

# BUILDING AND CONSTRUCTION SECTOR GUIDE



2020

North Central Workforce Development Area

*Funded by Workforce Solutions for North Central Pennsylvania and the PA Department of Labor and Industry.*

---

*Table of Contents*

---

Introduction to Sector Guide and Career Pathways .....	p. 3
Description of Building and Construction Sector .....	p. 8
Career Pathways Maps	
Brickmasons and Blockmasons .....	p. 11
Carpenters .....	p. 12
Construction Laborers .....	p. 13
Electricians .....	p. 14
Heating and Air Conditioning Mechanics and Installers .....	p. 15
Mechanical Drafters .....	p. 16
Plumbers, Pipefitters, and Steamfitters .....	p. 17
Industrial Truck and Tractor Operators .....	p. 18
Building and Construction Sector Job Descriptions .....	p. 19
Top Foundation Skills Required for Jobs in the Building and Construction Sector .....	p. 27
Bibliography .....	p. 31

---

## *Introduction to the Sector Guide*

---

The Career Pathways Sector Guides are designed to provide information about career pathways in the North Central Workforce Development Area in Pennsylvania. Each guide presents information that will benefit workforce development professionals, businesses, and job seekers.

### **Introduction to Career Pathways**

This section of the Sector Guide introduces you to career pathways. The information in this section will inform you about why career pathways are important and how the concept can be beneficial to businesses and job seekers. Information in this section can be shared with clients to help them get a better understanding of why we promote pathways.

### **Sector Description**

The sector descriptions provide a brief overview of the sector that the guide presents. Sector descriptions include information from Pennsylvania's Center for Workforce Information and Analysis <https://www.workstats.dli.pa.gov/Pages/default.aspx> that helps to give a snapshot of the sector as well as general information about education and experience levels associated with jobs in the sector and the types of businesses that employ in the sector.

Use the information in this section of the guide to share general information with job seekers, as more detailed information is provided throughout the guide.

### **Career Pathways Maps**

The jobs illustrated on the career pathway maps were identified using the North Central High Priority Occupations list. Information about the jobs was gathered through research using multiple sources to identify the salary, education required, and related occupations. Additionally, industry specific websites that contain career maps were used to inform the career map development. Most of the maps start with an entry-level job that requires less than a 2-year degree and demonstrate the ability to move up

the pathway by on the job training and work experience or through additional formal education and training.

Some occupations occur in multiple sectors and therefore may create a slightly different map for each sector. For example, janitors and cleaners are in manufacturing, healthcare, education, and hospitality. A worker who starts as a janitor and cleaner in education may move into maintenance and may possess the skills to move into a technical teaching role or departmental supervisory role within a school district or university. A janitor in manufacturing might be less likely to leave the sector to move into education and training of maintenance personnel. Technology and transportation related occupations are others that cross over many sectors and may look a little different.

Notice that some pathways seem to start at a higher “entry-level” than others. These would be appropriate for individuals that may have had some technical training while in high school or chose to do training before entering or reentering the workforce. These maps are also appropriate for places of employment that bring everyone in as a “general worker”, and in order to move up, an individual has to get a specialized training and compare multiple options/maps to make that decision.

These maps can be used with job seekers who are currently employed or choosing a career path. While these maps are general for the sector, they provide information about expected training, experience, and skills needed to move along a career path. This example illustrates the information that you will find about each job on every map.

**Occupation:** First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)

**Education:** postsecondary certificate and/or associate’s degree

**Training:** postsecondary education

**Skills:** understands process and product or service, demonstrates self-management strategies, lifelong learning

**Salary Range:** \$25.50-46/hour

Use this information to assist job seekers with career exploration, career planning, and goal setting. It is important to review each map carefully to understand the requirements needed on all steps of the

career path. Each map shows potential opportunities for advancement that may be achieved through additional education and training and experience on-the-job. Additional ways to use career pathways maps can be found at *20 Ways to Use Career Pathways Maps* at <http://www.paadultedresources.org/wp-content/uploads/2017/02/20-ways-to-use-career-pathway-maps-12-18-17.pdf>.

## **Job Descriptions**

The job descriptions in the guide provide details of every job that is mentioned in each of the career pathways maps. Information from O\*NET Online <https://www.onetonline.org/> was used to inform the descriptions. Another key component of the job descriptions is the *Sample of reported job titles*. These job titles are important because they are examples that employers might use for the same job. For example, an *energy auditor* at ABC Company might have the job title of *Building Performance Specialist* at DEF Company even though they do essentially the same kind of work.

Job descriptions are helpful for job seekers to get a clearer understanding of the jobs in isolation. More importantly, the descriptions help to provide clarity on how a career pathway builds on the skills and knowledge, and abilities of the jobs on the pathways. Use the information in this section to discuss the general qualifications of the job and the alternative names associated with the work that the job requires. Each job's description includes a citation and reference in the bibliography that can easily be accessed to provide additional information about the job. Use the references to assist job seekers in further career exploration when making decisions about any career path.

## **Foundation Skills Framework**

Selected jobs in this section of the guide are aligned to specific workforce preparation skills detailed in the Foundation Skills Framework (FSF). The FSF is a tool developed by workforce development professionals that identifies skills, competencies, and tasks that individuals need to master to get a job, keep a job, and advance in a job.

The jobs in this section are primarily the entry level jobs identified on each map in the guide. Top *skills* for each job that are identified on O\*NET Online were aligned to the FSF and can be used to help job seekers get an understanding of the workforce preparation skills that they will need for a particular job.

While this section provides examples of the workforce preparation skills for some of the jobs in the sector, additional research can be completed for any of the jobs on the pathways. Encourage job seekers to review the skills needed for their jobs of interest and compare them to the FSF. Additional FSF resources, including an assessment and competency lists can be found at <https://www.paadultedresources.org/foundation-skills-framework/>.

## **Bibliography**

This final section of the guide is the bibliography. The bibliography provides a listing of all of the resources that were used to research the information in the guide and can be used to conduct further research on the sector or career pathways.

