

September/October 2023
Vol. 36, No. 5

CRB

CONCRETE REPAIR BULLETIN

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WATERPROOFING AND
CORROSION PROTECTION**

PLUS: STATE OF THE INSTITUTE



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ISSN: 1055-2936

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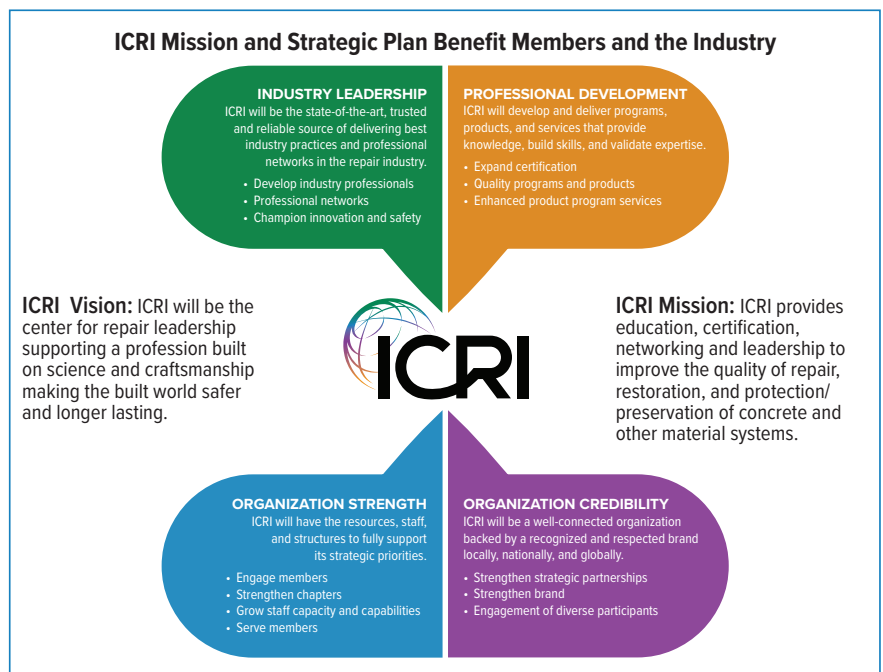
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PRESIDENT'S MESSAGE



PIERRE HÉBERT

Abraham Lincoln said, “The most reliable way to predict the future is to create it.”

As we mark ICRI’s 35th anniversary year, we’re not only celebrating the many contributions of our members that got us to this important milestone. We’re also very focused on making ICRI even stronger for the future!

The important work of ICRI depends on great technology—providing easy access to technical tools, chapters, events, and professional development. To power our future growth and better support you—our members—we’re investing in the launch of a new, best-in-class association management software (AMS) system provided by our vendor, Rhythm Software.

Quite simply, we have outgrown our current systems and after a deep analysis and vendor search process, we landed on a platform that will propel our organization forward and we’re now in full transition/implementation mode.

This change to a new AMS also means the launch of an improved ICRI website, and we’re very excited to be working with our vendor AS Creative on this front. Together, these solutions will improve the member experience, ensure better support of our great chapters throughout North America, and power the future growth of ICRI. We anticipate launching our technology platforms formally at World of Concrete in January 2024!

While we upgrade our technology, it’s also crucial to re-evaluate where we’ve been as an organization and where we need to go. Every year during the summer, ICRI’s Executive Committee (EC) holds a 2-day work session where we reflect on the outcome of the year’s major activities, we discuss feedback we get from the Board and committee chairs, we review the state of the association, consider the objectives from the previous work session, and settle on key orientations that can best benefit the membership and the Institute in the long run.

I’m happy to report that we identified three impact-filled strategies to help us focus our efforts. Importantly, these are not “add-ons” to the work of ICRI. No organization can continually add new things on the plate without losing focus. Instead, we landed on strategies that allow us to leverage and focus our efforts.

1. Technical Content Strategy

EC Leader: Matthew Sherman, PE, P.Eng.

