

Build Your Career In Construction



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03	Welcome
04	Boilermakers
06	Bricklayers + Allied Craftworkers
08	Carpenters
10	Cement Masons + Plasterers
12	Electricians
14	Elevator Constructors
16	Finishing Trades
18	Insulators
20	Ironworkers
22	Laborers
24	Operating Engineers
26	Plumbers
28	Roofers + Waterproofers
30	Sheet Metal Workers
32	Sprinkler Fitters
34	Steamfitters
36	Pathways to Careers in Construction
37	Higher Education Options
38	Notes

Building Your Career In the Construction Industry

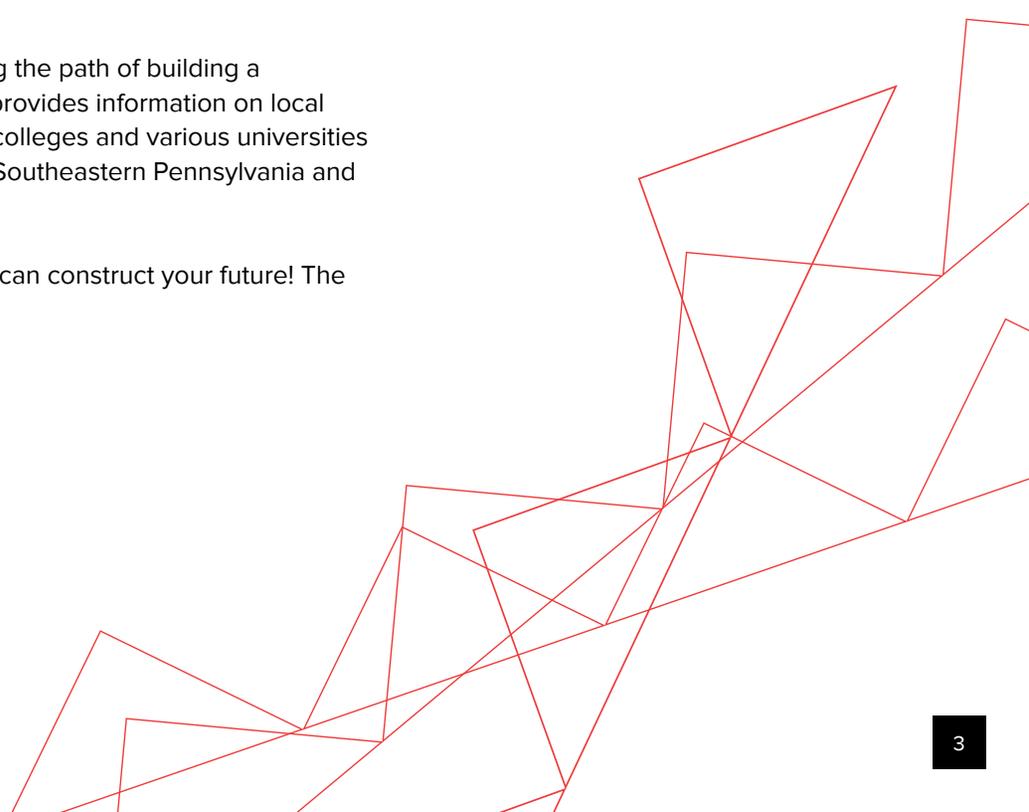
What do you mean you've never considered a career in construction? There are endless career possibilities in this industry. Whether you enjoy meticulous details, prefer to work with your hands, like putting things together and following directions, enjoy drawing, care about safety and welfare of those around you, like to get dirty or want to operate machines, there is something you will enjoy in construction!

Take a look at all of the structures you see around you: schools, hospitals, roads, bridges, stadiums, and places of worship. You see construction every day – whether it's being built or was built 100 years ago. It was designed, engineered, managed, and constructed by the professionals of our industry.

This resource guide will help you along the path of building a professional career in construction. It provides information on local apprenticeship programs, community colleges and various universities that offer degree-related programs in Southeastern Pennsylvania and New Jersey.

Just like the buildings in our area, you can construct your future! The opportunities are endless!

Let's start with a look at the trades...



BOILERMAKERS

Today's field construction boilermaker is a vital part of a construction project team. They erect and repair boilers, pressure vessels, air pollution equipment, blast furnaces, water treatment plants, storage and process tanks, stacks and liners.

A boilermaker could be involved in the installation of a giant superheater section in a large utility boiler, the erection of a 750,000-gallon water storage tank, the placement of a nuclear power plant reactor dome, the replacement of cyclones in a refinery catalytic cat-cracker or the construction of components on a hydroelectric power station.



The boilermaker profession dates back to the 19th century, when steam powered the Industrial Revolution and opened up new horizons through the train and steam locomotive. Boilermakers built these locomotives, ushering in the Industrial Age.

Boilers are the systems that generate high pressure steam that drive the turbines for power plants, nuclear reactors, oil and gas refineries, factories, chemical and pharmaceutical facilities, and even breweries. Boilermakers also build the massive containers that hold gases and liquids such as oil and chemicals.

Boilers are fired in furnaces, fireboxes or big burners that heat a series of tubes filled with water. Through a very complex system of heating exchanges, saturated steam is produced. The high-pressure steam turns massive turbines, providing energy.

Boilermakers also install and maintain the large pressure vessels in oil refineries that process the crude oil into different petroleum products. First and foremost, to build these systems, boilermakers must be master riggers, welders and tube fitters. They must employ a variety of sophisticated welding techniques to connect the tubes in the boiler. The components of the boiler must be impervious to cracks, which requires a level of welding skill that takes years to hone. Other skills boilermakers are gouging steel (burning grooves in steel), beveling and rolling steel tubes.



CONTACT

MATTHEW FINK

Apprentice and Training Coordinator

📍 Boilermakers Local 13
2300 New Falls Rd
Newportville, PA 19056

☎ (215) 785-5536

✉ matt.fink@boilermakers13.org

Boilermakers craft and assemble the tubes and tanks that make up boilers. Because projects – boilers, dams, power generation plants, storage tanks, and pressure vessels – are usually of such mammoth size, a significant portion of boilermaker work is performed at great heights, often from 200 to 1,000 feet above the ground.

Most of the projects are repairing, updating and replacing existing units. This involves removing old, damaged components before replacing them with boiler equipment. Boilermakers will readily admit their profession is not for everyone. They're dispatched to projects in all corners of the region. Their work is demanding, dirty, and often times involves confined spaces or tough conditions. It requires a dedicated person who seeks challenges. However, the people who can do the work are compensated very well and earn the satisfaction of being part of an elite group of professionals.

The Boilermakers of Local 13 are vital to many industries throughout Eastern Pennsylvania and New Castle County, Delaware and it's because of their highly skilled, dependable, productive, safe, and quality minded workforce. They are always looking for the best and brightest that the region has to offer.



BRICKLAYERS + ALLIED CRAFTWORKERS



The clean, straight lines of a brick façade... intricate mosaics composed of colorful tile... the distinctive appeal of a stone walkway. Tile, marble and terrazzo surfaces are aesthetic and highly durable. They are impervious to water and easy to clean – characteristics that have made them popular building materials in a wide array of commercial and industrial settings like hospitals, lobbies of buildings, bathrooms, and kitchens.

The bricklayer and stone mason profession is time honored, as their work lasts for centuries. The cathedrals in metropolitan cities, major public buildings, even famous bridges all are testimony to the work of masons throughout the ages. The men and women practicing tile, marble, and terrazzo setting must have an artistic flair and an eye for

precision. Tiles, such as those covering walls and floors in kitchens and bathrooms, or the large slabs of marble that cover the walls in hotel lobbies and offices buildings, must be perfectly aligned and require careful setting.

Bricklayers and Allied Craftworkers work with a variety of materials including tile, stone, marble, granite, plaster, concrete and much more. Some of the materials bricklayers and stone masons work with are quite expensive – as much as \$30 per square foot. All of the work requires precision, making sure each brick, tile or block fits perfectly. This is the part of the building process that everyone will see for a long time to come, so everything must be perfect.

Bricklayers repair walls, floors, partitions, fireplaces, chimneys, and other structures with brick. They also specialize in installing firebrick linings in industrial furnaces. Stone masons build stone walls, as well as set stone exterior and floors. They work with two types of stone: natural cut (marble, granite, and limestone) and artificial stone, most often made from concrete. Bricklaying and stone masonry are sometimes referred to as the trowel trade, which refers to the basic tool of the craft. Most people are familiar with the trowel – smooth, flat tools used to shape and form the cement that holds brick and stone in place. Aside from the trowel, the trade requires proficiency with a variety of hand and power tools. They not only lay the brick and stone, these professionals must cut the materials to precise sizes as to form a perfect fit. At times this cutting requires a hammer and chisel and at other times a saw with a diamond blade is needed. During cutting, precision is essential because the wrong cut can waste expensive material.