---

## *Introduction to Career Pathways*

---

The Workforce Innovation and Opportunity Act (WIOA) moved career pathways from just a good idea to a mandatory component of workforce development programming. While providing a comprehensive definition of and for career pathways, WIOA does little to describe the “how to” for this strategy. From the development of customized mapping tools for employers to integrated education and training programs for customers who are determined basic skills deficient, career pathways strategies are customized to the local labor market.

At a minimum, career pathways strategies for job seekers need to include opportunities to explore careers and occupations that fall within high priority occupation sectors, develop a career pathway plan that includes charting specific and realistic goals, and learn about and practice key employability skills. A concrete plan with established goals and steps to follow can offer guidance and structure to job seekers’ employment goals. This plan may include, for example, obtaining work while exploring careers, identifying and enrolling in educational or training opportunities, identifying, researching, and preparing for occupations so that they may be ready to begin the job search process immediately.

Workforce development professionals can use the information associated with career pathways to further develop opportunities for job seekers to enter a career path rather than just getting a job. To do this; however, career pathways strategies need to be recognized and embraced by workforce development professionals in order to coordinate service delivery so that individuals can become aware of opportunities and have access to what they need to move along a pathway.

While this guide presents the “nuts and bolts” of career pathways, professionals will need to work together to develop strategies to assist job seekers to move along these paths. Which of the illustrated pathways are most essential to the region? How can workforce development professionals work together to promote these essential pathways? What can we do to include postsecondary education and training partners to assist in these career pathways strategies? How can we include Title II adult education into our strategies? There are answers to all these questions when we work together with career pathways innovations.

---

### *Sector Description*

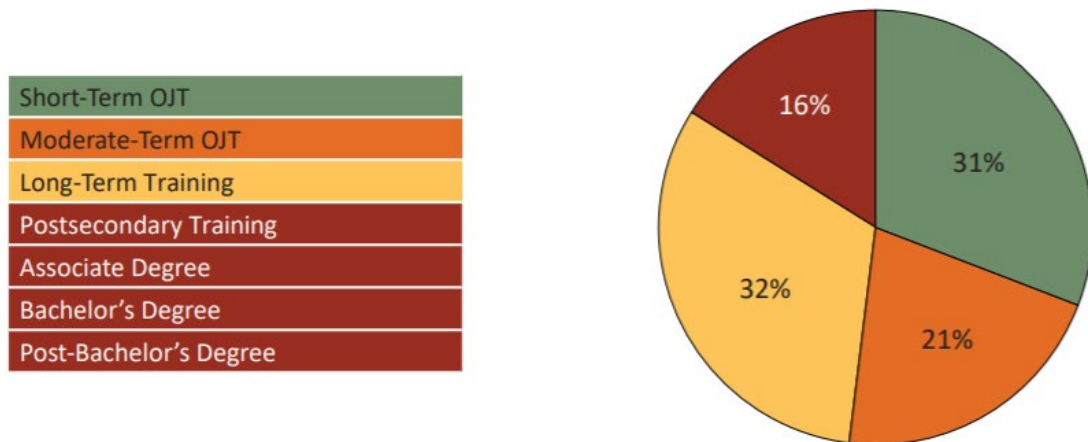
---

The Center for Workforce Information and Analysis states:

The Building and Construction (BC) cluster includes industries directly involved in the construction of housing, roadways or other physical structures. Industries such as HVAC equipment manufacturing, whose products are used exclusively in the construction of these structures, are also included. The retail industries such as Home Centers which act as a middle-man between manufacturer and independent contractors are included as well. Lastly, technical firms offering drafting or architectural services are also in the cluster.

This graph illustrates the minimum educational attainment levels for jobs found in this cluster’s various industries. Approximately 84 percent of BC jobs require no formal postsecondary training. Many occupations in the cluster may still have apprenticeship programs associated with them, which would be included in the Long-Term Training category. According to the Pennsylvania Apprenticeship & Training Office,

“Registered apprenticeship programs help recruit and develop a highly skilled workforce benefitting both employer and apprentice. Employers see reduced turnover, lower training costs and improved productivity while apprentices have the opportunity to earn a paycheck while receiving hands-on training and instruction that result in successful, well-paid and highly respected careers.”





Additionally, The Center for Workforce Information and Analysis identifies the following top industries:

#### Top Industries Based on Employment

- Home Centers
- Commercial Building Construction
- Nonresidential Plumbing & HVAC Contractors
- Nonresidential Electrical Contractors
- Highway, Street & Bridge Construction
- Residential Plumbing & HVAC Contractors
- Residential Remodelers
- Nonresidential Site Preparation Contractors
- New Single-Family Housing Construction
- Residential Electrical Contractors
- Water & Sewer System Construction
- All Other Residential Trade Contractors
- Residential Site Preparation Contractors
- Architectural Services
- Hardware Stores
- All Other Nonresidential Trade Contractors
- Other Building Material Dealers
- Nonresidential Drywall Contractors
- Metal Window & Door Manufacturing
- Other Nonresidential Equip. Contractors

The Pennsylvania Building & Construction Trades Council reinforces the importance of the BC sector and apprenticeship opportunities by saying:

Throughout our extremely large and diverse state, it is the members of the Pennsylvania Building Trades that create and maintain the infrastructure in the Commercial and Industrial Industries, which includes office buildings, hospitals, universities, schools, libraries, stadiums, bridges and highways, warehouses, power generation facilities, refineries and chemical plants that make our state such a wonderful place to live and do business.

The work of the unionized construction trades speaks for itself. Our apprenticeship training programs are second to none, and no one can compete with the level of skilled craftsmanship that our journeymen and women bring to the job site.

The North Central Multi-Year Regional Plan lists the BC sector as one of three sectors with a next-gen sector partnership. One of the goals of the Building and Construction Next Gen Partnership is for businesses in this sector to partner more with education. The Foundation Skills Framework can be used to support businesses and education working together to help identify specific skills needed to attain and retain employment in the BC sector.

