

# Building Futures®

2017-18 School Year

THE CONSTRUCTION INDUSTRY JOURNAL FOR STUDENTS

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Issue  
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ONE PROJECT AT A TIME

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### Welcome to Northwest College of Construction

Northwest College of Construction (NWCOC) is the school of choice for construction craft, technical, safety, supervisory and management professionals. Founded by the region's four largest construction trade associations, NWCOC meets the education and training needs of the industry. As a private, non-profit technical and career school, the College serves new and veteran craftworkers as well as emerging and experienced supervisors, managers and leaders. A career in construction is not just another job, it's a promise for an exciting, challenging and rewarding future, so join us in building the next generation of contractors.

## BUILDING FUTURES MAGAZINE ONLINE!

Building Futures Magazine can be found online at  
[djcoregon.com/building\\_futures](http://djcoregon.com/building_futures)

Are you interested in joining the effort to educate young people about the construction industry?  
Contact Tom Goodhue, Oregon Building Congress executive director,  
[tgoodhue@obcweb.com](mailto:tgoodhue@obcweb.com), 503-685-8313.

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# Plan, Design, Build Your Way to a Successful Career!

Forget the stereotypes of the past. Jobs in the construction industry are interesting, challenging, rewarding, and, by the way, pay quite well. This edition of Building Futures highlights careers in the construction industry and provides contacts to apprenticeship programs and colleges connected to educational training in those careers. Check out the career pages and see the diversity in the range of job descriptions. All these professions serve a vital role in the build community, working in the ultimate team experience using state-of-the-art high-tech tools and equipment.

Beyond just the information provided in this magazine and as a

resource for career counseling, consider a partnership with Oregon Building Congress to create a stronger connection with careers in this field. OBC can work with your CTE instructors to enhance the Advisory Committee process and raise the areas of achievement by sharing “best practices” already successfully implemented at other schools. Several schools also have adopted AGC (Associated General Contractors) student chapters, modeled after college-level programs in place across the country. Industry mentors and Oregon State University student chapter representatives work with students to create net-

work connections with employers and guidance to the educational resources needed for students’ career pathway success.

OBC leverages outside services to enhance the student learning experience and to grow the workforce to meet the nation’s construction needs. Have a special request? Let us know and we can work with you to customize a solution to meet your needs. Call us today at 503-685-8313 or visit us at [www.obcweb.com](http://www.obcweb.com).



**Tom Goodhue**

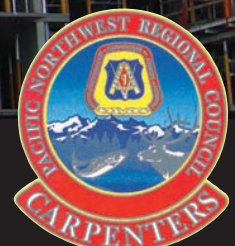
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Sam Tenney/DJC

Moses Clark, a project engineer with R&H Construction, spent three months last summer in Tanzania helping a nonprofit organization develop plans to build an agricultural resource center.

# Engineer is changing the world, one project at a time

**BY STEPHANIE BASALYGA**

Sometimes you meet people and just know they're going to change the world someday. Moses Clark has a head start on them.

Clark has spent the better part of the past two years juggling a full-time job as a project engineer for R&H Construction with classes at Multnomah University, where he's been pursuing a master's degree in

international development and social justice.

But for three months last summer, with the blessing of his employer, he headed to Africa to use his background in design, construction and project management to help a global nonprofit called Grace Ministries International develop plans to build an agricultural resource center in Tanzania.

For Clark, who grew up in

Cameroon, getting involved in the project was about more than simply paying it forward or racking up credits toward an advanced degree.

Africa has a long history of famines, and more than a quarter of its population qualifies as undernourished. The situation, however, actually has improved since 2008 due in large part to efforts made to increase food production through farming, according to nonprofit group

Our Africa. With the continent's population expected to increase in the future, continuing to place an emphasis on agriculture and farming to battle hunger is critical.

Success in farming doesn't just benefit local populations, though. Exporting crops means more money for farmers as well as big steps for Africa toward meeting goals to become self-sustaining by 2030 and completely free of dependence on foreign aid by 2050.

But farming – and being a farmer in Africa – comes with a complex set of challenges.

Easily accessible land can be hard to find in areas like Tanzania. As a result, many farmers are forced to obtain land in remote areas that often can't be accessed by motor vehicles. With limited financial resources, owners of small farming operations can't afford to buy tractors or other traditional farm equipment.

"You pack in bundles (of your supplies)," Clark said. "People put (crops) on their heads to carry them out."

Many of the farmers in Africa run small operations on limited land. That means they need to make the most of every square inch of soil. But constantly replanting the same crops in the same places can quickly deplete soil of valuable minerals and nutrients, resulting in low crop yields, Clark said.

That's where Grace Ministries' agricultural education center is expected to make a difference. Once established, the center will conduct research to determine which types of crops grow best in different parts of the area and then make seeds for those plants available to local farmers, while also teaching them techniques, such as crop rotation, to improve the quality and quantity of their crops.

"These people are already farmers," Clark said. "They just need to learn techniques to grow more, and grow more efficiently."

The agricultural center wasn't the only project Clark worked on while in Africa. The first stop on his itinerary was Cameroon, where he helped design a two-story physical therapy building that will allow a hospital on



Sam Tenney/DJC

the edge of town to expand its services.

Clark would like to return to Cameroon in the future, he said, to help the hospital continue to grow to better serve its patients. As for the agricultural center, construction of the building is still down the road. Grace Ministries must first find about 100 acres of land for the project, build a larger kiln than the one available in order to produce bricks needed for the building and drum up additional money.

There's also a farm that Clark helped start with some of the locals in Tanzania. His partners are running the operation, including testing several different types of papayas – grown from

seeds obtained from ECHO, another global agricultural nonprofit in the area – to determine which species of different fruits thrive during different growing seasons and conditions.

For now, though, Clark is busy working on R&H projects and preparing to walk across the stage to receive his master's degree, even as he looks forward to the day when he can again apply the lessons he's learned on construction sites – and in classrooms – in Portland to more projects in Africa.

"I'm excited to see what the future holds," he said.

*Stephanie Basalyga is the editor of the Daily Journal of Commerce newspaper.*

An advertisement for the Oregon &amp; SW Washington Roofers &amp; Waterproofers Apprenticeship. The ad features a silhouette of a person on a roof against a blue background. In the center is a circular logo with the text "OREGON &amp; SW WASHINGTON ROOFERS &amp; WATERPROOFERS" and "JATC" in the middle. The text "Oregon &amp; SW Washington Roofers &amp; Waterproofers Apprenticeship" is on the left, and "orsroofersapp.com (503) 546.4235" is on the right. At the bottom, a city skyline is shown in silhouette, with the text "PUT A ROOF OVER PORTLAND!" in large white letters.

# Scholarship opportunities

**T**here are hundreds of resources out there to assist you financially in gaining the education and skills required to meet your professional goals in the trades, no matter what you're aiming to become. In addition to assistance provided by most any apprenticeship program, as well as scholarships offered by companies to their employees' children, we have compiled a list of scholarship opportunities below. The list isn't exclusive, so be sure to check with local apprenticeship programs and professional groups on a regular basis to learn about new opportunities.

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## ACE MENTOR PROGRAM

[www.acementor.org](http://www.acementor.org)

ACE awards scholarships at both the national and local levels. Since 1995, ACE has presented participating students with \$14 million in scholarships. To qualify for an ACE scholarship, you must be an active participant in a local ACE affiliate's project(s) for the entire school year. The scholarship application period is open now and will continue through May. If you have any questions, please contact the National office.

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## ADVANCED AMERICAN CONSTRUCTION

Phone: 503.445.9000

[www.advanced-american.com/scholarship/](http://www.advanced-american.com/scholarship/)  
[schweiger@advanced-american.com](mailto:schweiger@advanced-american.com)

The Schweiger Memorial Scholarship Fund provides annual scholarships through a growing endowment fund, to applicants wishing to pursue educational excellence in construction and construction-related fields.

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## AMERICAN ASSOCIATION OF COST ENGINEERS

[web.aacei.org/resources/careers-mentoring-center/scholarships](http://web.aacei.org/resources/careers-mentoring-center/scholarships)

AACE International offers competitive and matching funds scholarships to U.S., Canadian, and International students pursuing a program related to cost engineering/cost management. The competitive scholarships are awarded by the AACE International Education Board and are currently available in various amounts to a maximum of \$2,500. AACE International Sections may also offer scholarships through the matching funds scholarship program. Applications received for the competitive scholarships will also be reviewed for inclusion in the matching funds scholarship program. All scholarships are awarded for use in the fall term of the next academic year.

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## AMERICAN COUNCIL OF ENGINEERING COMPANIES OF OREGON

Phone: 503.292.2348

[www.acecOregon.org](http://www.acecOregon.org)

The council offers a scholarship to applicants interested in majoring in civil, electrical, environmental or mechanical engineering, with a preference for those interested in consulting engineering careers. Students must attend any Oregon four-year college that offers Accreditation Board for Engineering and Technology programs in the major fields of study (currently OIT, OSU, PSU, George Fox, University of Portland). Check with your college if unsure of its accreditation. Scholarship automatically renews if renewal criteria met.

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## AMERICAN PUBLIC WORKS ASSOCIATION – OREGON CHAPTER

<http://oregon.apwa.net/PageDetails/5243>

The Oregon APWA Scholastic Foundation offers a variety of scholarships that are intended to promote and expand educational opportunities and vocational skills in public works and to support the development of public works professionals. New scholarships in 2016 are the \$1,500 Allen A. Alsing Memorial Scholarship to a student in the Civil Engineering program at Oregon State University and a \$750 Veterans Scholarship to a student at Lane Community College. The Veterans and the Past Presidents scholarships will rotate to different schools each year. Additional engineering and continuing education scholarships also available.

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## AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS, OREGON CHAPTER

Phone: 503.297.1005

[www.aslaoregon.org](http://www.aslaoregon.org)

Contributions are made by ASLA members toward an endowment at the University of Oregon, which then distributes the scholarships.

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## ARCHITECTURE FOUNDATION OF OREGON

Phone: 503.542.3825

<https://af-oregon.org>

SENATOR MARK O. HATFIELD ARCHITECTURAL AWARD provides \$3,500 for Oregon residents entering their final year in any accredited architectural degree program. ROSALIND REED DWIGHT SCHOLARSHIP fund — two \$1,000 awards to female architecture students, one at University of Oregon and one at Portland State University. Additional scholarships include pairs of \$1,000 awards given each year to female students — one specializing in design and the other in construction specifications — at the University of Oregon. These scholarships are funded by proceeds from the sale of Perky Kilbourn's book about Mary Alice Hutchins.

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## ASSOCIATED BUILDERS AND CONTRACTORS INC., NATIONAL CHAPTER

[www.abc.org/en-us/educationtraining/trimmerconstructioneducationfoundation/buildyourfuturescholarship.aspx](http://www.abc.org/en-us/educationtraining/trimmerconstructioneducationfoundation/buildyourfuturescholarship.aspx)

Ten scholarships of \$2,000 each will be awarded annually. Only one application per student per calendar year will be accepted. Past scholarship recipients are ineligible.

