

Official Blog of Pro-Tec Equipment

Along with being distributors of [trench shoring](#) products such as [trench shields](#) and [slide rail shoring systems](#), we like to provide useful information for students.

Civil engineering is a common profession in our field, and we realized that there weren't a tremendous amount of practical resources where students could learn more about what a career in this field would look like.

With that in mind, we asked some successful professionals and educators their thoughts on career paths, advice on classes, starting positions and much more.

Question 1:

If a student were looking to get into civil engineering, what courses should they take and what skills would will be most valuable in the industry and most important in helping them succeed?

They will need to take math and physics courses in high school and some chemistry. Computer skills, communication skills business and leadership skills is also a plus

Husam Najm, Ph.D., S.E.

I am assuming you mean students in high school or prospective students preparing to enter an ABET-accredited program for a Bachelor of Science in Civil Engineering (BSCE). Students interested in a career in civil engineering should take courses, such as:

- A) Mathematics: precalculus, calculus, statistics.
- B) General chemistry and/or biology/microbiology.
- C) Calculus-based physics.

D) Written communication: College Composition and/or Technical and Business Writing.

E) Oral Communication: Public Speaking.

F) Economics.

G) Graphical Communications/Computer Aided Design (CAD)/Computer Programming/Geographic Information Systems (GIS).

Upon entry into the BSCE degree program, students will typically receive more detailed course instruction in at least four core areas of civil engineering, which may include but not be limited to the following, depending on the individual accredited program: Geotechnical (soils), structural (bridges, buildings, etc.), water resources (hydraulics and hydrology), environmental (water, wastewater, and solid/hazardous waste), transportation (highways, railroads, airports, marinas, etc.), and other possible core areas.

Many consulting firms also are looking for Master's Degree prepared graduates. The primary reason is the demonstration of the skill set of: organization of effort and documentation, communication of a significant work and its results, and greater focus and expertise in a particular field of study.

Harvey A. Gullicks, Ph.D., P.E.

The must have a BS in civil engineering. The courses are defined by the ABET/EAC accredited program. A high school student should have good math and science skills. They need to be ready to take Calculus, Chemistry, and English at the college level. Experience in physics in high school could be helpful.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Question 2:

Is there such a thing as a “typical career path” in civil

engineering? If so, what would it look like? Are there industries that demand civil engineers more than others?

I am not sure if there is a clear path for civil engineering. Typically civil engineers and pretty much other engineers start as junior engineers (entry level), then become senior engineers— after that they get into project engineering and project management. Some take the technical track and become technical managers. Ultimately, some go on to become Principals Office Managers, Partners, and Vice Presidents. Some decide to start their own business along the way. That could be looked at as a career path.

Husam Najm, Ph.D., S.E.

Everyone's career path is different. Most BSCE degree programs tend to have curricula that emphasize courses leading to relatively high capabilities in structural engineering and can imply to the students that civil engineering is structural engineering. In reality, about 60 to 65 percent of employment opportunities in civil engineering are in the water resources and environmental fields and there are also lots of opportunities in transportation and significant opportunities in geotechnical and other fields, too. Often, graduates of BSCE programs really don't know what area of practice will most appeal to them or present the best opportunities for their futures. For example, upon graduation, I was convinced that structural engineering was for me and I had landed a great job in the bridge department of a national railroad company. On the first day of work, my physical exam revealed blindness in my left eye and my employer concluded that I could not safely work in the bridge department, resulting in my transfer to the mechanical engineering department, where my career in environmental engineering was launched and has proven to be my passion. What I have discovered during my career, however, is just how useful that broad general civil engineering education and training can be in your chosen area of practice. I have had the opportunity to do lots of geotechnical work and structural design in the completion of many water and wastewater treatment plant construction projects and have even been afforded the opportunity to provide expert testimony that won a significant legal case settlement for a municipal client following a structural pipe failure. In the long run, if it is your passion, you will persevere and succeed.

Harvey A. Gullicks, Ph.D., P.E.

No. Civil engineers do everything. The one most common issue is they are designing those engineered systems which define the quality of life in society and support economic development in a state or region. They work on water and transportation infrastructure. They have expertise in environmental, structural, geotechnical, construction, materials, transportation, surveying, and water resources management and engineering.

Civil engineers have many careers to follow. They are more likely to become Professional Engineers which qualify them to design public projects and a host of other design projects. They are working for heavy and light industry. They work for local, state and federal agencies and their military counterparts. They work for consulting firms. They work in construction, design, planning, and management. They also rise to manage, even own, these corporations.

Civil engineers also pursue corporate management, medicine, law, and political office in some instances.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Question 3:

In an entry level position, what types of tasks and responsibilities should a student expect to take on?

Entry level work is basic – mainly focuses on reading plans, doing quantities, site visits to collect data and information, learning codes and manuals, doing some design work – all under the supervision of a senior engineer

Husam Najm, Ph.D., S.E.