A tile setter lays and sets tile on walls or floors, using glue or a cement adhesive called "thin set." Because tile varies in color, shape, and size, some setters prearrange tiles on a dry floor according to a specified design. This allows them to examine the pattern and make changes. In order to cover all exposed areas, including corners, around pipes and tubs, and wash basins, tile setters cut tiles to fit with a machine saw or a special cutting tool. After the tiles are laid out perfectly in place, the finisher applies grout between the tiles.

For marble installation, the marble setter first cuts the marble to the right dimensions and then drills holes where strength anchors are inserted. When covering walls the marble finisher holds the heavy stone in place while the setter fastens the stone to the wall with the anchors. For floors, the finisher helps lay the marble in place before it is aligned and anchored. Marble setters and finishers learn rigging skills because of the size and weight of some marble pieces.

Terrazzo is a decorative flooring material made up of stone chips set in hard mortar mix. When setting terrazzo, the setter first pours the cement mixture and in this cement sets metal strips that form the shapes in which the terrazzo will be set. This can be in squares or decorative designs. After the cement and strips are in place, the stone chips are poured. Once dried, a grinder is used to smooth polish the surface. Completing the job requires final touches such as stripping between the edge of a floor and wall, sealing, and waterproofing.

Bricklaying and Allied Craftwork is an ideal career choice for men and women who have a desire to create work with lasting aesthetic value, who are creative and who have the patience to be precise in everything they do.

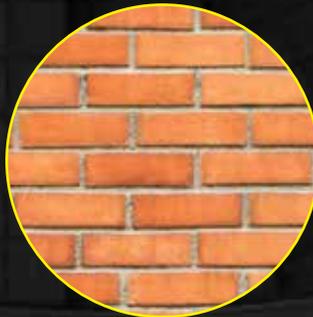
STONE



TILE



BRICK



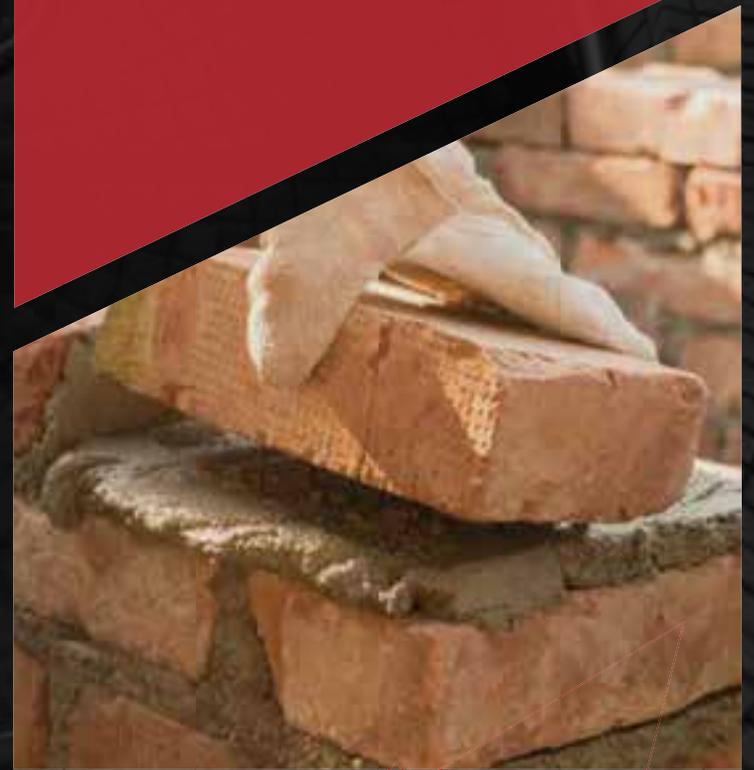
CONTACT

ROBERT POWERS

Apprentice Coordinator

📍 Bricklayers & Allied Craftworkers
Local #1 Training Center
2702 Black Lake Place
Philadelphia, PA 19154

☎ (215) 330-0544



CARPENTERS

Carpentry is one of the oldest and most respected trades in the world. No home... no office... no factory... no sports stadium can be built without the expertise of experienced carpenters.

Generally when people think of carpenters they think of working with wood, erecting frames for structures. However, anyone with the impression that carpenters spend most of their time hammering nails into wood is mistaken. While much of their work is still done with wood, carpenters also frame with metal studs, install gypsum wallboard, install tile and carpet, insulate, install ceilings and weld all types of materials.

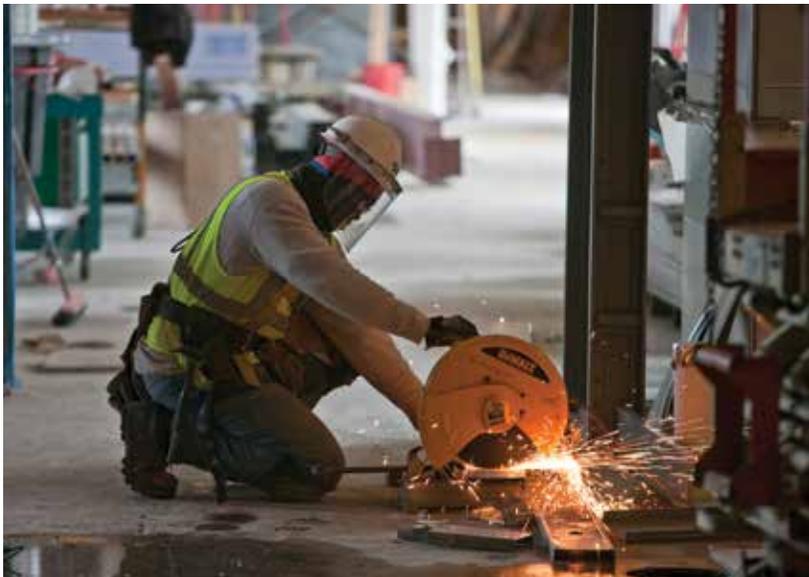
Carpenters must be able to read an architect's blueprint and turn the diagrams and instructions on those blueprints into a finished structure. Using the blueprints, carpenters do the layout – measuring, marking, and arranging materials. Then, using their skills with a variety of hand and power tools, they cut and shape the building materials. Then the carpenter assembles the materials with nails,

screws, staples, or adhesives. Throughout the work, the carpenters must check the accuracy of the work with levels, rules, plumb bobs, and framing squares, using basic mathematics, geometry, and common sense. This important step – attention to detail and ensuring the quality of product – reflects their skill and training and sets the professional carpenter apart from others.

Carpenters perform many jobs on a construction site. General carpenters provide the crucial foundation for concrete, exteriors, roofs, infrastructure, and scaffolding while also crafting fine trim and finish work. These professionals work with a variety of materials in every kind of structure; they are responsible for bringing blueprints to life. Carpenters are skilled in laying out, measuring, cutting, erecting, and joining materials together. They are highly trained to work quickly, accurately, and safely, while delivering the quality of work contractors and their customers have come to expect.

Carpenters also handle floor laying, installing a wide variety of flooring materials, including carpet, resilient, wood, laminates, and sport surfaces. Floor laying professionals are experts at estimating materials, understanding pattern layout, and safely and properly employing the industry's many tools, adhesives, and fastening systems. Floorlayers' comprehensive training translates into unmatched productivity for employers.

Interior systems carpenters specialize in assembling complex systems such as acoustical ceilings, computer-access flooring, metal framing, wall partitions, and office furniture. Work sites are typically occupied commercial and public buildings, so these professionals are adept at minimizing disruptions to client operations.





Cabinetmakers and millworkers fabricate and install decorative and functional elements, including trim and molding, cabinetry, ceiling treatments, doors, windows, exposed columns and beams, displays, mantels, staircases, and more. Custom architectural millwork requires the work of an expert—a skilled professional who can craft fine woodwork, cabinetry, and décor in commercial, residential, institutional, and retail structures.

Millwrights install, maintain, diagnose, and repair equipment such as compressors, pumps, conveyors, gas and steam turbines, monorails, and extruders. They can be found performing mission-critical work at coal, gas, nuclear, and alternative-energy power plants. Their skills are also vital in industries as diverse as automotive, aerospace, food processing, and pharmaceuticals.

Pile drivers drive steel, concrete, or wood piling into the earth during the early stages of construction. Skill is crucial to both a project's success and the safety of workers, since the piling is necessary to hold back the earth during excavations; to set up the foundation of skyscrapers, highways, and bridges; and to build docks and wharfs. Some pile drivers are also commercial divers, responsible for the underwater construction required by many industries, including construction and power generation.

CONTACT

CHARLES T. BROCK

Director

📍 Carpenters Apprentice School of Philadelphia & Vicinity
10401 Decatur Road
Philadelphia, PA 19154

☎ (215) 824-2300



CEMENT MASONS + PLASTERERS



Plastering and cement masonry are among the oldest trades in the construction industry, dating back centuries. Their work can be seen in historic buildings as well as structures being developed today.

