

Civil Engineering



1. Civil engineers transform ideas into reality

Imagine going to work and having to spend all day hunched over, eyes glued to a tiny computer screen. Then imagine instead getting to figure out how to best build a waterslide so it's both fun and safe by designing a pumping system to discharge just the right amount of water. Civil engineering is a STEM career that deals with just that. What's more, nothing in civil engineering is set in stone - there are a wide variety of jobs and skill sets that firms and colleges will look for in order to get the most diverse ideas and solutions.

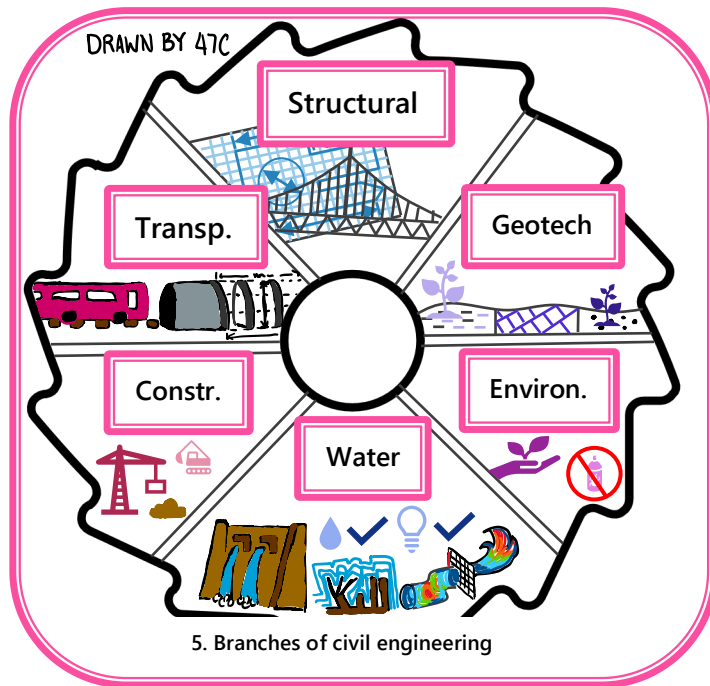
CIVIL ENGINEER (n): A career that deals with the design and construction of public infrastructures such as roads, bridges, dams, and buildings



2. Burj Khalifa – the tallest building in the world and an impressive example of civil engineering

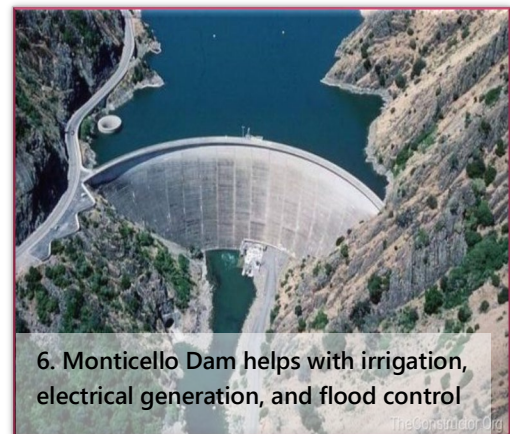
Through robotics, students are prepared for a job in the civil engineering field by learn vital life skills and lessons.

Overview



Just about anyone can become a civil engineer with enough hard work and dedication. Robotics allows students to gain traits like flexibility and creativity, which can be directly translated into the field of civil engineering, although in some branches, such as water resource, a deeper understanding of different subjects as well is

Civil engineering appeals to our team because we recognize that the world needs change, and that change starts with us. Engineering is one career that can have a huge, direct impact on the future of the entire planet. For example, by designing dams, civil engineers have found a greener energy source and have brought electricity to cities all around the world.



