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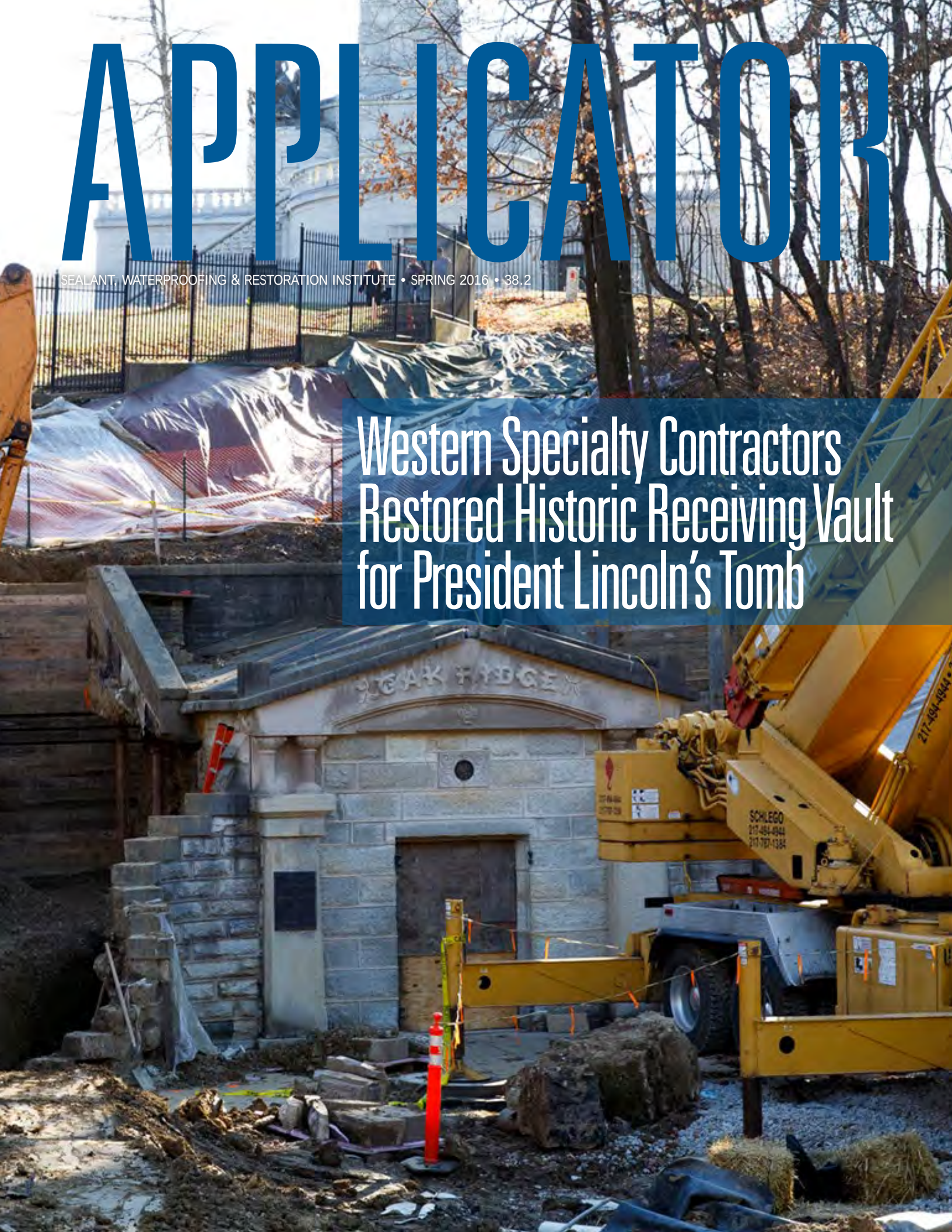

Western Specialty Contractors Restored Historic Receiving Vault for President Lincoln's Tomb

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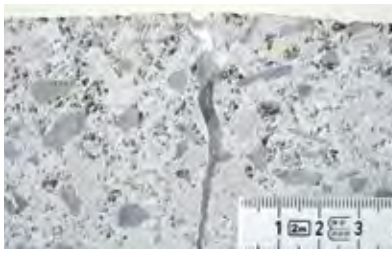





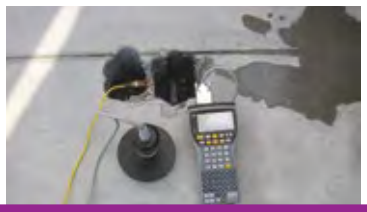

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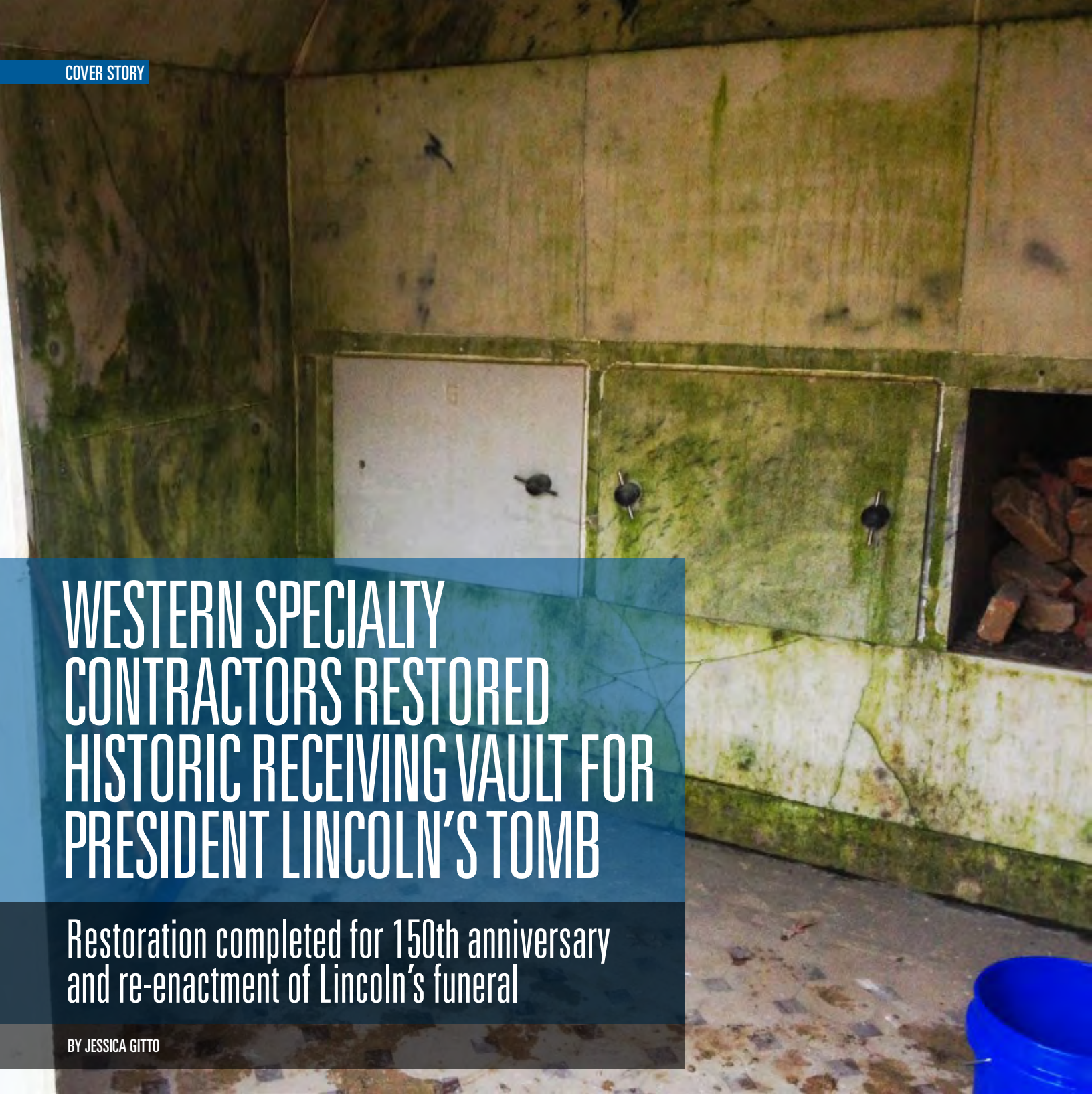


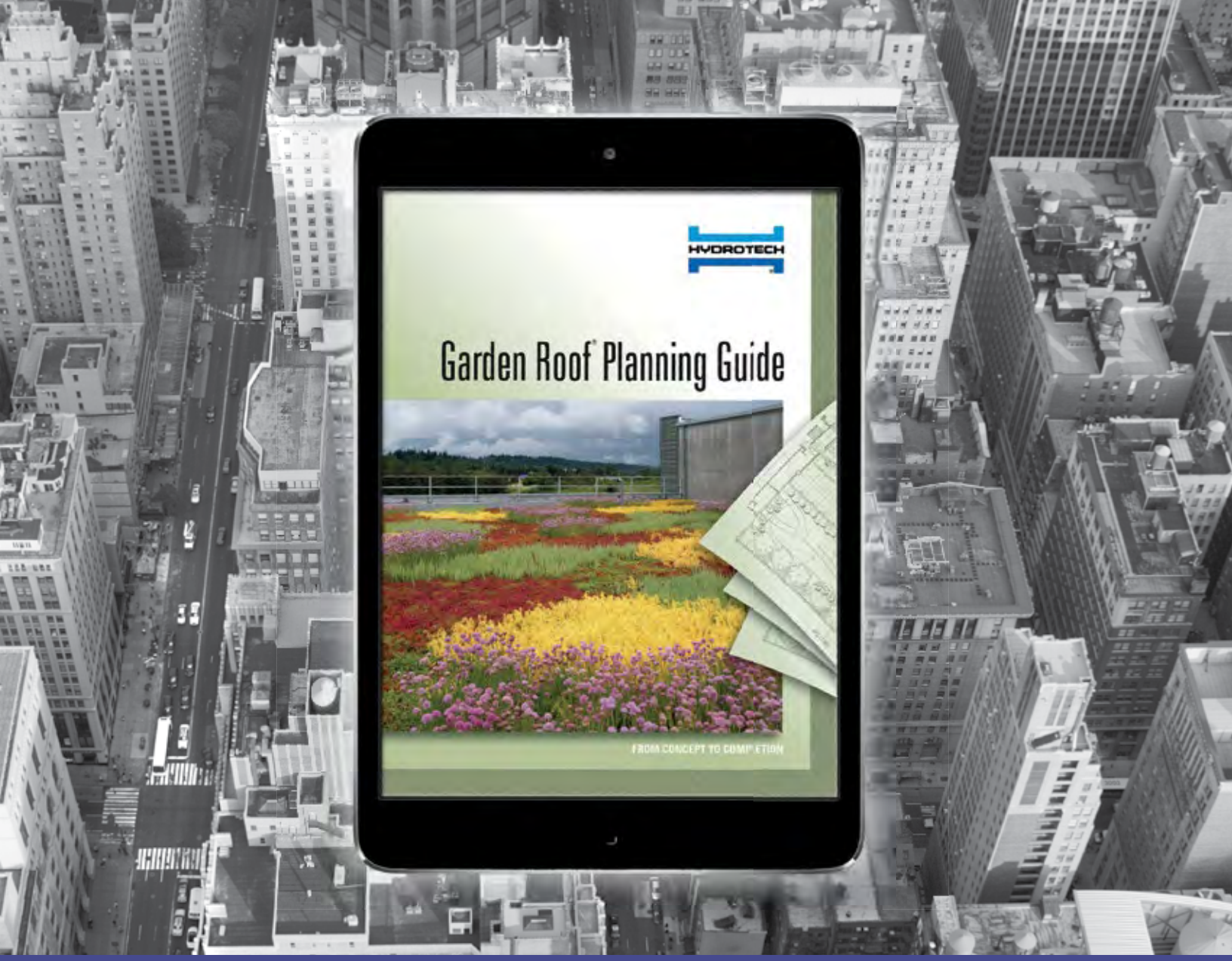
WESTERN SPECIALTY CONTRACTORS RESTORED HISTORIC RECEIVING VAULT FOR PRESIDENT LINCOLN'S TOMB

Restoration completed for 150th anniversary and re-enactment of Lincoln's funeral

BY JESSICA GITTO

Western Specialty Contractors (formerly Western Waterproofing Company) was honored with restoring the historic receiving vault that once held the bodies of assassinated President Abraham Lincoln and his son, Willie, following Lincoln's funeral service on May 4, 1865, in Springfield, Illinois. The bodies of Lincoln and his son, who died at age 11 in the White House, rested in the receiving vault until Dec. 21, 1865, when they were moved to another temporary vault.