Objective: Leverage ICRI’s consensus documents/criteria to develop easy-to-use “field guides” on a range of concrete repair and restoration processes.

To achieve this goal, we intend to enlist ICRI’s Board of Directors and committee volunteers to identify the most relevant content for the right audiences.

2. PD Training Strategy

EC Leader: Daniel Wald

Objective: Focus ICRI’s efforts on the most effective, high-impact professional development training.

To achieve this goal, we will pilot a new, non-certification, hands-on applicator training with the intention to scale the program in partnership with chapters. We will also look to partner with third-party organizations to help us scale ICRI’s two certifications and will continue growing ICRI’s webinar offerings.

3. Enhanced Digital Content Strategy

Leader: ICRI Executive Director Eric Hauth

Objective: Leveraging our technology, promote new technical field guides and training, and better assist chapters with membership marketing and growth.

To achieve this goal, we will identify, produce, and promote a consistent flow of new field guides and promote new hands-on training by ICRI and our chapters.

Together, we believe these targeted strategies will drive even greater interest and membership in ICRI and expand ICRI’s impact on the concrete repair and restoration industry!

If you’re looking to celebrate ICRI’s 35th anniversary milestone—and join in the discussions about how we’re creating ICRI’s future—register now for what promises to be an incredible Fall Convention (October 16-18) in St. Pete Beach, Florida! With the theme **Plan, Inspect, Restore—Preventing Structural Failure**, there is no better opportunity to join your colleagues for the best industry networking and education. I hope to see you there!

Pierre Hébert

Pierre (Pete) Hébert
2023 ICRI President



PEDESTRIAN DECK COATING SYSTEMS



MiraFlex XL is a cementitious, fabric- reinforced, waterproofing membrane system engineered for exterior pedestrian traffic applications.

MIRAFLEX XL

Where to use:

- Over interior/exterior concrete surfaces
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Advantages:

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- VOC and LEED-compliant, low odor and fast cure time



MiraFlex II is a multi-layered pedestrian deck coating system consisting of a lath-reinforced cementitious underlayment, fluid-applied waterproofing membrane, and decorative finished deck surface. It can also serve as an under tile waterproofing membrane system.

MIRAFLEX II

Where to use:

- Interior/Exterior over occupied space
- Mixed-use, residential and commercial
- Over plywood and concrete substrates

Advantages:

- Monolithic, seamless protection – waterproofing membrane
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TACTALK



MATT SHERMAN

I recently attended my first ICRI Executive Committee retreat, where the TAC chair sits ex officio. At the retreat, the group tried to look ahead a few years, anticipate direction, and discern the best paths for the organization. I am glad to report that the team I watched in action is taking their responsibilities very seriously and doing great work. They deeply care about the

organization and its future, and it showed in their thoughts and actions.

I will leave it to Pierre and Eric to talk about the overall themes, but a lot of them meshed very well with the TAC themes that I have been writing about—improving our processes, making membership more rewarding, responding to industry needs, and expanding our offerings appropriately.

In terms of expanding our offerings, TAC was charged with looking at ways to take the great information that our committees and members have developed and make it more accessible, more relevant, and more attuned to our industry's needs. We talked a lot about making small, bite-sized pieces of information and guidance available to our craft workers, our designers, and our clients. Ideas included position statements, directed “how-to” sheets, best-practices, and more education—all in smaller packages

available through different channels. All of this with a goal of making our industry better, differentiating our members, adding value, and making our clients happy.

Ideas included simple illustrations on preparing surfaces, defining the elusive saturated surface dry, preparing field guides to measuring repair quantities, and developing checklists to help ensure that direct-tension tests are performed in a way that evaluates our work fairly. We are developing some prototypes and will be asking our members, committees, and users for their thoughts. We are in this for our members, so let us know how to help.

The hope is that by making our current knowledge more accessible and actionable, we can better engage with the “right here, right now” needs of our members, make our technical products easier and faster to develop, and build a more engaging and attractive place to invest our time.

