



Civil and Structural Engineering

What it means to be a Civil and Structural Engineer!

Gajendra Circle Initiative (GCI) from IIT Madras Alumni Association and The Hindu Group

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What it means to be a Civil and Structural Engineer!

Introduction

Civil Engineer – Civil engineering is a professional engineering discipline that deals with the design, construction and maintenance of the physical and naturally built environment, such as bridges, roads, canals, dams and buildings. Civil Engineering is the oldest engineering discipline after military engineering, and it was defined to distinguish non-military engineering from military engineering. It is traditionally broken into several sub-disciplines including environmental engineering, geotechnical engineering, structural engineering, transportation engineering, municipal or urban engineering, water resources engineering, materials engineering, coastal engineering, surveying and construction engineering.

Civil engineering takes place on all levels: in the public sector from municipal to federal levels, and in the private sector from individual homeowners to international companies.

Structural Engineering – Structural Engineering is concerned with the structural design and structural analysis of buildings, bridges, towers, flyovers, tunnels, off shore structures like oil and gas fields in the sea, and other structures. This involves identifying the load that acts upon a structure and the forces and stresses that arise within that structure due to the load, and then designing the structure to successfully support and resist such load. Load can be self weight of the structures, other dead load, live loads, moving (wheel) load, wind load, earthquake load, load from temperature change etc. A Structural Engineer must design structures that are safe for users and also successfully accomplish the functions that they are designed for (to be serviceable). Due to the nature of some loading conditions, sub-disciplines within Structural Engineering have emerged, such as Wind Engineering and Earthquake Engineering.

Design considerations include strength, stiffness, and stability of the structure when subjected to static load, such as furniture, self-weight etc, or dynamic load, such as wind, seismic wave, crowd or vehicle load, or even transitory load, such as the impact of temporary construction etc. Other considerations include cost, constructability, safety, aesthetics and sustainability.

What You Learn in Civil and Structural Engineering?

Throughout the Civil and Structural Engineering course you will study subjects that will give you the necessary skills to analyze, design and manage solutions for innovative and complex engineering problems as a basis for future leadership in the civil engineering profession.

The courses combine core Civil Engineering subjects such as Surveying, Construction, Management and a significant amount of Mathematics and Analytical Subjects, such as Structures, Geo-technology, and Hydraulics. The third year particularly concentrates on Structural Design in a range of materials. Embedded in the courses is a strong focus on the development of team-spirit, communication and problem- solving skills.

Subjects studied in Civil and Structural Engineering curriculum:

- Civil Engineering Practice
- Structural Mechanics
- Design and Visualization
- Materials
- Engineering Mathematics
- Engineering Surveying
- Construction Management
- Structural Mechanics
- Structural Design
- Materials
- Soil Mechanics
- Hydraulics
- Project
- Contract Management
- Civil Engineering Design
- Structural Mechanics
- Steel and Concrete Structures
- Timber and Masonry Structures

Opportunities

Civil Engineering provides a solid background in Mathematics and Basic Sciences applied toward the study and design of engineering systems. As a broad field encompassing many disciplines, Civil Engineering offers a challenging and fulfilling career to individuals with a wide variety of interests.

Some of the possible career opportunities are as

- Builder
- City Planner
- Architect
- Civil Engineer
- Irrigation Engineer
- Civil Planner