These professionals are truly artisans. Along with creating extremely durable interior walls and ceilings, their work is marked by ornate designs that give the finished product special grandeur.

Walking through older buildings, their work manifests itself in elaborate ornamental plaster work on walls and ceilings.

Today, most of their work entails making walls and ceilings flat and strong to achieve a finished product much more durable than basic sheetrock. Aside from its resistance to nicks and gouges, plaster walls can be given texture to provide a decorative finish. Another advantage of plaster is that it is also more fire resistant than other interior wall materials. It also contains sound better and is used when acoustical factors must be taken into account.

Plasterers first apply a brown coat of thick gypsum plaster that provides a base, followed by a finish coat that is a mixture of lime, plaster of Paris and water. This second coat, called the “white coat,” sets very quickly and produces a very smooth, durable finish.



Though demand for plasterers was once in decline, that trend has reversed. Builders more and more are using plaster again for interior walls and ceilings. The reason for this trend is an appreciation for the superior durability of plaster. Thin-coat plastering – or veneering – in particular is gaining wide acceptance as more builders recognize its ease of application, durability, quality of finish, and fire-retardant qualities.

Cement masons use concrete – a mixture of Portland cement, sand, gravel, and water – to finish concrete walls and floors for high-rise buildings, stadiums, and a host of other commercial and multi-dwelling structures. Most of today's high-rise buildings are made entirely of steel reinforced concrete and cement masons are the men and women who create the walls, floors, ceilings, and exterior.

There is much more to the cement mason's work than laying cement. They must make sure it is precisely aligned with other parts of the structure and that it is perfectly smooth. As a cement mason, you will learn screeding, the process of cutting off excess concrete to bring the top surface of a slab to proper grade, and floating, creating a smooth surface. Properly trained cement masons are able to create a durable surface that is both aesthetically pleasing and resistant to cracking.

CEMENT MASONS

ROB PETRACCI

Apprentice & Safety Instructor/Coordinator

📍 Apprentice Training Center
2930 Snyder Avenue
Philadelphia, PA 19145

☎ (215) 468-0238 or (215) 468-0235

ANTHONY DITRI

Apprentice & Safety Instructor

Plasterers Training Center 📍
713 Cherry Street
Gloucester City, NJ 08030

(215) 468-0238 or (215) 468-0235 ☎

PLASTERERS

ELECTRICIANS

The electrician profession is one of the most widely recognized of all the construction trades. Whether wiring a home or office, repairing transmission wires, or installing the latest in telecommunications infrastructure – electricians are everywhere.

The opportunities in the electrician profession are extensive. The International Brotherhood of Electrical Workers (IBEW) and the

National Electrical Contractors Association (NECA) have identified 59 separate career paths for electricians. These career paths cover a wide array of industries from aeronautics and nuclear energy to residential construction.



Generally, the electrician trade can be broken down into four segments: **outline linemen, inside wiremen, telecommunications technician, and residential electrician.** The following is a brief description of each.



OUTSIDE LINEMEN

Work with specialized high-voltage cabling and equipment for utilities. They build and connect lines that bring power from power generation facilities to homes, businesses, schools, sports facilities, and every other type of structure that requires electricity. They also work with low-voltage cabling and equipment for long-distance communications.



INSIDE WIREMEN

Work with standard electrical installation and maintenance for office buildings, hospitals, power generation facilities, retail stores, manufacturing plants, malls, and similar structures.



TELECOMMUNICATIONS

Specialize in the installation and maintenance of wires and circuits that connect computer networks, Internet connections, and fiber optic systems; life, health, and safety equipment; and voice data and video systems.



RESIDENTIAL

These men and women specialize in installing all of the electrical systems in single-family and multi-family houses, apartments, and condominiums.

CONTACT

MICHAEL NEILL

Director of Apprentice Training

📍 Local 98 NECA/IBEW Joint
Apprenticeship and Training
1719 Spring Garden St
Philadelphia, PA 19130

☎ (215) 567-6405



ELEVATOR CONSTRUCTORS

The next time you're gazing at the majestic skyscrapers that make up a city skyline or have the opportunity to admire the view from the upper windows of these architectural marvels, realize their existence wouldn't be possible without elevators.

Millions of people every day use elevators to ascend and descend tall structures, taking for granted the skill and hard work that goes into building and maintaining today's state-of-the-art elevator systems. Elevator mechanics are the men and women who build these systems and keep them running safely and reliably.

Elevator Constructors must have a firm grasp of hydraulics, electricity, and computer electronics. They also must understand the physics that make the smooth ascent and descent of an elevator possible. Installing a new elevator requires a combination of skills and hard work. Using blueprints as their guide, elevator construction mechanics determine the equipment needed to install rails, machinery, car enclosures, motors, pumps, cylinders, and plunger foundations. Once this has been done, the building begins. Mechanics bolt or weld steel rails to the walls of the shaft to guide the elevator.

They then insert electrical wires and controls by running tubing for electrical wires between floors. After that, they install electrical components and related devices required at each floor and at the main control panel in the machine room. Installers then erect the steel frame of an elevator car at the bottom of the shaft; install the car's platform, walls, and doors; and attached guide shoes and rollers to minimize the lateral motion of the car as it travels up and down the shaft. They also install the outer doors and doorframes at the elevator entrances on each floor.





Once the shaft, cars, and electrical operating system are in place, it is fine-tuned to ensure it moves at a desired speed and stops correctly at each floor.

Elevator construction professionals also install and maintain escalators, dumbwaiters, moving walkways, and similar equipment in new and old buildings.

The elevator constructor's craft is highly challenging because technological innovations are constantly creating new ways to keep up with the need for higher speed in concert with the construction of taller buildings.

A series of diverse, innovative technological developments have been achieved – such as more powerful traction machine motors and more sophisticated drive control equipment.

Once the elevator is complete and running, proper service and maintenance is critical for its continued safe operation. Service mechanics are responsible for routine servicing and repair.

CONTACT

ODEN COWAN

Area Apprentice Coordinator

📍 National Elevator Industry
Education Program (NEIEP)

☎ (774) 331-6325

✉ ocowan@neiep.org



FINISHING TRADES PAINTERS | DRYWALL | FINISHERS GLAZIERS

When a structure is completed – whether it is a home, factory, office building, bridge, sports arena or shopping mall – one of the very last stages of construction is painting. This is why painters are considered “finishers.” Two other categories that fall under the finishing trades’ profession in the Mid-Atlantic region are drywall finishers and glaziers. In completing the construction process, the skill of professionals in each of these three trades determines how the final product looks.

The invaluable contribution of finishers can be seen everywhere. The smooth texture of walls and the perfect color scheme make a world of difference in any building or structure. Rows of sunlight-bearing windows and glass doors give an office building, retail mall or hotel a distinguished polished appearance.

PAINTERS

Commercial painters first prepare the surface for the finishes to be applied. They then use three major tools to apply paints and coatings: The spray gun, the roller, and the brush. The skilled Commercial Painter knows and uses what is best for each job. Although some painters do all types of painting, most specialize in one type, such as: interior or exterior work, new construction, signs, remodeling, particular structures and buildings (apartments, homes, bridges, water tanks, and structural steel), special effects and decorative designs, metal surfaces, or transportation equipment. Wall Coverers mix the adhesive, apply it to the back of the strip of the covering, place the strip in correct position on the wall and smooth it with a smoothing brush or knife. They are very careful to match the paper’s pattern, making sure the design continues from strip to strip without a visible break.

Painting and Wall Covering is strenuous work that often requires much walking, standing, reaching, kneeling, stooping, climbing, and carrying. Occupational hazards include falls from ladder or scaffolds, and skin or throat irritations from paint fumes and thinners. Exterior painters lose some work time each year due to bad weather. Interior painters who work primarily on new construction may lose work time during slowdowns in construction activity.

GLAZIERS

An Architectural Glass and Metal technician, called a Glazier, is responsible for selecting, cutting, installing, replacing, and removing all types of glass and architectural metal. Glaziers install windows, mirrors, and glass doors; install and repair architectural aluminum window and door frames, such as those in storefronts; install and repair automatic doors like the ones used in every supermarket; and install plastic exterior panels – such as those used for backlit signs. Once glaziers have the glass in place, they secure it with mastic, putty, or other paste-like cement, or with bolts, rubber gaskets, glazing compound, metal clips, or metal or wood moldings.

Glaziers most often work in teams of two or three in order to lift and set large panes of doors and storefront glass. Glaziers are continuously promoting the application of green technology with the use of solar performance and sustainability in the glazing trade. The glazing trade is specifically focused on energy efficient retrofitting projects as well as the design and installation of energy efficient weatherization materials and solar technology in both residential and commercial applications. The work may have to be prepared either inside or outside a building, and scaffolding may be used in installations. Glaziers lift, walk, bend, crouch, kneel and climb, often using cranes or hoists in elevated locations.