So, if you have an idea for a “quick hit” or would like to help with one, come visit a committee in St. Pete Beach or reach out to your board representative. We can find a way to get you involved.

Matt Sherman is chair of the ICRI Technical Activities Committee (TAC).



Volunteer

Why Volunteer?

The success of the International Concrete Repair Institute and its work in the industry depends on a strong, active volunteer force. As a member of ICRI, you are invited to participate in the meetings and projects of any ICRI administrative or technical committee. All are volunteer-led and depend on your expert contributions.

ICRI's volunteer program strives to create an environment that is friendly and welcoming. As an ICRI volunteer, you work closely with volunteer leaders and ICRI staff—active parts of each committee—and available to assist you to answer questions about how ICRI operates, and to help you be the most effective volunteer possible.

Follow Your Interests

Check out the administrative and technical committees of ICRI, attend their meetings and learn what each is working on. Then decide where your area(s) of interest fit best. The ICRI staff is here to answer your questions and help align you with your interests. You are welcome to attend any meeting of any committee on the administrative or technical committee list. You attend—you can decide if you want to join.

Length of Commitment

Most volunteer commitments are ongoing; leadership positions are a 3-year commitment. Committees usually meet monthly for 1-1.5 hours. In addition, committees often require tasks to be completed outside of the meetings on the volunteer's own time. **Visit www.icri.org for more information.**

MISSION STATEMENT

Establish an industry standard for concrete repair contracts and warranties, develop a tool to measure and record concrete repair work items to minimize disagreements between contractors, engineers, and owners.

BENEFITS OF COMMITTEE MEMBERSHIP:

- Connect with Contractors, Owners, Engineers, Manufacturers, and Legal Representatives.
- Be part of a team that improves the Concrete Repair Industry.

WHAT WE DO:

- Develop and review guidelines.
- Create tools for the concrete repair industry.



GOALS/DELIVERABLES

- Provide guidelines to aid in the drafting process of legal documents
- Educate users of these legal documents on the specific language used and topics covered
- Build an understanding in the industry to proper usage of contract documents.



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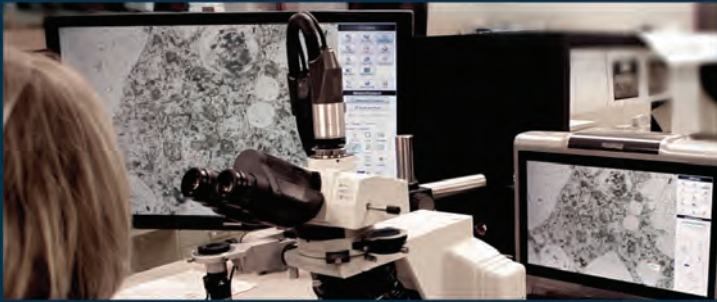
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ICRI Joins National Concrete Bridge Council

In Spring 2023, members of the National Concrete Bridge Council (NCBC) invited ICRI to join the council as NCBC's newest voting member. The ICRI Board of Directors unanimously endorsed joining NCBC, which was then affirmed by the voting members of the NCBC.



ICRI is extremely proud to participate in this important collaboration. The council consists of allied industry organizations dedicated to:

- Promoting quality in concrete bridge construction.
- Gathering and disseminating information on design, construction, and condition of concrete bridges.
- Establishing communication with federal and state departments of transportation, city and county public works departments, and consulting engineers.
- Providing information on behalf of the concrete industries to codes and standards groups.

ICRI Executive Director Eric Hauth will represent ICRI on the council, working to increase awareness and adoption of ICRI technical resources and training in the bridge repair community.

Current membership of the NCBC includes:

- **American Segmental Bridge Institute**, www.asbi-assoc.org
- **Concrete Reinforcing Steel Institute**, www.crsi.org
- **The Epoxy Interest Group (EIG)**, www.epoxyinterestgroup.org
- **Expanded Shale, Clay and Slate Institute**, www.escsi.org
- **International Concrete Repair Institute**, www.icri.org
- **The National Ready Mixed Concrete Association**, www.nrmca.org
- **Precast/Prestressed Concrete Institute**, www.pci.org
- **Post-Tensioning Institute**, www.post-tensioning.org
- **Silica Fume Association**, www.silicafume.org
- **Wire Reinforcement Institute**, www.wirereinforcementinstitute.org



UPDATED!