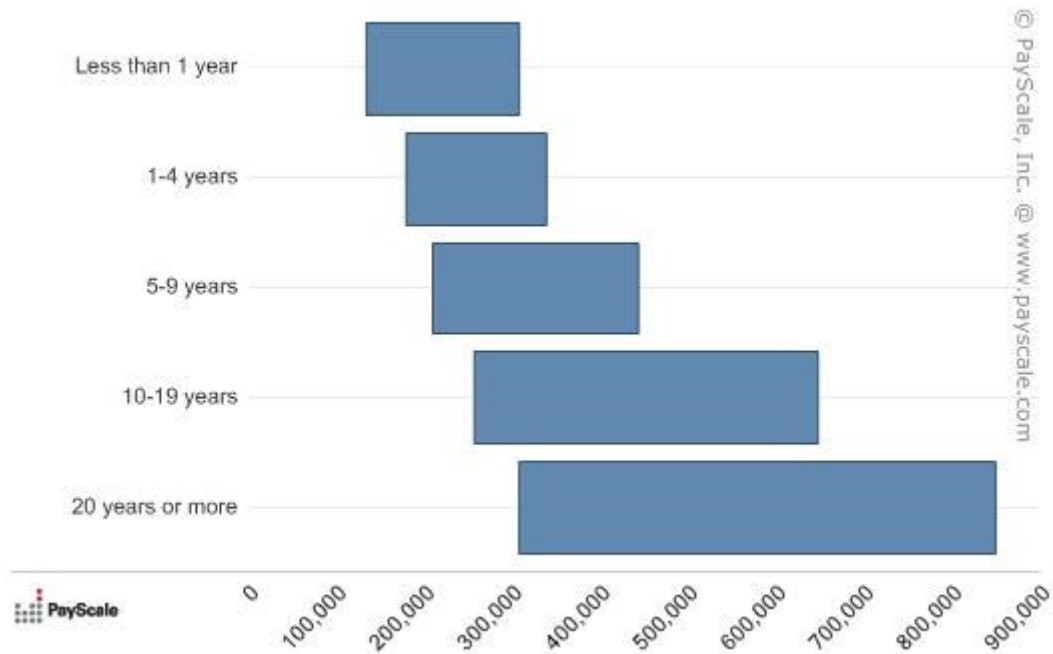
Civil Engineers are employed in public and private sector in all branches of design, maintenance and construction of

- Roads
- Highways
- Bridges
- Airports
- Housing complex
- Marketplaces

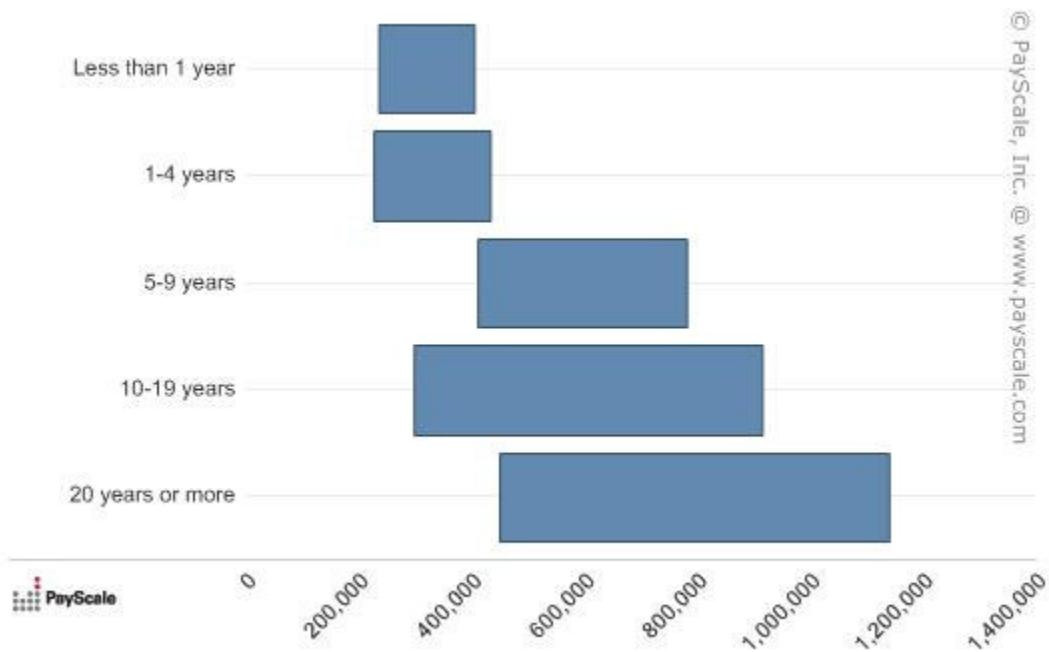
Salary Profile

This section provides salary profile of Civil and Structural engineers in India based on years of experience, city of employment and type of employer.