The vault, which had served as a temporary tomb while burial plans were made or if a grave could not be dug due to frozen ground, is located at the base of a hill, north of President Lincoln's tomb in Oak Ridge Cemetery. Due to its location at a low spot in the cemetery, the vault was subject to water penetration, which resulted in major deterioration. The vault's restoration needed to be completed in time for a two-day ceremony on May 2-3, 2015, to re-enact and commemorate the 150th anniversary of Lincoln's funeral.



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Western Specialty Contractors, along with project engineer Coombe-Bloxdorf, a Division of Fehr-Graham & Associates, began the five-month restoration project on Dec. 1, 2014. The initial phase of the project involved channeling water away from the vault with the installation of drains. Once that task was completed, the general contractor began excavating the area around the vault in preparation for Western's scope of work which included waterproofing, repairs to the stone facade, and restoration of the marble.

Constructed in the 1860s using outdated materials and technology, Western crews encountered more extensive deterioration to the vault than they had originally anticipated. During the excavation around the outside of the historic site, it was discovered that the walls making up the vault's exterior were in such poor condition – bricks were deteriorating, voids were present in the masonry wall, and stone infill had been used – that waterproofing could not be applied directly to the surface. An alternate means of repair was necessary to prepare the vault for the waterproofing application. Western crews used their extensive experience in historic restoration to find a solution to the challenge.

"Because this was a historic site, the customer did not want us using a lot of new means and methods to restore it," said Springfield Project Manager Josh Woolard. "We had to come up with a scope of work that would repair the walls without compromising the

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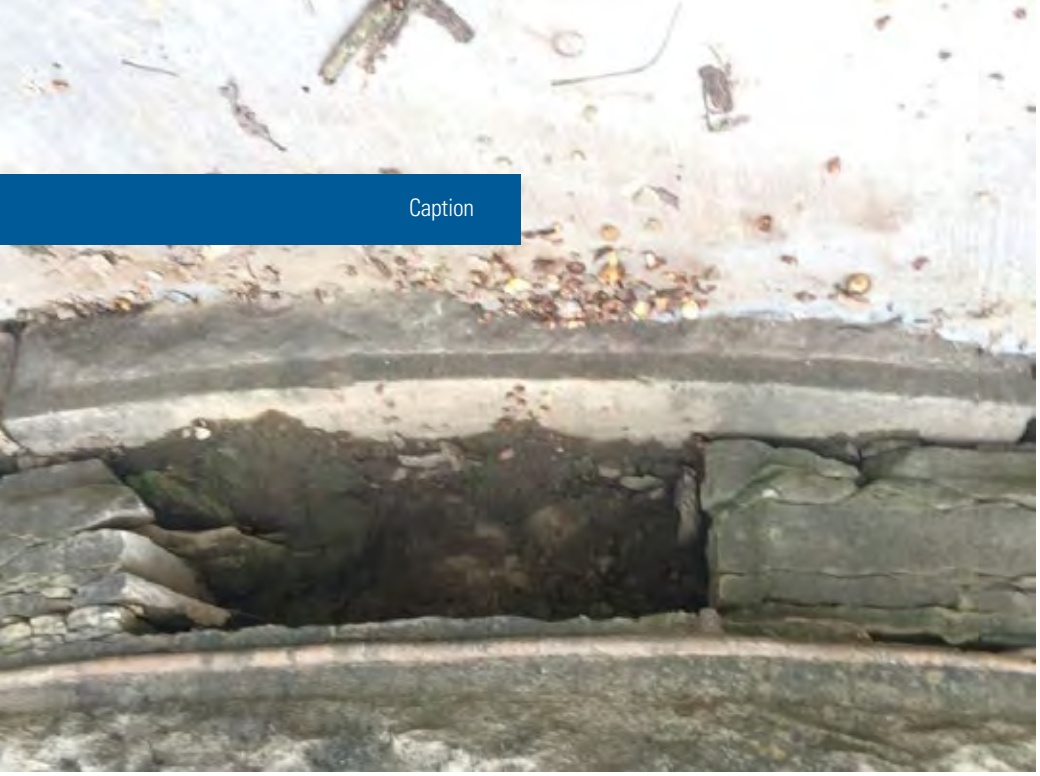

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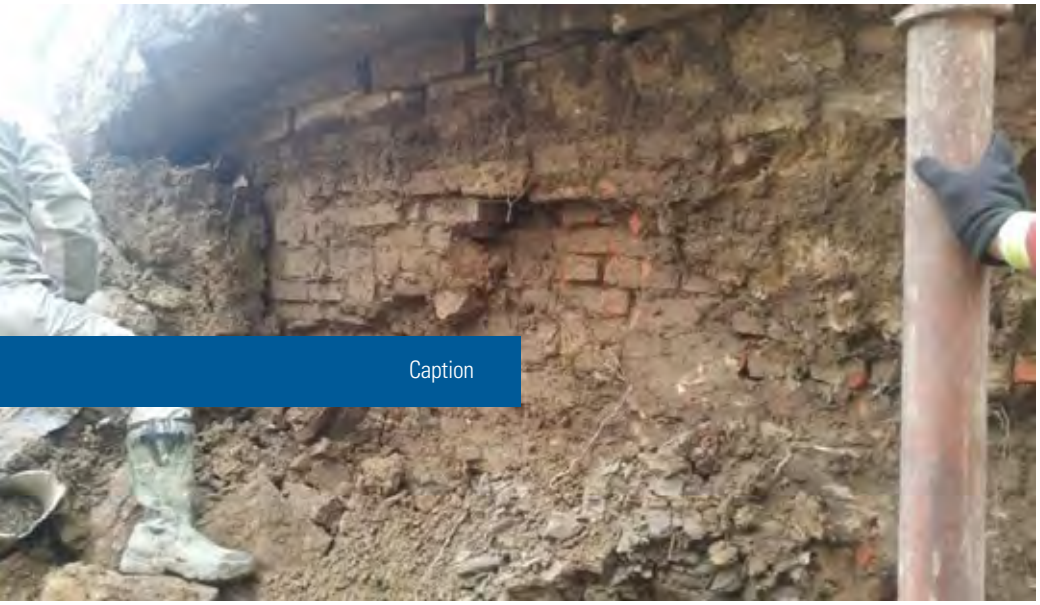

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Field dimensioning was critical in accurately replicating the lost detail.

integrity of the historic structure. We formulated a system using a low-cement-ratio mortar and brick infill in areas where the brick had deteriorated away from the wall. After infilling the voids in the walls, we applied a layer of the low-cement-ratio mortar to the entire wall surface to create a smooth surface with no protrusions that could penetrate through the bentonite sheet waterproofing."

Another challenge to the project was finding a quality match for the stone replacements on the serpentine retaining walls that extended outward away from the vault entrance. Due to the age of the vault, the original stone material used was no longer available, and Western crews had to find a suitable, alternate material that would closely match the existing stones and meet the customer's needs. Many mock-ups of stone fabrication were required to find the perfect match.

"These walls contain two curves, one inward and one outward. Due to this fact, it was not only a matter of finding the correct length and depth of the stone but also finding the radius of the curves in order to fabricate stone that would fit into the voids created by the removal of the stones," said Woolard. "In order to find the radius in the stone, we had to remove the existing stone. By first creating a template on Styrofoam of the gaps created by the removal of the stones, we were able to use computer software to find the radius of the curves within the wall."

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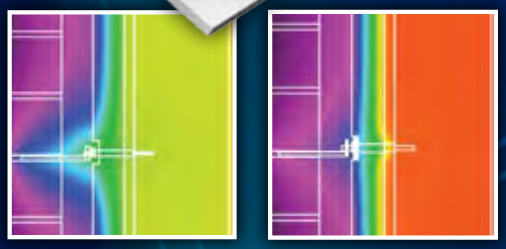

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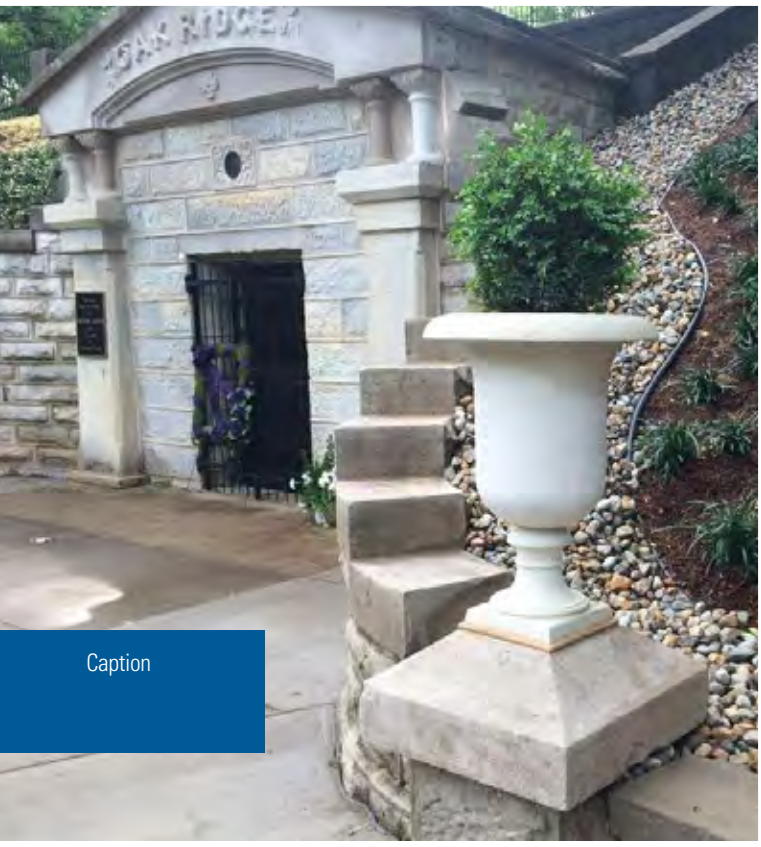

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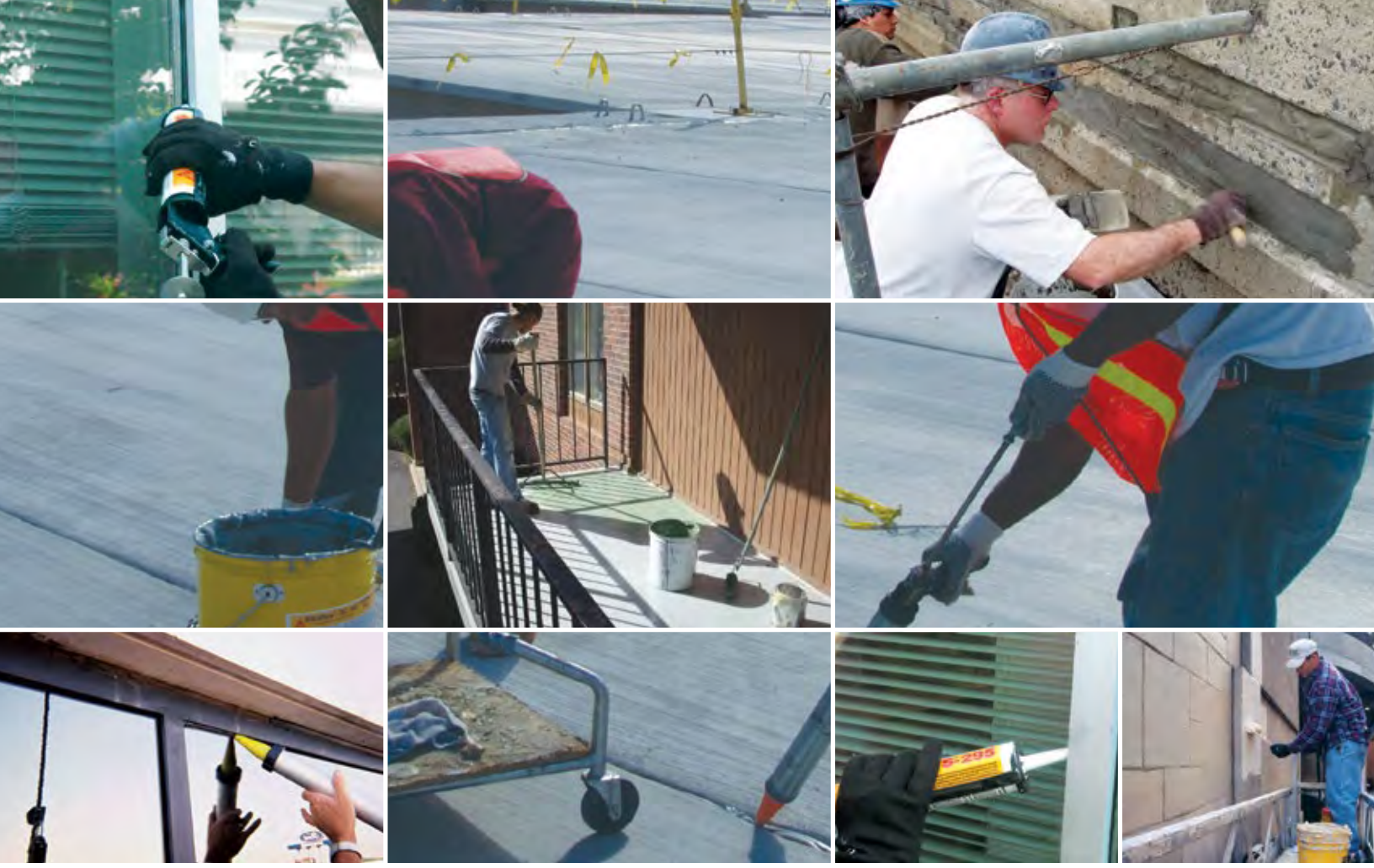
Western also used other special methods to re-create the unique beaded joint evident in the original masonry construction.