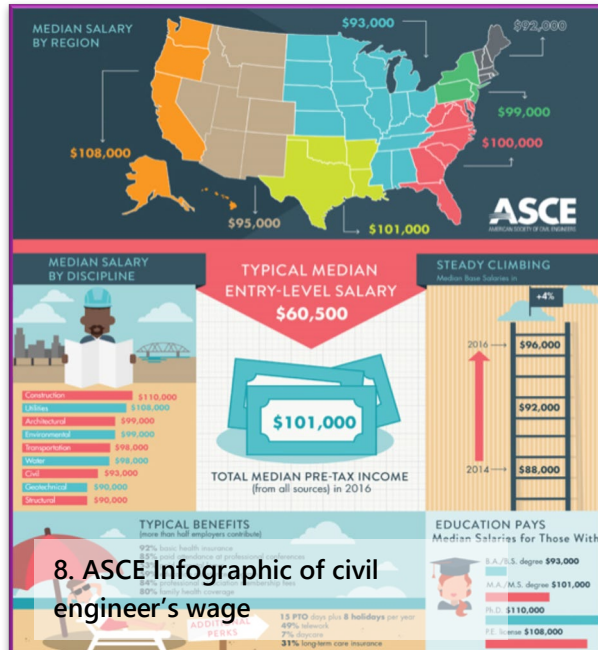
6. Monticello Dam helps with irrigation, electrical generation, and flood control



7. GMR, largest irrigation project in the world

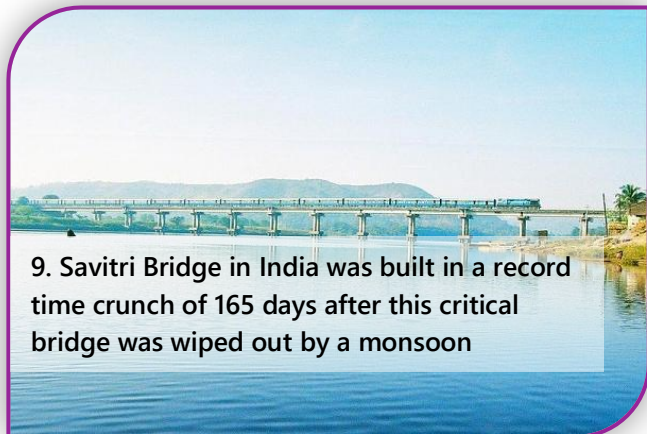
Libya's Great Manmade River (GMR) is one of the biggest engineering projects going on right now. Started in 1984, GMR is the largest collection of underground pipes, with 1,300 wells, and a predicted 6,500,000 m³ of fresh water every day brought to parched mouths.

Overview Cont.

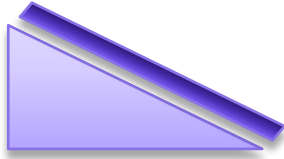


Like with most other jobs, a civil engineer's salary is directly proportional to their working experience and area of residence. Though a civil engineer's wage can range from \$26 to \$69 per hour, the average pay is \$45 per hour. Different regions in the US may have up to a \$26,780 per year difference in salary.

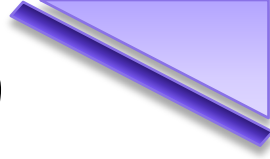
Typically, civil engineers work 40 hours a week, but may sometimes need to work extra to meet project deadlines. Most civil engineers' workdays span from 9 AM to 5 PM.



Civil engineering is amazing in how it covers a wide range of topics and interests. In general, a bachelor's degree is required to become an engineer, though different fields may delve deeper into different topics such as math, statistics, software engineering, and fluid dynamics.



Flexibility



The original coding language used in programming for our team turned out to be extremely difficult to use. There was a lot of debate as to whether we should simply endure through the hardships, or if we should completely restart and learn a simpler, better language. In the end, we chose the latter and members quickly learned how to use C++. In civil engineering, engineers must always be ready to have to scrap their designs, similar to how we did, and to go through the Engineering Design Process multiple times.



11. Working through obstacles towards success

ENGINEERING DESIGN PROCESS -- FIVE STAR METHOD TO SUCCESS

ASK

IMAGINE

PLAN

CREATE

IMPROVE

“REMAIN FIRM ABOUT YOUR GOALS, BUT FLEXIBLE ABOUT YOUR METHODS.” -- William A. Donohue (president of U.S Catholic League)

Creativity



12. Unleashing creativity will often lead to the best ideas

“INSTEAD OF THINKING
OUT OF THE BOX,

*Get rid of the
box.”*

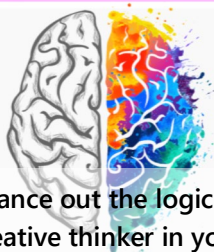
—DEEPAK CHOPRA (INDIAN
AMERICAN AUTHOR)

In both robotics and civil engineering, creativity is critical to solving problems and going above and beyond. Robotics helps train members of 47C to think big and to never set limits for themselves. With the perfect blend of smarts, curiosity, and a sprinkle of crazy, robotics helps develop future civil engineers.



