The Fine Homebuilding Interview

Christine Williamson

This forensic building scientist demystifies her discipline for architects and construction professionals

BY AARON FAGAN

Christine Williamson may have followed in the footsteps of her father, building scientist Joseph Lstiburek, but she is forging a path all her own. Williamson graduated from Princeton and then went on to study architecture at the New School of Architecture + Design, graduating with a master's degree in Architecture. She's a practicing forensic building scientist who investigates failures in enclosures, mechanical systems, and material. As a consultant, she offers risk mitigation on everything residential, from custom homes to high-rise towers. She has also worked on well-known buildings outside of the residential sphere.

Williamson has become one of the industry's most in-demand speakers, well worth catching at the next local or national conference you attend. She shares her experience and expertise freely via her very creative Instagram handle @buildingsciencefightclub—it is worth joining social media for. And her website, which bears the same name, is an educational platform for architects to learn the building science that will make their work as durable as it is beautiful. Williamson may be focused on educating architects, but it's safe to say that anyone in construction should be listening to what she has to say.

AF: Is building science becoming more widely understood by nonspecialists?

CW: I don't actually know. As a practitioner, the focus is always on acquiring deeper technical competence. As I've advanced in this profession, I've found the industry—not just building science, but the whole building industry—is phenomenally complex. And you really only get to understand small parts of it. There are wonderful practitioners who are very talented, but the band of their experience is really narrow.

A lot of the failures we see in building science can be better understood as consequences of poor decisions voluntarily made. I don't want people to have to deal with the negative consequences of their decisions, and there are a lot of areas of life where we humans prioritize our short-term interests over our long-term interests.

AF: The epigraph for your father's *Builder's Guide* series begins, "When we build, let us think we build forever." Yet you've said, "We shouldn't be designing buildings that never fail." Are these statements compatible?

CW: I like seeing that John Ruskin quotation repeated. I find it not so much to be an instruction for every type of building—not every building is a monument or intended for multiple generations—but I think nobody would deny that when we get an opportunity to work on a project that is intended to last that long, it's a humbling and inspiring experience. I had a chance to work on the restoration of Belvedere Castle in New York's Central Park, which was designed by Frederick Law Olmsted, whom I learned about in architecture school, and what a humbling and joyful experience to know I touched something that will be around for many more generations. And lots of other people did, too! I just love that.

