

## FORENSIC ENGINEERING NEWS AND VIEWS

**At this time, our offices continue to operate as an essential service, conducting site visits while following health and safety guidelines including the use of PPE and physical distancing.**

Summer 2020

### Presidents Box



*By Rene Caskanette*

Covid has made marketing, sales and employee training more difficult since most group events are cancelled. When gatherings are acceptable again, will everyone be comfortable getting together as in the past or is permanent change coming?

Zoom came along at the right time to have a sales boom as electronic meetings have replaced face to face meetings in many areas of business. There are lots of businesses that have benefitted with increased sales, Walmart, Grocery Chains, to name a few. Many others which require groups to gather in manufacturing settings, etc are on the opposite side of the coin with closures and interruptions.

Consultants working from home offices prior to the pandemic, such as our firm, have not had much change to operations. We did close our administrative office temporarily with staff moved to home offices, and we now use Zoom to meet, but otherwise it is business as usual. I guess we were trend setters, since many companies are planning permanent work from home operations even after the crisis ends.

We normally publish a newsletter twice each year, but decided to add this special third edition to stay in touch electronically since many of the usual meeting venues such as golf tournaments and monthly adjuster meetings are not available for networking this year.

We wanted our clients to know we are all healthy and working, and are available when needed. To refresh memories, we offer the full range of forensic engineering services from property claim investigation, to auto claims, environmental claims and personal injury investigations, working primarily with insurers and lawyers, along with property managers and owners.

Following investigative work, our Civil and Structural team of engineers and draftsmen can go the next step to scope the repairs, prepare drawings and obtain building permits to restore the building to pre loss condition.

If you have a unique claim requiring an expert opinion from a technical perspective, give us a call, there is a good chance we have worked on similar cases in the past. If we can't help we will refer you to someone who can.

I have been doing forensic engineering since 1986, after spending 6 years with Factory Mutual on large industrial and commercial insurance matters. Our experienced team of experts will get you quick answers to your questions so you can make well informed decisions in your file handling.

### Twister Season is Here



*By Jeff Udall*

As the summer season moves along, the possibility of a catastrophic tornado is ever present. We have considerable experience in dealing with damage to buildings including vehicle impacts, fire repairs, explosions, and water damage. But tornados require an experienced team with systems and resources ready to act.

Tornados can devastate an entire community. A fast response from emergency services companies is required. Our team of engineers stands ready with established methods and tools to enter a disaster area and begin assessing the damage.

The first priority is usually determining if a building is safe to enter. A heavily damaged building may be unstable and could collapse, jeopardizing the safety of residents and first responders. We can determine if the building can be made safe or should be demolished. We then review and document the damage to buildings and advise on what should be done for emergency work. This includes determining if there are any hazardous substances in the building such as asbestos or lead based paint. With a scope of repair established, we can begin measuring and preparing drawings for the contractor and municipality.

In addition to the clear damage from a tornado, there are usually a number of claims filed for less obvious damage. There are often claims for cracking in bricks and foundations, shifting of porches, decks, or fences, and a variety of other issues. With our extensive experience assessing the damage from tornados, we are able to separate damage related to the extreme winds and what was likely pre-existing.

After a tornado strikes, an engineering company needs to be ready to have 'boots on the ground' with systems in place to help triage the huge range of damages. With our experience in large catastrophic events, we stand ready to work with contractors, adjusters, first responders, and the municipal building department to begin the long process of rebuilding a devastated community.

# Covid-19 Clearance Testing and Surface Sampling Detection



**By Bob Caskanette**

As businesses and our economy begin to open up more and more, there will be the need by many to have their facilities, structures

and spaces cleaned and sanitized, potentially on an ongoing basis for the months to come. Having trust in the company doing the work is critical and we can assist with pointing you in the right direction to ensure competent, professional contractors are doing this work with effective and proven products. Beware of some less reputable contractors out there who may offer a cost advantage cleaning, but the work done will not be professional or appropriate to safeguard people using those spaces.

In addition to having the right contractor doing the job, it is also important to ensure the job is verified to be done correctly. This type of cleaning work can be meticulous and frankly, things can get missed. The potential liability if persons become sick as a result of this are very real.

On that note, we are pleased to announce we are able to provide assessments and testing of critical surfaces for the presence and persistence of SARS-CoV-2, the virus that causes COVID-19. These assessments and testing are intended to

help monitor and strengthen the effectiveness of disinfection and sanitation measures employed, particularly after outbreaks or positive tests in a business, care home, or public facilities.

