

Excerpt from

Introduction to the Building Trades

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Preview

The following is a sample excerpt from a study unit converted into the Adobe Acrobat format. A sample online exam is available for this excerpt.

When people talk about major modern industries, the construction industry is often overlooked. Automobile manufacturing, steel production, communications, and computer technology are the industries that are most often mentioned when people think of the giants. However, all of the buildings that those products are manufactured in, and all of the homes that shelter the employees of those industries, were built by the construction industry.

Because the construction industry is so important, skilled professionals are needed to work in this field. While construction companies are responsible for the completion of projects, individual craftspeople will perform the actual work. Builders and contractors employ different skilled workers to complete each phase of a construction project. These workers are highly trained individuals who possess the skills, tools, and knowledge to work a job through from beginning to end, making sure that the work complies with all building codes and other laws. In some cases, certain workers in the building trades will even be licensed to perform a particular type of work. It takes a lot of training to learn the skills you need to do the job properly and efficiently, and also to reach your own personal career goals.

The study unit on which this excerpt is based introduces you to the construction industry as a whole and to the different trades that are a part of the industry.

After reading through the following material, feel free to take the [sample exam](#) based on this excerpt.

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Introduction to the Building Trades

INTRODUCTION TO THE CONSTRUCTION INDUSTRY

Residential and Commercial Construction

The construction industry is a major part of our country's economy. At the present time in the United States, the annual value of new construction is approximately \$600 billion, with residential construction accounting for over \$180 billion. More than 5 million people work in the building trades, including superintendents, estimators, project managers, architects, and engineers. However, the largest segment of the construction industry is made up of the many professional building trades workers who perform all of the actual hands-on work.

The construction industry is generally divided into two parts—residential construction and commercial construction. *Residential construction* covers the construction of homes and residential buildings, such as garages, sheds, and other outbuildings. *Commercial construction* covers all commercial and industrial buildings, including office buildings, factories, power plants, parking garages, restaurants, and shopping malls.

For the most part, construction companies tend to specialize in only one segment of the construction industry; that is, either residential or commercial. There are some exceptions, of course. However, in the end, the size and type of the construction project doesn't make a lot of difference. Whether a construction company is building one house, a development of 25 houses, or a large sports stadium, the company will hire a number of subcontractors who specialize in particular building trades to complete the actual work. Although each subcontractor will specialize in one building trade, all will be required to complete their work on time, within the allowed budget for the job, and with a high degree of quality and accuracy.

Subcontractors are smaller companies that employ technicians who are skilled in one particular building trade. Roofing contractors, bricklaying contractors, and electrical contractors are all commonly employed to perform specialized tasks on a construction project. Each subcontractor will have the personnel, tools, equipment, and expertise to produce the expected results. In residential construction, subcontractors are often small companies that employ three or four people. Larger residential subcontractors, however, may be organizations made up of hundreds of skilled technicians. Commercial subcontractors are often large organizations that employ skilled technicians as well as project managers, estimators, office workers, and others who support the organization.

Construction may be one of the few remaining industries that provides every person involved in it a real opportunity for success. It's not uncommon for the head of a large construction company or subcontracting company to be a person who started his or her career in the building trades. With hard work, training, and personal ambition, many people are able to rise very rapidly in construction. While a college degree may be helpful, it's not necessary to accomplish your career goals. However, a full understanding of how things are accomplished in construction is absolutely essential. The "career tree" shown in [Figure 1](#) shows the many paths that are open to you as you progress through the building trades.

