships

Civil Engineers must combine mathematical and mechanical aptitude with an interest in community affairs and environmental issues. They must be able to organize, analyze, and evaluate technical data to solve detailed engineering problems and work as part of a team.

A bachelor of science degree in civil engineering is the minimum requirement for most entry-level positions. Some schools have civil engineering curricula accredited by the Accreditation Board of Engineering and Technology (ABET). Employers advise students to acquire practical experience through summer jobs or college work-study programs. They also recommend computer science courses due to the reliance on computer technology in the profession.

Registration by the State Board of Registration for Professional Engineers is required of all consulting Civil Engineers and those responsible for approving plans, specifications, and reports. Many employers

Civil Engineers

require registration for advancement to a specific level (Associate Civil Engineer in most public agencies). Registration requires passing two exams and from one to six years of civil engineering work experience. Successful candidates receive a certificate of registration as a Civil Engineer.

Recommended High School Course Work

High school students planning to become Civil Engineers should take college preparatory courses such as algebra, geometry, trigonometry, calculus, chemistry, physics, and English, as well as shop and drafting classes.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. However, when filling entry-level positions, some employers conduct college campus interviews. Others request referrals from college placement centers or engineering department faculty. Employers and applicants may also use the placement services of professional associations, private employment agencies, or the California Employment Development Department. Government agencies generally issue civil service announcements describing all current openings and hiring procedures.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Architectural Services
- ▶ Building Inspection Services
- ▶ Commercial Building Construction
- ▶ Drafting Services
- ▶ Engineering Services
- ▶ Geophysical Surveying & Mapping Services
- ▶ Industrial Building Construction
- ▶ Landscape Architectural Services
- ▶ Offices of Bank Holding Companies
- ▶ Offices of Other Holding Companies
- ▶ Other Surveying and Mapping Services
- ▶ Testing Laboratories

Search these **yellow page** headings for listings of private firms:

- ▶ Engineers-Civil
- ▶ Engineers-Consulting
- ▶ Engineers-Industrial
- ▶ Engineers-Manufacturing
- ▶ Engineers-Structural
- ▶ Engineers-Transportation

Where Can the Job Lead?

Civil Engineers are employed in most industries. Advancement opportunities exist along a specific career path. The main career path is to advance to a Senior Engineer and then Supervising Engineer. Some will advance to managerial positions within an organization. Lateral movement is quite easy for Civil Engineers. With their college engineering degree they can move around to many different occupations across most industries.

Other Sources of Information

California Department of Consumer Affairs, Board for Professional Engineers and Land Surveyors
www.dca.ca.gov/pels

American Society of Civil Engineers
www.asce.org

Construction and Building Inspectors

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What They Do

Construction and Building Inspectors examine and help regulate the construction or repair of buildings, highways and streets, sewer and waste water systems, dams, bridges, and other structures. Construction and Building Inspectors can specialize variously as building inspectors, electrical inspectors, elevator inspectors, mechanical inspectors, public works inspectors, and home inspectors. The following duties are common to most specialty fields.

Building Inspectors inspect the structural quality and general safety of buildings. They typically inspect the soil condition and position and depth of foundation footings before the construction of a building foundation. Building Inspectors also routinely examine a structure's fire sprinklers, alarms and smoke control systems, and fire exits.

Electrical Inspectors examine the installation of electrical systems and equipment to ensure compliance with electrical codes and standards. Other routine inspections include electrical wiring for heating and air-conditioning systems, appliances, and sound and security systems.

Mechanical Inspectors inspect the installation of the mechanical components of commercial kitchen appliances, heating and air-conditioning equipment, gasoline and butane tanks, gas and oil piping, and gas-fired and oil-fired appliances.

Public Works Inspectors ensure that federal, state, and local government construction projects (i.e., water and sewer systems, highways, streets, and bridges) comply with contract specifications. They inspect excavation and fill operations, the placement of forms for concrete, concrete mixing and pouring, asphalt paving, and grading operations. Public works inspectors can specialize in highways, structural steel, reinforced concrete, or ditches.

Home Inspectors conduct inspections of newly built or previously owned homes. They generally inspect a home's roofing and structural quality as well as the home's plumbing, electrical, and heating and air conditioning systems.

Tasks

- ▶ Use survey instruments, metering devices, tape measures, and test equipment, such as concrete strength measurers, to perform inspections.
- ▶ Inspect bridges, dams, highways, buildings, wiring, plumbing, electrical circuits, sewers, heating systems, and foundations during and after construction for structural quality, general safety and conformance to specifications and codes.

Construction and Building Inspectors

- ▶ Maintain daily logs and supplement inspection records with photographs.
- ▶ Review and interpret plans, blueprints, site layouts, specifications, and construction methods to ensure compliance to legal requirements and safety regulations.
- ▶ Inspect and monitor construction sites to ensure adherence to safety standards, building codes, and specifications.
- ▶ Measure dimensions and verify level, alignment, and elevation of structures and fixtures to ensure compliance to building plans and codes.
- ▶ Issue violation notices and stop-work orders, conferring with owners, violators, and authorities to explain regulations and recommend rectifications.
- ▶ Issue permits for construction, relocation, demolition, and occupancy.
- ▶ Approve and sign plans that meet required specifications.
- ▶ Compute estimates of work completed or of needed renovations or upgrades, and approve payment for contractors.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ▶ Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ▶ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ▶ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.

Construction and Building Inspectors

Work Environment

Construction and Building Inspectors have to work in all types of weather and often work alone at building sites. Building sites can be dirty, with tools, building materials, and debris scattered about and underfoot. They walk and move about construction jobs in any stage of completion, climbing ladders, riding on open platform hoists, crawling around in tight spaces, and working many stories above the ground. They also spend time indoors, reviewing blueprints, answering letters or telephone calls, writing reports, and scheduling inspections.

Many Construction and Building Inspectors work for city or county governments and can join government employee unions.

Construction and Building Inspectors normally work 40 hours a week, Monday through Friday. However, they may work additional hours during periods when a lot of construction is taking place. Also, if an accident occurs at a construction site, they must respond immediately and may work additional hours.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Construction and Building Inspectors				
47-4011	12,500	15,100	490	\$24.73 to \$39.43

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

This occupation will grow at a faster than average rate from 2006 to 2016. Construction and Building Inspectors tend to be older than most workers, therefore, a large number are expected to retire during this period. Most job openings will occur to replace workers who retire or permanently leave the occupation for various reasons.

The movement toward greening the construction industry may increase the need for Construction and Building Inspectors in the future. New construction and retrofit projects on existing buildings in an effort to achieve Leadership in Energy and Environmental Design (LEED) certification will require the skills of experienced Inspectors.

Training/Requirements/Apprenticeships

Construction and Building Inspectors must have knowledge of construction materials and practices. The areas of knowledge may be general, such as structural or heavy construction, or specialized, such as electrical or plumbing systems, reinforced concrete, or structural steel. This knowledge is acquired through years of work experience as a construction contractor, supervisor, or craft worker. Many Construction and Building Inspectors started out as carpenters, electricians, plumbers, or pipefitters. Employers prefer those who have graduated from an apprenticeship program, studied engineering or architecture for at least two years, or have a degree from a community college with courses in construction technology, blueprint reading, mathematics, and building inspection.

Construction and Building Inspectors

Most cities require certification for employment. Even if certification is not needed, inspectors who have a certificate enjoy more employment and advancement opportunities. Certification involves passing difficult tests on code requirements, construction techniques, and materials. Professional organizations like the Building Officials and Code Administrators International offer voluntary certification.

Recommended High School Course Work

Employers look for Construction and Building Inspector applicants who have at least a high school diploma. High school preparation should include courses in drafting, algebra, geometry, and English.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Public sector openings are listed with the personnel/human resource departments of cities and counties. California's State Personnel Board posts job opportunities within state government on their Web site at www.spb.ca.gov.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Administrative Management Consulting
- ▶ Architectural Services
- ▶ Building Inspection Services
- ▶ Engineering Services
- ▶ Exterminating and Pest Control Services
- ▶ Janitorial Services
- ▶ Landscape Architectural Services
- ▶ Landscaping Services
- ▶ Other Management Consulting Services
- ▶ Other Surveying and Mapping Services
- ▶ Other Technical Consulting Services
- ▶ Testing Laboratories

Search these **yellow page** headings for listings of private firms:

- ▶ Building Code Inspectors
- ▶ Construction Consultants
- ▶ Home Inspectors

Where Can The Job Lead?

Construction and Building Inspectors usually promote to higher level positions, such as Senior Construction and Building Inspector, Principal Construction and Building Inspector, and Chief Construction Building Inspector. Each higher level requires additional knowledge and experience, and usually involves supervisory responsibility. Upper-level inspectors perform the entire range of moderate to difficult inspections of a variety of residences, commercial, and industrial buildings.

Promotions in public agencies depend upon passing a series of written and/or oral civil service examinations for each higher level of the Construction and Building Inspector series.

Other Sources of Information

American Society of Home Inspectors
www.ashi.org

International Code Council
www.iccsafe.org

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What They Do

Construction Laborers dig trenches, mix and place concrete, erect scaffolds, set braces to support the sides of excavations, and clean and prepare construction sites to rid it of any dangers, such as rubble and debris, asbestos, and other hazardous waste. They use tools of all types: air hammers, earth tampers, cement mixers, small mechanical hoists, surveying and measuring equipment, and a variety of other equipment. They may assist other craft workers such as carpenters, plasterers, and masons.

At heavy and highway construction sites, Construction Laborers clear and prepare highway work zones and rights of way; install traffic barricades, cones, and markers; and control traffic passing near, in, and around work zones. They also install sewer, water, and storm drain pipes, and place concrete and asphalt on roads.

Construction Laborers at hazardous waste sites safely sample, identify, handle, pack, and transport asbestos, lead, radioactive waste, and other harmful materials, and clean and decontaminate equipment, buildings, and other enclosed structures.

Tasks

- ▶ Apply caulking compounds by hand or using caulking guns.
- ▶ Build and position forms for pouring concrete, and dismantle forms after use, using saws, hammers, nails, or bolts.
- ▶ Clean and prepare construction sites to eliminate possible hazards.
- ▶ Control traffic passing near, in, and around work zones.
- ▶ Dig ditches or trenches, backfill excavations, and compact and level earth to grade specifications, using picks, shovels, pneumatic tampers, and rakes.
- ▶ Erect and disassemble scaffolding, shoring, braces, traffic barricades, ramps, and other temporary structures.
- ▶ Grind, scrape, sand, or polish surfaces such as concrete, marble, terrazzo, or wood flooring, using abrasive tools or machines.
- ▶ Install sewer, water, and storm drain pipes, using pipe-laying machinery and laser guidance equipment.

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- ▶ Load, unload, and identify building materials, machinery, and tools, and distribute them to the appropriate locations, according to project plans and specifications.
- ▶ Measure, mark, and record openings and distances to lay out areas where construction work will be performed.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Trunk Strength — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without ‘giving out’ or fatiguing.
- ▶ Explosive Strength — The ability to use short bursts of muscle force to propel oneself (as in jumping or sprinting), or to throw an object.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.

Work Environment

The occupation of Construction Laborer is a dangerous one. According to the Bureau of Labor Statistics (BLS) studies, fatal occupational injury rates for Construction Laborers during 1992–2001 were substantially greater (2.5–3.4 times greater) than those for all construction workers. The BLS studies indicated that, during the same time period, the rates of nonfatal occupational injuries and illnesses involving days away from work for Construction Laborers during 1992–2001 were consistently greater (1.8–2.7 times greater) than those for all construction workers.

The work is physically demanding. Construction Laborers often lift and carry heavy objects; they bend, kneel, crouch down, or crawl in awkward positions. Construction Laborers may work high in scaffolds or other structures. The work is frequently done outdoors in all weather conditions. They can come into contact with dangerous machinery. They are sometimes exposed to hazardous materials or chemicals and fumes. Construction Laborers may be subjected to foul odors and loud noises.

To avoid injury, workers in these jobs wear safety clothing, such as gloves, hardhats, protective chemical suits, and devices to protect their eyes, lungs, or hearing. While working in underground construction, Construction Laborers must be especially alert to safety procedures and must deal with a variety of hazards.

Construction Laborers

Many Construction Laborers belong to the Laborers' International Union of North America.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Construction Laborers 47-2061	171,300	199,800	4,140	\$13.02 to \$22.65

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

This is an occupation with many workers statewide that is expected to grow faster than average compared to all occupations in California during the projections period. Growth will be fueled in large measure by the need to replace workers who are retiring, going into another occupation, or separating from the occupation for other reasons.

The emerging green economy should increase the demand for Construction Laborers. For example, Laborers will be needed to work on Leadership in Energy and Environmental Design (LEED) certification projects for both new construction and retrofit building projects.

Training/Requirements/Apprenticeships

Construction Laborers usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Vocational school
- ▶ Extensive on-the-job training

Most Construction Laborers gain their skills by watching and learning from experienced workers. Those who learn the trade on the job usually start as Construction Helpers.

Local apprenticeship programs are operated under guidelines established by the Laborers-Associated General Contractors of America Education and Training Fund. Apprenticeships typically require at least 4,000 hours of supervised on-the-job training and approximately 400 hours of classroom training. It can take from two to four years to complete the apprenticeship. Workers who use dangerous equipment or handle toxic chemicals usually receive training in safety awareness and procedures.

Apprentices must be at least 18 years old and physically fit to work. Many apprenticeship programs require a high school diploma or the equivalent.

Vocational classes in welding, construction, and other general building skills can give a leg up to those who want to become Construction Laborers.

Construction Laborers

Recommended High School Course Work

High school courses in science, physics, chemistry, and mathematics are helpful.

Where Do I Find the Job?

Direct application to employers is an effective job search method for Construction Laborers. Labor unions and apprenticeship councils are good places to start a job search.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Highway, Street, and Bridge
- ▶ Industrial Building
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Power/Communication System
- ▶ Residential Remodelers
- ▶ Water and Sewer System

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Construction Clean-Up Contractors
- ▶ Construction Management
- ▶ Construction Consultants

Where Can The Job Lead?

Experience as a Construction Laborer may lead to advancement to positions such as supervisor or construction superintendent. Some Construction Laborers become skilled craftworkers, either through extensive on-the-job training or apprenticeships in a craft. A few become independent contractors.

Other Sources of Information

Laborers' International Union of North America
www.liuna.org

Laborers-Associated General Contractors Education and Training Fund
www.laborerslearn.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

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What They Do

Construction Managers plan and organize construction projects. Depending on their situation or employer, they are also known as constructors, construction superintendents, general superintendents, project engineers, project managers, general construction managers, or executive construction managers. Construction Managers may own a construction management or contracting firm, or may work as an employee of the owner, developer, contractor, or management firm overseeing the construction project. They may plan and supervise the entire project or just a part of a project. Managers often work with engineers, architects, contractors, and others who are involved in the construction project.

