

# **CAREER GUIDE FOR CIVIL ENGINEERING TECHNICIANS**

Standard Occupational Code: SOC Code: 17-3022.00

Pay Band(s): 2, 3, 4, and 5 ([Salary Structure](#))

**Standard Occupational Description:** 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.

**Civil Engineering Technician positions in the Commonwealth are assigned to the following Roles in the [Engineering Technology Career Group](#):**

[Engineering Technician I](#)  
[Engineering Technician II](#)  
[Engineering Technician III](#)  
[Engineering Technician IV](#)

While Civil Engineering Technicians within the Commonwealth are all located within the Engineering Technology Career Group, individuals may want to pursue other opportunities within the Commonwealth depending upon individual training, education, knowledge, skills, abilities, and interests.

Other Career Group(s) that may be of interest are:

[Building Trades](#)  
[General Administration](#)  
[Transportation Operations](#)

## **SKILLS, KNOWLEDGE, ABILITIES AND TASKS**

(Technical and Functional Expertise)

### **Skills**

**Note:** *The technical and functional skills listed below are based on general occupational qualifications for **Civil Engineering Technicians** commonly recognized by most employers. Typically, you will not be required to have all of the skills listed to be a successful performer. Recruitment and selection standards for an individual state job must be based on the specific knowledge, skills, and abilities for that job as indicated in the job announcement and job description in the Employee Work Profile.*

1. Using mathematics to solve problems.
2. Using scientific rules and methods to solve problems.
3. Making Considering the relative costs and benefits of potential actions to choose the most appropriate one.
4. Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
5. Communicating effectively in writing as appropriate for the needs of the audience.
6. Thinking Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
7. Analyzing needs and product requirements to create a design.
8. Understanding written sentences and paragraphs in work related documents.
9. Understanding the implications of new information for both current and future problem-solving and decision-making.

10. Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
11. Talking to others to convey information effectively.
12. Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
13. Adjusting actions in relation to others' actions.
14. Determining the kind of tools and equipment needed to do a job.
15. Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.
16. Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
17. Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
18. Bringing others together and trying to reconcile differences.
19. Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.
20. Managing one's own time and the time of others.

### **Knowledge**

**Note:** *The technical and functional knowledge statements listed below are based on general occupational qualifications for **Civil Engineering Technicians** commonly recognized by most employers. Typically, you will not be required to have all of the knowledge listed to be a successful performer. Recruitment and selection standards for an individual state job must be based on the specific knowledge, skills, and abilities for that job as indicated in the job announcement and job description in the Employee Work Profile.*

The **Knowledge** of:

1. The practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
2. Design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
3. Materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
4. Arithmetic, algebra, geometry, calculus, statistics, and their applications.
5. The structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
6. Business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
7. The prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub-atomic structures and processes.
8. Relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
9. Laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process.
10. Economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
11. Media production, communication, and dissemination techniques and methods. This includes alternative ways to inform and entertain via written, oral, and visual media.
12. Administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology.

13. Principles and methods for describing the features of land, sea, and air masses, including their physical characteristics, locations, interrelationships, and distribution of plant, animal, and human life.
14. Machines and tools, including their designs, uses, repair, and maintenance.
15. Raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

### **Abilities**

**Note:** *The technical and functional abilities listed below are based on general occupational qualifications for **Civil Engineering Technicians** commonly recognized by most employers. Typically, you will not be required to have all of the abilities listed to be a successful performer. Recruitment and selection standards for an individual state job must be based on the specific knowledge, skills, and abilities for that job as indicated in the job announcement and job description in the Employee Work Profile.*

#### **The Ability to:**

1. Tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
2. Add, subtract, multiply, or divide quickly and correctly.
3. Choose the right mathematical methods or formulas to solve a problem.
4. Listen to and understand information and ideas presented through spoken words and sentences.
5. Read and understand information and ideas presented in writing.
6. Communicate information and ideas in speaking and in writing so others will understand.
7. 65 Deductive Reasoning The ability to apply general rules to specific problems to produce answers that make sense.
8. Imagine how something will look after it is moved around or when its parts are moved or C
9. Come up with a number of ideas about a topic (the number of ideas is important, not their quality, correctness, or creativity).
10. Speak clearly so others can understand you.
11. Combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
12. Arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
13. Come up with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.
14. Generate or use different sets of rules for combining or grouping things in different ways.
15. See details at close range (within a few feet of the observer).
16. Quickly make sense of, combine, and organize information into meaningful patterns.
17. Identify or detect a known pattern (a figure, object, word, or sound) that is hidden in other distracting material.
18. Match or detect differences between colors, including shades of color and brightness.
19. Know your location in relation to the environment or to know where other objects are in relation to you.
20. Quickly and accurately compare similarities and differences among sets of letters, numbers, objects, pictures, or patterns. The things to be compared may be presented at the same time or one after the other. This ability also includes comparing a presented object with a remembered object.