ICRI Technical Guideline No. 710.2R-2023

Guide for Horizontal Waterproofing of Traffic Surfaces

This and all ICRI guidelines are available from the ICRI online book store. AND...most ICRI guidelines are free to ICRI members as PDF downloads! Visit www.icri.org.



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ICRI PERSONAL AWARDS

As ICRI celebrates 35 years, the Institute would like to remind everyone about some of the legends and remarkable individuals who have achieved the highest ICRI recognitions.



ICRI FELLOWS

Being named an ICRI Fellow is recognition of an individual's long-term, devoted, and enthusiastic service to ICRI. An ICRI Fellow is responsible for many noteworthy contributions to ICRI and the

concrete repair industry in general. Criteria for nomination is based on the following: outstanding contributions to the production or use of concrete repair materials, products, or structures in the areas of education, research, development, design, construction or management; an individual shall have been an ICRI member for 5 consecutive years. We are now accepting nominations for 2024; get an application by visiting the ICRI website or by contacting ICRI headquarters.



Jason Coleman

Jason Coleman has contributed to ICRI by serving roles as Delaware Valley Chapter President, serving more than 10 years on the Delaware Valley Board of Directors, 5 years serving on the Board of Directors at the National level, serving as secretary and chair for the Masonry Technical Committee

410, and attending numerous national conventions. He has presented numerous times at national conventions, at the Minnesota Chapter Mega Demo Day, at Metro New York Symposiums and at the Delaware Valley Chapter. Jason has been a practicing structural engineer for over 20 years and his experience includes the assessment, repair design, and administration of numerous façade and parking structure projects.

Jason has served as engineer of record for numerous historical building façade rehabilitations, contributed to the development of the City of Philadelphia's Ordinance in 2008-2010, is a SPRAT certified Level 3 Rope Access Supervisor, and has been a guest lecturer at the International Masonry Institute, at local Structural Engineering Institute events, at his local high school, and at Lehigh University for high school science and engineering students.



Elena Kessi

Elena joined ICRI in 2005 when she first entered the construction industry working for Aquafin. She quickly got involved in the Metro New York Chapter. The chapter at the time was having breakfast meetings and struggling with attendance and involve-

ment. She was also attending other association meetings, such as CSI and ACI, however was more drawn to ICRI and the welcoming nature of the local chapter board members. Elena was asked to join the chapter board and started brainstorming new ways of boosting attendance. She served the local board until the end of 2006.

Her first national convention was in Denver, Colorado, where she was the chapter delegate. On the national level she joined both administrative and technical committees, including: 710—Grouting, Meetings & Conventions, Marketing, and was the Chair of the ICRI Awards Committee. In 2015 she was asked to join the ICRI National Board of Directors. She was instrumental in starting the ICRI 40 under 40 award to recognize ICRI's younger members. In the wake of the Surfside Tragedy in Florida she was responsible for getting ICRI "3 seats at the table" with the local Florida engineering group that was working with lawmakers to influence future building code in the state.



Brian MacNeil

Brian MacNeil has made numerous contributions to the culture at ICRI. He is the current Treasurer on the ICRI Board of Directors. He served a 3-year term on the Board before moving to Treasurer. He is also the past chair of the ICRI Awards Committee and has been a member of other ICRI

committees including Marketing, Education, Chapters, and Conventions. Brian is very proud of his countless contributions to the ICRI Awards program. In his mind, the members work on amazing projects that deserve to be recognized. He helped evolve the Awards ceremony from an audience of only 90+ in a paid evening program to a more robust lunch program with an audience over 300. A very well-received change. Brian is also proud of his work in starting the second Canadian Chapter, then turning that success into working with others to get the third Canadian Chapter going in Toronto.