Large construction projects such as an office building or industrial complex are often too complicated for one person to manage. These projects are divided into many segments: site preparation including land clearing and earth moving; sewage systems; landscaping and road construction; building construction including excavation and laying grounds, as well as erection of structural framework, floors, walls, and roofs; and building systems including fire-protection, electrical, plumbing, air-conditioning, and heating. Construction Managers may manage one or more of these segments.

Tasks

- ▶ Confer with supervisory personnel, owners, contractors, and design professionals to discuss and resolve matters such as work procedures, complaints, and construction problems.
- ▶ Plan, organize, and direct activities concerned with the construction and maintenance of structures, facilities, and systems.
- ▶ Schedule the project in logical steps and budget time required to meet deadlines.
- ▶ Determine labor requirements and dispatch workers to construction sites.
- ▶ Inspect and review projects to monitor compliance with building and safety codes, and other regulations.
- ▶ Interpret and explain plans and contract terms to administrative staff, workers, and clients, representing the owner or developer.
- ▶ Prepare contracts and negotiate revisions, changes and additions to contractual agreements with architects, consultants, clients, suppliers and subcontractors.
- ▶ Obtain all necessary permits and licenses.

Construction Managers

- ▶ Direct and supervise workers.
- ▶ Study job specifications to determine appropriate construction methods.
- ▶ Select, contract, and oversee workers who complete specific pieces of the project, such as painting or plumbing.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ▶ Coordination — Adjusting actions in relation to others' actions.
- ▶ Instructing — Teaching others how to do something.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ▶ Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- ▶ Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ▶ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

Work Environment

Construction Managers oversee overall construction projects from an off-site main office or out of a field office at the construction site. Managers travel when the construction site is out of state or when they are responsible for two or more sites. Managers usually take up temporary foreign residence when projects take place in other countries.

Although the work, as a rule, is not unusually dangerous, Construction Managers must be careful while performing on-site services, where conditions can be hazardous, with tools, building

Construction Managers

materials, or debris scattered about and underfoot.

Most Construction Managers work a 40-hour week but can be “on call” for 24 hours a day in order to be available to deal with delays, bad weather, or emergencies at the site.

California’s Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Construction Managers				
11-9021	47,100	55,200	1,540	\$38.68 to \$61.77

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

This occupation will grow at a faster than average rate compared with all other occupations during the projections period. The increasing complexity of construction projects should boost demand for management-level personnel within the construction industry as sophisticated technology and the proliferation of laws setting standards for building and construction materials, worker safety, energy efficiency, and environmental protection have further complicated the construction process.

Also, the movement toward greening the construction industry should increase the need for Construction Managers in the future. New construction and retrofit projects on existing buildings in an effort to achieve Leadership in Energy and Environmental Design (LEED) certification will require the skills of experienced Construction Managers.

Training/Requirements/Apprenticeships

In the past, those pursuing construction management positions have done so after working for a number of years as construction craftworkers (carpenters, electricians, masons, or plumbers, etc.) or after having been construction supervisors or owners of specialty contracting firms supervising workers in one or more construction trades. More and more employers (big construction firms, in particular) now prefer those who combine work experience in the construction trades with a bachelor’s degree in construction science, construction management, or civil engineering.

Many colleges and universities offer four-year degree programs in construction management, construction science, and construction engineering. Graduates from four-year degree programs usually are hired as assistants to project managers, field engineers, schedulers, or cost estimators. An increasing number of graduates in related fields (e.g. engineering or architecture) also enter construction management, often after acquiring substantial experience on construction projects or after completing graduate studies in construction management or building science. Some colleges and universities have a master’s degree program in construction management or construction science.

Some seeking work as a Construction Manager attend training and educational programs sponsored by industry associations, often in collaboration with postsecondary institutions. A number of community colleges nationwide offer construction management or construction technology programs.

Construction Managers

Although certification is not required for this occupation, either locally or on a national basis, there is a felt need to certify that Construction Managers have the knowledge, skill, and experience to do a competent job. The American Institute of Constructors (AIC) and the Construction Management Association of America (CMAA) have voluntary programs for certification of Construction Managers. Both certification programs combine written examinations with verification of education and experience.

Recommended High School Course Work

Employers look for Construction Manager applicants who have, at the very least, a high school diploma. High school preparation should include courses in drafting, algebra, geometry, physical sciences, and English.

Where Do I Find the Job?

Direct application to employers is an effective job search method for Construction Managers. Public sector openings are listed with the personnel/human resource departments of cities and counties. California's State Personnel Board posts job opportunities within state government on their Web site at www.spb.ca.gov.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Architectural Services
- ▶ Commercial Building
- ▶ Drafting Services
- ▶ Engineering Services
- ▶ Industrial Building
- ▶ Landscape Architectural Services
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Residential Remodelers

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Construction Consultants
- ▶ Construction Management

Where Can The Job Lead?

Depending upon work performance and the size and type of firm for which they work, Construction Managers may advance to become top-level managers or executives. Those with thorough experience may become independent consultants. Some Construction Managers serve as expert witnesses in court or as arbitrators in disputes. Some establish their own construction management services, specialty contracting, or general contracting company.

Other Sources of Information

American Institute of Constructors, Constructors Certification Commission
www.constructorcertification.org

Construction Management Association of America
www.cmaanet.org

American Council for Construction Education
www.acce-hq.org

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What They Do

Construction Trades Helpers (All Others) assist skilled trades workers in a variety of construction occupations. They are neither apprentice workers nor construction laborers. Helpers perform a variety of unskilled tasks and provide much of the routine physical labor needed in construction. They may help carpenters, plumbers, electricians, plasterers, cement masons, brickmasons, roofers, cabinetmakers, floor covering installers, glaziers, painters, and others working in home and commercial construction. Duties including using, supplying, or holding materials or tools, and cleaning work area and equipment.

Tasks

- ▶ Carry or move equipment, tools, and materials to the work site.
- ▶ Set up ladders.
- ▶ Mix cement.
- ▶ Build forms.
- ▶ Construct scaffolding.
- ▶ Cut carpeting.
- ▶ Carry lumber and bricks from delivery trucks to the construction site.
- ▶ Dig trenches.
- ▶ Tear out and remove old building materials on remodeling projects.
- ▶ Gather equipment and supplies at the construction site.
- ▶ Clean up at the end of work days.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Important Skills, Knowledge, and Abilities

- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Installation — Installing equipment, machines, wiring or programs to meet specifications.
- ▶ Coordination — Adjusting actions in relation to others' actions.

Construction Trades Helpers

- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ▶ Speaking — Talking to others to convey information effectively.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ▶ Selective Attention — The ability to concentrate on a task over a period of time without being distracted.
- ▶ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Dynamic Strength — The ability to exert muscle force repeatedly or continuously over time. This involves muscular endurance and resistance to muscle fatigue.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Speech Clarity — The ability to speak clearly so others can understand you.

Work Environment

Helpers work at construction sites and may work outdoors either on ground or rooftops, or inside office buildings, warehouses, or private homes. Helpers working outdoors are exposed to all types of weather.

Helpers do repetitive, physically hard work. Some jobs may expose workers to harmful materials, fumes, loud noises, or dangerous machinery. Workers must wear hard hats, safety eye goggles, and sometimes masks. Many Helpers and other laborers belong to the Laborers' International Union of North America.

Helpers work eight to twelve hour shifts, and may work evening or swing shifts.

Construction Trades Helpers

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Helpers, Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters				
47-3011	9,700	10,900	370	\$11.81 to \$18.24
Helpers, Carpenters				
47-3012	8,100	9,100	300	\$11.31 to \$16.79
Helpers, Electricians				
47-3013	5,300	5,600	160	\$12.32 to \$19.21
Helpers, Painters, Paperhangers, Plasterers, and Stucco Masons				
47-3014	3,400	3,500	100	\$9.93 to \$13.06
Helpers, Pipelayers, Plumbers, Pipefitters, and Steamfitters				
47-3015	7,600	8,700	300	\$12.23 to \$15.88
Helpers, Roofers				
47-3016	1,600	1,700	50	\$10.99 to \$15.99
Helpers, Construction Trades, (All Other)				
47-3019	1,600	1,900	70	\$11.06 to \$18.30

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

This group of occupations as a whole will have a slower than average growth rate during the 2006–2016 projections period. However, employment in the Specialty Trade Contractors industry will grow faster than average compared with all occupations in California.

There is a bright spot on the horizon. The movement toward greening the construction industry should increase the need for Construction Trades Helpers in the future. New construction and retrofit projects on existing buildings in an effort to achieve Leadership in Energy and Environmental Design (LEED) certification will require the skills of Construction Trades Helpers.

Training/Requirements/Apprenticeships

Construction Trades Helpers usually follow one of the following training paths:

- ▶ Vocational school
- ▶ Extensive on-the-job training

A high school diploma or its equivalent is required for Construction Trades Helpers jobs.

Construction Trades Helpers

Recommended High School Course Work

Recommended high school classes are mathematics and shop.

Where Do I Find the Job?

Labor unions and apprenticeship councils are good places to start a job search. Direct application to employers is an effective job search method for Construction Trades Helpers.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Employment Placement Agencies
- ▶ Hardware Stores
- ▶ Home Centers
- ▶ Industrial Building
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Other Building Material Dealers
- ▶ Paint and Wallpaper Stores
- ▶ Professional Employer Organizations
- ▶ Residential Remodelers
- ▶ Temporary Help Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Construction Clean-Up Contractors
- ▶ Construction Consultants
- ▶ Construction Management

Where Can The Job Lead?

Possible career paths for advancement include Construction Trade Apprentice, Journey-Level Construction Worker, Estimator, and Construction Supervisor.

Other Sources of Information

Laborers' International Union of North America
www.liuna.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Department of Consumer Affairs, Contractors State Licensing Board
www.cslb.ca.gov

Drywall and Ceiling Tile Installers

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Drywall Installers



Ceiling Tile Installers

What They Do

While the wood or steel framing parts carry a building's load, the structural parts of a building are generally covered to provide an attractive living or working space. Years ago, many interior surfaces were covered by wooden lath and plaster. However, most interior spaces today are covered by drywall, which comes in panels of gypsum covered on both sides by heavy paper. These panels go up much more quickly than lath and plaster, saving money during construction.

Ceiling tile is generally used in commercial construction, and is only occasionally used in houses. It serves the same purpose as drywall although it can have greater sound and heat insulation properties.

Only minor changes in techniques and materials have occurred in the past several decades. The traditional metal edging used to reinforce corners has been joined by paper or plastic corners that are round, leading to a different look. However, application techniques are largely unchanged.

Attaching these drywall panels to walls and ceilings, and ceiling tiles to ceilings, is the work of the Drywall and Ceiling Tile Installer.

Tasks

- ▶ Trim rough edges from wallboard to maintain even joints, using knife.
- ▶ Fit and fasten wallboard or Sheetrock into specified position, using hand tools, portable power tools, or adhesive.
- ▶ Measure and mark cutting lines on framing, drywall, and trim, using tape measure, straightedge or square, and marking devices.
- ▶ Install blanket insulation between studs and tacks plastic moisture barrier over insulation.
- ▶ Remove plaster, drywall, or paneling, using crowbar and hammer.
- ▶ Assemble and install metal framing and decorative trim for windows, doorways, and bents.
- ▶ Read blueprints and other specifications to determine method of installation, work procedures, and material and tool requirements.

Drywall and Ceiling Tile Installers

- ▶ Lay out reference lines and points, computes position of framing and furring channels, and marks position, using chalk line.
- ▶ Suspend angle iron grid and channel iron from ceiling, using wire.
- ▶ Install horizontal and vertical metal or wooden studs for attachment of wallboard on interior walls, using hand tools.

Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Installation — Installing equipment, machines, wiring, or programs to meet specifications.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Explosive Strength — The ability to use short bursts of muscle force to propel oneself (as in jumping or sprinting), or to throw an object.
- ▶ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Control Precision — The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- ▶ Wrist-Finger Speed — The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.

Work Environment

Unlike some construction jobs, Drywall Installers generally work indoors, protected from the weather. This means that Drywall Installers can work when it is raining, snowing, hot, or cold. Sometimes, weather conditions do affect joint compound application and texturing techniques. Hot weather can mean that joint compound will dry quickly, and in some cases cracking in some areas as the compound dries too fast. Cold, damp weather can make the joint compound dry very slowly, affecting scheduling. Installers often will use special mixtures or different techniques to cope with very hot or very cold temperatures.

Drywall Installers work a standard 40-hour week, but the work week may sometimes be longer. Workers who are paid hourly rates may receive premium pay for overtime.

Drywall and Ceiling Tile Installers

Some drywall workers belong to the United Brotherhood of Carpenters and Joiners of America (www.carpenters.org) or International Union of Painters and Allied Trades (www.iupat.org). However, most Drywall Installers in California are not members of a trade union.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Drywall and Ceiling Tile Installers				
47-2081	49,500	53,900	1,120	\$19.34 to \$27.83

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Over the next decade, the employment of Drywall and Ceiling Tile Installers is expected to grow at a slower than average rate compared with all occupations in California. However, most new construction or remodeling projects will use drywall or ceiling tiles to finish walls and ceilings.

Training/Requirements/Apprenticeships

Drywall Installers usually follow one of the following training paths:

- ▶ Formal, three- to four-year apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Most Drywall Installers learn the trade on the job. They start learning trade by helping experienced workers, first by cleaning the jobsite, carrying drywall panels, and lifting them into place, and holding them while Installers nail or screw the panels to walls or ceilings. Soon after, they may be given the task of measuring and cutting panels to size, and drilling or cutting holes in them for plumbing lines, or other obstacles. After that they learn how to attach the drywall, and tape seams, corners, and to apply the embedding compound. Eventually, they can master all the skills of the professional Drywall Installer including texturing, hanging ceiling panels, and estimating the costs of a drywall job.

Recommended High School Course Work

Most employers prefer applicants who have at least a high school diploma or equivalent. High school preparation should include courses in shop, basic mathematics, and English.

Where Do I Find the Job?

Direct inquiry with an employer is probably the best way to find a job for both the experienced and inexperienced job applicant. Going out to a construction site may also provide leads as to who is hiring in the area. Union Drywall Installers can go through their local union hall.

Drywall and Ceiling Tile Installers

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Employment Placement Agencies
- ▶ Industrial Building
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Professional Employer Organizations
- ▶ Residential Remodelers
- ▶ Temporary Help Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Contractors
- ▶ Drywall Contractors
- ▶ General Contractors

Where Can The Job Lead?