---

## *Career Pathways Maps*

---

# Building and Construction-

## Brickmasons and Blockmasons

Additional training and education



**Occupation:** First-Line Supervisors of Construction Trades and Extraction Workers (47-1011)

**Education:** high school diploma or equivalent and/or some college

**Training:** long-term on-the-job training

**Skills:** makes decisions, solves problems, demonstrates quality consciousness

**Salary Range:** \$21.75-33.50/hour

**Occupation:** Construction and Building Inspectors (47-4011)

**Education:** some postsecondary education and/or bachelor's degree

**Training:** long-term on-the-job training and/or short-term certificate

**Skills:** demonstrates quality consciousness, applies health and safety concepts, uses technology

**Salary Range:** \$17-26/hour

**Occupation:** Brickmasons and Blockmasons (47-2021)

**Education:** high school diploma or equivalent

**Training:** short-term on-the-job training or apprenticeship

**Skills:** speaks clearly and concisely, listens with understanding, demonstrates effective interpersonal relations

**Salary Range:** \$15-25/hour

**Occupation:** Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters (47-3011)

**Education:** high school diploma or equivalent

**Training:** short-term on-the-job training or apprenticeship

**Skills:** demonstrates self-management strategies, solves problems, applies health and safety concepts

**Salary Range:** \$12-17.25/hour

2019 HPO list retrieved from <https://www.workstats.dli.pa.gov/Products/HPOs/Pages/default.aspx>

U.S. Department of Labor, Employment and Training Administration. (2019). O\*NET OnLine. National Center for O\*NET Development. Retrieved from <https://www.onetonline.org/> Construction Industry Career Paths retrieved from <https://www.careersinconstruction.ca/en/careers/career-paths>

# Building and Construction-

## Carpenters

Additional training and education



**Occupation:** First-Line Supervisors of Construction Trades and Extraction Workers (47-1011)

**Education:** high school diploma or equivalent and/or some college

**Training:** long-term on-the-job training

**Skills:** makes decisions, solves problems, demonstrates quality consciousness

**Salary Range:** \$21.75-33.50/hour

**Occupation:** Construction and Building Inspectors (47-4011)

**Education:** some postsecondary education and/or bachelor's degree

**Training:** long-term on-the-job training and/or short-term certificate

**Skills:** demonstrates quality consciousness, applies health and safety concepts, uses technology

**Salary Range:** \$17-26/hour

**Occupation:** Construction Carpenters (47-2031)

**Education:** high school diploma or equivalent

**Training:** short-term on-the-job training or apprenticeship

**Skills:** speaks clearly and concisely, listens with understanding, demonstrates self-management strategies

**Salary Range:** \$15-23.50/hour

**Occupation:** Helpers--Carpenters (47-3012)

**Education:** high school diploma or equivalent

**Training:** short-term on-the-job training or apprenticeship

**Skills:** demonstrates self-management strategies, solves problems, listens with understanding

**Salary Range:** \$10-15.75/hour

2019 HPO list retrieved from <https://www.workstats.dli.pa.gov/Products/HPOs/Pages/default.aspx>

U.S. Department of Labor, Employment and Training Administration. (2019). O\*NET OnLine. National Center for O\*NET Development. Retrieved from <https://www.onetonline.org/> Construction Industry Career Paths retrieved from <https://www.careersinconstruction.ca/en/careers/career-paths>

# Building and Construction-

## Construction Laborers

Additional training and education



**Occupation:** Construction Managers (11-9021)  
**Education:** some college or bachelor's degree  
**Training:** short-term on-the-job training or apprenticeship  
**Skills:** understands process and product or service, applies mathematical concepts and operations, lifelong learning  
**Salary Range:** \$25.50-46/hour

**Occupation:** First-Line Supervisors of Construction Trades and Extraction Workers (47-1011)  
**Education:** high school diploma or equivalent and/or some college  
**Training:** long-term on-the-job training  
**Skills:** makes decisions, solves problems, demonstrates quality consciousness  
**Salary Range:** \$21.75-33.50/hour

**Occupation:** Operating Engineers and Other Construction Equipment Operators (47-2073)  
**Education:** high school diploma or equivalent  
**Training:** long-term on-the-job training and/or short-term certificate  
**Skills:** observes critically, applies health and safety concepts, solves problems  
**Salary Range:** \$15-23/hour

**Occupation:** Construction Laborers (47-2061)  
**Education:** high school diploma or equivalent  
**Training:** short-term on-the-job training  
**Skills:** demonstrates effective interpersonal relations, speaks clearly and concisely, listens with understanding  
**Salary Range:** \$12-18/hour

# Building and Construction-

## Electricians

Additional training and education



**Occupation:** Career/Technical Education Teachers, Secondary School (25-2032)

**Education:** bachelor's degree or higher

**Training:** postsecondary education and/or apprenticeship

**Skills:** lifelong learning, speaks clearly and concisely, uses technology

**Salary Range:** \$20-40/hour

**Occupation:** Electrical Power-Line Installers and Repairers (49-9051)

**Education:** high school diploma or equivalent and/or some postsecondary education

**Training:** long-term on-the-job training and/or apprenticeship

**Skills:** makes decisions, applies health and safety concepts, lifelong learning

**Salary Range:** \$25-40.50/hour

**Occupation:** Electricians (47-2111)

**Education:** high school diploma or equivalent and/or postsecondary certificate

**Training:** vocational training and/or apprenticeship

**Skills:** makes decisions, solves problems, listens with understanding

**Salary Range:** \$17-29/hour

**Occupation:** Helpers--Electricians (47-3013)

**Education:** high school diploma or equivalent

**Training:** short-term on-the-job training or apprenticeship

**Skills:** speaks clearly and concisely, listens with understanding, solves problems

**Salary Range:** \$10-14.50/hour

# Building and Construction-

## Heating and Air Conditioning Mechanics and Installers

Additional training and education

**Occupation:** First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)

**Education:** postsecondary certificate and/or associate's degree

**Training:** postsecondary education

**Skills:** understands process and product or service, demonstrates self-management strategies, lifelong learning

**Salary Range:** \$25.50-46/hour

**Occupation:** Refrigeration Mechanics and Installers (49-9021.02)

**Education:** postsecondary certificate and/or some college

**Training:** long-term on-the-job training and/or postsecondary education

**Skills:** solves problems, applies health and safety concepts, demonstrates quality consciousness

**Salary Range:** \$15-24/hour

**Occupation:** Heating and Air Conditioning Mechanics and Installers (49-9021)

**Education:** postsecondary education and/or associate's degree

**Training:** vocational training and/or specialty certificates

**Skills:** makes decisions, solves problems, listens with understanding

**Salary Range:** \$15-24/hour

**Occupation:** Maintenance and Repair Workers (49-9071)

**Education:** postsecondary education and/or associate's degree

**Training:** vocational training and/or specialty certificates

**Skills:** observes critically, demonstrates quality consciousness, applies mathematical concepts and operations

**Salary Range:** \$10.75-18.50/hour



# Building and Construction-

## Mechanical Drafters

Additional training and education



**Occupation:** Civil Engineer (17-2051)  
**Education:** bachelor's or master's degree  
**Training:** postsecondary education  
**Skills:** understands process or product and service, works within organizational structure and culture, works in teams  
**Salary Range:** \$26.25-39.50/hour

