

CIVIL ENGINEERING

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Civil engineering

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Definition

Civil engineering is a branch of engineering that deals with the design, construction, and maintenance of the physical and natural built environment, including structures, infrastructure, and public works.

Scope

The scope of civil engineering encompasses various disciplines, including structural engineering, geotechnical engineering, transportation engineering, environmental engineering, and water resources engineering.



History of Civil Engineering

Ancient Civilizations

- Civil engineering has been practiced since ancient times. Notable projects include:
- The Great Pyramid of Giza in Egypt
- The Roman aqueducts
- The Great Wall of China

Industrial Revolution

- The Industrial Revolution brought significant advancements in civil engineering. Notable projects include:
- The construction of railroads
- The development of modern cities
- The building of bridges and canals

The background image shows a cluster of modern skyscrapers, including the Burj Khalifa, set against a vibrant sunset or sunrise sky with hues of orange, pink, and purple.

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Modern Era

- In the modern era, civil engineering has continued to evolve and contribute to society. Notable projects include:
 - The Burj Khalifa in Dubai
 - The Panama Canal
 - The Golden Gate Bridge

Requirements

- Broad understanding of scientific principles and materials.
- Analytical and problem-solving skills.
- Research, teamwork, leadership, and business skills.



Responsibilities

- Planning, design, and construction of infrastructure.
- Major buildings, bridges, dams, pipelines, etc.
- Transportation systems and facilities.

Key Skills



UNDERSTANDING OF PHYSICAL LAWS AND ENVIRONMENTAL FORCES.



MATERIAL BEHAVIOR (NATURAL AND MAN-MADE).



ABILITY TO BUILD IN CHALLENGING ENVIRONMENTS.



USE OF NEW MATERIALS AND RESOURCE CONSERVATION.



CONSTRUCTION PRINCIPLES AND ENVIRONMENTAL IMPACT AWARENESS.



Graduate Skills

- Plan, develop, and manage civil engineering projects.
- Conduct feasibility studies and design civil engineering works.
- Prepare contract documents and terms of reference.
- Manage, monitor, and evaluate operation and maintenance of infrastructure.
- Renovate and rehabilitate existing structures.

Technical Skills

- Apply knowledge of math, science, engineering fundamentals, and civil engineering specialization.
- Identify, analyze, and solve complex engineering problems.
- Design solutions, systems, and processes for civil engineering projects.
- Conduct investigations using research methods and analyze data.
- Utilize modern engineering and IT tools for complex problems.





Professional Skills

- Consider societal, health, safety, legal, and cultural aspects in engineering solutions.
- Understand and evaluate the sustainability and impact of civil engineering work.
- Apply ethical principles and professional responsibilities in engineering practice.
- Function effectively in individual and team settings.
- Communicate effectively with engineers and the public.
- Demonstrate knowledge of engineering management and economic decision-making.

Courses related to Physics

- General Physics (Phys1001)
- Engineering Mechanics I (Statics) (CEng2005)
- Engineering Mechanics II (Dynamics) (MEng2102)
- Strength of Materials (CEng2104)
- Hydraulics (CEng2106)
- Engineering Hydrology (CEng3108)

Courses Related to Mathematics

- Applied Mathematics II (Math2007)
- Strength of Materials (CEng2104) (heavily relies on mathematics)
- Hydraulics (CEng2106) (uses mathematical equations and modeling)
- Open Channel Hydraulics (CEng3107) (uses mathematical models and calculations)
- Engineering Hydrology (CEng3108) (uses mathematical modeling and analysis)
- Numerical Methods (CEng3112) (focused on applying mathematical algorithms)
- Specification & Quantity Survey (CEng4111) (utilizes mathematical calculations for estimations)
- Engineering Economics (CEng5115) (involves economic analysis with mathematical modeling)

Challenges in Civil Engineering

Environmental Impact

- Civil engineers face the challenge of minimizing the negative environmental impact of construction projects. They must consider sustainable design practices and implement measures to reduce pollution, conserve resources, and protect ecosystems.