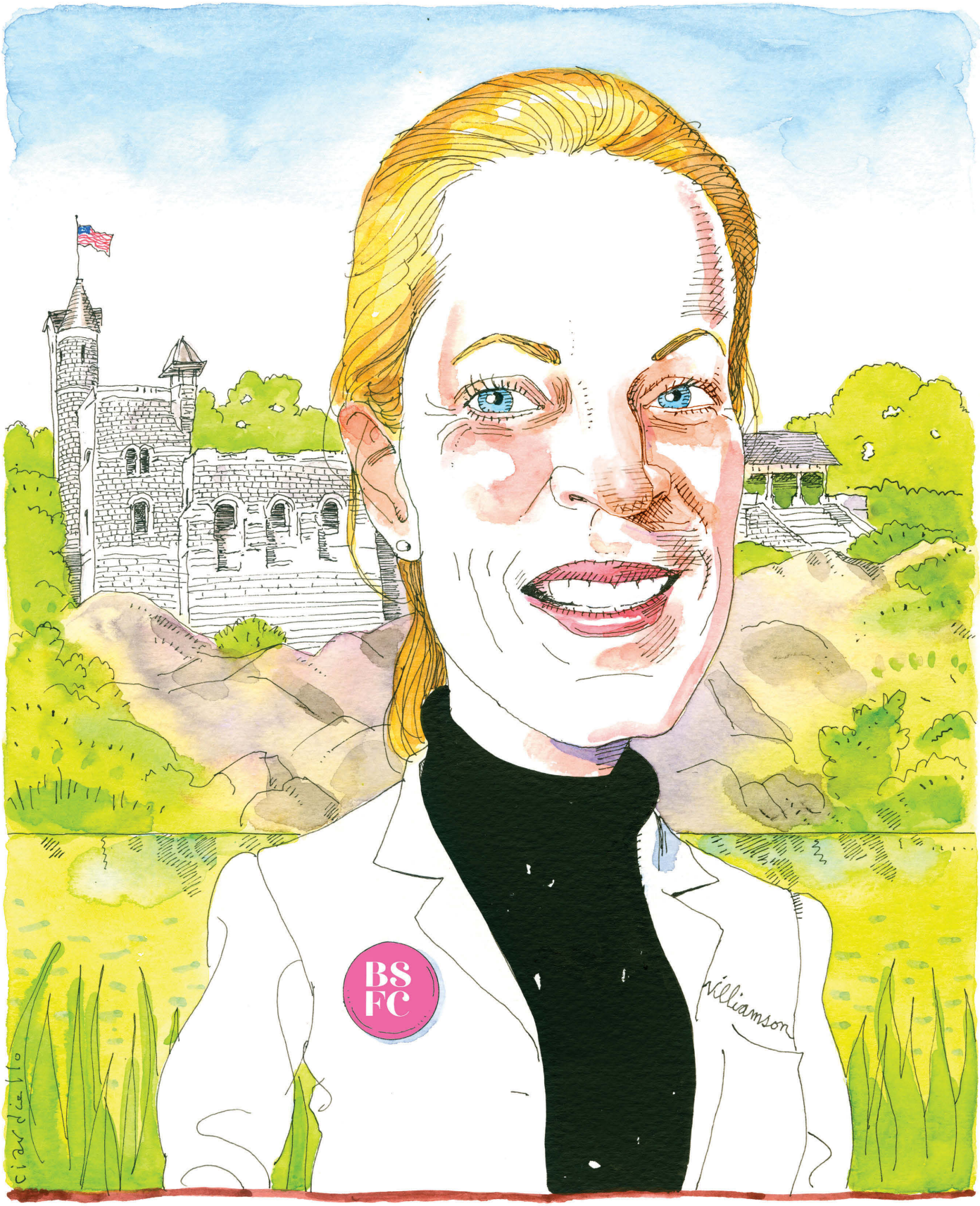
I also like that the quotation is addressing something cultural, not scientific. Our job day to day is to respond to very practical concerns, and we're working within a culture that is more immediate. Then there are other people—*Fine Homebuilding* readers. They have to remain practical and employed, but there's a deep culture of pride that accompanies their day-to-day work. It's a different way of approaching things. I think that's what that Ruskin quotation encourages us to have: a culture of care.

So I think we would be better if we collectively valued those things more, but also I think it would be silly to think that this quote applies to every setting all the time. If we built to that standard all the time, there'd be a lot of people who don't live in homes who otherwise might. So, sometimes there are trade-offs that reasonable people make.

AF: A realistic response to nature rather than a platonic ideal.

CW: I learned from fabulous teachers, including my own father, but what I was

Drawing: Joe Ciardiello



engaged in day to day was not this "let us build forever"–type stuff—it was in making daily decisions about products and details. This is one of the things I try to teach well. Something that's phenomenally frustrating for practicing architects is this acknowledgement that no one individual controls all of the variables. That's where professional judgment is particularly helpful. I think when you're in a more academic setting, it's easier to pretend that you have these infinite resources and that a single person gets to make all the decisions, and that that person is enlightened and shares your particular set of values. Those are some pretty big suppositions! Ask practicing professionals and I don't think any have had a client whose values have perfectly aligned with their own.

I think people find building science really helpful as an intellectual tool or a scientific tool to make some of these decisions with more confidence and awareness. Most reasonable people understand the concept of risk, and they're willing to take on some risk, but it's a whole lot better when they know where the risk is, and then they can weigh whether or not it's appropriate. The stuff that really makes people uncomfortable is the unknown. People feel pretty good about managing risk they understand.

AF: I've heard you speak about organizational problems versus design flaws or installation errors. Would you share more about what that means to you?