**Occupation:** Commercial and Industrial Designers (27-1021)  
**Education:** associates or bachelor's degree  
**Training:** postsecondary education  
**Skills:** solves problems, reads with understanding, demonstrates self-management strategies  
**Salary Range:** \$19.75-30/hour

**Occupation:** Civil Engineering Technicians (17-3022)  
**Education:** postsecondary certificate and/or associate's degree  
**Training:** short-term certificate or vocational training  
**Skills:** makes decisions, listens with understanding, observes critically  
**Salary Range:** \$17-26/hour

**Occupation:** Mechanical Drafters (17-3013)  
**Education:** postsecondary certificate or associate's degree  
**Training:** short-term certificate or vocational training  
**Skills:** applies mathematical concepts and operations, solves problems, uses technology  
**Salary Range:** \$16.50-25/hour

2019 HPO list retrieved from <https://www.workstats.dli.pa.gov/Products/HPOs/Pages/default.aspx>

U.S. Department of Labor, Employment and Training Administration. (2019). O\*NET OnLine. National Center for O\*NET Development. Retrieved from <https://www.onetonline.org/> Construction Industry Career Paths retrieved from <https://www.careersinconstruction.ca/en/careers/career-paths>



# Building and Construction-

## Plumbers, Pipefitters, and Steamfitters

Additional training and education



**Occupation:** Construction Managers (11-9021)

**Education:** some college or bachelor's degree

**Training:** short-term on-the-job training or apprenticeship

**Skills:** understands process and product or service, applies mathematical concepts and operations, lifelong learning

**Salary Range:** \$25.50-46/hour

**Occupation:** Boilermakers (47-2011)

**Education:** high school diploma or equivalent and/or some postsecondary certificate

**Training:** long-term on-the-job training and/or apprenticeship

**Skills:** solves problems, applies health and safety concepts, demonstrates quality consciousness

**Salary Range:** \$26-39.75/hour

**Occupation:** Plumbers, Pipefitters, and Steamfitters (47-2152)

**Education:** high school diploma or equivalent and/or postsecondary certificate

**Training:** vocational training and/or apprenticeship

**Skills:** makes decisions, solves problems, listens with understanding

**Salary Range:** \$16.25-26/hour

**Occupation:** Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters (47-3015)

**Education:** high school diploma or equivalent

**Training:** short-term on-the-job training or apprenticeship

**Skills:** applies mathematical concepts and operations, demonstrates effective interpersonal relations, works within organizational structure and culture

**Salary Range:** \$11-16/hour

2019 HPO list retrieved from <https://www.workstats.dli.pa.gov/Products/HPOs/Pages/default.aspx>

U.S. Department of Labor, Employment and Training Administration. (2019). O\*NET OnLine. National Center for O\*NET Development. Retrieved from <https://www.onetonline.org/> Construction Industry Career Paths retrieved from <https://www.careersinconstruction.ca/en/careers/career-paths>

# Building and Construction-

## Industrial Truck and Tractor Operators

Additional training and education



**Occupation:** First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators (53-1031)  
**Education:** high school diploma or equivalent  
**Training:** long-term on-the-job training  
**Skills:** solves problems, listens with understanding, makes decisions  
**Salary Range:** \$16.75-28/hour

**Occupation:** Operating Engineers and Other Construction Equipment Operators (47-2073)  
**Education:** high school diploma or equivalent  
**Training:** short-term on-the-job training and certifications  
**Skills:** solves problems, observes critically, makes decisions  
**Salary Range:** \$15.75-23/hour

**Occupation:** Paving, Surfacing, and Tamping Equipment Operators (47-2071)  
**Education:** high school diploma or equivalent  
**Training:** short-term on-the-job training and certifications  
**Skills:** observes critically, makes decisions, uses technology  
**Salary Range:** \$13.50-19.75/hour

**Occupation:** Industrial Truck and Tractor Operators (53-7051)  
**Education:** high school diploma or equivalent  
**Training:** short-term on-the-job training, forklift operator safety training, and/or apprenticeship  
**Skills:** observes critically, uses technology, applies health and safety concepts  
**Salary Range:** \$13-17/hour

## **Boilermakers**

Construct, assemble, maintain, and repair stationary steam boilers and boiler house auxiliaries. Align structures or plate sections to assemble boiler frame tanks or vats, following blueprints. Work involves use of hand and power tools, plumb bobs, levels, wedges, dogs, or turnbuckles. Assist in testing assembled vessels. Direct cleaning of boilers and boiler furnaces. Inspect and repair boiler fittings, such as safety valves, regulators, automatic-control mechanisms, water columns, and auxiliary machines.

*Sample of reported job titles:* Boiler Maker, Boiler Mechanic, Boiler Repairman, Boiler Service Technician, Boiler Technician, Boilermaker, Boilermaker Mechanic, Boilermaker Pipe Fitter, Boilermaker Welder, Service Technician (U.S. Department of Labor, O\*NET, Boilermakers, 2020a)

## **Brickmasons and Blockmasons**

Lay and bind building materials, such as brick, structural tile, concrete block, cinder block, glass block, and terra-cotta block, with mortar and other substances to construct or repair walls, partitions, arches, sewers, and other structures.

*Sample of reported job titles:* Block Layer, Block Mason, Blockmason, Brick and Block Mason, Brick Mason, Bricklayer, Concrete Finisher, Mason, Masonry Installer, Tender (U.S. Department of Labor, O\*NET, Brickmasons and Blockmasons, 2020b)

## **Career/Technical Education Teachers, Secondary School**

Teach occupational, career and technical, or vocational subjects at the secondary school level in public or private schools.