Many times entry level civil engineering tasks are performed by

students or by recent BSCE graduates. Entry level tasks might include field observation and documentation during construction, testing of materials, surveying, pay estimate quantity takeoffs, CAD and/or GIS work, and assisting with portions of reports, etc.

Harvey A. Gullicks, Ph.D., P.E.

They design, project review, and construction management of civil engineering projects. Depending on the employer, it is not impossible to find a recent graduate managing the construction management of multi-million dollar projects, or working in a team of engineers to design complex engineering projects.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Question 4:

What kinds of varying positions / jobs / experiences should a new hire seek out to become well-rounded as a civil engineer and make them marketable in the industry?

It is important that any entry level joins a company where he/she can learn and get experience quickly. Some companies allow entry levels to be exposed to many things to make them well rounded; other companies do not. They need to check out the company and see how new hires work there and can they get a lot of experience and be exposed to many things early on. If not, they need to change or wait for other opportunities at other companies.

Husam Najm, Ph.D., S.E.

In my opinion, every job or experience is an opportunity to become well-rounded and marketable. I would consider development in the following areas critical to a well-rounded, marketable civil engineer: client contact/marketing, construction observation and later management, safety training, CAD/GIS work, project need assessment, project planning and alternative identification, information research (processes, equipment, costs, etc.), cost estimating and economic analysis of alternatives, project report writing, alternative selection, familiarity with funding sources,

development of project funding, detailed project (or project component) design, design drawing supervision, specification writing, contract document preparation, bidding protocols, client and contractor interface activities, construction closeout and preparation of “as-built” documents.

Harvey A. Gullicks, Ph.D., P.E.

The best option is to pursue professional licensure which requires working under someone with a PE and taking the required tests. They need to be reasonably diverse in that work for the first few years.

Otherwise, pursuit of a graduate degree in one of the areas of civil engineering is appropriate and opens the doors for greater advancement and reward.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Question 5:

What differences are there between working for a large (national or international) civil engineering firm compared to a smaller, regional one?

The difference is there are more large scale projects with larger companies and more possibilities to work in other offices and get to know more people. In smaller firms, engineers tend to be involved in many more details of the project than in larger firms which gives them more experience but if the work slows down, they may be laid off. But sometimes you really do not know. My advice is that when looking for job, the student should try to ask what exactly they will be doing once they are hired, which project how long before they move to another project. Sometimes is not easy to get these answers.

Husam Najm, Ph.D., S.E.

In my experience, working for a smaller, regional civil engineering consulting firm often involves working on a wide variety of different

types of projects and becoming sort of a “jack of all trades.” You may not be an expert in all facets of the project involvement. So, it is not uncommon for smaller firms to work jointly or collaboratively with larger national/international firms on challenging local/regional projects. Employees of larger national/international firms are often more “pigeon-holed” into working on specific types of projects and through that narrower focus often, though not always, become experts in their narrower field or focus area. I have often experienced great working relationships between smaller firms and larger firms, where the client benefited dramatically from the collaborative effort.

Harvey A. Gullicks, Ph.D., P.E.

The types of projects and the diversity of skills. In smaller first, a person does more of everything at a more basic level. In bigger firms, an engineer will be expected to have stronger skills in a specific area.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Question 6:

If you had one piece of advice for a student looking to get into a career in civil engineering, what would it be?

Get good communications, business and managerial skills, and now computer/technology skills, learn how react quickly to handle an emergency. Either by taking courses, or attending seminars while at school and early after graduation.

Husam Najm, Ph.D., S.E.

Learn as much from the experiences of your peers, contractors, operators and clients and from their project experiences as possible, both from their successes and from their failures. Do not be destined to repeat the failures and be quick to credit the source of your successes. Above all, know your limitations and seek experts when expectations exceed your limitations and ability to deliver.

Harvey A. Gullicks, Ph.D., P.E.

Be committed to getting the education first and foremost. There is plenty of time to have fun in college, but if getting the education is not taken as a job..which is given priority...the diverse educational experience can adversely impact the education they get and this will limit their career options.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Question 7:

Based on your experience, what are the most surprising or unexpected elements about civil engineering?

Projects are unpredictable– once you have them and the next day you are told to stop! It's very difficult for managers and you need to have alternatives if that happens. Personal and communications skills can surprise you how important they can be. Third, natural disasters can really test civil engineers and they should be prepared for that either through education or through real life experience.

Husam Najm, Ph.D., S.E.

It always surprises me that so many people in the general public, as they daily go about using the infrastructure created by civil engineers and contractors, either take for granted or are unaware of what civil engineers and contractors do until a catastrophic failure and the media capture their attention. As an industry, we need to do a better job of advertising our societal contributions and successes.

Harvey A. Gullicks, Ph.D., P.E.