Besides contributing to the committee activities, board and executive, it is worth noting that Brian contributes quite a bit to making members feel welcome and connected—a trait that is evident if you meet or talk with Brian for any length of time. While he knows it can be intimidating joining this group for the first time, he steadfastly believes that being open to newcomers, helping them achieve their ICRI goals, and getting them involved should continue to be a focus of this organization.



Michelle Nobel

Michelle has been an active and engaged member of ICRI since 2008. Michelle was the Region 1 Representative to the ICRI Board of Directors from 2021 to 2023. She served as the Chair of the ICRI Chapters Committee from 2018 to 2022. She has been an active member and proponent of

the Women in ICRI Committee and has authored several articles on the committee and its members for the *Concrete Repair Bulletin*. She has also attended more than a dozen ICRI conventions since 2010 and participated actively at every turn.

Mark de Stefano, ICRI Fellow and the person who nominated Michelle for this honor says of his friend, “Her dedication to the craft, commitment to excellence, leadership, willingness to share ideas, fortitude and courage are what we aspire to in our commitment as Fellows. She has not only been a colleague, confidant, and resource, but more importantly a friend. She is courageous! She is fun, intellectual, and will always leave anything she finds a little brighter than she found it. She is a shiny penny and a beacon in the darkness.”

PRESIDENT’S AWARD RECIPIENTS



2019—**Jim McDonald**—recognized by 2018 President Ralph Jones for his achievements as Technical Activities Committee Secretary and his dedication to ICRI from the very beginning of the organization.



2020—**Fred Goodwin**—recognized by 2019 President Chris Lippmann for his work as Chair of the Technical Activities Committee, including his edits and updates to the Technical Committee Manual.



2021—**Rick Edelson**—recognized by 2020 President Mark LeMay for his continued dedication to ICRI throughout his career including his work on ICRI Committees and as ICRI’s 12th President in the year 2000.



2022—**Monica Rourke**—recognized by 2021 President Elena Kessi for her continuing efforts to promote the repair and restoration industry in addition to her groundbreaking term as ICRI’s first female President in 2008.



2023—**Mark Nelson**—recognized by 2022 President John McDougall for his contributions to the industry during his decades of service to ICRI including his recent term as ICRI TAC Chair.

DISTINGUISHED SERVICE AWARDS

ICRI continued its tradition of honoring those who have gone above and beyond in service to ICRI and the larger repair industry. The Distinguished Service award is given to those individuals nominated by one (or more) of their peers. Beginning in 2012, ICRI has honored Tree Tietsort, Peter Craig (2013), Danis Longpre (2014), Chris Lippmann (2016), James McDonald (2016), and Fred Goodwin (2022).



The most recent honoree is former ICRI Technical Director and former ICRI Treasurer, **Ken Lozen**. Ken was presented with a Distinguished Service Award at the Spring 2022 Convention in Baltimore, Maryland. Ken has been a vital part of ICRI from the very first meeting in Chicago in 1985 where Ken was chosen for the post of ICRI Treasurer. Remaining an active member of ICRI after his term on the Board or Directors, Ken’s next biggest contribution came in 2013 when Ken joined the staff team as ICRI’s Technical Director. For the next 9 years, Ken played a crucial role in launching the ICRI Certification programs and has been instrumental in growing the impact of ICRI’s technical products and publications.

You can find more information on submitting a nomination as well as details on more ICRI Honorees by visiting the Awards page on the ICRI website. You will find information on all ICRI’s award programs and recipients: Project; Safety Awards; President’s Award; ICRI Fellows; 40 Under 40 Award; Distinguished Service Award; Honorary Members, and the ICRI Scholarship Award.

