NORTHEAST TRANSPORTATION WORKFORCE CENTER

Environmental Work in the Transportation Sector

CAREER PROFILE

NAME: Robert Wildey

DEGREE: Environmental Studies, Water Resources Engineering

TITLE: Water Resources Engineer

COMPANY: Vanasse Hangen Brustlin, Inc. (VHB)

VHB is known as an American civil engineering consulting and design firm with offices throughout the country. Founded in 1978, the company primarily focuses on transportation and land development, working on a variety of transportation civil engineering projects in the Northeast and along the East Coast of the United States.

VHB "aspires for a sustainable world in all that (they) do. It is inherent to who (they are) and (their) generational company philosophy—founded on stewardship." VHB helps their clients take action to improve health and well being, contribute to economic vitality, and promote environmental stewardship.

Source: www.vhb.com/Pages/home.aspx

Q. What is your current role at the organization?

A. My job title is Water Resources Engineer. I am a Project Manager and supervise two other staff engineers. The three of us sit on the Environmental Services side of the office, which largely reflects how I came into this work and what the needs of the organization were when I was hired. Overall, the time I spend working on water resources is divided into a few categories, which includes work on land development and transportation projects but also working on more "pure environmental" type projects related to water resources.

The best part of my work is that I get to touch a wide range of projects. So, for the transportation practice—typically work on bridges and culverts that are being replaced—I analyze the hydraulics and hydrology for those structures to make sure they are sized correctly and have enough scour protection. I also work with our land development practice, so for example, the work might be for a ski resort that has a reservoir that they use for snow making and they need to be able to fill it from a water intake that will withdraw water from a nearby river and pump it up to the reservoir.

Sometimes my work involves sites where there are previous impacts to rivers or streams that need to be remediated, which usually happens in conjunction with another project that can provide the funding source. For example, this might involve a dam removal or bank stabilization work that is associated with a utility line project.

Another aspect of my work involves construction inspections for erosion and sediment control. This ties into my own history and interest, particularly in terms of seeing where water resources are being impacted, which is often due to sediment discharges. One of the key places and times that we can prevent excess sediment from getting into a water body is during construction projects, which is why there are state and federal permits that specifically address construction storm water controls.

Q. How did you get to this point in your career? Any

key points along that pathway?

A. I grew up in Florida, obviously a very wet place, so there was always a lot of water to be around. For my undergraduate, I ended up going to a small liberal arts college that did not have engineering but did have a strong science curriculum and a strong environmental studies program. I did not come around to the engineering profession until a bit later in life. As an undergraduate, I pursued an environmental studies degree, which was mostly focused on ecology and biology, but I also had an interest in economics and learning how society allocates resources for the things that it values. However, once I graduated, I ended up taking a few years where I wasn't working in the environmental field at all.

Eventually, I made my way back to an environmental field and landed an entry-level position with a company in Massachusetts that works in the environmental engineering field, specifically focused on bioengineering for stream bank stabilization, wetlands restoration, and the so on. Their target was federal contracts with the US Army Corps of Engineers. That work exposed me to this whole other side of the environmental profession that I had never really seen or even understood, based on my undergraduate experience. Everything I did there led me to understand that I loved working and playing in the swamp and wanted to be a "water rat," but at the same time it wasn't really

clear how to make a career out of that with the tools I had picked up as an undergrad.

After a few years there, my supervisor gave me some career advice and basically told me that, "If you are going to really make something of this field, what you need to do is go back to school and get an advanced degree, and it seems like what you really want to do is engineering because it brings together both the environmental side but also gives you a way to be at the table and have meaningful input in the projects."

And I saw the truth in that, because over the three years that I was with the firm, it was clear that most of the decisions for a project were driven by the engineering needs or by the desire of the project proponent to build something. The environmental components were often relegated to second-tier status and were advanced only as far as they needed to meet permit requirements. It was rare that the environmental components were the driver for the project or that they were really baked into the project design from the start.

I ended up leaving that job to go to graduate school and went to the University of New Hampshire (UNH) to pursue a Master's degree in Water Resources engineering. My focus at UNH was storm water. UNH has a storm water research center and I was one of the first graduate students to do that research pertaining to how we should go about treating storm water.