Generally, the Drywall Installer begins as a helper and moves up to full journey-level after several years of experience. From there, the Installer may move up to a foreman or manager level worker. In larger firms, he or she may become an estimator. Some Drywall Installers become contractors and open their own businesses.

Other Sources of Information

Associated Builders and Contractors
www.abc.org

National Association of Home Builders
www.nahb.org

Home Builders Institute
www.hbi.org

International Union of Painters and Allied Trades
www.iupat.org

United Brotherhood of Carpenters and Joiners of America
www.carpenters.org

California Department of Industrial Relations
www.dir.ca.gov

California Department of Consumer Affairs, Contractors State Licensing Board
www.cslb.ca.gov

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What They Do

Drafters prepare technical drawings and plans used by production and construction workers to build everything from manufactured products such as toys, toasters, industrial machinery, or spacecraft, to structures such as houses, office buildings, or oil and gas pipelines. Their drawings provide visual guidelines, showing the technical details of the products and structures and specifying dimensions, materials to be used, and procedures and processes to be followed. Drafters fill in the details using drawings, rough sketches, specifications, codes, and calculations previously made by engineers, surveyors, architects, or scientists.

Electrical Drafters make wiring diagrams and schematics of electrical circuits for use by those who install and repair electrical systems such as those found in buildings, communication centers, and power plants. Most Electrical Drafters use computer-aided drafting (CAD) systems to prepare drawings.

Electronic Drafters make drawings of the layout and schematics of electronic devices and components. They may specialize in the drafting of drawings used to make one or several related types of devices or components or they may be involved with many kinds of electronic items. Most Electronic Drafters use computer-aided drafting (CAD) systems to prepare drawings.

Mechanical Drafters use computer-aided drafting (CAD) systems to prepare drawings. These systems permit them to easily and quickly prepare variations of a design. They use their knowledge of engineering and manufacturing theory and standards to draw the parts of a machine in order to determine design elements such as the number and kind of fasteners needed to assemble it. Despite the near-universal use of CAD systems, manual drafting using pencils, pens, compasses, protractors, triangles, and other drafting devices is still used in certain applications.

Tasks

Electrical Drafters

- ▶ Study work order requests to determine type of service demanded, such as lighting or power.
- ▶ Visit proposed installation sites and draw rough sketches of location.
- ▶ Assemble documentation packages and produce drawing sets which are then checked by an engineer or an architect.
- ▶ Confer with engineering staff and other personnel to resolve problems.
- ▶ Draft working drawings, wiring diagrams, wiring connection specifications or cross-sections of underground cables, as required for instructions to installation crew.

Electrical, Electronic, and Mechanical Drafters

- ▶ Draw master sketches to scale showing relation of proposed installations to existing facilities and exact specifications and dimensions.
- ▶ Measure factors that affect installation and arrangement of equipment, such as distances to be spanned by wire and cable.

Electronic Drafters

- ▶ Compare logic element configuration on display screen with engineering schematics and calculate figures to convert, redesign, and modify element.
- ▶ Consult with engineers to discuss and interpret design concepts, and determine requirements of detailed working drawings.
- ▶ Draft detail and assembly drawings of design components, circuitry and printed circuit boards, using computer-assisted equipment or standard drafting techniques and devices.
- ▶ Examine electronic schematics and supporting documents to develop, compute, and verify specifications for drafting data, such as configuration of parts, dimensions, and tolerances.
- ▶ Key and program specified commands and engineering specifications into computer system to change functions and test final layout.
- ▶ Plot electrical test points on layout sheets, and draw schematics for wiring test fixture heads to frames.
- ▶ Review work orders and procedural manuals and confer with vendors and design staff to resolve problems and modify designs.

Mechanical Drafters

- ▶ Develop detailed design drawings and specifications for mechanical equipment, dies/tools, and controls, using computer-assisted drafting (CAD) equipment.
- ▶ Coordinate with and consult other workers to design, lay out, or detail components and systems and to resolve design or other problems.
- ▶ Review and analyze specifications, sketches, drawings, ideas, and related data to assess factors affecting component designs and the procedures and instructions to be followed.
- ▶ Compute mathematical formulas to develop and design detailed specifications for components or machinery, using computer-assisted drafting programs.
- ▶ Position instructions and comments onto drawings.
- ▶ Modify and revise designs to correct operating deficiencies or to reduce production problems.
- ▶ Design scale or full-size blueprints of specialty items, such as furniture and automobile body or chassis components.

Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

Electrical, Electronic, and Mechanical Drafters

- ▶ Engineering and Technology — (Electronics Drafters) Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Physics — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub-atomic structures and processes.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Instructing — Teaching others how to do something.
- ▶ Technology Design — Generating or adapting equipment and technology to serve user needs.
- ▶ Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Operations Analysis — Analyzing needs and product requirements to create a design.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ▶ Written Comprehension — The ability to read and understand information and ideas presented in writing.

Work Environment

Drafters usually work in well-furnished offices. They mostly work at computer terminals, although some may sit at adjustable drawing boards or drafting tables when doing manual drawings. Drafters often spend long periods of time in front of computers doing detailed work, which can cause eyestrain, back discomfort, and hand and wrist problems. They sometimes are required to travel to construction sites or other locations to gather additional information concerning a particular project that requires more detail.

Most Drafters work a standard 40-hour workweek. Occasionally, long or irregular hours may be necessary to meet special project deadlines.

Electrical, Electronic, and Mechanical Drafters

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupations across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Electrical and Electronic Drafters				
.....17-3012.....	3,900.....	4,100.....	130.....	\$20.25 to \$33.37.....
Mechanical Drafters				
.....17-3013.....	3,900.....	4,200.....	140.....	\$19.12 to \$30.89.....

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

The projected job growth for Electrical and Electronic Drafters is expected to grow slower than average compared to all occupations between 2004 and 2014. The projected growth for Mechanical Drafters is expected to grow at a slower than average rate for the same time period. The need for more Drafters is expected in the computer systems design and services industry sector, as well as temporary help agencies; however, most new job opportunities will come from a need to replace Drafters who retire or leave for other types of work. Opportunities will be best for individuals who have at least two years of post-secondary training in a drafting program, can demonstrate strong technical skills, and who have considerable skill and experience using current CAD systems.

Training/Requirements/Apprenticeships

Employers prefer applicants who have completed training programs in drafting from adult education, community college, private post-secondary, or four-year college training programs. Common program titles used in California are Electrical/Electronics Drafting & Electrical/Electronics CAD; Architectural Drafting and Architectural CAD; Automotive Engineering Technology/Technician; CAD Drafting and/or Design Technology/Technician; and Civil Drafting and Civil Engineering CAD/CADD. Technical training and experience obtained in the armed forces can sometimes be applied toward civilian drafting jobs. Go to the LaborMarketInfo Web site www.labormarketinfo.edd.ca.gov to locate training programs in your area.

Employers are most interested in applicants who have knowledge of drafting standards, mathematics, science, and engineering technology, plus a solid background in computer-aided drafting and design programs such as AutoCAD, LDD, or TurboCAD.

Interpersonal and problem-solving skills are important, as Drafters often work closely with engineers, surveyors, architects, other professionals, and sometimes customers. The American Design Drafting Association (ADDA) has established a certification program for drafters. Although Drafters are not required to be certified by employers, certification demonstrates the understanding of nationally recognized practices and that knowledge standards have been met. Individuals who wish to become certified must pass the Drafters Certification Test, which is administered periodically at ADDA-authorized test sites.

Electrical, Electronic, and Mechanical Drafters

Recommended High School Course Work

High school students interested in this career should take math, science, computer technology, computer graphics, electronics, and drafting courses.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Architectural Services
- ▶ Building Inspection Services
- ▶ Computer Systems Design Services
- ▶ Custom Computer Programming Services
- ▶ Drafting Services
- ▶ Electricity & Signal Testing Instruments
- ▶ Engineering Services
- ▶ Industrial Process Variable Instruments
- ▶ Landscape Architectural Services
- ▶ Other Surveying and Mapping Services
- ▶ Search, Detection, & Navigation Instruments
- ▶ Testing Laboratories

Search these **yellow page** headings for listings of private firms:

- ▶ Architects
- ▶ CAD Systems & Services
- ▶ Computer Graphics & Digital Imaging
- ▶ Drafting Services
- ▶ Engineers-Consulting
- ▶ Engineers-Mechanical
- ▶ Graphic Designers
- ▶ Graphic Services

School placement offices often help students find jobs. Beginning drafters can apply to the personnel departments of large manufacturing, engineering, or contracting firms. Newspapers, professional journals, trade publications, and the Internet may list openings.

Where Can the Job Lead?

Drafters have many opportunities to move upward or into related occupations. Related specialties include engineering technicians, land surveyors, map editors, technical illustrators, tool designers, and cartographers. Each specialty can open opportunities for advancement to a Senior Draftsman level or even Engineering Technician.

Other Sources of Information

American Design Drafting Association
www.adda.org

Accrediting Commission of Career Schools and Colleges of Technology
www.accsct.org

Skills USA
www.skillsusa.org

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[View Career Video](#)

What They Do

Electricians do electrical work required in the building and remodeling of structures. Electricians need good mechanical ability; a thorough knowledge of the principles of electricity, circuitry, and power distribution within a building; and familiarity with the materials and techniques of construction. On small jobs they may work alone with minimal supervision, and they may supervise an apprentice. On large jobs they may work under the direction of the electrician supervisor or superintendent.

Maintenance Electricians typically work in large industrial buildings, commercial establishments, and production or processing plants. Maintenance Electricians perform most of their work in preventive maintenance and repairing electrical systems rather than installing new systems. When a breakdown occurs, they must diagnose and locate the cause, correct the problem, and restore service quickly. In hospitals, hotels, and public buildings, Electricians must operate and maintain emergency generators in the event of power failure.

Tasks

- ▶ Assemble, install, test, and maintain electrical or electronic wiring, equipment, appliances, apparatus, and fixtures, using hand tools and power tools.
- ▶ Diagnose malfunctioning systems, apparatus, components, using test equipment and hand tools, to locate the cause of a breakdown and correct the problem.
- ▶ Connect wires to circuit breakers, transformers, or other components.
- ▶ Inspect electrical systems, equipment, and components to identify hazards, defects, and the need for adjustment or repair, and to ensure compliance with codes.
- ▶ Advise management on whether continued operation of equipment could be hazardous.
- ▶ Test electrical systems and continuity of circuits in electrical wiring, equipment, and fixtures, using testing devices such as ohmmeters, voltmeters, and oscilloscopes, to ensure compatibility and safety of system.
- ▶ Maintain current electrician's license or identification card to meet governmental regulations.
- ▶ Plan layout and installation of electrical wiring, equipment and fixtures, based on job specifications and local codes.
- ▶ Direct and train workers to install, maintain, or repair electrical wiring, equipment, and fixtures.

Electricians

- ▶ Prepare sketches or follow blueprints to determine the location of wiring and equipment and to ensure conformance to building and safety codes.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ▶ Troubleshooting — Determining causes of operating errors and deciding what to do about it.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Finger Dexterity — The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).

Work Environment

Electricians on construction sites work outdoors surrounded by noise. When working in old buildings, they may have to deal with dirt, cramped spaces, and poor ventilation. They may have to dig trenches to lay conduit. Maintenance Electricians usually work in finished buildings, which can be clean, air-conditioned offices or noisy, dirty factories. Electricians risk falls from ladders, scaffolds, and roofs. They risk injury from electrical shock, which can be fatal. To avoid injury, they must adhere to strict safety procedures.

The standard work week is generally 32 to 40 hours as determined by contract or company policy. Companies that operate 24-hours-a-day may require evening and graveyard shiftwork. Any overtime, weekend, and holiday work is also governed by contract or company policy. Most Electricians are members of the International Brotherhood of Electrical Workers.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Electricians				
47-2111	68,300	75,300	2,460	\$18.76 to \$33.98

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacement.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

This occupation will have a slower than average growth rate during the 2006–2016 projection period. The demand for Maintenance Electricians should be more stable overall during the same period of time.

There is a bright spot on the horizon. The movement toward greening the construction industry may increase the need for Electricians in the future. New construction and retrofit projects on existing buildings in an effort to achieve Leadership in Energy and Environmental Design (LEED) certification will require the skills of experienced Electricians. Also, Electricians will be needed for green activities such as solar panel and wind turbine installation and repair.

Training/Requirements/Apprenticeships

Electricians usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Vocational school
- ▶ Community college programs or certificates
- ▶ Extensive on-the-job training

The apprenticeship program consists of 7,200 to 8,000 hours of combined on-the-job and classroom training. Candidates must be at least 18-years old and have a high school diploma. Upon completion of the program, they receive a “Certificate of Completion” from the California Division of Apprenticeship Standards.

Another method of entry into this occupation is completion of an electrical construction and maintenance program at a vocational or trade college. Graduates work as trainees, gaining journey-level status from six months to two years. Some cities and counties require Electricians to be licensed.

Recommended High School Course Work

Completion of two semesters of algebra with a passing grade is highly desirable but one semester is usually required. Other recommended high school classes are physics, blueprint reading, and shop.

Where Do I Find the Job?

Candidates for training or apprenticeship programs should apply to one of the several unions for Electricians. Direct application to employers is an effective job search method for journey-level Electricians. Community colleges throughout California also provide training for Electricians.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Elementary and Secondary Schools
- ▶ Employment Placement Agencies
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Oil and Gas Pipeline
- ▶ Power/Communication System
- ▶ Professional Employer Organizations
- ▶ Residential Remodelers
- ▶ Temporary Help Services
- ▶ Water and Sewer System

Electricians

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Electric Contractors
- ▶ Electric Contractors-Comm. & Ind.
- ▶ Electric Equipment Service and Repair
- ▶ Electric Service and Utility Providers
- ▶ Electrical Consulting
- ▶ Electrical Power Systems-Testing
- ▶ Energy Consulting and Documentation
- ▶ Home Repair and Maintenance

Where Can The Job Lead?

Journey-level Electricians can advance to the positions of leadperson supervisor, chief electrician, or superintendent. Others work as trade or vocational school instructors, building supply sales representatives, electrical inspectors, or estimators.

Electricians may go into business as electrical contractors. Businesses involved in electrical contracting need licensing from the Contractors State Licensing Board of the California State Department of Consumer Affairs.

Other Sources of Information

International Brotherhood of Electrical Workers
www.ibew.org

Western Electrical Contractors Association
www.weca-iec.org

Associated Builders and Contractors
www.abc.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Department of Consumer Affairs, Contractors State Licensing Board
www.cslb.ca.gov

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What They Do

First-Line Supervisors/Managers of Construction Trades and Extraction Workers are commonly referred to as “the boss” by most construction workers, regardless of their specific trade. Sometimes going by the title of foreman or forewoman, they directly supervise and coordinate activities of construction trades workers and their helpers. Construction Supervisors lay out construction sites and assign workers to specific jobs. In smaller companies, they function as both supervisors and managers, doing accounting, marketing, personnel work, and in some cases, engage in the same construction trade work as the people they supervise. They order supplies and equipment. Supervisors discuss prices and details of the work with customers. They interpret design plans for other workers and inspect their work.