"Unlike most joints in masonry construction, these joints were not concave or flat joints. Instead, they were beaded joints within the masonry. In order to achieve this effect, we used special tools and procedures which allowed the mortar to hold its shape while it was formed. This process provided a less workable material and was more time consuming for even small amounts of tuck pointing, but the end result is a structurally-sound, historical replication of how the vault was originally constructed," said Woolard.

Western crews completed their restoration work by carefully cleaning the tile floor and marble walls and ceiling inside the vault chamber using a cleaner with a low pressure rinse. Additionally, crews re-attached two marble doors on the loculi, or shelves set into the wall of the vault where a coffin or body is stored.

The restoration project was completed on May 1, 2015, in time for the commemoration and funeral reenactment ceremonies.



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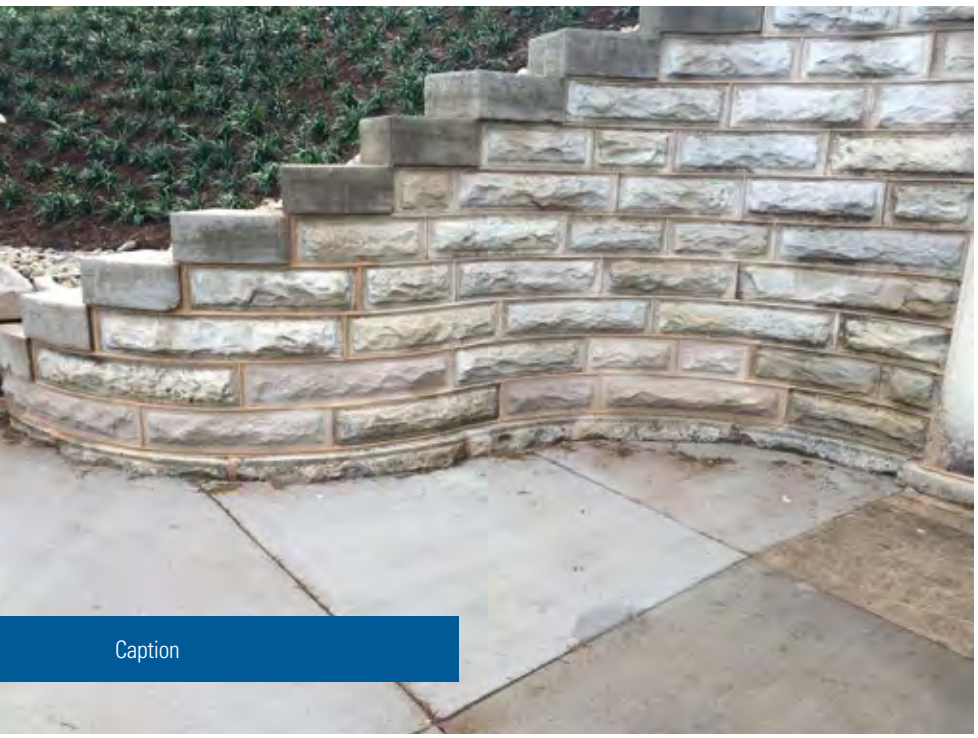

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Western took great care in respectfully preserving not only the look of the receiving vault, but also the method by which it was originally constructed. With the restoration process in place, the historic vault is now preserved for future generations to treasure and appreciate.

About Western Specialty Contractors

Family-owned and operated for 100 years, Western Specialty Contractors is the nation's largest specialty contractor in masonry and concrete restoration, waterproofing and specialty roofing. Western is headquartered in St. Louis, Mo., with over 30 branch offices. For more information about Western Specialty Contractors, visit www.westernspecialtycontractors.com. •

About the Author

Jessica Gitto is Business Development Representative at Western Specialty Contractors.

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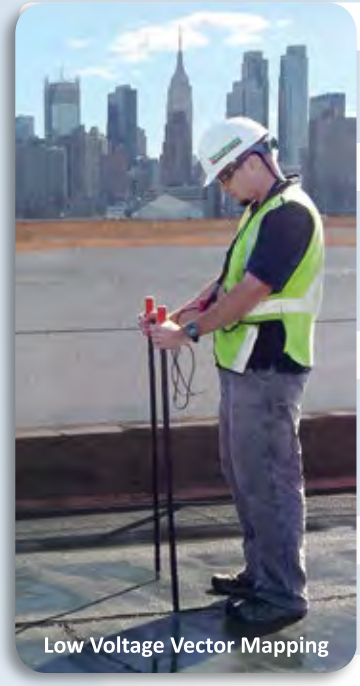

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THREE MOST COMMON MISTAKES IN WATERPROOFING

TOM MICHIELS, TECHNICAL SERVICES MANAGER, LIQUIDS & WATERPROOFING, SOPREMA
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The visible components of building construction typically receive the most attention, but it's the unseen building elements, such as waterproofing, that can have the greatest impact on building performance. Failures of these unseen elements can be expensive and disruptive to normal operations. In the case of failed waterproofing, leaks in a building envelope can be especially costly to address. If waterproofing is done incorrectly, building owners can anticipate a re-application or a forced remediation solution.

There are many ways a waterproofing job can go wrong, but the top three culprits of waterproofing failure are improper design, incorrect choice of materials and lack of quality workmanship.

Improper Design

Waterproofing must be considered at the front-end of any building construction project, typically during the design phase. Before breaking ground, building designers and architects should consult with the waterproofing manufacturer and contractors to ensure that all requirements are fulfilled. All parties must communicate at pre-construction meetings or major problems could ensue. From construction sequencing to accounting for inevitable building movement, the design phase is where the most critical decisions are made.

Construction Sequencing

There are many pieces of construction sequencing that play a role in the success or failure of a waterproof-

ing project. First, it's important to take into consideration the durability of products being utilized. The impact of contractors continuously working over a material, commonly referred to as work benching, that cannot take the abuse can lead to waterproofing failures. It's important to sequence the construction project properly and have a quality control process and associated repair methodology in place should abuse of material occur.

During the design phase, consider the detailing and whether the waterproofing manufacturer has recommended the product be used in that particular configuration. With so many steps to a complete project, it's imperative to have sequencing outlined correctly to allow for a proper installation.

Sequencing is also important when developing a construction schedule. Certain products won't yield well to unforeseen schedule changes in projects. Some products cannot be exposed to UV rays for an extended period of time, while other products may react adversely to precipitation after installation. Project delays could play a part in exposing these products to elements or conditions that they are not designed to withstand. Due to possible construction delays, product selection must be carefully considered.

Sequencing is also important when developing a construction schedule. Certain products won't yield well to unforeseen schedule changes in projects.

Compatibility

To avoid waterproofing failures, it must be verified that all waterproofing systems used in the building envelope are compatible. At the design phase, all waterproofing materials must have a clear and concise tie-in throughout the building envelope and compatibility must be considered to ensure long-term effectiveness.

Soil Conditions

At the start of a below grade waterproofing project, a soil analysis is essential. This serves to determine what type of waterproofing material will or will not perform well in the given environment.

Building Use, Movement and Geographic Location

Some final design phase considerations include geographic location, understanding building use and building movement. Over time, and even by design, every building inevitably moves. This movement must be accounted for in the design phase. Waterproofing materials must be selected to accommodate this movement by ensuring flexibility in both material properties and details. Additionally, all geographic locations have unique climates and environments and it is essential to

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understand these conditions before the start of a waterproofing project.

Incorrect Choice of Materials

Selecting the right material goes hand-in-hand with design. Material selection must be based on the design, quality and track record of a waterproofing assembly and its compatibility to the substrate and other building envelope waterproofing systems. Consideration should be given to the appropriateness for the intended use on the project, rather than selecting materials exclusively based on economic considerations or length and scope of a warranty.

Long-Term Viability

A waterproofing job is one no building owner or facilities manager wants to repeat. The long-term service life of a product or system is an important consideration when selecting materials.

Material Manufacturer History and Product Warranty

The manufacturer's warranty shouldn't be the sole deciding factor when selecting materials. The quality of the product, with a proven track record in similar applications, should take precedence. Additionally, it is preferable that the manufacturer has been in business longer than the offered material warranty.

Applicability for the Project

The material chosen needs to be appropriate for the project requirements and all building envelope materials must be compatible. This compatibility extends to the finishes that encompass the waterproofing material, as well as any materials coming in contact with it.

Proper Storage of Material

Every manufacturer should clearly list the material storage requirements. Improper storage can lead to degradation of the material and ultimately a decrease, or lack of, material performance.

Proper Equipment for Installation

Installation equipment needs to be appropriate for the project and for the material being applied. Certainly, the correct equipment must be utilized and all installers must possess proper usage and safety knowledge.

Quality of Workmanship

It's always recommended that designers work with qualified professional waterproofing contractors. As stated earlier, they should be included during the design phase and before specifications or contract documents are prepared. When it comes time for installation, all work needs to be performed by skilled, trained workers who are familiar with the specified product and attendant application techniques.

Trained Installers

Contractors on waterproofing projects should be manufacturer-authorized, signifying that they went through the manufacturer's product-specific application training program. It's also important to remember that on any job the people in the field aren't always the ones who have been trained. The actual installers need to be the ones who received the training. In most cases, the contractor will have a certificate or training I.D. from the manufacturer proving program completion. Finally, training needs to be maintained. As employees come and go within a company, those skills shouldn't be lost. Ongoing, regular training is imperative in ensuring all installers on any job are familiar with the product and application for that job.

Project Requirements

Some projects require a variety of products due to varying project conditions. Contactors must know when and where they are installing, so that the correct material is being used for that climate, environment and specific project conditions.

Ensuring a Protected Building

When an estimated 10 percent of the job cost can protect your entire building structure, waterproofing isn't an area that can be overlooked. It's important to execute due diligence upfront to avoid installation mistakes, waterproofing failures and potentially expensive repairs later on. •

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Better Business

Make the Most of E-mail

E-mail can be a valuable communication tool, but effective e-mail messages can be challenging to write. This second article on mastering e-mail focuses on tips for writing engaging e-mail messages that engender responses.

BY CATHEE JOHNSON PHILLIPS

"But I sent you an e-mail!"

"Why haven't they responded?"

"No, no, no, that's not what I meant to say in the e-mail!"

