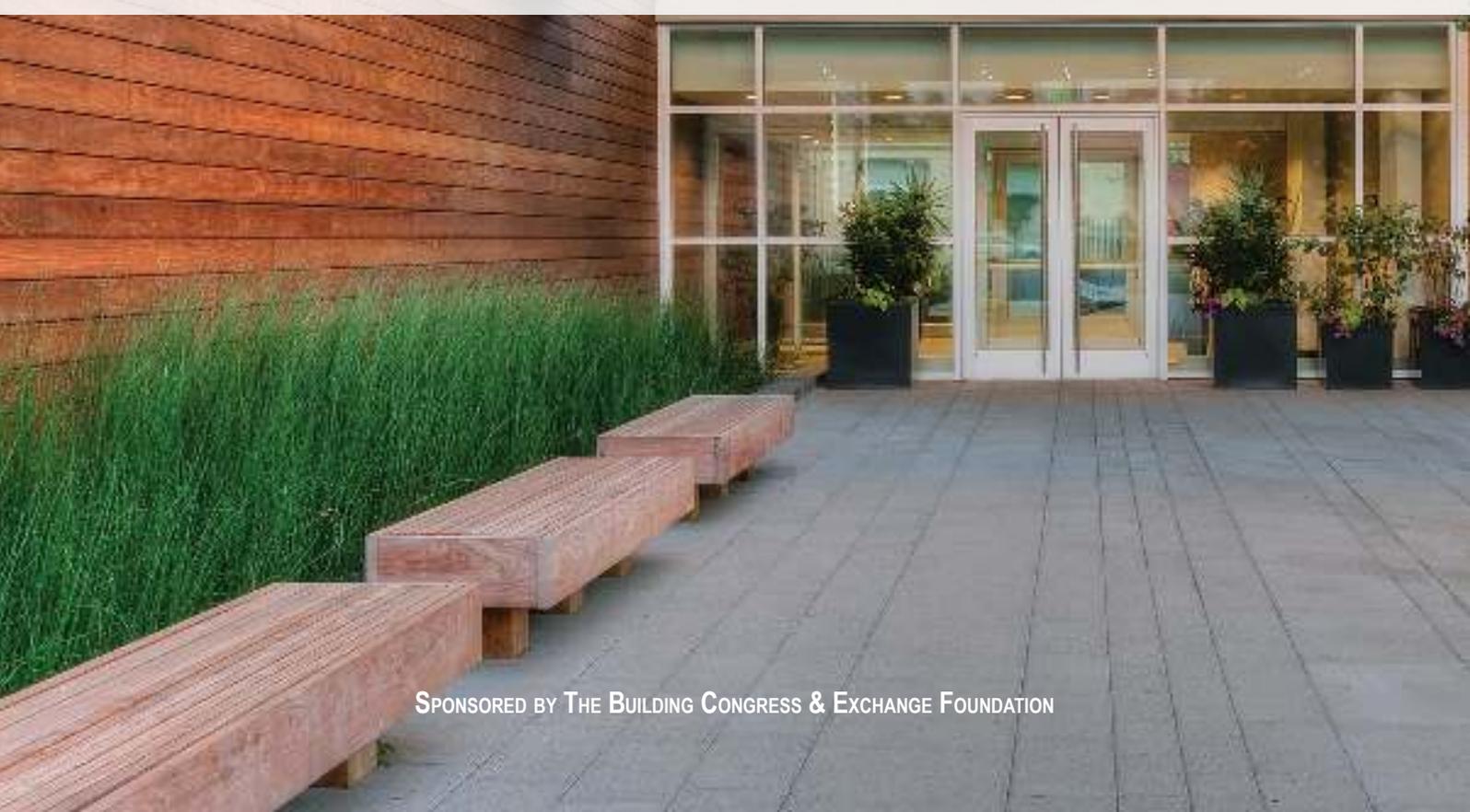




THE MARYLAND CENTER FOR CONSTRUCTION EDUCATION & INNOVATION

# Build Your Path

A GUIDEBOOK FOR BUILT ENVIRONMENT CAREERS



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- MAGIC Camp (Mentoring A Girl in Construction)



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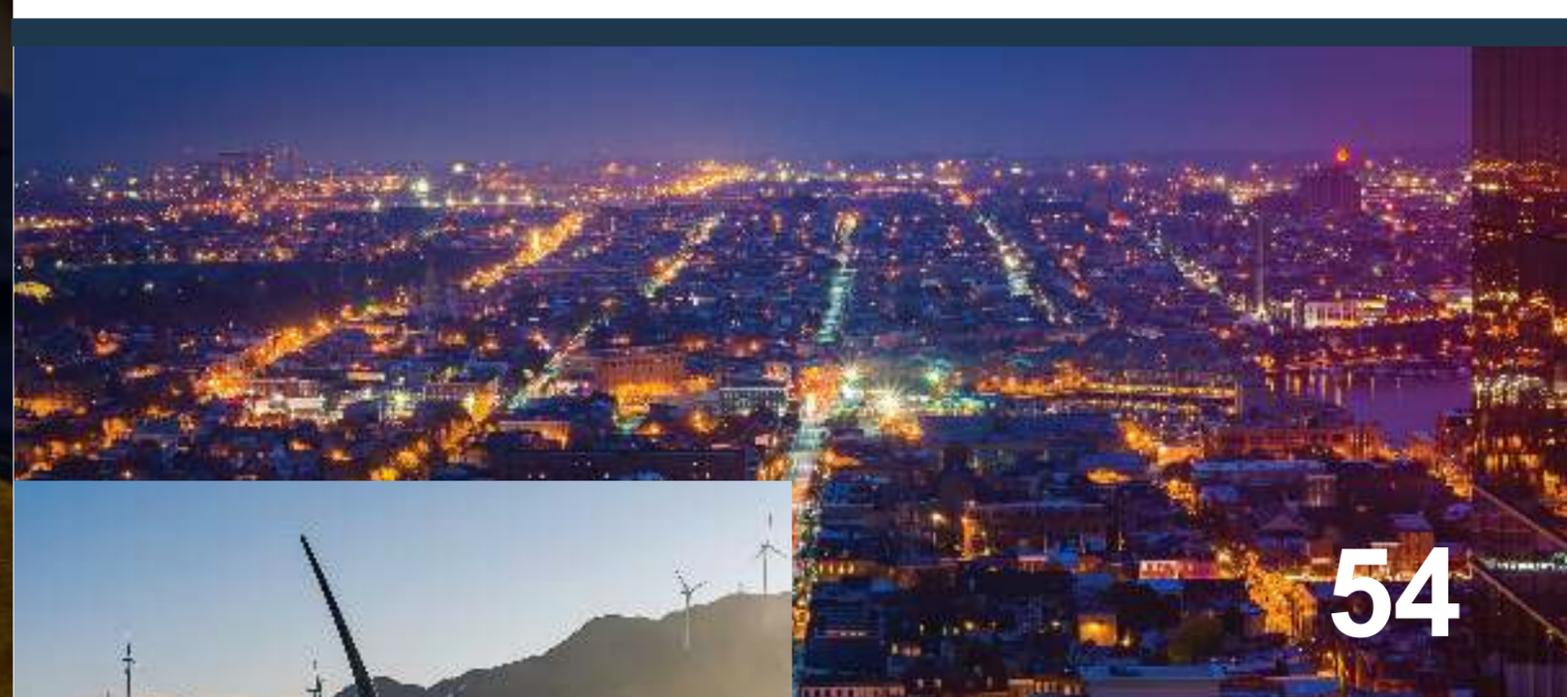
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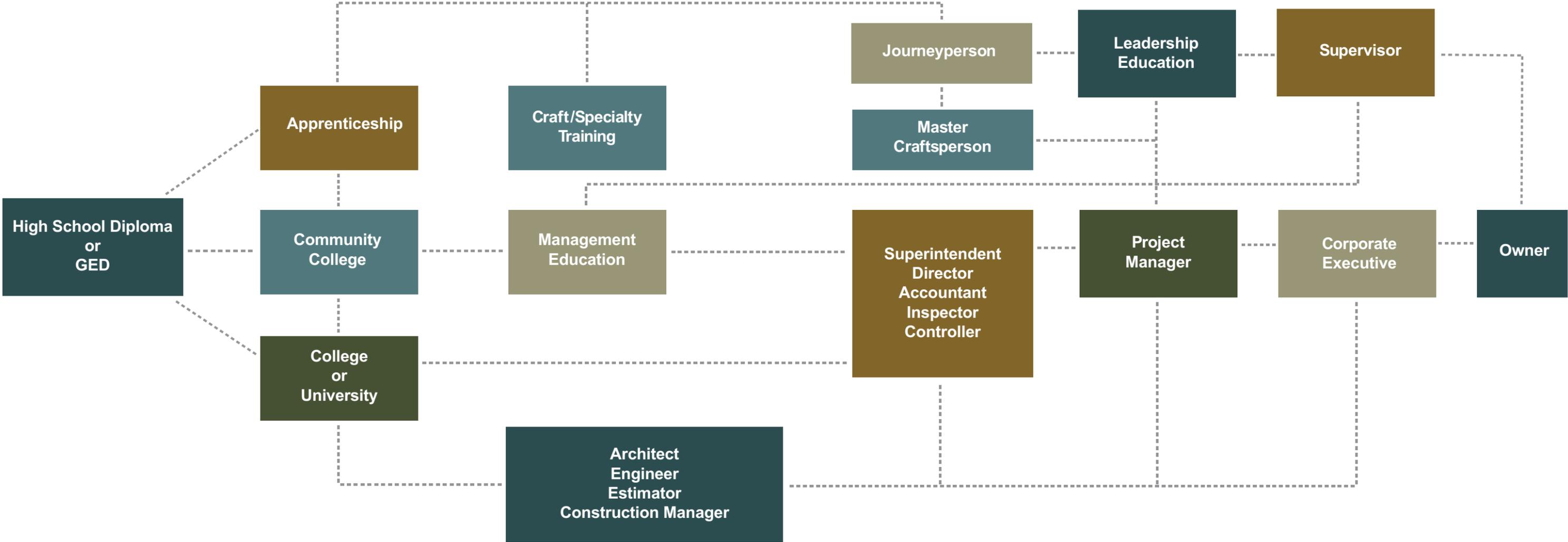
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# Pathways

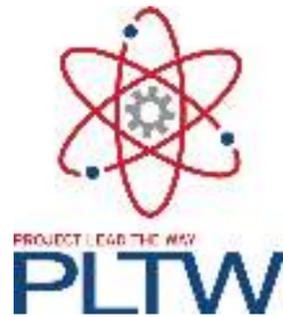
No two people are alike. You can make the path that you choose work for you and your individual situation. The important thing is that there is no right or wrong answer. Whether it takes you two years or ten to travel along your path, there is a place for you if you have the drive and passion to finish. You could start off as a laborer and eventually become a construction manager. You could go to college to become an engineer but decide that you're happier being a carpenter. Or you could start off as an apprentice, become a master trade professional, and own your own business. It won't be easy, and it will require lots of hard work, but the path is yours to travel, and the destination is up to you. The good news? You'll have help along the way.





Maryland high school construction-related programs allow students to advance their knowledge in specific construction trades, design or construction management. All of these programs lead to a jump start in a career in construction, through industry certification, early college credits or Apprenticeship experiences.

For more information, visit [www.mdcteprogams.org](http://www.mdcteprogams.org).



Pathway	Pathway	Pathway	Pathway
<b>Planning</b>	<b>Design</b>	<b>Construction Trades</b>	<b>Construction Maintenance</b>
↓	↓	↓	↓
Civil Engineering & Architecture	Construction Design & Management (CDM)	Carpentry, Electrical, Masonry, Plumbing	Industrial Maintenance, HVAC, Welding
1. Intro to Eng. Design (1 cr) 2. Principles of Engineering (1 cr) 3. Civil Eng. & Architecture (1 cr) 4. Engineering Design & Development (1 cr)	1. Introduction to CDM (1 cr) 2. Principles of CDM (1 cr) 3. Advanced Design & 3D (1 cr) 4. Advanced Construction Management (1 cr)	1. Core Curriculum a. NCCER Core (1 cr) or b. BTC Multi-Craft Core (1 cr) 2. NCCER Craft Level I (1 cr) 3. NCCER Craft Level II (2 cr)	1. Core Curriculum a. NCCER Core (1 cr) or b. BTC Multi-Craft Core (1 cr) 2. NCCER Craft Level I (1 cr) 3. NCCER Craft Level II (2 cr)
<b>Value-Added Outcome</b>	<b>Value-Added Outcome</b>	<b>Value-Added Outcome</b>	<b>Value-Added Outcome</b>
↓	↓	↓	↓
Pre-Engineering College Credit	Autodesk Certification Revit Certification College Credit	NCCER Certification(s) Advanced Apprenticeship Standing College Credit	NCCER Certification(s) Advanced Apprenticeship Standing College Credit

# Apprenticeships

An apprenticeship is a training program for specialized and technical jobs that require a lot of brainpower as well as hands-on work. Sometimes called the “other four year degree,” an apprenticeship includes classroom time and on-the-job training that leads to specific certifications and licenses for each trade. Some of the different trades that are apprenticeship-based include electricians, plumbers, HVAC technicians, carpenters, and many more.