DRYWALL FINISHERS

The Drywall Finisher finishes gypsum wallboard surfaces by taping, spotting, pointing, filling, finishing, and sanding joints, angles, internal and external corners, and all field surfaces. Before paint or other covering can be applied, the drywall must be completely smooth and this is the responsibility of the drywall finisher – sometimes known as the taper. Drywall finishers go to work as soon as the drywall is put up. To create a seamless finish, tapers fill joints between panels with joint compound. Using the wide, flat tip of a special trowel, they spread the compound into and along each side of the joint with brush-like strokes. Then, they apply a paper tape – used to reinforce the drywall and to hide imperfections – in the wet compound. Nail and screw depressions are also covered with this compound, as are imperfections caused by the installation of air-conditioning vents and other fixtures.

When a professionally trained drywall finisher is through with his or her task, it is virtually impossible to see where the two pieces of drywall meet. They also fill holes, cracks or imperfections in the drywall so that painters have a perfect surface on which to complete the job. A skilled Drywall Finisher will be organized and capable of working independently. Drywall Finishing requires standing, bending, and lifting. Sometimes the use of a respirator is required due to coating and/or sanding.

CONTACT

DENNIS MCDONOUGH
Recruitment Coordinator

☎ (215) 989-3812

✉ dennis@fti.edu

ERIN HOFFMAN
Painting Department

☎ (267) 939-0035

✉ erin@fti.edu

FINISHING TRADES INSTITUTE
Mid-Atlantic Region

📍 2190 Hornig Road
Philadelphia, PA 19116



INSULATORS

Conserving energy continues to grow in importance, as prudent homeowners routinely look for ways to reduce the amount of their utility bills and managers of major commercial buildings and industrial plants must always control their energy costs, which amount to millions of dollars per year in their companies' bottom lines.

Not only does conserving energy save money, it preserves vital natural resources and contributes to cleaner air and water. For these reasons, insulation has become a vital part of every building project – whether commercial, industrial, or residential. It is why insulators have become such sought after professionals.

Insulation professionals – known as mechanics – primarily install and maintain the material that prevents loss of warm inside air on cold days and the cool inside air on warm days. This reduces the workload of air conditioning, heating, and refrigeration equipment.



Insulation is installed around boilers, tanks, and refrigeration units, and pipes that carry water and gas. Essentially, insulation is used anywhere it's necessary to maintain a certain climate or temperature.

When people think of insulation, what often comes to mind are the cushiony fiberglass blankets (known as Batts) that are laid on attic floors. However, in the past two decades, few construction materials have undergone more changes than thermal insulation, and few products have been so well adapted to fit the needs of commercial, industrial, and residential users. Insulation is now crafted using advanced materials and is installed using a variety of methods such as pasting, wiring, taping, and spraying. Among the most advanced materials insulation professionals currently use are calcium silicate, cellular glass, polyurethane, and organic foam.

Insulation mechanics don't only know how to install the high-tech materials; they understand thermodynamics – the physics of temperature transfer. By knowing the fundamentals of thermodynamics, they can achieve the best results for each individual project.

For pipes, boilers, and other equipment, sheets of insulation must be fitted precisely to ensure optimum thermal effectiveness. The insulation mechanic must measure, cut and fasten it around the piping or equipment. Depending on the situation, fastening can be accomplished using tape, wire or cement. Sometimes they must sew a cover of plastic or canvas to properly secure the insulation or may encase pipes in sheet metal for protection against moisture.



Insulation mechanics also install materials that prevent fire and smoke from penetrating walls and ceilings. With these materials in place, fires that begin in one part of a building can be stopped from spreading throughout the entire structure.

The tools of the trade include power saws, compressors, trowels, and sewing equipment.

Aside from installing new insulation, these professionals often must remove old materials, which includes asbestos. There are those in the trade who specialize in the removal of asbestos – which was widely used from the 19th century until the mid-20th century when it was found to be a severe health hazard. When removing old material, the latest safety equipment – including coveralls and masks – are required and when used properly are ample protection.

Insulation mechanics also install acoustical control material that keeps sound from emanating outside a room. Acoustical control is used in theaters, recording studios, and locations where it's important to keep sound waves from escaping an enclosed area.

Still, the majority of work is for climate control purposes and the insulation profession will continue to grow as energy consumption continues to become a greater concern for businesses and homeowners. New and more effective insulation products will require insulation mechanics that are highly skilled and knowledgeable, making it a very promising career choice.

CONTACT

JOHN STAHL
Administrator

📍 Insulators Local 14 J.A.C.
2014 Hornig Rd.
Philadelphia, Pa., 19116

☎ (215) 533-0395 ext. 5
✉ information@insulators14jac.com



IRONWORKERS LOCAL 401

BRIDGE | STRUCTURAL | ORNAMENTAL | REINFORCING IRON WORKERS

The first part of any major project that people see from miles around is the steel skeleton rising into the sky. Ironworkers are the men and women who erect the steel columns and beams that are the hallmark of every major building project.

There are several types of ironworkers. Before the steel goes up, ironworkers are involved in building the foundation, and once the structural steel is in place, they enclose the structure in aluminum, and glass, or precast stone. Finally, they install steel stairways, handrails, parts of elevators and many other components that make a project complete.

The ironworker's craft is also displayed in the elaborate webs of steel that support bridge spans. They even assemble roller coasters and major pieces of equipment like commercial printing presses. Name the structure and you can be assured ironworkers played a major role in its creation.

Ironworkers in Local 401 are trained in skills such as the erection of structural steel, miscellaneous steel, metal curtain-wall and window wall systems, precast concrete structures, fences, towers, pre-engineered metal buildings, and other steel structures.

Apprentices receive training in all segments of the industry, such as, structural steel erection, rigging, miscellaneous and architectural metal erection, metal window systems, blueprint reading, welding, flame cutting, plasma arc welding and cutting, fence installation, use of hand and power tools, OSHA Construction Safety Regulations, First Aid/CPR, and the use of precise plumbing and leveling instruments. Ironworkers are trained in everything from the erection of structural steel, ornamental metals, welding, and rigging, to blueprint reading, care and safe use of tools, mathematics, safety welding and oxy-acetylene flame cutting.

The public is well acquainted with the image of the hearty ironworker walking beams hundreds of feet off the ground. This image perpetuates the ironworker's dynamic reputation, but it also gives the impression that the work is dangerous, which causes some people to shy away from this rewarding career. In truth, while the typical ironworker possesses the heart of an extreme athlete, ironworkers are protected by rigorous safety standards and are trained to handle working off the ground when erecting tall buildings or bridges.

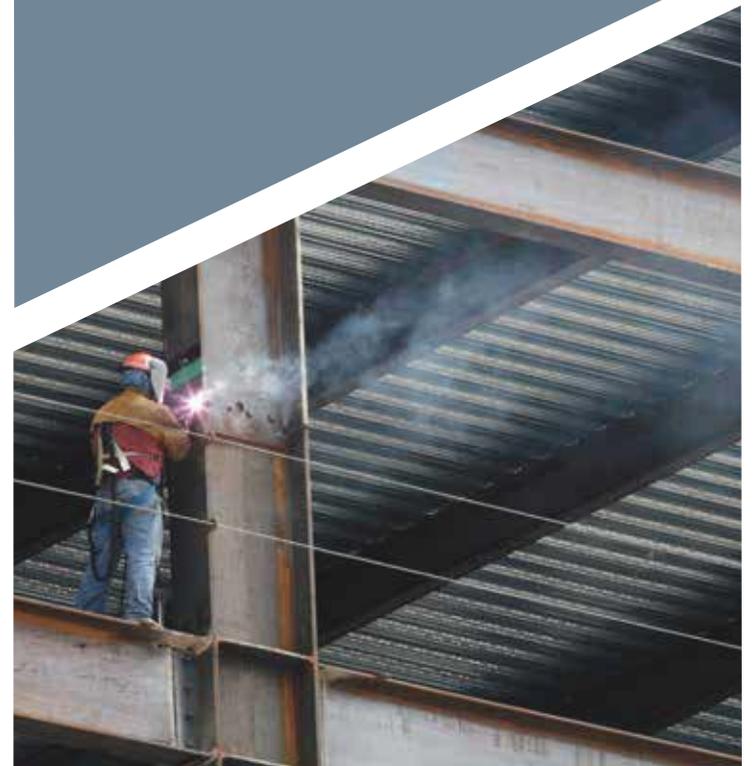
CONTACT

FRANK MARSH

Director of Training
Ironworkers Local 401

📍 11600 NORCOM ROAD
PHILADELPHIA PA, 19154

☎ (215) 676-3000



IRONWORKERS LOCAL 405

RODSETTERS

When a major structure is built, one of the most important parts of the project is building the foundation. Ironworkers are the men and women who build the structural foundation that is the base of every major building project. From schools and hospitals, to stadiums, skyscrapers and office buildings.