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## ASSOCIATED BUILDERS AND CONTRACTORS INC., PACIFIC NORTHWEST CHAPTER

Phone: 503.598.0522

[www.abcpnw.org](http://www.abcpnw.org)

Students who intend to pursue careers in the building trades and are enrolled in two- or four-year programs and apprenticeships can apply for \$1,000 scholarships through Associated Builders and Contractors. ABC's Trimmer Education Foundation awards the scholarships nationally.

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## ASSOCIATED GENERAL CONTRACTORS – NATIONAL CHAPTER

<https://www.agc.org/learn/scholarships-research>

The AGC Education and Research Foundation supports the future of our industry. Thanks to the generosity of AGC members since 1968 and visionary leadership from industry leaders, the Foundation is committed to sustaining quality education through scholarships. More than 100 students each year benefit from AGC Foundation scholarships. Since 1970, 3,500 scholarships have been awarded, totaling \$9 million.

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## ASSOCIATED GENERAL CONTRACTORS OREGON-COLUMBIA CHAPTER

Phone: 503.682.3363

[www.agc-oregon.org](http://www.agc-oregon.org)

AGC works with Oregon State University's Construction Engineering Management program to award scholarships to minority students enrolled in the program. A second scholarship is funded by an endowment named for retired OSU Professor Hal Pritchett. The scholarship is administered by the AGC of America Education and Research Foundation and typically is awarded to an OSU student.

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## BUILD YOUR FUTURE SCHOLARSHIP

Scholarships are awarded annually to applicants pursuing craft professional training in the construction industry through an NCCER-accredited program or a state/federally approved apprenticeship program in a merit-shop training facility.



## HOME BUILDERS ASSOCIATION OF METROPOLITAN PORTLAND

Phone: 503.684.1880

[www.hbapdx.org](http://www.hbapdx.org)

The association and its foundation are sponsoring the second annual High School Scholarship Competition, which provides awards ranging from \$100 U.S. Savings Bonds to \$1,000 cash prizes. A Community College Scholarship program established in 2000 by the HBA's Remodelers Council helps support students who are pursuing careers in residential remodeling. The students must be enrolled in an Oregon community college or the Associated General Contractors Apprenticeship Program.

## HUMAN RESOURCES CONSTRUCTION COUNCIL

888.622.3720. ext 6915

<http://byf.org/hrcc-scholarship>

NCCER and its Build Your Future initiative have teamed up with the Human Resources Construction Council to award multiple \$500 scholarships each year to help cover training costs.

## INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS LOCAL 280

Phone: 541.812.1771

[www.ibew280.org](http://www.ibew280.org)

Scholarships awarded by IBEW Local 280 are available to children and grandchildren of members and retired members. Most IBEW locals offer such scholarships, and more information can be found on their individual websites.

## INTERNATIONAL INTERIOR DESIGN ASSOCIATION, OREGON CHAPTER

Phone: 503.546.1280

[www.iida-or.org](http://www.iida-or.org)

INDA's international headquarters offers a revolving circuit of scholarships that are available to eligible students. The organization most recently awarded a \$1,000 cash prize through the Uoy Hack Memorial Fund. The local chapter recently established the Bern Cowman Memorial Fund, which will create a scholarship for Oregon student members and research grants for the group's professional members.

## NATIONAL ASSOCIATION OF WOMEN IN CONSTRUCTION

[www.nawicportland54.org](http://www.nawicportland54.org)

The association's scholarships are administered by Clackamas Community College through the college's endowment. Local NAWIC members also contribute to the national association's education and scholarship foundation.

## NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION, OREGON-COLUMBIA CHAPTER

Phone: 503.233.5787

[www.orecolneca.org](http://www.orecolneca.org)

The association awards an annual scholarship that provides students with \$2,000 a year for four years. Students must be associated with NECA or its member firms to be eligible for the scholarship. They can apply the scholarship toward any career they choose to pursue and at any college or apprenticeship program across the country.

## NATIONAL TECHNICAL HONOR SOCIETY SCHOLARSHIP FOR SkillsUSA MEMBERS

<http://www.skillsusa.org/membership-resources/scholarships-financial-aid/national-technical-honor-society/>

NTHS awards four \$1,000 scholarships to SkillsUSA members at SkillsUSA National Leadership Conference. Two scholarships will be awarded to high school members, and two scholarships will be awarded to college/postsecondary members. To be eligible, students must be active, dues-paying members on both SkillsUSA and NTHS.

## OREGON BUILDING CONGRESS OUTSTANDING CONSTRUCTION ACADEMY STUDENT

Phone: 503.318.8145

[www.obcweb.com](http://www.obcweb.com)

Each year, OBC offers scholarships to one student from each Construction Academy program at its annual awards banquet. To be eligible for a scholarship, students must have completed an OBC-affiliated construction academy while demonstrating exceptional leadership, academic, technical, and job-related skills. Students must have a clear interest in pursuing a career in the design-build field. Scholarship amounts vary from year to year but all scholarships will be applied to post-secondary education costs, such as tuition, books, tools and gear, etc.

## PROFESSIONAL LAND SURVEYORS OF OREGON

Phone: 503.585.4551

[www.plso.org](http://www.plso.org)

The organization offers scholarships for students enrolled in land surveying courses at any Oregon school.



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SOURCE: BUREAU OF LABOR AND STATISTICS

Did you know that more than 6 million people work in the construction industry – making it one of the nation’s largest industries? That’s a lot of people and not all of them are swinging hammers and driving big trucks – cool jobs that those may be. Look beyond the obvious and you’ll discover an industry as diverse as the structures it builds. Opportunities abound for all kinds of skills, talents, and educational backgrounds. Just take a look at some of these constructive career opportunities:

**ACCOUNTANT**

**WHAT ACCOUNTANTS DO**

The accountant performs professional-level accounting work in the maintenance and review of fiscal records. The position requires considerable knowledge of basic accounting principles and accounting functions. This individual is responsible for the general ledger, job cost, bank reconciliations and accounts payable. Additional responsibilities include performing monthly closings, maintenance of accounting files, and preparation/organization of various financial forms, reports, and financial analyses, etc. This individual may be asked to assist with ad-hoc projects and general office support tasks when necessary. These responsibilities and tasks will be coordinated with and supervised by the Senior Project Controller.

**WORK ENVIRONMENT**

Most accountants and auditors work full time. In 2014, about one in five worked more than 40 hours per week. Overtime hours are typical at certain times of the year, such as at the end of the budget year or during tax season.

**HOW TO BECOME AN ACCOUNTANT**

Graduation from an accredited four-year college or university with a major in the field of accounting or other related field. Experience may be considered as a substitute for this requirement.

**PAY**

The median annual wage for accountants and auditors was \$68,150 in May 2016.

**JOB OUTLOOK**

Employment of accountants and auditors is projected to grow 11 percent from 2014 to 2024, faster than the average for all occupations. In general, employment growth of accountants and auditors is expected to be closely tied to the health of the overall economy. As the economy grows, more workers should be needed to prepare and examine financial records.

Quick Facts: Accountants  
2016 Median Pay: \$68,501 per year / \$32.76 per hour  
Entry-Level Education: Bachelor’s degree  
Work Experience in a Related Occupation: None  
On-the-job Training: Could require job-specific training  
Number of Jobs, 2014: 1,332,700  
Job Outlook, 2014-24: 11% (Faster than average)  
Employment Change, 2014-24: 142,400

**ARCHITECT**

**WHAT ARCHITECTS DO**

Architects plan and design houses, factories, office buildings, and other structures.

**WORK ENVIRONMENT**

Architects spend much of their time in offices, where they develop plans, meet with clients, and consult with engineers and other architects. They also visit construction sites to prepare initial drawings and review the progress of projects to ensure that clients’ objectives are met. About one in five were self-employed in 2014.

**HOW TO BECOME AN ARCHITECT**

There are typically three main steps to becoming a licensed architect: completing a professional degree in architecture, gaining relevant experience through a paid internship, and passing the Architect Registration Examination.

**PAY**

The median annual wage for architects was \$76,930 in May 2016.

**JOB OUTLOOK**

Employment of architects is projected to

grow 7 percent from 2014 to 2024, about as fast as the average for all occupations. Competition for jobs will be very strong because the number of applicants continues to outnumber available positions.

Quick Facts: Architects  
2016 Median Pay: \$76,930 per year / \$36.99 per hour  
Entry-Level Education: Bachelor’s degree  
Work Experience in a Related Occupation: None  
On-the-job Training: Internship/residency,  
Number of Jobs, 2014: 112,600  
Job Outlook, 2014-24: 7% (As fast as average)  
Employment Change, 2014-24: 7,800

**BOILERMAKERS**

**WHAT BOILERMAKERS DO**

Boilermakers assemble, install, and repair boilers, closed vats, and other large vessels or containers that hold liquids and gases.

**WORK ENVIRONMENT**

Boilermakers perform physically demanding and dangerous work. Many boilermakers must travel to worksites and live away from home for long periods.

**HOW TO BECOME A BOILERMAKER**

Most boilermakers learn their trade through an apprenticeship program. Candidates are more likely to be accepted into training programs if they already have welding experience and certification.

**PAY**

The median annual wage for boilermakers was \$62,060 in May 2016.

**JOB OUTLOOK**

Employment of boilermakers is projected to grow 9 percent from 2014 to 2024,

faster than the average for all occupations. Workers with welding experience and general mechanical aptitude will have the best job opportunities.

Quick Facts: Boilermaker  
2016 Median Pay: \$62,060 per year / \$29.84 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Number of Jobs, 2014: 17,400  
Job Outlook, 2014-24: 9% (Faster than average)  
Employment Change, 2014-24: 1,500

**BRICKMASONS (MASON WORKERS)**

**WHAT BRICKMASONS, BLOCKMASONS, AND STONEMASONS DO**

Brickmasons, blockmasons, and stonemasons (or, simply, masons) use bricks, concrete blocks, and natural stones to build fences, walkways, walls, and other structures.

**WORK ENVIRONMENT**

The work is physically demanding because masons often must lift heavy materials and must stand, kneel, and bend for long periods of time. They usually work outdoors, and poor weather conditions may reduce work activity.

Most masons work full time.

**HOW TO BECOME A BRICKMASON, BLOCKMASON, OR STONEMASON**

Although most masons learn through a formal apprenticeship, some learn informally on the job. Others learn through one- or two-year mason programs at technical colleges.

**PAY**

In May 2016, the median annual wage of brickmasons and blockmasons was \$41,230.

**JOB OUTLOOK**

Employment of masonry workers is projected to grow 15 percent from 2014

to 2024, much faster than the average for all occupations. Population growth will result in the construction of more schools, hospitals, homes, and other buildings. Workers with a good job history and with experience in masonry and construction should have the best job opportunities.