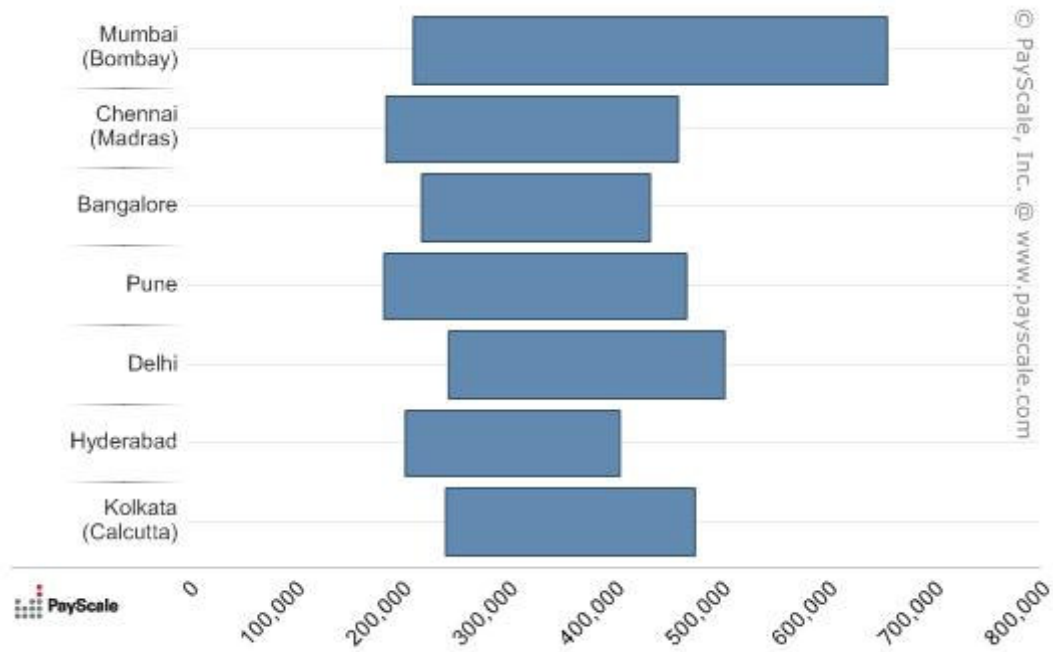
Salary Range for Civil Engineers (by years of experience)



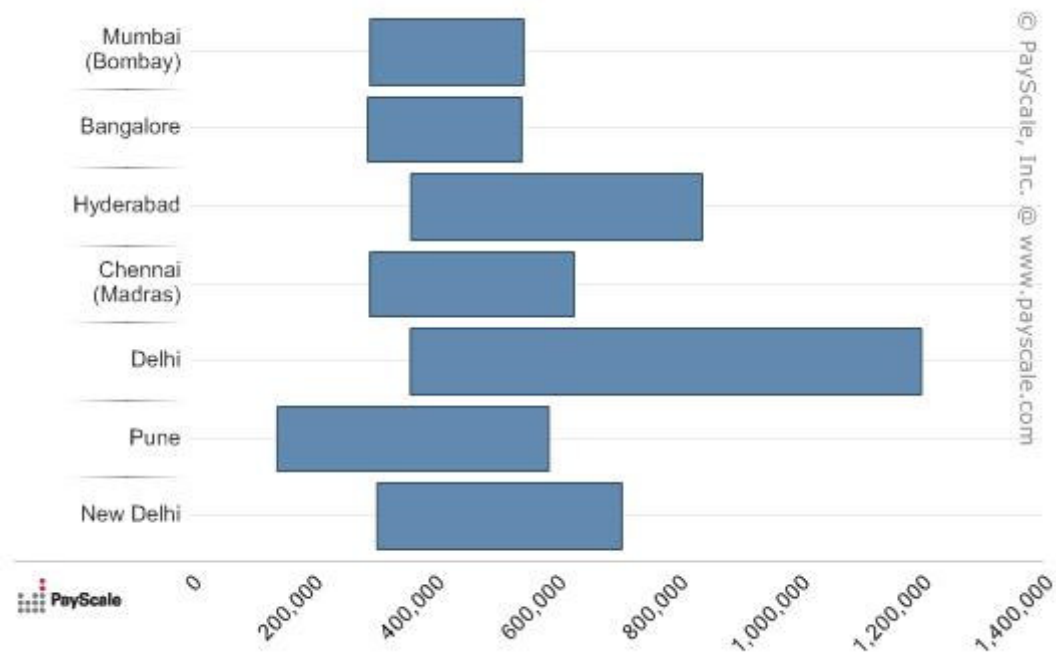
Salary Range for Structural Engineers (by years of experience)