Ironworkers work is at the heart of a building's structure. Ironworkers erect the reinforcing framework of buildings and also are essential in other projects, such as erecting bridges, blast furnaces, and power plants. Ironworkers' skillset includes welding, placing reinforcing steel and rigging.

The iron working industry is very strenuous and most tedious. An Ironworker must be alert at all times in order to perform the duties of setting of reinforced columns, welding, installing reinforcing steel in structural slabs, in addition to climbing, lifting, sitting, standing, bending and pulling of the steel in the erection of buildings and spanning of bridges.

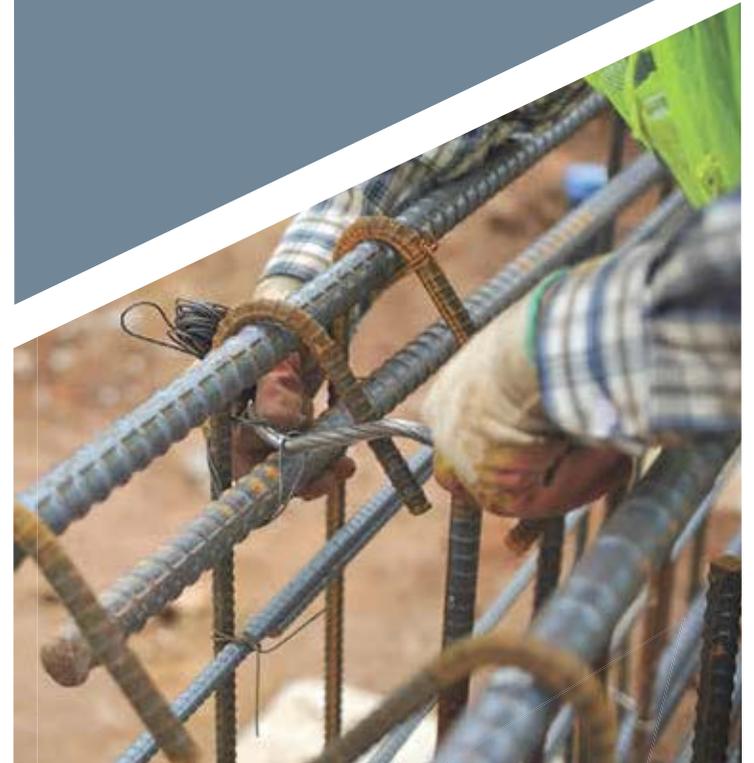
An Ironworker is a stalwart individual with a great deal of upper body strength for twisting, turning, and awkward postures of the back. Blueprint and drafting reading are a part of the training to become an Ironworker and safety is a plus in training and working side by side with co-workers and other Craftsmen. Iron work is performed inside and outside in most weather conditions.

Not all ironwork is performed at heights. Ironworkers do much of their work at ground level, such as reinforcing foundations, assembling and setting reinforced columns and walls, and moving and placing machinery. Reinforcing Ironworkers perform a variety of tasks. Much of the work involves carrying and placing rebar, setting columns and beams in place. Other tasks include setting the iron bars (known as rebar) that reinforce concrete foundations and floors.

CONTACT

📍 Ironworkers Local 405
2433 Reed Street
Philadelphia, PA 19146

☎ (215) 462-7300



LABORERS



Construction craft laborers are the most diverse and versatile trade professionals in the construction industry. Construction craft laborers are able to perform a number of skills and take part in every type of project. All other trade professionals depend on laborers for their multifaceted array of skills.

By learning these all-around skills as an apprentice and applying them on the job, the construction craft laborer becomes part of a fraternity of indispensable professionals who make even the most difficult and complex project possible.

The term laborer belies the complex and critical functions they perform and their skill with high-tech equipment. For instance, they operate pipe-laying machinery and use computers and other high-tech input devices such as lasers and transits.

Craft laborers are also experts at demolition and excavation. Using special equipment such as tunnel boring machines, craft laborers clear the way for tunnels, highways, and new structures.

Their work is separated into three categories:



**BUILDING
CONSTRUCTION**



**HEAVY HIGHWAY &
UTILITY CONSTRUCTION**



**ENVIRONMENTAL
REMEDICATION**



Among the critical work functions performed by construction craft laborers are:

- Build structures and infrastructures such as buildings, houses, bridges, dams, tunnels, utilities, and roads
- Demolish and/or disassemble and remove structures and buildings
- Prepare and layout sites for construction activities
- Abate all types of environmental hazards
- Move, store, and supply construction and building materials for all types of construction activities
- Recognize and mitigate safety hazards including hazardous materials, environmental hazards, and accident conditions at any type of construction site
- Maintain and supply hand tools, power tools, and equipment for all types of tasks

These are just some of the skills and duties of the construction craft laborer. Some laborers choose to specialize in a particular skill, mainly critical functions such as demolition or environmental remediation. Others remain generalists, building all-around skills that allow them to work on a wide range of projects.

CONTACT

ROSCOE GREEN
Training Director

📍 Laborers Training School
500 E. Lincoln Highway
Exton, PA 19341

☎ (610) 524-0404



OPERATING ENGINEERS

Whether it's the roads you travel on, the bridges you cross, the tunnels you whisk through, the subway systems you ride...or the buildings and complexes where you work, receive medical care, view sporting events...or the dams, pipelines, oil refineries and rigs, and petro-chemical plants you rely on for water and energy needs... or programs to rid your schools and communities of asbestos and hazardous materials and waste... It's a good bet they were built and are operated and serviced by Operating Engineers.

Operating Engineers run the iron behemoths that excavate the terrain and transport heavy material around building sites. They are behind

the controls of the cranes that raise and move large steel beams. They operate the machines used in every stage of road, tunnel and bridge construction – from flattening and grading to paving and sealing. Bulldozers, cranes, front-end loaders, pile drivers and other large machines are the tools of their profession.

Operating Engineers not only know how to control the equipment, they must learn how it works so they know its capabilities. Operating Engineers must also maintain and repair their equipment. When a piece of machinery breaks down, the operating engineer has to get it working again quickly so work can continue.





CONTACT

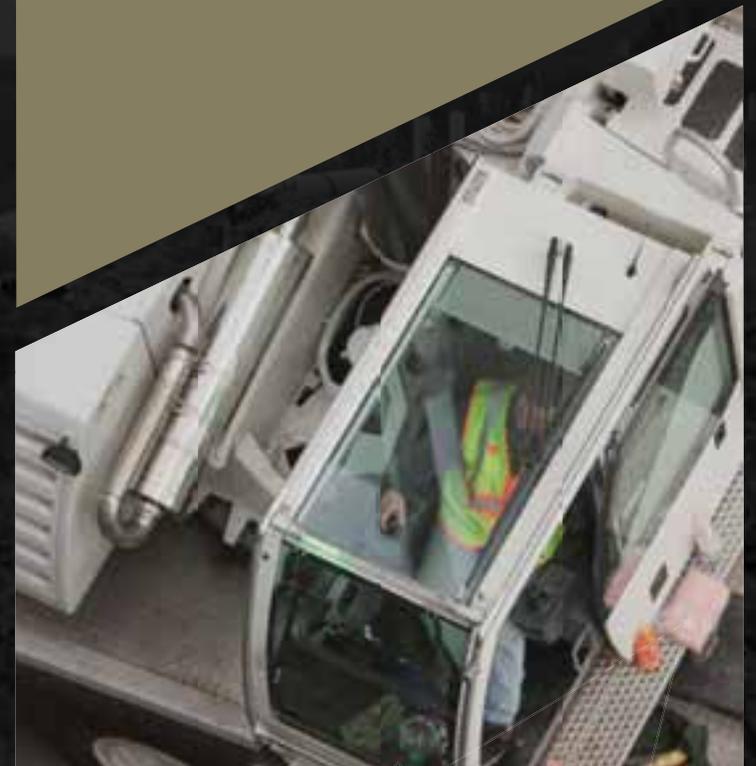
DANIEL P. SULLIVAN, Coordinator/Director
BRIAN MURPHY, Assistant Coordinator

📍 Operating Engineers Local 542 JATC
1375 Virginia Drive Suite 206
Fort Washington, Pa 19034

☎ (215) 591-5282

Operating Engineers operate the bulldozers, the motor graders, the backhoes, the cranes helping to form and shape the infrastructure and skylines. They work the mines, and dig the wells. They operate the boilers, the generators and the heating and cooling systems, as well as maintain the buildings and grounds, that help make you comfortable at work and play. Operating Engineers are the first on a construction job and the last off. When it involves a commercial or industrial complex, stationary engineers are there long after the construction is finished, operating and maintaining the completed facility.