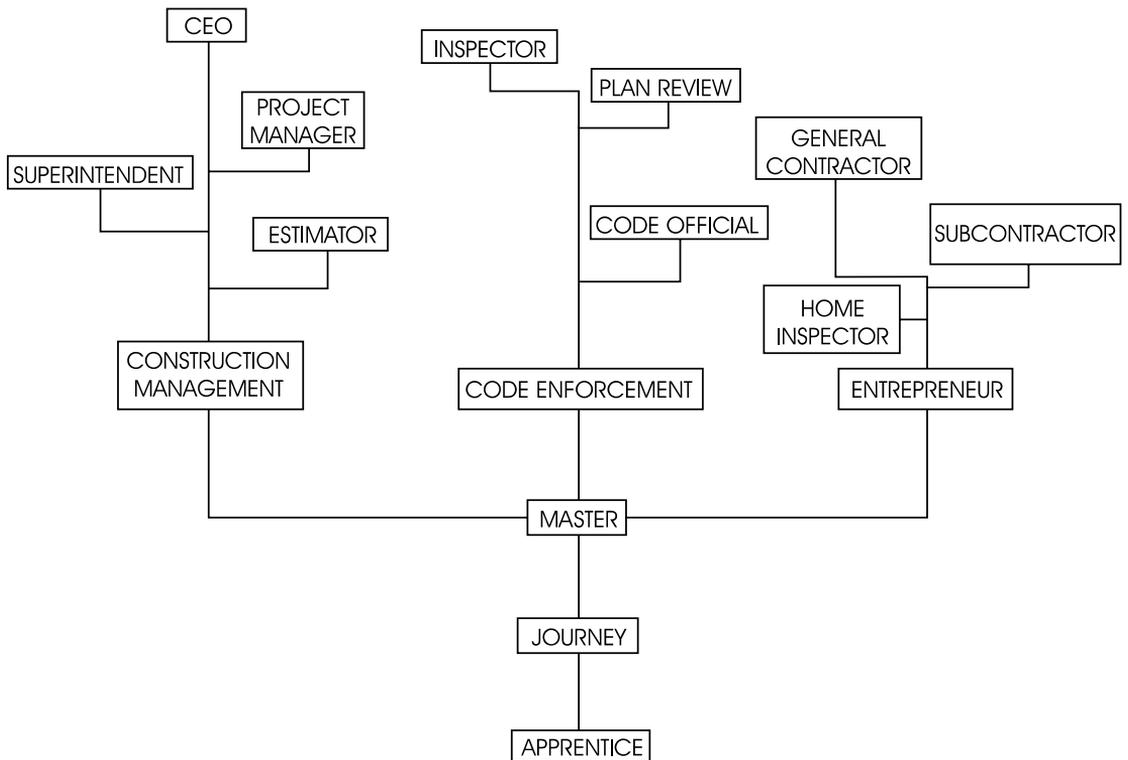


FIGURE 1—This career tree shows the many paths that are open to you in the world of construction.

Trade Unions and Associations

Construction industry trade unions and professional associations are a good source of information on construction regulations (local, state, and federal), supplemental educational programs, starting a business, obtaining licensing, new technology, and even social activities. These organizations exist to represent the common interests of both individuals and companies. Most are national groups that will have a local affiliate in your local area, but some are strictly local groups.

Professional associations may be able to recommend employment opportunities as well as training programs that can help you to advance in your trade. Many groups sponsor apprenticeship programs that will

combine on-the-job experience with formal classroom training. Typically, apprenticeship programs are between three and five years in length, with the average program running for four years. An apprenticeship can provide you with an opportunity to earn a living wage while you're learning, and the cost of the education is often covered by your employer. For information on apprenticeship programs or on any other construction topic, contact the national offices of the associations and unions you might be interested in, and ask for the nearest local affiliate.

Professional Licensing

In many areas, building trades workers will need *licenses* to perform certain types of work. Licenses are issued in order to ensure the quality of the work that's done, and also to ensure individual compliance with the building codes and regulations that protect consumers. The building trades that most often require licenses are electrical work and plumbing. In a growing number of areas, however, heating, ventilating, and air conditioning (HVAC) technicians will also need to obtain licenses.

The licensing process promotes professionalism in the building trades and ensures that technicians have the proper technical knowledge to do the job correctly. For example, if a house was wired by an unskilled and uncertified worker, an improper installation could lead to a fire or an electrical shock. A poorly installed plumbing fixture that doesn't comply with code regulations could lead to expensive water damage to the home, or even pollution of the environment. An incorrectly installed HVAC system could leak refrigerant gases into the air and cause dangerous pollution. All of these situations can be prevented by making sure that only skilled professionals do these types of work. A skilled professional is someone who has demonstrated knowledge of the rules and regulations of a trade and obtained a license. The licensing procedure is the best way to ensure that workers in those fields have the skills and knowledge they need, so you should plan to earn licenses whenever necessary.