Quick Facts: Brickmasons, Blockmasons, and Stonemasons  
2016 Median Pay: \$41,230 per year / \$19.82 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Number of Jobs, 2014: 252,900  
Job Outlook, 2014-24: 15% (Faster than average)  
Employment Change, 2014-24: 37,300

**BUILDING INSPECTOR**

**WHAT CONSTRUCTION AND BUILDING INSPECTORS DO**

Construction and building inspectors ensure that construction meets local and national building codes and ordinances, zoning regulations, and contract specifications.

**WORK ENVIRONMENT**

Construction and building inspectors spend considerable time inspecting worksites, alone or as part of a team. Some inspectors may have to climb ladders or crawl in tight spaces. Most work full time during regular business

hours.

**HOW TO BECOME A CONSTRUCTION OR BUILDING INSPECTOR**

Most employers require construction and building inspectors to have at least a high school diploma and considerable knowledge of construction trades. Inspectors typically learn on the job. Many states and local jurisdictions require some type of license or certification.

**PAY**

The median annual wage for construction and building inspectors was \$58,480 in May 2016.

**JOB OUTLOOK**

Employment of construction and building

inspectors is projected to grow 8 percent from 2014 to 2024, about as fast as the average for all occupations. Public interest in safety and desire to improve the quality of construction should continue to create demand for inspectors. Certified construction and building inspectors who can perform a variety of inspections should have the best job opportunities.

Quick Facts: Building Inspector  
2016 Median Pay: \$58,480 per year / \$28.12 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: five years or more  
On-the-job Training: Moderate-term on-the-job training  
Number of Jobs, 2014: 101,200  
Job Outlook, 2014-24: 8% (Faster than average)  
Employment Change, 2014-24: 8,100

## BUSINESS DEVELOPMENT MANAGER/MARKETING

### WHAT ADVERTISING, PROMOTIONS, AND MARKETING MANAGERS DO

Advertising, promotions, and marketing managers plan programs to generate interest in products or services. They work with art directors, sales agents, and financial staff members.

### WORK ENVIRONMENT

About 31 percent of advertising and promotions managers worked for advertising agencies in 2014. About 17 percent of marketing managers worked in the

management of companies and enterprises industry.

### HOW TO BECOME AN ADVERTISING, PROMOTIONS, OR MARKETING MANAGER

A bachelor's degree is required for most advertising, promotions, and marketing management positions. These managers typically have work experience in advertising, marketing, promotions, or sales.

### PAY

The median annual wage for advertising, promotions, and marketing managers was \$127,560 in May 2016.

### JOB OUTLOOK

Employment of advertising, promotions, and marketing

managers is projected to grow 9 percent from 2014 to 2024, faster than the average for all occupations. Advertising, promotions, and marketing campaigns will continue to be essential for organizations as they seek to maintain and expand their share of the market.

Quick Facts: Business Development Manager/Marketing  
2016 Median Pay: \$127,560 per year / \$61.33 per hour  
Entry-Level Education: Bachelor's degree  
Work Experience in a Related Occupation: Usually have some sales experience  
On-the-job Training: None  
Number of Jobs, 2014: 225,200  
Job Outlook, 2014-24: 9% (Faster than average)  
Employment Change, 2014-24: 19,700

## BUYERS/PURCHASING AGENTS

### WHAT BUYERS AND PURCHASING AGENTS DO

Buyers and purchasing agents buy products and services for organizations to use or resell. They evaluate suppliers, negotiate contracts, and review the quality of products.

### WORK ENVIRONMENT

Most buyers and purchasing agents work full time. Some work more than 40 hours per week.

### HOW TO BECOME A BUYER OR PURCHASING AGENT

Although a high school diploma may be sufficient for some

positions, many employers require buyers and purchasing agents to have a bachelor's degree. Most entry-level positions require some form of on-the-job training.

### PAY

The median annual wage for buyers and purchasing agents was \$60,700 in May 2016.

### JOB OUTLOOK

Employment of buyers and purchasing agents is projected to grow 2 percent from 2014 to 2024, slower than the average for all occupations. These

workers will be needed to buy goods and services for business operations or for resale to customers. Employment growth will vary with the type of purchasing agent and the specific industry.

Quick Facts: Buyers/Purchasing Agent  
2016 Median Pay: \$60,700 per year / \$29.18 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Long-term on-the-job training  
Number of Jobs, 2014: 443,200  
Job Outlook, 2014-24: 2% (Slower than average)  
Employment Change, 2014-24: 7,200

## CARPENTERS

### WHAT CARPENTERS DO

Carpenters construct and repair building frameworks and structures — such as stairways, doorframes, partitions, and rafters — made from wood and other materials. They also may install kitchen cabinets, siding, and drywall.

### WORK ENVIRONMENT

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

work is sometimes strenuous, and carpenters experience a higher than average rate of injuries and illnesses.

### HOW TO BECOME A CARPENTER

Although most carpenters learn their trade through a formal apprenticeship, some learn on the job, starting as a helper.

### PAY

The median annual wage of carpenters was \$43,600 in May 2016

### JOB OUTLOOK

Employment of carpenters is projected to grow 20

percent from 2010 to 2020, faster than the average for all occupations. Job prospects for carpenters should improve over the decade as construction activity rebounds from the recent recession.

Quick Facts: Carpenters  
2016 Median Pay: \$43,600 per year / \$20.96 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Number of Jobs, 2014: 945,400  
Job Outlook, 2014-24: 6% (As fast as average)  
Employment Change, 2014-24: 60,400

## CEMENT MASONS AND TERRAZZO WORKERS (MASON WORKER)

### WHAT CEMENT MASONS AND TERRAZZO WORKERS DO

Cement masons pour, smooth, and finish concrete floors, sidewalks, roads, and curbs. Using a cement mixture, terrazzo workers create durable and decorative surfaces for floors and stairways.

### WORK ENVIRONMENT

Concrete and terrazzo work is fast paced and strenuous and often involves kneeling, bending, and reaching. Because many jobs are outdoors, work generally stops in wet weather.

### HOW TO BECOME A CEMENT MASON OR TERRAZZO WORKER

Although most cement masons and terrazzo workers learn informally on the job, some learn their trade through a formal apprenticeship.

### PAY

In May 2016, the median annual wage of cement masons and terrazzo workers was \$41,230.

### JOB OUTLOOK

Overall employment of cement masons and terrazzo workers is projected to grow 15 percent from 2014 to 2024, much faster than the average for all occupations. Although

employment growth will vary by specialty, both specialties' growth will depend on the number of heavy construction and civil construction projects, including roads, bridges, and buildings. Applicants who take masonry-related courses at technical schools will have the best job opportunities.

Quick Facts: Cement Masons and Terrazzo Workers (Mason Worker)  
2016 Median Pay: \$41,230 per year / \$19.82 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Number of Jobs, 2014: 252,900  
Job Outlook, 2014-24: 15% (Much faster than average)  
Employment Change, 2014-24: 37,300

## CIVIL ENGINEERS

### WHAT CIVIL ENGINEERS DO

Civil engineers design and supervise large construction projects, including roads, buildings, airports, tunnels, dams, bridges, and systems for water supply and sewage treatment.

### WORK ENVIRONMENT

Civil engineers generally work indoors in offices. However, they sometimes spend time outdoors at construction sites so they can monitor operations or solve problems at the site. Most work full time.

### HOW TO BECOME A CIVIL ENGINEER

Civil engineers need a bachelor's degree. They typically need a graduate degree for promotion to managerial positions. Civil engineers who sell their own services publicly must be licensed in all states and the District of Columbia.

### PAY

The median annual wage of civil engineers was \$83,540 in May 2016.

### JOB OUTLOOK

Employment of civil engineers is expected to grow 8 percent from 2014 to 2024, about as fast as the average

for all occupations. As infrastructure continues to age, civil engineers will be needed to manage projects to rebuild bridges, repair roads and upgrade levees.

Quick Facts: Civil Engineers  
2016 Median Pay: \$83,540 per year / \$40.16 per hour  
Entry-Level Education: Bachelor's degree  
Work Experience in a Related Occupation: None  
On-the-job Training: None  
Number of Jobs, 2014: 281,400  
Job Outlook, 2014-24: 8% (As fast as average)  
Employment Change, 2014-24: 23,600

## CONSTRUCTION MANAGERS

### WHAT CONSTRUCTION MANAGERS DO

Construction managers plan, coordinate, budget, and supervise construction projects from early development to completion.

### WORK ENVIRONMENT

Many construction managers have a main office, but spend most of their time working out of a field office at a construction site, where they monitor the project and make daily decisions about construction activities. The need to meet deadlines and respond to emergencies often requires construction managers to work many hours.

### HOW TO BECOME A CONSTRUCTION MANAGER

Large construction firms increasingly prefer candidates with both construction experience and a bachelor's degree in a construction-related field. Although individuals with a high school diploma and many years of experience in a construction trade may be hired as construction managers, these individuals are typically qualified to become self-employed general contractors.

### PAY

The median annual wage for construction managers was \$89,300 in May 2016.

### JOB OUTLOOK

Employment of construction managers is projected to grow 5

percent from 2014 to 2024, about as fast as the average for all occupations. Construction managers will be needed as overall construction activity increases over the coming decade. Those with a bachelor's degree in construction science, construction management, or civil engineering, coupled with construction experience, will have the best job prospects.

Quick Facts: Construction Managers  
2016 Median Pay: \$89,300 per year / \$42.93 per hour  
Entry-Level Education: Bachelor's degree  
Work Experience in a Related Occupation: More than 5 years  
On-the-job Training: Moderate-term on-the-job training  
Number of Jobs, 2014: 373,200  
Job Outlook, 2014-24: 5% (As fast as average)  
Employment Change, 2014-24: 17,800

CONTINUED ON page 14

# THE FUTURE IS BRIGHT WITH THE OTHER 4 YEAR DEGREE



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# The Choice is Yours

**Career pathway  
in construction  
industry paved with  
opportunities**



locked in with one career path, you could still move to an apprenticeship program or seek a four-year degree. Work a few years in the industry. Keep your options open.

You may be ready after getting your high school degree to enter an apprenticeship program. Training costs are usually paid for by industry contributions with little or no cost to the apprentice. Apprenticeship programs are highly competitive and the applicant should have completed related courses taken in high school and/or be able to demonstrate job experience to enhance their resume. These are starting position jobs in a craft trade usually beginning at 50 percent of journey pay levels with incremental salary increases every six months. In addition to on-the-job training, classroom education is provided at the different skilled craft training centers. Similar to the community college pathway, your options for additional education are always open. You could still move laterally on the chart

to the community college or a four-year university. The choice is yours.

For students who know they want to pursue a four-year university pathway, you can see that there are several careers available from that choice. Remember that you can still pursue the other two routes if you determine at a later time that you changed your mind. Having practical work experience is always something that an employer is looking for. Having direct skills work experience makes you more valuable as a construction manager, engineer, or any of the university-based careers.