Throughout their careers, operating engineers can continually enhance their skills in operating equipment, diesel mechanics, field engineering and hazardous material. Through this ongoing commitment to education, these men and women can ensure career advancement. Local 542 is a blend of heavy equipment operators in the building and construction industry, along with the C & D-Branch Division members who are employed at quarries, landfills, equipment dealers, shipyards, breweries, manufacturing, airports, bridges, and public works.



PLUMBERS

Most people can recall when their household had to call in a plumber to unclog pipes or repair appliances, and every building has a network of pipes that carries water. However, this is only the top of the iceberg of the plumbing profession. Plumbers are involved in a variety of high-tech construction projects from nuclear power plants to energy refineries to manufacturing facilities. Plumbers are even an integral part of the nation's space program.

Plumbing involves installation and repair of a wide variety of piping systems and equipment. The majority of plumbing work is in the commercial segment of building construction. From layout (or even design) preparation to final installation of fixtures and equipment. A plumber practices daily, all of the mental and physical skills acquired through a structured learning process during the five-year apprenticeship period. The layout and installation of piping materials, plumbing fixtures and mechanical equipment are learned on the job. Blueprint reading, drawing, trade- math, related systems theory and selected manipulative skills are taught in the related training school program.

A plumbing apprentice works under the direct guidance and supervision of a licensed plumber. Plumbing is hard work, and is performed throughout the year, in all kinds of weather, inside and out. Ditch work, elevated work often involving jobs in uncomfortable positions. Potential hazards require constant "good safety attitude and practice". As a professional plumber you would work on a host of different projects including schools, hospitals, pharmaceutical manufacturing facilities, oil refineries and chemical plants.





CONTACT

MIKE BRADLEY
TRAINING DIRECTOR

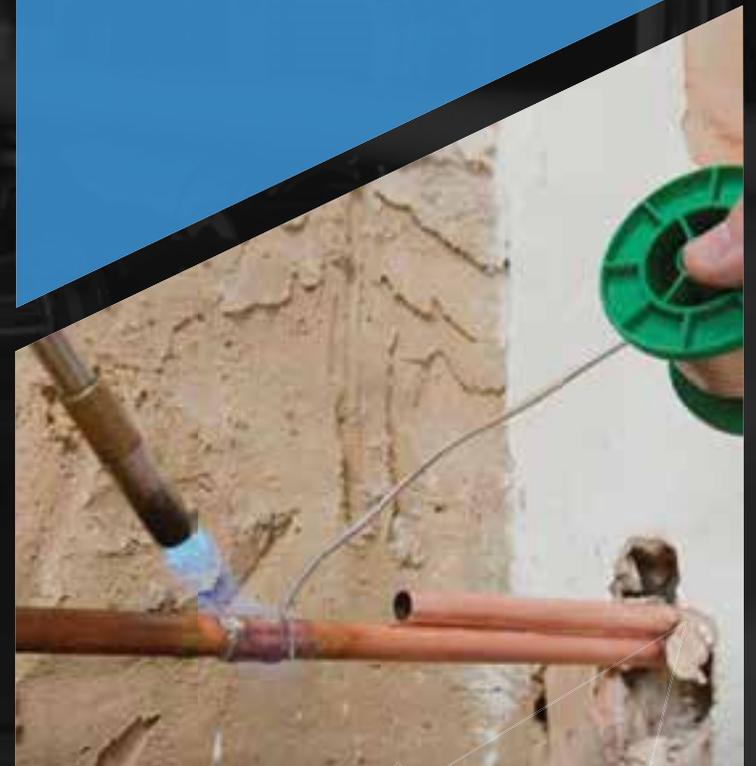
📍 Plumbers Union Local 690
2791 Southampton Road
Philadelphia, PA 19154

☎ (215) 677-6900

Plumbers are required to interpret plans and blueprints, measure and cut sections of piping to exact specifications and install the system of pipes, valves, pumps and backflow prevention equipment. They connect sections of pipe by welding, soldering or brazing them together. They often must cut sections of pipe using a variety of techniques – from simple manual pipe cutters to heavy saws or oxy-acetylene for the thickest materials. Plumbers work processes include sanitary and storm piping, disposal drainage, waste and venting piping, soldering, brazing, welding, water supply and services, fixtures, appliances, trim and supports, gas piping and equipment. Plumbers should be able to understand detailed instructions to plan and visualize a completed project.

Plumbers must understand the physics of how liquids and gases flow, and they often use computer aided design (CAD) software to create intricate systems for highly sophisticated industrial and commercial projects. When the project is finished, the professional plumber ensures every section is leak free.

Plumbers work with pipes that carry water and gas. They are separated into two categories – commercial plumbers and residential plumbers. Residential plumbers, as you would expect, work on the indoor plumbing in homes, apartments and small commercial properties. Commercial plumbers work on commercial and industrial buildings larger than three stories, and they install water and gas systems in large multipurpose dwellings such as apartment buildings or major nursing and assisted living homes



ROOFERS

Since roofers work on top of buildings, you rarely get a good look at what they do, but their work is critical to the durability of a building and the protection of everything inside.

No matter how structurally sound a building is constructed or how good it looks, you do not want rain to come through the top. Rainwater may look harmless but it can have devastating effects on the interior of a building. The integrity of a roof is more important now than ever because of the expensive computer and telecommunications equipment in most of today's office buildings.

Roofers don't build the top of a building, which is called the roof deck. They install the protective covering that protects the roof deck from wear and weather damage and ensures moisture doesn't penetrate through to the inside of the building. Most roofs also offer a layer of insulation to help maintain a comfortable climate inside the building.

There are a variety of roofing systems from the very simple to the complex. The type of roof used on a building depends on several factors such as weather conditions, the type of building and how long the designers expect a roof to last before replacement or repair.

A roof can have as many as three section on top of the deck – vapor retardant, insulation and the membrane. Vapor retardant keeps moisture from passing the inside and is used only for special conditions. Most projects call for an insulation and membrane. Some projects only require a membrane.





The most common type of system is the built-up roof (BUR), in which layers of felt are soaked in hot bitumen (tar or asphalt) and laid over insulation boards. Another type of roof is the modified bitumen system, which adds polymers to the tar or asphalt to enhance strength, flexibility and UV protection. The felt layers are then applied using high-intensity propane torches that reach temperatures of 1,200 degrees Fahrenheit.

As with all building trades, advances in materials create new options. An increasing number of flat roofs are covered with a single-ply membrane of waterproof rubber, treated metal or spray foam. Rubber roofs involved placing sheets over the roof's insulation and then sealing them with adhesive, mechanical fasteners, or stone ballasts to hold the sheets in place.

Roofers work on four types of projects: new construction, re-roofing, recovering, tear off, and waterproofing. Re-roofing and recovering involve placing new layers over older roofs. Tear offs are the complete replacement of deteriorated roofs.

With tear offs, roofers totally remove the old roof system by using a machine commonly called a power rhino, which cuts through and lifts the old surface. Apprentices then dispose of the material into wheelbarrows, allowing roofing mechanics to lay a new roofing system onto the bare roof deck. Whatever is removed must be replaced the same day because roof decks can never be exposed bare to the elements.

Roofers must also ensure water drains properly off a roof. Water puddles that remain on a rooftop for as little as 24 hours can seriously diminish the durability of the membrane. Experienced roofers know how to build the surface so water flows to gutters and drains quickly and unhindered. Proper roof drainage is often written into a building's design, which requires roofers to possess the ability to read blueprints and expertly carry out those plans.

CONTACT

NICK LODISE

Training Coordinator

📍 Roofers Local 30
2751 Juniata Street
Philadelphia, PA 19137

☎ (215) 288-8005



SHEET METAL WORKERS



The next time you're sitting comfortably in a climate-controlled office or classroom, think of the maze of duct lines carrying the cooled or heated air around the building. Then, think of the men and women who designed, crafted and installed this ductwork. They are sheet metal professionals also known as journeypersons.

While sheet metal professionals design, craft and install a wide variety of products – from aircraft and train components to architectural sheet metal work – the most common projects are heating ventilation and air conditioning (HVAC) systems.

Sheet Metal Master HVAC/R licensed contractors and/or professional technicians not only assemble these HVAC systems, they design the

duct system, fabricate, install, test, adjust & balance (TAB) for optimum efficiency.

The process begins at a drafting table or a computer with CAD (computer aided design) software, where a sheet metal professional designs the duct system. The detailer determines the size of the ducts and what route they will take to deliver air to each room of the building. CAD software enables the detailer to render his or hers plans in a three dimensional format known as Building Information Modeling (BIM).

Using these detailed plans each component of the system is custom crafted in a sheet metal shop. Since each building is unique, the dimensions of each section must be precise; mass-manufactured components are rarely used. Utilizing special saws, shears and presses journeypersons cut, stamp, bend, and weld and fasten the sheet metal to the component necessary to fulfill the design.