The licensing process is generally the same regardless of the trade or geographic area. There are three different levels of ability as defined by the license—apprentice, journey, and master. Let's take a closer look at the requirements for each licensing level.

The *apprentice* level is the beginning trade level and has the fewest requirements. The apprentice may need to enroll in a registered apprenticeship program (that is, a program that's approved by his or her state) for the duration of the apprenticeship period, which is usually four years. Apprentices must often work under the direct supervision of a licensed technician in order for their work experience to count toward the program's requirements. An apprenticeship program ensures that you'll have the opportunity to develop the skills necessary for advancement to the next level.

The next trade level is the *journey* level. To move up to this level, you must possess a certain number of work experience hours. You must also pass a written test to demonstrate your practical knowledge and familiarity with the codes that regulate the trade. If you have the required

number of work experience hours and receive a passing grade on the written test, you'll be entitled to a journey license. At this level, you can work unsupervised and on your own. It's very important to strive to reach the journey level in the licensed trades. Without a journey license, you're limited in what you can do, employers are limited in the kind of work they can give you, and the wage you can earn is limited.

The highest license you can earn is the *master* license. To receive a master license, you'll require between two and four years of experience at the journey level with an employer who has a master license. You'll also need to pass another written test that's designed to determine your understanding of the codes and regulations that govern your trade area. A master license allows you to supervise other workers, and it's often required to obtain a permit to do work in that trade. Every company needs at least one person who possesses a master license in order to carry on their work. The owner of a company will often have a master license, but it's not uncommon for the owner to hire others who also possess their master licenses. At the master level, you'll be paid the highest wage rates in the trade.

To find out the licensing requirements for particular trades in your local area, contact your state licensing office. They should be able to give you the information you need to obtain appropriate licenses. You could also ask an experienced worker for guidance in this area.

In the construction industry, building codes are updated, new building materials are introduced, and new work techniques are developed frequently. The best way to keep up with all these changes is to continue the learning and training process throughout your life. Your career goal may be to obtain a higher license, be promoted to a supervisory job, or run your own construction company. However, no matter what your goal is, it will be much easier to reach that goal if you keep up to date with the advances in your trade (and in the construction industry as a whole). Remember, people who enter a building trade and make no effort to learn new skills will never advance beyond the beginner level.

CARPENTRY

In residential construction, carpentry is the trade that gives a house form and shape by constructing the frame. The frame is a skeleton-like network of boards that forms the outline of a building. The *frame* is made of wood and is built according to precise building code requirements. A house frame will be erected on top of a *foundation*. The foundation is a concrete base that's installed in the ground to support the entire building structure.

Carpenters will cut each piece of the wood frame to its appropriate length, place the pieces in the right positions, and nail them together. Note that building code requirements will specify the minimum sizes of the wood pieces that are used in each part of the frame, as well as the spaces between each piece of wood. An experienced carpenter will know all applicable code requirements on every project.

Next, the carpenters will cover the building frame with *sheathing*—sheets of wood or wooden boards that are used to enclose the frame. The sheathing is nailed directly to the frame. Sheathing provides the frame with strength, and also provides a surface that siding and shingles can be attached to.

The entire process we’ve just described is called *rough carpentry* (Figure 2). The word “rough” here doesn’t refer to the physically demanding work. Instead, it refers to the roughness or imperfection of the work. At the rough carpentry stage of the building process, hammers will make dents in the wood, and some of the wood will have slightly irregular cuts and rough edges. These imperfections are acceptable because the rough carpentry work will all be covered by other materials and will never be seen.

FIGURE 2—This figure illustrates the process of rough carpentry.



Carpenters will work with a set of *construction plans* when working on a building project. Plans are also referred to as *working drawings*, *blueprints*, or just *prints*. Construction plans are drawings that show the entire layout of a project and provide all the information necessary to assemble the project (Figure 3). Plans will show the carpenter where to build walls, where to leave openings to install doors and windows, the length of each piece of wood needed for a floor, and the direction in which the floorboards should be installed. Plans are essential for the proper construction of a house or any other building. Every building trades worker will need to understand how to read plans accurately in order to succeed.