Many apprenticeships now include the possibility of earning college credits that can be used at local community colleges toward an associate degree.

## How long does it take?

A typical apprenticeship program can take anywhere from 3 to 5 years to complete, depending on the trade. Generally, an apprentice will spend 120 hours in class and complete 2,000 hours of on-the-job training per year. After that time, you can take a test to earn your Journeyman’s license, which allows you to work without supervision. Many people go on to earn a Master’s license after more years of experience in the field and successfully passing additional exams.

## Are there accelerated programs?

Yes! Each situation is different, but curricula taught in Maryland’s high schools are nationally recognized. It is possible for a graduating senior to have completed the first year of classroom work and enter a program as a Year 2 apprentice. Speak with your school counselor to assess your options.

## Are there any requirements?

The minimum requirement to start an apprenticeship is a high school diploma or GED. Most programs require you to be at least 18 years old and have a job in the field you are training in before starting. Understanding math, especially algebra, is very important, and you will be using it often.

Several apprenticeship programs require passing an entrance exam that may include interviews and math tests. Being drug-free is important as well since there will be drug tests, failing one means you’ll lose your place in a program.

## Do I get paid?

Yes! A major benefit of being in an apprenticeship program is that you are paid while you learn. In order to begin an apprenticeship, you are required to have a job in that field. After each year you complete in the program, your wages will increase, and at the end of the 3–5 years, you could possibly double your salary from what it was at the beginning.

Instead of starting your career at 20 or 22 when you finish a typical college degree program, you could be earning a full-time salary right out of high school. That’s a very different scenario than paying lots of money to go to college (and very possibly graduating with huge debts).

## How do I apply? Are there any fees?

There are fees to enter an apprenticeship program, but many times your employer will pay them for you. Fees and application dates will differ depending on the program. Visit [buildyourpath.org](http://buildyourpath.org) or see the directory in this guide to find apprenticeship programs in the state of Maryland.

## Why Consider an Apprenticeship?

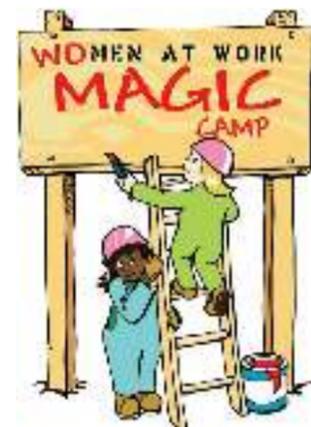
- **Earn While You Learn** – Completing an apprenticeship allows you to finish a formal training program without incurring debt.
- **Portability** – With apprenticeship training, you can take your training, and certifications, anywhere in the country. Some states may honor previous licensing as well.
- **Earnings Potential** – Many skilled trade jobs have income potential that’s equal to or greater than careers that require college degrees.
- **Demand** – Employers all over Maryland are looking for skilled, eager, and trainable young men and women to fill craft trade positions.
- **Starting Point** – Skilled trades are not dead-end jobs, apprentices often go on to become managers or business owners.

# Programs

These programs are available to middle and high school students across Maryland. Many admissions offices and employees look for students who complete one or more of these great programs.



Project Lead the Way (PLTW) is a nonprofit organization that provides a transformative, pre-engineering learning experience for K–12 students and teachers across the United States. PLTW empowers students to develop and apply transportable skills that are in demand by exploring real-world challenges. Through pathways in computer science, engineering, and biomedical science, students learn technical skills, how to solve problems and think critically and creatively, and how to develop critical communication and collaboration skills. There are currently 119 schools in Maryland that have PLTW engineering programs. For more information, visit [www.pltw.org](http://www.pltw.org).



## NAWIC MAGIC Camps

NAWIC is the National Association of Women In Construction. Each year, different chapters hold MAGIC camps. These are free, weeklong day camps for girls in grades 7 to 12 where they are introduced to potential careers in the construction industry. Many young girls are unaware of the possibilities of rewarding and financially beneficial careers in the construction trades or related fields. MAGIC is designed to give them hands-on experience to expand their horizons. One chapter holds MAGIC Camps in Maryland, located in the Baltimore area. Visit [www.nawicbaltimore.org](http://www.nawicbaltimore.org) to learn more.



SkillsUSA is a partnership of students, teachers, and industry leaders working together to ensure that America has a skilled workforce. They serve middle school, high school, and college/postsecondary students who are preparing for careers in technical, skilled, and service occupations. SkillsUSA Inc. is a national nonprofit and tax-exempt organization with the aim of helping every student excel. They provide educational programs and statewide events as well as national competitions that support career and technical education. With more than 300,000 students and advisors participating annually in 52 state and territorial associations, SkillsUSA has served more than 12.2 million members since its founding in 1965.

For more information, visit [www.skillsusa.org](http://www.skillsusa.org) or contact Charles Wallace, MDSE and MD SkillsUSA State Director.



## ACE MENTOR PROGRAM

ARCHITECTURE • CONSTRUCTION • ENGINEERING

ACE Mentor is a nationwide, high school mentorship program that helps inspire students to explore careers in Architecture, Construction, and Engineering. In Maryland, we are fortunate to have several active ACE Chapters operating in Baltimore, Annapolis, Frederick, the Eastern Shore (Easton and Salisbury) and in Washington, DC, covering Prince George's and Montgomery Counties.

Teams of students from area schools are mentored by industry professionals, many of them ACE alumni. This is a project-based program that simulates genuine industry situations. Past projects have included State Center development in Baltimore, Annapolis's Rivalution site, and repurposing of the Memorial Hospital in Easton. Mentors conduct lectures, lead tours of offices and project sites, and guide students through the design and building process. This program is rewarding, and it works. For more information about the program and how to get involved in your local chapter, visit [www.acementor.org](http://www.acementor.org).

# Success By Association.

The Mechanical Contractors Association – Maryland is a premier trade association dedicated to the promotion and support of high quality, safe mechanical construction. MCA is focused on the education, promotion and success of member companies – providing high-quality educational materials and events to attain the highest level of managerial and technical expertise. Members have access to educational programs, training seminars, legislative advocacy and networking outings to grow their business.



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Baltimore, Maryland 21224

**For information or guidance in your career path contact us at: 410-276-1926**  
[info@MCA-Maryland.org](mailto:info@MCA-Maryland.org)

[www.MCA-Maryland.org](http://www.MCA-Maryland.org)



# Architect

Architects are licensed professionals who design buildings including houses and commercial structures. They can be hired for a range of projects including renovations, additions, designing a single room, or designing a complex of buildings.

## Quick Facts

**Average Salary:** \$83,364, but will vary depending on experience and training.

**Important Skills:** Analytical skills  
Communication skills  
Organizational skills  
Technical skills  
Visualization skills

**Education:** A degree from a university is required. This is usually a five year program.

## What Do Architects Do?

Architecture is a highly technical profession requiring vast knowledge of building materials, codes, engineering principles, and spatial relationships. At the same time, it is also a highly creative career that allows for both functional and aesthetically pleasing designs.

Architects meet with clients to discuss objectives, requirements, and conceptual budgets. Before initial meetings, they may conduct impact studies or site investigations. To obtain an accurate budget estimate, they may determine the required materials, time frame, labor, and equipment costs. Once plans and budgets have been agreed upon, architects then develop construction documents, which typically illustrate the floor plans and general appearance of the structure to be built.

In designing structures, architects need to follow all state and local building codes, along with zoning laws. They also have to ensure that the structure will comply with fire and safety regulations and any requirements for accessibility.

Although architects used to draw plans by hand, now most of them use software that often involves computer-aided drafting and building-information modeling programs. Some architects design buildings by themselves, while others receive help from drafters, who use these software programs professionally. Nevertheless, drawing by hand continues to be practiced, especially during the early stages of design.

Once plans have been approved and construction begins, architects periodically visit the construction site to make sure that the project is following the finalized design and the construction schedule. They carry out these tasks by meeting with construction managers and other contractors in order to address the project's progress and any problems that arise, and to discuss solutions.

## Work Environment

Architects work in an office setting where they meet with clients to develop projects. They also write reports and may work with other architects and engineers on a team. As their careers progress, architects may have the opportunity to work from home.

Architects work full time, but might need to work longer hours at some points in a building's progress in order to meet deadlines. Architects who are self-employed tend to work longer hours because they do not share responsibility. However, they do enjoy the option of having a more flexible work schedule.

## Becoming an Architect

There are three major steps in the process of becoming an architect: earn a degree in architecture, gain experience from a paid internship, and pass examinations to become a registered architect.

To become an architect in the United States, a professional degree in architecture is required in all states. A typical bachelor's degree in architecture takes 5 years to complete, after which many graduates stay in school to earn their master's degrees, which often takes another 1–5 years depending on the student's previous education. Many states require an architecture degree from an accredited school, as opposed to a general degree. Information about accreditation can be obtained from the National Architectural Accrediting Board and the National Council of Architectural Registration Board. Once an aspiring architect earns a professional degree, a lengthy paid internship is necessary. Internships typically fulfill the 3-year requirement for the Architect Registration Board. Some internships completed during undergraduate education may count toward the total internship period.

In all US states, architects are required to be licensed, which first requires them to earn a professional degree, fulfill the internship period, and pass the Architect Registration Examination. In addition to becoming registered, all architects must earn continuing education credits throughout their careers. In fact, one in three architects also opt to become certified by the National Council of Architects Registration Board by receiving the designation of the American Institute of Architects, which allows them to become licensed in many states more easily.

**I AM AIA**

“Architecture is a demanding, but extremely fulfilling career. We do a multitude of things, all with the common goal of making a positive impact on the world through design.”

Joseph Lai, AIA Member since 2012

**Join me.**  
[aia.org/join](http://aia.org/join)

 The American Institute of Architects





# Carpenter

Carpenters build and repair frameworks and structures, which can entail working with wood or steel framing, stairways, doorways, trusses, and rafters. They may also build and install cabinets and drywall. Alternatively, many carpenters become specialized in artisan millwork or room finishing.

## Quick Facts

**Average Salary:** \$54,080, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

**Important Skills:**  
Business skills  
Attention to detail  
Manual dexterity  
Advanced math skills  
Physical stamina  
Physical strength  
Problem-solving skills

## What Do Carpenters Do?

Carpenters perform many different tasks during their workday. They need to be able to read and understand construction documents, plans, and specifications.

Carpenters install many different building components, including windows, cabinets, and doors, and have to be able to measure and cut materials accurately. Carpenters are trained to properly construct walls, floors, stairways, and doorways. They may rely on cranes and large equipment for assistance when constructing building frameworks.

## Types of Carpenters

**Residential carpenters** specialize in single-family, townhome, and condominium building and remodeling. They build and set forms for footings, walls, and floor slabs; frame and finish exterior walls, roofs, and decks; frame interior walls, build stairs, and install drywall; and install crown molding, doors, millwork, and cabinets. In addition, residential carpenters may tile floors and lay wood floors and carpet. Fully trained carpenters can easily switch from new homebuilding to remodeling.

**Commercial carpenters** build and remodel commercial office buildings, hospitals, hotels, schools, and shopping malls. Some specialize in working with light-gauge and load-bearing steel framing for interior partitions, exterior framing, and curtain wall construction. Others specialize in working with concrete forming systems and finishing interior and exterior walls, partitions, and ceilings.

**Industrial carpenters** work on civil engineering projects and in industrial settings, building scaffolding and setting forms for pouring concrete. Some industrial carpenters build tunnel bracing or partitions in underground passageways and mines to control the circulation of air to worksites. Others build concrete forms for tunnels, bridges, dams, power plants, or sewers.

**Finish carpenters** provide finishing touches after the primary building of a structure is done. This includes installing baseboards, molding, stairs, doors, windows, cabinets, and hardwood floors.

## Work Environment

Because carpenters are involved in many types of construction, from building highways and bridges to installing kitchen cabinets, they may work indoors as well as outdoors.

Carpenters normally work full time and sometimes work evenings or weekends. Overtime is also common for carpenters, especially when working to meet deadlines. Around 36 percent of carpenters are self-employed, and most of these work in residential settings.

## Becoming a Carpenter

An apprenticeship is the typical launchpad for a career in carpentry. However, some aspiring carpenters may begin as assistants without having had any formal training. Either way, a high school diploma or the equivalent is required. Mathematical skills are crucial in this career, so special attention should be paid to mathematics coursework in school. Many carpenters go on to become independent contractors or construction superintendents.



# RYAN MONAHAN

High school drafting student.

Volunteer firefighter/EMT.

Architecture graduate.

Construction management  
professional.

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*Every day I have the satisfaction of building something of quality that is essential and long-lasting.*



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A.A. Construction Management  
Howard CC 2015

Dave  
Senior Estimator  
B.S. Construction Management  
VA Tech 2006

Richard  
Superintendent  
Veteran,  
U.S. Navy Seabees

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Therrien Waddell will help you take your first steps!