After the components are delivered to the job site and installed, sheet metal professionals conduct what is known as TAB. Testing, adjusting and balancing in the final stage of the process, sheet metal professionals ensure the system is functioning properly, adjust the system controls to provide the ideal level of heated or cooled airflow, and balance the system to ensure each building zone receives its specified share of airflow.

As the demand for more efficient and sophisticated HVAC systems and the constant evolution of technology increases, sheet metal professionals are always challenged to stay up to date on industry developments.

CONTACT

JOSEPH S. FRICK
Training Coordinator

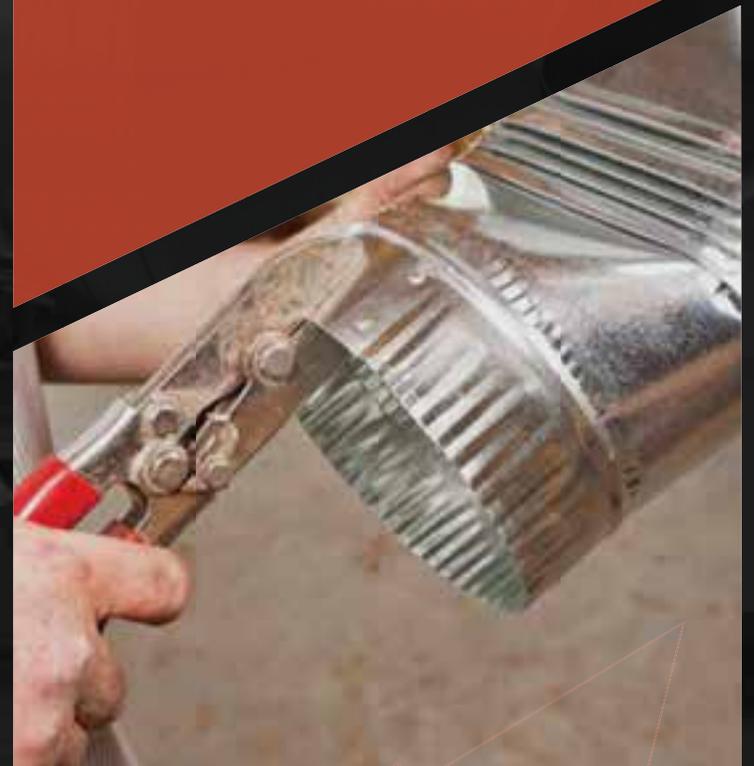
📍 Sheet Metal Workers Local no. 19
1301 Columbus Blvd
Philadelphia, PA 19147

☎ (215) 952-1950

Sheet metal professionals specialize in Fire Life Safety (FLS), the installation of fire dampers, fire smoke dampers, stairwell air pressurized systems and inspections. In addition sheet metal professionals work hand-in-hand with the Green Building Technology striving to work and build safer, more efficient, and especially more environmentally conscious.

About 15% of the building of the industry involves architectural sheet metal work, which enhances a building's durability and attractiveness. The first priority of architectural sheet metal is to weather and waterproof buildings, particularly at the ground level, where moisture seepage through the floor can significantly erode the attractiveness and durability of a building. Architectural sheet metal also can add to the overall beauty of a building. Skilled sheet metal professionals can fabricate decorative accents and sculpture using various metals like copper, aluminum and stainless.

Sheet metal professionals also play a role in building interiors of chemical, energy and manufacturing plants. Sheet metal professionals don't construct the hulls of ships or fuselage of airplanes, but sheet metal is a significant part of the rest of the ship or aircraft (fuel tanks, galleys, restrooms, food service containers). Other industries that use sheet metal professionals include appliance and sign manufacturers.



SPRINKLER FITTERS

Sprinkler fitters literally save lives through their work. Sprinkler fitters are pipe fitters that specialize in the installation and maintenance of fire protection systems.

If a fire emergency occurs in an office tower, industrial plant or residential property it is critical for the automatic sprinkler system to work reliably. How important is a sprinkler fitter's work? Consider this fact: there has never been a case of multiple deaths due to fire in a building that had a professionally installed sprinkler system. Fire protection systems range from the simple to the complex. Systems sometimes deal with freezing conditions, which makes it

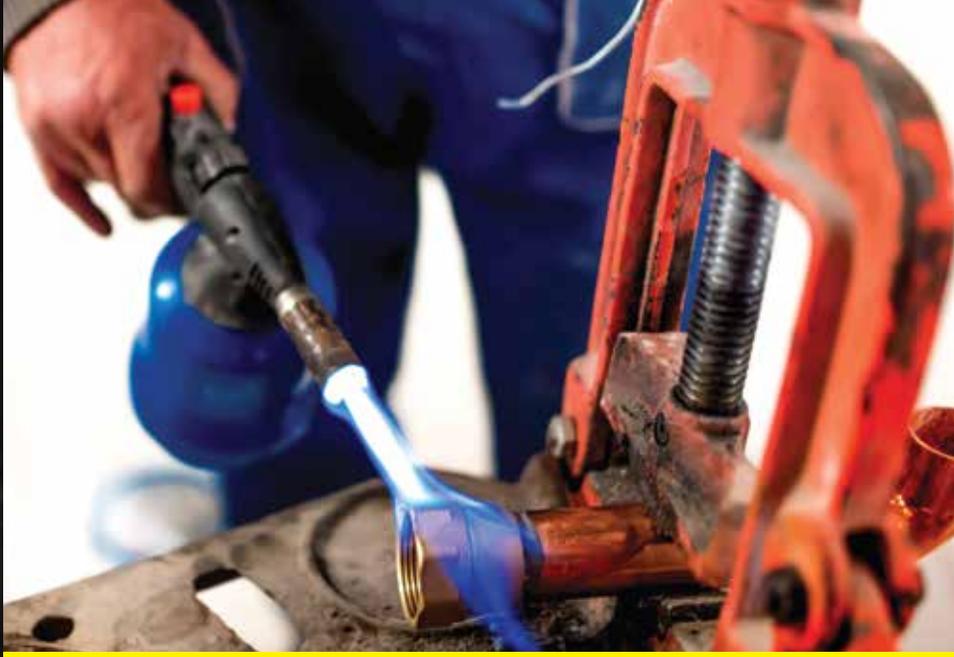
impossible to have water constantly flowing through pipes. Other systems must have additional safeguards to prevent false triggering, and in instances where grease or oil fires are likely, chemicals rather than water are used to extinguish flames.

Fire protection systems begin with underground supply piping that is connected to an integrated overhead piping system inside the building. Sprinkler fittings are spaced along this overhead pipe. Each sprinkler head consists of a glass fuse that holds a seal in place. When the temperature reaches 165 degrees Fahrenheit, the glass fuse breaks. Without the fuse holding it in place, the disk drops, allowing water to rush through the sprinkler head.

When sprinkler systems are hidden above a drop ceiling, a plate is put in place under each sprinkler head. These plates are attached to the ceiling with material that melts at 135 degrees Fahrenheit. When the temperature reaches that point, the plates drop, allowing water to flow unimpeded a short while later when the heat triggers the sprinkler head.

A dry system is used in areas at risk from freezing temperatures. The dry system pipe network contains compressed air between the alarm valve and sprinkler head. This prevents the water from freezing in the pipelines. When the sprinkler head is engaged, the air flows out the sprinkler. As the air pressure holding back the water dissipates, the water can then flow through the pipes and to the flames.





With the advent of expensive computer and telecommunications equipment, pre-action systems have emerged. This “Pre-Action System” combines a fire detection system with a sprinkler system. This fills the pipe network with water, awaiting the operation of the sprinkler heads by the fire heat output. In this way, two modes of detection prevent accidental discharge.

Construction projects will range from residential to nuclear power plants. Except for underground supply piping, most sprinkler piping is installed at or near the roof deck. Most of the installation is performed while working on ladders, scaffolds or manlifts. Some states require by law that sprinklers be put in all college dormitories and in all multi-family facilities.

CONTACT

DON SWEETEN

Training Coordinator

📍 Local 692
14002 McNulty Road
Philadelphia, PA 19154

☎ (215) 673-9565
✉ dsweeten@sprinklerfitters692.org



STEAMFITTERS

All buildings have a network of pipe. Professional steamfitters build and repair all of the complex piping systems that rely on the circulation of liquid, gas and steam to name a few of the many process' that flow through pipe. Steamfitters assemble and maintain industrial refrigeration and climate control systems. The scope of work of the Steamfitter or Pipefitter encompasses installation and servicing of systems requiring piping. This includes steam and hot

water heating systems, chemical and petrochemical plants, and complete environmental systems in hospitals, schools, churches, high rise office buildings, and apartment buildings.