## Tasks

**Note:** The following is a list of sample tasks typically performed by **Civil Engineering Technicians**. Employees in this occupation will not necessarily perform all of the tasks listed.

1. Inspects project site and evaluates contractor work to detect design malfunctions and ensure conformance to design specifications and applicable codes.
2. Analyzes proposed site factors and designs maps, graphs, tracings, and diagrams to illustrate findings.
3. Plans and conducts field surveys to locate new sites and analyze details of project sites.
4. Drafts detailed dimensional drawings and designs layouts for projects and to ensure conformance to specifications.
5. Develops plans and estimates costs for installation of systems, utilization of facilities, or construction of structures.
6. Reads and reviews project blueprints and structural specifications to determine dimensions of structure or system and material requirements.
7. Calculates dimensions, square footage, profile and component specifications, and material quantities, using calculator or computer.
8. Reports maintenance problems occurring at project site to supervisor and negotiate changes to resolve system conflicts.
9. Conducts materials test and analysis, using tools and equipment, and applying engineering knowledge.
10. Confers with supervisor to determine project details, such as plan preparation, acceptance testing, and evaluation of field conditions.
11. Prepares reports and documents project activities and data.
12. Evaluates facility to determine suitability for occupancy and square footage availability.
13. Responds to public suggestions and complaints.

## INTERESTED?

Like people, occupations have traits or characteristics. These characteristics give important clues about the nature of the work and work environment, and give you an opportunity to match your own personal interests to a specific occupation. When you choose a job in an occupation that matches your own interests you have taken an important step in planning a successful and rewarding career.

Civil Engineering Technician work is considered a “**Realistic Occupation**” because it involves work activities that include practical, hands-on problems and solutions. They often deal with plants, animals, and real-world materials like wood, tools, and machinery. Many of the occupations require working outside, and do not involve a lot of paperwork or working closely with others.

It is also referred to as a “**Conventional Occupation**” since it frequently involves following set procedures and routines. These occupations can include working with data and details more than with ideas. Usually there is a clear line of authority to follow.

It can also be an “**Investigative Occupation**” since it frequently involves working with ideas, and requires an extensive amount of thinking. These occupations can involve searching for facts and figuring out problems mentally.

## **LICENSURE, REGISTRATION, OR CERTIFICATION REQUIREMENTS**

Generally this is not required for Civil Engineering Technician positions in state government. However, to improve career advancement opportunities, you should consider the advantages of certification and include this step in your self-development plan.

For more information, contact the following organizations:

Accreditation Board for Engineering and Technology, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202, or on the web at <http://www.abet.org>

National Institute for Certification in Engineering Technologies (NICET), 1420 King St., Alexandria, VA 22314-2794, or on the web at <http://www.nicet.org>

## **EDUCATIONAL, TRAINING, AND LEARNING OPPORTUNITIES**

According to the Department of Labor:

Most employers prefer to hire someone with at least a 2-year associate degree in engineering technology. Training is available at technical institutes, community colleges, extension divisions of colleges and universities, and public and private vocational-technical schools, and in the Armed Forces. Persons with college courses in science, engineering, and mathematics may qualify for some positions but may need additional specialized training and experience. Although employers usually do not require engineering technicians to be certified, such certification may provide jobseekers a competitive advantage.

## **COMMONWEALTH COMPETENCIES**

Competencies are a set of identified behaviors, knowledge, skills, and abilities that directly and positively impact the success of employees and the organization. Competencies can be observed and measured. When consistently demonstrated, competencies make employees particularly effective in their work. Competencies help lay out a road map to career success. You can use the Commonwealth Competencies to help improve your individual performance by adopting behaviors that make high performing employees successful in their jobs. In this way, you can use the Commonwealth Competencies for your further professional development.