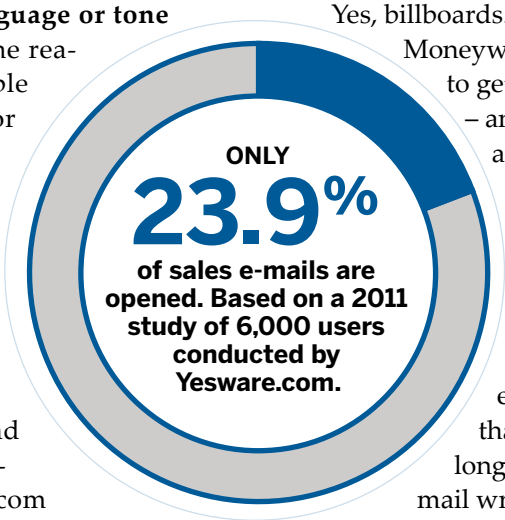
Ever had these thoughts? Do you cringe when someone says, "Let's take care of this by e-mail"?

Many e-mail messages go unopened or unanswered, and those that are opened run the risk of being misunderstood. In some cases, unopened, unanswered, or misunderstood e-mail messages can lead to serious consequences, such as costly mistakes on projects or damaged professional—and personal—relationships.

E-mail, however, has become a primary communication tool and is often preferred over the phone or face-to-face meetings. So, how can one make the most of e-mail?

REMEMBER ITS LIMITATIONS

E-mail communication doesn't allow for body language or tone of voice. That's the reason so many people use smiley faces or other emoticons, which can be effective but can come across as unprofessional. Before sending an e-mail message, **read the message again** and consider the audience. MindTools.com suggests: "Think about how your email 'feels' emotionally. If your intentions or emotions could be misunderstood, find a less ambiguous way to phrase your words." Say "hello" and "thank you" and be respectful and courteous. If you are too emotional to do so, wait to write the message until you've calmed down.



Less is generally more. Think of e-mails as billboards rather than novels. Yes, billboards. In the CBS News Moneywatch article "4 tips to get your e-mail read – and answered," author Tom Searcy suggested that e-mail is more about transactions than communication and recommends that e-mails be no more than three sentences long. The expert e-mail writer will become a clear, concise writer that would make any editor proud. Searcy offered the following tips for writing better e-mails:

Hone in on that subject line! The recipient should immediately know the subject of the e-mail message and the action that is required. Example: "Please review article by tomorrow COB."

Declare action requests up front. Pretty much repeat your subject line in the first sentence of the message: "Please review the attached article by 5 p.m. tomorrow, March 7, 2016."

Write out your context and details. Keep it short and sweet: "We want to be sure to get your revisions in the magazine, which goes to press on March 9. Thanks so much!" If there are too many details to address in two or three sentences, attach a longer letter and refer to that in the message.

Write your e-mail as if your boss, your spouse, your mom and a lawyer were going to read it out at a press conference. Remember that every e-mail message you send can be forwarded… and forwarded… and forwarded. And, writing "Confidential" in the subject line is no guaranteed that it will be… confidential.

Always read your email twice before you send it. Besides checking it for tone and clarity, double-check your grammar and spelling.

ENGAGED RECIPIENTS = INCREASED RESPONSES

Yesware.com also provides advice on writing better e-mail. The article "7 Proven Ways To Write Emails That Get Replies, Backed By Science" by Bernie Reeder provides tips based on sound psychological principles, as well as Yesware's own research.

Include others on the message; in other words, use peer pressure. Reeder wrote, "When it comes to making decisions –like whether or not to reply to someone's email– we take cues from other people." His statement is supported by research: In 2011, Yesware conducted a survey of 6,000 of their anonymous users who sent nearly 80,000 e-mail messages to recipients in 132 countries over 15 days. The results showed that e-mail messages have higher open rates when sent to multiple recipients.

Use the word "because." Reeder recommended that you give a reason for your request, especially if the recipient is someone you don't know and if you are asking a favor. He referred to a study conducted by Harvard social psychologist Ellen Langer, where nearly all (93%) people complied when the word "because" was used.

Use a little humor. Other studies have indicated that "when you make someone smile, they relax" and are more receptive to your message. The key word here is "little" – don't try to be a stand-up comedian and, again, consider your audience.

Use numbers strategically. Including numerals in the subject line is effective, as is presenting statistics in the message. For example, the subject line might read "Please review: Option 1 could reduce our costs by 15%." Just don't overdo it with options: According to Reeder, studies have shown that three choices engage the mind, but four can cause confusion.

Use their name more than once! Reeder said, "Personalization is key." Try putting their name in the subject line or repeating it in the message.

OTHER TIPS TO KEEP IN MIND

Based on the 2011 survey, Yesware recommends two other simple tips to increase your response rates:

For the best response rates, send e-mails early in the morning or on Friday afternoons.

Don't wait days for a reply; after 24 hours, try again.

CONTRIBUTE TO BUSINESS BITES

The *Applicator* plans to address time management and pricing for profit in future issues. Do you have tips to share on these subject? Please send them to cathee@swrionline.org.

ABOUT THE AUTHOR

Cathee Johnson Phillips is editor of the *Applicator* and struggles every day to write effective e-mail messages. •

FOR MORE INFORMATION

Read these articles for more information:

"Writing Effective Emails: Getting People to Read and Act on Your Messages" (https://www.mindtools.com/CommSkll/EmailCommunication.htm)

"4 Tips to Get Your Email Read--and Answered (http://www.cbsnews.com/news/4-tips-to-get-your-email-read-and-answered/)

"7 Proven Ways To Write Emails That Get Replies, Backed By Science" (http://www.yesware.com/blog/emails-that-get-replies/)

"How Can I Increase E-mail Open Rates?" (http://www.yesware.com/blog/how-can-i-increase-email-open-rates/)

"10 Common Email Mistakes: Using Email Effectively" (https://www.mindtools.com/pages/article/10-common-email-mistakes.htm)

THE EDITOR'S TIP

When in doubt, read out loud. When I am agonizing over the tone of an important message, I'll close my door and read it out loud. That almost always identifies any needed revisions.

Combine communication tools. If the person hasn't replied to a time-critical e-mail within 24 hours, consider leaving a voice mail to let the recipient know that the e-mail is waiting for their attention. If the recipient answers the phone, so much the better!

1976—2016 40 YEARS OF GROWTH

Founding Companies SWI 1976

ABCO Waterproofing, Inc

A.J. Spanjers Company, Inc

Chamberlin of California

Charbetz, Inc

Columbia Cornice Company

Culbertson Company

Dominion Caulking Company, Ltd

The Grenadier Company

Holbrook Waterproofing Company

Raymond E. Kelly, Inc

Seager Waterproofing, Inc

Western Waterproofing Company, Inc

In 1976, Mike Chiodo and George Grenadier, two restoration contractors from Philadelphia and New York, respectively, got together to discuss the merits of forming a national association of waterproofing and sealant contractors. They determined there was a need and agreed to move forward. The ensuing collaboration resulted in invitations to 10 other like-minded companies to join the Sealant and Waterproofing Institute (SWI).

From these humble beginnings, SWI has evolved into the Sealant, Waterproofing and Restoration Institute (SWR Institute) with 275 member companies representing not only contractors but also manufacturers and architectural/engineering firms. Its growth has gone beyond just a group of contractors getting together to discuss industry/business issues to being a respected source of programs and publications that serve the entire industry.

To celebrate this amazing history, the SWR Institute held its 40th anniversary at the Hotel del Coronado, a magnificent example of historic and sustainable restoration on Coronado Island in the middle of San Diego bay. This 128-year-old hotel provided ample opportunities for everyone to enjoy the facility and the great weather, plus explore the many sights that Coronado offers.

Sessions

Even though celebration was on everyone's minds, the main event was the excellent educational program that was developed by the Program Committee. There were three days of timely and informative sessions that covered a myriad of topics.

The program began with a challenging project undertaken by

Old World Stone to assist in the historical restoration of the Schinasi Mansion in New York City. This 12,000-square-foot National and New York City Landmark property was being totally restored. Old World Stone was hired to cut, sculpt, and carve exact replicas of Renaissance marble using the original Olympian marble.

Other sessions included insights on how to handle significant "unforeseens," like those that Sean Dunham of Kawika Painting and Adriano Bortlin of SIKA Corporation ran into on a high rise in Waikiki. It was an ongoing study, from minor repairs to full exterior restoration of the tower. A good follow up on high rises, Kelly Streeter of Vertical Access explained the positives of using Unmanned Aerial Vehicles (UAVs) for inspection of buildings. She

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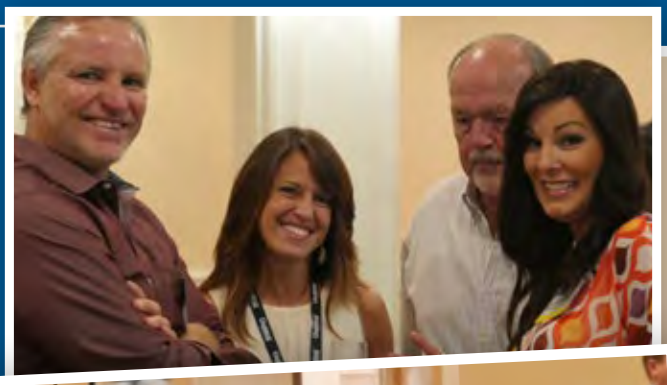
SWR INSTITUTE'S 2016 TRINITY AWARD WINNERS

The SWR Institute's Trinity Award is a prestigious juried acknowledgement of a successful project that was accomplished through the collaboration between three categories of SWR Institute membership – Contractor, Associate and Manufacturer.

This year's winners all represent the best of our industry and we congratulate and thank them for their efforts and recognition!



RESTORATION

Project: PNC Bank Building Façade Restoration
Contractor: Otto Baum Company, Inc – Dan Bagley
Associate: Raths, Rathes & Johnson – David Fortino
Manufacturer: Dow Corning Corporation – Lisa Honoman

SEALANT

Project: AON Center Façade Sealant Replacement
Contractor: Western Specialty Contractors – Krista Gnatt (Not Present)
Associate: Wiss, Janney, Elstner Associates, Inc - Brett Laureys
Manufacturer: Dow Corning Corporation – Lisa Honoman
Presenter: Dave Kimball

WATERPROOFING

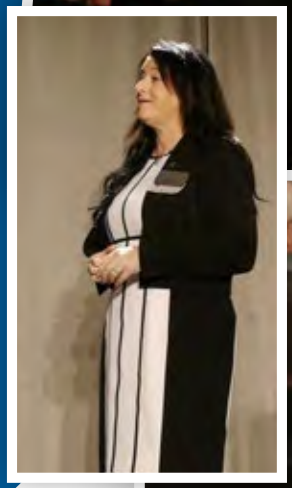
Project: Two Wells Fargo Veranda Waterproofing
Contractor: Stone Restoration of America, Inc – John Lambert and Jim Lambert
Associate: Terracon Consulting, Inc – Brandon Bendele (Not Present)
Manufacturer: Tremco, Inc – Steve Peters
Presenter: Dave Kimball

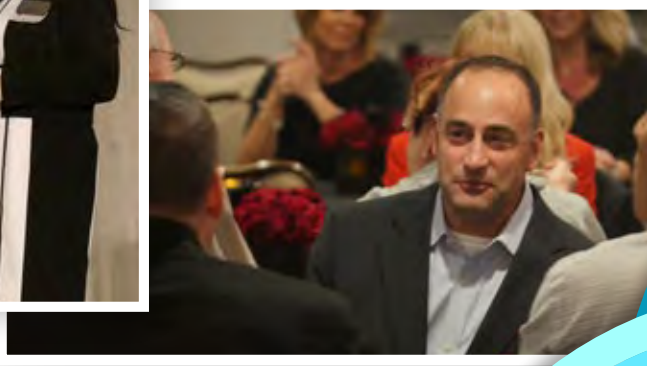
noted that ten cities in the northeast have passed legislation requiring façade inspections on regular intervals. She also gave a detailed explanation on the ways that regulatory issues are impacting the use of UAVs in such inspections.

Turning to waterproofing John Lamb of Structural Waterproofing Consultants threw a penalty flag on the University of Oregon's leaking football stadium. He was brought in to evaluate and specify a solution for five miles of failed sealant and seismic joints located within the stadium's seating bowl. The solutions have taken away the Fighting Ducks worry about getting wet!