The available test for SARS-CoV-2 uses a molecular diagnostic assay that detects the presence of viral ribonucleic acid (RNA) that is unique to the virus. This gold standard test is closely modeled after clinical testing protocols recommended by the US Center for Disease Control (CDC), but modified for the testing of environmental surface swabs. The test involves the amplification of targeted viral RNA by a process called Reverse Transcription Polymerase Chain Reaction (RT-PCR).

You can help protect your employees, patrons, and the general public by identifying which surfaces in your facility may play a role in the transmission of COVID-19. Identifying and testing of "high-touch" surfaces in common areas of your facilities, especially surfaces that may be touched by many different people, such as:

- door handles and handrails
- light switches
- restrooms
- telephones
- tables and desks
- other high touch surfaces

We can undertake an assessment and collect surface swab samples for COVID-19 testing, including sterile swabs with wetting agent, and sample vials with the appropriate preservative. Once a swab sample has been taken, the swab is placed into a sterile sample vial. The preservative within the vial lyses and inactivates the SARS-CoV-2 virus (if present), rendering it non-infectious. As a result, samples have no potential to be biohazardous. The preservative also prevents growth of fungi and bacteria (gram-negative or positive). According to the World Health Organization (WHO) guidelines, the maximum sample hold time is 72 hours prior to analysis, so assessment dates should be carefully thought out and shipments to the laboratory must be done as soon as possible and the samples must be cooled immediately after collection.

Please contact our office if you wish to discuss a project we may be able to assist you with or if you have any questions. We hope everyone remains healthy and well during these unprecedented times.

Don't forget about some of our other environmental services such as Environmental Site Assessments (ESA's), spill remediation consulting and peer review, mould assessment and abatement, indoor air quality (IAQ) assessments, asbestos and hazardous materials assessment and abatement, designated substance surveys (DSS), clandestine drug lab assessments and fentanyl projects, radon assessments and much more.

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## Engineering Cost Controls and Peer Reviews



**By Micheka Kostyniuk**

In the insurance world, there are various appraiser firms that assist insurers with cost control when it comes to contractors. They assist with

reviewing the scope and associated costs, among other things. But contractor costs aren't the only thing that can exceed expectations for insurers.

Usually, contractor costs are far more significant than engineering costs, but occasionally engineering fees can become excessive throughout a project. This may be due to a high number of billable hours and the client doesn't understand why there were so many hours or a scope that expands drastically, among other reasons. Our firm has been asked many times in the past to review engineering scope and

costs in a variety of areas. Questions arise as to how a scope and the associated fees evolved so much from what was expected to be much more simplistic and/or cheaper.

Environmental jobs can often become expensive as scope creeps as the contaminated areas are identified and delineated, which can cause additional need for sampling and laboratory analysis, consulting, and other fees. No one knows for sure what you're going to find when you begin excavating or drilling boreholes, but knowledgeable experts in these areas have a detailed understanding of what they are getting into after preliminary sampling and analysis, and then build a remediation plan and scope of work to go forward. But what if the plan changes or expands drastically throughout the course of the job? The question arises, was the original scope proper? Was there enough early testing done to attempt to delineate the area so a proper scope could be initially determined? If there was enough sampling and analysis undertaken, was the data

properly analyzed to come up with an appropriate scope? Or did something unforeseen happen during remediation that caused the scope to unexpectedly expand? A detailed peer review can help answer these questions and identify if costs incurred were appropriate or if errors were made.

There are other non-environmental engineering situations where something goes drastically wrong and we are asked to review what happened, either from a scope or financial point of view, or both. These often are more unique situations.

For example, a building was under renovation/restoration in the summer and the roof was removed from the building. The building was tarped, but the new roof wasn't installed until the spring. Water infiltrated the home and there was widespread water and mould damage throughout the home and the home was no

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# Caskanette Udall to present at ICRI Convention



We are pleased to announce that Caskanette Udall Consulting Engineers was selected as a presenter at the International Concrete Repair Institute (ICRI) 2020 Fall Convention to be held on October 5-7 in Minneapolis. ICRI is one of the most highly respected, trusted and reliable sources of providing the best industry practices and professional networks in the repair and restoration industry. The main goal in ICRI is to deliver programs, products, and services that provide knowledge, build skills and validate expertise. We highly recommend taking advantage of this opportunity by attending the ICRI Fall 2020 convention to expand your understanding of concrete repair, protection and restoration through networking, technical sessions and participating in ICRI committee meetings.