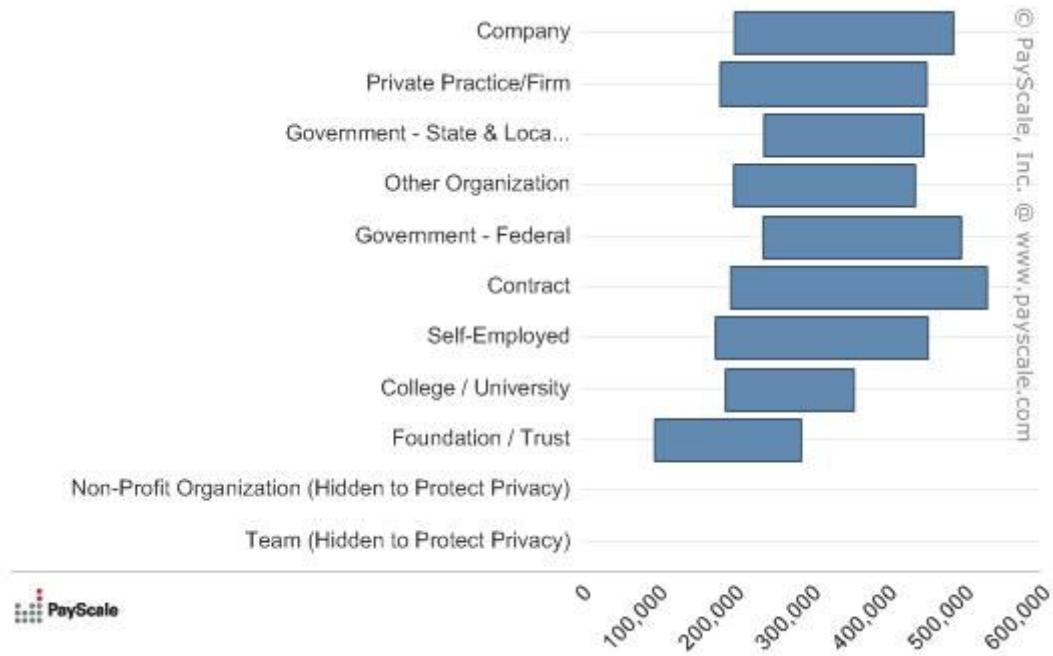
Salary Range for Civil Engineers (by City)