VISIT WWW.ICRI.ORG

CERTIFICATION UPDATE

CSMT PROGRAM OUT WEST

ICRI was able to host 3 Concrete Slab Moisture Testing (CSMT) programs in Spring 2023 and went (almost) coast to coast. First, we hosted a joint program in April with our partners, the National Floor Covering Association (NFCA) in Canada. We gathered in Toronto and were able to certify more than a dozen people in Canada. Next up was another partnership program with the National Wood Flooring Association (NWFA) Expo in early May. Their annual Expo was held in Milwaukee, Wisconsin, and we certified 10 more in addition to re-certifying 4 current technicians.

The final Spring program was held in the Western U.S. We worked with our good friends at Ardex to host a CSMT program at their facility in Stockton, California, with a total of 22 participants. We certified 15 for the first time, re-certified 1, and provided education to another 6 students.

If your company or chapter wishes to schedule a CSMT Program, please contact Dale Regnier (daler@icri.org) and provide him with contact information for the point person in charge of coordinating the event, the proposed exam location, and potential date(s).



New CSMT Certified professionals from the NFCA event in Toronto, Canada



Top 3 drillers at the NFCA class in Toronto, Canada



◀ Top 3 drillers at the NWFA Expo in Milwaukee with Class Administrator Dale Regnier (2nd from left)



The Milwaukee class, with 14 participants studying for the written exam ▶



Stockton drilling contest winners (left to right) Ray Balderas, CSMT Instructor Roland Vierra, Jon Bain, and Robert Simpson



The CSMT program in Stockton, California, included more than 17 workshop participants in the well-equipped warehouse area at the Ardex facility.



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Traffic Deck Coating—Layers to Success

Maximizing Service Life in Traffic Deck Coating Restoration and Installation Applications

by Bryant Bartolotto-Freeman

WHAT IS TRAFFIC DECK COATING?

Traffic Deck Coatings (TDC) are typically a multi-coat assembly utilizing a 1 or 2 component polyurethane (PU) based system. Most TDCs utilize a primer (PU or epoxy-based), a basecoat (waterproofing layer), and a top coat (wearing surface or wear course) (Fig. 1) designed to protect concrete structures and structural elements from contact with moisture and contaminants (chlorides). The primer is typically moisture-tolerant (to a specific moisture level), reduces substrate off-gassing, and promotes adhesion. The base coat provides the elastomeric, bridge-cracking, waterproof layer. The wear course(s) typically consists of a liquid applied topcoat layer, broadcasted and backrolled with aggregate (angular sand, rounded sand, etc.), and a second layer of topcoat with a broadcasted and backrolled aggregate, depending on the serviceability and aesthetic requirements. In some instances, the aggregate can be installed to refusal, where aggregate is applied to a point where the topcoat cannot accept additional aggregates. In a seeded to refusal assembly, once the topcoat has cured, excess aggregate is removed and a final tie coat is required to seal the surface of the assembly.

The curing mechanism differs from single component to two-component systems. Single component systems utilize/consume water during the curing process and require access to ambient moisture and the ability to off-gas. Two component systems react chemically in a closed system without the need to access ambient moisture. Due to this, two-component materials cure in less time than a single component, allowing subsequent layers to be applied in shorter time intervals, returning the structure to service sooner. Typical TDC applications are on exterior suspended concrete elements (balconies, plaza slabs, etc.) (Fig. 2) and parking decks/ramps (both exterior and interior) (Fig. 3), providing waterproofing protection, traction/non-slip enhanced surfaces, wayfinding, and interior light reflection in parkades (for aesthetics, security, etc.). In addition to exterior environments, indoor environments (parking structures suspended slabs and stairwells) have the potential for vehicles and foot traffic to transport moisture and road salts (chlorides) into enclosed areas.