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## UNIVERSITY of MARYLAND EASTERN SHORE



The **Construction Management Technology (CMT)** Program at UMES, is the only American Council on Construction Education (ACCE) accredited construction program in the State of Maryland. The CMT program is designed to develop a capable and knowledgeable construction workforce by preparing interested individuals for job opportunities in the field of construction.

Students can either enter the program directly from high school or take basic qualifying courses at neighboring community colleges, or any other universities and have their courses transferred to CMT program at UMES.



If you have any additional questions, please visit our website at [www.umes.edu/tech/](http://www.umes.edu/tech/) or contact us at (410) 651-6465.



# Civil Engineer

Civil engineers design, maintain, and supervise large projects and systems, including roadways, airports, tunnels, commercial buildings, bridges, and water systems. Civil engineering is one of the most diverse fields in the construction industry.

## Quick Facts

- |                                                                                                            |                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Average Salary:</b> \$85,583, but will vary depending on experience and training.                       | <b>Important Skills:</b><br>Decision-making skills<br>Leadership skills<br>Mathematical skills<br>Organizational skills<br>Problem-solving skills<br>Writing skills |
| <b>Education:</b> A degree from an accredited university is required. This is usually a five year program. |                                                                                                                                                                     |

## What Do Civil Engineers Do?

Civil engineers normally begin projects by analyzing site plans, which are similar to maps, and other data in order to plan projects accordingly. Specifically, civil engineers take into account government regulations, environmental hazards, and risk-analysis data when planning projects. They are responsible for developing a project budget and schedule for the civil engineering work, as well as for submitting all permit applications before beginning a project. Civil engineers oversee soil testing in order to determine the type and durability of any foundation that is needed.

Civil engineers use software programs to design transportation, hydraulic, and structural systems. While designing such systems, they make sure that plans align with industry standards. Once a project is underway, they oversee all aspects of it, from the initial survey to the structure's completion. Many engineers also go on to maintain and repair infrastructures.

Civil engineers occupy supervisory positions. They may work on other projects and receive assistance from civil engineering technicians. If they are employed by the federal government, civil engineers may inspect structures and projects in order to make sure that the projects comply with regulations. Civil engineers work on complex projects and tend to specialize in one of several areas, including those listed below.

## Types of Civil Engineers

**Construction engineers** manage construction projects, ensuring that they are scheduled and built in accordance with plans and specifications. In addition, construction engineers are typically responsible for the design and safety of temporary structures used during construction.

**Geotechnical engineers** make sure that foundations are structurally solid. They focus on structures built by civil engineers, such as buildings and tunnels, that interact with the earth (including soil and rock). In addition, they design and plan for slopes, retaining walls, and other types of foundational structures.

**Structural engineers** design and assess major projects such as buildings, bridges, or dams in order to ensure their strength and durability.

**Transportation engineers** plan, design, operate, and maintain everyday transportation systems such as streets and highways, but they also plan larger projects such as airports, shipping ports, mass transit systems, and harbors.

## Work Environment

Most civil engineers work in an office setting, yet periodically they need to visit construction sites in order to review their progress. Some civil engineers travel to other countries in order to work on larger projects. Civil engineers work full time, but they may need to work longer hours to meet deadlines. In 2012, one in four civil engineers worked more than 40 hours per week.

## Becoming a Civil Engineer

The starting point for any career in civil engineering is to earn a bachelor's degree from an Accreditation Board for Engineering and Technology (ABET) accredited school in civil engineering or a related field. Upon graduation, an engineer can pursue licensing, the Professional Engineer (PE) designation, or continue on to earn a master or doctorate degree.

Licensing is required for anyone who works in the public sphere for projects such as designing bridges, roadways, and public places. Licensing varies from state to state and often requires several years of practice and successfully passing state licensing examinations. To become a Professional Engineer, a graduate must first pass the Fundamentals of Engineering examination and become an Engineer-in-Training (EIT). EITs typically work for a minimum of 5 years under the supervision of a licensed or Professional Engineer, and then they must pass the Professional Engineer examination. Licensures and designations must be maintained by continuing education throughout one's career. About one in five graduates go on to earn a master's degree or other advanced degrees.

Licenses, designations, and advanced degrees are not required to have a long and successful career. However, these are the most highly recognized pathways to earning promotions, becoming project leaders, and being given increasing responsibilities.





# Construction Manager

Construction managers oversee all aspects of worksites and construction projects. They plan, coordinate, budget, and supervise all phases of construction from the start of a project to its completion. Construction managers may work as project managers, superintendents, or cost estimators for general and sub-contracting firms.

## Quick Facts

### Average Salary:

\$103,196, but will vary depending on experience and training.

**Education:** A bachelor's degree or working your way up. Extensive field experience is sought after.

### Important Skills:

Analytical skills  
Business skills  
Communication skills  
Customer-service skills  
Decision-making skills  
Leadership skills  
Speaking skills  
Technical skills  
Time-management skills  
Writing skills

Most Construction managers work full time during the week. However, working weekends and working overtime may be required, especially to meet deadlines or in the case of an emergency. Since problems and emergencies do arise, many construction managers are on call 24 hours a day.

## Becoming a Construction Manager

Construction management is a unique field because many managers have worked their way up from trade or engineering positions, while others have earned a bachelor's degree in construction management at a four-year college or university. It is recommended that Construction managers have field experience and understand all aspects of construction. Currently, certifications are not required, but they are becoming increasingly popular.

## What Do Construction Managers Do?

Construction managers oversee most of the personnel working on construction sites, meaning that their role is supervisory. They develop a detailed construction schedule, and they coordinate with electricians, HVAC mechanics, and plumbers, among others, to ensure that projects stay on schedule and within their budgets. It is possible for large projects to encompass multiple worksites at the same time, and in this case, a Construction manager needs to oversee the entire project. Communication is a critical aspect of a Construction manager's job.

For the duration of a project, the Construction manager coordinates all meetings among the owners, architects, engineers, bankers, and government officials.

## Work Environment

Most Construction managers work from a field office on a construction site—most typically, a trailer equipped with everything normally found in an office setting. Working at the site allows the construction manager to oversee the entire project and make decisions quickly when necessary. Traveling is required, especially if construction managers oversee multiple projects.

When beginning his or her career, a Construction manager will likely work as an assistant under an experienced manager. He or she may stay in this position for a couple of months to a few years before being promoted to management.

## Careers In Construction

Experience  
You Can *Build* On.



- Accountants
- Asphalt Paving and Concrete Installers
- Asphalt Plant Production & Quality Control Technicians
- Dispatchers
- Estimators
- Sales Representatives
- Equipment Operators
- Mechanics
- Project Management
- Truck Drivers



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Estimates are based on factors such as time, materials, and labor costs, as well as bad weather, delays for other reasons, and any other issues that might increase the cost of a project. Many cost estimators use software to simulate a typical construction timeline in order to accurately determine the cost of a project.

### Types of Cost Estimators

**Construction cost estimators** prepare estimates for a building project. They identify the costs of elements such as raw materials, products, components, and labor, and they may set a timeline for how long they expect a project to take. Although many work directly for construction firms, some construction cost estimators work for sub-contractors and engineering firms.

**Manufacturing cost estimators** calculate the costs of developing, producing, or redesigning a company's goods or services. Some manufacturing cost estimators work in software development. Many high-technology products require a considerable amount of computer programming, and calculating the costs of software development requires great expertise.

### Work Environment

Typically, cost estimators work full time in an office environment. However, travel to construction sites may be needed to gather information, as well as working overtime to meet deadlines.

### Becoming a Cost Estimator

A bachelor's degree in a related field such as architecture, construction management, or engineering is usually required to become a cost estimator, in addition to a strong background in math. However, a very experienced worker with a background in construction may be able to qualify without a degree. On-the-job training and field experience is often required. Cost estimators will also need to learn specialized software, which may be included in their on-the-job-training.

### Licenses, Certifications, and Registrations

Certification exams are typically not required for cost estimators, but these demonstrate competence and experience so are highly recommended. Companies may require a job candidate to take certification exams before he or she is hired. In order to become certified, estimators generally need to have at least two years of estimating experience and be able to pass a written exam.

The following organizations offer a variety of certifications:

- American Society of Professional Estimators
- Association for the Advancement of Cost Estimating

# Cost Estimator

Cost estimators collect and analyze data in order to estimate the amount of time, money, materials, and labor required to construct a building. They often specialize in a certain industry segment, such as structures, finishes, or electrical systems. Estimators also collaborate with construction managers in order to keep a project within budget.

### Quick Facts

**Average Salary:** \$62,527, but will vary depending on experience and training.

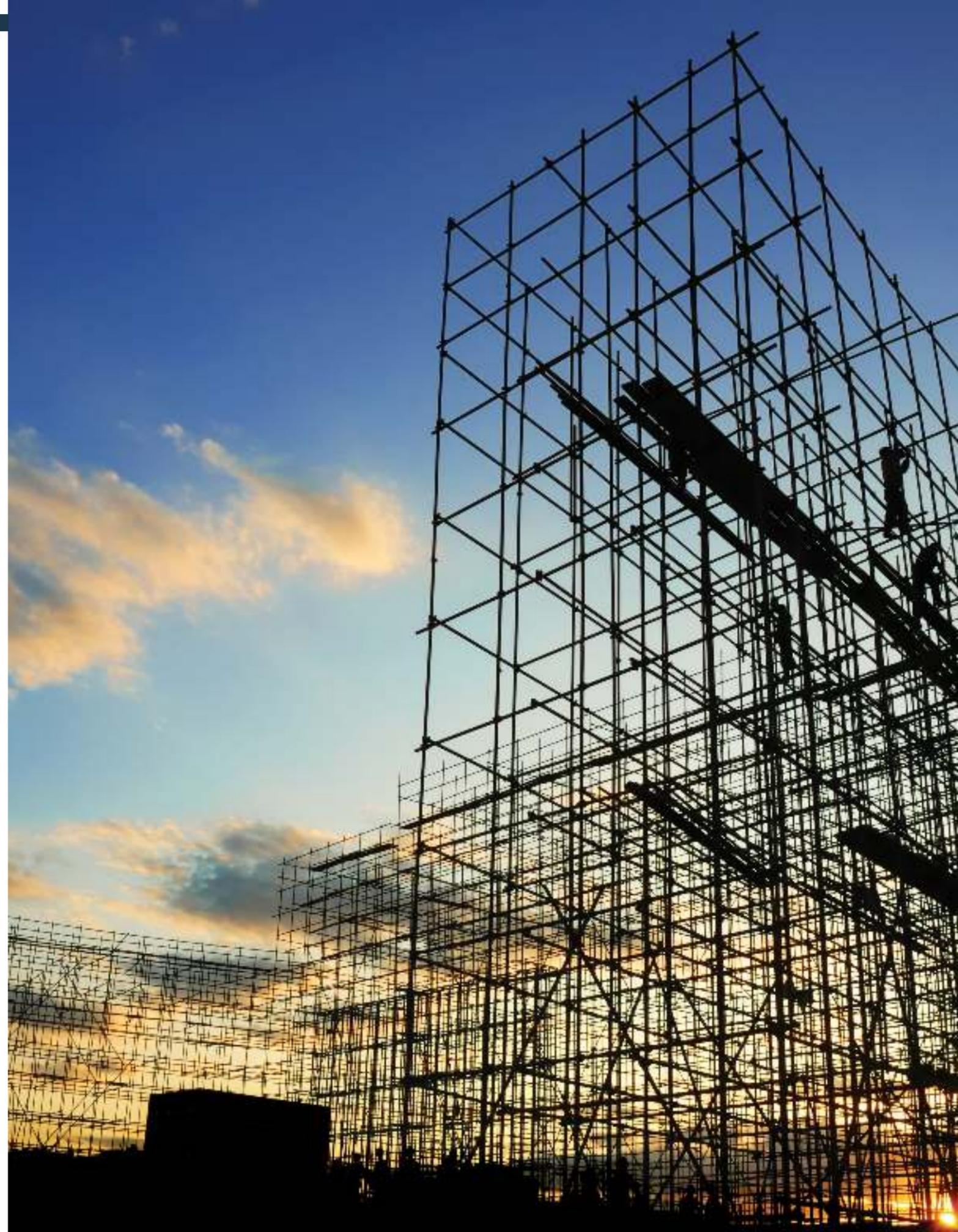
**Education:** A degree in a related field (usually engineering or management), and strong math skills.

### Important Skills:

- Analytical skills
- Ability to interpret plans and specifications
- Attention to detail
- Math skills
- Time-management skills
- Writing skills

### What Do Cost Estimators Do?

Cost estimators are vital to any construction project or business. They provide estimates that are used to submit contract bids or to price projects accurately. Estimators collaborate with contractors, architects, engineers, and clients to keep a project within budget as well as to maintain the cost records for the entire project.



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# Electrician

Electricians install and maintain electrical systems including lighting and control systems for public and private clients.

## Quick Facts

**Average Salary:** \$76,960, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

## Important Skills:

Business skills  
Ability to see all colors  
Manual dexterity  
Critical-thinking skills  
Customer-service skills  
Troubleshooting skills

## What Do Electricians Do?

Most public and private locations use some sort of electrical power for lighting, communication systems, appliances, and sound systems. Any system that involves electrical wiring is usually installed and maintained by an electrician. Installing these systems while buildings are being constructed is usually easier and less complicated than updating or renovating an existing building.