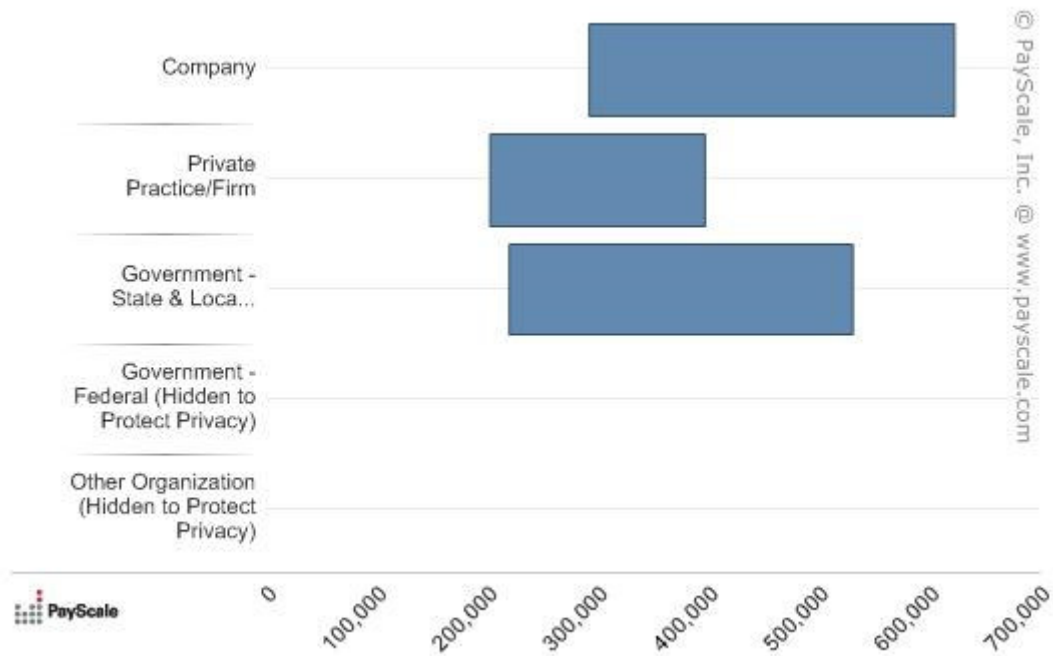
Salary Range for Structural Engineers (by City)



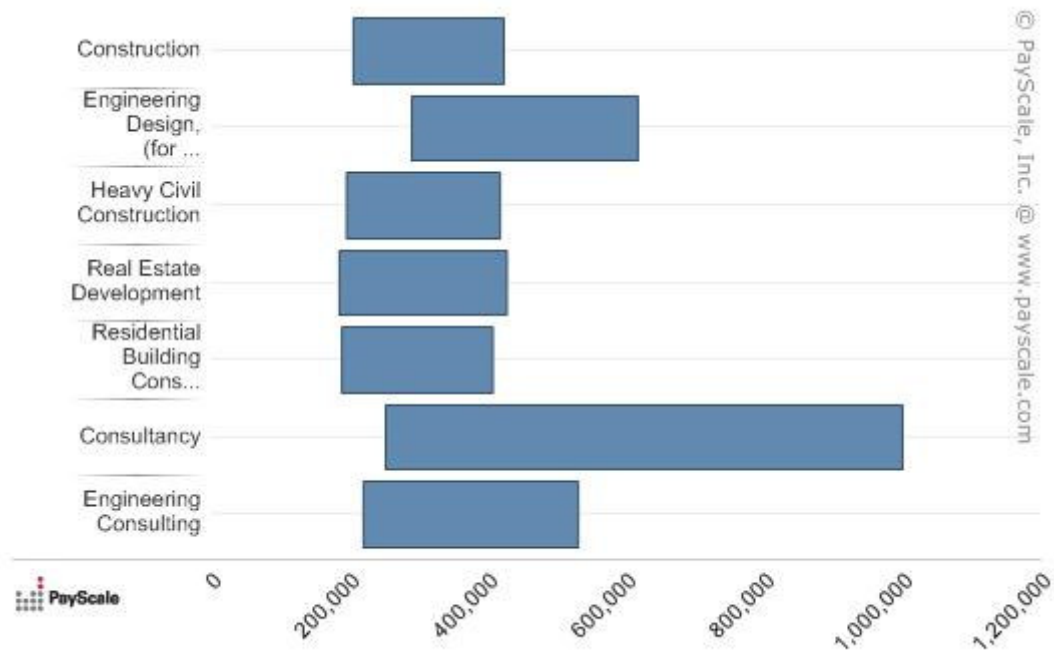
Salary Range for Civil Engineers (by Employer Type)