Shaun Claus of Angelus Waterproofing & Restoration and Annette Wren of Urethane Polymers International presented the rehabilitation of the entry portico and parking area for a very popular Southern California hotel. The project was challenging due to constraints put on scheduling, "fussy"

SWR Institute has persevered and succeeded over four decades. The majority of this success is directly applicable to the string of excellent presidents and the volunteer board members.





management, and moisture/condensation from the ocean, among other issues.

Doug DeSilvio of The George D. Alan Company guided the audience through the steps of developing and launching mobile apps that would make it easier to capture day-to-day job site information. This process allows for more accessible data plus gives options for analysis.

Rounding out the program was John Lambert, Jr. of Stone Restoration of America and Mike Parker of SIKA Corporation giving a presentation of the problems faced when they were called in to repair failures of original construction of a newly built massive condo project. He noted that most of the project leaked because of improper installation of windows, flashing, weeps, and sealants – you name it – and it was done wrong or not done at all. Further the condo association could only afford approximately 75 percent of the cost of the restoration, which tremendously complicated the whole process. As Lambert said, this was a good example of a bad example of incorrect original installation.

Pass the Gavel

Being in business for forty years is a remarkable achievement. Most businesses fail within the first five years, yet SWR Institute has persevered and succeeded over four decades. The majority of this success is directly applicable to the string of excellent presidents and the volunteer board members.

To celebrate this achievement, it was decided that all past presidents who were in attendance would say a few words about their involvement with the Institute and then pass the gavel to the next past-president and finally to the current president, Dave Grady, who passed it to the incoming president Cindy Raffio.

In all, we were fortunate to have 19 past presidents at the meeting (Mike Ahearn was a little stiff and quiet but had an excuse, since it was a full size photo of himself!) It was an emotional and enlightening ceremony where the depth of love, commitment, and experiences of these leaders were shared as they talked about their involvement with the Institute.

Once current president Dave Grady received the gavel, he took time to reflect on his two years as president, outlining all that had been accomplished by the Institute and thanking

All SWR Institute meetings are great times to get together to socialize and learn from each other; but, this year's Winter Tech Meeting was especially wonderful with the celebration of forty years as an organization.

everyone for their help and commitment to making this a strong and successful resource for the members and the industry. He then turned to Cindy Raffio and presented her with a special pink gavel, denoting that she represented only the second lady to be president of SWR Institute.

Raffio gave a very heartfelt address that covered her background, family, and business, plus the value that SWR Institute has provided to her. She outlined the goals and action items, integrated with the overall goals of SWR Institute's strategic plan, that would be tackled during her administration.

Fellowship

No SWR Institute meeting would be complete without the bonding events that are as much a part of our culture as working hard. This fellowship was evident on the very first evening with the opening reception, when the record number of attendees were treated to food and drink while catching up on each other's lives. The following day, 44 golfers and duffers had a very enjoyable afternoon participating in the Red Simpson Golf Tournament.

The culminating event was a boat cruise in San Diego Bay. Not only did we have an excellent view of the harbor side but the attendees were treated to an excellent meal and a fun night of playing casino games. Many fortunes were made and lost that evening, and it lucky that it was only play money! But, in the end several prizes were won along with bragging rights… and there was also dancing!

All SWR Institute meetings are great times to get together to socialize and learn from each other; but, this year's Winter Tech Meeting was especially wonderful with the celebration of forty years as an organization.

About the Author

Ken Bowman is publisher of the *Applicator* and executive vice president of the SWR Institute.

NATIONAL SAFETY STAND-DOWN ON MAY 2-6 TO PREVENT THE NO. 1 KILLER OF CONSTRUCTION WORKERS

The third annual National Safety Stand-Down to Prevent Falls in Construction will take place May 2-6, 2016. The purpose of the Stand-Down is to increase awareness of ways to prevent fall hazards in construction.

Since at least 1992, falls have been the leading cause of death for construction workers. According to the Center for Construction Research and Training (CPWR), falls account for roughly one-third of on-the-job injury deaths in the industry. Falls to a lower level also cause a significant number of non-fatal injuries, similar to the number of injuries caused by over exertion in lifting and surpassed only by injuries that are a result of being struck by falling objects.

The Stand-Down campaign has its roots in the revised strategic plan adopted by the National Occupational Research Agenda (NORA) in 2008. The plan has 15 strategic goals, and Goal 1.0 is to "Reduce Construction Worker fatalities and serious injuries caused by falls to a lower level." The intermediate Goal 1.5 is to "Work with construction partners to develop and implement a national campaign to reduce fatal and serious injuries associated with construction falls to a lower level." NORA wanted this campaign to begin within five years.

In 2012, in response to the need for this campaign, CPWR, the National Institute for Occupational Safety and Health (NIOSH), and the National Institute for Occupational Safety and Health (OSHA) joined together to launch a national construction fall prevention campaign on Worker's Memorial Day. This effort evolved into the first annual National Safety Stand-Down to Prevent Falls in Construction in 2014, and over a million workers participated in the Stand-Down that year. In 2015, 2.5 million workers participated; they were from all types and sizes of businesses and in every U.S. state, as well as international locations. This year, OSHA's goal is to reach 5 million participants and to increase the participation of small companies with fewer than 25 employees.

EPOXY INJECTION

It seems that just about everyone that asks for epoxy injection, doesn't get it. It's not that surprising when one considers that they are usually calling a company whose middle name is "Waterproofing." It's our experience that just about every frantic homeowner, property manager or job superintendent that calls uses the word "epoxy" generically to mean, "goop that goes in a crack." Even after explaining that their particular problem would be better solved using foaming polyurethane grout, polyurethane gel, an acrylate, or even bentonite clay, many people insist on calling the process epoxy injection. How can you blame them? "Foaming polyurethane grout" is quite a mouthful, and only so much memory can be dedicated to the outer fringes of construction terminology.

Around 26 years ago, co-author Charlie Ford was working as a hodcarrier on a project in Oakland California. The building was solid masonry encasing a steel structure, and it got shook up pretty well in an earthquake a few years earlier. While his responsibilities were completely mundane, mixing mortar, cutting lip stretchers and scrubbing down the walls, there were two guys on the job responsible for the really cool work…epoxy injection. They hardly interacted with hod carrier riff raff! Like surgeons they had swept in from some other important job, daintily pacing the planks that were laid before them. Their task was to use their fancy glass faced gear pump to fill the sizeable gaps running typically in a big "X" vertically between windows. Very rarely, but a few times over the course of the project, upon breaking down the rig, the Foreman would discover a whole lot more of either Part A or Part B had been used. Recalling the animated, or more precisely, homicidal, reaction of the foreman still brings a smile to Ford's face. It is still wondered if the unmixed epoxy has found its way out of the wall yet, or if it's still sitting, like so much maple syrup, within the wall. This recounting of these two stories is to color this article's premise. While epoxy injection has become part of the construction vernacular, known widely by homeowner and contractor alike, it's not a process to be considered lightly. Applicators need do a little thinking prior to heading out of the warehouse with drills and ports ablaze.

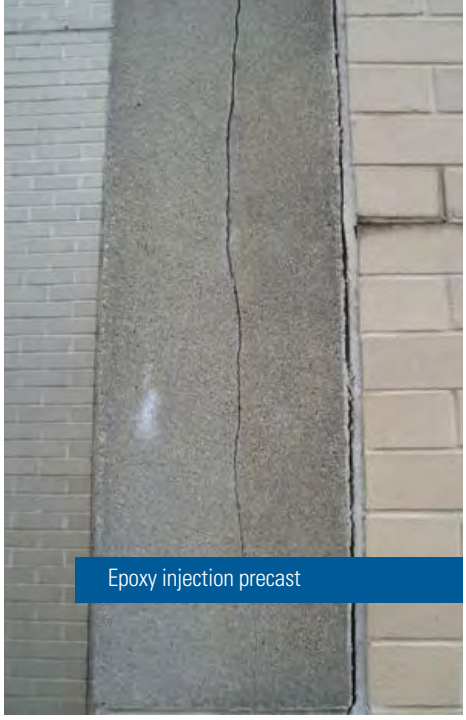
CHEMISTRY

Some part of the controversy surrounding epoxy grows out of its chemistry. Unlike the stone into which it's injected, epoxy is organic, not in the stemmed tomato sense, but by virtue of its long chain of carbon molecules. There is a sizeable chunk of the preservation community that is ethically opposed to the notion of integrating organic with inorganic, and their pursuit of new and resurrected ways to use inorganic crystalline cements is ongoing. Had the Oakland building in the example above been located in Los Angeles, it probably would not have been allowed to inject the multi-wythe masonry with epoxy. Through LA's particular local ordinance, the injection would have been mandated to be a mixture of bentonite and cements. Such grouts, it was argued, have similar physical characteristics to the masonry being injected; they breathe, experience similar thermal movement, and promise to age along the same path.

Different examples of building structures in need of epoxy injection

Coincidentally, when it comes to concrete, as opposed to multi-wythe masonry, epoxy is still used widely in LA. And why shouldn't it be? LA has

An example of how NOT to inject epoxy



Epoxy injection precast

the unique distinction of hosting one of the oldest epoxy injected structures in existence, Pier 187 at the Port of Los Angeles. The structure was built in 1920, but had already experienced significant deterioration by 1957, when it was inspected, found lacking, and slated for demolition. 6,000 pounds of epoxy was injected into 5,000 linear feet of cracks, and it's still there today, little worse for the wear. In theory the epoxy could have crept a bit, prevented the proper migration of water and vapor, even sprouted algae, but it seems not to have done so. That's the difference between the theory and the practice of preservation.

WHEN TO AND WHEN NOT TO

So when do you and when don't you use epoxy? Of the SWR Institute members, very few probably make the bulk of their money doing injection of any sort. It's part of the arsenal, with a small percentage of the crew dedicated to its practice, but perhaps not even a daily event. Here in Boston, where we thankfully don't see a lot of earthquake activity, the bulk of what little injection work there is found in concrete foundations and decks. From this we have developed some basic rules regarding potential injection jobs.

Unless it's been engineered otherwise, we determine an effective injection repair by first evaluating the crack. How did it get there? If it's in a foundation, was settlement or shrinkage to blame? Is water running through it presently, or is the membrane on the outside face of the wall still intact? If it's in an overhead beam, standing column or poured slab, are structural issues or rust jacking to blame? If it's a leaker, where or what is the source and what's in the water? Is it saline?, caustic?, any solvents or other hazardous materials? Having assessed these various parameters, we either (A) call an engineer and let their liability insurance bear the burden, or (B) inject with any of the following materials.

EPOXY AND POLYURETHANE

The dry joints, cracked from settlement, shrinkage or over eager backfilling, will get epoxy, unless of course, the cracking is so great the aforementioned engineer deems demolition and rebuilding is safer. When presented with a dry crack that may or may not have been wet, we need to ask ourselves whether it is a structural or inert crack. If it is structural, it needs to be repaired or "glued" back together again. Epoxies always come to mind first, but Urethanes are also a viable option for structural repairs. Remember the previously mentioned fancy glass faced gear pump? The structural urethanes can be applied/injected through slightly modified airless paint pump. Our preferred method of getting the epoxy/polyurethane into the crack is remarkably low tech, since the remarkably high tech gear pump, like Disco, died sometime in the mid eighties. It sits in a rear corner of the shop, covered in a light dusting of fumed silica. We instead use bulk guns with special tips fitted to use surface mounted ports. These little straws with seats straddle the crack, glued down with knife grade epoxy. The ports are set at interval, varying according to the width of the crack the depth of the concrete. Between ports, more knife grade is smeared along the crack to keep the material from running out, as is the opposite side, if accessible. We learned the hard way to check what's on the other side of the wall, when we bid, won and accidentally defaced a cracked concrete building dating back to the 1939 San Francisco World's Fair.

POLYURETHANE FOAM

The dry joints cracked from rust jacking, are by their nature not really dry joints. At some point they were wet, and might again become so. In these cases we'll chase the offending water with foaming urethane by either drilling through the concrete to the wet side and making big pillows of grout, or if the cracks are right, shooting them tight prior to or in the course of removing spalls and preparing steel imbedments.