Tasks

- ▶ Supervise and coordinate activities of construction trades workers.
- ▶ Direct and lead workers engaged in construction activities.
- ▶ Assign work to employees, using material and worker requirements data.
- ▶ Confer with staff and worker to ensure production and personnel problems are resolved.
- ▶ Suggest and initiate personnel actions, such as promotions, transfers, and hires.
- ▶ Analyze and resolve worker problems and recommend motivational plans.
- ▶ Examine and inspect work progress, equipment and construction sites to verify safety and ensure that specifications are met.
- ▶ Estimate material and worker requirements to complete job.
- ▶ Read specifications, such as blueprints and data, to determine construction requirements.
- ▶ Analyze and plan installation and construction of equipment and structures.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Important Skills, Knowledge, and Abilities

- ▶ Coordination — Adjusting actions in relation to others' actions.
- ▶ Management of Personnel Resources — Motivating, developing, and directing people as they work, identifying the best people for the job.
- ▶ Time Management — Managing one's own time and the time of others.

First-Line Supervisors/ Managers of Construction Trades & Extraction Workers

- ▶ Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Personnel and Human Resources — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.
- ▶ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ▶ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ▶ Written Comprehension — The ability to read and understand information and ideas presented in writing.

Work Environment

Construction Supervisors sometimes work outdoors in severe weather conditions. At construction sites they may be exposed to potentially dangerous equipment, hazardous debris, and heavy falling objects, and are required to wear safety gear such as hardhats and safety glasses. Construction Supervisors may be exposed to uncomfortably high noise levels.

Most Construction Supervisors work a 40-hour week, but in some cases may work overtime, as well as weekends and holidays. Most Construction Supervisors work at only one site at a time, but some may also have responsibilities at multiple-sites. They are often at work before other workers arrive and after they leave. Construction Supervisors may be on-call in case of emergencies.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
First-Line Supervisors/Managers of Construction Trades and Extraction Workers				
47-1011	86,300	96,600	2,240	\$27.73 to \$42.39

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment for First-Line Supervisors/Managers of Construction Trades and Extraction Workers is expected to grow slower than average for all occupations in California. Employment of Construction Trades Supervisors, like that of many other construction workers, is sensitive to the fluctuations of the economy. Workers in these trades may experience periods of unemployment when the overall level of construction falls. Employment opportunities are best when the local economy is healthy. The majority of job openings each year will occur due to the need to replace workers who retire, transfer to other occupations, or leave the labor force altogether.

The greening of the Construction Industry may increase the future need for Construction Trades Supervisors on Leadership in Energy and Environmental Design (LEED) construction projects.

Training/Requirements/Apprenticeships

Construction Supervisors must complete an apprenticeship program in a construction trade. (More information on apprenticeship programs can be obtained from local unions and the nearest office of the California Department of Industrial Relations, Division of Apprenticeship Standards.) In addition, they must work for a few years in trades such as carpentry or plumbing.

Workers in these positions are often drawn from the ranks of the trades workers and include workers who have been in the industry for many years, have worked their way up to manager or supervisor, and have extensive experience in the industry. For these jobs, work experience is currently more important to employers than formal education such as a bachelor's degree.

Employers also emphasize the ability to motivate employees, maintain high morale, and command respect. In addition, well-rounded applicants who are able to deal with different situations and a diverse work force are desired.

Some Construction Supervisors are required to have a professional license. For example, Construction Supervisors who supervise plumbers often need a plumbing license from the State Contractors Licensing Board.

Recommended High School Course Work

Completion of high school is often the minimum educational requirement to become a Construction Supervisor. High school preparation should include courses in drafting, algebra, geometry, and English.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Public sector openings are listed in personnel/human resource departments of cities and counties. The State Personnel Board posts job opportunities with the State of California on their Web site at www.spb.ca.gov.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Highway, Street, and Bridge
- ▶ New Single-Family Housing
- ▶ Oil and Gas Pipeline

First-Line Supervisors/ Managers of Construction Trades & Extraction Workers

- ▶ Industrial Building
- ▶ Land Subdivision
- ▶ New Multifamily Housing
- ▶ Power/Communication System
- ▶ Residential Remodelers
- ▶ Water and Sewer System

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Construction Consultants
- ▶ Construction Management

Where Can The Job Lead?

In the construction industry, Construction Supervisors increasingly need a degree in construction management or engineering if they expect to advance to project manager, operations manager, or general superintendent. Some use their skills and experience to start their own construction contracting firms.

Other Sources of Information

American Institute of Constructors, Constructors Certification Commission
www.constructorcertification.org

Construction Management Association of America
www.cmaanet.org

American Council for Construction Education
www.acce-hq.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Department of Consumer Affairs, Contractors State Licensing Board
www.cslb.ca.gov

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What They Do

Carpet, tile, hardwood flooring, vinyl or linoleum, and other types of floor coverings are often used in residences and commercial buildings where comfort and appearance is important. Carpet, floor, and tile installers and finishers lay these floor coverings in homes, offices, hospitals, stores, restaurants, and many other types of buildings. Tile also is installed on walls and ceilings and is covered in the Tile Setters guide (see page).

Each specialty construction trade covered in this guide has its own methods of installation and many contractors only do one type of installation. Some install both carpet and vinyl floor coverings. However, laying hardwood floors is usually done by a specialist who works principally in laying wood floors.

Before any type of floor covering is applied, installers make sure the subfloor or other area to be covered is in good condition, level, and smooth. If holes and other irregularities are present, they must fill them in with patching or leveling compound. They may take out high spots in the surface by cutting them out or sanding them down. Some materials, such as old linoleum or vinyl floors, must never be sanded because they contain asbestos.

Once the floor area is smooth, they measure the area to be covered, and rough cut the carpet or vinyl to fit, leaving some overlap that will be cut away later. When applying a wood floor, a pattern must be chosen that will look attractive, satisfy the customer, and work well with the space available. When carpet is applied, a soft cushion of 'rebond' or other padding material is either stapled or glued down. Next, the carpet, vinyl, or wood flooring is laid down. Most carpet is attached through the use of tackless strips, which have been nailed to the floor beforehand to hold it in place.

Floor installers use hand tools such as hammers, drills, staple guns, carpet knives, linoleum knives, rubber mallets, power saws, trowels, utility knives, nail setters, and power nailers.

Tasks

- ▶ Apply adhesive cement to floor or wall and glue carpet or vinyl down.
- ▶ Cut covering and foundation materials, according to blueprints and sketches.
- ▶ Cut flooring material to fit around obstructions.

Floor Covering Installers

- ▶ Determine traffic areas and decide location of seams in both carpet and vinyl.
- ▶ Plan an attractive wood floor pattern that will fit the room well.
- ▶ Form a smooth foundation by stapling plywood or Masonite over the floor or by brushing waterproof compound onto surface and filling cracks with plaster, putty, or grout to seal pores.
- ▶ Heat and soften floor covering materials to patch cracks or fit floor coverings around irregular surfaces, using blowtorch.
- ▶ Inspect surface to be covered to ensure that it is firm and dry.
- ▶ Lay out, position, and apply shock-absorbing, sound-deadening, or decorative coverings to floors, walls, and cabinets, following guidelines to keep courses straight and create designs.
- ▶ Measure and mark guidelines on surfaces or foundations, using chalk lines and dividers.
- ▶ Remove excess cement to clean finished surface.

Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Installation — Installing equipment, machines, wiring, or programs to meet specifications.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Extent Flexibility — The ability to bend, stretch, twist, or reach with your body, arms, and/or legs.

Work Environment

Floor Covering Installers can work year-round since virtually all of their work is done inside a building. The floors in a building are usually one of the last things put into a building, so exposure to dust and other construction debris is usually not as much of a problem as with other construction trades. That's not to say that the jobsite is always comfortable. The building may not be heated or cooled, construction equipment can be noisy, and floors must be protected during and after installation from being damaged by other workers on site.

Shift work is not common in this occupation unless overtime is required to meet a deadline. Most Floor Covering Installers work a standard day shift. Some Floor Covering Installers are members of a labor union, however, most are not.

Floor Covering Installers

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupations across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Floor Layers, Except Carpet, Wood and Hard Tiles				
47-2042	8,200	7,300	120	\$14.11 to \$24.26
Carpet Installers				
47-2041	16,300	16,500	260	\$14.93 to \$24.95

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment for Floor Covering Installers will grow slower than average over the next few years. During economic downturns, workers are subject to layoffs or reductions in hours. However, employment opportunities will still continue due to a need to replace workers who transfer to other occupations, retire, or leave the labor force for other reasons. Also, carpets and other floor coverings are needed in both new construction and in remodeling projects so employment can remain stable even if the pace of new construction falls off a bit.

Modern consumers are demanding more choices in floor coverings than a decade or two ago. No longer are the choices between linoleum, hardwood flooring, or wall-to-wall carpeting. Now, some floors are covered with imported marble tiles, exotic hardwoods, or even prefabricated wood flooring systems. Some homeowners are choosing wood that has been salvaged from old barns or industrial buildings. Bamboo is also a recent choice in floor coverings; so is wood from palm trees. Even cork flooring is making a comeback. All of these choices open up more job possibilities for the skilled Floor Covering Installer.

Training/Requirements/Apprenticeships

Floor Covering Installers usually follow one of the following training paths:

- ▶ Formal, three to four-year apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Many people learn the trade by working with a journey-level Floor Covering Installer on the job. They usually help out by carrying materials, mixing floor-leveling compound, or lugging buckets of adhesives to the job site. They also rip up old flooring materials, haul debris to be disposed, and prepare the surface before the installation of the new floor covering. They also clean up after the job is completed.

An apprenticeship program may be available in parts of California. These programs last three or four years. Information on apprenticeship programs can be found at www.dir.ca.gov.

Recommended High School Course Work

Most employers prefer applicants who have at least a high school diploma or equivalent. High school preparation should include courses in shop, basic mathematics, and English.

Floor Covering Installers

Where Do I Find the Job?

Applying directly to an employer is a good way of finding a job in this industry. Sometimes larger construction companies that specialize in remodeling will have openings. Union Floor Covering Installers can contact their local union hall for jobs that might be available.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Floor Covering Stores
- ▶ All Other Home Furnishing Stores
- ▶ Window Treatment Stores

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Contractors, Commercial/Industrial
- ▶ Building Contractors, General
- ▶ Carpeting
- ▶ Floor Laying
- ▶ Floor Refinishing
- ▶ Floor Resurfacing
- ▶ Linoleum
- ▶ Wood Flooring

Where Can The Job Lead?

Beginning Floor Covering Installers can increase their income as their skills increase. Once they have proven themselves on the job, they can handle more responsibility and generally increase their productivity, which makes them more valued employees. However, because many employers are relatively small, promotional opportunities within a company may be limited.

Some Floor Covering Installers start their own businesses or become estimators, salespeople, or managers in larger companies.

Other Sources of Information

Floor Covering Installation Contractors Association
www.fcica.com

National Tile Contractors Association
www.tile-assn.com

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

California Department of Industrial Relations
www.dir.ca.gov

International Union of Painters and Allied Trades
www.iupat.org

United Brotherhood of Carpenters and Joiners of America
www.carpenters.org

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What They Do

Glaziers select, cut, assemble, and install all makes and kinds of glass, and perform a variety of related tasks. In a shop setting, Glaziers build metal sash and moldings using aluminum or steel framing. The metal is cut and shaped for storefront facings; entrances in commercial, office, and factory buildings; and glass doors and windows of all types.

At a construction site, Glaziers attach the formed metal moldings to the building. The job is finished by fitting in the glass and, if necessary, attaching face moldings, weather seals, or hardware, and adjusting door or window operation. Less skill is required of Glaziers installing prefabricated glass products that are increasingly used in building construction. Although some Glaziers may specialize in jobs such as installation of tub or shower doors, many learn to handle all the different types of glass installation and the special problems presented by each.

Tasks

- ▶ Assemble, fit, and attach metal-framed glass enclosures for showers or bathtubs to couplings, and glass enclosures for showers or bathtubs to framing around bath enclosure.
- ▶ Measure mirror and dimensions of area to be covered and determine plumb of walls or ceilings, using plumb-line and level.
- ▶ Attach mounting strips and moldings to surface and apply mastic cement, putty, or screws to secure mirrors into position.
- ▶ Cover mirrors with protective material to prevent damage.
- ▶ Drive truck to installation site and unload mirrors, equipment, and tools.
- ▶ Move furniture to clear work site and covers floors and furnishings with drop cloths.
- ▶ Load and arrange mirrors on truck, following sequence of deliveries.
- ▶ Measure, cut, fit, and press antiglare adhesive film to glass or spray glass with tinting solution to prevent light glare.
- ▶ Fasten glass panes into wood sash and spread and smooth putty around edge of pane with knife to seal joints.
- ▶ Install pre-assembled framework for windows or doors designed to be fitted with glass panels, including stained glass windows, using hand tools.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Glaziers

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Installation — Installing equipment, machines, wiring or programs to meet specifications.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.

Work Environment

Glaziers often work outdoors. They do a considerable amount of bending, kneeling, lifting, and standing. Minor cuts from glass edges and sharp tools are common in this occupation. Safety training given by employers and unions have helped reduce the incidence of severe cuts. Glaziers also face the danger of falls from scaffolding and the possibility of injury from lifting.

This occupation is heavily unionized in commercial construction, and some jobs in retail are also under union contract. Union membership is high in big cities such as San Francisco and Los Angeles. Many workers belong to the Glaziers and Glass Workers Union of the Brotherhood of Painters and Allied Trades.

Most Glaziers work 40 hours a week. However, some union locals have negotiated alternating 32 and 40 hour weeks. Overtime may be necessary during the peak construction periods.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Glaziers				
47-2121	7,500	8,300	210	\$15.11 to \$29.45

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment for Glaziers is expected to grow slower than average for all occupations in California through 2016. Employment in this occupation is highly sensitive to economic cycles. During economic downturns, workers are subject to layoffs or reductions in hours. However, employment opportunities will still exist due to the need to replace workers who transfer to other occupations, retire, or leave the labor force for other reasons.

The greening of the construction industry should increase the need for glaziers for weatherization and insulation activities such as installing weather stripping and dual pane windows.

Training/Requirements/Apprenticeships

Glaziers usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Extensive on-the-job training
- ▶ Vocational school

Completion of a four-year apprenticeship is the usual way to become a Glazier. To be eligible for apprenticeship, the applicant must be at least 17 and a high school graduate or its equivalent, with adequate grades in mathematics and a passing score on an aptitude test. Upon being accepted into a program, apprentices attend evening trade classes at local schools. Journey-level workers keep current by studying manufacturers' manuals.