The key point to remember is to always keep your options open. You are young now and will have many new life experiences that will influence your career decisions. The construction industry offers you that flexibility to explore and fulfill your career growth.

*Tom Goodhue is executive director of the Oregon Building Congress.*

## **By Tom Goodhue**

A career pathway in the construction industry has no right or wrong point of entry. As you can see on the chart on pages 12-13, all career paths can lead to the same ultimate outcome. The choice is yours.

If you are not sure of your passion, start at a community college. Keep your options open. Take core classes that would articulate to a four-year university but also allow you to explore different elective classes relating to a profession in construction. You may want to enter the workforce with a two-year Associates Degree. There are several types of jobs available utilizing those skills within the industry. Your future is not

# Your Construction Career Path



# Career Path Starts Here

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TECHNICAL  
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## COST ESTIMATORS

### WHAT COST ESTIMATORS DO

Cost estimators collect and analyze data in order to estimate the time, money, materials, and labor required to manufacture a product, construct a building, or provide a service. They generally specialize in a particular product or industry.

### WORK ENVIRONMENT

Cost estimators work mostly in offices, and some estimators also visit construction sites and factory floors. They may sometimes work overtime to meet deadlines.

### HOW TO BECOME A COST ESTIMATOR

A bachelor's degree is generally required to become a cost estimator, although some highly experienced construction workers may qualify without a bachelor's degree. A strong background in mathematics is essential.

### PAY

The median annual wage for cost estimators was \$61,790 in May 2016.

### JOB OUTLOOK

Employment of cost estimators is projected to grow 9

percent from 2014 to 2024, faster than the average for all occupations. Overall job opportunities should be good as companies require accurate cost estimates to operate efficiently.

#### Quick Facts: Cost Estimators

2016 Median Pay: \$61,790 per year / \$29.71 per hour  
Entry-Level Education: Bachelor's degree  
Work Experience in a Related Occupation: None  
On-the-job Training: None  
Number of Jobs, 2014: 213,500  
Job Outlook, 2014-24: 9% (Faster than average)  
Employment Change, 2014-24: 18,700

## DRAFTERS

### WHAT DRAFTERS DO

Drafters use software to convert the designs of engineers and architects into technical drawings. Most workers specialize in architectural, civil, electrical, or mechanical drafting and use technical drawings to help design everything from microchips to skyscrapers.

### WORK ENVIRONMENT

Although drafters spend much of their time working on computers in an office, some may visit jobsites in order to collaborate with architects and engineers. Most

drafters work full time.

### HOW TO BECOME A DRAFTER

Drafters typically need specialized training, which can be accomplished through a technical program that leads to a certificate or an associate's degree in drafting.

### PAY

The median annual wage for drafters was \$53,480 in May 2016.

### JOB OUTLOOK

Employment of drafters is projected to decline 3 percent from 2014 to 2024. Although drafters will continue to

work on technical drawings and documents related to the design of buildings, machines, and tools, new software programs are making drafters and related professionals more efficient, thus requiring fewer workers. Competition for jobs is expected to be strong.

#### Quick Facts: Drafters

2016 Median Pay: \$53,480 per year / \$25.71 per hour  
Entry-Level Education: Associate's degree  
Work Experience in a Related Occupation: None  
On-the-job Training: None  
Number of Jobs, 2014: 204,400  
Job Outlook, 2014-24: -3% (Decline)  
Employment Change, 2014-24: -6,200

## DRYWALL AND CEILING TILE INSTALLERS AND TAPERS

### WHAT DRYWALL FINISHERS DO

Drywall finishers seal joints between plasterboard or other wallboards, mix sealing compound, press paper tape over joints to embed tape into compound and seal joints, or tape joints using mechanical applicators that spread compound and embed tape in one operation. They sand rough spots, fill cracks and holes in walls and may apply texturing compound and primer to walls and ceilings preparatory to final finishing, using brushes, rollers and spray guns.

### WORK ENVIRONMENT

The work is done on residential, industrial and commercial properties, both new and existing construction, inside and outside as well.

### HOW TO BECOME A DRYWALL FINISHER

Drywall finishers gain their training through formal apprenticeship programs or develop their skills through on-the-job training.

### PAY

The median annual wage of drywall finishers was \$42,280 per year in May 2016.

### JOB OUTLOOK

Overall employment for drywall finishers is projected to grow 5 percent from 2014 to 2024, about as fast as the average. Workers with a good employment history and experience in construction should have the best job opportunities.

#### Quick Facts: Drywall and Ceiling Tile Installers and Tapers

2016 Median Pay: \$42,280 per year / \$20.33 per hour  
Entry-Level Education: No Formal Educational Credential  
Work Experience in a Related Occupation: None  
On-the-job Training: Moderate-Term On-the-Job Training  
Number of Jobs, 2014: 127,000  
Job Outlook, 2014-24: 5% (As fast as average)  
Employment Change, 2014-24: 6,600

## ELECTRICIANS

### WHAT ELECTRICIANS DO

Electricians install and maintain electrical systems in homes, businesses, and factories.

### WORK ENVIRONMENT

Electricians work indoors and out, in nearly every type of facility. Almost all electricians work full time, which may include evenings and weekends. Although the work is not as dangerous as some other construction occupations, common risks include electrical shocks and burns, cuts, and falls.

### HOW TO BECOME AN ELECTRICIAN

Although most electricians learn through a formal apprenticeship, some start out by attending a technical school. Most states require licensure.

### PAY

The median annual wage of electricians was \$52,720 in May 2016.

### JOB OUTLOOK

Employment of electricians is projected to grow 14 percent from 2014 to 2024, much faster than the average for all occupations. As homes and businesses

require more wiring, electricians will be needed to install the necessary components. The job prospects for electricians should be very good, as many employers report difficulty finding qualified applicants.

#### Quick Facts: Electricians

2016 Median Pay: \$52,720 per year / \$25.35 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Number of Jobs, 2014: 628,800  
Job Outlook, 2014-24: 14% (Much faster than average)  
Employment Change, 2014-24: 85,900

## FLOORING INSTALLERS, TILE AND MARBLE SETTERS

### WHAT DO FLOOR COVERING INSTALLERS DO

Resilient floor and decorative coverings workers install, replace and repair all types of carpets, plastic laminates, and other decorative coverings in residential, commercial and industrial buildings, airplanes, ships, swimming pools, highway medians, garage aprons, automobiles and athletic fields. Apprentices learn about products, how to prepare a pattern to absolute tolerances, and to use scribes and dividers for precision work. Floorcoverers use manual and power tools to measure, hammer, cut and shear, spread and stretch, and prepare floors.

### WORK ENVIRONMENT

Most work is inside with occasional outside work when weather conditions are suitable. Work sites range from clean to dirty. The job requires stooping, kneeling, reaching, stretching and heavy lifting for long periods.

### HOW TO BECOME A FLOOR COVERING INSTALLER

Floor Covering Installers gain their training through formal apprenticeship programs or develop their skills through on-the-job training.

### PAY

The median annual wage of floor covering professionals was \$39,150 in May 2016.

### JOB OUTLOOK

Overall employment of floor covering professionals is projected to grow 18 percent from 2010 to 2020, about as fast as the average for all occupations. Overall job prospects should be good, and opportunities for floor covering professionals should remain strong.

#### Quick Facts: FLOORing installers, tile and marble setters

2016 Median Pay: \$39,150 per year / \$18.82 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Learn-on-the-job  
Job Outlook, 2014-24: 5% (As fast as average)  
Employment Change, 2014-24: 5,900

## GLAZIERS

### WHAT DO GLAZIERS DO

Glaziers prepare and install various types of glass, mirrors, windows and aluminum doors. Construction Glaziers cut, fit and install plate glass windows, mirrors and specialty glass items in commercial and residential buildings. Some glass workers specialize in the fabrication, assembly and installation of glass framing systems for storefronts including doors, architectural panels and sealants. Hand and power tools are used.

### WORK ENVIRONMENT

Glaziers work indoors and outdoors. Construction glaziers often work on ladders, rigging and scaffolding. The job requires bending, lifting, carrying, pushing and pulling.

### HOW TO BECOME A GLAZIER

Most glaziers learn their trades through formal apprenticeship programs.

### PAY

The median annual wage for glaziers was \$41,920 in May 2016.

### JOB OUTLOOK

Employment of glaziers is projected to grow 4 percent from 2014 to 2024, slower than the average for all occupations. Good job opportunities are expected from the need to replace glaziers who leave the occupation each year.

#### Quick Facts: Glaziers

2016 Median Pay: \$41,920 per year / \$20.16 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Job Outlook, 2014-24: 4% (Slower than average)  
Employment Change, 2014-24: 1,900



## HEATING AND AIR CONDITIONING TECHNICIAN

### WHAT DO HEATING AND AIR CONDITIONING TECHNICIANS DO

Heating and air conditioning technicians — often called heating, ventilation, air conditioning, and refrigeration (HVACR) technicians — work on heating, ventilation, cooling, and refrigeration systems that control the temperature and air quality in buildings.

### WORK ENVIRONMENT

HVACR technicians work mostly in homes, schools, hospitals, office buildings, or factories. Their worksites may be very hot or cold because the heating and cooling systems they must repair may not be working properly and because

some parts of these systems are located outdoors. Working in cramped spaces and during irregular hours is common.

### HOW TO BECOME A HEATING AND AIR CONDITIONING TECHNICIAN

Because HVACR systems have become increasingly complex, employers generally prefer applicants with postsecondary education or those who have completed an apprenticeship. Some states and localities require technicians to be licensed.

### PAY

The median annual wage for HVACR technicians was \$45,910 in May 2016.

### JOB OUTLOOK

Employment of heating and air conditioning technicians

is projected to grow 14 percent from 2014 to 2024, much faster than the average for all occupations. Candidates familiar with computers and electronics and those with good troubleshooting skills will have the best job opportunities as employers continue to have difficulty finding qualified technicians to install, maintain, and repair complex new systems.

Quick Facts: Heating and air conditioning technician  
2016 Median Pay: \$45,910 per year / \$22.07 per hour  
Entry-Level Education: Postsecondary nondegree award  
Work Experience in a Related Occupation: None  
On-the-job Training: Long-term on-the-job training  
Number of Jobs, 2014: 292,000  
Job Outlook, 2014-24: 14% (Faster than average)  
Employment Change, 2014-24: 39,600

## HEAVY EQUIPMENT OPERATORS

### WHAT DO HEAVY EQUIPMENT OPERATORS DO

Heavy equipment operators drive, maneuver, or control the heavy machinery used to construct roads, bridges, buildings, and other structures.

### WORK ENVIRONMENT

Heavy equipment operators work in nearly all weather conditions. Workers often get dirty, greasy, muddy, or dusty. The vast majority of operators work full time, and some operators have irregular hours. Some construction projects, especially road building, are done at night.