### **The Commonwealth Competencies are:**

1. Technical and Functional Expertise
2. Achieve Results
3. Serve the Customer
4. Teamwork
5. Understanding the Business
6. Interpersonal and Communication Skills
7. Leadership and Personal Effectiveness

The above competencies may be applied to employees throughout the Commonwealth of Virginia. They can be rank-ordered by agencies and hiring managers to represent the needs of

a specific job. The rank ordering will change depending upon the occupation, an organization's priorities, the actual job requirements, and the supervisor's preferences.

Career success is both about what you do (applying your technical knowledge, skills, and ability) and how you do it (the consistent behaviors you demonstrate and choose to use) while interacting and communicating with others. Hopefully, by studying the Commonwealth competencies, identifying your developmental opportunities, and working to refine your own competence, you can take charge of your career!

For additional information about the **Commonwealth Competencies** go to: [http://jobs.state.va.us/cc\\_planningctr.htm](http://jobs.state.va.us/cc_planningctr.htm). For the competencies, we first list the competencies and then define each. Finally, we list competency indicators; to describe what successful performance looks like.

## **COMMONWEALTH CAREER PATH**

Career opportunities in the Commonwealth are not limited to moving “up” to the next highest role and pay band, changing positions, or to becoming a supervisor. That’s because most roles describe a broad group of occupationally related positions that perform a range of work that requires increased knowledge and skills. For that reason, Commonwealth roles describe the career paths within the same or higher-level role for the same or different Career Group. The broad salary range and the Commonwealth’s pay practices provide flexibility in recognizing career development and advancement. ([Salary Structure](#))

Many employers, including the Commonwealth, expect trades professionals to gain knowledge, skills, and abilities in more than one area. Multi-skilled workers can add value to the organization and often find that a variety of work assignments can be rewarding.

### **Sample Career Path**

PAY BAND	PRACTITIONER ROLES	MANAGEMENT ROLES
2	Engineering Technician I	
3	Engineering Technician II	
4	Engineering Technician III	
5	Engineering Technician IV	

### **Engineering Technician I**

The Engineering Technician I role provides career tracks for engineering technicians who perform or provide assistance to others who perform engineering activities. Duties range from trainee to entry level and are of limited scope and require knowledge of principles/techniques in a specific/narrow area of technical assignment and/or acquired through a formal training program.

### **Engineering Technician II**

The Engineering Technician II role provides career tracks for engineering technicians performing at the journey level who apply technical skills in support of specialized tasks, phases and/or segments of a specialty-engineering project or assignment. Duties include drafting and sketching of engineering plans or maps; conducting on-site bridge/structure and project construction inspections; performing materials sampling and testing; calculating geometrics; or other specialty activities to ensure accurate program execution and compliance with Department, State and Federal regulations and standards.

### **Engineering Technician III**

The Engineering Technician III role provides career tracks for engineering technicians performing responsibilities ranging from advanced level to supervisory in support of a broad range of engineering specialty activities. Duties involve interpreting engineering guidelines; coordinating varied activities; performing engineering drafting and design work, traffic engineering improvements, materials acceptance evaluations, bridge/structure inspections and construction inspections for moderate to major scale projects; providing technical assistance to others; and performing detailed reviews of engineering related projects. This role also provides career tracks for photogrammetrists who perform entry level to advanced level responsibilities.

### **Engineering Technician IV**

The Engineering Technician IV role provides career tracks for engineering technicians who perform as experts and/or supervisors of technical specialty engineering support and/or coordination of research, planning, design, construction and/or rehabilitation of comprehensive engineering projects and activities. Duties range from ensuring that projects, programs and procedures are effectively and efficiently administered to providing practical technical expertise in making decisions in the review, analysis, coordination and delivery of a specialty engineering function.

## **ADDITIONAL OCCUPATIONAL INFORMATION CAN BE FOUND AT:**

Accreditation Board for Engineering and Technology

<http://www.abet.org>

National Institute for Certification in Engineering Technologies (NICET)

<http://www.nicet.org>

O\*NET (Occupational Information Network)

[http://online.onetcenter.org/cgi-bin/gen\\_search\\_page?1](http://online.onetcenter.org/cgi-bin/gen_search_page?1)

Virginia Employment Commission

<http://www.alex.vec.state.va.us/>

Department of Professional & Occupation Regulation

[http://www.state.va.us/dpor/conNEW\\_reg.pdf](http://www.state.va.us/dpor/conNEW_reg.pdf)

Career One Stop

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

Virginia Career Resource Network

<http://www.vacrn.net/>