



# Sloan Career Cornerstone Center

## Profiles of Civil Engineers



**Agnes Ayuso, E.I.T.**

**Water Resources Engineer  
Camp Dresser & McKee, Inc.**

### Education:

B.S., Massachusetts Institute of Technology  
M.S., Massachusetts Institute of Technology

### Job Description:

Water Resources Engineer, involved in lake/reservoir/river water quality assessment and modeling, sewer system modeling, water quality field programs, and watershed management planning

### Advice to Students:

"What I like most about being a civil engineer is the variety of projects and the combination of scientific and social thinking needed in each project."

### Video Transcript:

"I am a water resources engineer at Camp Dresser & McKee. I guess a lot of people think that engineers would all day like, I don't know, do -- build buildings or something, that that's the only thing engineers do. But what I do is -- a lot of people would not think of it as like engineering because what I -- what I do is I work a lot with computers and for one part that tends to be technical. But there's also a lot of sides to the job that are not just like technical or computer related. We do field work, we go out. We have to take samples. We have to organize field programs. We have to round up people to go to these field programs. We have to write reports. There's a lot of writing."

### Interview:

My name is Agnes Ayuso. I am a water resources engineer at Camp Dresser & McKee, an environmental consulting firm. It's one of the biggest in the world and it has offices all around the world but the headquarters are here in Cambridge, Massachusetts. Within Camp Dresser & McKee there are different groups that do different things. And I work in the water resources group within the management and technology unit. The type of work that we do is very diverse but mostly has to do with water, obviously, and how to better manage water. And for that we

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use computers a lot. So it's a combination, I guess, of using computers and using doing field work and all of these things to help our clients achieve their results.

The best way to describe what we do is to give examples of projects that I've worked in. For instance, right now I'm working on a project for a client in Sao Paulo, Brazil. And our client is the water utility for that city. And we're trying to help them to better manage their data. Because in order to supply the city with water, it's one of the biggest cities in the world, they need to collect all this data about water quality in the reservoir, hydro logic data like what flows are going into the reservoir, climate data like when it rains, when it doesn't rain, what temperature.

And my specific role in that project is to study the algae data that they've been collecting since 1972 because more and more they've been having problems of algae just like growing out of control in the reservoir and that is bad for drinking water because then the water doesn't taste very good and it also could have potential for toxicity. So it is important to study that data to figure out if what things they can do to make the water better.

Other projects that I worked in are completely different. Other cities that I've worked in have been in the northeast of the U.S. which are old cities and have sewers that, instead of a having separate source for storm water and for sanitary sewers that come from houses, they have sewers that combine both. And when it rains, the volume of water in the sewers is just too great. And engineers in the past, what they did was they would build little escape hatches for the water to just flow out into the nearest water body. And in a way, that is better than the person having a flood in their basement, you know, it is better to let the water out some way. But on the other hand, the United States Government has become concerned because these overflows, are polluting some of the water bodies near cities. And so it is important to find ways of controlling these overflows. And so our group works with engineers who design storage, storage vessels and they also design treatment facilities to find ways of containing these overflows.

**Q: Tell me about your background. What degrees do you have?**

Ayuso: I went to MIT, the Massachusetts Institute of Technology. My undergraduate degree was in environmental engineering and then my graduate degree is in civil engineering with a specialization in environmental. I, wasn't very decisive when I first went to MIT about what I wanted to do, a lot of people who go to MIT know what they want to do but I wasn't one of them. I knew that I wanted to be in science and engineering but I didn't know what I wanted to do within that area. I was very confused at that time but I became interested in environmental engineering and I wasn't sure, because a lot of people would tell me that it was harder to get a job in that field or they said the salaries were not as big as if you went into computer science or other types of engineering. And so I was concerned about that but eventually I decided to do what I enjoyed and that I would worry about finding a job when I graduated. And I guess that is the advice that a lot of people told me, that you should just do what you like and the money will follow.

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**Q: Do you do any networking?**

Ayuso: I am on the low networking side, I would say. But in graduate school I knew a lot of people who had a lot of lists on the Internet and you'd hear about a lot of jobs and conferences and things that are happening that way. So people like to get involved more formally and can become really, really active in some organizations like ACE. But I have never been really involved. But I have done some, I guess you would say informal networking like talking to professors and talking to people in graduate school. And now that I'm working I talk to the people that I work with. And I also get a lot of things in the mail. I belong to ASCE and so it's not hard once you are in that environment to, just hear about things.

**Q: Is there any other advice you have for people that are starting out or are not really sure, like you weren't really sure what kind of science they want to study. How can they sort that out? What should they do to make that decision?**

Ayuso: Well, like I said before, I was really concerned about am I going to be able to find a job or, you know, what am I going to do? How am I going to sustain myself? And I guess I would tell them that it is important to know what career opportunities there are and I wouldn't go blindly into a profession without finding out what kind of opportunities there are. But that shouldn't be the sole focus; they should also like what they are doing. Because they are going to be working 40 hours a week for the rest of their life or unless they hit the lottery or something so they should try and find something that they enjoy doing. And I would say don't be afraid if you are interested in the environmental field, because it's growing a lot. And it is true that civil engineering is not the highest paid but there are things in civil engineering that I like a lot. I like a lot of projects that I work in and I feel that I'm contributing to society. That's one of the most beautiful things about civil engineering, that you're doing things for that are beneficial, where in other jobs you might not be connected that directly to beneficial things.