### HOW TO BECOME A CONSTRUCTION EQUIPMENT OPERATOR

Many workers learn equipment operation on the job after earning a high school diploma or equivalent, while others learn through an apprenticeship or by attending vocational schools.

### PAY

The median annual wage for heavy equipment operators was \$45,040 in May 2016.

### JOB OUTLOOK

Employment of heavy equipment operators is projected to grow 10 percent from 2014 to 2024, faster than the

average for all occupations. Spending on infrastructure is expected to increase, resulting in many new positions over the next ten years. Workers who can operate multiple types of equipment should have the best job opportunities.

Quick Facts: Heavy equipment operators  
2016 Median Pay: \$45,040 per year / \$21.65 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Moderate-term on-the-job training  
Number of Jobs, 2014: 428,800  
Job Outlook, 2014-24: 10% (Faster than average)  
Employment Change, 2014-24: 43,200

## HEAVY VEHICLE AND MOBILE EQUIPMENT SERVICE TECHNICIANS

### What Heavy Vehicle and Mobile Equipment Service Technicians Do

Heavy vehicle and mobile equipment service technicians inspect, maintain, and repair vehicles and machinery used in construction, farming, rail transportation, and other industries.

### Work Environment

Service technicians usually work indoors in noisy repair shops. They often lift heavy parts and tools, handle greasy and dirty equipment, and stand or lie in uncomfortable

positions. Most service technicians work full time, and many work evenings and weekends.

### How to Become a Heavy Vehicle or Mobile Equipment Service Technician

Most heavy vehicle and mobile equipment service technicians have a high school diploma or equivalent. Because vehicle and equipment technology is increasingly sophisticated and computerized, some employers prefer to hire service technicians who have completed a formal training program at a postsecondary institution.

### Pay

The median annual wage for heavy vehicle and mobile equipment service technicians was \$47,690 in May 2016.

### Job Outlook

Employment of heavy vehicle and mobile equipment service technicians is projected to grow 5 percent from 2014 to 2024, about as fast as the average for all occupations. Job opportunities for qualified jobseekers should be good.

Quick Facts: Heavy vehicle and mobile equipment service technicians  
2016 Median Pay: \$47,690 per year / \$22.93 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship or long-term on-the-job training  
Number of Jobs, 2014: 186,500  
Job Outlook, 2014-24: 5% (As fast as average)  
Employment Change, 2014-24: 10,100

## INTERIOR DESIGNER

### WHAT INTERIOR DESIGNERS DO

Interior designers make interior spaces functional, safe, and beautiful by determining space requirements and selecting decorative items, such as colors, lighting, and materials. They read blueprints and must be aware of building codes and inspection regulations, as well as universal accessibility standards.

### WORK ENVIRONMENT

Many interior designers work for the specialized design services industry or for the architectural, engineering, and related services industry. In 2014, about one in four were self-employed.

and related services industry. In 2014, about one in four were self-employed.

### HOW TO BECOME AN INTERIOR DESIGNER

Interior designers usually need a bachelor's degree with a focus on interior design.

### PAY

The median annual wage for interior designers was \$49,810 in May 2016.

### JOB OUTLOOK

Employment of interior designers is projected to grow

4 percent from 2014 to 2024, slower than the average for all occupations. Designers will be needed to respond to consumer expectations that the interiors of homes and offices meet certain conditions, such as being environmentally friendly and more easily accessible.

Quick Facts: Interior Designer  
2016 Median Pay: \$49,810 per year / \$23.95 per hour  
Entry-Level Education: Bachelor's degree  
Work Experience in a Related Occupation: None  
On-the-job Training: None  
Number of Jobs, 2014: 58,900  
Job Outlook, 2014-24: 4% (Slower than average)  
Employment Change, 2014-24: 2,200

## IRONWORKER

### WHAT DO IRONWORKERS DO

Ironworkers install structural and reinforcing iron and steel to form and support buildings, bridges, and roads.

### WORK ENVIRONMENT

Ironworkers perform physically demanding and dangerous work, often working at great heights. As a result, workers must wear safety harnesses to reduce the risk of falling.

### HOW TO BECOME AN IRONWORKER

Although most ironworkers learn through an

apprenticeship, some learn on the job. Certifications in welding, rigging, and signaling can be helpful for new entrants.

### PAY

The median annual wage for ironworkers was \$50,830 in May 2016.

### JOB OUTLOOK

Employment of ironworkers is projected to grow 9 percent from 2014 to 2024, faster than the average for all occupations. The construction of large projects, such as high-rise buildings, is expected to drive employment

growth, as will the need to rehabilitate, maintain, and replace an increasing number of older roads and bridges. Job opportunities should be best in metropolitan areas, where most large construction projects take place.

Quick Facts: Ironworker  
2016 Median Pay: \$50,830 per year / \$24.44 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Number of Jobs, 2014: 80,100  
Job Outlook, 2014-24: 9% (Faster than average)  
Employment Change, 2014-24: 7,100

## LABORERS AND HELPERS

### WHAT CONSTRUCTION LABORERS, HELPERS DO

Construction laborers and helpers do many basic tasks that require physical labor on construction sites.

### WORK ENVIRONMENT

Most construction laborers and helpers work full time and do physically demanding work. Some work at great heights or outdoors in all weather conditions. Construction laborers have one of the highest rates of injuries and illnesses.

### HOW TO BECOME A CONSTRUCTION LABORER OR HELPER

Most construction laborers and helpers learn their trade through short-term on-the-job training.

### PAY

The median annual wage for construction laborers and helpers was \$32,230 in May 2016.

### JOB OUTLOOK

Employment of construction laborers and helpers is projected to grow 13 percent from 2014 to 2024, faster than the average for all occupations. Laborers and helpers

work in all fields of construction, and demand for these workers will mirror the level of overall construction activity.

Quick Facts: Laborers and Helpers

2016 Median Pay: \$32,230 per year / \$15.49 per hour

Entry-Level Education: None

Work Experience in a Related Occupation: None

On-the-job Training: Short-term on-the-job training

Number of Jobs, 2014: 1,386,400

Job Outlook, 2014-24: 13% (Faster than average)

Employment Change, 2014-24: 180,100

## LANDSCAPE ARCHITECTS

### WHAT LANDSCAPE ARCHITECTS DO

Landscape architects design parks and the outdoor spaces of campuses, recreational facilities, private homes, and other open areas.

### WORK ENVIRONMENT

Landscape architects spend much of their time in offices, creating designs, preparing models, and meeting with clients. They spend the rest of their time at jobsites. About one in five were self-employed in 2014.

### HOW TO BECOME A LANDSCAPE ARCHITECT

Most states require landscape architects to be

licensed. Licensing requirements vary by state, but usually include a degree in landscape architecture from an accredited school, internship experience, and passing the Landscape Architect Registration Examination.

### PAY

The median annual wage for landscape architects was \$63,480 in May 2016.

### JOB OUTLOOK

Employment of landscape architects is projected to grow 5 percent from 2014 to 2024, about as fast as the average for all occupations. Planning

and developing new commercial, industrial, and residential construction projects and redeveloping existing landscapes will drive employment growth. Competition for jobs in the largest and most prestigious landscape architecture firms is expected to be strong.

Quick Facts: Landscape Architect

2016 Median Pay: \$63,480 per year / \$30.52 per hour

Entry-Level Education: Bachelor's degree

Work Experience in a Related Occupation: None

On-the-job Training: Internship/residency

Number of Jobs, 2014: 22,500

Job Outlook, 2014-24: 5% (As fast as average)

Employment Change, 2014-24: 1,200

## LANDSCAPER

### WHAT LANDSCAPERS AND GROUNDS MAINTENANCE WORKERS DO

Landscapers and grounds maintenance workers ensure that the grounds of houses, businesses, and parks are attractive, orderly, and healthy in order to provide a pleasant outdoor environment.

### WORK ENVIRONMENT

Many landscapers and grounds maintenance jobs are seasonal, available mainly in the spring, summer, and fall. Most of the work is done outdoors in all weather conditions. The work can be repetitive and physically demanding,

requiring frequent bending, kneeling, lifting, and shoveling.

### HOW TO BECOME A LANDSCAPER AND GROUNDS MAINTENANCE WORKER

Most landscapers and grounds maintenance workers need no formal education and are trained on the job. Most states require licensing for workers who apply pesticides or fertilizers.

### PAY

The median yearly wage for landscapers and grounds maintenance workers was \$26,830 in May 2016.

### JOB OUTLOOK

Employment of landscapers and grounds maintenance

workers is projected to grow 6 percent from 2014 to 2024, about as fast as the average for all occupations. More workers will be needed to keep up with increasing demand for lawn care and landscaping services from large institutions and individual homeowners. Job prospects should be very good.

Quick Facts: Landscaper

2016 Median Pay: \$26,830 per year / \$12.90 per hour

Entry-Level Education: None

Work Experience in a Related Occupation: None

On-the-job Training: Short-term on-the-job training

Number of Jobs, 2014: 1,282,000

Job Outlook, 2014-24: 6% (As fast as average)

Employment Change, 2014-24: 77,600

## PAINTERS

### WHAT PAINTERS, CONSTRUCTION AND MAINTENANCE DO

Painters apply paint, stain, and coatings to walls, buildings, bridges, and other structures.

### WORK ENVIRONMENT

Painting requires a lot of climbing, bending, kneeling, and stretching. Most industrial painters work outside, almost always in dry, warm weather. Those who paint bridges or building infrastructure may be exposed to extreme heights and uncomfortable positions.

### HOW TO BECOME A PAINTER, CONSTRUCTION OR MAINTENANCE

Although most painters learn their trade informally on the job, some learn through a formal apprenticeship.

### PAY

The median annual wage of painters was \$37,570 in May 2016.

### JOB OUTLOOK

Employment of painters is projected to grow 7 percent from 2014 to 2024, about as fast as the average for

all occupations. Overall job prospects should be good, and opportunities for industrial painters and coaters are expected to be excellent, especially in the Gulf Coast region.

Quick Facts: Painters

2016 Median Pay: \$37,570 per year/\$18.06 per hour

Entry-Level Education: No formal educational credential

Work Experience in a Related Occupation: None

On-the-job Training: Moderate-term on-the-job training

Number of Jobs, 2014: 360,500

Job Outlook, 2014-24: 7% (As fast as average)

Employment Change, 2014-24: 26,500

## PLUMBERS, PIPEFITTERS, AND STEAMFITTERS

### WHAT PLUMBERS, PIPEFITTERS, AND STEAMFITTERS DO

Plumbers, pipefitters, and steamfitters install and repair pipes that carry water, steam, air, or other liquids or gases to and in businesses, homes, and factories.

### WORK ENVIRONMENT

Plumbers, pipefitters, and steamfitters work in factories, homes, businesses, and wherever else there are pipes or septic systems. Workers must often lift heavy materials, climb ladders, and work in tight spaces. Some plumbers travel to a variety of work sites every day.