Recommended High School Course Work

Besides mathematics, helpful high school classes include mechanical drawing, metalshop, and woodshop.

Where Do I Find the Job?

Candidates for training or apprenticeship programs should apply to a union local for Glaziers. Direct application to employers is an effective job search method for journey-level Glaziers.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Automotive Body and Interior Repair
- ▶ Car Washes
- ▶ Fabricated Structural Metal Mfg.
- ▶ General Automotive Repair
- ▶ Hardware Stores
- ▶ Home Centers
- ▶ Metal Window and Door Manufacturing
- ▶ Ornamental and Architectural Metal Work
- ▶ Other Automotive Mechanical Repair
- ▶ Other Building Material Dealers
- ▶ Paint and Wallpaper Stores
- ▶ Sheet Metal Work Manufacturing

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Glass-Plate & Window
- ▶ Glaziers
- ▶ Shower Doors & Tub Enclosures
- ▶ Windows-Aluminum & Metal
- ▶ Windows-Repair & Installation
- ▶ Windows-Storm
- ▶ Windows-Vinyl
- ▶ Windows-Wood

Glaziers

Where Can The Job Lead?

Journey-level Glaziers can advance to the position of supervisor or they may go into business as glazing contractors. Businesses involved in glazing contracting need licensing from the Contractors State Licensing Board of the California State Department of Consumer Affairs. (See *Other Sources of Information.*)

Other Sources of Information

Glass Association of North America
www.glasswebsite.org

United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry
www.ua.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Department of Consumer Affairs, Contractors State Licensing Board
www.cslb.ca.gov

Highway Maintenance Workers

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What They Do

Highway Maintenance Workers are vital to the safe construction and repair of our roads and highways. Working mainly for California's Department of Transportation (CalTrans) and local governments, they help maintain the thousands of miles of roads, airport runways, and other structures. These workers warn drivers of work or hazards that exist on the road ahead. They generally do this by standing in the roadway ahead of the construction or hazard and using flags or signs to slow or stop traffic. They communicate with other maintenance and flag workers using hand signals or radios. They also do a variety of tasks to maintain road surfaces, airports runways, bridges, tunnels, and adjacent areas.

Tasks

- ▶ Flag motorists to warn them of obstacles or repair work ahead.
- ▶ Set out signs and cones around work areas to divert traffic.
- ▶ Drive trucks or tractors with adjustable attachments to sweep debris from paved surfaces, mow grass and weeds, and remove snow and ice.
- ▶ Dump, spread, and tamp asphalt, using pneumatic tampers, to repair joints and patch broken pavement.
- ▶ Drive trucks to transport crews and equipment to work sites.
- ▶ Inspect, clean, and repair drainage systems, bridges, tunnels, and other structures.
- ▶ Haul and spread sand, gravel, and clay to fill washouts and repair road shoulders.
- ▶ Erect, install, or repair guardrails, road shoulders, berms, highway markers, warning signals, and highway lighting, using hand tools and power tools.
- ▶ Remove litter and debris from roadways, including debris from rock and mud slides.
- ▶ Clean and clear debris from culverts, catch basins, drop inlets, ditches, and other drain structures.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Important Skills, Knowledge, and Abilities

- ▶ **Public Safety and Security** — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of

Highway Maintenance Workers

people, data, property, and institutions.

- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Equipment Maintenance — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Speaking — Talking to others to convey information effectively.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.

Work Environment

Highway Maintenance Workers work outside day and night in all types of weather conditions. Workers are subject to sunburn, poison oak, and snake and insect bites. Their work is physically demanding and requires stamina, agility, and strength. Their working conditions are also hazardous because they are working directly in the road or on the side of the road where they are exposed to vehicular traffic. There is also the possibility of injury by working with and around heavy equipment. It is very common for workers to wear safety equipment such as safety shoes, glasses, gloves, ear plugs, hard hats, and life jackets.

Highway Maintenance Workers usually work a standard 40-hour workweek. However, some workers are often called on weekends and nights for emergency road work to repair damage caused by storms or floods. Also, heavily traveled roads may be repaired or resurfaced during the graveyard shift. Most Highway Maintenance Workers who hold union membership are members of the International Union of Operating Engineers (IUOE).

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Highway Maintenance Workers				
47-4051	3,800	4,600	150	\$19.31 to \$28.36

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Highway Maintenance Workers

Trends

The demand for Highway Maintenance Workers is likely to increase at a faster than average pace over the next 10 years. With an expanding population, more traffic on the state's roads mean that more maintenance and repairs will be necessary. Additional new road construction will also be needed to keep pace with the growth in population.

Construction techniques generally change slowly. New machines, new materials, computerization of inventories and repair schedules, and new ways of location finding such as Global Positioning System (GPS) have helped modernize some aspects of highway maintenance, but many of the tools and techniques workers have used for decades remain largely unchanged.

Training/Requirements/Apprenticeships

A high school diploma, while desirable, is not required for this job, but completion of the eighth grade and some experience in the construction or maintenance field improves the chances of employment. The experience requirement may be for as short as six months or up to one year. A good driving record and a valid California driver's license are a must.

Jobs in government have promotional opportunities that are dependent upon meeting civil service requirements. Employment is contingent upon passing a pre-employment physical and drug test.

Recommended High School Course Work

Employers prefer applicants who have at least a high school diploma or equivalent. High school preparation should include courses in shop, basic mathematics, and English.

Where Do I Find the Job?

Heavy construction (roadway) companies are one of the largest employers. State and local governments also employ a sizeable number of Highway Maintenance Workers. Direct application to employers remains one of the most effective job search methods.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Employment Placement Agencies
- ▶ Professional Employer Organizations
- ▶ Highway, Street, and Bridge Construction
- ▶ Temporary Help Services

Search these **yellow page** headings for listings of private firms:

- ▶ Blasting Contractors
- ▶ Pipeline Contractors
- ▶ Parking & Highway Improvement Contractors
- ▶ Sewer Contractors
- ▶ Paving Contractors

Where Can The Job Lead?

Many workers are employed in state or local public works departments. As a worker's skill level increases, he or she is sometimes given greater responsibilities. Eventually, some workers are named crew leader with the responsibility of supervising a small crew. Sometimes, they are able to drive a truck or a piece of heavy equipment such as a loader, compactor, or paver.

Highway Maintenance Workers

Other Sources of Information

California Department of Transportation (CalTrans)

www.dot.ca.gov

International Union of Operating Engineers

www.iuoe.org

America's Career InfoNet

www.acinet.org

Operating Engineers and Other Construction Equipment Operators

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What They Do

Whenever big construction equipment is hard at work, it draws a crowd. Maybe it's just human nature but it seems like everyone likes to watch huge machines bang, crush, smash, pulverize, pound, or demolish whatever is in the way. Taming these monster machines is the job of the Operating Engineers and Other Construction Equipment Operators.

Operating Engineers (also known as Construction Machine Operators) use different types of heavy equipment on construction work sites. Simply put, they use these heavy duty machines to move things around. Most of the time, they dig, scrape, cut, and move dirt, rocks, stones, and boulders. Some equipment is designed to move construction materials from where it is delivered to where the workers need it. Other equipment is designed to smash rocks, boulders, buildings, and other things that need to be demolished. Some equipment is used to crush materials, and still others are made to squeeze, press, and squish material such as asphalt so that it can stick together well and form a solid roadway. These machines include bulldozers, backhoes, graders, trench diggers, excavators, loaders, paving machines, rollers, cranes, pile drivers, pumps, tractors, scrapers, and other machines.

Besides operating the controls of these impressive machines, Operating Engineers also inspect their vehicles for safe operation prior to using them. They also may help set up these machines, perform routine maintenance on them, and make minor repairs.

Tasks

- ▶ Start engine, move throttle, switches, levers, and depress pedals to operate machines, equipment, and attachments.
- ▶ Adjust handwheels and depress pedals to drive machines and control attachments, such as blades, buckets, scrapers, and swing booms.
- ▶ Turn valves to control air and water output of compressors and pumps.
- ▶ Fasten bulldozer blade or other attachment to tractor, using hitches.
- ▶ Align machine, cutterhead, or depth gauge marker with reference stakes and guidelines on ground or position equipment following hand signals of assistant.
- ▶ Connect hydraulic hoses, belts, mechanical linkage, or power takeoff shaft to tractor.
- ▶ Signal operator to guide movement of tractor-drawn machine.

Operating Engineers and Other Construction Equipment Operators

- ▶ Drive equipment in successive passes over working area to achieve specified result, such as grade terrain or remove, dump, or spread earth and rock.
- ▶ Grease, oil, and perform minor repairs on tractor, using grease gun, oil cans, and hand tools.
- ▶ Repair and maintain equipment.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Operation and Control — Controlling operations of equipment or systems.
- ▶ Equipment Maintenance — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- ▶ Repairing — Repairing machines or systems using the needed tools.
- ▶ Operation Monitoring — Watching gauges, dials, or other indicators to make sure a machine is working properly.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Troubleshooting — Determining causes of operating errors and deciding what to do about it.
- ▶ Multilimb Coordination — The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
- ▶ Control Precision — The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

Work Environment

As impressive as some of these large machines are, they can also be dangerous in untrained, inexperienced hands. When a bulldozer rolls over or a ten-story high crane crashes, it's not something that witnesses will soon forget. Thankfully, accidents involving these huge machines are rare. Proper training and appropriate respect for the 'heavy metal' is at least partly responsible for the low death and serious injury rate. Proper operation often requires the use of fellow workers who help guide the machine as it is moving, warning away unobservant people.

Work can slow or even stop when the weather doesn't cooperate. Heavy rain, snow, or high winds can force equipment operators off their machines. Workers are often exposed to the elements and may have to contend with heat, cold, and other unpleasant weather conditions. Some large machines have enclosed cabs that can protect the worker from adverse weather conditions. Some

Operating Engineers and Other Construction Equipment Operators

equipment with cabs offer air-conditioning. However, the worker still must operate his or her machine with regard to weather conditions and adjust operation accordingly.

Operating Engineers usually work 40-hours or more workweek. They frequently work overtime and may work longer on weekdays or work six days a week in good weather or during the summer. Much of their work is done from March through November.

Union membership requirements depend upon whether the contractor in charge of the project has an agreement with the labor union. When union operators are required, Operating Engineers in California belong to the International Union of Operating Engineers. Those working for the government may join a public employee union.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Operating Engineers and Other Construction Equipment Operators				
47-2073.....	34,400.....	39,800.....	1,210.....	\$23.61 to \$37.15.....

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Operating Engineers and Other Construction Equipment Operators will grow at an average rate compared with all other occupations in California. Employment prospects in the field tend to follow construction activity. When there is high demand for housing and commercial buildings, Operating Engineers have a busy schedule. When construction slows, they may work fewer hours or have interrupted work schedules. Overall, however, the future is sound since the rapid population growth in California shows no sign of letting up in the next several decades.

Training/Requirements/Apprenticeships

Employers generally prefer to hire workers who have a high school diploma or equivalent. Some engineers have learned how to operate heavy equipment on the job, while others have received training in vocational schools or through apprenticeship programs. Previous experience operating farm equipment or heavy equipment in the armed forces can be an advantage when looking for an entry position in the field.

Information regarding apprenticeship programs for Operating Engineers can be found on the California Department of Industrial Relations, Division of Apprenticeship Standards Web site at www.dir.ca.gov/das.

Recommended High School Course Work

High school preparation should include courses in automotive shop, metal shop, and basic mathematics.

Operating Engineers and Other Construction Equipment Operators

Where Do I Find the Job?

For those Operating Engineers who belong to a union, the union hall is a good place to find employment. Others can look for work with established companies or can try to find employment on a temporary basis. Direct application to employers remains one of the most effective job search methods.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Construction Sand and Gravel Mining
- ▶ Dimension Stone Mining and Quarrying
- ▶ Industrial Building
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Oil and Gas Pipeline
- ▶ Other Crushed Stone Mining and Quarrying
- ▶ Other Heavy Construction
- ▶ Power/Communication System
- ▶ Residential Remodelers
- ▶ Water and Sewer System

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Contractors, Commercial/Industrial
- ▶ Building Contractors, General
- ▶ Concrete Contractors
- ▶ Demolition Contractors
- ▶ Excavating Contractors
- ▶ Foundation Contractors
- ▶ General Engineering Contractors
- ▶ Landscape Contractors
- ▶ Paving Contractors
- ▶ Pipeline Contractors

Where Can The Job Lead?

Some Operating Engineers become foremen, supervisors, or project managers. It is also possible to obtain a specialty contractor's license in Earthwork and Paving from the California Contractors State License Board, buy one's own equipment, and bid on construction projects.

Other Sources of Information

International Union of Operating Engineers
www.iuoe.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

Painters, Construction and Maintenance

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What They Do

Painters, Construction and Maintenance paint and varnish new and old buildings. They paint a variety of surfaces including wood, metal, concrete, masonry, and plastic. Painters must be skilled in handling painting tools and must expertly select the right tools and materials. When choosing paints and finishes, Painters have to consider job appropriateness, cost, and durability. Although most finishes come ready-mixed in almost any color, Painters must know about paint composition and color harmony to get the texture, tint, and shade the customer wants.

Tasks

- ▶ Read work order or receive instructions from supervisor or homeowner.
- ▶ Fill cracks, holes, and joints with caulk putty, plaster, or other filler, using caulking gun or putty knife.
- ▶ Mix and match colors of paint, stain, or varnish.
- ▶ Erect scaffolding or set up ladders to work above ground level.
- ▶ Wash and treat surfaces with oil, turpentine, mildew remover, or other preparations.
- ▶ Sand surfaces between coats and polish final coat to specified finish.
- ▶ Cut stencils, brush and spray lettering and decorations on surfaces.
- ▶ Paint surfaces, using brushes, spray gun, or rollers.
- ▶ Apply paint to simulate wood grain, marble, brick, or stonework.
- ▶ Bake finish on painted and enameled articles in baking oven.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Operation and Control — Controlling operations of equipment or systems.

Painters, Construction and Maintenance

- ▶ Visual Color Discrimination — The ability to match or detect differences between colors, including shades of color and brightness.
- ▶ Dynamic Strength — The ability to exert muscle force repeatedly or continuously over time. This involves muscular endurance and resistance to muscle fatigue.
- ▶ Wrist-Finger Speed — The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Written Comprehension — The ability to read and understand information and ideas presented in writing.