Electricians need to be able to read construction documents, plans, and specifications in order to understand the location of wiring in a building. Fortunately, most electrical plans show where all the circuits, outlets, and other devices are located, and special tools have been developed over the years to help electricians perform their work safely and more efficiently, such as the short-circuit tester, which can identify a short in a circuit.

Although electricians normally work alone, when designing new buildings they may need to work with engineers and architects in order to ensure that no building conflicts arise. To that end, the introduction of building information modeling has helped reduce the likelihood of problems. Electricians may also work in teams if they are part of a large company, and some might supervise new apprentices.

## Types of Electricians

**Inside electricians** maintain and repair large motors, equipment, and control systems inside businesses and factories. Some inside electricians also install the wiring for businesses and factories that are being built and perform scheduled maintenance.

**Residential electricians** install wiring and troubleshoot electrical problems in people's homes. Residential electricians who work in new-home construction install components and provide access to power where needed. Those who work in maintenance and remodeling typically repair and replace faulty equipment.

## Work Environment

The work environment for electricians varies widely. Some electricians work outdoors almost all of the time, while others work mostly indoors. Their work is jobsite-based rather than office-based. About 9 percent of electricians are self-employed.

Because electrical systems are generally situated in confined areas, electricians may need to be able to work in small spaces or at strange angles in order to perform their work. It's important to note that electricians can face many risks while fulfilling their duties. They must wear protective clothing and follow all safety procedures to avoid accidents.

Electricians work full time and have schedules that often involve work in the evenings and on weekends. Since many electricians work outside, available work shifts can vary due to weather. Overtime is also necessary sometimes, especially when working on new construction projects.

## Becoming an Electrician

Being an electrician is considered a trade career that generally requires an apprenticeship in order to become licensed as required by law. Although the primary requirement to become an apprentice electrician is a high school diploma or its equivalent, many aspiring electricians attend technical school. Programs at these schools may offer specific certifications and training that count as credit toward completing an apprenticeship. Apprenticeships typically last four years, after which an apprentice can take examinations to advance to licensed journeyman status. A journeyman is an electrician who can work without supervision. Many go on to become master certified electricians; this requires additional education and professional experience.



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Some engineers study ways to minimize the effects of acid rain, climate change, automobile emissions, and ozone depletion. They may also collaborate with environmental experts in law and business to address environmental problems and sustainability.

### Work Environment

Environmental engineers work full time in a variety of locations, depending on the project or task. For example:

- When working with other engineers and with urban and regional planners, environmental engineers are likely to perform their duties in offices.
- When working with businesspeople and lawyers, environmental engineers are likely to be at seminars where they present information and answer questions.
- When working with hazardous-waste technicians and environmental scientists, environmental engineers work at specific sites outdoors.

Some overtime work may be required to ensure that deadlines are met.

### Becoming an Environmental Engineer

In order to become an environmental engineer, a bachelor's degree in environmental engineering or a related field is required. Internships or college credit cooperatives are recommended. Many colleges and universities also offer a five-year program in which a student can receive both his or her bachelor's and master's degrees. A graduate degree allows an engineer to work as an instructor and also gives him or her an advantage when searching for a job.

Students interested in becoming environmental engineers should take high school courses in chemistry, biology, physics, and math, including algebra, trigonometry, and calculus.

Many employers prefer a degree from an Accreditation Board for Engineering and Technology (ABET) program. An ABET degree is also usually a requirement to become a licensed engineer. As an environmental engineer gains experience, he or she can advance to supervising a team of engineers and technicians or move on to management.

### Licenses, Certifications, and Registrations

Entry-level positions do not normally require a license; however, to become a professional engineer, a license is required. A Professional Engineer (PE) can oversee projects and other engineers. To become a Professional Engineer, a graduate must first pass the Fundamentals of Engineering examination and become an Engineer-in-Training (EIT). EITs typically work for a minimum of 5 years under the supervision of a licensed or Professional Engineer, and then they must pass the Professional Engineer examination.

# Environmental Engineer

Environmental engineers design systems that reduce the negative impacts of building on the natural environment. They are involved in reducing water and air pollution, improving public health, and in waste disposal. They also address global issues such as climate change and environmental sustainability.

### Quick Facts

- |                                                                                                            |                                                                                                                               |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Average Salary:</b> \$91,652, but will vary depending on experience and training.                       | <b>Important Skills:</b><br>Interpersonal skills<br>Problem-solving skills<br>Reading skills<br>Math skills<br>Writing skills |
| <b>Education:</b> A degree from an accredited university is required. This is usually a five year program. |                                                                                                                               |

### What Do Environmental Engineers Do?

Environmental engineers design systems for municipal and industrial water supplies and wastewater treatment. They also research the environmental impact of proposed construction projects and work with government officials to develop regulations designed to prevent mishaps.





# Glazier

Glaziers install glass in windows, skylights, and other fixtures in storefronts and buildings.

## Quick Facts

**Average Salary:** \$54,080, but will vary depending on experience and training.

**Important Skills:** Balance  
Hand-eye coordination  
Physical stamina  
Physical strength

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

## What Do Glaziers Do?

Glaziers specialize in installing tempered and laminated glass, windows of all sizes, and doors to make a building seem open, airy, and inviting.

Glaziers work on residential and commercial properties installing glass used for showers, tabletops, room dividers, and anything else that involves the use of glass. They can also work on replacing older windows on existing buildings.

For construction projects, most of the glass is pre-cut, mounted, and delivered to the site. The finished glass is then lifted into place by cranes or other equipment with suction cups, and then the glaziers will place and secure it. They will then place laminate film or tints over the glass to help it become less prone to shattering and to provide UV protection. Some glaziers may also work with plastic, marble, granite, or other glass substitutes.

## Work Environment

Glaziers work full time, usually outside. Working at great heights may be required depending on the building. The ability to lift and move heavy panes of glass is required for this job. Glaziers may also need to manage a team of people when working with large pieces of glass.

## Becoming a Glazier

Glaziers usually have a high school diploma and receive training through an apprenticeship. Courses in math are considered useful.

An apprenticeship usually lasts three to four years before a glazier takes a test for a journeyman's license. Advanced licensure allows a glazier to work without supervision.



# HVAC Mechanic

Heating, ventilation, and air conditioning (HVAC) mechanics, who may also work with refrigeration, install and maintain systems that control the temperature, airflow, and air quality in buildings.

## Quick Facts

**Average Salary:** \$54,053, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

**Important Skills:**  
 Customer-service skills  
 Attention to detail  
 Mechanical skills  
 Physical strength  
 Time-management skills  
 Troubleshooting skills

In the event of a malfunction, they need to determine the cause and to repair any worn or defective parts. HVAC mechanics are normally either installers or repairers, depending on their skill set.

Some HVAC mechanics specialize in a certain area, such as solar-panel systems or commercial-refrigeration systems. Mechanics need to know and understand all required government regulations, including how to handle and dispose of certain fluids and gases.

## Work Environment

Most HVAC mechanics are employed full time by a company, although roughly 9 percent are self-employed. Evening and weekend work is sometimes required, and overtime may be necessary to address serious issues and deadlines. Many locations are assigned through contracts by which mechanics work in one location for a certain period, whether it's only a week or a year. Others may travel to different sites during the day to make service calls. Most HVAC mechanics work in indoor environments, but they may have to go outside to check systems. Since most systems are in small spaces, cramped working conditions are common. If an air cooling or heating system malfunctions, the temperature may vary while working inside a building.

## What Do HVAC Mechanics Do?

HVAC mechanics must understand how to read construction documents, plans, and specifications. HVAC systems are highly complex and are some of the first aspects that contractors analyze in order to estimate the duration and cost of a project. Mechanics install or repair systems that, once they are completed, may require a water or fuel supply to be connected, as well as air ducts and other pieces that make the entire system work. Given new standards for buildings, HVAC mechanics may also check energy use and suggest ways to improve a system's efficiency.

Some HVAC mechanics oversee an electrician or install electrical wiring and controls, then test the entire system. Many mechanics are assigned to a certain project's system and are responsible for all repairs and routine maintenance.

HVAC mechanics face many risks as well as injury while fulfilling their duties. They must wear protective clothing and follow all safety procedures.

## Becoming an HVAC Mechanic

Being an HVAC mechanic is considered a trade career that generally requires an apprenticeship. The chief requirement to start an apprenticeship is a high school diploma or the equivalent, although many aspiring HVAC mechanics attend a technical school where programs may offer specific certifications and training that counts as credit toward an apprenticeship.

An apprenticeship usually lasts three to four years before testing for a journeyman's license is possible. Advanced licensure would allow a mechanic to work without supervision. Many HVAC mechanics go on to become master certified, which requires continued education and career experience. Mechanics who work with refrigerants must be certified by the US Environmental Protection Agency. Many trade schools and apprenticeships add this program to their courses of study.



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# Insulation Worker

Insulation workers install and replace material used to insulate buildings and mechanical systems. They can also be known as insulators.

## Quick Facts

**Average Salary:** \$70,720, but will vary depending on experience and training.

**Important Skills:**  
 Dexterity  
 Math skills  
 Mechanical skills  
 Physical stamina

**Education:** A High Diploma or GED is required. An apprenticeship or employer training are the traditional pathways.

## What Do Insulation Workers Do?

Insulated buildings save energy by keeping heat in during the winter and out in the summer. Insulation workers use traditional and spray-foam methods to properly insulate commercial and residential buildings. They also insulate mechanical systems and hot-water pipes and, therefore, may be referred to as mechanical insulation workers. This type of insulation helps systems run better, saves energy, and prevents burns. In addition, they may install plastic sheets known as vapor barriers to seal out moisture and humidity.

Because of the use of asbestos in older buildings, insulators must know how to properly remove insulation when renovating. An insulator can become specially trained in hazardous-materials removal. They will remove the old insulation and make sure all materials are disposed of properly before starting to install new insulation.

## Types of Insulators

**Floor, ceiling, and wall insulators** install insulation in attics, under floors, and behind walls in homes and other buildings. Most of these workers unroll, cut, fit, and staple batts of fiberglass insulation between wall studs and ceiling joists. Some workers, however, spray foam insulation with a compressor hose into the space being filled.

**Mechanical insulators** apply insulation to equipment, pipes, or ductwork in businesses, factories, and many other types of buildings. When insulating a steam pipe, for example, they consider the temperature, thickness, and diameter of the pipe to determine the type of insulation that should be used.

**Asbestos-removal workers** remove asbestos from ceilings, walls, beams, boilers, and other structures, following guidelines for handling hazardous-waste materials. These guidelines can include assembling scaffolding and sealing off work areas using plastic sheeting and duct tape.

## Work Environment

Most insulation workers have full-time jobs, and some jobs may require overtime, depending on a particular project. Residential and commercial workers spend their time indoors, while mechanical insulators may need to work outside, depending on where a system is located.

Insulators must also wear protective clothing that limits contact with irritants that are found in insulating materials.

## Becoming an Insulation Worker

There are no requirements for becoming an interior-insulation worker, although a high school diploma or GED and courses in math, woodworking, drawing, and science are very helpful. They will usually learn their trade on the job and begin installing insulation after being given basic instructions.

Mechanical insulators usually learn their trade through a four-year apprenticeship. An apprenticeship usually lasts three to four years before testing for a journeyman's license is possible. Advanced licensure allows an insulator to work without supervision. Many go on to become master certified, which requires continued education and career experience.

## Licenses, Certifications, and Registrations

While most insulation workers are not required to have a license, licensing is required for those who wish to handle asbestos, and the license must be granted by a program accredited by the U.S. Environmental Protection Agency.

Insulation contractor organizations offer voluntary certification to help workers prove their skills and knowledge of residential and industrial insulation.

The National Insulation Association also offers a certification for mechanical insulators who conduct energy appraisals to determine if and how insulation can benefit industrial customers.



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# Landscape Architect

Landscape architects and designers design attractive and functional parks, gardens, playgrounds, campuses, and public spaces. They also plan the locations of buildings, walkways, trees, shrubs, and flowers within the environment. Their goal is to create spaces that are easy to use but blend well with the natural environment.

## Quick Facts

- Average Salary:** \$64,251, but will vary depending on experience and training.
- Education:** A degree from an accredited university program is usually required.
- Important Skills:** Analytical skills, Communication skills, Creativity, Problem-solving skills, Technical skills, Visualization skills

## What Do Landscape Architects Do?

Landscape architects use different types of technologies for their work. They use computer-aided design and drafting (CADD) software, and may also prepare 3D models of their work to present to clients. In addition, they use geographic information systems (GIS), which provide the coordinates of different geographical features. This software helps them locate specific geographic points on the environment they are designing. For example, rainfall on a nearby hill could cause flooding at the building site, which can be reduced by design. The main goal of a landscape architect is to enhance the

natural beauty of a space and provide environmental benefits. The restoration of streams, wetlands, and other places altered by human use may also be part of their design work, as well as green roofs or rooftop gardens. In addition, landscape architects may work on historical restorations or memorials, such as the World War II memorial in Washington, DC.

