



## FREQUENTLY ASKED QUESTIONS: CIVIL ENGINEERING AND CIVIL ENGINEERING TECHNOLOGY

### **Why a career as a Civil Engineer or Engineering Technician?**

From the pyramids of Egypt to the exploration of space, civil engineers have always faced the challenges of the future - advancing civilization and improving our quality of life.

Today, the world is undergoing vast changes – the technological revolution, population growth, environmental concerns and more all create unique challenges. The next decades will be the most creative, demanding and rewarding times for civil engineers and now is the best time to find out if civil engineering is the right career for you:

- Civil engineers today are designing methods and facilities to improve the quality of life in communities throughout Minnesota and the world.
- Civil engineers are problem-solvers. Whether it's designing and improving roadways, replacing deteriorating bridges, easing traffic congestion, meeting energy needs, recovering from floods and earthquakes, redeveloping urban communities or designing new light-rail lines, being an engineer means working to make things better.
- You will be a person who accomplishes things. Service to the community, its development and improvement, is basically what civil engineering is all about. The opportunity for creativity is unlimited.

### **What is the job market potential?**

- The time couldn't be better!!!
- All sources (including employers) are saying that in the next four to seven years almost half of all civil engineers are eligible to retire.
- Many civil engineers were hired to design and update infrastructure when the Clean Air, Clean Water and National Highway Acts were passed in the 1950s, 60s and 70s. Today's civil engineers will help continue these efforts and address new challenges.
- By the way, when there is a shortage of something, the cost usually goes up! In this case, we are talking about your potential salary.

### **What kind of person makes a good Civil Engineer?**

- An engineer must be creative and have good problem-solving skills.
- Engineers must have a good understanding of mathematics and science, computers and new technology.
- Since engineering projects are typically done by teams, an engineer needs good communication skills and leadership qualities.
- Engineers must be aware of the environmental impact of their work as well as the needs and desires of the public.
- Finally, engineers need a good understanding of business practices, finance and management.

### **What advice do you have for someone considering a career in Civil Engineering?**

- Talk to civil engineers and/or technicians about their current and past jobs to see if it sounds like something you would like to do. Call your local county or city engineer and set up a time to visit his or her office, or ask if you can shadow an engineer for a couple of days.
- Another great way to explore civil engineering is through informational interviews; check the internet for tips on requesting these and what questions to ask. Be brave – it's your future.



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### What is the difference between a Civil Engineer and an Engineering Technician?

#### Engineering Technician

- Generally requires a two-year associate degree, although it may be possible to qualify for a job with no formal training.
- Typically a technician's work is practically oriented. It includes computer aided drafting (CAD), preparing plans and construction documents, estimating project costs, surveying, scheduling and managing and inspecting construction projects. Some technicians, such as surveyor's assistants, spend a lot of their time working outdoors.
- The technician's role is a critical one. Without a good technician, plans would never be drafted and essential quality checks would not get done.

#### Civil Engineer

- Civil Engineers require a four-year bachelor's degree from an accredited college or university.
- The engineer is a designer, conceptualizer, developer and formulator of new techniques and standards.
- The engineer is often a project manager responsible for many aspects of a project including financial planning and reporting, communicating with people, managing construction crews and working with contractors.
- The engineer is a partner with the public and elected officials, listening to needs and ideas and proposing ultimate solutions.

### What can I do to prepare to become a Civil Engineer or Engineering Technician?

- Take as many high school science and math courses as possible.
- Computer courses are also highly recommended.
- Join your school's speech club, or write articles for your school newspaper. Having excellent public speaking and writing skills will help you as a college student and be invaluable in advancing your professional career.
- Admissions policies vary among colleges, universities and technical schools, but maintaining a "B" average is important.
- For more information, speak to your high school guidance/career counselor or math/science teacher.

### Do I have to be good at math and science to be a Civil Engineer or Engineering Technician?

- Being good at math and science certainly helps. However, if you enjoy figuring out solutions to problems and have a strong interest in math and science, that's a good place to start. Remember that applying math and science to design solutions to real-life problems is nearly always more interesting than textbook work and, even if you are an average student in high school, you may excel in applying these skills.



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### What education or training do I need to become a Civil Engineering Technician?