Work Environment

Painters often work for long periods of time, extending their arms over their heads, which can be tiring and painful. They work from ladders, scaffolds, and swing stages. They risk injury from slips or falls. Painters sometimes work in places with poor air circulation. Painters also risk contact with hazardous chemicals when mixing paints. Airless spray painting can give off toxic fumes or the strong spray can cut a worker's skin. Exterior Painters must work in extreme temperatures.

Those who work for contractors may belong to the International Brotherhood of Painters and Allied Trades.

Hours of work are dependent on contract. Painters are usually laid off during periods of wet weather. In some areas of California, they may be out of work for three months or longer each year because of poor weather.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Painters, Construction and Maintenance				
47-2141	73,700	83,900	2,330	\$14.99 to \$24.36

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment for Painters is expected to grow at an average rate compared to all occupations in California. During economic downturns, workers are subject to layoffs or reductions in hours. Also, painting work is seasonal in nature. Inclement weather can bring jobs to a standstill. However, employment opportunities will still continue due to a need to replace workers who transfer to other occupations, retire, or leave the labor force for other reasons. Also, even during downturns there is a continuing need for maintenance and home improvement projects.

Training/Requirements/Apprenticeships

Painters usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Extensive on-the-job training

The apprenticeship program consists of three and one-half years of on-the-job training and 144 hours of related school instruction. Related work experience can be credited to apprentices by evaluation by the apprenticeship committee. Apprentices must be at least 16 years old.

Recommended High School Course Work

The minimum education for entry into the painting or wallpapering trade is the ability to read, write, and do simple arithmetic. Although it is not required, employers reported that most recent hires were high school graduates.

Where Do I Find the Job?

Candidates for training or apprenticeship programs should apply to a local of the International Brotherhood of Painters and Allied Trades. Direct application to employers is an effective job search method for journey-level Painters.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Elementary and Secondary Schools
- ▶ Employment Placement Agencies
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Professional Employer Organizations
- ▶ Residential Remodelers
- ▶ Temporary Help Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Painting Contractors
- ▶ Home Repair and Maintenance
- ▶ Fix-It Service

Where Can The Job Lead?

Promotion for Painters is achieved by going through the regular skill levels to reach journey-level. Some workers advance to supervisor, superintendent, cost estimator, or sales associate.

Painters may go into business as painting contractors. Businesses involved in painting contracting need licensing from the Contractors State Licensing Board of the California Department of Consumer Affairs. (See *Other Sources of Information*.)

Workers must have 4 years of journey-level experience in the past 10 years to qualify for the contractor test.

Painters, Construction and Maintenance

Other Sources of Information

International Union of Painters and Allied Trades
www.iupat.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Department of Consumer Affairs, Contractors State Licensing Board
www.cslb.ca.gov

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What They Do

Plasterers and Stucco Masons apply decorative and protective materials to walls and ceilings of buildings. Plaster is generally used inside a building, because it isn't waterproof. Stucco, on the other hand, can stand up to the weather and is generally used on exterior walls and ceilings.

The materials are similar in the way they are prepared and applied. Both are mixtures of a dry powder, additives, and water. In the case of plaster, specially prepared gypsum is mixed with water, sand, and other materials designed to make the mixture harder, more wear resistant, and less likely to crack.

Traditionally, the interior walls of homes were covered with plaster. Since plaster needs something to stick to, thin wooden strips called lath were nailed to the wall's wood studs. Three coats of plaster were then spread over the lath.

Today, this is rarely done although metal lath covered with plaster can form curves and other shapes not possible with wooden lath. Most plasterers today apply plaster over a gypsum board substrate. This skim coat makes the walls much less likely to be dented in day-to-day activities. It can also help hide imperfections that may be present such as an irregular appearance of the drywall.

Stucco Masons apply stucco in much the same way to exterior walls. Stucco is a cement-based product much like concrete but without stones (aggregate). Stucco Masons prepare the surface to be stuccoed by first attaching a protective layer of tarpaper or housewrapping fabric. They then attach stucco wire to the house. Then, three layers of stucco is applied. Once the stucco dries, it is generally painted for a nice, decorative look.

Tasks

- ▶ Apply coats of plaster or stucco to walls, ceilings, or partitions of buildings, using trowels, brushes, or spray guns.
- ▶ Apply weatherproof, decorative coverings to exterior surfaces of buildings, such as troweling or spraying on coats of stucco.
- ▶ Clean and prepare surfaces for applications of plaster, cement, stucco, or similar materials, such as by drywall taping.
- ▶ Cure freshly plastered surfaces.

Plasterers and Stucco Masons

- ▶ Install guidewires on exterior surfaces of buildings to indicate thickness of plaster or stucco, and nail wire mesh, lath, or similar materials to the outside surface to hold stucco in place.
- ▶ Mix mortar and plaster to desired consistency or direct workers who perform mixing.
- ▶ Mold and install ornamental plaster pieces, panels, and trim.
- ▶ Rough the undercoat surface with a scratcher so the finish coat will adhere.
- ▶ Spray acoustic materials or texture finish over walls and ceilings.
- ▶ Apply insulation to building exteriors by installing prefabricated insulation systems over existing walls or by covering the outer wall with insulation board, reinforcing mesh, and a base coat.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Installation — Installing equipment, machines, wiring, or programs to meet specifications.
- ▶ Monitoring — Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ▶ Coordination — Adjusting actions in relation to others' actions.
- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Wrist-Finger Speed — The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Finger Dexterity — The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.

Work Environment

Plasterers generally work indoors, while Stucco Masons work outdoors. The difference means that Plasterers can work when it is raining, cold, hot, and in other weather conditions that might stop a Stucco Mason from working altogether. They do have to think about the weather, though, because very hot, very cold, humid, or dry weather will affect how plaster will dry.

Stucco Masons are exposed to the heat from the sun, cold during the winter, rain during the rainy season, as well as windy, dusty days. The material can be applied in some of those adverse conditions, but the Mason must make sure the job doesn't suffer, even if he or she is!

Plasterers and Stucco Masons

The work can be dirty and somewhat risky, as some plaster and stucco are applied while standing on ladders or scaffolding. These workers must wear protective clothing including masks and goggles when necessary. The work can be quite physically demanding.

Plasterers and Stucco Masons generally work a regular day shift, Monday through Friday, although overtime and weekend work is not uncommon. Some Plasterers and Stucco Masons belong to unions such as the Operative Plasterers' and Cement Masons' International Association or the International Union of Bricklayers and Allied Craftworkers.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Plasterers and Stucco Masons				
47-2161.....	21,000.....	22,900.....	680.....	\$17.02 to \$24.60.....

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment of Plasterers and Stucco Masons will grow slower than average compared with all occupations in California over the 2006–2016 period. Because of newer construction materials, as well as the inherent properties of plaster and stucco, this ancient trade continues to enjoy popularity among California's property owners, builders, and remodelers.

Training/Requirements/Apprenticeships

Plasterers and Stucco Masons usually follow one of the following training paths:

- ▶ Formal, four-year apprenticeship
- ▶ Vocational school
- ▶ Community college programs or certificates
- ▶ Extensive on-the-job training

Training in the four-year apprenticeship program consists of classroom and on-the-job training. Apprentices learn about different types of plaster and other materials, as well as how to prepare and apply plaster and other products. In some ways, applying plaster and stucco requires artistry and an eye for design.

Recommended High School Course Work

Most employers prefer applicants who have at least a high school diploma or equivalent. High school preparation should include courses in shop, basic mathematics, and English.

Plasterers and Stucco Masons

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Union members can sometimes find jobs through the union hiring hall.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Industrial Building
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Residential Remodelers

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Commercial and Industrial Contractors
- ▶ General Building Contractors
- ▶ Plastering Contractors
- ▶ Stucco and Coating Contractors

Where Can The Job Lead?

Some Plasterers and Stucco Masons leave to start their own companies. Others may work for a large company and become supervisors. Since plastering and stucco application is somewhat of an art, some workers may gain a reputation for creativity and be in demand with prestige builders. California's Department of Consumer Affairs, Contractors State License Board offers a specialty contractor's license in lathing and plastering.

Other Sources of Information

Operative Plasterers' and Cement Masons' International Association
www.opcmia.org

Stucco Manufacturers Association
www.stuccomfgassoc.com

Plastering Contractors Association of Southern California
www.plasteringcontractors.org

International Union of Bricklayers and Allied Craftworkers
www.bacweb.org

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

California Department of Industrial Relations
www.dir.ca.gov

Plumbers, Pipefitters, and Steamfitters

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What They Do

Plumbers assemble, install, and repair pipes, fittings, and fixtures of water, gas, and waste disposal systems according to specifications and plumbing codes in homes and commercial and industrial buildings. Plumbers also maintain existing plumbing systems. Journey-level Plumbers may give written estimates of the cost of their work.

In new construction work, Plumbers must follow blueprints so that the plumbing lines go in the right place. They plan the job, determine the size and type of pipe to be used, and select the proper fixtures.

After the system is inspected by the building inspector, Plumbers install the necessary plumbing fixtures such as sinks, toilets, bathtubs, showers, etc. This means that Plumbers must come back to the job site after the floors and walls are up and finished.

Tasks

- ▶ Assemble pipe sections, tubing and fittings, using couplings, clamps, screws, bolts, cement, plastic solvent, caulking, or soldering, brazing and welding equipment.
- ▶ Fill pipes or plumbing fixtures with water or air and observe pressure gauges to detect and locate leaks.
- ▶ Review blueprints and building codes and specifications to determine work details and procedures.
- ▶ Prepare written work cost estimates and negotiate contracts.
- ▶ Study building plans and inspect structures to assess material and equipment needs, to establish the sequence of pipe installations, and to plan installation around obstructions such as electrical wiring.
- ▶ Keep records of assignments and produce detailed work reports.
- ▶ Perform complex calculations and planning for special or very large jobs.
- ▶ Locate and mark the position of pipe installations, connections, passage holes, and fixtures in structures, using measuring instruments such as rulers and levels.
- ▶ Measure, cut, thread, and bend pipe to required angle, using hand and power tools or machines such as pipe cutters, pipe-threading machines, and pipe-bending machines.

Plumbers, Pipefitters, and Steamfitters

- ▶ Install pipe assemblies, fittings, valves, appliances such as dishwashers and water heaters, and fixtures such as sinks and toilets, using hand and power tools.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ▶ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ▶ Troubleshooting — Determining causes of operating errors and deciding what to do about it.
- ▶ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.

Work Environment

Because pipelayers, plumbers, pipefitters, and steamfitters frequently must lift heavy pipes, stand for long periods, and sometimes work in uncomfortable or cramped positions, they need physical strength as well as stamina. They also may have to work outdoors in inclement weather. In addition, they are subject to possible falls from ladders, cuts from sharp tools, and burns from hot pipes or soldering equipment.

Many Plumbers belong to the United Association of Journeymen and Apprentices of the Plumbers and Pipefitting Industry of the United States and Canada. The work week for union Plumbers varies with the union local. Most Plumbers work 35 to 40 hours per week.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Plumbers, Pipefitters, and Steamfitters				
47-2152	56,000	62,900	1,850	\$18.29 to \$32.35

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Plumbers, Pipefitters, and Steamfitters

Trends

Employment for Plumbers, Pipefitters, and Steamfitters is expected to grow at an average rate compared to all occupations in California. These occupations are generally less sensitive to changes in economic conditions than jobs in other construction trades. Even when new construction activity declines, maintenance, rehabilitation, and replacement of existing piping systems, as well as the increasing installation of fire sprinkler systems, provide many jobs for Plumbers, Pipefitters, and Steamfitters.

The greening of the construction industry should increase the demand for plumbers involved in green activities such as installing or repairing tankless hot water heaters, and solar hot water and pool heating systems.

Training/Requirements/Apprenticeships

Plumbers usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Extensive on-the-job training
- ▶ Vocational school

Some Plumbers train on the job, but most complete an apprenticeship program. The length of an apprenticeship is usually four to five years. The programs consist of full-time on-the-job training in addition to classroom instruction. The courses include drafting, blueprint reading, math, and local plumbing codes and regulations. After completing the program, apprentices must pass a trade test given by the union and a city licensing test regulated by the California Department of Industrial Relations, Division of Apprenticeship Standards. Candidates for apprenticeships must have a high school diploma or its equivalent and must pass aptitude tests. More information on apprenticeship programs can be obtained from local unions and the California Department of Industrial Relations, Division of Apprenticeship Standards (www.dir.ca.gov/das).

Plumbers must be licensed, but licensing requirements vary from area to area. Most localities require Plumbers to pass an exam testing their knowledge of the trade and local plumbing codes.

Recommended High School Course Work

Drafting and mathematics classes are recommended as preparation for a career as a Plumber.

Where Do I Find the Job?

Candidates for training or apprenticeship programs should apply to the one of the several unions for Plumbers. Direct application to employers is an effective job search method for journey-level Plumbers.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Oil and Gas Pipeline
- ▶ Power/Communication System
- ▶ Residential Remodelers
- ▶ Water and Sewer System

Plumbers, Pipefitters, and Steamfitters

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Plumbing Contractors
- ▶ Plumbing Contractors-Commercial & Ind.
- ▶ Plumbing Drains & Sewer Cleaning
- ▶ Plumbing Drains & Sewer Consultants

Where Can The Job Lead?

Journey-level Plumbers can advance to the positions of supervisor or superintendent. Plumbers with considerable experience may become plumbing inspectors.

Plumbers may go into business as plumbing contractors. Businesses involved in electrical contracting need licensing from California's Department of Consumer Affairs, Contractors State Licensing Board.

Other Sources of Information

Plumbing-Heating-Cooling Contractors National Association
www.phccweb.org

United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry
www.ua.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov

California Department of Consumer Affairs, Contractors State Licensing Board
www.cslb.ca.gov

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What They Do

Roofers attach a variety of materials to the roofs of buildings to ensure they are watertight so that buildings and their contents are protected. Wood shingles are a traditional choice, but more and more, other materials such as asphalt (composition) and tile are chosen by homeowners. Most commercial structures still use “hot mop” roofs to cover flat or low-pitched roofs.

Roofers both patch or repair roofs and replace them. Techniques are similar for both tasks. The roofer inspects the roof to determine if the roof can be repaired or if the damage is so extensive that the entire roof needs to be replaced.

Sometimes old roofing material needs to be removed in order to comply with building codes or because the damage extends down to the roof deck (the wood sheathing that supports the roofing material). The roofer then prepares the roof surface, and nails or staples new material to the roof.