Later in the building process, after other professionals have completed their work, carpenters will return to the job to install doors, windows, moldings, cabinets, and stairs. Most of this work takes place inside the house and is generally referred to as *finish carpentry*. Outside, the carpenters will close in the ends of the roof and the overhang. This work is called *trim carpentry*.

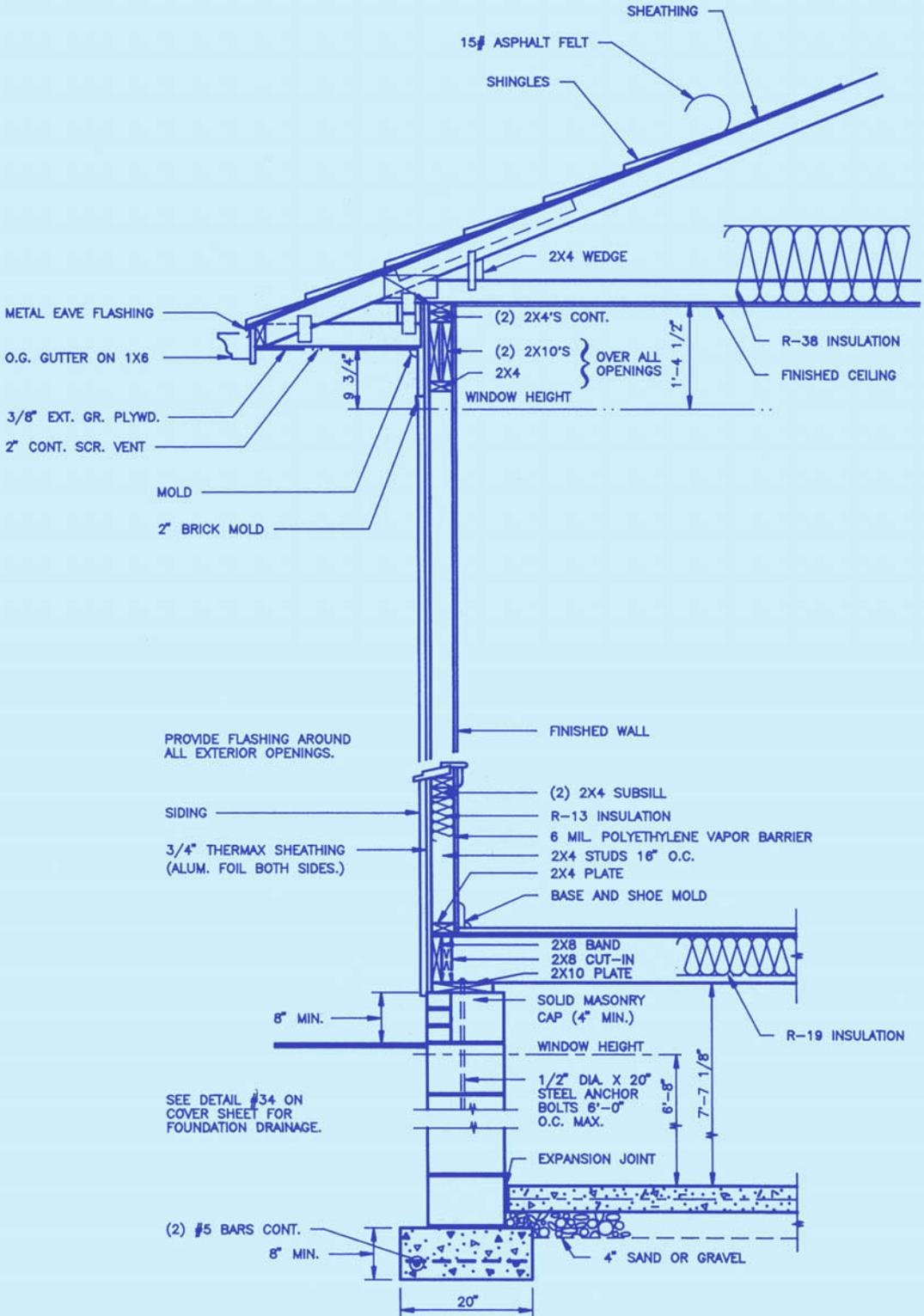
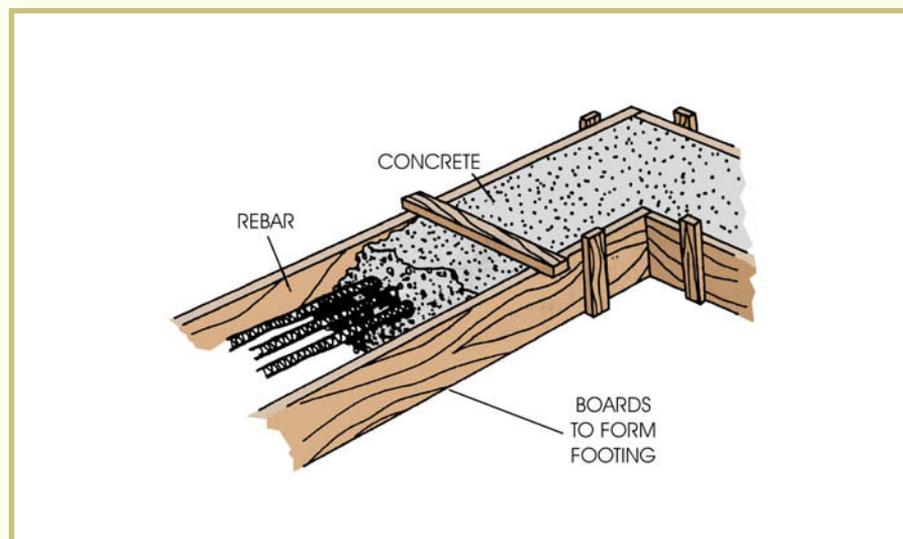