**Q: So do you really like being an engineer?**

Ayuso: Yes, I -- I guess I take it for granted perhaps now. It surprised me because I guess a lot of people think that engineers would all day build buildings or something, that not the only thing engineers do. But what I do is work with computers and for one part that tends to be technical. But computers are becoming easier for people to work with and it is true that here we try to push the boundaries of what we do with computers but there's also a lot of sides to the job that are not just technical or computer related. We do field work. We have to take samples. We have to organize field programs. We have to round up people to go to these field programs. We have to write reports. There's a lot of writing. And a lot of times, the type of writing that we do has to be explained to people who don't have the technical knowledge. Explain to them what's going on so the client can understand what the problem is and why are we proposing these solutions and why the solution costs more than the other one and what is the difference there. There's also a lot of opportunity to use creativity because in this firm we do a lot of studies that people haven't really done a lot before. We have to go to the library, do some research, find out what these people did and think of ways of how we're going to approach this problem. It's not cut and dried, it's not like a formula or anything.

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**Q: Can you tell me what it's like day to day? Tell me what you do in a day. Or are the days all different?**

Ayuso: I would say it depends on the project. But it doesn't change dramatically from day to day but the variety in projects do. I'm in the office or I'm doing something in the computer. The next week I could be doing a lot of writing, a lot of using spreadsheets to look at data. But other times I'm running models in the computer. Or I could be working with specialists in GIS or mapping to develop certain maps. Other times we're organizing field programs. I would say not the majority of the time but when these programs do arrive, like last summer, then a lot of the time is going to be spent organizing the program and being out in the field taking the samples. And so that certainly takes you away from the office for a bit.

**Q: Do you have to travel very much?**

Ayuso: I wanted to tell you a little bit about traveling because I had the opportunity with CDM to go live in Paraguay for a month. And I think definitely people who are interested in doing international work, engineering is a great field to be able to do that. My goal was not to be gone perhaps for such a long time. But I really enjoyed the opportunity to go. Originally, I'm from Puerto Rico so to be in South America was very special. I guess there was a more direct connection, because we were working on this project for the City of Asuncion and I was very familiar with the problems that they have. Asuncion is a very modern city but they many problems that we don't have here. They have a lot of poverty and people who are living in conditions that you don't see in the United States. I guess it connects into what I was talking about before of seeing why civil engineers are needed and what kind of things we can do to help people and to help society. It also offered a great opportunity to see another country and to expand I guess your perspective. I would have never gone to Paraguay otherwise.

**Q: How does it feel being a minority, if you will, in the world of engineering?**

Ayuso: Well, there are a lot of women in environmental engineering so I haven't felt as different in that respect of being a woman. But in the aspect of being Hispanic or from a Latin country, most of the people that I work with are American or how do you say, not minorities. And so, when I began to work I felt very different from other people that I work with. But with time, I realized that they were very open-minded. Even though we had some differences, we did have a lot of things in common, like for instance, we did the same work. Or we had common interests like certain books we had read, going hiking or things like that. So I would say that for minorities who are thinking of going into engineering and feel perhaps that would not be as welcomed or that they would feel isolated in the field, I would say that they should not feel that without giving it a try. Because a lot of times I will be surprised at how things can work out.

**Q: Do you feel you need to do anything special to sort of show that you are as competent as anybody else or that you were willing to sort of engage with people that were willing to engage with you? What sort of characteristics did you attempt to cultivate in yourself that would make it easier for you?**

Ayuso: Well, I guess I saw it like this, is what I wanted, to be an engineer and if I was a different person than most people who were in engineering, then I would just have to live with

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it. And I found that often it is better to just think very positively, and try to get to know someone first before saying oh, that person won't like me or something. So it's hard, when you're talking about human relationships, and sometimes people don't realize that in the work environment human relationships are very important. But I have never had problems.

To summarize, I would just say that when I began working, I didn't think about being a woman or being from Puerto Rico or being fresh out of school or anything, I just said you know, this is a job that I want and I want to do well and I'm going to be very positive about it and I'm not going to let things like me being different stand in the way of me doing a good job & enjoying my work.

**Q: Do you have a mentor?**

Ayuso: I've had informal mentoring relationships with people but I wouldn't say I have a mentor. It sounds like a very scary kind of concept. So like I said, when I was in college, I worked or when I was in graduate school I was working with a professor and he kind of became my mentor informally. And he would advise me on things of my career. While I've been here, I guess the project managers I work with, they informally are my mentors because they tell me about things that re going on and they explain me things that I wouldn't otherwise know about, that I don't need to know about the projects. But they will do this because they are interested in getting young people like me to learn the ropes and the kind of progress in the company.