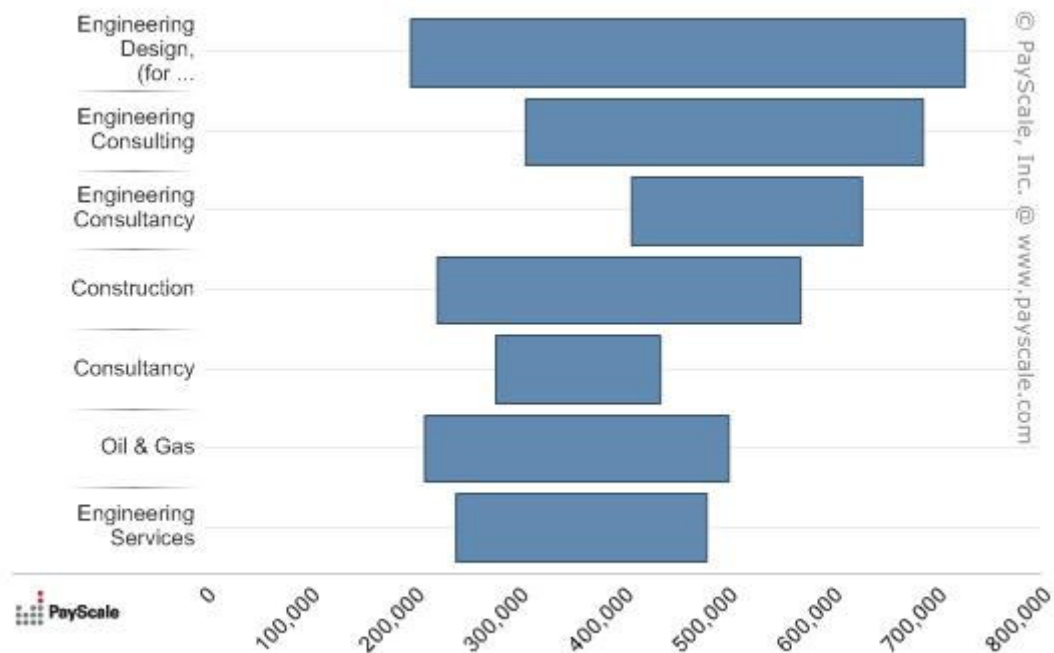
Salary Range for Structural Engineers (by Employer Type)



Popular Industries for Civil Engineering Jobs



Popular Industries for Structural Engineering Jobs



Gender Profile for Civil Engineers



Gender Profile for Structural Engineers



Areas of Research in Civil and Structural Engineering

Civil Engineers are employed primarily by Government departments, Utilities, Architectural firms, Builders, and Engineering firms. There are also career options available in Education and Consulting. Civil Engineering is far from average desk job. Engineers are often on the move, working outdoors at construction sites, sometimes in offices, and sometimes in research labs.

Civil Engineers work in all parts of the country, and some spend their entire careers traveling and working on different projects. About half of Civil Engineers work for Public Authorities. In the Private Sector, Civil Engineers can work not only for traditional engineering firms, but also for Telecommunication Businesses, consulting firms, or even for Toy and Athletic Equipment manufacturers. A variety of engineering specialties are open to qualified graduates:

Transportation Engineers – Transportation Engineers work with local and regional planning boards to identify areas of growth and development. They also look for opportunities to alleviate traffic snarl. Once they understand the needs of drivers in a region, they design plans and develop cost estimates for construction projects.

Structural Engineers – Structural Engineers work with architects and builders to assure that steel and other materials used in construction projects exceed the needs of a given project. With advances in technology and an abundance of creative new building materials, today's Structural Engineers work on a wider variety of projects than ever before.

Geo-technical Engineers – Geo-technical Engineers help builders excavate underground projects and work with experts who manage challenging land renewal projects. When cities want to expand their underground mass transit systems, they call in geo-technical engineers to oversee the tunneling. As more developers erect skyscrapers and other large buildings in urban centers, Geo-technical Engineers assure that the bedrock can safely sustain the pressure of new structures and the people they will support.