13. Piano House -- China

The Piano House in Huainan, China is an example of one of the most innovative structures ever built. Shaped like a piano and a violin, the Piano House is a place where music students can practice and perform.



14. Balance out the logic and the creative thinker in you

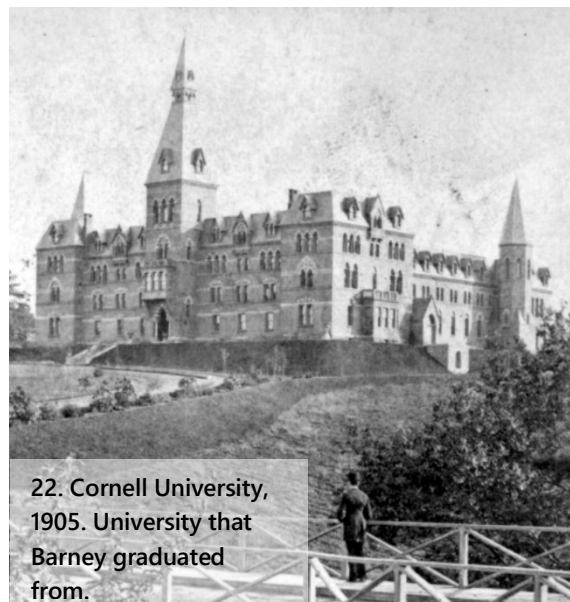
Nora S. Barney

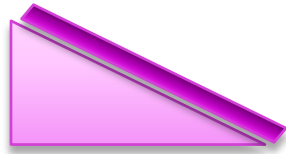


THANKS TO NORA BARNEY:

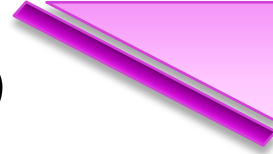
- By 1949, 50 women had by then been admitted to ASCE membership.
- By 2015, when 14 percent of ASCE's more than 146,000 members are female
- Our team, 47C With Fire, is an all-girl team and looks up to Nora Stanton Barney because she is an example of a woman breaking barriers in a previously all men occupation.
- Not only was Barney an incredible role model and women's activist, but she was also a prominent contributor to the civil engineering knowledge base.

- Nora Barney: the first woman to become a civil engineer.
- Her first husband, Lee De Forest, tried to get her to leave her engineering job to become a housewife, but Nora refused, instead divorcing him
- "In 1916, Barney sought to become the first woman to enjoy full ASCE Associate member status, but the Board of Direction turned down her application," (ASCE news).
- Never gave up and went on to help solve a key problem with hydrodynamics and design an early radio broadcast system.





Interview



23. Kelly Jiang, an alumna of Berkeley and an environmental engineer

What made you decide to become an environmental engineer?

"Once I started learning more about climate change, and how that's basically the biggest problem our generation has to fix, I was like, okay, this is going to be what I'm going to spend my life working on."

Kelly has helped us realize that civil engineering is a game-changing career path that helps make the world greener, safer, and healthier.

KELLY JIANG

- Bachelor's degree in environmental engineering
- Works at Centrica in Seattle, WA
- Has interned at Environmental Resource Management

What do you think helped you become successful? Advice?

"You can apply any skill set to helping the environment. Find something you're passionate about. So, if you're interested in clean energy, read about it, talk about it with your friends, do side projects and competitions in high school."



24. UC Berkeley

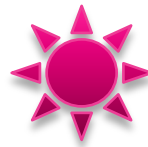
The Future



15. Climate change will lead to changes in civil engineering

A huge part of civil engineering for the future is ecofriendly infrastructure. One of the biggest problems that the 21st century is facing is global warming. For Earth to be able to sustain life for future generations, buildings such as hospitals, schools, and apartments, that civil engineers design and build, must be ecofriendly.