*Sample of reported job titles:* Agricultural Education Teacher, Allied Health Teacher, Business Education Teacher, Cosmetology Teacher, Drafting Instructor, Family and Consumer Sciences Teacher (FACS Teacher), Instructor, Teacher, Technology Education Teacher, Vocational Teacher (U.S. Department of Labor, O\*NET, Career/Technical Education Teachers, Secondary School, 2020c)

## **Civil Engineer**

Perform engineering duties in planning, designing, and overseeing construction and maintenance of building structures, and facilities, such as roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipelines, power plants, and water and sewage systems.

Sample of reported job titles: Bridge/Structure Inspection Team Leader, City Engineer, Civil Engineer, Civil Engineering Manager, County Engineer, Design Engineer, Project Engineer, Railroad Design Consultant, Structural Engineer, Traffic Engineer (U.S. Department of Labor, O\*NET, Civil Engineer, 2020d)

## **Civil Engineering Technicians**

Apply theory and principles of civil engineering in planning, designing, and overseeing construction and maintenance of structures and facilities under the direction of engineering staff or physical scientists.

*Sample of reported job titles:* Civil Designer, Civil Engineering Assistant, Civil Engineering Designer, Civil Engineering Technician, Design Technician, Engineer Technician, Engineering Assistant, Engineering Specialist, Engineering Technician, Transportation Engineering Technician (U.S. Department of Labor, O\*NET, Civil Engineering Technicians, 2020e)

## **Commercial and Industrial Designers**

Develop and design manufactured products, such as cars, home appliances, and children's toys. Combine artistic talent with research on product use, marketing, and materials to create the most functional and appealing product design.

*Sample of reported job titles:* Design Engineer, Designer, Industrial Designer, Mechanical Designer, Mold Designer, Product Design Engineer, Product Designer, Product Development Engineer, Product Engineer, Sign Designer (U.S. Department of Labor, O\*NET, Commercial and Industrial Designers, 2020f)

## **Construction and Building Inspectors**

Inspect structures using engineering skills to determine structural soundness and compliance with specifications, building codes, and other regulations. Inspections may be general in nature or may be limited to a specific area, such as electrical systems or plumbing.

*Sample of reported job titles:* Building Code Administrator, Building Inspection Engineer, Building Inspector, Building Official, Combination Building Inspector, Construction Inspector, Construction Materials Testing Technician, Elevator Inspector, Inspector, Plumbing Inspector (U.S. Department of Labor, O\*NET, Construction and Building Inspectors, 2020g)

### **Construction Carpenters**

Construct, erect, install, and repair structures and fixtures of wood, plywood, and wallboard, using carpenter's hand tools and power tools.

*Sample of reported job titles:* Assembler, Cabinet Maker, Carpenter Foreman, Carpentry Foreman, Concrete Carpenter, Construction Superintendent, Construction Worker, Foreman, Framing, Production Worker (U.S. Department of Labor, O\*NET, Construction Carpenters, 2020h)

### **Construction Laborers**

Perform tasks involving physical labor at construction sites. May operate hand and power tools of all types: air hammers, earth tampers, cement mixers, small mechanical hoists, surveying and measuring equipment, and a variety of other equipment and instruments. May clean and prepare sites, dig trenches, set braces to support the sides of excavations, erect scaffolding, and clean up rubble, debris and other waste materials. May assist other craft workers.

*Sample of reported job titles:* Construction Laborer, Construction Worker, Curb and Gutter Laborer, Drain Layer, Drop Crew Laborer, Helper, Laborer, Post Framing, Skill Labor, Union Laborer (U.S. Department of Labor, O\*NET, Construction Laborers, 2020i)

### **Construction Managers**

Plan, direct, or coordinate, usually through subordinate supervisory personnel, activities concerned with the construction and maintenance of structures, facilities, and systems. Participate in the conceptual development of a construction project and oversee its organization, scheduling, budgeting, and implementation. Includes managers in specialized construction fields, such as carpentry or plumbing.

*Sample of reported job titles:* Concrete Foreman, Construction Area Manager, Construction Foreman, Construction Manager, Construction Superintendent, General Contractor, Job

Superintendent, Project Executive, Project Manager, Project Superintendent (U.S. Department of Labor, O\*NET, Construction Managers, 2020j)

### **Electrical Power-Line Installers and Repairers**

Install or repair cables or wires used in electrical power or distribution systems. May erect poles and light or heavy duty transmission towers.

*Sample of reported job titles:* A Class Lineman, Apprentice Lineman Third Step, Class A Lineman, Electric Lineman, Electrical Lineman (Power), Electrical Lineworker, Journeyman Lineman, Lineman, Lineworker, Power Lineman (U.S. Department of Labor, O\*NET, Electrical Power-Line Installers and Repairers, 2020k)

### **Electricians**

Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.

*Sample of reported job titles:* Chief Electrician; Control Electrician; Electrician; Industrial Electrician; Inside Wireman; Journeyman Electrician; Journeyman Wireman; Maintenance Electrician; Mechanical Trades Specialist, Electrician; Qualified Craft Worker, Electrician (QCW, Electrician) (U.S. Department of Labor, O\*NET, Electricians, 2020l)

### **First-Line Supervisors of Construction Trades and Extraction Workers**

Directly supervise and coordinate activities of construction or extraction workers.

*Sample of reported job titles:* Construction Foreman, Construction Superintendent, Construction Supervisor, Field Supervisor, Foreman, Job Superintendent, Project Superintendent, Site Superintendent, Superintendent, Supervisor (U.S. Department of Labor, O\*NET, First-Line Supervisors of Construction Trades and Extraction Workers, 2020m)

### **First-Line Supervisors of Mechanics, Installers, and Repairers**

Directly supervise and coordinate the activities of mechanics, installers, and repairers.

*Sample of reported job titles:* Crew Leader, Electrical Foreman, Facilities Manager, Facility Maintenance Supervisor, Maintenance Foreman, Maintenance Manager, Maintenance Planner, Maintenance Supervisor, Production Crew Supervisor, Superintendent (U.S. Department of Labor, O\*NET, First-Line Supervisors of Mechanics, Installers, and Repairers, 2020n)

### **First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators**

Directly supervise and coordinate activities of transportation and material-moving machine and vehicle operators and helpers.