How much one can really achieve, just how big a difference one's designs can have on society. I have designed projects that have generated millions of dollars of revenue for public agencies, or

reduced operating costs in ways that paid for changes in a matter of months with those saving going on for years to come. Civil engineers impact the lives of thousands of people every day, for the good or the bad depending on how they do their job.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Question 8:

What do you find to be the most rewarding aspect of working in a civil engineering profession?

A lot of satisfaction when you work on major project and see it built and used by people.

To be help to help people when a natural disaster strikes and is called upon civil engineers to help repair and restore roads, bridges, water, levies, and shelters.

Husam Najm, Ph.D., S.E.

For me, the most rewarding aspect of civil engineering is the satisfaction of knowing that my efforts have led to the construction of critically-needed infrastructure that benefits the public and private sectors. There is tremendous pride in being able to visit or drive past a facility and know that you designed it (or at least a significant part of it), that it was constructed under budget, and is functioning as it was intended to function. It is truly gratifying to be told by your clients that your work has contributed to successfully completed and highly appreciated projects.

Harvey A. Gullicks, Ph.D., P.E.

See the answer to Question 7. This job allows you to make a difference in the live of people. We have the opportunity to make a difference, to leave things better than we find them.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Biographies:

Husam Najm, Ph.D., S.E.; Associate Professor of Civil Engineering;
Rutgers University

Short Biography for Harvey A. Gullicks, Ph.D., P.E.

Harvey Gullicks graduated Summa cum Laude from the University of North Dakota (UND) with a BSCE in 1976. He was employed in the railroad industry for slightly over one year, before returning to complete a Master's degree in Civil Engineering (environmental emphasis) at the UND in 1979. Gullicks then entered consulting with STS, Ltd, a national materials, geotechnical and environmental firm. In 1983, he began working on a Ph.D. in Civil Engineering at Iowa State University, specializing in water and wastewater engineering and graduating in 1987. Gullicks was employed with consulting firms (Veenstra and Kimm, Inc. in West Des Moines, IA as a Project Manager and UniField Engineering in Billings, MT as the Manager of Environmental Services) before accepting an offer to join the faculty at the UND in the August 1993. In 2010, Gullicks, an Associate Professor, was appointed Chair of the Department of Civil Engineering at UND. Since 1993, Gullicks has also held the position of Senior Environmental Engineer with AE2S, Inc., a regional consulting firm headquartered in Grand Forks, ND. Dr. Gullicks is a professional engineer, currently registered in the states of MN, ND, and MT.

Dennis D. Truax, Ph.D., P.E., BCEE, F.ASCE

Dr. Dennis D. Truax, P.E., BCEE, F.ASCE, is Head and Professor of Civil and Environmental Engineering at Mississippi State University. A noted authority in the fields of environmental and water resources engineering; he is in his sixth year as the James T. White Chair of Civil and Environmental Engineering. A member of the faculty for 32 years, he is a licensed professional engineer and nationally certified as an environmental engineer by the American Academy of Environmental Engineering. He has been inducted into Tau Beta Pi, Chi Epsilon, Sigma Xi, Phi Kappa Phi, Golden Key, and the Order of the Engineer. In 1999, he was elected a Fellow by the American Society of Civil Engineers. A Herrin-Hess Professor of Engineering at Mississippi State, he is a member of the Bagley

College of Engineering Academy of Fellows at Mississippi State.

He is responsible for both administrative and education tasks for an academic department with over 450 students, a operating budget of over \$4 million, and programs that extend around the world. During his academic career, he has published 100 refereed and reference papers and report and has made over 160 paper and poster presentations. His externally-funded research has focused of environmental and water resources engineering with projects related to modeling of surface waters and pollutant transport, evaluating watersheds and management practices, managing hazardous wastes, and optimizing water and wastewater treatment facilities. He has investigated issues related to improving aeration, coagulation, microbial, separation, and disinfection treatment processes.

Professionally, Dr. Truax has worked on environmental management systems throughout the United States as well as Argentina, Canada, China, Mexico, Romania, Tanzania, Turkey and Venezuela. He has consulted for local and international engineering firms, small municipalities and regional authorities, law firms, industry, and federal agencies. Technically, he has helped design over 500 wastewater treatment plants world-wide. He was project engineer for the design, permitting, contract management, and construction of a regional solids waste management system and has worked on almost a dozen county or regional solid waste management plans. He has performed numerous Environmental Assessments, supervised remediation of several Underground Storage Tank (UST) sites, and inspected drip pads and other hazardous materials management systems.

In 1976, he earned a bachelor of science in civil engineering with a concentration in environmental and hydraulic engineering at Virginia Polytechnic Institute and State University. He later went on to earn a master of science in civil engineering and a doctor of philosophy in civil engineering from Mississippi State University. An active member of his professional community he maintains active affiliation with the American Society of Civil Engineers, the Water Environment Federation, and the American Water Works Association, among others. He has served on the Board of Directors of the American Society of Civil Engineers, the Advisory Council for

the Center for Professional Engineering Education Services. He also serves as a member of the Mississippi Board of Licensure for Professional Engineers and Surveyors.