FIGURE 3—Construction plans show the entire layout of a project and provide all the information necessary to assemble the project. The drawing shown here is a structural section for a house. Note the details in the plan regarding the construction of the roof, foundation, and walls.

Since finish and trim carpentry are visible, the carpenters must be more careful when doing this kind of work. They'll make sure that all pieces are cut accurately, install them carefully to avoid gaps, and try not to dent any pieces with their hammers. Corners where two pieces of wood meet will be fitted together at angles so that the ends of the molding or board aren't visible. Finish and trim carpentry require a high level of skill and accuracy.

Carpenters who work in commercial construction will work on a variety of building projects and with many different types of materials, such as metal, plastic, and concrete. The most common work for carpenters in this area is building concrete forms. *Concrete forms* are the wooden molds that give poured concrete a specific shape and design. The concrete is poured into the forms, and after the concrete hardens, the wood forms are removed and discarded (Figure 4). Carpenters in commercial construction will also typically construct protective barriers, safety rails, storage areas, and security fences.

FIGURE 4—This illustration shows how concrete forms are used in construction.



As a carpenter, the primary material you'll work with is wood. In rough carpentry, the type of wood you'll work with is called *dimension lumber*. Dimension lumber includes pieces that measure 2 inches by 4 inches, 2 inches by 6 inches, 2 inches by 8 inches, and so on. These boards are commonly referred to as two-by-fours, two-by-sixes, and two-by-eights. Finish and trim carpenters will work mostly with *board lumber*. Board lumber is 1 inch thick and 2 inches, 4 inches, 6 inches, 8 inches, 10 inches, or 12 inches wide. Board lumber is smoother and of better quality than dimension lumber because it's used for visible finishing work.

Although carpenters will most often use wood to build house frames, there's growing interest in using steel to build house frames. The steel pieces would simply replace the wood pieces, and the frame would be erected in much the same way as a wood frame. At the present time, steel frames are growing in popularity and it seems that the trend will continue.

No special licensing or certification is required for carpenters. However, if you choose, you can earn professional certification through one of many available apprenticeship programs. Although certification isn't required in this field, a certificate is a good way for you to show potential employers that you have the skills they need. Employers are more likely to hire individuals who have some type of formal training or education.