The pipes that Steamfitters work with may be copper, steel, cast or wrought iron, brass, bronze, glass, plastic, concrete or any material from which pipe can be made. The size ranges from 1/16" up to 10 feet and larger in diameter. Steamfitters join pipes mechanically by threading, flanging, or friction joints; and metallurgically by soldering, brazing or welding- including shielded metal arc welding; gas tungsten arc welding, gas metal arc welding and oxy-fuel gas welding. Steamfitting also involves erecting and working on scaffolding, interpreting blueprints, and writing technical reports, measuring, cutting, and fabricating piping or tubing using mechanical equipment.

The scope of work for the Mechanical equipment serviceman (MES), also called Refrigeration Pipefitter, encompasses mechanical service and maintenance of commercial air conditioning, refrigeration, ventilation, and heating equipment. This includes electric, gas-fired and oil-fired hydronic and forced air heating equipment and associated combustion controls, temperature and humidification controls. The trade also includes repair, overhaul and replacement of refrigeration compressors, condensers, evaporators, metering devices and cooling towers. Building automation equipment service (a.k.a. energy management system service) is also the work of the MES. Typically, the MES is provided with a company vehicle, provided by the contractor, to carry tools and equipment and other related equipment necessary to perform the work of the trade.

The range of options for pipe trade professionals is vast and the opportunities continue to grow with each technological advance. Tools of the trade include wrenches, soldering and welding equipment, and heavy cutting equipment. Steamfitting requires walking, bending, lifting, crouching, climbing, kneeling, stretching and standing for long periods.

CONTACT

PETER A. KLEIN
Director of Training

📍 Steamfitters / Pipefitters' Joint
Apprenticeship Program Training School
14420 Townsend Road, Suite C
Philadelphia, PA 19154

☎ (267) 350-2610

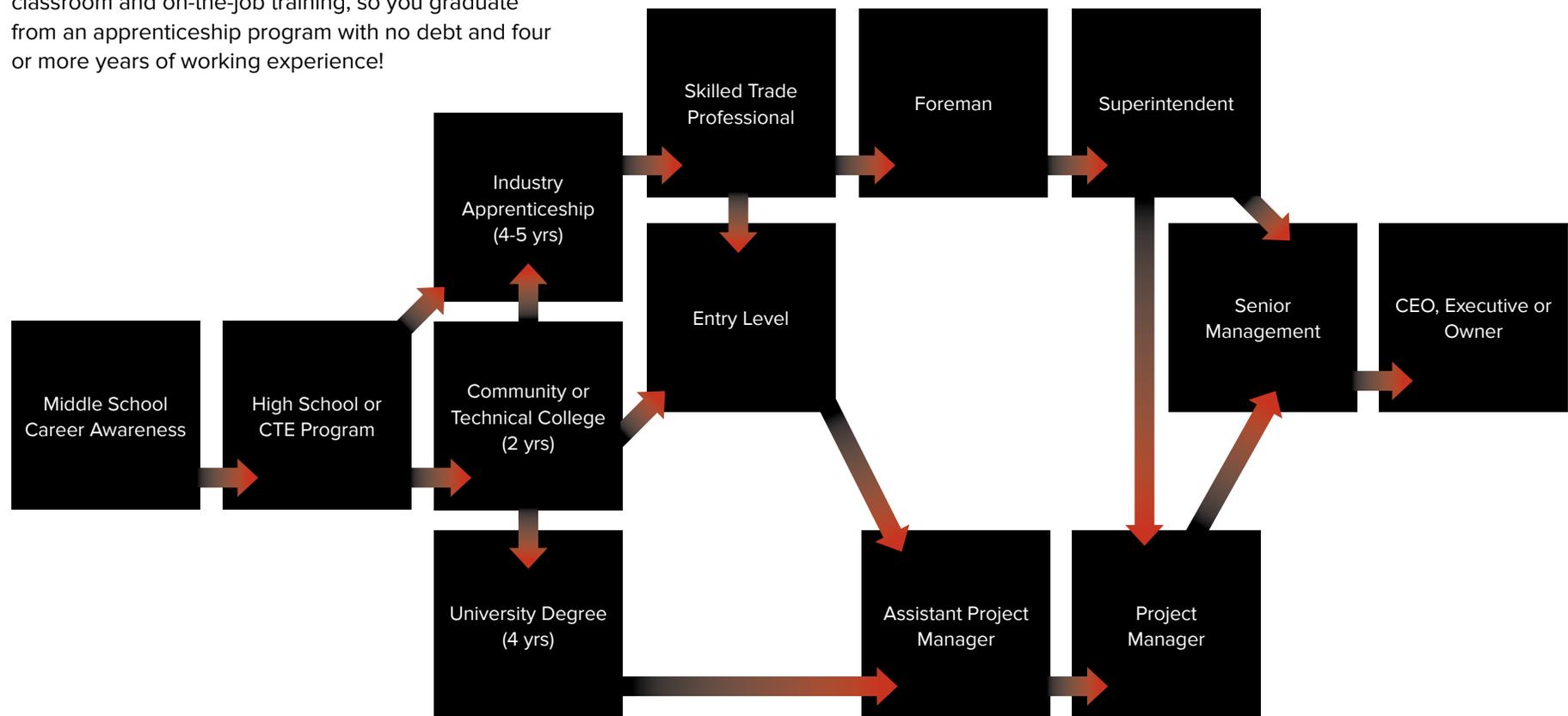


PATHWAYS TO CAREERS IN CONSTRUCTION

Construction careers today require **smart, enthusiastic, creative, hard-working problem solvers** who work well on a team. Careers range from labor, who work with their hands, to management who plan, schedule and execute projects.

Construction careers have huge earning potential. Local union apprenticeships pay you while you receive classroom and on-the-job training, so you graduate from an apprenticeship program with no debt and four or more years of working experience!

Wherever you are in your education, there is a way for you to start training for a career in construction today!



HIGHER EDUCATION OPTIONS

While many colleges and universities around the country offer excellent programs for construction-related degrees, we have quite a few in our own backyard! Check out these institutions of higher learning located in our region. They are some of the best... and close to home.

Architects, engineers, and project managers are a few of the more “notable” construction professions, but check out the unsung heroes like

estimators and safety directors. They are an integral part of the construction process and deserve as much career consideration as their counterparts. Of course the internet is a great resource to learn more about these rewarding professions.

COMMUNITY COLLEGE OF PHILADELPHIA

Associate’s Degree in Construction Management
Department of Architecture, Design & Construction
1700 Spring Garden Street
Philadelphia, PA 19130
www.ccp.edu/node/384
Contact: David Bertram, RA, LEED AP BD+C
Department Chair
(215) 751-8860
dbertram@ccp.edu

DREXEL UNIVERSITY

Bachelor’s Degree & Master’s Degree in Construction Management
Construction Management Program - College of Engineering
3101 Market Street, Suite 130
Philadelphia, PA 19104
www.drexel.edu/engmgmt/cmgt
Contact: Jessica Cruz
Academic Advisor
(215) 895-5943
jc635@drexel.edu

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Bachelor’s Degree & Master’s Degree in Project Management
Project Management Program - College of Engineering
3001 Market Street, Suite 100, Ofc 010
Philadelphia, PA 19104
www.drexel.edu/engmgmt/projmgmt/
Contact: Mercedes Moultrie
Program Manager
(215) 571-3939
mm342@drexel.edu

JEFFERSON UNIVERSITY (Philadelphia

University + Thomas Jefferson University)
Bachelor’s Degree in Construction Management
4201 Henry Avenue
Philadelphia, PA 19144
Construction Management Program – College of Architecture and the Built Environment
Contact: Ed Keeter
Director and Associate Professor
(215) 951-2914
edward.keeter@jefferson.edu

ROWAN UNIVERSITY

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Glassboro, NJ 08028
www.RowanU.com/Construction
Contact: Stephen J. Krone, D.Sc., P.E., M.ASCE.
Director of Construction Management and Engineering
(856) 341-5924
krone@rowan.edu

TEMPLE UNIVERSITY

Bachelor’s Degree in Construction Engineering Technology
Construction Management - Department of Civil & Environmental Engineering
1947 N. 12th Street
Philadelphia, PA 19122
www.temple.edu/academics/degree-programs/construction-engineering-technology-major-en-cnet-bsct
Contact: Denise Guiteras
Administrative Specialist
(215) 204-7814
dguiter@temple.edu

This publication is made possible through contributions from multiple trade apprenticeship programs throughout our region. We recognize and thank our labor partners for their dedication to safety and training, and for promoting professionalism in the industry.

For a digital copy of Build Your Career in Construction, visit our website at gbca.com/workforcedevelopment.

Still need more information?

Angela Hendrix

Director, Education & Professional Development
General Building Contractors Association

☎ (215) 568-7015

✉ ahendrix@gbca.com



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