- Training is available at technical institutes, community colleges, public and private vocational schools and even the Armed Forces.
- Most training schools require you to take algebra, trigonometry and one or two basic science courses.
- In general, technical schools offer intensive practical training, but will not offer as many general education opportunities as community colleges.
- Many programs offer internships to help you gain experience and earn money to help pay for your education.
- At the end of this document, you'll find a list of local schools offering engineering technician programs.

### How do I find a good school to get a Civil Engineering Technician certificate?

Ask your school counselor or search the internet; a good general site for Minnesota is [www.mnscu.edu/System/VisitACampus.html](http://www.mnscu.edu/System/VisitACampus.html). Another good educational planning site is [www.iseek.org](http://www.iseek.org).

- Locally there are several schools offering technician training:
  - o Lake Superior College – Duluth [www.lsc.cc.mn.edu](http://www.lsc.cc.mn.edu)
  - o Minnesota State Community & Technical College, Detroit Lakes [www.minnesota.edu/campuses/detroit\\_lakes/](http://www.minnesota.edu/campuses/detroit_lakes/)
  - o St. Cloud Technical College, St. Cloud [sctcweb.tec.mn.us](http://sctcweb.tec.mn.us)
  - o Chippewa Valley Technical College, Eau Claire, WI [www.cvtc.edu](http://www.cvtc.edu)
  - o North Dakota State College of Science, Wahpeton, ND [www.ndscs.edu](http://www.ndscs.edu)
  - o Southeast Technical Institute, Sioux Falls, SD [www.southeasttech.com](http://www.southeasttech.com)
  - o Ask your high school career or guidance counselor.

### What do I do in college to prepare to be a Civil Engineer?

- Major in civil engineering.
- Obtain experience either through internships or summer/part-time jobs.
- Join engineering student associations.
- Continue to network and research. Visit public works and civil engineering company web sites. Look online at job requirements for civil engineering positions. Consider visiting a company and requesting an informational interview to get recommendations for your education.

### How do I find a good school to be a Civil Engineer?

- Ask your school counselor or search the internet.
- Locally there are several great universities:
  - o University of Minnesota - Twin Cities [www.ce.umn.edu](http://www.ce.umn.edu)
  - o Minnesota State University - Mankato [www.mnsu.edu/](http://www.mnsu.edu/)
  - o University of Wisconsin – Madison [www.engr.wisc.edu](http://www.engr.wisc.edu)
  - o University of Wisconsin – Platteville [www.uwplatt.edu/~ce](http://www.uwplatt.edu/~ce)
  - o Iowa State University, Ames [www.cce.iastate.edu](http://www.cce.iastate.edu)
  - o University of Iowa, Iowa City [www.cee.engineering.uiowa.edu](http://www.cee.engineering.uiowa.edu)
  - o South Dakota State University, Brookings [www.sdstate.edu](http://www.sdstate.edu)
  - o North Dakota State University, Fargo [www.ndsu.edu](http://www.ndsu.edu)
  - o University of North Dakota, Grand Forks [www.und.edu](http://www.und.edu)



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### **Where would I work as a Civil Engineer or Civil Engineering Technician?**

- Virtually anywhere and everywhere – the possibilities are almost endless.
- You could work for the public as a Federal, State, County or City employee or for a private firm. Someday, you may even start your own firm!
- A partial list of employers includes:
  - o Public agencies: Federal, State, County or City
  - o Private companies: consulting firms, construction companies, manufacturing companies and large industries)
  - o Military
- You could work in a large metropolitan area or a quiet rural area.
- You can have the choice of an office career or working out in the field. Many engineering careers offer a bit of both experiences.
- You can choose to work here in Minnesota, elsewhere in the United States or abroad.

### **What are the job prospects and pay for Civil Engineers and Civil Engineering Technicians?**

- Job opportunities are very good.
- At the start of their careers, civil engineering graduates can expect to make between \$40,000 and \$50,000 per year.
- Civil engineering technicians can expect to make around \$30,000 per year at the start of their careers.

### **What are some different things I can do with a Civil Engineering career?**

- Construction Engineering
- Environmental Engineering
- Geotechnical Engineering
- Structural Engineering
- Transportation Engineering
- Urban Development
- Water Resources

### **Construction Engineering**

- As a construction engineer, you turn designs into reality.
- You must manage construction projects so they are built right, completed on time and within budget.
- You apply your knowledge of construction methods, materials and equipment to turn the designs of other engineers into successful projects.