Those who work for government agencies design sites and landscapes for government buildings, parks, and other public lands, as well as plan for landscapes and recreation areas in national parks and forests. In addition, they prepare environmental-impact assessments based on proposed construction.

## Work Environment

Most landscape architects work full time and spend some of that time in an office environment designing plans, researching, and preparing presentations. Time spent at the worksite is also required, as well as traveling to meet with clients. About one in five landscape architects are self-employed.

## Becoming a Landscape Architect

A bachelor's or master's degree is required to become a landscape architect. There are two undergraduate professional degrees: a Bachelor of Landscape Architecture (BLA) and a Bachelor of Science in Landscape Architecture (BSLA). These programs usually require four to five years of study. However, those who receive an associate degree or certification can work under the title landscape designer.

Accredited programs are approved by the Landscape Architectural Accreditation Board (LAAB). Those with an undergraduate degree in a field other than landscape architecture may enroll in a Master of Landscape Architecture (MLA) graduate degree program, which typically takes three years of full-time study.

In order to become licensed, candidates must meet experience requirements determined by each state. A list of training requirements can be found at the Council of Landscape Architectural Registration Boards.

New hires are usually referred to as intern landscape architects until they become licensed. Although duties vary with the type and size of the employing firm, interns must work under the supervision of a licensed landscape architect for the experience to count toward licensure. In addition, all drawings and specifications must be signed and sealed by the licensed landscape architect.

## Licenses, Certifications, and Registrations

All states, except for Illinois, Massachusetts, Maine, and Washington, DC, require landscape architects to be licensed in order to practice. In addition, every state (but not Washington, DC) requires applicants to be licensed before they can use the title landscape architect when soliciting business. Licensing is based on candidates passing the Landscape Architect Registration Examination (LARE), which is sponsored by the Council of Landscape Architectural Registration Boards. If a person is not licensed, he or she can use the title landscape designer.

Potential landscape architects usually need a degree from an accredited school and several years of work experience under the supervision of a licensed landscape architect, although standards vary. For those without an accredited degree, some states provide alternative paths to qualify to take the LARE; this usually requires more work experience. In addition, several states have their own registration exam to test for competency on state-specific issues, such as earthquakes in California or hurricanes in Florida.

Because requirements for licensing vary by state, it is difficult to transfer registration from one state to another. By meeting national requirements, a landscape architect may also obtain certification from the Council of Landscape Architectural Registration Boards, which might be useful in getting a license in another state.





# Line Installer and Repairer

Everywhere you go, there are power lines and cables that provide people with electricity, phones, cable television, and Internet. Line installers, also known as line workers, are the ones responsible for installing, repairing, and maintaining these lines. They can also specialize in different areas depending on the industry.

## Quick Facts

**Average Salary:** \$62,400, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship or employer training are the traditional pathways.

**Important Skills:**  
 Ability to see all colors  
 Mechanical skills  
 Physical stamina  
 Physical strength  
 Teamwork  
 Technical skills  
 Troubleshooting skills

Telecommunications line installers and repairers install, maintain, and repair lines used by communications companies such as cable television, telephone, or Internet. Some of these lines are fiber-optic, and instead of carrying electricity, they transmit signals using light. Working with these lines requires specific training to learn how to splice and terminate the cables.

Because both types of systems are complicated, many line workers specialize according to their job duties.

## Types of Line Installers

**Line installers** install new cable. They may work for construction contractors, utilities, or telecommunications companies. Workers generally start a new job by digging underground trenches or erecting utility poles and towers to carry the wires and cables. They use a variety of construction equipment, including digger derricks, which are trucks equipped with augers and cranes used to dig holes in the ground and set poles in place. Line installers also use trenchers, cable plows, and directional bore machines, which are used to cut openings in the earth to lay underground cables. Once the poles, towers, tunnels, or trenches are ready, workers install the new cable.

## What Do Line Installers and Repairers Do?

Electrical power-line installers and repairers install, maintain, and repair the electrical grid – the network of power lines that provide electricity to homes, businesses, schools, hospitals, and other buildings. They work with high-voltage lines and transformers, underground conduits, and highly specialized equipment. Line workers tend to travel around within their designated region in order to make sure that everything is running smoothly and that there are no outages. They may also work on traffic-signal lights and streetlights.

**Line repairers** employed by utility and telecommunications companies maintain existing lines. Maintenance needs can be identified in a variety of ways, including by remote monitoring, by aerial inspections, and by customer reports of service outages. Line repairers must often replace aging or outdated equipment, so many of these workers have installation duties in addition to their repair duties.

When a problem is reported, line repairers must identify the cause and fix it. This usually involves diagnostic testing using specialized equipment and repair work. To work on poles, line installers usually use bucket trucks to raise themselves to the top of the structure, although all line workers must be adept at climbing poles and towers when necessary. Workers use special safety equipment to keep them from falling when climbing utility poles and towers.

Storms and other natural disasters can cause extensive damage to power lines. When power is lost, line repairers must work quickly to restore service to customers.

## Work Environment

Line workers spend the majority of their workday traveling and working outside, sometimes in extreme conditions. Most use bucket trucks for their work, but all workers must be able to climb a utility pole and maintain their balance on it while working. The ability to work at great heights is a requirement for both types of line workers; however, electrical lines are typically higher. While most work full time, extreme weather and power outages may cause line workers to work extended hours.

## Becoming a Line Installer or Repairer

A high school diploma is required to become either type of line worker. Most of the time, the worker will be trained on the job by his or her company. Long-term on-the-job and technical training will help a worker advance in his or her career. Apprenticeships are also common.

Math skills in algebra and trigonometry are highly desirable assets, as well as technical training from apprenticeships, community colleges, or stand-alone courses on electricity or electronics. Many community colleges partner with companies to offer one-year certificates with an emphasis on hands-on training and experience.

Associate degrees that provide students with training in telecommunications and electrical utilities are also accepted and may offer job searchers a boost. These programs typically include courses in electricity, electronics, fiber optics, and microwave transmission.

Electrical line workers usually complete apprenticeships or employee training programs in order to become more skilled. Such programs can last up to three years and can combine

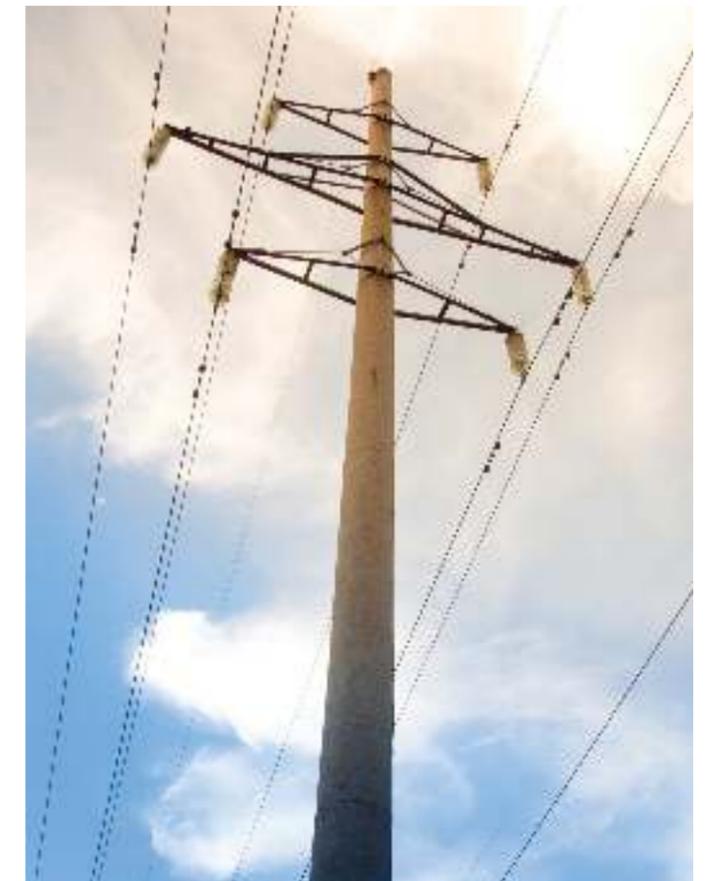
on-the-job training with technical instruction. This training may take place through a partnership between the employer and a training program. An apprentice may then test for a journeyman's license. Advanced licensure allows the line installer or repairer to work without supervision. Many go on to become first-line supervisors or trainers.

## Licenses, Certifications, and Registrations

Although not mandatory, certification for line installers and repairers is also available from several associations. For example, the Electrical Training ALLIANCE offers certification for line installers and repairers in several specialty areas.

In addition, The Fiber Optic Association (FOA) offers two levels of fiber optic certification for telecommunications line installers and repairers.

Workers who drive heavy-duty company vehicles usually need a commercial driver's license.





# Mason

Masons constitute a general group of specialized workers that include brick masons, block masons, and stone masons. They use brick, concrete, and stones for building foundations, walkways, chimneys, or retaining walls.

## Quick Facts

**Average Salary:** \$62,400, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

**Important Skills:**  
Hand-eye coordination  
Mathematical skills  
Physical stamina  
Physical strength  
Visualization skills

**Stone masons** build stone walls and set stone exteriors and floors. They work with two types of stone: natural-cut stone, such as marble, granite, and limestone, and artificial stone made from concrete, marble chips, or other masonry materials.

**Terrazzo workers and finishers**, also known as terrazzo masons, create decorative walkways, floors, patios, and panels. Terrazzo workers create decorative finishes by blending fine marble chips into an epoxy or cement, which is often colored. They also install decorative toppings and/or polishing compounds to new or existing concrete.

## What Do Masons Do?

Masons need to know how to read construction documents, plans, and specifications in order to perform their jobs correctly. They must be able to understand plans so that they can correctly calculate the amount and cost of materials needed to complete projects.

As well as building basic projects, masons lay out intricate patterns and foundations. All projects begin by planning instructions, cutting materials, and mixing mortar or grout. Once everything is laid out and in place, masons clean up any excess mortar and fill in joints and polish surfaces.

## Types of Masons

**Brick masons and block masons**—often called bricklayers—build and repair walls, floors, partitions, fireplaces, chimneys, and other structures with brick, terra cotta, precast masonry panels, concrete block, and other masonry materials.

**Refractory masons** are brick masons who specialize in installing firebrick, Gunite, castables, and refractory tile in high-temperature boilers, furnaces, and soaking pits in industrial establishments.

**Cement masons** and concrete finishers place and finish concrete. They may color concrete surfaces, expose aggregate (small stones) in walls and sidewalks, or make concrete beams, columns, and panels. Throughout the process of pouring, leveling, and finishing concrete, cement masons must monitor how wind, heat, humidity, or cold affects the curing of the concrete.

**Segmental pavers**—also referred to as patio pavers—install interlocking walkways, driveways, and patios.

## Work Environment

Masons commonly work outdoors and in all types of buildings. Building construction today uses stone, brick, marble, and a variety of other materials. Robotics is an emerging technology in masonry where experienced masons program and operate machines that lay brick and mortar. Most masonry work is performed outside, with weather playing a role in work schedules, and most masons work full time but may need to adjust their schedule or work overtime to meet deadlines and deal with weather-related delays. Masonry work may be stopped during extreme temperature or weather conditions. Some masons are self-employed, although the majority work for contractors.

## Becoming a Mason

Masons are normally required to complete an apprenticeship in order to begin their careers. However, some masons gain experience as assistants. Others attend a technical school to earn a degree, the credit for which can be used toward completing an apprenticeship. Although there are many ways to become a mason, a high school diploma or equivalent is required.




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# Mechanical Engineer

Mechanical engineering is one of the broadest careers in engineering. These engineers design and develop mechanical and thermal devices such as turbines, engines, and power plants. They also design elevator and conveyor systems.

### Quick Facts

**Average Salary:** \$98,370, but will vary depending on experience and training.

**Important Skills:**  
Creativity  
Listening skills  
Mathematical skills  
Mechanical skills  
Problem-solving skills

**Education:** A degree from an accredited university program is required.

### Work Environment

Most of a mechanical engineer's work is performed in an office. However, engineers may travel to worksites in order to observe how their designs are progressing. Nearly all mechanical engineers work with a team of other engineers and professionals. A forty-hour workweek is typical for this career, although one in three mechanical engineers works more than forty hours a week.

### Becoming a Mechanical Engineer

Aspiring mechanical engineers need to obtain a bachelor's degree from an Accreditation Board for Engineering and Technology (ABET) approved college or university. Most of these engineers go on to receive their master's degree in order to conduct research. All mechanical engineers must be licensed to perform their work. Licensure allows them to become professional engineers, a position requiring a degree from an accredited program, at least four years of relevant work experience, and a passing score on the final examination.

To become a teacher, conduct research, or advance in the field, a master's degree is usually required. Many mechanical engineers earn additional degrees in engineering or business administration.