In our presentation, Justin Breg (Ph.D.) and Farhad Habibi (Ph.D.), will focus on best practices to minimize the risk of Alkali-Silica Reaction (ASR) in concrete during placement and will propose several strategies for repair of structures that have been degraded due to ASR. The presentation will be based on results from a research program that was undertaken at the University of Toronto with the sponsorship of the Canadian Nuclear Safety Commission (CNSC) to investigate the effects of ASR on large-scale and small-scale concrete specimens.

We are excited to meet and work with a number of repair and restoration professionals from all

over the world at the ICRI convention, and welcome and encourage other professionals across Canada to reach out to us as we continue our mission of educating and sharing knowledge in the field of forensic engineering.

Please visit the convention web page at [www.icri.org/event/2020-ICRI-Fall](http://www.icri.org/event/2020-ICRI-Fall) for information about this event.



## Justin Breg

Justin consults in the fields of structural design and analysis, forensics, and building science. He holds a PhD in Civil Engineering from the University of Waterloo.

His research background covers a broad range of topics, including micromechanics of concrete, renovation of historic structures, and building in extreme climates.

Justin teaches at the University of Waterloo, on subjects related to Advanced Structures, Building Science, and Building Construction.

### Justin Breg, PhD

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## Farhad Habibi

Farhad holds a PhD in Civil Engineering from the University of Toronto, and is currently an EIT. His primary focus is on reinforced concrete. Farhad's interests also include seismic and dynamic analysis, finite

element analysis, failure analysis, non-destructive testing methods, monitoring and evaluating life expectancy of structures, and assessment of construction materials.

Prior to joining Caskanette Udall Consulting Engineers, Farhad worked for the University of Toronto as a research assistant and instructor for many engineering courses. During his research, he collaborated with the Canadian Nuclear Safety Commission (CNSC) to investigate the performance of shear walls affected by Alkali-Silica Reaction (ASR) under seismic loading.

*Farhad will be leaving Caskanette Udall at the end of July to begin working with the City of Brampton Building Department.*

### Farhad Habibi, PhD, EIT

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## Engineering Cost Controls and Peer Reviews

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longer habitable. The contractor stated that there were extenuating, unforeseen engineering issues that were discovered after the roof was removed that resulted in the delays with the new roof installation. We were asked to review the file and assess the project scope and timelines, including the engineering issues that were discovered along the way, and determine whether or not the sequence of events was reasonable or what should have been done from a planning and early engineering investigation stage to ensure this project ran more smoothly once construction began. This file ultimately went to court, and we were qualified in court to give expert witness testimony on this matter.

Another recent example involved an engineer that provided a quote for a specific scope to complete a cause and origin report to determine why a building sustained damages following a methane release into their home, and to provide recommendations on remediating the house. The scope ultimately expanded due to unforeseen

circumstances and the final bill at the end of the project was approximately four times the quoted amount. We were asked to review the scope of work, report, and invoices of the other engineer to determine what was reasonable and what was not reasonable, and ultimately what an appropriate engineering fee (from a time point of view) would have been for this project with the same scope. Our review found that the hours billed to the client were extremely excessive for the associated scope. This was another file that ultimately went to court, and we were qualified in court to give expert witness testimony on this matter.

We hope all your projects run smoothly and with no issues arising. If they don't, and you're not sure how to sort through what went wrong on a project or assessing whether or not the scope or fees were excessive or inappropriate, feel free to reach out to us to assist you with sorting out what went wrong and what should have been undertaken.

## What our clients are saying...

*"Thank you as well for your very informative description and analysis of the various documents you were provided. I was very impressed."  
(Insurance Adjuster)*

*"FYI, you did an excellent job on the stand. We just finished with [the opposition's] engineer today and comparatively your evidence was by far superior."  
(Lawyer)*

*"Thank you for being so accommodating and able to deliver so quickly on such short notice. I received the report and it is the best report I have ever seen. It was easy to understand and covered all the areas that I asked you to address."  
(Insurance Adjuster)*

*"I wanted to let you know that I've noticed a very professional, responsive and client sensitive demeanor from your firm, and wish to commend you on it."  
(Lawyer)*



# Do it yourself – Vertical Wood Fences in 10 Steps!

These days with many of us cooped up in our homes due to the COVID-19 outbreak, home renovation projects may be a good idea to keep us busy and give us a sense of accomplishment, which can go a long way. Now that the weather is nice and lovely outside, how does a new fence for your backyard sound? Whether you want to replace your existing fencing or build a new one, you will find this article helpful. Summarized below are some key steps that you must know if you are planning to construct your own vertical fence.