*Sample of reported job titles:* Dock Supervisor, Driver Manager, Fleet Manager, On Car Supervisor, Operations Supervisor, Street Supervisor, Supervisor, Trainmaster, Transportation Supervisor, Warehouse Supervisor (U.S. Department of Labor, O\*NET, First-Line Supervisors of Transportation and Material Moving Machine and Vehicle Operators, 2020o)

### **Heating and Air Conditioning Mechanics and Installers**

Install, service, or repair heating and air conditioning systems in residences or commercial establishments.

*Sample of reported job titles:* A/C Tech (Air Conditioning Technician); HVAC Installer (Heating, Ventilation, Air Conditioning Installer); HVAC Mechanic (Heating, Ventilation, Air Conditioning Mechanic); HVAC Service Tech (Heating, Ventilation, Air Conditioning Service Technician); HVAC Specialist (Heating, Ventilation, and Air Conditioning Specialist); HVAC Tech (Heating, Ventilation, Air Conditioning Technician); HVAC Technician (Heating, Ventilation, and Air Conditioning Technician); Service Technician; Systems Mechanic (U.S. Department of Labor, O\*NET, Heating and Air Conditioning Mechanics and Installers, 2020p)

### **Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters**

Help brickmasons, blockmasons, stonemasons, or tile and marble setters by performing duties requiring less skill. Duties include using, supplying or holding materials or tools, and cleaning work area and equipment.

*Sample of reported job titles:* Brick and Blocker Aid, Labor; Bricklayer Helper; Helper; Helper, Marble Finisher; Hod Carrier; Lead Mason Tender; Mason Tender; Mason Tender, Restoration Labor; Mortar Mixer; Tender, Labor (U.S. Department of Labor, O\*NET, Helpers-Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters, 2020q)

## **Helpers--Carpenters**

Help carpenters by performing duties requiring less skill. Duties include using, supplying or holding materials or tools, and cleaning work area and equipment.

*Sample of reported job titles:* Carpenter Assistant, Installer; Carpenter Helper; Carpenter's Helper; Carpenter/Labor; Carpentry; Drywall Hanger, Framer; Form Setter; Form Setter/Driver; Framing and Hanging; Hanger (U.S. Department of Labor, O\*NET, Helpers-Carpenters, 2020r)

## **Helpers--Electricians**

Help electricians by performing duties requiring less skill. Duties include using, supplying or holding materials or tools, and cleaning work area and equipment.

*Sample of reported job titles:* Cable Puller, Electrician Helper, Electrician's Helper (U.S. Department of Labor, O\*NET, Helpers-Electricians, 2020s)

## **Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters**

Help plumbers, pipefitters, steamfitters, or pipelayers by performing duties requiring less skill. Duties include using, supplying or holding materials or tools, and cleaning work area and equipment.

*Sample of reported job titles:* Drain Technician, Gas Fitter, Helper, Irrigation Installation Specialist, Irrigation Technician, Plumber's Helper, Service Technician, Sprinkler Fitter, Sprinkler Installer, Sprinkler Repair Technician (U.S. Department of Labor, O\*NET, Helpers-Pipelayers, Plumbers, Pipefitters, and Steamfitters, 2020t)

## **Industrial Truck and Tractor Operators**

Operate industrial trucks or tractors equipped to move materials around a warehouse, storage yard, factory, construction site, or similar location.

*Sample of reported job titles:* Checker Loader, Fork Lift Technician, Fork Truck Driver, Forklift Driver, Forklift Operator, Lift Truck Operator, Shag Truck Driver, Spotter Driver, Tow Motor Operator, Truck Driver (U.S. Department of Labor, O\*NET, Industrial Truck and Tractor Operators, 2020u)



## **Maintenance and Repair Workers**

Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of an establishment in repair. Duties may involve pipe fitting; boiler making; insulating; welding; machining; carpentry; repairing electrical or mechanical equipment; installing, aligning, and balancing new equipment; and repairing buildings, floors, or stairs.

*Sample of reported job titles:* Building Maintenance Mechanic, Building Mechanic, Equipment Engineering Technician, Facilities Manager, Maintenance Engineer, Maintenance Man, Maintenance Mechanic, Maintenance Supervisor, Maintenance Technician, Maintenance Worker (U.S. Department of Labor, O\*NET, Maintenance and Repair Workers, 2020v)

## **Mechanical Drafters**

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

*Sample of reported job titles:* CAD Designer (Computer Aided Design Designer), CAD Operator (Computer Aided Design Operator), Design Drafter, Designer, Drafter, Drafting Technician, Mechanical Designer, Mechanical Drafter, Product Designer, Project Designer (U.S. Department of Labor, O\*NET, Mechanical Drafters, 2020w)

## **Operating Engineers and Other Construction Equipment Operators**

Operate one or several types of power construction equipment, such as motor graders, bulldozers, scrapers, compressors, pumps, derricks, shovels, tractors, or front-end loaders to excavate, move, and grade earth, erect structures, or pour concrete or other hard surface pavement. May repair and maintain equipment in addition to other duties.

*Sample of reported job titles:* Back Hoe Operator, Engineering Equipment Operator, Equipment Operator, Heavy Equipment Operator, Loader Operator, Machine Operator, Motor Grader Operator, Operating Engineer, Operator, Track Hoe Operator (U.S. Department of Labor, O\*NET, Operating Engineers and Other Construction Equipment Operators, 2020x)

### **Paving, Surfacing, and Tamping Equipment Operators**

Operate equipment used for applying concrete, asphalt, or other materials to road beds, parking lots, or airport runways and taxiways, or equipment used for tamping gravel, dirt, or other materials. Includes concrete and asphalt paving machine operators, form tampers, tamping machine operators, and stone spreader operators.