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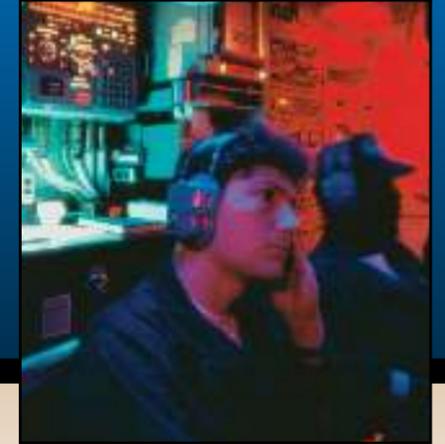
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# Plumber

Plumbers, pipefitters, and steamfitters install and repair piping that carries liquids or gases in residential, commercial, and industrial locations.

## Quick Facts

**Average Salary:** \$76,960, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

**Important Skills:**  
 Business skills  
 Customer-service skills  
 Mechanical skills  
 Physical strength  
 Troubleshooting skills

## What Do Plumbers, Pipefitters, and Steamfitters Do?

As with most professions in the construction industry, plumbers must be able to read and understand construction documents, plans, and specifications. They also need to follow state and local regulations, as well as building codes. Reading plans allows these workers to estimate how much material is needed and the type of equipment necessary for its installation. In addition, they also periodically replace old or worn parts.

Although plumbers, pipefitters, and steamfitters are three distinct specialties, their duties are often similar. Master plumbers who have gained years of experience in the field may develop a plumbing layout for new construction projects. Their experience and input ensure that a project meets codes and is accomplished within budget.

## Types of Plumbers, Pipefitters, and Steamfitters

**Plumbers** install and repair water, drainage, and gas pipes in homes, businesses, factories, and other buildings. They also install or repair plumbing fixtures—bathtubs, showers, sinks, and toilets—and appliances such as dishwashers, garbage disposals, and water heaters.

**Pipefitters**, sometimes referred to as fitters, install and maintain pipes that carry chemicals, acids, and gases, mostly in manufacturing, commercial, and industrial settings. Fitters often install and repair pipe systems in power plants, in addition to heating and cooling systems in large office buildings. Some pipefitters specialize; for example:

- Gasfitters** install pipes that provide natural gas to heating and cooling systems and to stoves for cooking. They also install pipes that provide clean oxygen to patients in hospitals.
- Sprinklerfitters** install and repair water/fire-sprinkler systems in businesses, factories, homes, and other buildings.
- Steamfitters** install pipe systems that move steam under high pressure. Most steamfitters work at college campuses and natural-gas power plants where heat and electricity are generated, but others work in factories that use high-temperature steam pipes.

## Work Environment

Work locations for these occupations vary due to the immense number of piping systems, but the most common locations are homes, factories, and businesses. Since plumbing often occupies confined spaces, plumbers may need to be able to squeeze into tight spaces. They also need to travel to their worksites. Although most plumbers work indoors, some work outside as well, regardless of the weather.

Plumbing positions are usually full-time jobs that can include work on nights and weekends and being on call for emergencies. Overtime is common, especially to meet project deadlines. Around 11 percent of plumbers are self-employed, which allows them to set their own schedules.

## Becoming a Plumber

Careers in plumbing normally require the completion of an apprenticeship, although some have gained experience as assistants. Others attend a technical school to earn a degree, the credits for which can be applied toward completing an apprenticeship. Technical schools offer courses on pipe system design, safety, and tool use, as well as welding courses considered to be necessary by some pipefitter and steamfitter apprenticeship training programs. Although there are many routes to becoming a plumber, a high school diploma or the equivalent is required, as is licensing in many states in the US.

Most plumbers, pipefitters, and steamfitters learn their trade during a four-to-five-year apprenticeship. After the apprenticeship, testing for a journeyman's license is possible, which allows a plumber to work without supervision.

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# Sheet Metal Worker

Sheet metal workers make or install products made of metal sheets. Sheet metal is thin steel, aluminum, or another alloy metal. Examples of products made by metal workers include HVAC ducts, metal roofing, siding, and gutters. Sheet metal workers may also install nonmetallic materials like fiberglass and plastic board.

## Quick Facts

**Average Salary:** \$79,040, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

### Important Skills:

Computer skills  
Dexterity  
Math skills  
Mechanical skills  
Physical stamina  
Physical strength

## Work Environment

Most sheet metal workers are employed full time, usually in shops or manufacturing plants. At a jobsite, sheet metal workers sometimes have to work at great heights. They also work in all kinds of weather, although projects may be postponed due to extreme weather or temperature.

It's important to note that sheet metal workers face risks to accomplish their jobs, as well as the possibility of injury. Sheet metal workers must wear protective clothing and follow all safety procedures.

## What Do Sheet Metal Workers Do?

Metal workers select the required type of metal according to the product plans. They will measure and mark all dimensions and reference lines on the metal sheets, then drill holes where fasteners will be placed. If manufacturing a product in a plant, they then install the metal sheets on supportive frameworks. If installing on a jobsite, they will fabricate the product there. Once the product is in place, sheet metal workers will fasten the seams and joints by welding, soldering, bolting, or riveting.

## Types of Sheet Metal Workers

**Fabrication sheet metal workers** make precision parts for a variety of industries. Most work in a shop or factory and control automated machines. They often use computer aided design and drafting (CADD) and building information modeling (BIM) systems to make products.

**Installation sheet metal workers** install heating, ventilation, and air-conditioning ductwork. They also install metal products such as roofs, sidings, and gutters.

**Maintenance sheet metal workers** repair and clean ventilation systems so the systems use less energy. Workers remove dust and moisture and fix leaks or breaks in the sheet metal that makes up the ductwork.

**Testing and balancing sheet metal specialists** adjust sheet metal ductwork to ensure that the system is running properly and that there are no airflow problems.

## Becoming a Metal Worker

A high school diploma or the equivalent is required. Coursework in algebra, geometry, and general vocational education courses including plan reading, mechanical drawing, and welding can be particularly useful.

Becoming a sheet metal worker is considered a trade career that generally requires an apprenticeship. Although the chief requirement to become an apprentice is a high school diploma or its equivalent, many aspiring sheet metal workers attend technical school. These schools offer programs that may provide specific certifications and training that can even count as credit toward completing an apprenticeship.

An apprenticeship usually lasts three to four years before testing for a journeyman's license is possible. Advanced licensure allows a metal worker to work without supervision. Many metal workers go on to become master certified, which requires continued education and career experience.

Although not required, some sheet metal workers become certified welders by the American Welding Society, the International Training Institute for the Sheet Metal and Air Conditioning Industry, and the Fabricators & Manufacturers Association, International. Certifications in welding, rigging, and crane signaling may increase a worker's value and result in higher pay.

# Surveyor

Surveyors make precise measurements to determine property boundaries. The boundary lines are used to prepare sites for construction projects and to prevent any legal disputes. Surveyors also aid in the collection of data used to determine the shape of the Earth's surface for engineering, mapmaking, and construction projects.

## Quick Facts

**Average Salary:** \$63,133, but will vary depending on experience and training.

**Education:** An accredited degree is required.

### Important Skills:

Communication skills  
Attention to detail  
Math skills  
Physical stamina  
Problem-solving skills  
Time-management skills  
Visualization skills

## What Do Surveyors Do?

Surveyors measure the distances and angles between points on, above, or below the Earth's surface. This helps them determine where boundary lines are; these are then used for construction projects, databases, or property lines for residential and commercial sales.

During construction, surveyors have to determine the exact locations of roads or buildings and the depth for foundations. They will also note potential restrictions on a property and what can or cannot be built on it.

Surveyors use the Global Positioning System (GPS) to locate reference points to begin a project. They will then use GPS units and robotic laser systems to collect information about the site. All the data are loaded into a computer and then used to verify the results.

Geographic Information Systems (GIS)—the technology that allows surveyors to present spatial information visually as maps, reports, and charts, is also used. They can overlay aerial images with GIS data to create digital maps. Those maps are then provided to governments and businesses in order for them to know where to plan homes or roads.

Surveyors also work with civil engineers, landscape architects, and urban and regional planners to develop comprehensive design documents.

## Types of Surveyors

**Geodetic surveyors** use high-accuracy technology, including aerial and satellite observations, to measure large areas of the Earth's surface.

**Marine or hydrographic surveyors** survey harbors, rivers, and other bodies of water to determine shorelines, the topography of the floor, water depth, and other features.

## Work Environment

Surveyors usually work full time for a private surveying or engineering firm. Some may also work for construction companies or local governments.

Surveyors work both in offices and out in the field, depending on the day. Traveling to different sites is very common, and surveyors may need to stay at a location for extended periods of time. They may need to climb tall hills carrying their equipment. They are also required to wear bright-colored clothing and reflective vests in order to be seen. Those who work on resource-extraction projects may work in remote areas and spend long periods away from home.

## Becoming a Surveyor

Because of the sophisticated technology and math used in this career, surveyors are typically required to have a bachelor's degree from an accredited ABET school in surveying; a degree in civil engineering may also be accepted.

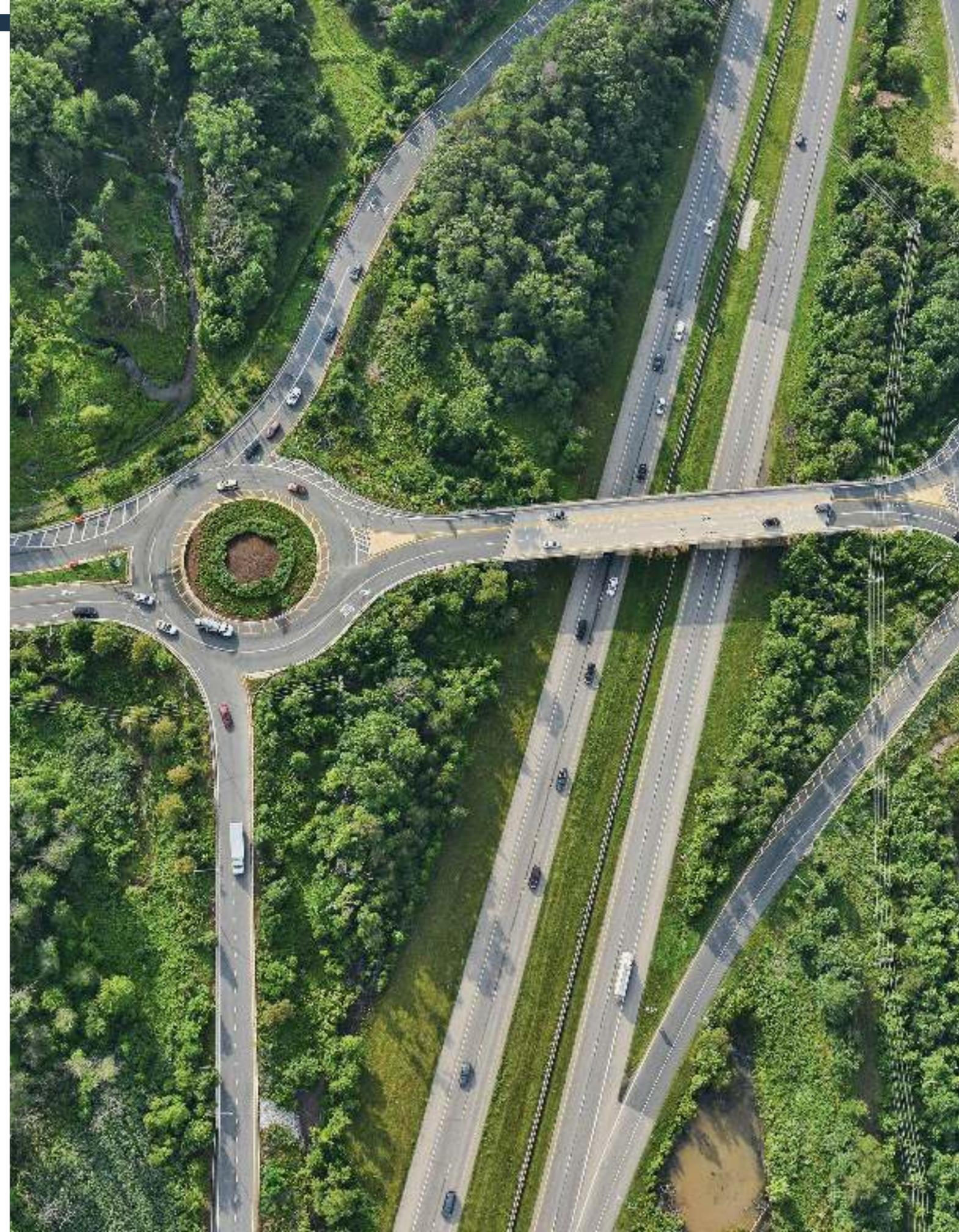
## Licenses, Certifications, and Registrations

Surveyors must be licensed in order to provide services to the public and to certify legal documents.

However, a survey technician with four years of experience may be able to become licensed in Maryland following several competency tests. In many states, an associate's degree in surveying, coupled with several years of work experience under a licensed surveyor, may be sufficient. Most states also have continuing education requirements. The licensing requirements for Maryland can be found at the Department of Labor, Licensing, and Regulation's website.

Although the process of obtaining a license varies by state, the National Council of Examiners for Engineering and Surveying has a generalized four step process:

- Complete the level of education required in your state
- Pass the Fundamentals of Surveying (FS) exam
- Gain sufficient work experience under a licensed surveyor
- Pass the Principles and Practice of Surveying (PS) exam





Some planners work on state, county, city, or community-wide projects, while others focus on specific issues. Ultimately, planners provide fact-based advice and information for the best use of a community's land and resources for residential, commercial, industrial, educational, and recreational purposes.