When I graduated I took a job with VHB in Massachusetts but it turned out not to be in line with what I wanted to be doing. I spent a few years there, kind of hitting my head against the wall, because I felt like I was losing touch with what I was interested in with the work. I ended up finding another job within VHB that allowed me to move to Vermont. This was more in the mode of stream and river work, while still having the storm water component, but a broader set of projects and just a better niche for what my interests are and how I work with people.

I've been in Vermont for six years now. I never in a million years thought that I would be interested in transportation engineering, never could have seen that linkage as an undergrad, and yet you come to Vermont and thanks to Tropical Storm Irene and how the DOT has taken a very active role in managing rivers and human infrastructure interface, we touch it just about every single day.

Q. Were there any experiences that helped to best prepare you for the work that you do?

A. Perhaps one of the most instructional things for me was coming up here (Vermont) in the aftermath of Irene and seeing the number of projects that we have done subsequent to that, as well as, how it has driven the regulation so that you have permits and know what they are controlling. And, people are engaged and interested in that because it's still relatively fresh in their mind that if they don't do it right, it blows up and people lose their houses and the roads are gone.

Q. What does a day in the life of your position look like?

A. The job does vary seasonally, maybe not as much as I initially thought that it would. But it is true that the work on a typical day will vary depending on the season. Ideally, I would like to spend 50 to 75% of my time in the office and 25 to 50% of my time being out in the field—actually taking stream measurements, collecting water samples, meeting with contractors--but that percentage varies across the seasons and depending on what is projects are happening. I think one of the interesting problems of the career is that as you get farther into it, you are supposed to be spending less time in the field and more time managing other people and letting them do the fun field work. So that's one tricky piece that I haven't mastered yet. But at the same time, you get to the point where you've done what you set out to do and it's time to help train other people.

Otherwise, lots of emails. I think one of things that has been really helpful to me is the importance of communication—being able to write a coherent paragraph to explain things and to be able to transmit information to others. There are always calculations using Excel or other software packages—and, even if I'm not performing the calculations myself, I'm at least checking another person's work as a measure of quality control. I also review plans that will be going out the door and add comments or markups on them—so if you see something that is missing the point of the project or is going to cause an environmental problem, or if you got a piece of information from the client, then another way to transmit that information to others is to do a markup on a set of plans.

There are also a fair number of meetings—face-to-face communication is a great way to move a project forward and keep the team working together to meet the project goals, all while understanding what we need to do the work. There is also time spent budgeting and writing contracts so that we can keep getting paid. The interesting thing about consulting is that you don't just show up and get paid; not only do you have to do the work but then you have to justify the work to the client so that they will pay you for it. That role and responsibility changes as you develop in your career.

Q. What skills have you gained in the work? Are these unique or transferable to other disciplines?

A. I'd say some of them are unique—you know, calculating runoff from a development site, sizing a storm water basin, developing an erosion sediment control plan. These are very focused skills that don't necessarily transfer. But another set of skills would be, being able to communicate and being able to analyze a problem and try to lead your

way to the solution. The process is an important part of that. So, being able to lay out a logical process, come to a conclusion, and then be able to backup your conclusion with some set of calculations that others can review, I think all of that is transferable to some other fields and other endeavors.

One other thing is, that learning something in school, being able to turn in an assignment and get a grade is a world apart from getting a blank slate and being told 'here is this thing that I need to accomplish, you need to take me there' and having to come up with the series of steps to get to that end result. There is a leap forward from a school assignment to the real world. Additionally, your skills with that school assignment is not the same as doing it for real one time. You have to understand the steps and do it correctly to get to the answer, and then you have to be satisfied that it is the correct answer.

Q. What do you enjoy most about your job?

A. I think in this job my favorite thing is the diversity. We have a really good group of folks here and we work on a ton of different kinds of projects. There are certainly common threads that run through, but the science is always changing, the regulations are always changing—it is nice to have a job that is the same but changes.