### **Environmental Engineering**

- As an environmental engineer, you develop physical, chemical and biological processes to address environmental concerns.
- You may provide safe drinking water, clean up sites contaminated by hazardous materials, clean up and prevent air pollution, treat wastewater and manage solid wastes.
- Environmental engineers are more in demand as more emphasis is placed on protecting the environment.



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### **Geotechnical Engineering**

- As a geotechnical engineer, you work to solve design problems related to earth materials.
- Examples of facilities in the earth are tunnels, deep foundations and pipelines. Highway pavements and buildings are facilities supported on the earth.
- As a geotechnical engineer, you conduct analyses based on the principles of science and mathematics to design facilities.

### **Structural Engineering**

- As a structural engineer, you design structures that can support their own weight and are safe even during extraordinary events like hurricanes, earthquakes, blizzards and floods.
- You develop and use knowledge of the properties and behaviors of steel, concrete, aluminum, timber and plastic as well as new and exotic materials.
- To make certain that plans for stadiums, skyscrapers, bridges, office buildings and amusement park rides are being followed, you will often be on the construction site inspecting the work.

### **Transportation Engineering**

- As a transportation engineer, you determine how to move people, goods and materials safely and efficiently.
- You design, construct and maintain highways, railroads, airfields and water ports.
- Your challenge is to find ways to meet increasing travel needs by improving existing transportation methods and discovering new ones.

### **Urban Development**

- As a professional in this area, you are concerned with the full development of a community as well as the redevelopment of older communities.
- You analyze a variety of information to coordinate projects, such as projecting street patterns, identifying park and recreation areas and determining areas for residential and industrial growth.
- Successful project coordination requires you to be people-oriented as well as technically knowledgeable.

### **Water Resources**

- As a water resources engineer, you deal with issues concerning the quality and quantity of water.
- You work to prevent floods, supply water for cities, treat wastewater, protect beaches and manage and redirect rivers.
- You may be involved in the design, construction or maintenance of hydroelectric power facilities, canals, dams, pipelines, pumping stations, locks or seaport facilities.



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### ONLINE INFORMATIONAL RESOURCES FOR CIVIL ENGINEERING AND CIVIL ENGINEERING TECHNOLOGY

#### Sources of Information for Civil Engineers

- American Society of Civil Engineers: [www.asce.org/kids/careers.cfm](http://www.asce.org/kids/careers.cfm)
- Jobs for Kids Who Like Math: [www.bls.gov/k12/html/mat\\_001.htm](http://www.bls.gov/k12/html/mat_001.htm)
- Junior Engineering Technical Society: [www.jets.org/](http://www.jets.org/)
- United States Bureau of Labor Statistics: [www.bls.gov/oco/ocos030.htm](http://www.bls.gov/oco/ocos030.htm)
- American Public Works Association: [www.apwa.net](http://www.apwa.net)
- Minnesota Public Works Association: [minnesota.apwa.net](http://minnesota.apwa.net)
- National Society of Black Engineers: [www.nsbe.org](http://www.nsbe.org)
- Society of Hispanic Professional Engineers: [www.shpe.org](http://www.shpe.org)
- American Indian Science and Engineering Society: [www.aises.org](http://www.aises.org)
- Society of Women Engineers: [www.societyofwomenengineers.org](http://www.societyofwomenengineers.org)

#### Sources of Information for Civil Engineering Technicians

- United States Bureau of Labor Statistics: [www.bls.gov/oco/ocos112.htm](http://www.bls.gov/oco/ocos112.htm)
- National Institute for Certification in Engineering Technologies: [www.nicet.org](http://www.nicet.org)
- Minnesota Society of Professional Surveyors: [mnsurveyor.com](http://mnsurveyor.com)
- American Congress on Surveying and Mapping: [www.acsm.net](http://www.acsm.net)
- Minnesota Department of Transportation Technical Certification Program: [www.dot.state.mn.us/const/tcp](http://www.dot.state.mn.us/const/tcp)

#### Student Associations:

- American Society of Civil Engineers: [www.asce.org/community/student](http://www.asce.org/community/student)
- Institute of Transportation Engineers: [www.ite.org/students/](http://www.ite.org/students/)
- Minnesota Society of Professional Engineers: [www.mnspe.org/students/](http://www.mnspe.org/students/)
- Minnesota County Engineers Association: [www.mcea.gen.mn.us/](http://www.mcea.gen.mn.us/)