Budget Constraints

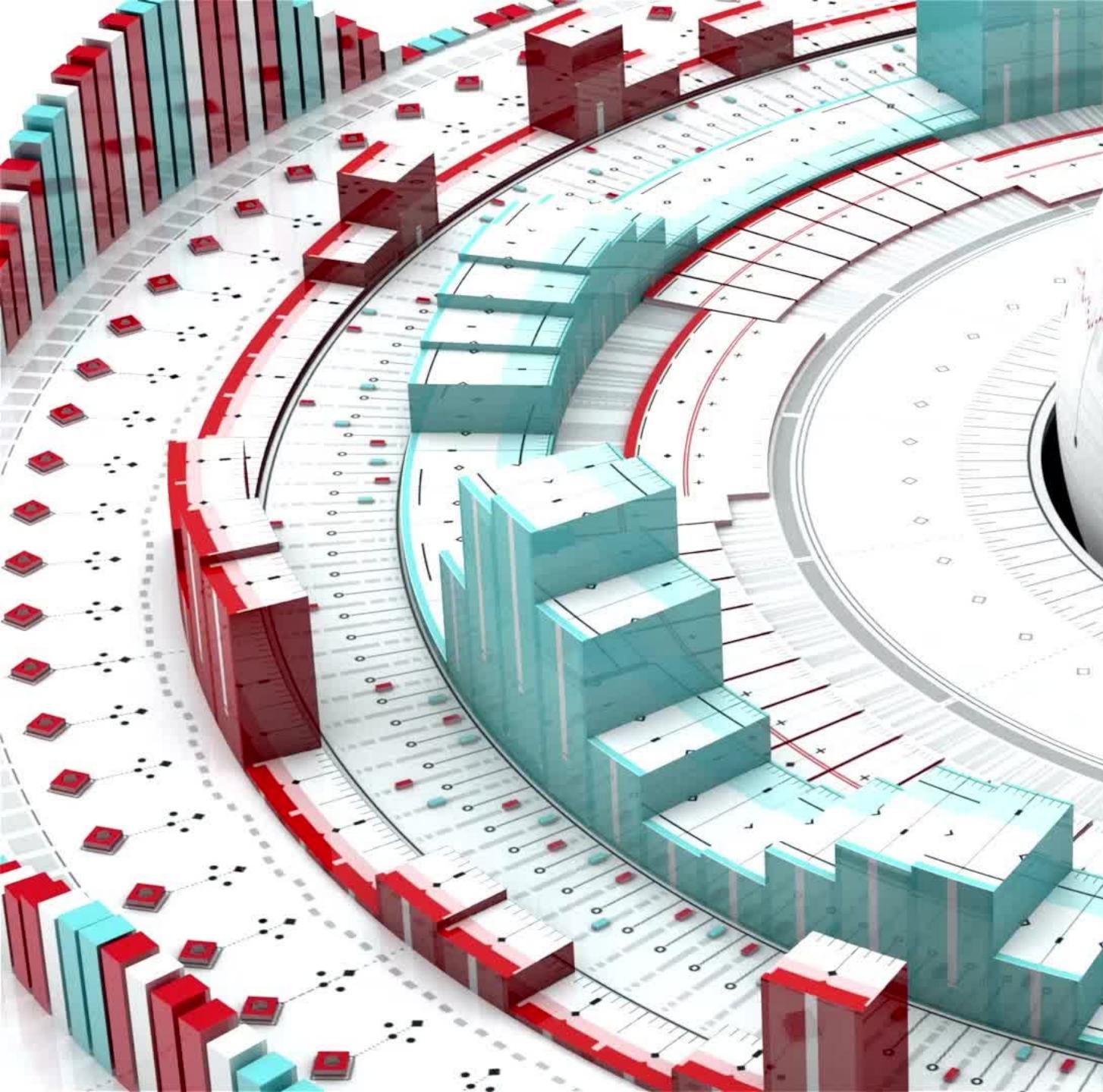
- Limited budgets can pose significant challenges for civil engineers, as they must deliver projects within financial constraints.
- They need to carefully plan and manage resources, optimize project costs, and find cost-effective solutions without compromising quality or safety.

A photograph showing the grand marble steps and fluted columns of the United States Supreme Court building. The perspective is from the bottom of the stairs, looking up towards the entrance. The marble has a warm, light brown tone with darker veining. A white curved graphic element is overlaid on the right side of the image.