The injection technology is significantly different for urethane. Since the crack is often times wet, the default method of getting the resin into the joint involves compression fittings which do not rely on adhesive bond. The injection ports are set into drill holes that bisect the crack at alternating and staggered

intervals according to the crack width and depth of the concrete. The rule of thumb is for the drilled hole to intersect the crack halfway through the depth of the crack at a 45° angle. We stagger the pattern, or alternate sides of the crack, just to increase the "odds" or chance of intersecting the crack at that critical point. Not every crack we encounter will allow this. There may be something in the way, which will only allow for drilling on one side of the crack. This situation will demand precision from the contractor. The placement and drilling of the holes are the most important aspect of performing a successful crack injection job.

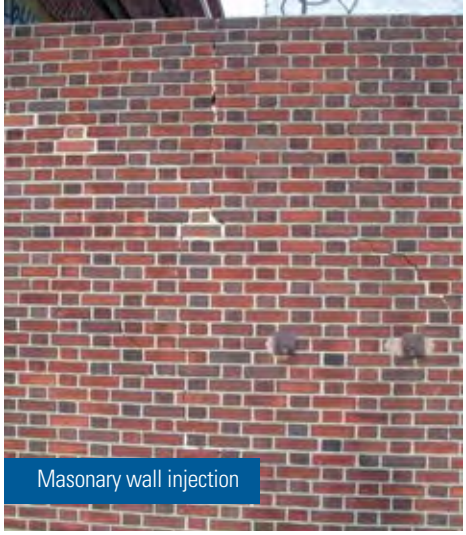
The polyurethane we use, like epoxy, is also comprised of long carbon based polymer chains, only there are fewer links crossing between the chains, and it's therefore significantly more flexible. Unlike its epoxy cousin, polyurethane grout has an affinity for water, which it utilizes to both cure and foam. We therefore always rinse the joint with water prior to injection the resin. While the expanded foam stops the water, it too can have some problems of its own. When the resin comes in contact with water, the combination creates CO2 gas which forms different size bubbles throughout the foam. These bubbles and their diameter create what we call an open cell or closed cell foam. This structure, over time, will let water infiltrate the foam and eventually pass through it. Polyurethane's affinity for water, however, is partially responsible past problems with reversion and attack by salinity and alkalinity. These problems have largely been taken care of through new formulation.

Today's technology allows for us to use hybrid products. These particular resins will foam when they come in contact with water, and form a solid body resin or gel if water is not present. It is a 2 in 1 concept. The idea now is to have a double injection using one resin. The leaking crack is prepared for injection. The holes are drilled, the packer pattern set , and the crack flushed with clean water While this type of injection requires special packers (ball valve), they are now very readily available in the industry. The hybrid resin is injected and allowed to foam hereby stopping the flow of water. After 15-20 minutes, the same resin is injected through the same special packers. The fresh injection now fills in all of the cells created by the foam and forms flexible secondary seal. This preserves the water tight seal as well as protects the foam from possible reversion. Keep in mind however, the presence of aromatic solvents often still precludes polyurethane's use altogether.

CURTAIN WALL GROUTING

It has been the case, several times, where crack injection just doesn't work. Not that it doesn't work, it becomes impractical. How many times can we go back and keep injecting the same series of cracks over and over again. Here is a long kept secret that waterproofing contractors hold near and dear to their hearts; we are not stopping water, we are making it go somewhere else. You can't change Mother Nature or the Laws of Physics. When injecting one crack in a wall or slab, we are sealing that crack from leaks, but the water behind it remains. The water will now seek the path of least resistance for a way out. When a structure has many cracks, injecting each one may not be best solution. The best way to waterproof anything is from the positive side or the point in the structure where the water comes in direct contact with that structure.

A very common practice as of late has become a procedure called curtain wall grouting or area injection. Using polyurethane gels or poly-acrylates, the process involves inserting or injecting these resins all the way through the wall or slab to the positive side, creating a seamless grout curtain. Holes are drilled



Masonary wall injection

through the entire thickness of the structure in a particular pattern that will best distribute the waterproofing material. This is called a raster. The gel or acrylate is then pumped under pressure through the injection lances. The viscosities of these products are so low, they find their way through most obstructions and tightest of spaces. The resins cure as a complete seamless membrane. These chemistries are used most often because of their ability to re-swell very readily when they come in contact with water. Materials like cements and clays (Bentonite) only swell once during the first injection. If the water was ever to move or go away from the clay, the waterproofing material will shrink and dry up. If water comes back, the clay will not have the ability to re-swell. The acrylates and polyurethane gels can do this continually, making them a better candidate for curtain wall grouting or area injection.

CRYSTALLINE

The rules for these below grade situations are pretty straightforward. If it's wet, you can't use epoxy anyway, so polyurethane is the default. The controversy really begins above grade, with stone structures, monuments and multi wythe masonry. In Boston we have plenty of stone and masonry buildings, but we fortunately don't see a lot of earthquake activity, and so injection seems generally to be small component of any given restoration project; a cracked spandrel panel, sill, the occasional cast column.

Cracks in stone and masonry are a little trickier than those in concrete. Especially now that air barrier systems have become part of our knowledge base, our is acutely aware of vapor drive, condensation and the permeability of various materials in a wall system. Since cracks in masonry walls don't always run perpendicular to the face, epoxy injection presents the potential of preventing the migration of water and water vapor from interior to exterior and vice versa. We have and will probably continue to use epoxy in masonry walls, mostly because an engineer has instructed us to do so, but not without hesitation.

The theory that we should be using cementitious grouts has generally not trickled down to ~~we~~ applicators. Ok, there was that one job where we attempted to inject a brownstone ballastrade with a proprietary crystalline injection resin, but it was a disaster. The crack, or more accurately, hollow area, we were supposed to inject had been caused by the migration of soluable silicates from within the stone to the face of the stone. The stone sounded hollow, much like a concrete spall on a parking deck, so it was reasoned that we could drill holes through the face of the stone and inject the fancy cement grout. Crystalline grout was chosen because of its vapor permeability and performance over a range of thermal and environmental conditions. The injection in practice, however, pretty much impossible. It was found that the angle of the stone's bedding plane relative to the face of the stone caused the hollow to be more a series of cells than one open space. A concrete crack it wasn't, and though we got paid to do it, the actual amount of material injected was a fraction of the expected.

THE FUTURE

On the cutting edges of preservation, mostly among the fine arts people and in Europe, people question epoxy's organic nature, research its ability to grow micro organisms. Everyone is concerned over its irreversibility, and many argue against it use in consolidating masonry walls, testing to determine if a wall consolidated with relatively low compressive strength cement grouts actually yields a stronger wall than one consolidated with epoxy. Still other researchers are training tiny bacteria to grow calcium carbonate in cracks within natural stone. In such circles the poor plastic is definitely out of favor. Meanwhile applicators struggle with a public that can't utter anything but "epoxy" when they see a crack. Perhaps one day, we'll be as comfortable with macromolecular bioscience as we are with grabbing a couple yellow pails and heading out the door, but it is doubted.

NOTES ON INJECTION READING

Cappitrelli, Francesca: Kanardini, E; and Sorlini, C.Cappitelli, Franesca; Zanardini, E.; Solini, C.; The biodeterioration of synthetic resins used in conservation, Macromolecular Bioscience 4 (2004) 399-406

- Questions whether microorganisms can live on resins. Regarding Epoxy resin and stone, no definitive proof that it can sustain growth.

Orial, G; Vieweger, TH; Loubiere, J.F; Biological Mortars: A Solution for Stone Sculpture Conservation; Laboatoire de Recherche des Monuments Historiques, Champs sur Marne, France

- Mixture of Stone powder and microorganisms to make a mortar that's more compatible with soft stones like Tuffa or Limestone

Selwitz, Charles; Epoxy resins in stone consolidation; Stone buildings - Conservation and Restoration, 1992 by the J. Paul Getty Trust.

- Epoxy resins made available since the 1950's. In 1957 Pier 187 at the Port of Los Angeles was injected with 6000 pounds of resin, with large concrete beams transverse cracks up to 1cm wide.
- The essential player in one carbon and two hydrogens.
- Polymerization occurs without the formation of condensation by products or off gasses and generally with less than 5% bulk shrinkage.
- Mechanical hooking and covalent bonding each play a role in epoxy polymers, but the major mechanism for adhesion is the sharing of electrons between the polymer and the substrate.
- Cured resins with widely differing properties can be obtained by changing the structure of the epoxy compound. Industrial chemists have succeeded in synthesizing and making different commercial products, however almost all of the various products used for stone consolidation have been based on bisphenal A diglycidyl ether. Produced from common petrochemical building blocks, propane and benzene.
- Describes swelling of epoxy resin that destroyed an artifact.
- Described rapid deterioration of marble in the presence of moisture.

Ingoul, s; Gemert, D and Van Ricksal, F; Application of mineral grouts for structural consolidation of historical monuments.; Internationale Zeitschrift fur Bauinstandsetzen = International journal for restoration 9 no. 4 (2003)

- Injection of polymers, especially epoxy resins, has certain disadvantages. Expensive, adhesion on wet surfaces is poor, there is a possibility of problems with moisture permeability and thermal behavior, and only in special cases their use is justified regarding the preservation of the authenticity of the monument. Despite this epoxy resins have good penetration on the masonry due to their low viscosity, show excellent mechanical properties and have very good adhesion to dry surfaces.

Schueremans, L,; Van Gemert, D.; Safety assessment and design of consolidation and strengthening by means of injections.; Internationale Seitschrift fur Baunstansetzen = International journal for restoration 9, no. 4 (2003)

- Initially, high strength epoxy grouts were used. These products are chosen to penetrate small voids. For reasons of cost, the emphasis is shifted toward the rheology, stability and chemical compatibility of the new gouts using fine granulates, bentonite, ultra fine admixtures and using high speed mixers, a product is obtained which has similar or even better rheological properties as epoxy grouts. The extra benefit is that these products have a similar strength value as the original masonry and are chemically compatible with the original material.

Lewin, S. Z; Charola, A. E. The Physical Chemistry of Deteriorated Brick and It's Impregnation Technique; Convengo Del Mattone Di Veneziz (1974 Fondazzione) NYU Library TA/432

- Some reference to the compatibility of polymers and the glass face of masonry

REMR Technical Note CS-MR-3.9; Crack Repair Method: Epoxy Injection
- Injection technique

Baker, Mary T; Conservation Issues for Modern Materials; Preserving the Recent Past

- Polymers are large molecules, often described as chains with a characteristic unit acting as the links in the chain. When the repeat units are linked end to end it's a linear polymer, when there are short side linking chains that connect two long linear chains, the polymer is considered cross linked.
- Most polymers form amorphous solids, they do not solidify into crystals like salts. However, if the chains can fit together in some sort of regular packed pattern, the polymer will be partially crystalline. (Cementitious grouts already crystalline)
- Epoxy resins are made from a dimmer or oligomer that has at least one glycidyl ether end group. The epoxy is cured by the addition of an amine or an acid for low or high temperature respectively.

Deitz, Albert, Plasics for Architects and Builders, Cambridge, MA 1969

- Thermoplastics are linear molecules in long chains of carbon molecules. The forces of valence attraction between adjacent chains are relatively small. At any temperatures above absolute zero, molecules are in constant random movement.
- Unsaturated polyesters, stripped of the side groups, are free to cross link. The open bond wants to link to something, it is possible to cross link them with an activator, a linking agent.
- Thermosetting definition: This type of linking reaction, crosslinking to interlinking, in which the material goes through a liquid or plastic stage and then hardens to set irreversibly, is called thermosetting. Still called thermosetting, despite the fact that it happens at room temperature.

Ferragni, D.; Forti, M.; Malliet, J.; Mora, P.; Teutonico, J.M.; Torraca, G.; Injection grouting of Mural Paintings and Mosaics., N1 ST 94

- Thanks to their great strength and adhesive power, epoxies and polyesters are considered for concrete structures. They don't think that their use in consolidation of stuccos is justified. Based on the fact hat after setting these resins are exceedingly strong and very difficult to remove, also they are non porous and inhibit evaporation.

Hill, James; Cracks in structures. Not every crack is structurally significant; Concrete Construction March 1988

- Article emphasizes that all concrete cracks and subsequently moves through thermal changes.

McDonald, Wille E., Evaluation of Grouting Materials for Anchor Embedments in Hardened Concrete; Technical Report REMR-CS-56, US ARMY Corps of Engineers February 1998.

- Article concludes that epoxy does not bond well in wet environments.