*Sample of reported job titles:* Asphalt Paver Operator, Asphalt Raker, Equipment Operator (EO), Maintenance Equipment Operator (MEO), Operator, Paver Operator, Roller Operator, Screed Operator, Truck Driver (U.S. Department of Labor, O\*NET, Paving, Surfacing, and Tamping Equipment Operators, 2020y)

### **Plumbers, Pipefitters, and Steamfitters**

Assemble, install, alter, and repair pipelines or pipe systems that carry water, steam, air, or other liquids or gases. May install heating and cooling equipment and mechanical control systems. Includes sprinklerfitters (U.S. Department of Labor, O\*NET, Plumbers, Pipefitters, and Steamfitters, 2020z)

### **Refrigeration Mechanics and Installers**

Install and repair industrial and commercial refrigerating systems.

*Sample of reported job titles:* HVAC / R Technician (Heating, Ventilation, Air Conditioning / Refrigeration Technician); HVAC Tech (Heating, Ventilation, Air Conditioning Service Technician); HVAC Technician (Heating, Ventilation, Air Conditioning Technician); HVAC/R Service Technician (Heating, Ventilation, and Air Conditioning/Refrigeration Service Technician); Refrigeration Mechanic; Refrigeration Operator; Refrigeration Technician (Refrigeration Tech); Service Technician (Service Tech); Transportation Refrigeration Technician (U.S. Department of Labor, O\*NET, Plumbers, Refrigeration Mechanics and Installers, 2020aa)

---

*Top Foundation Skills Required for Jobs in the  
Building and Construction Sector*

---



Using information from O\*NET job summaries, the following skills from the Foundation Skills Framework were identified as important skills for jobs in the building and construction sector.

***Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters***

***Observes Critically***

Critical and reflective thinking and discrimination skills needed to notice, analyze, and respond to visual information, especially in irregular or unusual situations

***Demonstrates Self-Management Strategies***

Skills and knowledge needed to understand how personal factors contribute to employability and how to manage time and tasks effectively

***Helpers—Carpenters***

***Observes Critically***

Critical and reflective thinking and discrimination skills needed to notice, analyze, and respond to visual information, especially in irregular or unusual situations

***Listens with Understanding***

Skills needed to comprehend, analyze, and interpret orally presented communications and directions on familiar and unfamiliar topics

***Solves Problems***

Critical, creative, and reflective thinking skills needed to identify problems, analyze and evaluate various solutions, implement solutions and monitor their effectiveness

*Speaks Clearly and Concisely*

Skills needed to express ideas and information orally in a clear and understandable manner while sustaining interest and attention

**Construction Laborers**

*Observes Critically*

Critical and reflective thinking and discrimination skills needed to notice, analyze, and respond to visual information, especially in irregular or unusual situations

*Listens with Understanding*

Skills needed to comprehend, analyze, and interpret orally presented communications and directions on familiar and unfamiliar topics

*Reads with Understanding*

Skills needed to read and understand written work-related information, such as reading for various purposes - reading to complete a task, locate specific information, or critically analyze information

*Speaks Clearly and Concisely*

Skills needed to express ideas and information orally in a clear and understandable manner while sustaining interest and attention

**Helpers—Electricians**

*Observes Critically*

Critical and reflective thinking and discrimination skills needed to notice, analyze, and respond to visual information, especially in irregular or unusual situations

*Listens with Understanding*

Skills needed to comprehend, analyze, and interpret orally presented communications and directions on familiar and unfamiliar topics

*Speaks Clearly and Concisely*

Skills needed to express ideas and information orally in a clear and understandable manner while sustaining interest and attention

## ***Maintenance and Repair Workers***

### *Observes Critically*

Critical and reflective thinking and discrimination skills needed to notice, analyze, and respond to visual information, especially in irregular or unusual situations

### *Solves Problems*

Critical, creative, and reflective thinking skills needed to identify problems, analyze and evaluate various solutions, implement solutions and monitor their effectiveness

### *Lifelong Learning*

Core foundation skills that enable one to reach realistic learning and employment goals through lifelong learning opportunities; includes knowing how to learn, applying skills in new contexts, and anticipating and adapting to changes in the workplace

### *Makes Decisions*

Critical, creative, and reflective thinking skills needed to consider relevant facts and opinions, evaluate potential risks and benefits of various decisions, make a decision, and analyze its outcome

### *Reads with Understanding*

Skills needed to read and understand written work-related information, such as reading for various purposes - reading to complete a task, locate specific information, or critically analyze information

## ***Mechanical Drafters***

### *Reads with Understanding*

Skills needed to read and understand written work-related information, such as reading for various purposes - reading to complete a task, locate specific information, or critically analyze information

### *Observes Critically*

Critical and reflective thinking and discrimination skills needed to notice, analyze, and respond to visual information, especially in irregular or unusual situations

### *Lifelong Learning*

Core foundation skills that enable one to reach realistic learning and employment goals through lifelong learning opportunities; includes knowing how to learn, applying skills in new contexts, and anticipating and adapting to changes in the workplace

*Solves Problems*

Critical, creative, and reflective thinking skills needed to identify problems, analyze and evaluate various solutions, implement solutions and monitor their effectiveness

*Listens with Understanding*

Skills needed to comprehend, analyze, and interpret orally presented communications and directions on familiar and unfamiliar topics

***Industrial Truck and Tractor Operators***

*Observes Critically*

Critical and reflective thinking and discrimination skills needed to notice, analyze, and respond to visual information, especially in irregular or unusual situations

*Demonstrates Self-Management Strategies*

Skills and knowledge needed to understand how personal factors contribute to employability and how to manage time and tasks effectively

*NOTE: All the information on pages 27-30 of this guide is taken verbatim from the Foundation Skills Framework Competency Lists (2016) accessed at [http://www.paadultresources.org/wp-content/uploads/2016/05/FSF-competency\\_list-12-18-17.pdf](http://www.paadultresources.org/wp-content/uploads/2016/05/FSF-competency_list-12-18-17.pdf)*

## Bibliography

Institute for the Study of Adult Literacy. (2016). *Foundation skills framework resource guide*.

[http://www.paadultedresources.org/wp-content/uploads/2016/05/FSF-competency\\_list-12-18-17.pdf](http://www.paadultedresources.org/wp-content/uploads/2016/05/FSF-competency_list-12-18-17.pdf)

Pennsylvania Building & Construction Trades Council. (2008). *Welcome to Pennsylvania building & construction trades council*. Pennsylvania Building & Construction Trades Council.