Q. What are some of the challenges you have faced in the work? How did you overcome them?

A. It is a double-edged sword between always having to be on your tip-top to understand new changes. But with the fast-paced work, it means that there is always a deadline crunch. The ideal situation is that you are just a little busier than you'd like to be. You don't want to be bored or looking for work, but there are also periods with simultaneous deadlines that it gets to be like exam week all over again. And so those are the weeks that I don't like but I think that's my biggest drawback.

Q. What are some of your own personal characteristics and values that make you a good fit for this type of work?

A. There is a fair amount of individual drive that is needed, you are not going to advance very well if you are waiting for the next assignment to fall into your lap—so, the personal initiative and willingness to take on some challenges. You are only advancing your career if you are learning something new which means stretching yourself in the work that you are doing. So, if you are looking for a vanilla job, this might not be the right career.

There is a good degree of people skills that are necessary: being able to relate to people and work with them even if they are different. The engineering field is a horribly un-diverse place across all schemes and it's an area where we are actively seeking to improve upon that. But if they are not working here, they are working on the other side of the table—in the public sector, in the private sector—and you need to be able to work through that without being biased about different people, different backgrounds, and/or different expectations in order to get the job done.

Q. What is something that you want people to know about the work that you do?

A. The first thing that comes to mind is that infrastructure matters. We tend to take it for granted, our roads and bridges and clean water and systems that work. All of that is a luxury that we experience in this country because of the amazing work that was done in the last century, century and a half. We have forgotten about this in a lot of ways. It really is time for us to refocus on that both for the economic and health benefits that it provides, but also because of the environmental benefits that it provides. We've all heard the slogan about think globally, act locally? This is really where the rubber meets the road and it really is the chance to act-locally; all of the pieces that we work on have meaningful impacts to the environment.

Overview of Position as it Relates to Transportation

In the field of hydrological studies, water resources engineers study how water moves across and through the earth's crust. Because of this, engineers are equipped to solve problems in the areas of water quality and availability. Much of the work requires analyzing how water influences the surrounding environment and how changes to the environment influence the water source. Work in hydrology requires the measurement of bodies of water, collecting and testing water and soil samples, analyzing data on the environmental impacts of pollution, erosion, drought, and other problems that come to impact the environment.

Water resource engineers use computer models to predict water supplies, to map the spread of pollution, and to track floods and other weather events that can impact water sources. They work closely with engineers, scientists, and public officials to study the water supply as well as to evaluate water-related building projects (ie: hydroelectric power plants, irrigation systems, and wastewater treatment facilities).

Hydrological Studies

"The field is equipped to solve problems in the areas of water quality and availability. Much of the work requires analyzing how water influences the surrounding environment and how changes to the environment influence the water source. Work in hydrology requires the measurement of bodies of water, collecting and testing water and soil samples, analyzing data on the environmental impacts of pollution, erosion, drought, and other problems that come to impact the environment."

—Collegegrad.com

Water Resource Engineer

"Water resource engineers develop new equipment and systems for water resource management facilities across the United States. The systems that water resource engineers create ensure that citizens are provided with a continuous supply of clean, uncontaminated water for drinking, living, and recreational purposes. Water resource engineers not only design these water management systems, but often oversee the construction and maintenance of these systems as well. An increasing population and continuous need for more water stimulates this fast-growing industry. A Bachelor's degree and official certification are required to pursue this career, though many water resource engineers also go on to pursue their Master's Degrees."

In addition to being a subset in the field of hydrology and hydraulics, water resources engineering is also a specific type of civil engineering. Engineers in this specific field are tasked with creating new equipment and systems "to increase the effectiveness and efficiency of water treatment and aquatic resource management."

Robert is a water resources engineer with VHB's Environmental Services Group where he has worked on a variety of water and storm-water-related projects for both public and private-sector clients. His key focus is the interface between natural streams and the built environment, from bridges and culverts that carry transportation infrastructure to storm water treatment practices that manage runoff from impervious areas and convey flows to surface waters. Robert is also experienced with environmental permitting related to wetlands and other water resources at the local, state, and federal levels on projects as diverse as residential developments, retail shopping centers, renewable energy facilities, highway and rail projects, and utility corridors.