### HOW TO BECOME A PLUMBER, PIPEFITTER, OR STEAMFITTER

Most plumbers, pipefitters, and steamfitters learn on the job through an apprenticeship. Some start out by attending a technical school. Most states and localities require plumbers to have a license.

### PAY

The median annual wage of plumbers, pipefitters, and steamfitters was \$51,450 in May 2016.

### JOB OUTLOOK

Employment of plumbers, pipefitters, and steamfitters is projected to grow 12 percent from 2014 to 2024,

faster than the average for all occupations. Construction of buildings which need new plumbing systems should drive demand for these workers. Overall job opportunities are expected to be good, with some employers continuing to report difficulty finding qualified workers.

Quick Facts: Plumbers, Pipefitters, and Steamfitters

2016 Median Pay: \$51,450 per year / \$24.74 per hour

Entry-Level Education: High school diploma or equivalent

Work Experience in a Related Occupation: None

On-the-job Training: Apprenticeship

Number of Jobs, 2014: 425,000

Job Outlook, 2014-24: 12% (Faster than average)

Employment Change, 2014-24: 49,100

## ROOFER

### WHAT ROOFERS DO

Roofers replace, repair, and install the roofs of buildings using a variety of materials, including shingles, bitumen, and metal.

### WORK ENVIRONMENT

Roofing work can be physically demanding. It involves heavy lifting, as well as climbing, bending, and kneeling, frequently in very hot weather. Overtime may be required to finish a job, especially during busier summer months.

### HOW TO BECOME A ROOFER

Although most roofers learn on the job, some learn their trade through an apprenticeship program. There are no specific education requirements for roofers.

### PAY

The median annual wage for roofers was \$37,760 in May 2016.

### JOB OUTLOOK

Employment of roofers is projected to grow 13 percent from 2014 to 2024, faster than the average

for all occupations. Most of the demand for roofers will stem from roof replacement needs and high job turnover.

#### Quick Facts: Roofer

2016 Median Pay: \$37,760 per year / \$18.15 per hour  
Entry-Level Education: No formal educational credential  
Work Experience in a Related Occupation: None  
On-the-job Training: Moderate-term on-the-job training  
Number of Jobs, 2014: 123,400  
Job Outlook, 2014-24: 13% (Faster than average)  
Employment Change, 2014-24: 15,800

## SAFETY SPECIALIST

### WHAT SAFETY SPECIALISTS DO

Safety specialists analyze many types of work environments and work procedures. Specialists inspect workplaces for adherence to regulations on safety, health, and the environment. They also design programs to prevent disease or injury to workers and damage to the environment.

### WORK ENVIRONMENT

Safety specialists work in a variety of settings, such as offices, factories, and mines. Their jobs often involve

fieldwork and travel. Most specialists work full time.

### HOW TO BECOME A SAFETY SPECIALIST

Safety specialists typically need a bachelor's degree in occupational health and safety or in a related scientific or technical field.

### PAY

The median annual wage for safety specialists was \$70,920 in May 2016.

### JOB OUTLOOK

Employment of safety specialists is projected to grow 4

percent from 2014 to 2024, slower than the average for all occupations. Specialists will be needed to work in a wide variety of industries to ensure that employers are adhering to both existing and new regulations.

#### Quick Facts: Safety Specialist

2016 Median Pay: \$70,920 per year / \$34.09 per hour  
Entry-Level Education: Bachelor's degree  
Work Experience in a Related Occupation: None  
On-the-job Training: None  
Number of Jobs, 2014: 70,300  
Job Outlook, 2014-24: 4% (Slower than average)  
Employment Change, 2014-24: 2,800

## SHEET METAL WORKERS

### WHAT SHEET METAL WORKERS DO

Sheet metal workers fabricate or install products that are made from thin metal sheets, such as ducts used for heating and air-conditioning.

### WORK ENVIRONMENT

Sheet metal workers often lift heavy materials and stand for long periods. Those who install sheet metal at construction sites or inside buildings often must bend, climb, and squat, sometimes in awkward positions. Most workers are employed full time.

### HOW TO BECOME A SHEET METAL WORKER

Although most sheet metal workers learn their trade through formal apprenticeships, some learn informally on the job or in technical colleges. Formal apprenticeships are more likely in construction.

### PAY

The median annual wage of sheet metal workers was \$46,940 in May 2016.

### JOB OUTLOOK

Employment of sheet metal workers is projected to

grow 7 percent from 2014 to 2024, about as fast as the average for all occupations. Job opportunities should be particularly good for sheet metal workers who complete apprenticeship training or are certified welders.

#### Quick Facts: Sheet Metal Workers

2016 Median Pay: \$46,940 per year / \$22.57 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
On-the-job Training: Apprenticeship  
Number of Jobs, 2014: 141,000  
Job Outlook, 2014-24: 7% (As fast as average)  
Employment Change, 2014-24: 9,400

## SURVEYOR

### WHAT SURVEYORS DO

Surveyors make precise measurements to determine property boundaries. They provide data relevant to the shape and contour of the earth's surface for engineering, mapmaking, and construction projects.

### WORK ENVIRONMENT

Surveying involves both fieldwork and indoor work. When working outside, surveyors may stand for long periods

and often walk long distances, sometimes in bad weather. Most work full time.

### HOW TO BECOME A SURVEYOR

Surveyors typically need a bachelor's degree. They must be licensed before they can certify legal documents and provide surveying services to the public.

### PAY

The median annual wage for surveyors was \$59,390 in May 2016.

### JOB OUTLOOK

Employment of surveyors is projected to decline 2 percent from 2014 to 2024. Improvements in surveying technology have increased productivity, reducing demand for surveyors.

#### Quick Facts: Surveyor

2016 Median Pay: \$59,390 per year / \$28.56 per hour  
Entry-Level Education: Bachelor's degree  
Work Experience in a Related Occupation: Less than five years  
Training: None  
Number of Jobs, 2014: 44,300  
Job Outlook, 2014-24: -2% (Decrease)  
Employment Change, 2014-24: -900

## WELDER

### WHAT WELDERS, CUTTERS, SOLDERERS, AND BRAZERS DO

Welders, cutters, solderers, and brazers use hand-held or remotely controlled equipment to join or cut metal parts. They also fill holes, indentations, or seams of metal products.

### Work ENVIRONMENT

Welders, cutters, solderers, and brazers may work outdoors, often in inclement weather, or indoors, sometimes in a confined area. They may work on a scaffold, high off the ground, and they occasionally must lift heavy objects and work in awkward positions.

Although most work full time, overtime is common.

### HOW TO BECOME A WELDER, CUTTER, SOLDERER, OR BRAZER

A high school diploma or equivalent combined with technical and on-the-job training is typically required to become a welder, cutter, solderer, or brazer.

### PAY

The median annual wage for welders, cutters, solderers, and brazers was \$39,390 in May 2016.

### JOB OUTLOOK

Employment of welders, cutters, solderers, and brazers

is projected to grow 4 percent from 2014 to 2024, slower than the average for all occupations. Despite slower than average employment growth, skilled welders with up-to-date training should have good job opportunities.

#### Quick Facts: Welder, cutter, solderer or brazer

2016 Median Pay: \$39,390 per year / \$18.94 per hour  
Entry-Level Education: High school diploma or equivalent  
Work Experience in a Related Occupation: None  
Training: Moderate-term on-the-job training  
Number of Jobs, 2014: 397,900  
Job Outlook, 2014-24: 4% (Slower than average)  
Employment Change, 2014-24: 14,400

## EDUCATION RESOURCES

### PRE-APPRENTICE PROGRAMS

#### Benson Polytechnic High School

www.bensonhs.pps.k12.or.us/construction.php  
Richard Weber  
rweber@pps.net  
(503) 916-5100

#### Cascadia Tech Academy

www.ccskillscenter.com/construction-technology/  
Peggy Leifheit  
Peggy.leifheit@evergreenps.org  
(360) 604-1050 x2158

#### CAWS: Construction Apprenticeship & Workforce Solutions, Inc.

www.caws-pdx.org  
John Gardner  
jgardner@caws-pdx.org  
(503) 478-7354

#### Construction Hope

www.constructinghope.org  
Visit website for contact form  
(503) 281-1234

#### Job Corps – Oregon

www.jobcorps.gov  
Several locations in Oregon  
1-800-733-JOBS (5627)

#### Oregon Tradeswomen

www.tradeswomen.net  
Kelly Kupcak  
kelly@tradeswomen.net  
(503) 335-8200 x 22

#### Portland Community College (Cascade Campus)

www.pcc.edu/programs/apprenticeship/pre-trades.html  
Stacey Zumwalt  
trades@pcc.edu  
(971) 722-5650

#### Portland Youth Builders

www.pybpdx.org  
Ruthie Ditzler  
apply@pybpdx.org  
(503) 286-9350 x254

#### Reynolds Learning Academy – The Trading Up Program

www.reynolds.k12.or.us/ria/trading-program  
(503) 912-1576 (east)  
(503) 667-4673 (west)

#### Rogue Community College

www.go.roguecc.edu/department/apprenticeship  
(541) 245-7912  
800-460-7908

### APPRENTICESHIP PROGRAMS

#### Bricklayers

www.bac1or.org/training-education-safety/apprenticeship  
Shawn Lenczowski  
shawn@bac1or.org  
(503) 234-3781

#### Pacific Northwest Carpenters' Institute

www.pnci.org/apprenticeship.lasso  
Bob Calwhite  
bobcalwhite@pnci.org  
(503) 287-3708  
*Carpenters, Millwrights, Pile Drivers, Interior/Exterior Specialists, Scaffold Erectors, Drywall Finisher (Taper) and Trade Show exhibition workers*

#### Cement Masons

www.cementmasons555.org  
Craig Smith  
cm555jatic@integra.net  
(503) 408-8555

#### Central Oregon Electricians

www.cjatc.org  
Dave Baker  
centraljatic@cjatc.org  
(541) 971-6199

#### NECA-IBEW Electrical Training Center

www.nietc.org  
Rod Belisle

rbelisle@nietc.org  
(503) 501-5050

#### Flooring Trades

www.finishingtrades.org/apprenticeship.html  
John Lawson  
jlaws@iupatdc5.org  
(503) 481-3420

#### Glaziers

https://glazierslocal740.org/apprenticeship/shtml  
craig.feely@mhcc.edu  
(503) 491-7359

#### Insulators

www.insulators36.org/apprenticeship/  
Dave Gamble  
coordinator@insulators36.org  
(503) 255-5124

#### Ironworkers

www.iw29appr.org  
Jack Fussell  
info@iw29appr.org  
(503) 775-0877

#### Oregon Laborers Apprenticeship

www.oregonlaborers.com  
Visit website to apply

#### Line Workers

www.nwlinejatic.com  
Mike Kiessling  
mike@nwlinejatic.com  
(360) 816-7100

## NW COLLEGE OF CONSTRUCTION

### Northwest College of Construction

Northwest College of Construction (NWCOC) is the school of choice for construction craft, technical, safety, supervisory and management professionals. Founded by the region's four largest construction trade associations, NWCOC meets the education and training needs of the industry. As a private, non-profit technical and career school, the College serves new and veteran craftworkers as well as emerging and experienced supervisors, managers and leaders. A career in construction is not just another job, it's a promise for an exciting, challenging and rewarding future, so join us in building the next generation of contractors.

www.nwccoc.com  
Sara Gourley, Director of Apprenticeship, sarag@nwccoc.com  
Jeff Joubert, Director of Education, jeffj@nwccoc.com  
503-256-7300

*Brick Masons, Carpenters, Concrete Finishers, Construction Laborers, Heating and Ventilation and Air Conditioning (HVAC) Technicians, Heavy Equipment Operators, Tile Finishers & Setters, Sheet Metal Technicians, Sign Hangers.*



#### Operating Engineers

Operating Engineers operate construction equipment such as heavy-duty trucks, cranes, bulldozers, pavers, rollers, excavators, scrapers, loaders and many other kinds of equipment used in constructing buildings, dams, airports and highways. Apprentices may also work as heavy-duty truck and equipment mechanics (Heavy Duty Repairer) and as technical engineer surveyors (Construction Surveyors). Contact IUOE Local 701 Training Coordinator, Deanna Robles, at (503) 650-7701 for more information about the apprenticeship programs available in Oregon and SW Washington.