Tasks

- ▶ Fasten composition shingles or sheets to roof with asphalt, cement, or nails.
- ▶ Cut roofing paper to size and nail or staple paper to roof in overlapping strips to form base for roofing materials.
- ▶ Clean and maintain equipment.
- ▶ Remove snow, water, or debris from roofs prior to applying roofing materials.
- ▶ Insulate, soundproof, and seal buildings with foam, using spray gun, air compressor, and heater.
- ▶ Punch holes in slate, tile, terra-cotta, or wooden shingles, using punch and hammer.
- ▶ Apply gravel or pebbles over top layer, using rake or stiff-bristled broom.
- ▶ Apply alternate layers of hot asphalt or tar and roofing paper until roof covering is completed as specified.
- ▶ Overlap successive layers of roofing material, determining distance of overlap, using chalkline, gauge on shingling hatchet, or lines on shingles.
- ▶ Cut strips of flashing and fit them into angles formed by walls, vents, and intersecting roof surfaces.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Roofers

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Operation and Control — Controlling operations of equipment or systems.
- ▶ Coordination — Adjusting actions in relation to others' actions.
- ▶ Installation — Installing equipment, machines, wiring, or programs to meet specifications.
- ▶ Gross Body Equilibrium — The ability to keep or regain your body balance or stay upright when in an unstable position.
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Stamina — The ability to exert yourself physically over long periods of time without getting winded or out of breath.
- ▶ Extent Flexibility — The ability to bend, stretch, twist, or reach with your body, arms, and/or legs.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Explosive Strength — The ability to use short bursts of muscle force to propel oneself (as in jumping or sprinting), or to throw an object.
- ▶ Multilimb Coordination — The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
- ▶ Trunk Strength — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing.

Work Environment

Roofers may work in dry or wet weather, though their functions differ depending upon the outside weather conditions. For instance, they are sometimes called upon to fix leaky roofs in the pouring rain. Besides being unpleasant, working on a wet roof can be dangerous because roofs may be very slippery.

For the most part, though, Roofers work on dry roofs. In California, most replacement roofing work is done in the dry season. This means that Roofers work when it is sunny and warm or hot. Temperatures on a roof can be much higher than on the ground since there is little if any shade, and the roofing materials themselves can become quite warm. A composition shingle roof, for example, is generally made of fiberglass and asphalt, a tar-like substance, which can heat up quickly and become very warm. And working on a flat roof that is "hot mopped," involving the use of molten tar, is even hotter. It is important for Roofers to drink plenty of liquids to avoid suffering heat-related illnesses.

Other hazards include falling off a roof or ladder or being injured by heavy construction equipment including cranes, trucks, and loaders. Roofers may also be exposed to burns from hot tar, kettles, and buckets.

The work of a Roofer is physically demanding. Roofers often must carry heavy bundles of wood or asphalt shingle roofing along a roof, and sometimes up and down a ladder. They usually spend hours on a roof, bending over to staple roofing felt (tar paper), cutting shingles, and nailing or stapling shingles to the roof deck.

Most Roofers work a 40-hour workweek unless construction deadlines have to be met or for emergency repairs. They may work nights or weekends depending on the job or extent of repair.

Some roofers are members of the United Union of Roofers, Waterproofers, and Allied Workers.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Roofers				
47-2181	24,800	28,800	970	\$16.80 to \$25.62

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Employment in this occupation will grow faster than average for all California jobs. With the population exploding in California, the demand for Roofers will continue to be strong through 2016. Roofers work both in new and existing construction so the employment opportunities are less dependent upon new construction. This strong demand will not be significantly affected by the economy, since having a rain-tight roof is not something homeowners or business owners can put off indefinitely.

Roofing materials have improved to enhance energy efficiency to include insulation, heat reflective coatings, and recycled products. The greening of the construction industry will increase the need for Roofers involved in green activities such as installing rooftop solar panels and light-colored cool roofs with reflective coatings.

Training/Requirements/Apprenticeships

Roofers usually follow one of the following training paths:

- ▶ Formal, four-year apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Most Roofers learn the trade through on-the-job training. New Roofers start by assisting experienced workers with roof tearoffs, cleaning and preparing the roof deck, carrying and stacking materials, and moving ladders. Since Roofers work off the ground, sometimes several stories up, safety is an important aspect of their training. California's Department of Industrial Relations, Division of Apprenticeship Standards oversees apprenticeship programs in the state.

Roofers

Some Roofers learn the trade through a formal apprenticeship program offered through local roofing contractors and a local union. The apprenticeship program involves a combination of classroom and on-the-job instruction.

Most employers seek Roofers with a high school diploma. They also look for workers who are familiar with hand and power tools and have the ability to do basic problem solving.

Recommended High School Course Work

High school preparation should include courses in shop, basic mathematics, blueprint reading, and English.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Application at a jobsite is one way of finding a job. The occupation has a higher turnover rate than many other construction trades so finding a job can be somewhat easier.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Managing Offices
- ▶ New Multifamily Housing
- ▶ New Single-Family Housing
- ▶ Offices of Bank Holding Companies
- ▶ Offices of Other Holding Companies
- ▶ Residential Remodelers

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Contractors, Commercial/Industrial
- ▶ Building Contractors, General
- ▶ Roofing

Where Can The Job Lead?

Larger firms may offer promotional opportunities for Roofers. Increasing skill levels can lead to higher pay and responsibility within a firm. Some Roofers get a contractor's license from the California Department of Consumer Affairs, Contractors State License Board and start their own business. The ability to use a variety of roofing materials such as asphalt, tile, or wood shingles can mean that more jobs will open up for the journey-level Roofer.

Other Sources of Information

National Roofing Contractors Association
www.nrca.net

United Union of Roofers, Waterproofers, and Allied Workers
www.unionroofers.org

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

Security and Fire Alarm Systems Installers

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What They Do

Security and Fire Alarm Systems Installers install, maintain, and repair electrical systems that signal a private central office of fire or burglary on a subscriber's premises, automatically dial 911 if a break-in or fire is detected, or ring an on-site alarm. Installers set up wired and wireless alarm systems, conduits, electronic sensors, and signaling units in residential and commercial establishments, following blueprints of electrical layouts and building plans. Installers also install closed circuit TV, surveillance, and intercom systems.

Tasks

- ▶ Consult with clients to assess risks and to determine security requirements.
- ▶ Inspect installation sites and study work orders, building plans, and installation manuals in order to determine materials requirements and installation procedures.
- ▶ Install, maintain, or repair security systems, alarm devices, and related equipment, following blueprints of electrical layouts and building plans.
- ▶ Drill holes for wiring in wall studs, joists, ceilings, and floors.
- ▶ Feed cables through access holes, roof spaces, and cavity walls to reach fixture outlets; then position and terminate cables, wires and strapping.
- ▶ Mount and fasten control panels, door and window contacts, sensors, and video cameras, and attach electrical and telephone wiring in order to connect components.
- ▶ Mount raceways and conduits, and fasten wires to wood framing, using staplers.
- ▶ Test and repair circuits and sensors, following wiring and system specifications.
- ▶ Adjust sensitivity of units based on room structures and manufacturers' recommendations, using programming keypads.
- ▶ Examine systems to locate problems such as loose connections or broken insulation.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org*

Important Skills, Knowledge, and Abilities

- ▶ Repairing — Repairing machines or systems using the needed too
- ▶ Quality Control Analysis — Conducting tests and inspections of products, services, or processes to evaluate quality or performan

Security and Fire Alarm Systems Installers

- ▶ Installation — Installing equipment, machines, wiring, or programs to meet specifications.
- ▶ Operation Monitoring — Watching gauges, dials, or other indicators to make sure a machine is working proper
- ▶ Troubleshooting — Determining causes of operating errors and deciding what to do about it.
- ▶ Equipment Maintenance — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- ▶ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ▶ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
- ▶ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ▶ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).

Work Environment

The work is done both indoors and outdoors. Security and Fire Alarm Systems Installers often work on high ladders. At times, they must crawl into and work in small confined areas. Various hand tools, power tools, and soldering irons are used during the course of their work. They also use electrical testing devices such as ohmmeters or voltmeters. Some workers employed by larger firms are covered by union contracts with the International Brotherhood of Electrical Workers.

Those who do construction-related work may work on a contract basis and are subject to seasonal fluctuations in jobs, but all-around technicians, who do both installation and repair, generally work a 40-hour week, Monday through Friday. In addition to this, they are often on standby for emergency repair work one or more nights each week and perhaps one weekend every four to six weeks.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Security and Fire Alarm Systems Installers				
49-2098	6,200	7,500	210	\$15.42 to \$24.57

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Security and Fire Alarm Systems Installers

Trends

This occupation will have a growth rate of 21 percent during the 2006-2016 projection period. This growth will be fueled in large measure by the increasing concern for security in many communities.

Training/Requirements/Apprenticeships

Job applicants with a with knowledge of electrical principles or experience in any of the construction trades have a hiring advantage. A few companies provide on-the-job training through videos and technical manuals, while some offer manufacturer training programs.

Installers cannot be hired with a prior felony conviction. All workers must be registered with the State of California Bureau of Security and Investigative Services. Employers will help with the 90-day registration process that includes application, fingerprinting, and renewal fees. Some firms also require that workers be bondable. A valid California driver's license and good driving record are needed.

Recommended High School Course Work

High school or technical school courses in mathematics, basic electricity, and electronics are important.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Armored Car Services
- ▶ Investigation Services
- ▶ Locksmiths
- ▶ Security Guards and Patrol Services
- ▶ Security Systems Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Burglar Alarm Systems
- ▶ Fire Alarm Systems
- ▶ Fire Alarm Systems & Equipment-Testing
- ▶ Intercoms-Systems & Services
- ▶ Security Control Equipment & Systems
- ▶ Television Systems-Closed Circuit

Where Can The Job Lead?

Experienced Security and Fire Alarm Systems Installers can become installation supervisors. Positions in upper management are usually not available without a college degree.

Security and Fire Alarm Systems Installers

Other Sources of Information

National Burglar and Fire Alarm Association
www.alarm.org

California Department of Consumer Affairs, Bureau of Security and Investigative Services
www.dca.ca.gov/bsis

International Brotherhood of Electrical Workers
www.ibew.org

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What They Do

Sheet Metal Workers perform all operations necessary to make, install, and repair a wide variety of products made from metal sheets. They also may work with fiberglass and plastic materials. Sheet Metal Workers first study plans, blueprints, and specifications to determine the kind and quantity of materials they will need. They locate and mark reference points, and using shop mathematics, calculate angles and curves. Next, they cut the flat material and shape it into a three-dimensional form, using hand and power-driven tools and fabricating machines. In an increasing number of shops, Sheet Metal Workers use computerized metalworking equipment. This enables them to experiment with different layouts to find the one that results in the least waste of material. They cut, drill, and form parts with computer-controlled saws, lasers, shears, and presses.

Most Sheet Metal Workers work for contractors who specialize in sheet-metal equipment for residential, industrial, or commercial buildings. They install heating, ventilating, and air conditioning systems, as well as roofing, siding and drains. Many sheet metal parts come in standard sizes and shapes, quickly assembled at the job site and needing little change for a proper fit. Residential sheet metal parts are inexpensive and easy to mass produce. As a result, residential Sheet Metal Workers may do only on-site installation, often using flexible duct instead of more expensive, custom parts.

Tasks

- ▶ Determine project requirements, including scope, assembly sequences, and required methods and materials, according to blueprints, drawings, and written or verbal instructions.
- ▶ Select gauges and types of sheet metal or nonmetallic material, according to product specifications.
- ▶ Lay out, measure, and mark dimensions and reference lines on material, such as roofing panels, according to drawings or templates, using calculators, scribes, dividers, squares, and rulers.
- ▶ Drill and punch holes in metal, for screws, bolts, and rivets.
- ▶ Fasten seams and joints together with welds, bolts, cement, rivets, solder, caulks, metal drive clips, and bonds in order to assemble components into products or to repair sheet metal items.
- ▶ Finish parts, using hacksaws, and hand, rotary, or squaring shears.
- ▶ Inspect individual parts, assemblies, and installations for conformance to specifications and building codes, using measuring instruments such as calipers, scales and micrometers.
- ▶ Shape metal material over anvils, blocks, or other forms, using hand tools.

Sheet Metal Workers

- ▶ Trim, file, grind, deburr, buff, and smooth surfaces, seams, and joints of assembled parts, using hand tools and portable power tools.
- ▶ Install assemblies, such as flashing, pipes, tubes, heating and air conditioning ducts, furnace casings, rain gutters, and down spouts, in supportive frameworks.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Installation — Installing equipment, machines, wiring, or programs to meet specifications.
- ▶ Operation and Control — Controlling operations of equipment or systems.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

Work Environment

Sheet Metal Workers may work inside or outside, in a shop or at the job site. Most shops have adequate lighting, ventilation, and machinery safeguards, but may be unheated, oily, greasy, and noisy. At job sites, work may be done from high ladders and scaffolding, or in confined areas. Those who install siding, roofs, and gutters are exposed to all kinds of weather. Sheet Metal Workers are subject to cuts from sharp metal, burns from soldering and welding, falls from ladders and scaffolds, and harmful noise levels. They usually wear safety glasses but must avoid wearing jewelry or loose-fitting clothing that could easily be caught in machinery. They stand for long periods and lift heavy materials and finished pieces. Those performing installation work do considerable bending, lifting, standing, climbing, and squatting, sometimes in close quarters.

Sheet Metal Workers usually work a 40-hour week. Many belong to the Sheet Metal Workers International Association.

Sheet Metal Workers

What's the California Job Outlook?

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Sheet Metal Workers				
47-2211	18,700	20,500	630	\$17.37 to \$33.21

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Job opportunities are expected to grow slower than average compared with all occupations in California. The largest contributor to this growth is the demand for more energy efficient air-conditioning, heating, and ventilation systems in older structures. Since equipment maintenance makes up a large part of the work done by Sheet Metal Workers, the demand for workers in this occupation is less sensitive to the declines in new construction than employment of some other construction trades.

It is important for Sheet Metal Workers to keep up-to-date with technological changes because sheet metal shops are increasingly using new technological developments such as computerized layout and laser-cutting machines.

The movement toward greening the construction industry and public interest in environmentally friendly products should increase job opportunities for sheet metal workers as older air-conditioning and heating systems are replaced with newer energy efficient models in older buildings.

Training/Requirements/Apprenticeships

Sheet Metal Workers usually follow one of the following training paths:

- ▶ Formal, four-year apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Completion of a four-year apprenticeship is the general requirement to becoming a Sheet Metal Worker. Apprenticeship programs, administered in each area by the local Sheet Metal Joint Apprenticeship Committee, consist of four or five years of on-the-job training and an average of 200 hours per year of classroom instruction. Apprenticeship programs provide comprehensive instruction in both sheet metal fabrication and installation.

Many community colleges offer manufacturing technology and machine shop certificates or degrees. For further information about training and education providers access www.labormarketinfo.edd.ca.gov.

Recommended High School Course Work

High School preparation courses in metal shop, algebra, geometry, trigonometry, mechanical drawing, blueprint reading, drafting, physics, and computer programming are helpful.