<http://www.pabuildingtrades.org/>

Pennsylvania Department of Labor and Industry. (2019). *2019 HPO list*.

<https://www.workstats.dli.pa.gov/Products/HPOs/Pages/default.aspx>

Pennsylvania Department of Labor and Industry. (2020). *The apprenticeship & training office*.

<https://www.dli.pa.gov/Individuals/Workforce-Development/apprenticeship/Pages/default.aspx>

U.S. Department of Labor, Employment and Training Administration. (2019). O\*NET OnLine. National Center for O\*NET Development. <https://www.onetonline.org/>

U.S. Department of Labor, Employment & Training Administration. (2020). <http://onetonline.org>

U.S. Department of Labor, Employment and Training Administration. (2020a). O\*NET OnLine.

*Boilermakers*. <https://www.onetonline.org/link/summary/47-2011.00>

U.S. Department of Labor, Employment and Training Administration. (2020b). O\*NET OnLine.

*Brickmasons and Blockmasons*. <https://www.onetonline.org/link/summary/47-2021.00>

U.S. Department of Labor, Employment and Training Administration. (2020c). O\*NET OnLine.

*Career/Technical Education Teachers*. <https://www.onetonline.org/link/summary/25-2032.00>

U.S. Department of Labor, Employment and Training Administration. (2020d). O\*NET OnLine.

*Civil Engineers*. <https://www.onetonline.org/link/summary/17-2051.00>

U.S. Department of Labor, Employment and Training Administration. (2020e). O\*NET OnLine.

*Civil Engineering Technicians*. <https://www.onetonline.org/link/summary/17-3022.00>

U.S. Department of Labor, Employment and Training Administration. (2020f). O\*NET OnLine.

*Commercial and Industrial Designers*. <https://www.onetonline.org/link/summary/27-1021.00>

- U.S. Department of Labor, Employment and Training Administration. (2020g). O\*NET OnLine.  
*Construction and Building Inspectors.* <https://www.onetonline.org/link/summary/47-4011.00>
- U.S. Department of Labor, Employment and Training Administration. (2020h). O\*NET OnLine.  
*Construction Carpenters.* <https://www.onetonline.org/link/summary/47-2031.01>
- U.S. Department of Labor, Employment and Training Administration. (2020i). O\*NET OnLine.  
*Construction Laborers.* <https://www.onetonline.org/link/summary/47-2061.00>
- U.S. Department of Labor, Employment and Training Administration. (2020j). O\*NET OnLine.  
*Construction Managers.* <https://www.onetonline.org/link/summary/11-9021.00>
- U.S. Department of Labor, Employment and Training Administration. (2020k). O\*NET OnLine.  
*Electrical Power-Line Installers and Repairers.* <https://www.onetonline.org/link/summary/49-9051.00>
- U.S. Department of Labor, Employment and Training Administration. (2020l). O\*NET OnLine.  
*Electricians.* <https://www.onetonline.org/link/summary/47-2111.00>
- U.S. Department of Labor, Employment and Training Administration. (2020m). O\*NET OnLine.  
*First-Line Supervisors of Construction Trades and Extraction Workers.*  
<https://www.onetonline.org/link/summary/47-1011.00>
- U.S. Department of Labor, Employment and Training Administration. (2020n). O\*NET OnLine.  
*First-Line Supervisors of Mechanics, Installers, and Repairers.*  
<https://www.onetonline.org/link/summary/49-1011.00>
- U.S. Department of Labor, Employment and Training Administration. (2020o). O\*NET OnLine.  
*First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators.*  
<https://www.onetonline.org/link/summary/53-1031.00>
- U.S. Department of Labor, Employment and Training Administration. (2020p). O\*NET OnLine.  
*Heating and Air Conditioning Mechanics and Installers.*  
<https://www.onetonline.org/link/summary/49-9021.01>



- U.S. Department of Labor, Employment and Training Administration. (2020q). O\*NET OnLine. *Helpers-Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters*. <https://www.onetonline.org/link/summary/47-3011.00>
- U.S. Department of Labor, Employment and Training Administration. (2020r). O\*NET OnLine. *Helpers-Carpenters*. <https://www.onetonline.org/link/summary/47-3012.00>
- U.S. Department of Labor, Employment and Training Administration. (2020s). O\*NET OnLine. *Helpers-Electricians*. <https://www.onetonline.org/link/summary/47-3013.00>
- U.S. Department of Labor, Employment and Training Administration. (2020t). O\*NET OnLine. *Helpers-Pipelayers, Plumbers, Pipefitters, and Steamfitters*. <https://www.onetonline.org/link/summary/47-3015.00>
- U.S. Department of Labor, Employment and Training Administration. (2020u). O\*NET Online. *Industrial Truck and Tractor Operators*. <https://www.onetonline.org/link/summary/53-7051.00>
- U.S. Department of Labor, Employment and Training Administration. (2020v). O\*NET Online. *Maintenance and Repair Workers*. <https://www.onetonline.org/link/summary/49-9071.00>
- U.S. Department of Labor, Employment and Training Administration. (2020w). O\*NET Online. *Mechanical Drafters*. <https://www.onetonline.org/link/summary/17-3013.00>
- U.S. Department of Labor, Employment and Training Administration. (2020x). O\*NET Online. *Operating Engineers and Other Construction Equipment Operators*. <https://www.onetonline.org/link/summary/47-2073.00>
- U.S. Department of Labor, Employment and Training Administration. (2020y). O\*NET Online. *Paving, Surfacing, and Tamping Equipment Operators*. <https://www.onetonline.org/link/summary/47-2071.00>
- U.S. Department of Labor, Employment and Training Administration. (2020z). O\*NET Online. *Plumbers, Pipefitters, and Steamfitters*. <https://www.onetonline.org/link/summary/47-2152.00>
- U.S. Department of Labor, Employment and Training Administration. (2020aa). O\*NET Online. *Refrigeration Mechanics and Installers*. <https://www.onetonline.org/link/summary/49-9021.02>

Workforce Solutions for North Central Pennsylvania. (2019). *PY 2017- 2019 WIOA multi-year local area plan*. <https://workforcesolutionspa.com/plans/>