**Q: How do you balance the demands of your professional life and having a private life as well? Do you work long hours, weekends, that sort of thing, away from your family?**

Ayuso: I would say I've been fortunate that I work at CDM and CDM is a very good company. It doesn't expect people to not have a private life, to just live for the company. People that I work with have been very considerate of having a balance. And after, I guess, after being at MIT where very often I didn't have a balance, I pretty much, was overloaded the whole time I was there so I didn't want to just keep going on that track. I wanted to have some balance after I graduated and started working. And, and that's one thing that I can truly say has not been a problem. And some times, you know, we have projects that have deadlines and we need to work long hours. But often that is just a project driven necessity and often I'm so involved in the work that I want to do it. I just want to get this report out or I want to, you know, finish what I've been doing or I want to do it better. I want to do it in a more perfectionistic way than perhaps is needed. So I want to stay a couple of extra hours to get it done the way I think it should be done. But, if a student is thinking of going into engineering, it is possible. It is not a career where you are expected to not have a private life.

**Q: What do you do besides work?**

Ayuso: I have two dogs and I take them on long walks and we go hiking. And I'm also married and I like to eat out with my husband a lot. I have many friends in the Boston area that I like to see a lot. Let's see, I like to read books. I don't know, it's just nice having some free time for doing the things you enjoy and not just work all the time.

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**Q: Do you think that makes you a better engineer?**

Ayuso: I think it does because it makes you a happier person and when you are happier, then you can perform your job better and you have more energy and you have more of a balance. I mean, it's important for the mind to have some rest, to be able to perform to the top of your capacity.

**Q: What really motivates you?**

Ayuso: What motivates me? I think that I like to get involved in a project, set a goal and see it completed. And at first, when you're starting, well, sometimes it can be difficult because you're trying to figure things out but sometimes it is very exciting at the beginning. Then, at one point things usually become difficult. But once you have figured that out, and you figure out what the barriers are and how you can overcome those, then you get really caught up. I become easily very caught up in the projects and I really enjoy doing them.

**Q: How about international projects? You do a lot of international projects. Have you ever had sort of cultural differences that were either interesting or problematic?**

Ayuso: Well, I think that the company that I work with, I would think any company, would try to breach those cultural barriers because the market is becoming more and more international and they want to be a part of that. I had the opportunity to go to Paraguay with CDM and work in a project there for the City of Asuncion and I really enjoyed working in the South American culture. And I really also liked it, because I was living in the city and I was seeing the problems that the city had, like a lot of people were very poor and were living in substandard housing. I guess my role in it was because the housing didn't have sewage and didn't have sewers. So the sewage would all go into the river next to the city.

And we had to evaluate how to make the river better. Other people that I was working with were working on the housing and other people were working on the institutional side of it, there were lawyers that were kind of talking to the politicians. And it was very interesting because you could see how civil engineers or engineers are part of making a positive improvement on people's lives. And I'd say that you can see that more directly in a city like Asuncion or a country like Paraguay than perhaps you can see it in the U.S. because they have more urgent means. They have bigger problems. And you know, often here people worry about things that there are not necessary; people in Paraguay don't worry about those things because they have other bigger problems. And it's very eye opening, I think it's important for an engineer to be able to see those problems and it's also very nice for, a person to be able to be in another country and learn another culture, so it's interesting. I would have never been able to go to that country if I had not been an engineer working with CDM.

When I was in Paraguay, most people who got sent there by my company, but I was also working with people from other companies. Most people had to have some knowledge of Spanish. We're also doing projects in Brazil and although a lot of people, more people in our company speak Spanish than Portuguese, those who are Spanish speakers have an easier time kind of adjusting to, or learning the Portuguese because they are more similar languages than English and Portuguese. And I would say, I've heard that the projects that we have in South America we've had a lot of success in keeping our clients happy because the company

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has had people there that are able to connect with the local culture and so knowing another language helps the communication.

People often think that an engineer will be like building bridges or I don't know, defining screws or something like that. But the things that I do, people wouldn't maybe think of them as engineering. A lot of times I'm working with a computer and that is very technical because I am, I guess, using these programs, these models, that do push the technical barriers of the computer. And I often work with data and try to understand data. I do a lot of plots and statistical analysis.

But on the other hand, I also have to do things like explain in writing what the results of my analysis were. And often our clients are not very technical people, they work for the government or they are involved in other organizations. And we just want to explain this also for the general lay people and we have to find ways of explaining things.

We also do a lot of field work. We sometimes have to go out and get samples and we've got to coordinate this, we've got to organize a bunch of people and equipment and all that requires a lot of organizing. Once we're out there, it's very intense so it's more varied than people would think. You don't just sit in a little office with some plans. But that's not what I do at all. I mean, sometimes I have to look at plans but it's just one part of the whole variety of things that I do.

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