Hydraulic/Hydrology/Water Resource Engineers – Hydraulic/Hydrology/Water Resource Engineers redirect water to benefit residents and businesses in a community. They construct canals to speed up

shipping while preserving the natural flow of wild fish in a region, and build dams that generate vital electricity while opening up potential new land for development. Some hydraulic engineers design pipelines that safely transfer fresh water to remote areas, allowing new communities to thrive.

Wastewater Engineers – Wastewater Engineers help improve both our environment and our economy by helping communities and businesses dispose of waste without polluting natural water sources. Until very recently, factories and refineries dumped their industrial wastes into rivers and streams (some still do, though it's now illegal). Today, wastewater engineers develop sewage treatment plants that can remove waste products from water, returning pure water to streams and reservoirs.

Environmental Engineers – Environmental Engineers are in astonishingly high demand as developed countries finally address the climate change crisis. Environmental engineers work closely with business leaders and government officials to institute new air pollution standards that reduce harmful emissions from factories without negatively impacting industrial output. Environmental Engineers also examine the quality of our soil, ensuring that harmful toxins do not seep through the ground and contaminate crops, animals, businesses and homes.

Compliance Officers – Compliance officers work in both corporate and government settings to ensure that local and federal laws are observed in the construction, maintenance, and operation of all kinds of facilities. Compliance officers working in the private sector help their employers prepare for upcoming inspections by anticipating and eliminating sources of pollution or substandard construction. In-house compliance officers simulate visits from official inspectors, saving their companies significant amounts of money through their proactive approach.

Construction Managers – Construction Managers use their engineering and leadership skills to ensure that building projects are completed on time and under budget. Construction Managers must coordinate the efforts of teams of engineers and laborers to meet tight production schedules. They are often the most visible hub of connection between architects, developers, and construction specialists.

Government and Urban Planning Engineers – Government and urban Planning Engineers often use a combination of skills and specialties to coordinate public works and private construction in their communities. Traditionally, Government Planning Engineers forged relationships with state agencies that would provide funds or allow construction of major projects. Local planning engineers often help residents understand the potential environmental impact of new highways or infrastructure projects.

More recently, local governments across the country have strengthened their internal planning systems and hired more engineers. By creating comprehensive land development plans as part of their long-range strategies, cities and towns can position themselves to benefit from explosive growth without succumbing to overwhelming demands on water systems or roads. When residents manage engineering issues internally, they retain more control over the shape and the scope of development in their communities.

Reference

This report has been compiled based on the following publications.

- <http://www.worldwidelearn.com/online-education-guide/engineering/civil-engineering-major.htm>
- http://www.winentrance.com/civil_engineering_course.html
- http://wwwm.coventry.ac.uk/undergraduate/ugstudy/pages/ugft.aspx?itemID=205#whyStudy_anchor
- http://en.wikipedia.org/wiki/Civil_engineering
- http://en.wikipedia.org/wiki/Structural_engineering

About Gajendra Circle

Gajendra Circle (GC) Initiative is a subset of IITM alumni association, and is aimed at building the IIT Madras brand and strengthening the Institute resources. It has been structured as a collection of city specific cells. GC Hyderabad was constituted in April 2010 with the aim to take up activities which strengthen IIT Madras and have a good resonance with the core team.

About Adayana

Adayana is a leading Human Capital Development organization with its headquarters in Indianapolis, IN, USA and offices across Americas, EMEA, and Asia. Adayana provides comprehensive learning services that leverage best-of-class and proprietary technologies and processes.

For four subsequent years, from 2006 to 2009, TrainingOutsourcing.com recognized us as one of the "Top 20 Companies in the Training Outsourcing Industry" for its unique and diverse capabilities. In 2007, 2008 and 2009 Adayana has been named to the Inc. 500 list of America's 500 fastest growing companies. Adayana offers e-Learning, instructor-led training, mobile learning, gameware and performance support tools to its customers for improving human capital performance.

Adayana India (based in Hyderabad) focuses on India and Asia markets - serving large multinationals in the Automotive, IT/ITES, Healthcare, Agriculture & Food and other verticals. Adayana is a leading player in skill development and capacity building and has partnered with leading universities and colleges to provide finishing school content to improve employability of students.

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