The following are some skills that you should develop in order to become a professional carpenter:

- Reading construction plans and interpreting the information accurately
- Measuring accurately with a number of different tools
- Applying basic math and basic geometry skills
- Cutting wood to proper lengths and with straight cuts
- Using a variety of power tools
- Working quickly and efficiently to save time and materials
- Working as part of a team

Professional carpenters must also be knowledgeable about the following:

- Local building code regulations
- The materials that are used in building projects

If you would like to review current information about employment opportunities and earning potential for carpenters, check the entry "Carpentry" in the current *Occupational Outlook Handbook*. This book is published by the U.S. Department of Labor, Bureau of Labor Statistics. This book can be found in most libraries. You can also contact the following organizations for general information about professional carpentry:

- Associated Builders and Contractors
- Associated General Contractors of America, Inc.
- Home Builders Institute, National Association of Home Builders
- United Brotherhood of Carpenters and Joiners of America

The [Appendix](#) found at the end of this excerpt contains the addresses of these professional organizations.

Appendix

Contact the following organizations and associations for information about specific building trades:

Air Conditioning Contractors of America
1712 New Hampshire Avenue NW
Washington, DC 20009

Air Conditioning and Refrigeration Institute
4201 North Fairfax Drive, Suite 425
Arlington, VA 22203

American Fire Sprinkler Association, Inc.
12959 Jupiter Road, Suite 142
Dallas, TX 75238-3200

Associated Builders and Contractors
1300 North 17th Street
Rosslyn, VA 22209

Associated General Contractors of America, Inc.
1957 E Street NW
Washington, DC 20006

Brick Institute of America
11490 Commerce Park Drive, Suite 300
Reston, VA 22091-1525

Home Builders Institute
National Association of Home Builders
1201 15th Street NW
Washington, DC 20005

Independent Electrical Contractors, Inc.
507 Wythe Street
Alexandria, VA 22314

International Brotherhood of Electrical Workers
1125 15th Street NW
Washington, DC 20005

International Brotherhood of Painters and
Allied Trades
1750 New York Avenue NW
Washington, DC 20006

International Union of Bricklayers and Allied
Craftsmen
815 15th Street NW
Washington, DC 20005

Mechanical Service Contractors of America
1385 Piccard Drive
Rockville, MD 20850-4329

National Association of Plumbing-Heating-
Cooling Contractors
180 S. Washington Street
P.O. Box 6808
Falls Church, VA 22046

National Association of the Remodeling Industry
4900 Seminary Road, Suite 320
Alexandria, VA 22311

National Concrete Masonry Association
2302 Horse Pen Road
Herndon, VA 22071

National Electrical Contractors Association
3 Metro Center, Suite 1100
Bethesda, MD 20814

National Fire Sprinkler Association
Route 22 and Robin Hill Park
Box 1000
Patterson, NY 12563

National Property Management Association, Inc.
380 Main Street, Suite 290
Dunedin, FL 34698

National Roofing Contractors Association
O'Hare International Center
10255 West Higgins Road, Suite 600
Rosemont, IL 60018-5607

Refrigeration Service Engineers Society
1666 Rand Road
Des Plaines, IL 60016-3552

United Association of Journeymen & Apprentices
of the Plumbing & Pipefitting Industry
901 Massachusetts Avenue NW
Washington, DC 20001

United Brotherhood of Carpenters and Joiners of
America
101 Constitution Avenue NW
Washington, DC 20001

United Union of Roofers, Waterproofers and
Allied Workers
1125 17th Street NW
Washington, DC 20036

If you have a computer and access to the Internet (available at many libraries), check the following addresses for information on specific trades:

Carpentry: <http://stats.bls.gov/oco/ocos202.htm>

Heating and air-conditioning installation: <http://stats.bls.gov/oco/ocos192.htm>

Plumbing: <http://stats.bls.gov/oco/ocos211.htm>

Electrical work: <http://stats.bls.gov/oco/ocos206.htm>

Roofing: <http://stats.bls.gov/oco/ocos212.htm>

Drywall installation: <http://stats.bls.gov/oco/ocos205.htm>

Bricklaying and stonemasonry: <http://stats.bls.gov/oco/ocos201.htm>

General maintenance: <http://stats.bls.gov/oco/ocos191.htm>