Planners must work with public officials, community members, and other groups to identify overall community issues and goals. Using research and data analysis, they will formulate strategies to address all issues and to meet the identified goals. Urban and regional planners may also oversee and organize projects being developed by other groups. This could be policy recommendations or helping to create a long-term area plan.

Urban and regional planners use geographic information systems (GIS) that analyze and manipulate data. GIS data can be used to create digital maps of an area. They also use statistical software, visualization and presentation programs, financial spreadsheets, and other database and software programs.

### Types of Urban and Regional Planners

**Land use and code enforcement planners** are concerned with the way land is used and whether development plans comply with codes, which are the standards and laws of a jurisdiction.

**Transportation planners** develop transportation plans and programs for an area, including road, mass transit, bike, and pedestrian modes of travel. They identify transportation needs and issues, assess the impact of transportation services or systems, and anticipate and address future transportation patterns.

**Environmental and natural resources planners** attempt to mitigate the harmful effects of development on the environment. They may focus on conserving resources, preventing the destruction of ecosystems, or restoring polluted areas.

**Economic development planners** focus on the economic activities of an area. They may work to expand or diversify commercial activity, attract businesses, create jobs, and expand the tax base or housing stock.

**Urban design planners** work to make building architecture, streets, and public spaces look and function in accordance with an area's development and design goals and land-use codes. They combine planning with aspects of architecture and landscape architecture. Urban design planners focus on issues such as city layout, street design, and building and landscape patterns.

### Work Environment

Urban and regional planners work full time in offices and travel to development sites. Overtime and weekend hours may be needed to accommodate meetings with community groups, officials, and planning commissions. While planners are needed in every part of Maryland, most of them work in a metropolitan area, such as Baltimore or Washington, DC. Planners often collaborate with public officials, engineers, architects, lawyers, and developers and coordinate community meetings to hear feedback on proposed changes, conditions, the environment, and use.

### Becoming an Urban or Regional Planner

Urban and regional planners require a master's degree from a program accredited by the Planning Accreditation Board in order to qualify for most positions.

While an undergraduate degree in any program could possibly be accepted for the master's program, most people have a degree in urban and regional planning, economics, geography, political science, or environmental design.

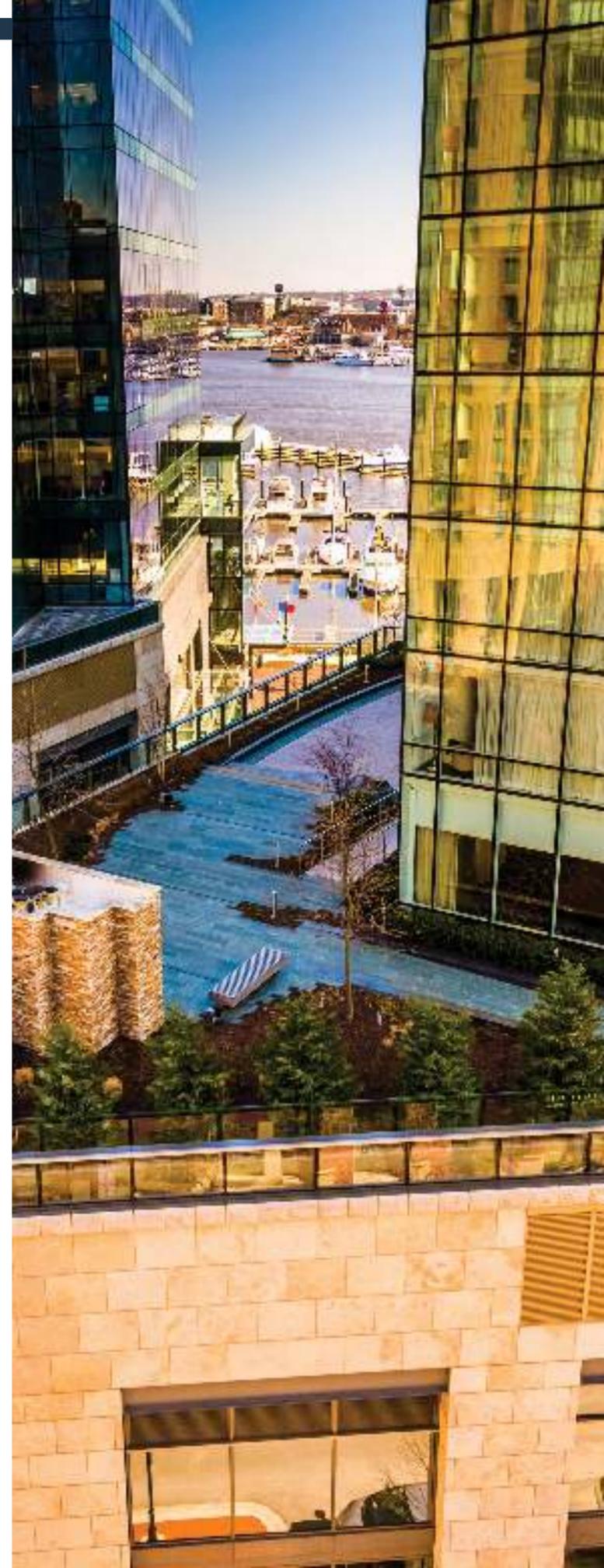
A master's program consists of time spent in seminars, workshops, and laboratory classes, where students will learn to analyze and solve planning problems. Courses offered may vary between schools and states, depending on local issues. For example, programs located in agricultural states may focus on rural planning, and programs located in an area with high population density may focus on urban revitalization.

Although not necessary for all positions, some entry-level positions require one to two years of work experience in a related field, such as architecture, public policy, or economic development. Many students gain experience through real-world planning projects or part-time internships while enrolled in a master's program. Others enroll in full-time internships after completing their degree.

### Licenses, Certifications, and Registrations

As of 2015, New Jersey was the only state that required urban and regional planners to be licensed, although Michigan required registration to use the title community planner.

The American Institute of Certified Planners (AICP) offers the professional AICP Certification for planners. To become certified, candidates must meet certain education and experience requirements and pass an exam. Certification must be maintained every two years. Although certification is not required for all planning positions, some organizations prefer to hire certified planners.



# Urban Planner

Urban and regional planners develop land-use plans and programs for an area to help create communities, accommodate population growth, and revitalize physical facilities in towns, cities, counties, and metropolitan areas.

### Quick Facts

- Average Salary:** \$66,138, but will vary depending on experience and training.
- Education:** A master's degree from an accredited university is required.
- Important Skills:**
  - Analytical skills
  - Communication skills
  - Decision-making skills
  - Management skills
  - Writing skills

### What Do Urban and Regional Planners Do?

Urban and regional planners identify the needs of a community and develop short-, intermediate-, and long-term solutions for building or revitalizing a community. For example, they examine proposals for new schools to make sure they account for increased population, or manage the social and economic factors involved in developing a new park. They will also examine ways to make a community more attractive to businesses.



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**For more information contact:**

**Laura LeMire**, Engineering Chair: 443-840-5904 or email, [llemire@ccbcmd.edu](mailto:llemire@ccbcmd.edu)

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# Virtual Designer

Drafting and virtual designers are the backbone for all careers in engineering and architecture. Using computing software, drafters prepare technical drawings and plans that become templates for constructing a host of buildings and systems.

## Quick Facts

**Average Salary:** \$56,192, but will vary depending on experience and training.

**Education:** A degree from a two-year college or technical school is required.

**Important Skills:**  
Critical-thinking skills  
Attention to detail  
Interpersonal skills  
Mathematical skills  
Time-management skills

## Types of Virtual Designers

**Architectural designers** draw architectural and structural features of buildings for construction projects. These workers may specialize in a particular type of building, such as residential or commercial. They may also specialize according to the materials that will be used for construction, such as steel, wood, or reinforced concrete.

**Civil designers** prepare topographical maps used in construction and civil engineering projects, such as highways, bridges, and flood-control projects.

**Electrical designers** prepare wiring diagrams that other construction workers use to install and repair electrical equipment and wiring in power plants, electrical distribution systems, and residential and commercial buildings.

**Electronics designers** produce wiring diagrams, assembly diagrams for circuit boards, and layout drawings used in manufacturing and for installing and repairing electronic devices and components.

**Mechanical designers** prepare layouts that show the details for a wide variety of machinery and mechanical tools and devices, such as medical equipment. These layouts indicate dimensions, fastening methods, and other requirements needed for assembly. Mechanical drafters sometimes create production molds.

## Work Environment

Most designers work full time in an office setting. They typically spend their time at their desks, although they may occasionally travel to jobsites and to collaborate with architects and engineers.

## Becoming a Designer

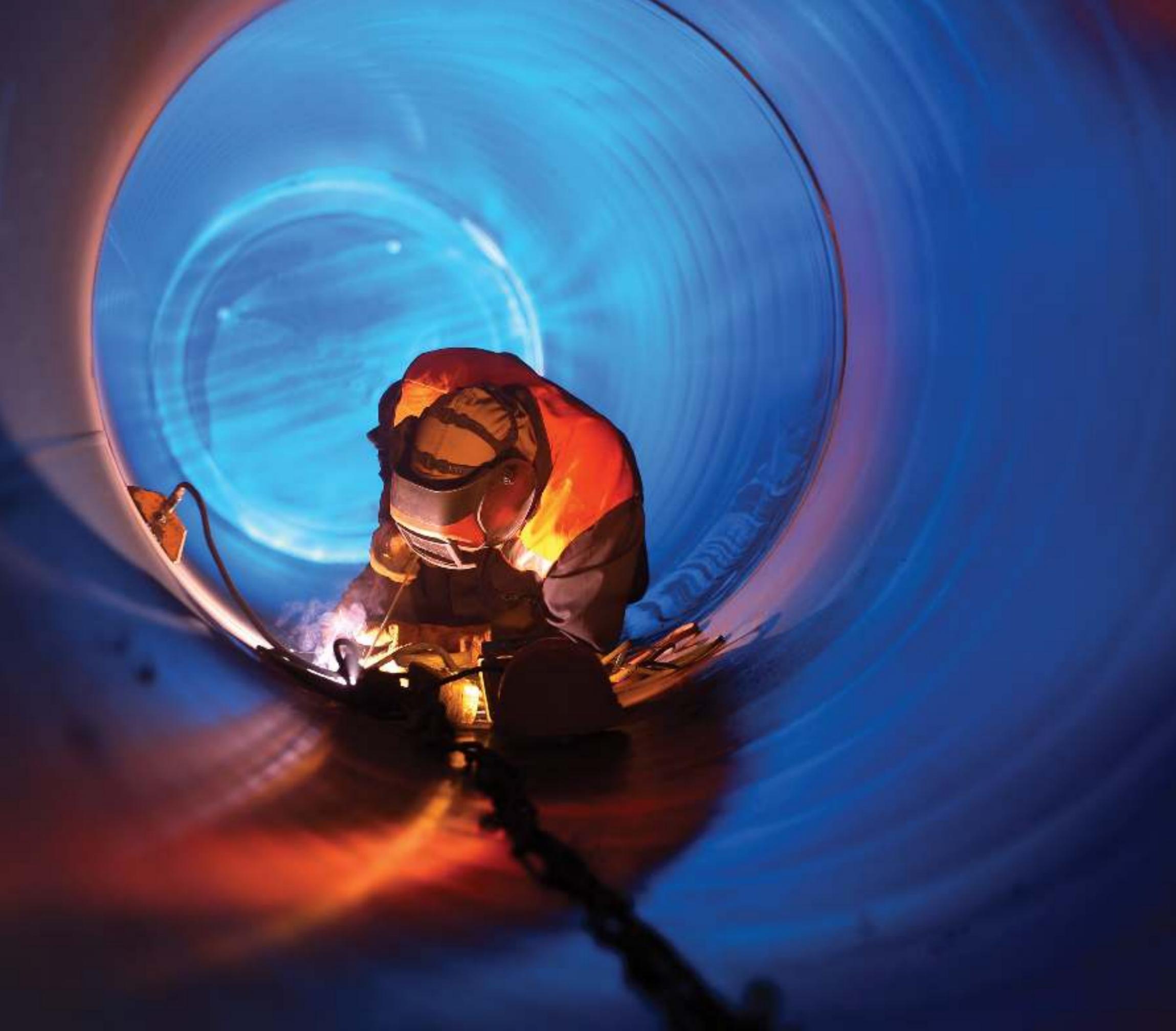
Most designers earn a degree from a two-year college or technical school.

## What Do Designers Do?

Designers rely on drafting software to lay out plans. Normally, they receive a rough sketch or hand-drawn layout of a project that they need to convert to a computerized model. Designers with more experience may also add certain details and information that they know will be helpful. Once an initial layout has been created, a designer creates multiple versions of the layout with different requirements for the architects and engineers to review. Designers also ensure that all dimensions, materials, and procedures for projects are detailed in the plans.

