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PLUS

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BARBARA ROBINSON: THE SONG OF THE SEWER



At a recent presentation to a group of businesswomen, Barbara Robinson had audience members on the edge of their seats listening to how groundwater and rainwater is entering their sewers and taking up valuable capacity. “People don’t know much about sewers and don’t think about them,” says the president of

Norton Engineering, adding that once they realize they own the sewer up to the edge of their property line, homeowners become very interested in issues such as leakage. “The 15 minutes of questions turned into 30. Then I was mobbed by the audience.”

This was not the type of experience Robinson ever envisioned would become part of her life when she graduated from the University of Toronto with a Master’s degree in Civil Engineering in 1990. “As a young girl, I didn’t think that I’d grow up to be a sewer expert, but that’s what happened,” she laughs, adding that she also ended up spending a lot of time underground. “I think it’s really important to go into sewers because that’s how you learn what’s going on down there.”

Robinson became involved with inflow and infiltration (I/I) right at the beginning of her career, working with the former Gore and Storrie on their City of Toronto wet weather master plans. During that time, she also participated in public meetings, which only broadened her interest and ability to speak on the subject.

As an engineer working in consulting, she also had the opportunity to work in the general design and construction of a variety of infrastructure, but as her career in consulting advanced, she became increasingly drawn to the sewer side of the equation. “Over the last 15 years, I’ve been exclusively focused on I/I,” she confirms. “Saying I’m passionate about I/I would be an understatement.” During this time, she spent 10 years on the Water Environment Federation (WEF) Collections Committee (four in leadership) as well as the balance of her time with WEAO, on the Public Education and Collections committees.

In 2012, after 23 years in the private sector, Robinson accepted a position as Director of Engineering for the City of Kitchener. “Being a city engineer was one of the best things I ever did,” she recalls. “I saw how things worked from the inside.” She points out that consultants rarely have a deep understanding of the politics and approval processes associated with public infrastructure. Today, much of the work she does is informed by her understanding of these processes, particularly those related to development.

For many years, the industry has known that I/I is occurring in both the public and the private side of sewer lines. However, very little attention had been paid to the private side. “So when I established Norton, I decided to take a hard look at the private side,” says Robinson. “I was already pretty familiar with the public side.”

Another given when she launched her own business in 2015 was the company name. In the 1950s sitcom



The Honeymooners, one of the main characters, Ed Norton, is so passionate about his work as a sewer maintenance worker that he sings a song about it (a link is available on the Norton Engineering website). “I’ve been nicknamed Norton in the industry for 15 years, so when I started my own company, I thought I’d name it Norton, and colleagues knew exactly why” laughs Robinson.

In line with her decision to focus on the private side of sewer installation and maintenance, she started taking building code courses and getting involved with building departments and building officials associations. Robinson points out that many engineers typically have no exposure to the private side, which is governed by the building code. While most engineering work focuses on investigating sources of I&I on the public side, in order to reduce or eliminate it, very little of this type of work is being done on the private side. So she shadowed building inspectors, became a regular on construction sites, and surveyed contractors, drainlayers, consultants, plumbers and building inspectors to learn about private side regulation, design and construction.

Robinson explains that research undertaken by Norton has uncovered a previously unknown phenomenon: brand

new subdivision sewers are showing unacceptable levels of I/I. “It’s a very complex issue because there are 100 different reasons why this is happening,” says Robinson. “Some of it has to do with inspection processes.” She points out that on the private side, 93% of those surveyed are not performing leak testing of the new sanitary building sewers. Even on the public side approximately 70% of municipalities are not conducting leak testing. Engineers for the public sector routinely send CCTV cameras into the sewers to check for leakage, but methodology is imperfect, as sewers need to be leaking at the time they are CCTV-inspected (evidence on the pipe walls has not yet had time to develop). Despite the fact that these processes are part of Ontario provincial standards and specifications, included in all building contract documents, there is no legal obligation to perform them. Ironically, on the private side, the specifications fall under the Building Code Act, a legally-binding document that can be enforced by building inspectors.