Civil engineers will be forced to use green materials and methods such as grasscrete - a method of laying concrete flooring, walkways, sidewalks, and driveways so there are that there are open patterns allowing grass or other flora to grow. (Concrete Climate Challenge).



16. Grasscrete



17. Inside of Amazon Spheres

The Amazon Spheres has incorporated over 40,000 plants into its overall design. This garden not only helps fight against climate change by housing an array of plants but has also proven to be an amazing place to visit. The design of the Amazon Spheres is just the beginning of ecofriendly infrastructure in the future.

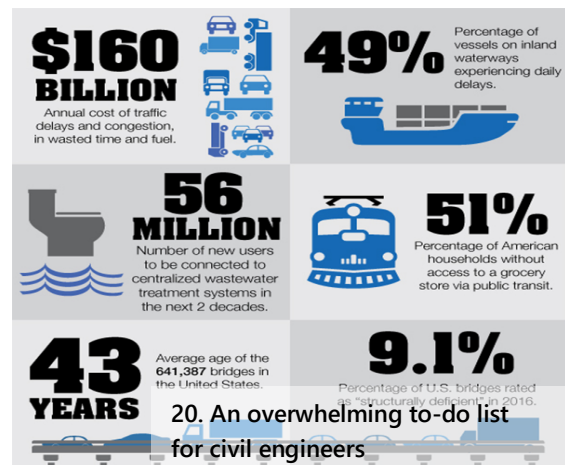
Obstacles

Civil engineers struggle to implement greener materials. Not only is there not enough money to make it possible, but not enough countries in the world are willing to work together. Converting to grasscrete, for instance, would mean having to replace more than 75 million tons of already-existing concrete.



The U.S. infrastructure is crumbling by the second and civil engineers are rushing to scrap together enough money to renovate the U.S. before it falls apart. In fact, the American Society of Civil Engineers (ASCE) estimates that it will take \$3.6 trillion to bring all our bridges, dams, buildings, sewer systems, etc. to working order.

There's a growing list of tasks that need to be completed and a decreasing number of civil engineers. One retired engineer told ASCE, "I was just a cog in the wheel and anyone can replace me...[the world] will keep improving with or without me." Not only that, but with the evolving world circulating around technology, engineering simply can't guarantee the same appeal and compete.



Angela Dong, Brooke Lin, Manya Pradeep Narayan, Maddie Tsai

47C With Fire

Civil Engineering

Work and Picture Citations

“10 Amazing Eco-Friendly Constructions.” *Jobsite Worklife*, Jobsite UK, 15 Oct. 2014,

www.jobsite.co.uk/worklife/10-amazing-eco-friendly-constructions-18315/.

Akash, Akash. “India Needs Skilled Civil Engineers for the Booming Construction Industry.”

DigitalLEARNING Magazine, Digital Learning, 5 Apr. 2019,

<https://digitallearning.eletsonline.com/2019/04/india-needs-skilled-civil-engineers-for-the-booming-construction-industry/>

Bureau of Labor Statistics, “Civil Engineers: Occupational Outlook Handbook.” *U.S. Bureau*

of Labor Statistics, U.S. Bureau of Labor Statistics, 10 Apr. 2020,

www.bls.gov/ooh/architecture-and-engineering/civil-engineers.html

Careers360, Team. “Civil Engineering.” *Core Subjects, Fee, Top Recruiters*, Careers360, 5 Sept.

2014, 8:37 AM, <https://engineering.careers360.com/articles/civil-engineering-1>.

“Civil Engineering Grand Challenges: Opportunities for Data Sensing, Information Analysis,

and Knowledge Discovery.” *American Society of Civil Engineers (ASCE)*, ASCE, 14 Oct.

2014, www.asce.org/computing-and-it/news/20141014-civil-engineering-grand-

[challenges--opportunities-for-data-sensing,-information-analysis,-and-knowledge-discovery/](#).

Civil Engineer, Truity, 13 May 2020, www.truity.com/career-profile/civil-engineer.