#### Pipefitters, Plumbers & Steamfitters

www.ua290.org  
Al Shropshire  
shropshire@ua290.org  
(503) 616-0349

#### Plasterers

Craig Smith  
cm555jatic@integra.net  
(503) 232-3257

#### Portland Community College (Swan Island Trade Center)

www.pcc.edu/programs/apprenticeship  
Stationary Engineers, Manufacturing Plant Electricians, Limited Maintenance Electricians, Millwright, Industrial Mechanic, Construction Trade General Apprenticeship  
Stacey Zumwalt  
Stacey.zumwalt@pcc.edu  
(971) 722-5650

#### Roofers & Waterproofers

www.orswrooferapp.com  
Joel Gonzalez  
joelg@orswrooferapp.com  
(503) 546-4235

#### Sheet Metal Institute

www.sheetmetal institute.org  
Kevin Roth  
kevinr@sheetmetal-16.org  
(503) 257-1022

#### Signatory Painting Contractors Organization

www.paintertraining.org  
Jim Phelps  
jphelps@patt.org  
(503) 287-4856

#### Tree Trimmers

nwpowerlinetretrimmer.org  
Mike Kiessling  
nwline@nwlinejatic.com  
(360) 816-7100

### COLLEGES AND UNIVERSITIES

#### Blue Mountain Community College

2411 NW Garden Ave.  
Pendleton, OR 97801  
(541) 276-1260  
www.bluecc.edu/academics/departments-academic-programs/apprenticeship  
Construction apprenticeship  
Electrician apprenticeship

#### Central Oregon Community College

2600 NW College Way  
Bend, OR 97703  
(541) 383-7700  
www.cocc.edu/special-curriculum/apprenticeship  
Industrial mechanics and maintenance technology  
Construction trades general apprenticeship  
Electrician apprenticeship technologies

#### Chemeketa Community College

4000 Lancaster Dr. NE  
Salem, OR 97305  
(503) 399-5000  
www.chemeketa.edu/programs/



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## EDUCATION RESOURCES CONT.

apprenticeship/  
HVAC/R specialization  
Plumber specialization  
Sheet Metal specialization  
Inside wire electrician  
specialization

### Clackamas Community College

19600 Molalla Ave.  
Oregon City, OR 97045  
(503) 594-6000  
www.clackamas.edu/  
academics/departments-  
programs  
Construction trades general  
apprenticeship  
Electrician apprenticeship  
technologies

### Clark College

1933 Fort Vancouver Way  
Vancouver, WA 98663  
(360) 699-6398  
www.clark.edu  
Construction Technology  
Construction Engineering

### Clatsop Community College

1652 Lexington Ave.  
Astoria, OR 97103  
(503) 325-0910  
www.clatsopcc.edu  
Construction trades general  
apprenticeship

### George Fox University

414 N. Meridian St.  
Newberg, OR 97132  
(503) 538-8383  
www.georgefox.edu  
Civil engineering

### Lane Community College

4000 East 30th Ave.  
Eugene, OR 97405  
(541) 463-3000  
www.lanecol.edu/apprenticeship  
Construction trades general  
apprenticeship  
Electrician apprenticeship  
technologies  
Industrial mechanics and  
maintenance technology  
apprenticeship

### Linn-Benton Community College

6500 Pacific Blvd. SW  
Albany, OR 97321  
(541) 917-4999  
www.linnbenton.edu/  
apprenticeship  
Limited energy technician  
apprenticeship

### Mount Hood Community College

26000 SE Stark St.  
Gresham, OR 97030  
(503) 491-6422  
www.mhcc.edu/apprenticeship  
Brick masons  
Carpenters  
Cement masons  
Construction craft laborers  
Electrician  
Glass workers  
Heat and frost insulators  
Ironworkers  
Plasterers  
Roofers  
Sheet metal

### Oregon Institute of Technology

3201 Campus Drive

Klamath Falls, OR 97601  
www.oit.edu  
(541) 885-1000  
27500 SW Parkway Ave.,  
Wilsonville, OR 97070  
(503) 821-1250  
• Civil Engineering  
• Electrical Engineering  
• Mechanical Engineering  
• Mechanical Engineering  
Technology  
• Operations Management

### Oregon State University

1500 SW Jefferson Way,  
Corvallis, OR 97331  
(541) 737-1000  
Oregonstate.edu  
• Civil Engineering  
• Construction Engineering  
Management  
• Electrical and Computer  
Engineering  
• Energy Engineering  
Management  
• Mechanical Engineering

### Portland Community College

Rock Creek Campus  
17705 Springville Rd.,  
Portland, OR 97229  
(971) 722-6111  
www.pcc.edu/programs/bldg-  
construction  
Shannon Baird  
shannon.baird@pcc.edu  
Hilary Campbell  
hilary.campbell@pcc.edu  
(971) 722-7344  
Associates of Applied Science  
Degree

• Building Construction  
Technology  
• Building Construction  
Technology: Construction  
Management Option  
• Building Construction  
Technology: Design/Build  
Remodeling Option Less than  
One-Year Certificate  
• Building Construction  
Technology

### Portland Community College

Swan Island Trades Center  
6400 N Cutter Circle  
Portland, OR 97219  
www.pcc.edu/programs/  
apprenticeship  
Stacey Zumwalt  
Stacey.zumwalt@pcc.edu  
(971) 722-5650  
• Associate of Applied Science  
in Construction Trades, General  
Apprenticeship  
• Associate of Applied Science  
in Electrician Apprenticeship  
Technologies  
• Associate of Applied Science  
in Industrial Mechanics and  
Maintenance Technology  
Apprenticeship Certificates of  
Completion  
• Limited Electrician  
Apprenticeship Technologies  
• Electrician Apprenticeship  
Technologies  
• Manual Trades Apprenticeship  
• Construction Trades, General  
Apprenticeship  
• Mechanical Maintenance

Apprenticeship  
• Industrial Mechanics &  
Maintenance Technology  
Apprentices

### Portland Community College

Sylvania Campus  
12000 SW 49th Ave.  
Portland, OR 97219  
www.pcc.edu/programs/civil/  
engineering  
Linda Browning  
linda.browning@pcc.edu  
(971) 722-8730  
Civil Engineering Technology

### Portland State University

1930 SW 4th Ave., Ste. 200  
Portland, OR 97201  
(503) 725-4282  
www.pdx.edu/cee  
ceedept@cecs.pdx.edu  
Civil and Environmental  
Engineering

### Rogue Community College

3345 Redwood Hwy.,  
Grants Pass, OR 97527  
(541) 956-7500  
www.go.roguecc.edu/  
department/apprenticeship  
Associates of Applied Science  
Degrees  
• Construction Trades-General  
Apprenticeship  
• Electricians Apprenticeship  
Technologies Career Pathways  
Certificates  
• Construction Industry  
Management/Construction  
Technology: CAD Assistant

• Construction Industry  
Management/Construction  
Technology: Construction Helper  
• Construction Industry  
Management/Construction  
Technology: Concrete Laborer  
Certificates  
• Construction Technology  
• Construction Trades-General  
Apprenticeship  
• Electrician Apprenticeship  
Technologies  
• Electrician Apprenticeship  
Technologies (Limited)

### Umpqua Valley Community College

1140 Umpqua College Rd.  
Roseburg, OR 97470  
(541) 440-4600  
www.umpqua.edu/apprenticeship  
Industrial maintenance machinist  
Industrial maintenance millwright  
Industrial pipefitter  
Inside electrician  
Limited maintenance electrician  
Manufacturing plant electrician

### University of Oregon

5249 University of Oregon  
Eugene, OR 97403  
(541) 346-3631  
Aaa.uoregon.edu  
Architecture

### University of Portland

5000 N. Willamette Blvd.  
Portland, OR 97203  
(503) 943-8000  
https://engineering.up.edu  
Engineering

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info@tradeswomen.net | 503.335.8200 x 21

# From trade school to business ownership

## A Q&A with Brandon Stowe

Brandon Stowe has done it all. He's owned a business, been a teacher, been in the military, went to college, worked for the state, and even helped his grandpa fix refrigeration systems in mom and pop stores across the south when he was as young as twelve years old.

While none of these experiences were more important than the next to get him to where he is now – running Stowe Mechanical Heating and Cooling in Long Beach, Washington – he wouldn't have accomplished any of it without the skills he's dedicated his life learning as a HVAC professional.

We sat down with Stowe to talk with him about his career, and the importance of the education he received at the Northwest College of Construction in Portland, a craft, technical, supervisory and management education facility where he's now an instructor.

### ***How did you find out about the Northwest College of Construction?***

I worked for a company down here in the Pacific Northwest that was an apprenticeship training sponsor and worked with the Northwest College of Construction. It was a requirement that their employees went through the schooling. When I joined up with the company I'd already had a lot of years of experience in the trades from working with my grandpa growing up, but the state of Oregon requires you to have a journeyman card for journey level work and a limited electricity class B license.

When I started, my intention was to just sit through the classes, not pay many dividends to what's going on, take the tests and get out of there because I already had so much experience. What



Luke Whittaker/Coast River Business Journal

Brandon Stowe with his family outside his business, Stowe Mechanical Heating and Cooling, in Long Beach, Washington.

I learned quickly, and what was pretty eye opening, was that even for an experienced individual like myself, there was still so much to learn. Even in year one, when we were learning the basics, the curriculum really filled in the gaps from the things I did know to the things I didn't.