Sheet Metal Workers

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Candidates for training or apprenticeship programs should apply directly to employers who employ Sheet Metal Workers. Community colleges offer assistance in finding jobs to graduates of degree or certificate programs in sheet metal occupations or machine shops. Unions representing Sheet Metal Workers also have information concerning apprenticeships and related matters.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Aircraft Engine and Engine Parts
- ▶ Aircraft Manufacturing
- ▶ Fabricated Structural Metal Mfg.
- ▶ Guided Missiles and Space Vehicles
- ▶ Metal Window and Door Manufacturing
- ▶ Ornamental and Architectural Metal Work
- ▶ Other Aircraft Parts and Equipment
- ▶ Plate Work Manufacturing
- ▶ Prefabricated Metal Building and Component
- ▶ Sheet Metal Work Manufacturing

Search these **yellow page** headings for listings of contractors and private firms:

- ▶ Air Conditioning Contractors & Systems
- ▶ Building, General Contractors
- ▶ Heating Contractors
- ▶ Metal Fabricators
- ▶ Metal Specialties
- ▶ Sheet Metal Work
- ▶ Sheet Metal Working Equipment & Supplies

Where Can the Job Lead?

Journey-level Sheet Metal Workers may advance to supervisory jobs, while others may become estimators or managers. Some Sheet Metal Workers may go into the contracting business for themselves. Because a sheet metal contractor must have a shop with equipment to fabricate products, this type of business is more expensive to undertake than other types of construction businesses. Self-employed contractors must obtain a sheet metal contractor's license from the California Department of Consumer Affairs, Contractors State License Board.

Other Sources of Information

California Department of Consumer Affairs
www.dca.ca.gov

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

Sheet Metal Workers International Association
www.smwia.org

Sheet Metal and Air-Conditioning Contractors' National Association
www.smacna.org

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[View Career Video](#)

What They Do

Surveyors measure and record property boundaries and the topography of the land covered by construction and engineering projects. This measurement and the recorded data is called a “survey.” Surveys are used to establish legal boundaries, prepare maps and exhibits, and are the basis for written descriptions of land tracts that satisfy legal requirements.

Surveyors work to set land values, subdivide land into lots, and stake development sites. Surveyors also measure and chart the depths and expanses of underground areas, the ocean floor, the atmosphere, and outer space. Surveyors use mathematical reasoning ability to visualize objects, measure distances, sizes, and other abstract forms. They must be precise and accurate in their work because mistakes can be costly.

Global Positioning System (GPS) is the newest land surveying technology. GPS is an electronic system that uses information from earth-orbiting satellites to locate fixed points on the ground to establish survey lines.

Tasks

Teams or parties of two to four members usually conduct surveys. Survey party roles and tasks are detailed below:

Licensed Professional Land Surveyors (LPLS)

- ▶ Direct survey teams and take the legal responsibility for all survey results.
- ▶ Write descriptions of land for deeds, leases, and other legal documents.
- ▶ Research legal records for evidence of previous boundaries.
- ▶ Interpret and check GPS results.
- ▶ Prepare survey maps.
- ▶ Prepare subdivision maps.

Party Chiefs

- ▶ Plan and supervise daily activities of survey teams working directly under the LPLS.
- ▶ Verify the accuracy of measurements and calculations at survey sites.

Surveyors

Land Surveyor Technicians

- ▶ Operate standard and complex survey instruments to measure horizontal and vertical angles and GPS positioning.
- ▶ Use electronic distance-measuring instruments and GPS receivers.
- ▶ Compile notes, sketches, and records of measurement data.
- ▶ Operate data collection devices.

Surveyor Assistants (Rod and Chain Persons)

- ▶ Hold vertical rods in place while technicians sight them with special instruments called theodolites to establish distances and angles.
- ▶ Clear away brush and trees from the lines of a survey when needed.
- ▶ Set up traffic warnings and flag vehicles.
- ▶ Set survey stakes and monuments.

Survey teams spend some of their work hours in offices planning surveys, drawing maps, preparing reports, and performing computations for completed site surveys. Most private surveying and engineering firms separate field and office duties. Field personnel spend little time doing office duties.

*Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Important Skills, Knowledge, and Abilities

- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Writing — Communicating effectively in writing as appropriate for the needs of the audience.
- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ▶ Geography — Knowledge of principles and methods for describing the features of land, sea, and air masses, including their physical characteristics, locations, interrelationships, and distribution of plant, animal, and human life.
- ▶ Computer — Knowledge of hardware and software applications for drafting.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ▶ Far Vision — The ability to see details at a distance.
- ▶ Science — Using scientific rules and methods to solve problems.

Work Environment

Members of survey teams spend a lot of time outdoors and work hard carrying heavy equipment long distances over rough country. Survey workers stand for long periods. They cut brush in the way of their work. They drive stakes with four- to eight-pound sledgehammers. They are out in all kinds of weather and can suffer sunburn, rash from poison oak, and snake and insect bites. On construction sites, there is danger from falling objects, moving vehicles, and heavy equipment. Survey work requires the skill to communicate by hand signals over great distances. Sometimes, workers must drive long distances to survey sites and, consequently, must have a valid California driver's license.

Many survey workers in the construction industry belong to the International Union of Operating Engineers. Surveyors working for government may join public employee unions.

Surveying teams usually work a five-day, forty-hour week, but many Surveyors work seasonally, especially in the construction industry, working during the dry weather months of March through November. According to the Southern California Joint Apprenticeship Committee, Surveyors work an average of 1,700 hours a year.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupations across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Surveyors				
17-1022	5,900	6,700	260	\$29.80 to \$41.70
Surveying and Mapping Technicians				
17-3031	4,100	4,600	130	\$20.71 to \$33.44

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

The growth rate for Surveyors will be at an average rate compared with all occupations in California. While the growth for Surveying and Mapping Technicians will be slower than average compared with all occupations in California. The use of electronic distance-measuring equipment and GPS may limit employment growth. However, employment opportunities for these two relatively small occupations will continue due to the need to replace workers who transfer to other work, retire, or leave the labor force for other reasons.

Training/Requirements/Apprenticeships

Surveyors usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Extensive on-the-job training

California is the only state that has a formal apprenticeship program for Surveyors in the construction industry. Apprentices must be 18 years old or over, be able to perform all aspects of the work, and have a valid driver's license. Applicants to apprenticeship must have a high school diploma or an equivalent certificate and pass a qualification test. The apprenticeship program leads to journey-level Rod and Chain Person and then to Chief of Party and Certified Chief of Party.

The California Board for Professional Engineers and Land Surveyors licenses Surveyors who establish boundaries. Applicants need six years of land surveying experience to qualify for a license, including one year of responsible field training and one year of responsible office training. Graduates from an approved four-year curriculum in land surveying receive credit for four years of experience. The American Congress on Surveying and Mapping offers voluntary certification for Surveying Technicians. Progressive experience and passing written examinations certify technicians at four levels. Although not required for state licensing, many employers require professional certification for promotion to positions of greater responsibility.

Surveyors

Fresno State University offers a bachelor degree in surveying and mapping technology through the engineering department. California Polytechnical Institute at Pomona offers an engineering degree with a survey option.

Recommended High School Course Work

Those interested in surveying jobs should take courses in algebra, geometry, computer science, drafting, and mechanical drawing.

Where Do I Find the Job?

Candidates for training or apprenticeship programs should apply to a local office of the International Union of Operating Engineers. Direct application to employers is an effective job search method for journey-level Surveyors.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Architectural Services
- ▶ Building Inspection Services
- ▶ Drafting Services
- ▶ Engineering Services
- ▶ Geophysical Surveying & Mapping Services
- ▶ Landscape Architectural Services
- ▶ Other Surveying and Mapping Services
- ▶ Testing Laboratories

Search these **yellow page** headings for listings of private firms:

- ▶ Digital Engineers-Civil
- ▶ Engineers-Consulting
- ▶ Engineers-Earthquake
- ▶ Engineers-Environmental
- ▶ Engineers-Geotechnical
- ▶ Surveyors-Land
- ▶ Utility Companies

Where Can The Job Lead?

With experience, the career path leads to Rod and Chain Person or Land Survey Technician, then to Chief of Party. Chief of Party Surveyors can advance to Licensed Land Surveyors by meeting the work experience and written exam requirements of the California Board for Professional Engineers and Land Surveyors. Some Surveyors go on to management positions such as field engineers; others take advanced training to become civil engineers.

Other Sources of Information

International Union of Painters and Allied Trades
www.iupat.org

California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das

California Land Surveyors Association
www.californiasurveyors.org

California Department of Consumer Affairs, Board for Professional Engineers and Land Surveyors
www.dca.ca.gov/pels

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What They Do

Ancient cities in Rome and Greece were famous for their mosaic tile floors and walls—some of which still exist today! The fact that their beauty has withstood centuries of use and neglect demonstrates that tile is a superior building material, one that finds many uses in modern commercial, industrial, and residential buildings. In fact, tile has been used in homes and other buildings for more than 4,000 years.

Marble has also been used since antiquity and can be found in the most prestigious buildings of the ancient world. Marble possesses a natural beauty and can be carved, split, and polished easily. These properties also mean that marble is highly prized as a flooring and wall surface today.

Tile and marble are wonderful building materials. They are water resistant, fireproof, and can't be munched on by bugs. Both products are strong, resisting the occasional bump or ding. And, being fireproof, tile and marble can even be used to enhance the beauty of a fireplace or stove. As they are also water-resistant, tile and marble can be found around swimming pools, and in bathroom and kitchen countertops and floors.

Tasks

- ▶ Determine and implement the best layout to achieve a desired pattern.
- ▶ Prepare cost and labor estimates based on calculations of time and materials needed for project.
- ▶ Measure and mark surfaces to be tiled, following blueprints.
- ▶ Build underbeds and install anchor bolts, wires, and brackets.
- ▶ Level concrete and allow to dry.
- ▶ Cut and shape tile to fit around obstacles and into odd spaces and corners, using hand and power cutting tools.
- ▶ Mix, apply, and spread plaster, concrete, mortar, cement, mastic, glue, or other adhesives to form a bed for the tiles, using brush, trowel, and screed.
- ▶ Apply mortar to tile back, position the tile, and press or tap with trowel handle to affix tile to base.
- ▶ Align and straighten tile using levels, squares, and straightedges.
- ▶ Finish and dress the joints and wipe excess grout from between tiles, using a damp sponge.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Tile and Marble Setters

Important Skills, Knowledge, and Abilities

- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Coordination — Adjusting actions in relation to others' actions.
- ▶ Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
- ▶ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ▶ Multilimb Coordination — The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
- ▶ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ▶ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ▶ Trunk Strength — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing.

Work Environment

Tile and Marble Setters usually work indoors in buildings that are under construction or that are being remodeled. The work is strenuous and involves a great deal of prolonged standing, reaching, bending, kneeling, and heavy lifting. Setters lift boxes of tiles, cement bags, and mortar buckets which may weigh 100 pounds or more. Hazards of the job include falls from ladders, possible cuts from tools or materials, muscle strains, and back and knee injuries.

Most Tile and Marble Setters work about 40 hours a week. They may be represented by various unions including the International Union of Bricklayers and Allied Craftworkers, the Ceramic Tile Layers Union, and the United Brotherhood of Carpenters and Joiners of America. However, most Tile and Marble Setters in California are not members of unions.

Tile and Marble Setters

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2006	Estimated Number of Workers 2016	Average Annual Openings	2009 Wage Range (per hour)
Tile and Marble Setters				
47-2044	20,600	24,200	660	\$17.80 to \$26.48

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Tile is used in both residential and commercial buildings. Employment for Tile and Marble Setters is expected to grow at a faster than average rate compared to all occupations in California during the projections period. However, during economic downturns, workers are subject to layoffs or reductions in hours.

New materials have both changed the demand for Tile and Marble Setters, and affected what they do on the job. Stone, such as granite and granite composites, began to see widespread application in homes and businesses more than a decade ago. Marble has had a long history of use in construction. Solid composites have also been used in place of tile as well. Sometimes, Tile and Marble Setters will install this material.

On the other hand, tile itself may be more widely used as houses become more elaborate and tile and marble are often viewed as a "move up" building material. It may replace inexpensive material such as plastic laminate material on countertops and bathtub/shower walls.

Training/Requirements/Apprenticeships

Tile and Marble Setters usually follow one of the following training paths:

- ▶ Formal apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Tile and Marble Setters usually begin as helpers. Sometimes, they enter an apprenticeship program. To be an apprentice, candidates must be at least 18 years old and be physically able to perform the work of the trade to become an apprentice. After completing a three or four-year program that includes both practical and classroom education, the apprentice can advance to full journey-level status. An apprenticeship program usually consists of on-the-job training and related classroom instruction in blueprint reading, layout, and basic mathematics. The apprenticeship program is overseen by the California Department of Industrial Relations, Division of Apprenticeship Standards (www.dir.ca.gov/das).

Though there are no formal educational requirements, employers usually prefer high school graduates. Job applicants should know basic mathematics, and be able to read and write. In areas where there are no union apprenticeship programs, many Tile and Marble Setters acquire skills informally by working as helpers to experienced workers.

Tile and Marble Setters

Recommended High School Course Work

High school students interested in this type of work should take course work in basic mathematics, shop, mechanical drawing, and blueprint reading.

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Construction jobsites, housing developments, and commercial building projects are places to look. Since tile setting requires a lot of skill to be done properly, many builders are looking for workers who have a good reputation in the community.

Use the *Find Employers* feature in the *Job Search Tools* section on the *Career Information* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. When using the search feature *Employers by Industry*, select keywords from the following construction industry names to get a list of private firms and their addresses:

- ▶ Commercial Building
- ▶ Industrial Building
- ▶ Employment Placement Agencies
- ▶ Professional Employer Organizations
- ▶ Floor Covering Stores
- ▶ Temporary Help Services

For local listings of contractors, search these **yellow page** headings for listings of private firms:

- ▶ Building Materials-Retail
- ▶ Marble-Natural
- ▶ Concrete Products
- ▶ Tile-Ceramic-Contractors
- ▶ Counter Tops
- ▶ Tile-Ceramic-Dealers
- ▶ Floor Materials

Where Can The Job Lead?

Tile and marble setting is a highly skilled occupation. Many journey-level workers get a contractor's license that allows them to work on their own, which has the potential to offer greater pay and more freedom to choose jobs.

Other Sources of Information

International Masonry Institute
www.imiweb.org

International Union of Bricklayers and Allied Craftworkers
www.bacweb.org

United Brotherhood of Carpenters and Joiners of America
www.carpenters.org

California Department of Consumer Affairs, Contractors State License Board
www.cslb.ca.gov

Ceramic Tile Institute of America
www.ctioa.org

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