THE FOUNDATION IS LAID, AND THE REPUTATION IS SOLID

Timothy McGill is owner and president of McGill Restoration in Omaha, Nebraska. A member of the Sealant Waterproofing and Restoration (SWR) Institute, he is past president of the International Concrete Repair Institute (ICRI) Great Plains Chapter and current president of Entrepreneurs' Organization (EO) of Nebraska.

Applicator: Please tell us about your start in the industry and at McGill Restoration.

Timothy McGill: I've been around the industry my entire life. My father, Timothy P. McGill, started the company in 1985 when I was only 7 years old. Throughout my childhood, I went to job sites with my dad, and I took an interest in the company at a very young age. I worked as a laborer during summers before my junior and senior years of high school and then summers throughout college. I had six years of experience working in the field when I began working in the office as an estimator during my last year of college. It didn't take long after coming out of college before I started to run operations for McGill Restoration.

When I got started in the industry, I had the luxury of having a father who was a past president of SWR Institute and a big believer in education within our trade. He was technically knowledgeable and was also an excellent business man who was very proficient in our trade. My father and my older brother Rich, who was also involved in SWR Institute and ICRI, taught me a lot.

We were brought up with the understanding that we should be educated about what we do. Our company is invested in educating and training our key employees and executives. SWR Institute and ICRI provide educational opportunities to my employees that have proven to both beneficial to them and to our company. We believe that it is a great benefit to allow our employees to better themselves while at work. Beyond the industry education that I've received, EO has really helped me to dial in on the business side.

Applicator: What are some advantages of being part of a family business?

McGill: A major advantage is that our family name has an outstanding reputation. We are known as a capable, fair, and honest contractor. The only way you can build such a strong image is over time. Because of our strong image and dependable performance, we have commercial accounts for which we do all of their work. Our customers know that we perform quality work and that our guys operate in a safe manner. We are committed to ensuring the integrity of our image and our people. We never want to sacrifice that.

Applicator: How have you achieved a reputation for safety in the workplace?

McGill: Safety is always at the forefront in our company. It is one of the most important aspects of our work. We want our workers to be able to go home at the end of the day and live a normal life. We have a minimum of four full company safety meetings each year. Among the required training, all of our guys who use aerial work platform (AWP) equipment must be certified in AWP training, and all of the workers have to complete the OSHA-10 training, as well as CPR and first aid training periodically. We also have an annual safety bonus available for those who work safely all year. Having a financial incentive helps everyone to understand that they have skin in the game. Right now, we are 100-percent trained. As new employees come in, they, too, will be trained.

Applicator: Are you facing any major challenges as your company grows?

McGill: It has become more difficult to get young people interested in joining a specialty trade or the construction industry as a whole. We are fortunate to have a lot of qualified people interested in managerial jobs including estimators, project managers, and superintendents. However, we've had difficulty in placing workers as skilled craftsman and laborers. I don't think people understand that there is the opportunity to make a really good living as a laborer or skilled craftsman in the waterproofing and restoration industry. It is a well-compensated trade. People who are interested in making a career in this industry are hard to come by and everyone wants them.

Applicator: How has membership in the SWR Institute benefited your company?

McGill: The connections and relationships I have built are very valuable. I appreciate how other contractors have been open and willing to share their experiences with me so that I can learn more about our industry and trade. If I am ever doing something new, I can ask another contractor "How did you do that?" It's been great for networking opportunities and for growing our business. The learning that is available at the seminars is also very valuable and keeps us on the cutting edge of our industry.

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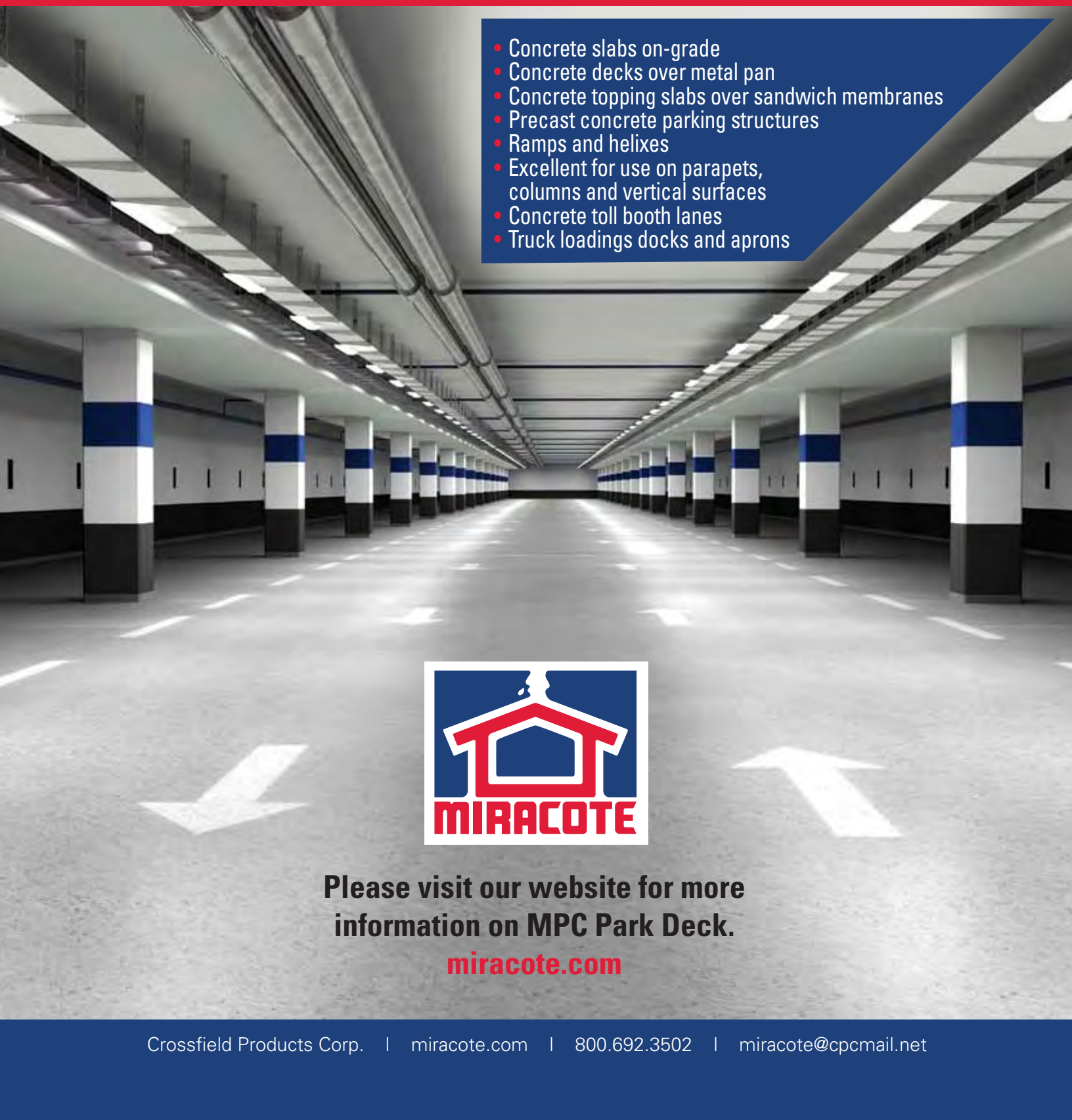

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- Concrete decks over metal pan
- Concrete topping slabs over sandwich membranes
- Precast concrete parking structures
- Ramps and helixes
- Excellent for use on parapets, columns and vertical surfaces
- Concrete toll booth lanes
- Truck loadings docks and aprons

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VALIDATION PROGRAMS

For more information about the SWR Institute Validation Programs, contact SWR Institute headquarters at 816.472.7974 or online at www.swrionline.org.

VALIDATED PRODUCTS

LIQUID SEALANTS

BASF
Sonolastic 150 W/VLM
Validation Date: 10/12/12 – 10/11/17

Bostik
Bostik 915FS
Validation Date: 9/22/14 - 9/21/19

Chem-Calk 2000 Advanced Urethane Sealant
Validation Date: 1/10/13 – 1/9/18

Chem–Calk 955–SL Commercial Grade Self Leveling Sealant
Validation Date: 11/12/12 – 11/11/17

Chem–Calk 900
Validation Date: 2/22/12 – 2/21/17

Chem-Calk 915
Validation Date: 2/22/12 - 2/21/17

Chem–Calk 505
Validation Date: 2/22/12 – 2/21/17

CHEM LINK Products
DuraLink Super Adhesion Sealant
Validation Date: 9/9/13 – 9/8/18

NovaLink
Validation Date: 7/07/12 – 7/6/17

Dow Corning Corp.
121 Silicone Structural Glazing Sealant
Validation Date: 8/21/15 – 8/20/20

983 Silicone Structural Sealant
Validation Date: 8/21/15 – 8/20/20

790 Silicone Building Sealant
Validation Date: 9/12/11 – 9/11/16

Contractors Weatherproofing Sealant
Validation Date: 10/7/11 – 10/6/16

758 Silicone Weather Barrier Sealant
Validation Date: 2/15/11 – 2/14/16

995 Silicone Structural Glazing Sealant
Validation Date: 4/15/16 – 1/14/19

756 SMS Building Sealant
Validation Date: 4/30/12 – 3/31/17

Contractors Concrete Sealant
Validation Date: 2/4/13 - 2/3/18

795 Silicone Building Sealant
Validation Date: 9/11/1 2 –9/10/17

791 Silicone Weatherproofing Sealant
Validation Date: 5/6/14 – 5/5/19

Henry Company
925 BES Sealant
Validation Date: 5/17/13 – 5/16/18

Momentive Performance Materials
SCS 2000 SilPruf
Validation Date: 6/25/2013 – 6/24/2018

SCS2700 SilPruf LM
Validation Date: 5/12/15 – 5/11/20

SCS 9000 SilPruf NB
Validation Date: 6/25/13 – 6/24/18

Pecora Corporation
864 NST Silicone Sealant Validation Date: 4/23/13 – 4/22/18

890 NST Silicone Sealant Validation Date: 10/16/14 - 10/15/19

895 NSTSilicone Sealant
Validation Date: 5/12/15 – 5/11/20

AVB Silicone Sealant
Validation Date: 4/23/13 – 4/22/18

Dynatrol I-XL
Validation Date: 4/23/13 – 4/22/18

Dynatrol II
Validation Date: 4/23/13 – 4/22/18

NR-201 STPU
Validation Date: 5/12/15 – 5/11/20

PROSOCO, Inc.
PROSOCO R-GUARD AirDam
Validation Date: 9/11/13 – 9/10/18

Sika Corp.
Sikaflex–1A
Validation Date: 8/3/12 – 8/2/17

Sikaflex 15 LM
Validation Date: 2/27/14 – 2/26/19

Sikasil WS-290
Validation Date: 8/3/12 – 8/2/17

Sikasil WS-295
Validation Date: 4/3/12 – 4/2/17

Soudal, Inc.
SoudaSeal 50LM
Validation Date: 11/15/11 – 11/14/16

SoudaSeal 150LM
Validation Date: 11/15/11 – 11/14/16

Tremco Incorporated
Dymonic 100
Validation Date: 2/18/14 – 2/17/19

Spectrem 2 Silicone Sealant
Validation Date: 9/16/13 – 9/15/18

Tremco Spectrum 1
Validation Date: 12/18/14 -12/17/19

WALL COATINGS

Conproco Corporation
Conpro Lastic
Validation Date 6/20/12 – 6/19/17

CSL Silicones, Inc
CSL Silicone's Si Coat 550
Validation Date: 11/16/15 – 11/15/20

CSL Silicone's Si Coat 551
Validation Date: 11/16/15 – 11/15/20

Dow Corning Corp.
AllGuard Silicone Elastomeric Coating
Validation Date: 2/24/14 – 2/23/19

Dryvit Systems, Incorporated
Weatherlastic Smooth
Validation Date: 4/11/13 – 4/12/18

Momentive Performance Materials
SilShield SEC2400 Silicone Elastomeric Coating
Validation Date: 9/6/11 – 6/5/16

DECK COATINGS

BASF Corporation
Conipur 265-Z Basecoat & 295 UV Top Coat
Validation Date: 2/22/13 – 2/21/18