### ***What got you interested in the trades and this type of work?***

When I was younger, my grandfather did HVAC. He used to take me out to his jobsites and let me clean the coils or do other helper work. But what really

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got me interested in it was anytime he would change out a motor he would have me dissect it the same way you would a frog in science class. I was just fascinated by how reels of copper and metal can form a moving mechanical motor that can drive something or perform a task. At first I was just intrigued, then I started to figure out how it all worked, and that's when I knew I was interested in it as a career.

### ***You already had a job lined up when you started going to Northwest College of Construction, but did your job opportunities increase once you graduated?***

Absolutely. I started the school and the curriculum with a local company, but the licenses, certificate and education I received through the program was the key to getting my next job, as the energy engineer for the State of Oregon. The engineering degree I already had wasn't a requirement for the job, but what was required was the certificate and licenses. I had a relatively good job, but those licenses, are what got me the career people strive for – a civil job with high pay, good health care, a pension, 401k and the whole nine yards. I wouldn't have gotten the job without the program. But not only was I able to get the job, but because of the education I got from the Northwest College of Construction, I was able to perform, and be utilized, in the way the state was looking for.

### ***So you not only got the requirements for the job, you got the skills to actually perform the job once you had it?***

Exactly. I was confident to perform all my tasks because we'd gone over them in the classroom, and in the performance evaluation where you're actually doing the hands-on training. I hadn't just seen it in a book, I'd done it. Those types of experiences were good for me because I'm an audio and visual learner, but I'm also very tactile.

### ***So how did your time at the Northwest College of Construction help you in what you're doing now, running your own successful business?***

There are two courses that really helped me beyond just the technical training. In year one there is a course on communications and how to talk to your clients. Then in year four there is a course on leadership, which teaches you how to be effective running a jobsite, foreman or even a business owner. Both of those courses were very

beneficial to transitioning me to where I am at today running a company that's in its second year and grossing \$4 million in revenue.

### ***Outside of your technical skill, what has your experience with Northwest College of Construction taught you personally?***

Confidence building in a structured learning environment is important to everyone. We deal with a lot of people who come into these schools and feel as if it's a level below traditional institutions like a four-year college. So, a lot of the time there are some confidence issues with the person starting the program. They feel like this isn't as successful as a path as some of their peers. But honestly, after going through this program, these programs are geared to change that way of thinking and to show you the opportunity in your chosen field.

Let's face it, I can teach you a technical skill, but if you don't have the confidence to go succeed with it, you won't.

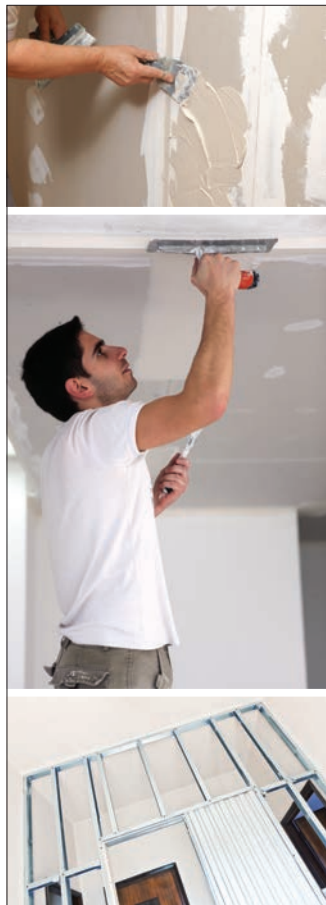
I went through a four-year college before I went to the Northwest College of Construction. That shows you that there isn't a magical pathway or formula. What we try to teach everyone is that you have just as much ability to be suc-

cessful in this world as someone that becomes a nurse, a doctor or a lawyer. A trade doesn't have a cap or a limit as far as what you can do or what you can earn. The only person that can put that cap on you is yourself.

### ***Lastly, what have been the key differences between the four-year university you went to and the Northwest College of Construction?***

For me, both are very positive paths with loads of potential. I would never bash a four-year college or more traditional learning environment. They're all there to help facilitate your next phase in life. There are positives all around, but with trade schools their aim is to be more specific in what they're teaching you. And if you look at what they're teaching you, these are skills that are highly in demand, and will continue in demand. You're seeing a lot of the workforce in other industries diminish with technology. That's not happening in the trades.

The advantage of these programs is that you're going to be able to find a job, it's going to be a job in what you studied, you're going to be able to work just about anywhere you want to, and it's going to pay you a living wage.



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Sam Tenney/DJC

Jon Oldenburg, a pipe layer with Westech Construction, sets a manhole in place while building a pipe trainer at the Northwest College of Construction.

# Pipe dream becomes reality

**BY GARRETT ANDREWS**

Study hard in school, teachers would say to John Kalkhoven, or you'll end up a ditchdigger.

Kalkhoven is today head of Titan Utilities of Beaverton, and though his field of work is not exactly ditchdigging, he's worked a long, successful career in the trenches. With the construction labor shortage slamming firms that handle water, sewer and storm lines, he wants more people to study hard – and enter the field of utility construction.

Kalkhoven's idea for a permanent training location for underground utility workers is becoming a reality in the parking lot of the Northwest College of Construction. The pipe trainer is intended to streamline technical and safety

training, showcase new products, and help combat a labor shortage affecting the pipe-laying industry as much as any other. The team involved, including sponsors with the Northwest Utility Contractors Association, says the one-of-a-kind device could help educate the entire construction industry and lead innovation.

Or, as NWCOC President Bob Strader said, it's pretty exciting "for a hole in the ground."

## **BRAND NEW CLAY**

The NWCOC pipe trainer idea started about seven years ago with an emerging construction material and the city of Portland.

Portland and most modern cities were once awash in clay pipe. By 1933, around 1,100 miles of terra

cotta was employed in conveying this city's raw sewage directly into the Willamette River. The product fell out of fashion as technology advanced and plastics took over. Eventually, a product called Vitrified Clay Pipe (VCP) hit the market, made by heating clay until it gains the water resistance of glass. Officials with Portland's Bureau of Environmental Services were interested in its superior durability and lower environmental impact.

But VCP was a new product, and a sensitive one at that – it could crack easily if installed improperly. The local contracting community lacked installation experience as well as a reliable supplier. So BES had to step in and become the region's clay pipe authority, eventually targeting a supplier in

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the Tacoma, Washington, area and reaching out to the National Clay Pipe Institute for materials and instruction. It offered training sessions to local contractors and even helped devise effective installation methods, senior engineering associate Colleen Harold told Public Works Magazine at the time.

“We learned how to work with pipe so that we were the experts, not the contractor,” she said. “We found out, for example, that we couldn’t use chains and nylon straps to handle the pipe because it was too slick and that grippers worked best.”

After the city’s construction specifications were amended to include VCP standards, BES began a pair of sewer rehabilitation projects piloting VCP in Portland. By this time, the NWCOC and the NWUCA had been brought into the loop, and an idea started to jell with Kalkhoven.

## PERSONNEL TRAINER

Technically speaking, the pipe trainer coming to the NWCOC will be a trench 60 feet long with a big manhole at one end for confined space testing. It will have three levels of depth – 4 feet, 9 feet and 12 feet. At the 4-foot depth a removable grate will allow for instruction on the installation of basins.

When not in use, steel plates will cover the hole to allow vehicle parking on top.

Accompanying NWCOC training programs will address installation of the numerous varieties of pipe – PVC, pre-cast concrete, ceramic and cast-iron. Corporate reps will instruct workers on manufacturer best practices – to reduce the kind of installation errors that can lead to million-dollar lawsuits.

Unlike in other sub-trades that have more formal training programs, instruction in the field of utility contracting has long been old-fashioned – firsthand knowledge passed down directly. Often this would take place in a field behind a supplier’s office.

This is because when it comes passing on knowledge, there’s no substitute for firsthand, said Kalkhoven, who as a teenager accompanied his contractor father on jobsites.

“You can read as many books as you want,” he said. “But when you see it and you do it, it just learns faster.”

This is why NWUCA member firms



Sam Tenney/DJC

Jon Oldenburg, right, signals as James Holmes, operating a front loader, backfills a trench dug for a new pipe trainer being installed at the Northwest College of Construction.

eagerly bought into the pipe trainer, according to contractors and college officials. They report that manufacturers in particular have shown interest, eager to accustom new workers to their unique product features.

“It will be a good thing for our industry,” said Dan Vannoy, vice president of Emery & Sons Construction. “There’s certainly nothing similar to this anywhere else.”

This week, NWUCA member Westech Construction will donate labor to saw the pavement and perform other prep work prior to what will be about a two-month construction process involving apprentices in class at NWCOC.

With safety being a huge issue across the industry, the trainer will assist with instruction on shoring, cave-ins, confined space and “competent person.” Contractors have expressed interest in bringing staff members in for safety training.

“It gives us a very realistic work study environment for confined space and fall protection,” Strader said.

## LABOR PAINS

Since the end of the Great Recession, the college, NWUCA and others in the construction industry have been preoccupied with the next existential dilemma – a generational shift away from the skilled trades.

“It is a challenge just finding guys to

do the work,” Vannoy said.

Construction is notoriously slow to change, but new products and methods can take hold quick, as Portland’s BES showed with VCP. Since 2010, the city has constructed five projects specifying a total of 62,400 linear feet of clay pipe. Bill Ryan, BES’ chief engineer, estimates about 20 percent of in-service pipe in Portland is now clay (terra cotta or VCP).

About one-third of all construction projects in the area involve public works utilities, and Ryan said he notices a definite graying of the utility contracting workforce.

“Every day in the field we see a decreasing number of old hands,” he said.

Utility contractors report that there’s more to pipe fitting than there might seem, and the margin of error is always slim. All pipe is tested after it’s been laid, and if a line doesn’t “test,” the contractor has to fix the problem – work it won’t get paid for.

Mathew Warrington, president of Westech Construction, said pipe fitting isn’t just a craft. Any city street job could potentially involve a snarl of water lines, sewer lines and storm lines as well as conduit and drainage.

“There are so many different kinds of pipe and they’re all laid differently,” he said. “It’s not just ditchdigging – there’s definitely an art to it.”

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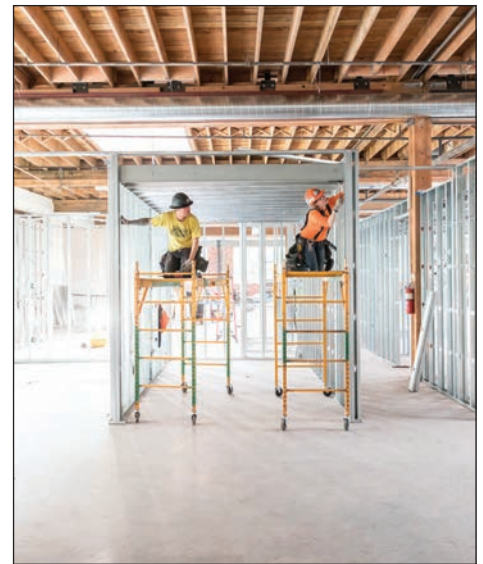
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