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Regulatory Compliance

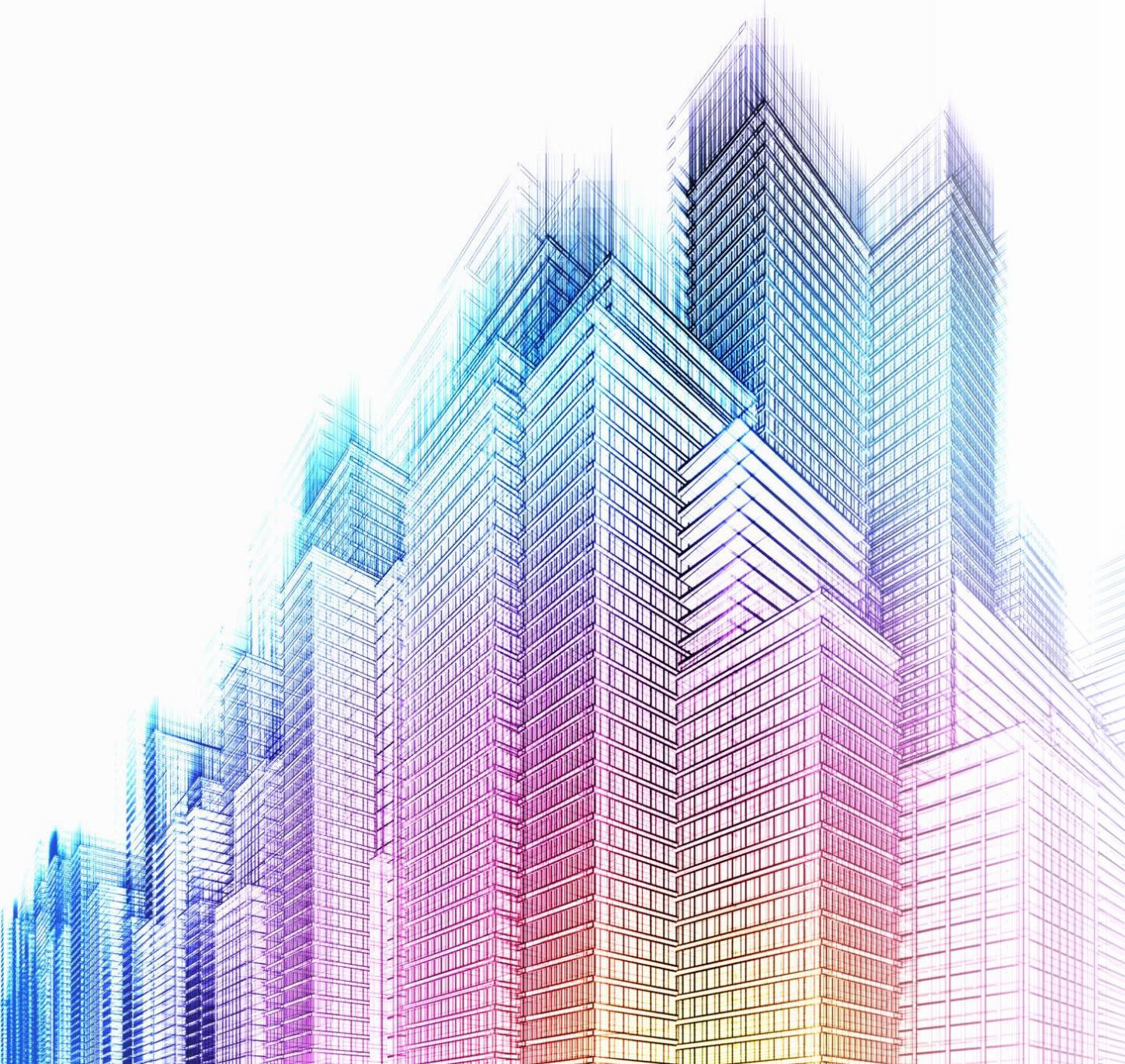
- Civil engineers must navigate complex regulations and ensure compliance with local, state, and federal laws.
- They need to stay updated with changing regulations, obtain necessary permits, and adhere to standards and codes to ensure the safety and legality of their projects.



Job Opportunities

Traditional roles:

- Structural engineer: Design and analyze buildings, bridges, and other structures.
- Geotechnical engineer: Assess soil and rock conditions for foundations, slopes, and other earthworks.
- Transportation engineer: Design and plan transportation systems like roads, highways, and public transit.
- Water resources engineer: Manage water resources for irrigation, drainage, and flood control.
- Environmental engineer: Address environmental challenges like water pollution, waste management, and sustainability.



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Emerging fields:

- Construction management: Oversee construction projects from planning to completion.
- Urban planning and development: Design and manage sustainable and livable communities.
- Disaster mitigation and resilience: Design infrastructure to withstand natural disasters.
- Smart cities: Integrate technology into urban infrastructure for improved efficiency and sustainability.

Is there any available Job in Ethiopia?

Yes, there is. But it depends on your point, the internship place you visited in the summer, and family business groups if they are available otherwise, you are finished ☺.



A cluster of several lightbulbs of different sizes and finishes are arranged against a solid black background. One bulb in the center is brightly lit, casting a soft glow on the surrounding bulbs and the surface below. The other bulbs are dark and reflect some of the light from the central bulb.

Thank you for your attention