Conipur 275 Topcoat & 265Z Basecoat
Validation Date: 3/7/13 – 3/6/18

Sonoguard Base Coat & Sonoguard Top Coat
Validation Date: 3/7/13 – 3/6/18

Pecora Corporation
Pecora Deck 800 Series
Validation Date: 4/23/13 – 4/22/18

Sika Corp.
Sikalastic 720/745 AL Traffic System
Validation Date: 10/12/15 – 10/11/20

Sikalastic 710/715/735 AL Traffic System Seal
Validation Date: 10/12/15 – 10/11/20

Tremco Inc.
Tremco Vulkem 350 SL Basecoat & 346 Topcoat
Validation Date: 5/17/12 – 5/6/17

Tremco Vulkem 350 NF Self–Leveling Basecoat & 346 Topcoat
Validation Date: 5/23/12 – 5/22/17

Tremco Vulkem 350 NF Roller Grade Basecoat & 346 Topcoat
Validation Date: 5/23/12 – 5/22/17

Tremco Vulkem 360 NF SL Basecoat & 951 NF Topcoat
Validation Date: 11/9/12 – 11/8/17

PRE–CURED SEALANTS

Dow Corning Corp.
123 Silicone Seal
Validation Date: 12/28/11 – 12/27/16

Silicone Transition Strip
Validation Date: 2/27/13 – 2/26/18

Momentive Performance Materials
UltraSpan US1000
Validation Date: 2/15/12 – 2/14/17

Pecora Corporation
Sil-Span
Validation Date: 11/12/12 – 11/11/17

Sealex, Inc.
ImmerSeal
Validation Date: 12/6/11 – 12/5/16

CLEAR PENETRATING VERTICAL WATER REPELLENTS

BASF Corporation
HYDROZO 100
Validation Date: 4/3/12 – 4/2/17

PROSOCO, Inc.
Sure Klean Weather Seal SL100 Water Repellent
Validation Date: 4/3/13 - 4/2/18

Sure Klean Weather Seal Siloxane WB Concentrate
Validation Date: 4/3/13 - 4/2/18

Sure Klean Weather Seal Natural Stone Treatment
Validation Date: 4/3/13 - 4/2/18

Sure Klean Weather Seal Siloxane PD
Validation Date: 4/3/13 - 4/2/18

Winkler S.R.L
SKERMO Terrazze
Validation Date: 1/26/15 – 1/25/20

VALIDATED TRAINING PROGRAM

AIR BARRIERS

PROSOCO, Inc.
Air & Water Resistive Air Barrier Training Program
Validation Date: 9/15/14 - 9/14/19

EXPANSION CONTROL

MM Systems Corporation
Contractor Certification Thermal & Seismic Expansion Joint Systems
Validation Date: 2/18/14 – 2/17/19

HIGH PERFORMANCE COATINGS

Witmer Restoration Inc.
Elastomeric Coatings Training Program
Validation Date: 1/23/15 - 1/22/20

JOINT SEALANTS

Blanchard Caulking & Coating, Inc.
Sealant Application Training Program
Validation Date: 11/24/15 – 11/23/20

Gorman Moisture Protection, Inc.
Applying Liquid Sealants Training Program
Validation Date: 5/08/15 – 5/07/20

The George D. Alan Company
Introductory Sealant Application Training Program
Validation Date: 2/3/14 - 2/2/19

Witmer Restoration Inc.
Joint Sealant Training Program
Validation Date: 1/23/15 - 1/22/20

JOINT SEALER FIRESTOPPING & FIRE-RESISTIVE JOINT SYSTEMS

Emseal Joint Systems, Ltd.
Joint Protection and Firestopping, Fire-Resistive Joint Systems
Validation Date: 2/1/12 – 1/31/17

SELF-ADHERING SHEET FLASHING

Witmer Restoration Inc.
Sheet Membrane Flashing Training Program
Validation Date: 2/4/15 - 2/3/20

SELF-ADHERING SHEET WATERPROOFING SYSTEMS

Polyguard Products
Self-Adhering Sheet Waterproofing: Waterproofing Installation Training Program
Validation Date: 6/5/12 – 6/4/17

SHEET WATERPROOFING

The George D. Alan Company
Introductory Sheet Membrane Waterproofing Application Training Program
Validation Date: 1/15/16 – 1/14/21

SPECIAL COATINGS

BASF Corporation
Wall Coating Applicator Training
Validation Date: 6/08/15 – 6/07/20

TRAFFIC COATINGS

BASF Corporation
Deck Membrane Applicator Training Program
Validation Date: 5/8/15 - 5/7/20

Neogard
Traffic Coating Applicator Training Program
Validation Date: 12/11/13 – 12/10/18

Tremco, Inc.
Traffic Coating Applicator Training Program
Validation Date: 1/18/16 – 1/17/21

WATER REPELLENTS

The George D. Alan Company
Cleaning and Water Repellent Training Program
Validation Date: 6/5/12 – 6/4/17

Witmer Restoration Inc.
Water Repellents Training Program
Validation Date: 2/4/15 - 2/3/20

World Demand for Adhesives & Sealants to Exceed 20 Million Metric Tons in 2019

Global demand for adhesives and sealants is forecast to rise 4.5 percent per year through 2019 to 20.2 million metric tons, valued at $64 billion. Strong growth in construction activity will underpin advances, driven by increased urbanization and infrastructure improvements in developing countries, combined with rebounding construction spending in Western Europe and the United States. Expanding manufacturing output, particularly in emerging Asia/Pacific economies, is expected to fuel growth across a number of segments, boosting adhesive and sealant use in packaging, tapes and labels, motor vehicles, electronics, and footwear applications, among others. Increasing adoption of adhesive bonding technologies designed to replace or augment mechanical fasteners will provide additional growth opportunities for adhesives suppliers worldwide, as will the availability of improved, high performance products. These and other trends are presented in "World Adhesives & Sealants," a new study from The Freedonia Group, Inc., a Cleveland-based industry research firm.

China's global dominance in several adhesives-intensive industries, including electronics, footwear, furniture, and machinery, will bolster the country's position as the top adhesive and sealant consumer through 2019. According to analyst Carolyn Zulandt, "Construction spending will remain robust in China, fueling demand for silicone and epoxy sealants, flooring and wall covering adhesives, and other products." Suppliers of packaging adhesives will benefit from growing urban populations and improving disposable incomes, which will continue to boost demand for packaged consumer goods sold in supermarkets, online, and via other retail outlets.

India is expected to post the most rapid advances of any major market, fueled by robust increases in construction spending and motor vehicle output. In India's automotive sector, rising motor vehicle sales are fueling output and capacity expansions by major original equipment manufacturers (OEMs), boosting sales of epoxies, polyurethanes, and other adhesive and sealant types. Similar trends will also spur demand growth in the auto industries of Thailand and other emerging economies.

"World Adhesives & Sealants," published in January, is available for $6,300 from The Freedonia Group, Inc. For further details or to arrange an interview with the analyst, please contact Corinne Gangloff by phone 440.684.9600 or e-mail pr@freedoniagroup.com. Information may also be obtained through www.freedoniagroup.com.

W. R. MEADOWS Celebrates 90 Years

Co-founded in 1926 by W. R. "Bob" Meadows and Edna Meadows, the company has grown steadily through the decades to become what it is today: a designer, manufacturer, and marketer of high quality building materials for today's construction professionals, with an emphasis on treating its clients with the utmost product quality, outstanding service, and business integrity. From its asphalt expansion joint product that started it all (and is still being made and sold today all over the world) all the way to its jump into pool deck products and everything in between (vapor seals, joint sealants, curing and sealing products, and more), W. R. MEADOWS' products are environmentally friendly, VOC compliant, durable, and premium grade.

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BTC Welcomes Patricia Aguirre and David Wojcik

Building Technology Consultants, Inc. (BTC) is pleased to announce that Patricia (Tricia) Aquirre and David Wojcik are joining its professional staff.

Patricia Aquirre

David Wojcik

Patricia (Tricia) Aguirre, PE, REWC has joined BTC as a senior engineer in the Washington, DC area. Tricia has earned a Bachelor of Science degree in civil engineering from the Virginia Polytechnic Institute and State University (Virginia Tech) in 2000 and a Master of Science degree in civil engineering from Virginia Tech in 2002. With over 10 years of experience and published in several technical journals, Aguirre has expertise with investigations of various exterior wall cladding systems, including; brick, concrete masonry units, stucco, EIFS, adhered veneer, glass fiber reinforced panels, dimension stone, and fiber cement siding, as well as low-slope and steep slope roofing projects including standing seam metal roofing, clay tile, slate, and asphalt shingles. Her expertise is further concentrated in the area of litigation support with respect to building envelope design and construction. Prior to joining BTC, she was employed at WDP & Associates Consulting Engineers in Manassas, Virginia, from 2002 to 2015.

David Wojcik, AIA, LEED AP O+M, BEC-2 in now affiliated with BTC as an architectural consultant. He has been a Licensed Architect for 15 years specializing in sustainable design, technical detailing, existing building evaluation, repair/renovation projects and construction administration services. He earned his Bachelor of Science degree in advanced technical studies - architecture from Southern Illinois University at Carbondale in 1993. Wojcik became affiliated with BTC in late 2015 and continues to operate his own architectural consulting practice, Wojcik + Associates Architects, Inc., which he established in 2002.

SPRING 2016 *APPLICATOR* AD INDEX

Call for Presenters

SWR Institute is accepting submissions for presentation/speaking opportunities. We are looking for contractors, architects, engineers or consultants that have a unique project, technical expertise, an interesting solution to a waterproofing, sealant or restoration challenge, operational ideas or other topics that would be of interest to our membership.

SWR Institute has two technical meetings a year and this is an excellent opportunity for you to share your knowledge and topic. Our members are experienced and successful people who are very involved in our industry. Our meetings provide a sophisticated audience and considerable interaction.

If you have a subject that you would like to present at our meetings, please visit http://swrionline.org/CallForSpeakers or call (816) 472-7974 for more information.

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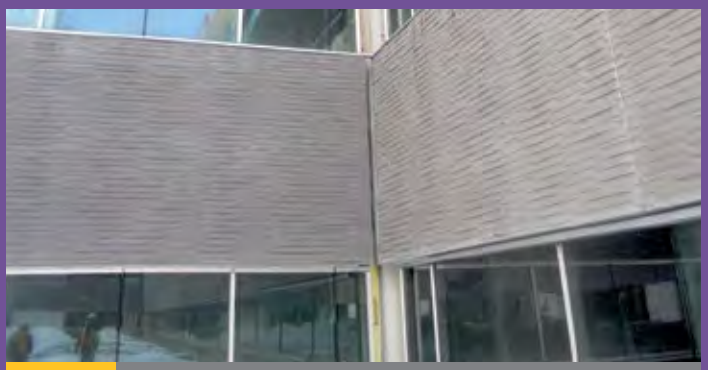
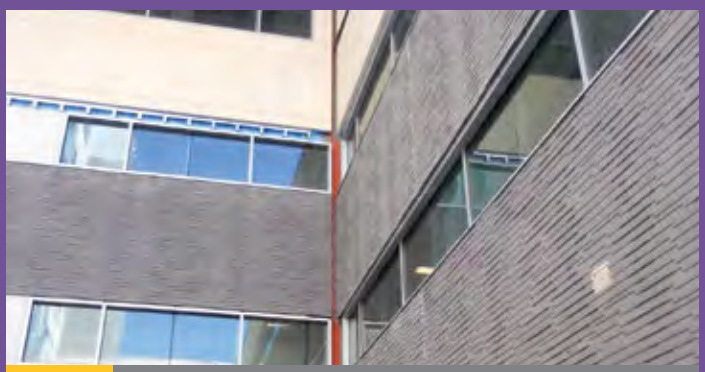


Challenge

The New Oakville Hospital is on track to be one of the most modern health facilities in Canada. One of the key design features was building envelope continuity at joints between various parts of the hospital.

Solution

The unique monolithic construction of RedLINE® adapted itself well in providing a continuous building envelope seal. The vertical joints proved to be a special case which required factory prefabrication and careful site coordination.



Installation

While installation access was a challenge, the prefabricated RedLINE® joint with all detailing complete contributed to an easier installation process ensuring an on schedule completion.

SITURA Expansion Joint Performance

Hospital buildings typically have a life span of 50 years or more, it is anticipated that the RedLINE® joint system will match this life span in this particular application.

PROJECT 13-588/CASE#69

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