Source: www.environmentalscience.org/career/water-resource-engineer

Overview of General Skills and Requirements

Hydrologists are required to have certain skills. These include skills in analysis and critical thinking. These skills are important because hydrologists need to analyze the data that is collected in the field and to examine results of the field that might have undergone laboratory testing. In conducting analysis, hydrologists develop and use models to assess risks to water supply. This concludes with the development of a water management plan, which functions to mitigate threat to water sources. Hydrologists are also required to have physical stamina, interpersonal skills and communications skills—not only do hydrologists work in remote locations of varying terrain, but they must be able to report in detail—to government officials and the general public on their research, methods, and findings.

Hydrologists require certain credentials. Most begin careers in hydrology with a Master's degree as very few universities offer undergraduate degrees in hydrology. Students interested in hydrology should attend universities that offer degrees and concentrations in geosciences, engineering, or earth science. Prior to entering college, if there is an interest in studying hydrology, students should have a strong background in math, statistics, and be well rounded in the sciences. Additionally, hydrologists might also find use of a background in economics, environmental law, and other policy-related topics. This is because it is important to understand the goals and implications of policy makers and other government workers and how that relates to the environment.

Source: www.bls.gov/ooh/life-physical-and-social-science/hydrologists.htm#tab-2

GLOSSARY

- **Scour** – the removal of sediment such as sand and gravel from around bridge abutments or piers. Scour is caused by swiftly moving water, and can scoop out scour holes, compromising the integrity of the structure.
- **Hydrology** – the branch of science concerned with the movement of water in relation to land.
- **Built Environment** – man-made structures, features, and facilities collectively viewed as the environment in which people live and work.

About VHB, Inc.

VHB is an environmental consulting firm focused on making a positive impact on its surrounding communities, making the most out of opportunities to grow personally and professionally, while building a network of lifelong colleagues. VHB is known for collaborating across disciplines to develop and implement effective strategies, problem-solving techniques and solutions through, "a combination of technical and personal skills to help build a successful consulting team."

Source: www.vhb.com/Pages/Trends/Students-and-New-College-Grads.aspx

Type of Projects Carried Out at VHB

FLOOD RESILIENCY

Meeting the requirements for floodplain and river corridor protection are a big part of what Robert Wildey works on to help preserve roads.

CULVERTS

The Jenny Coolidge Brook and Bingo Brook culverts were designed by VHB.

STORMWATER

Managing stormwater is one big component that drives many of VHB's projects.

Key Skills

- **Reading Comprehension** – Reading work-related information.
- **Complex Problem Solving** – Noticing a problem and figuring out the best way to solve it.
- **Critical Thinking** – Thinking about the pros and cons of different ways to solve a problem.
- **Active Listening** – Listening to others, not interrupting, and asking good questions.
- **Judgment and Decision Making** – Thinking about the pros and cons of different options and picking the best one.
- **Coordination** – Changing what is done based on other people's actions.
- **Active Learning** – Figuring out how to use new ideas or things.
- **Systems Evaluation** – Measuring how well a system is working and how to improve it.
- **Systems Analysis** – Figuring out how a system should work and how changes in the future will affect it.
- **Time Management** – Managing your time and the time of other people.
- **Monitoring** – Keeping track of how well people and/or groups are doing in order to make improvements.

Abilities Needed for Success

- **Written Comprehension** – Reading and understanding what is written.
- **Oral Expression** – Effective spoken communication.
- **Written Expression** – Effective communication in written form.
- **Deductive Reasoning** – Using rules to solve problems.
- **Inductive Reasoning**– Making general rules or coming up with answers from lots of detailed information.
- **Oral Comprehension** – Listening and understanding what people say.
- **Problem Sensitivity** – Noticing when problems happen.
- **Fluency of Ideas** – Coming up with lots of ideas.
- **Near Vision** – Seeing details up close.
- **Originality** – Creating new and original ideas.
- **Information Ordering** – Ordering or arranging things.
- **Visualization** – Imagining how something will look after it is moved around or changed.

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