On the other hand, building codes were designed to protect against catastrophic failure so recommendations about sewer installation and maintenance are vague. Furthermore, building inspectors do not have the experience that engineers do with I/I. “One of my goals has been to connect stakeholders working on the public side with those working on the private side and get them talking to each other,” says Robinson. “In municipalities, they typically exist in silos, not interacting on issues like leakage, and focusing exclusively on separate sides of the property line. The engineering staff on the public side need to better understand the building codes and the building code officials need to understand better why having leaking sewers is a problem.”

Despite the fact that private-side sewer testing is a requirement of the building code, only about 5% of municipal building departments across Ontario are following through, likely because the tests are time-consuming and difficult to perform. As a result, virtually all developments have costly unaddressed issues with I/I. Robinson points out that a leak of 1L/sec into the sewer costs an annual \$80,000 to treat at the wastewater treatment plant (WWTP). Meanwhile, the leakage can undermine the entire structure of the sewer, reducing its design life. The additional water also consumes capacity in the trunk sewer, in some cases leading to development freezes.

“The combined costs of this problem is absolutely staggering,” says Robinson. “Through flow-monitoring, I have seen subdivisions with 10, 15, even 20L/sec of base flow I/I, in sewers that are supposed to be in the ground for about 75 years.” Some of the long-term implications for municipalities include comprising their ability to cope with more frequent and extreme rainfall events expected due to climate change.

Nor is the problem isolated to new subdivisions or to the subdivision in which it occurs. Leakage in one suburb, for example, can flow into downstream combined or separated sewers that may overflow and cause downtown flooding during an extreme weather event. “We cannot dig up all the combined sewers,” says Robinson, “but we can

prevent new clean water from getting into them.”

As municipalities begin to understand the scope of the problem, they are looking for ways to address it. Norton’s work has been partially funded by municipalities across Ontario, including Peel, Halton, York, and Niagara, as well as the cities of London, Windsor, Orangeville and Cambridge, among others.

A known area of vulnerability to I/I occurs at where the private sewer meets the public sewer at the property line. Although the Ontario Building Code specifies that all piping must be inspected, it does not specify that an inspector must be onsite to verify the connection at the property line. Robinson believes this is something that should be explicitly written into building codes. As such, she has been working on developing proposed changes to the building code in relation to issues such as pipe type, design, installation, and inspection and testing of connections at the property line, etc. Findings are true for both sanitary sewers (on which Norton’s research has focused) and storm sewers.

Norton Engineering has been working with the Institute of Catastrophic Loss Reduction to evaluate the existing provisions to the building code as well as the societal costs of I/I. Work in Ontario and British Columbia on assessing and addressing I/I has led to projects with the Standards Council of Canada and the National Research Council for further studies across the country.

Robinson was appointed chair of a 30-member committee of industry experts focused on developing a new CSA Guideline Z 800, Basement Flood Protection and Risk Reduction. Recently, Robinson received a letter from Infrastructure Canada, indicating interest in working with her on I/I issues at a national level. “The insurance industry is also very interested in my work because basement flooding is very costly,” she points out.

Robinson is trying to get the word out about leaky sewers any way she can. Since 2016, she has worked as CBC Radio’s Ontario infrastructure columnist, speaking on various engineering topics, including I/I. Robinson has spoken about the political pressure developers put on municipalities to forego inspections for pipes they are putting into the ground, with homeowners paying for subsequent I/I on their sewer bills. “Residents pay for that without realizing it,” she notes. Her mission is to change that scenario by empowering the public with knowledge about what is happening right beneath their feet.

Sometimes residents are unknowingly contributing to I/I by illegally connecting their sump pumps to their sanitary sewer system. Along with educating the public it is important for municipalities to take charge of this practice (which is illegal throughout Ontario) using the tools they have under their Sewer Use By-Laws and encouraging By-Law inspectors to proactively watch for this practice when going into people’s homes. “Change can happen,” says Robinson, “but it takes both education and political will. No need to wait for a climate change model or anything else. By making changes today in our policies, procedures, practices and knowledge base, we can start reducing the amount of water in our sewers right now!” ♦