CW: Speaking of tools to help people make decisions better, one of the most helpful tools to help architects understand their buildings better, and make better design decisions on the front end, is understanding construction sequencing—how the actual building gets put together by different trades. One of the things that's fascinating about buildings is nobody knows how to build them. Nobody. No single person knows how to build an entire building. Even if you're building a log cabin. Did you machine the tools that cut down the trees? Did you grow the trees? Go back far enough, and there are a lot of hands in what we're doing. But it's extremely helpful to understand how the job gets divided up into different parts and the order in which those parts are installed—it really helps architects draw better details. If you can account for construction sequencing, you can make it less likely that you'll have an installation error. The general contractor's job is to coordinate among a whole bunch of different trades. The more you understand construction, not even building science, the more it will help you draw or design in a way where the delineation between one person's area of responsibility and another's is clearer, and the clearer it is, the less likely you are to have installation errors.

> *"People feel pretty good about managing risk they understand."*

AF: What's the low-hanging fruit for us to make the housing industry better?

CW: From a performance perspective, I think there's no question that it's air-sealing: comfort control, pest control, acoustic control, and having control over separating the inside air from the outside air is going to be key. And then I would say attentiveness to general detailing to that end. There are some ways we put things together that seem almost designed to make it harder to air-seal. But I think our progress on this front is one of the reasons we've seen so much success in how our residential buildings, on average, continue to use less energy per square foot than they have in the past. Our codes are pretty great in that regard.

It's also no coincidence that better air control also produces enormous comfort benefits for occupants, such as a quieter and less dusty home. Especially for people with allergies or asthma, there's a real value to indoor-air quality for health and quality of life. I think people are a lot more inclined to think about indoor-air quality, particularly now after COVID-19 and the California wildfires. Air control and air barriers are partial design solutions for that. We've come a really long way, and we're going to continue to see improvements. I think it's one of the achievements in our industry.

AF: Historically, so much emphasis has been given to the amount of insulation for thermal comfort, but what's the point of insulation without air-sealing?

CW: Yeah, people are really surprised by that when I teach. Air control is a greater contributor to thermal comfort and energy performance than insulation levels. When I learned it, it was a very powerful way of ranking priorities in design. If you were to list indicators of how energy-efficient a building will be, the top three enclosure-related things at are: First, what is the glazing ratio—how much glass is on the building and how good is that glass? Second, how well is it air-sealed—how well have they separated the inside from the outside? Third, how well insulated is it? And that order is surprising to a lot of people—I think many people would reverse it.

Another thing I challenge people to do—because people know that they like light—is calculate the window-to-wall ratio in their own house, just as a point of reference. They hear that something is 40% glazed, for example, and that doesn't sound like that much. But when they realize they only have 15% glass in their house and that it's comfortable and bright and happy, they understand. I don't ask them to do this because people are bad at math. It's a simple calculation, but it's helpful to attach meaning to the numbers.

AF: What are some of the most misunderstood building-science principles by architects and builders?

CW: That we're in the business of keeping water out, when we're actually in the business of managing it. If you fill up your bathtub with water, take a bath, and then drain it, and then the next time you want to have a bath, you fill it up again—nobody considers that to constitute a failure. You drained it. That's part of how the system is designed to work. The bathtub has a drain, and it's intended to be used. When we add drainage to our walls, suddenly people view that as a secondary feature that should only come into play when there's been a failure. But the drainage isn't to account for failure, the drainage is part of a functioning system. Maybe it seems like splitting hairs to make that distinction, because functionally what

matters is whether the drainage is there or not, but from a practical perspective, it's a failure to understand that this is part of the proper functioning of the system, and that failure to understand winds up leading to a lot of problems—bad window detailing, and all kinds of other bad decisions. For example, people think cladding is supposed to be completely impervious to water and then detail it that way, but that specification is usually not the case.

That's the biggest misconception. We don't design anything not to fail ever, we design it for the conditions we intend to use it for.

AF: People don't necessarily think of a house as a system. Is there a way to encourage people to think about building more along those lines?

CW: No. I agree our homes are systems like a lot of things in life and they're very complex, but unfortunately, I'm not sure people will ever change. People pay attention to the system when there's a failure. When you do something well, it just becomes part of the background.