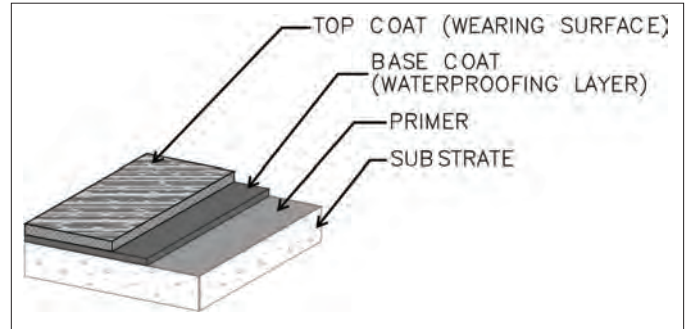


Fig. 1: Typical TDC Assembly



Fig. 2: Typical TDC installed on balcony

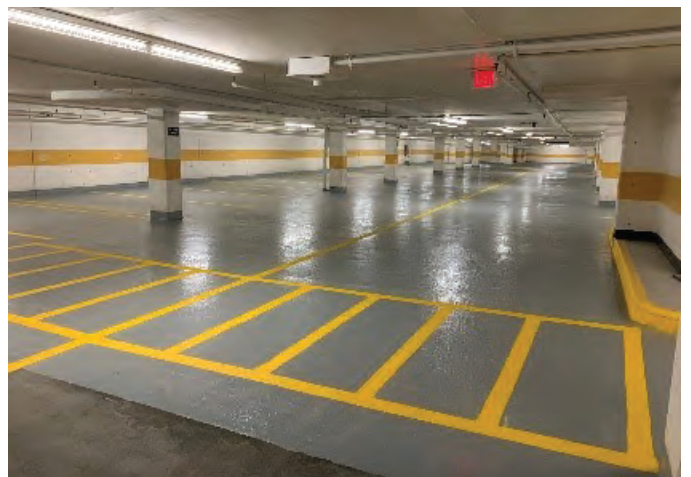


Fig. 3: Typical TDC installed on parking structure

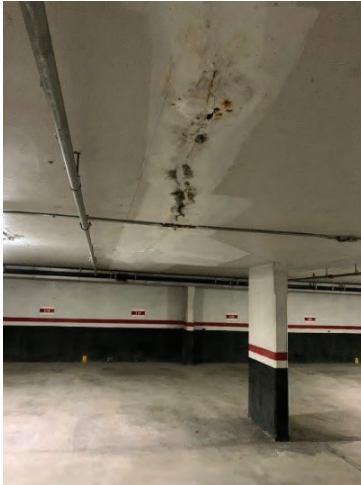


Fig. 4: Moisture staining through slab



Fig. 5: Concrete deterioration on bottom surface of beam

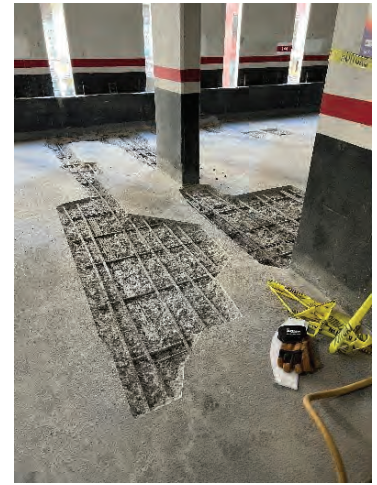


Fig. 6: Removal of unsound concrete in progress near support columns

The thin two-layer system is advantageous over other waterproofing assemblies concealed/protected by concrete topping, pavers, or overburden, as it allows the coating to be exposed to assess its condition, performance, and perform any required repair over its service life. This thin application also allows for assessing the condition of the underlying concrete structure by acoustic methods (chain dragging/hammer sounding). The thin coating is also lightweight, adding negligible deadloads to the structure.

To protect concrete structures from moisture and chloride induced deterioration, the use of traffic deck coatings has become widespread over North America. However, regular cleaning and maintenance is required. Failures in traffic deck coatings can be expected over time, if worn areas and isolated locations of damage are not addressed in a timely fashion. In this article, we will explore the mechanisms behind concrete deterioration, the importance of corrosion protection with traffic deck coatings, common TDC failures observed in the field, and best practices for installation and repairing TDCs, to maximize service life.

