



LIFE AS A CIVIL ENGINEER

WORK SKILLS, INTEREST & COMPETENCIES

Introduction

Civil engineers plan, design, develop and manage projects for the construction or repair of buildings, earth structures, bridges, powerhouses, roads, airports, railways, transit facilities, bridges, tunnels, canals, dams, ports and coastal installations and systems related to highway and transportation services, water distribution and sanitation. Civil engineers may also specialize in foundation analysis, building and structural inspection, surveying, geomatics and municipal planning. Civil engineers are employed by engineering consulting companies, in all levels of government, by construction firms and in many other industries, or they may be self-employed.

A CIVIL ENGINEER IS EXPECTED TO BE TECHNICALLY TRAINED TO HANDLE WORK IN THE ABOVE REFERRED AREAS.

FOLLOWING ARE TYPICAL TASKS WHICH A CIVIL ENGINEER HAS TO DO IN THE COURSE OF HIS/HER WORK SCHEDULE.

Tasks

- Manage and direct staff members and the construction, operations, or maintenance activities at project site.
- Provide technical advice regarding design, construction, or program modifications and structural repairs to industrial and managerial personnel.
- Inspect project sites to monitor progress and ensure conformance to design specifications and safety or sanitation standards.
- Estimate quantities and cost of materials, equipment, or labor to determine project feasibility.
- Test soils or materials to determine the adequacy and strength of foundations, concrete, asphalt, or steel.
- Compute load and grade requirements, water flow rates, or material stress factors to determine design specifications.
- Plan and design transportation or hydraulic systems and structures, following construction and government standards, using design software and drawing tools.

- Analyze survey reports, maps, drawings, blueprints, aerial photography, and other topographical or geologic data to plan projects.
- Prepare or present public reports on topics such as bid proposals, deeds, environmental impact statements, or property and right-of-way descriptions. 🌿
- Direct or participate in surveying to lay out installations or establish reference points, grades, or elevations to guide construction.

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Tools & Technology

Tools used in this occupation:

Distance meters — Electronic distance measuring devices; Rhodes arcs

Levels — Laser levels; Precision levels

Microfiche or microfilm viewers — Microfilm readers

Scales — Drafting scales; Rolling scales

Triangles — Drafting triangles

Technology used in this occupation:

Analytical or scientific software — HEC-1 ^{*}; Hydraulic modeling software; Trimble Geomatics Office; WinTR-55 ^{*}

Computer aided design CAD software — Autodesk AutoCAD software; Bentley MicroStation; Eagle Point Site Design; Research Engineers International STAAD.Pro

Map creation software — Cartography software; ESRI ArcView; Geographic information system GIS software; Intergraph MGE

Project management software — Cost estimating software; Microsoft Project; The Gordian Group PROGEN Online

Spreadsheet software — Microsoft Excel

Knowledge

Engineering and Technology — Knowledge of 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.

Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

Building and Construction — Knowledge of materials, methods, and the tools involved

in the construction or repair of houses, buildings, or other structures such as highways and roads.

Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.

Physics — Knowledge and 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.

Transportation — Knowledge of principles and methods for moving people or goods by air, rail, sea, or road, including the relative costs and benefits.

Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.

Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.

Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.

Skills

Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.

Mathematics — Using mathematics to solve problems.

Operations Analysis — Analyzing needs and product requirements to create a design.

Reading Comprehension — Understanding written sentences and paragraphs in work related documents.

Active Listening — 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.

Speaking — Talking to others to convey information effectively.

Science — Using scientific rules and methods to solve problems.

Time Management — Managing one's own time and the time of others.

Abilities

Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.

Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.

Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).

Information Ordering — The ability to 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).

Mathematical Reasoning — The ability to choose the right mathematical methods or formulas to solve a problem.

Near Vision — The ability to see details at close range (within a few feet of the observer).

Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.

Oral Expression — The ability to communicate information and ideas in speaking so others will understand.

Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

Written Comprehension — The ability to read and understand information and ideas presented in writing.

Work Activities

Making Decisions and Solving Problems — Analyzing information and evaluating results to choose the best solution and solve problems.

Communicating with Supervisors, Peers, or Subordinates — Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person.

Getting Information — Observing, receiving, and otherwise obtaining information from all relevant sources.

Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment — Providing documentation, detailed instructions, drawings, or specifications to tell others about how devices, parts, equipment, or structures are to be fabricated, constructed, assembled, modified, maintained, or used.

Evaluating Information to Determine Compliance with Standards — Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards.

Interacting With Computers — Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.

Analyzing Data or Information — Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts.

Estimating the Quantifiable Characteristics of Products, Events, or Information — Estimating sizes, distances, and quantities; or determining time, costs, resources, or materials needed to perform a work activity.

Updating and Using Relevant Knowledge — Keeping up-to-date technically and applying new knowledge to your job.

Communicating with Persons Outside Organization — Communicating with people outside the organization, representing the organization to customers, the public, government, and other external sources. This information can be exchanged in person, in writing, or by telephone or e-mail.