One of the images I find really telling and insightful is the G. K. Chesterton quote, "Don't ever take a fence down until you know the reason why it was put up." The older I get, the more I see that played out, over and over again—where in the idealism and excitement of youth you want to change things and make them better and different. The truth is a lot of things that we seek to change are part of systems we don't understand yet. That's why I like that line; the instruction is not "don't take down the fence" or "don't change it." The instruction is don't change it until you understand. I think that's true for our industry as a whole. The Chesterton is really similar to the Ruskin quotation in that, if you're waiting to fully understand the fence before we take any action, maybe we never take any action at all, so we can't quite abide by that in its entirety all the time. But it's also true that we would do well to understand systems before we propose changing them, especially dramatically.

There are a lot of young people who are attracted to architecture as a profession, especially with respect to green building, the Passive House standard, and moving our industry to be more environmentally responsible. I think the passion there is wonderful, but I also think my advice is—and it sucks to hear; I felt the same when I heard it—you're not competent to change the industry yet. Understand it first. Then we can work on changing it. Seek to understand why something is the way it is before we go in and change everything.

AF: The popularity of your Instagram account Building Science Fight Club is encouraging. I appreciate the way you demystify specialized terminology.

CW: We end up confusing the metric or terminology we use for what it's intended to represent. We strive for ever lower blower-door test numbers, for example, and we can sometimes lose sight of what it is that we're actually trying to do. The blower-door test is meaningless in and of itself. I don't care what a blower-door test does. I don't know, I don't care what it is in my house. What I do care about is what that test was intended to help me do, which is to design a more energy-efficient, comfortable interior environment. I think this happens frequently in our profession with credentialism as well—we mistake understanding the terminology for understanding the concept itself.

> *"No single person knows how to build an entire building."*

I've been really pleased that Building Science Fight Club has gotten so big for a bunch of reasons. On a kind of personal level, I struggled along the way to learn these concepts myself. Having the Instagram account get so popular is sort of an acknowledgement that a lot of other people have the same struggle, so these people are all acknowledging it is hard. I love that people actually are benefiting from it and enjoying their professional practice more as a result. And it makes me so immensely happy that people actually use the information to better serve their clients, to feel better on the job site, to design more competently and confidently, to interact with their clients better, and to interact with their colleagues better.

Also, I really enjoy teaching. That's a joy I sort of discovered partially through Instagram, and I've since started teaching for money. So, Instagram has become a little preview of the teaching I do for professionals. Instagram is informal, though, and these concepts really can't be compressed down to a few minutes.

But it's still helpful. You learn both ways. Sometimes you're cracking a textbook, sometimes you're attending an actual lecture, but a lot of the learning you need to do is experiential. This is really what I set out to mimic when I started on Instagram—a forensic site visit. The most concentrated time of learning in my career was when I was working for a woman named Fiona Aldous, an Australian who practices building science in the U.S. She was a phenomenal mentor and teacher to me. We would walk a job site together, and I would ask her to tell me what she saw. I wanted to know what her inner monologue was. I wanted to hear how she was thinking and processing things. Those moments weren't long—a small snippet from somebody who has experience in a particular area walking through the ins and outs of just one thing.

You still need that other intensive component in a different context—at a different time, that's still important—but the little snippets add up to a lot. So, I was trying to kind of imitate that. I would train myself when I was not with Fiona. I would look at a job site that was not my own, just stand there and look at it for a little while, and say, "OK, what's the structural system?" And I would say it to myself, out loud: "This is a concrete and wood-framed building with one story below grade. The waterproofing would have had to be a blind-side system that was applied first."

Just say what you're seeing. It's a great way of learning, because it teaches you to see stuff. This is good advice for young people who are practicing: Learn the names of things. Because when you know the names of things, you see them. And if you don't know what it's called, you won't see it. □

Aaron Fagan, a former associate editor for *Fine Homebuilding*, is a freelance writer and the author of three books of poetry, including *A Better Place Is Hard to Find* (The Song Cave, 2020).