**1. Call 1-800-400-2255:** Before any digging work, it is required by law to get all of the underground utilities such as hydro and gas lines located. Call this number, and schedule a FREE locating service, at least five days prior to digging.

**2. Check Fencing By-Law:** You can access the fencing by-law by simply doing an internet search. Each municipality has a different set of fencing requirements in regard to height, style, and so on. Make sure you read them before choosing your desired fence height (typically 6 ft to 7 ft). Most municipalities do not require a building permit to construct a fence unless you are installing a swimming pool or replacing an existing pool fence. Nevertheless, it is a good idea to give the building department a call and ask if you need a permit.

**3. Determine the Property/Fence Line:** Use the land survey document if you have it handy to map out your fence line. Also, you can always reach out to your neighbour and discuss (in some cases argue!!!) the property line together. Once the property line is determined, use a thread or a rope to layout your desired fence line. If you have an existing fence that needs replacement, it is always safe to assume that the fence is on the property line unless you have been notified otherwise by your neighbour or municipality.

Although not necessary, fence work is typically done from both sides. Thus, establishing a friendly relationship with your neighbour can facilitate the work significantly as they are far more likely to allow you to have access to their side. They might even pitch in to share the cost with you.

**4. Material Selection:** Most typical wood fences are built using pressure-treated (PT) wood or cedar. However, in recent years, the use of pre-fabricated modular vinyl fences or their combinations with wood has become popular. You may want to take some time and explore your options before rushing into digging holes and setting up the posts since the spacing and installation requirements for pre-fabricated vinyl fences are slightly different from the wooden ones.

**5. Size and Spacing of Posts:** For typical fences that are not accommodating a massive gate, the post sizes can be 4" x 4". The minimum height for the post would be your desired height of the fence plus 4' for foundation (below the ground). You can also add another 2" to the post length in case you are going to use post caps. For example, for a 7' high fence with post caps, you would need 11'-2" long posts. Each post might vary in terms of the length slightly if the ground is not levelled. That is why it is a good practice to measure each location separately, do a little elevation sketch and then cut the posts one by one accordingly to allow for the height difference in an unlevelled ground.

It is recommended to keep the post spacing at 8 ft or less from the centre of post to the centre of post. Depending on the length of the fence, you may want to reduce the spacing to allow the posts to be spaced out evenly. For instance, if your fence line is 30 ft long, instead of having three posts with 8 ft spacing and one with 6 ft spacing, you can add an extra post to build it with six posts spaced out at 6 ft evenly.

**6. Post installation:** Now that the locations of your posts are marked, it is time to start digging. If the ground is more or less levelled, you can install the first post at any end or corner that you want within the laid-out line. If not, start from the highest point, which is usually toward the house side. Dig an 8" diameter hole with the depth of 4'. You can do it by hand using a shovel or rent a post hole digger (Auger) from a variety of rental tool places (costs around \$120/day). Try to make the hole slightly larger at the very bottom to around 10" diameter to provide it with a good base.

Use ready-to-use concrete mix and pour the holes with concrete up to about 10" below the ground. Use a marker and measure 4 ft from the bottom of the post and make a mark. Push the post down into the concrete until the mark on the post is levelled with the ground. While the concrete is still wet, level the post in both directions (x and y-axis). Fill the remaining depth of the hole with soil. Confirm the location of the next post and repeat the same step.

**7. Fence Railing:** Now that you are done with the installation of all the posts, it is time to get the top and the bottom 2" x 4" rails done. These two rails give your vertical fence boards something to connect to. Starting from the highest elevation, make a mark at 4" above the ground on the first post. Similarly, mark the next post at 4" above the ground. Ensure the two marks are levelled with respect to each other. You can check that by holding a piece of 2" x 4" lumber between the two posts where you made

the mark and use a levelling beam. These marks indicate the location of the bottom of your lower rail. Continue marking the remaining posts in a similar fashion until you mark all of them.

Now you need to mark the location of the top rail. Using a similar method as described above, make a mark at 8" from the top of the post. Use a 2" x 4" fence bracket (recommending Simpson Tie FB24Z) and flush the bottom of the bracket with the marks you made at both top and bottom of each post. Secure the ties to the posts at mid-depth using fence nails. Cut 2" x 4" lumbers to the required length and then slide them into the brackets between the posts to form the railings at both top and bottom. Secure the 2" x 4" lumbers to the bracket using fence nails. If desired, you can add a middle rail.