"Civil Engineers." *Career Profiles*, 2020, www.careerprofiles.info/civil-engineer-career.html.

Dash, Dipak K. "Bridge on Savitri river in Maha built in record 165 days." *Times of India*, Bennett, Coleman & Co, 3 June 2017, <https://timesofindia.indiatimes.com/india/bridge-on-savitri-river-in-maha-built-in-record-165-days/articleshow/58969383.cms>.

Datawheel. "Civil Engineers." *Data USA*, <https://datausa.io/profile/soc/172051/>. Accessed 28 Oct. 2020.

Defense, Department of. "Civil Engineers." *My Future*, MyFuture, www.myfuture.com/career/civil-engineers.

Editors of Encyclopædia Britannica. "Nora Stanton Blatch Barney." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., 14 Jan. 2020, www.britannica.com/biography/Nora-Stanton-Blatch-Barney.

"Entry Requirement & Skills Needed For a Civil Engineer." *Learn.org*, 2003, https://learn.org/articles/entry_requirements_skills_needed_for_a_civil_engineer.html#:~:text=Career%20Information%20at%20a%20Glance%20%20%20Education,fast%20as%20average%29%2A%20%201%20more%20rows%20.

"Green Building Materials That Are Alternatives to Concrete." *Volvo CCC*, Construction

Climate Challenge, 15 Mar. 2018,

<https://constructionclimatechallenge.com/2016/07/07/green-building-materials-that-are-alternatives-to-concrete/>.

Lloyd, Sarah Anne. "Inside the Amazon Spheres: The Plants, the Architecture, and a Transforming City." *Curbed Seattle*, CurSeattle, 30 Jan. 2018,

<https://seattle.curbed.com/2018/1/30/16947838/amazon-spheres-seattle-architecture-photos>.

Mowlace, Nader. "Top 12 Personality Traits of Ultra-Successful Engineers." *Interesting Engineering*, Interesting Engineering, 12 Mar. 2018,

<https://interestingengineering.com/personality-traits-successful-engineers>.

OwlGuru. "How Much Do Civil Engineers Make in 2020 (including Starting Salary)",

OwlGuru.Com, www.owlguru.com/career/civil-engineers/salary/#:~:text=Entry-level%20Civil%20Engineers%20with%20little%20to%20no%20experience,they%20become%20more%20experienced.%20Featured%20Civil%20Engineering%20Schools.

Accessed 28 Oct. 2020.

Shah, Himanshu. "What Can I Do With A Civil Engineering Degree?" *My Decorative*, 27 Aug.

2019, <https://mydecorative.com/what-can-i-do-with-a-civil-engineering-degree/>.

"Top Personality Traits of Engineers." Top Personality Traits of Engineers | Kettering University Online, Kettering University, 6 Oct. 2016,

<https://online.kettering.edu/news/2016/10/06/top-personality-traits-engineers>

"Top 10 Most Impressive Civil Engineering Projects." *Norwich University Online*, 8 May 2018, <https://online.norwich.edu/academic-programs/resources/top-10-most-impressive-civil-engineering-projects>.

Tourkamen, Annabelle. "The State of Women in Civil Engineering." *The State of Women in Civil Engineering* | *ASCE News*, ASCE News, 11 Apr. 2018, <https://news.asce.org/the-state-of-women-in-civil-engineering/>.

Walpole, Ben. "ASCE Recognizes Stanton Blatch Barney; Pioneering Civil Engineer, Suffragist." *ASCE Recognizes Stanton Blatch Barney; Pioneering Civil Engineer, Suffragist* | *ASCE News*, ASCE News, 28 Aug. 2015, <https://news.asce.org/asce-recognizes-stanton-blatch-barney-pioneering-civil-engineer-suffragist/>.

"What Is Green Infrastructure?" *EPA*, Environmental Protection Agency, 4 Dec. 2019, www.epa.gov/green-infrastructure/what-green-infrastructure.

Women, Minorities, and Persons with Disabilities in Science and Engineering, National Science Foundation, Jan. 2017, www.nsf.gov/statistics/2017/nsf17310/digest/fod-women/engineering.cfm#:~:text=Chart%20View