Most designers use computer-aided design and drafting (CADD) systems to create and store technical data. These systems normally have more-detailed information, including materials and dimensions. These drawings can then be shared electronically or printed. Programs involving building information modeling (BIM), which creates 3D virtual models using layers so that an entire building can be visualized, are increasingly common. This technology allows for better collaboration among personnel and shows unexpected problems before buildings are constructed. Product data-management systems that track and manage data help mechanical drafters by allowing them to create drawings as work is completed by other professionals working on a project.





# Welder

In short, welders join metal parts together. They also fill in holes and seams by using high-heat joint equipment. Given the strength of these joints, welders commonly work on ships, cars, and building structures.

## Quick Facts

**Average Salary:** \$76,960, but will vary depending on experience and training.

**Education:** A High Diploma or GED is required. An apprenticeship is the traditional pathway.

### Important Skills:

Attention to detail  
Manual dexterity  
Physical stamina  
Physical strength  
Spatial orientation  
Technical skills

## What Do Welders Do?

Welders use construction documents, plans, specifications, and sketches to understand the tasks involved in a project. They calculate the dimensions that they need and inspect structures. Using high-heat torches, they permanently join metal together, while monitoring equipment eliminates overheating or material malfunction.

## Work Environment

Welders normally work full time, although shifts may vary. Some manufacturing companies run shifts for 8–12 hours, with overtime being common. Many welders work outside and inside buildings. Some specially trained welders even work underwater.

## Becoming a Welder

Welders require special training. Some welders complete a few weeks of classes, while others complete postsecondary coursework; others may combine training and work experience. Many secondary-level technical schools allow aspiring welders to take certification tests, and further training is available in postsecondary institutions such as vocational–technical institutes, community colleges, and private welding, soldering, and brazing schools. The US Armed Forces also maintains welding and soldering schools.

Although not always required, many companies require welders to be certified, which can be done through an apprenticeship or at a technical school.

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The following is a list of Built Environment education programs available in Maryland. Some of these programs may not be accredited. Contact the individual school or program for more information.

### Pre-Apprenticeship Programs

**ACE Mentorship**  
[www.acementor.org/affiliates/maryland](http://www.acementor.org/affiliates/maryland)

**Civic Works**  
[www.civicworks.com](http://www.civicworks.com)  
410-366-8533  
Baltimore, MD 21213

**Job Opportunities Taskforce**  
[www.jotf.org](http://www.jotf.org)  
410-234-8040  
Baltimore, MD 21202

**Living Classrooms**  
[www.livingclassrooms.org](http://www.livingclassrooms.org)  
410-685-0295  
Baltimore, MD 21231

**Skills USA**  
[www.mdskillsusa.org](http://www.mdskillsusa.org)

**Baltimore City Joint Apprenticeship Committee, AFSCME Local No. 44**  
410-545-3260  
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**Baltimore Electricians JATC Local Union No. 24**  
[jatc24.org](http://jatc24.org)  
410-247-3313  
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*Electrical*

**International Union of Elevator Constructors, Local No. 7, JAC**  
[www.trainbaltimore.org](http://www.trainbaltimore.org)  
410-661-1491  
Baltimore, MD 21234  
*Elevator Constructor*

continued on next page...

### Apprenticeship Programs

**ABC Baltimore Metro**  
[www.abcbaltimore.org](http://www.abcbaltimore.org)  
410-821-0351  
Towson, MD 21286  
*Masonry, Carpentry, Electrical, HVAC, Environmental, Plumbing*

**ABC Chesapeake Shores**  
[www.abc-chesapeake.org](http://www.abc-chesapeake.org)  
410-267-0347  
Annapolis, MD 21401  
*Electrical, HVAC, Plumbing*

**ABC Cumberland Valley**  
[www.abccvc.org](http://www.abccvc.org)  
301-739-1190  
Hagerstown, MD 21740  
*Bricklayer, Carpentry, Cement Mason, Craft Laborer, Electrical, Glazier, Heavy Equipment Operator, HVAC-R, Insulation Worker, Painter, Pipefitter, Plumbing, Ironworker, Roofer, Sheet Metal, Sprinkler Fitter, Steamfitter, Welding*

**ABC Metro Washington**  
[www.abcmetrowashington.org](http://www.abcmetrowashington.org)  
301-595-9711  
Beltsville, MD 20705  
*Bricklaying, Carpentry, Electrical, HVAC, Operating Engineer, Plumbing, Welding*

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**Baltimore Sheet Metal Workers JATC  
Local Union No. 100**  
www.smart100.org  
410-732-1849  
Baltimore, MD 21205  
*Sheet Metal*

**Baltimore Sprinkler Fitters Local No. 536**  
www.sprinklerfitters536.org  
410-747-0630  
Baltimore, MD 21228  
*Sprinkle Fitting*

**Baltimore Operating Engineers**  
www.iuoe37.org  
410-254-0219  
Baltimore, MD 21222  
*Operating Engineering, Heavy Equipment*

**Heating and Air Conditioning Contractors of  
Maryland, Inc.**  
www.haccmd.org  
410-431-8889  
Severna Park, MD 21146  
*HVAC, Insulation*

**Heat and Frost Insulators and Allied Workers  
Local No. 24**  
www.insulators24.org  
301-498-9162  
Laurel, MD 20707  
*HVAC*

**Independent Electrical Contractors - Chesapeake**  
www.iecchesapeake.com  
301-621-9545  
Laurel, MD 20723  
*HVAC, Electrical, Voice/Data/Video*

**International Union of Elevator Constructors,  
Local No. 10**  
iueclocal10.org  
301-459-0497  
Lanham, MD 20706  
*Elevator Constructor*

**Iron Workers Local No. 5**  
www.ironworkerslocal5dc.com  
301-599-0960  
Upper Marlboro, MD 20772  
*Welding, Structural Steel*

**Ironworkers Local No. 16 Apprenticeship Program**  
410-282-6650  
Baltimore, MD 21222  
*Welding, Structural Steel*

**Maryland Plumbing, Heating, Cooling Contractors, Inc.**  
marylandphcc.org  
410-461-5977  
Ellicott City, MD 21043  
*Plumbing, HVAC*

**Mid-Atlantic Carpenters' Training Centers- Baltimore**  
mactc.net  
410-737-9670  
Baltimore, MD 21227  
*Carpentry*

**Plumbers and Steamfitters Local Union No. 486**  
www.ualocal486.com  
410-866-5313  
Baltimore, MD 21237  
*Plumbing, Steam Fitting, HVAC, Welding, Gas Fitting, Medical Gas  
and Backflow Prevention*

**Sprinkler Fitters Local No. 669**  
www.sprinklerfitters669.org  
410-381-4300  
Columbia, MD 21046  
*Sprinkler Fitting, Plumbing*

**Steamfitters Local No. 602, JATC**  
steamfitters-602.org  
301-341-1555  
Landover, MD 20785  
*Pipe Fitting*

**Washington D.C. Joint Plumbing Apprenticeship  
Committee Local No. 5**  
www.local5plumbers.org  
301-322-8810  
Landover, MD 20785  
*Plumbing*

**The Electrical Alliance Joint Apprenticeship  
Training Center**  
www.washingtondcjatc.org  
301-429-2565  
*Electrical*

## Community Colleges

**Anne Arundel Community College**  
www.aacc.edu  
410-777-2222  
Arnold, MD 21012-1895  
*Electrical, Virtual Drafting & Design (CADD), Civil Engineering,  
Construction Management, Welding, Wiring*

**Baltimore City Community College**  
www.bccc.edu  
410-462-8300  
Baltimore, MD 21215-7807  
*Virtual Drafting & Design (CADD), Engineering transfer, Electrical  
Engineering, Construction Supervision*

**Carroll Community College**  
www.carrollcc.edu  
410-386-8000  
Westminster, MD 21157  
*Virtual Drafting & Design (CADD)*

**Cecil College**  
www.cecil.edu  
410-287-1000  
North East, MD 21901  
*Engineering basic classes with transfer opportunities to University of  
Deleware and Frostburg State University to complete your degree*

**Chesapeake College**  
www.chesapeake.edu  
410-822-5400  
Wye Mills, MD 21679  
*Electrical, Virtual Drafting & Design (CADD), HVAC, Welding,  
Landscape Architecture*

**College of Southern Maryland**  
www.csmd.edu  
301-934-2251  
Multiple locations  
*Engineering, Construction Management, Virtual Drafting & Design  
(CADD), Electrical, Manufacturing*

**Community College of Baltimore County – Catonsville**  
www.ccbcmd.edu  
443-840-4435  
Baltimore, MD 21228  
*Civil Engineering, Electrical Technology, Virtual Drafting & Design  
(CADD), Home Inspection, Construction Management, Occupational  
Safety and Health Technology, Building Maintenance, Surveying*

**Community College of Baltimore County – Dundalk**  
www.ccbcmd.edu  
443-840-3131  
Baltimore, MD 21222  
*HVAC*

**Community College of Baltimore County - Essex**  
www.ccbcmd.edu  
443-840-1732  
Baltimore, MD 21237  
*Electrical Technology, Virtual Drafting & Design (CADD)*

**Fredrick Community College**  
www.frederick.edu  
301-846-2400  
Frederick, MD 21702  
*Electrical, Virtual Drafting & Design (CADD), Welding, HVAC,  
Construction Management,*

**Hagerstown Community College**  
www.hagerstowncc.edu  
240-500-2000  
Hagerstown, Maryland, 21742  
*HVAC, Plumbing, Welding, Metal Fabrication, Virtual Drafting &  
Design (CADD), Mechanical Engineering Tech. Engineering transfer,  
Geothermal energy installation, Alternative energy tech., Advanced  
manufacturing, Industrial tech.*

**Harford Community College**  
www.harford.edu  
443-412-2000  
Bel Air, MD 21015  
*Electrical, Virtual Drafting & Design (CADD), Welding,  
Project Management*

**Howard Community College**  
www.howardcc.edu  
410-772-4944  
Columbia, MD 21044  
*Electrical, Virtual Drafting & Design (CADD), Carpentry,  
Professional Management, Construction Management*

**Montgomery College**  
cms.montgomerycollege.edu  
240-567-5000  
Rockville, MD 20850  
*Civil Engineering, Electrical, Virtual Drafting & Design (CADD),  
Construction Management, Welding*

**Prince George's Community College**  
www.pgcc.edu  
301-546-7422  
Largo, MD 20774-2199  
*Electrical, Virtual Drafting & Design (CADD), Construction  
Management, Property Management*

**Wor-Wic Community College**  
www.worwic.edu  
410-334-2800  
Salisbury, MD 21804  
*Construction Engineering Tech., Manufacturing Engineering Technology*

## 4+ Year Colleges

**Capitol College**  
www.captechu.edu  
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Laurel, MD 20708  
*Electrical Engineering*

**Frostburg State University**  
www.frostburg.edu  
301-687-4201  
Frostburg, MD 21532  
*Engineering, Mechanical Engineering*

**Johns Hopkins University**  
www.jhu.edu  
410-516-4050  
Baltimore, MD 21218-2608  
*Engineering, Real Estate Development*

**Loyola University**  
www.loyola.edu  
410-617-2000  
Baltimore, MD 21210  
*Engineering*

**Maryland Institute College of Art**  
www.mica.edu  
410-669-9200  
Baltimore, MD 21217  
*Architectural Design*

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**Morgan State University**

www.morgan.edu  
443-885-3333  
Baltimore, MD 21251  
*Engineering, Architecture, Construction Management*

**Notre Dame Of Maryland**

www.ndm.edu  
410-435-0100  
Baltimore, Maryland 21210  
*General Engineering with transfer to Johns Hopkins, UMD, or Columbia University*

**United States Naval Academy**

www.usna.edu  
410-293-1858  
Annapolis, MD 21402  
*Aerospace Engineering, Electrical Engineering, General Engineering, Mechanical Engineering, Naval Architecture & Marine Engineering, Ocean Engineering*

**University of Baltimore**

www.ubalt.edu  
410-837-5797  
Baltimore, MD 21201  
*Real Estate and Economic Development*

**University of Maryland – Baltimore County**

www.umbc.edu  
410-455-1000  
Baltimore, MD 21250  
*Engineering*

**University of Maryland – College Park**

www.enme.umd.edu  
301-405-2410  
College Park, MD 20742  
*Engineering, Architecture, Project Management*

**University of Maryland Eastern Shore at Shady Grove**

Main Campus: (4-year program)  
www.umes.edu/tech/cmt.html  
410-651-6468/6465  
Princess Anne, MD 21853  
*Construction Management*

Satellite Campus –Universities at Shady Grove (2+2 program)

www.shadygrove.umd.edu  
301-738-6214  
Rockville, MD 20850  
*Construction Management*

**Washington College**

www.washcoll.edu  
410-778-2800  
Chestertown, Maryland 21620  
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**Sources**

**Information about Careers :** United States Bureau of Labor Statistics Occupational Outlook Handbook <http://www.bls.gov/ooh/>

**Salary Information :** Maryland Department of Labor, Licensing & Regulation Occupational Employment and Wages <http://www.dlrr.state.md.us/lmi/wages/toc001.htm> and Prevailing Wages <https://www.dlrr.state.md.us/labor/prev/>

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