**8. Fence Boards:** Decide on the pattern for your fence boards. You can alternate the height and width of each board. Take your time and look for some inspiration. Typically fences boards are made of 1" x 6" lumber with a maximum of 3/4" gap in between. You can use a spare 1/2" or 3/4" thick board as a guide for spacing the vertical fence boards. Secure the vertical boards to the railings with two fence nails at top and bottom (four in total). Make sure you leave a 2" gap between the bottom of the board and the ground to avoid rotting. Also, check occasionally to ensure everything is levelled.

**9. Finishing touches:** Install the post caps. Post caps come in a variety of styles and designs. Find the one that suits your design and taste. Also, in case you used cedar, apply stain to preserve its gorgeous texture and look. However, staining cedar is a little tricky. Fresh cedar usually does not accept the stain. Use a spare piece of the cedar lumber that you have and apply the stain. If it soaks in, it is ready. If it stays on the surface, give it some time and try later again. In some cases, it takes about a year before you can apply stain to cedar depending on how fresh the wood is.

**10. Final Step:** Sit back and enjoy your job well done and think of how much you just saved by doing this yourself. According to the Home Advisor (2020), a typical pressure treated wood fence could cost up to \$80 per linear foot. Add an extra 50% to this price in case you were thinking of cedar!

# Soft Water During Hard Times



**By Alex  
Caskanette**

During this ongoing pandemic, the last thing anyone wants is water damage to their property. Many municipalities in Ontario provide

“hard water” to their residents, which is a term that means that the water supply contains high concentrations of dissolved minerals, specifically calcium and magnesium. To avoid the staining and the scale accumulation that hard water causes, individuals and businesses often incorporate water softeners into their plumbing systems.

Water softeners often consist of a resin tank (filled with resin beads) and a brine tank. Hard water enters at the top of the water softener tank and flows down through the resin beads. As the water percolates through the resin beads, ion exchange occurs. The negatively charged resin beads attract the positively charged minerals (the calcium and magnesium) and exchange them for sodium ions, removing the undesired minerals from your water supply. The now soft water flows out of the softener tank providing softened water throughout the house. This process continues overtime and the concentration of sodium in the resin tank is depleted and the resin beads can no longer remove the minerals from the water.

A process called regeneration is used to replenish the concentration of sodium ions in the resin tank. Brine (a solution of water and salt) prepared in the brine tank is run through the resin beads. Ion exchange occurs again this time replacing the undesired minerals that were removed from the water supply with sodium ions. These undesired minerals are then flushed out of the resin tank and down the drain. The water softener has been regenerated and is once again ready to soften hard water.

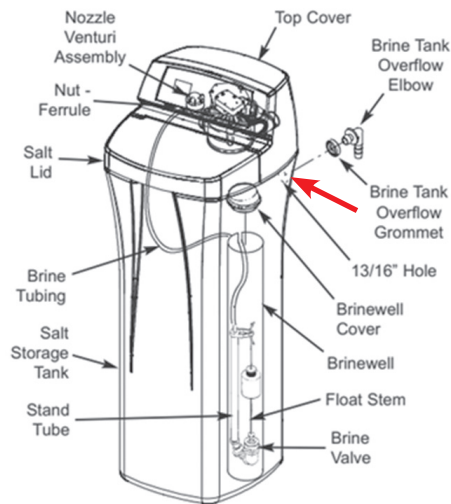
We have investigated a number of water softeners that have failed due to installation deficiencies, manufacturing defects, maintenance issues,

and user error. All of the losses have resulted in significant damage to property and many of the losses would have been avoided if the water softener and brine tank had been installed correctly.

Brine tanks are often equipped with an overflow gravity drain that must be connected to the nearest floor drain in order to prevent the brine tank from overflowing if the brine valve fails. Failure to properly install the overflow gravity drain is an installation deficiency and is a possible subrogation avenue. Check your brine tank today to make sure that your overflow protection is properly connected. The typical location of a brine tank overflow gravity drain is indicated in Figure 1.

We specialize in determining the cause of plumbing appliance failures, such as, but not limited to: water softeners, water heaters, washing machines, dishwashers, and sump pumps.

Let us assist you in determining the cause of water loss claims and if subrogation is an option for you.



*Figure 1: The typical location of a brine tank overflow gravity drain is indicated with a red arrow.*

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**We are available to provide you with web based training that can be tailored to the needs of our clients, dealing with engineering and building science matters**