UNDERSTANDING CONCRETE DETERIORATION

Concrete deterioration occurs when moisture and contaminants (de-icing salts, chlorides, sulfates, etc.) penetrate the porous concrete matrix, leading to the corrosion of embedded steel reinforcement (Fig. 4) and the weakening/reacting with the chemicals that create the cement matrix, producing concrete surface scaling. As moisture and chlorides penetrate deeper into the concrete member and contact embedded steel reinforcement, the steel corrodes, expanding in volume and fracturing the surrounding concrete. Over time, if the steel is further exposed to moisture and chlorides, it continues to expand, causing the surrounding concrete to delaminate from the steel surfaces, creating potential for the concrete to become loose while affecting the structure's ability to sustain loading (Fig. 5). Concrete top surface delamination is likely to occur near columns and stair/elevator cores where embed-

ded reinforcement is abundant at the slab surface. When the concrete slab's top surface is delaminated in close proximity to columns (Fig. 6), this deterioration impacts the slab's ability to transfer loading to the column below, creating the potential for the column to punch through the slab cross section. Top surface concrete delamination in the centre of the slab also impacts the structure's load carrying ability due to reducing the effective concrete compression block area. Should this concrete deterioration occur on the slab underside, slab edges (balconies) (Fig. 7) and vertical surfaces, it has the potential to break loose over time and fall from heights, creating hazards to people and property below.

In addition to corroding embedded steel reinforcement, moisture and contaminants have the potential to impact unbonded post-tensioned (PT) reinforcement by corroding steel strands within the structure (Fig. 8) and anchors at the slab edge. As strands are typically stressed/loaded upwards of 25,000 lbs., corrosion-induced strand breakage can occur, releasing the tension force violently and significantly reducing the structure's ability to sustain loading.

These types of concrete/structural deterioration can be reduced significantly by applying TDCs that create a protective barrier between the concrete and water/contaminants.



Fig. 7: Spalled concrete on front edge of balcony



Fig. 8: Removal of unsound concrete in progress at PT strands

COMMON FAILURES IN TRAFFIC DECK COATINGS

Debonding: Debonding refers to the separation of the coating from the underlying substrate or between layers of coatings (intercoat adhesion). This issue is often caused by use over the coating service life but can also be due to insufficient surface preparation, high moisture content in the slab at time of application, water migration between the layers, or applications outside of recoat windows between coats. As the coating tears/gouges from wheel racking and use (Fig. 9), specifically at drive aisles and turning areas, penetrations in the waterproofing allow water to migrate under the coating and weaken the bond between the waterproofing and concrete substrate. As the bond weakens, the coating becomes less resistant to forces caused by moving vehicles and expands in size. Debonding can also occur between layers (wear course and base coat) (Fig. 10) due to inadequate surface preparation, placing materials outside of specified cure times, or if in an open air/exterior application, where ambient temperatures can affect curing.



Fig. 9: Unbonded/tear coating



Fig. 10: Intercoat adhesion failure between topcoat and base coat

Cracks and Scrapes: Cracking of the underlying concrete substrate (by concrete shrinkage after casting in place, thermal expansion, or deflection under load) can lead to cracks in the TDC. In new construction, cracking is likely to occur within the first year of service life where plastic shrinkage has occurred and the structure first experiences occupancy loading. As the coating ages, its plasticizers become brittle, leading to loss of elasticity in the coating and cracking. Regular use and traffic can lead to scrapes in the coating as well. Type of use—such as loading dock or industrial settings—can exacerbate the occurrence of scrapes and gouges (Fig. 11). In colder climates, power brushes should be used for exterior applications instead of snowplows or buckets to avoid scraping the coating. Cracks are often not detailed as per manufacturers' recommendations, which can lead to crack reflection through the installed assembly or a reduction of the crack bridging potential over time. As per CSA S413-21, cracks <1.6 mm need to be pre-stripped with base coat prior to full base coat application. Cracks >1.6 mm up to 25 mm need to be routed, filled with a compatible sealant, and pre-stripped with basecoat prior to full basecoat application.



Fig. 11: Typical gouge in TDC

Surface Wear: Over time, the aggregate surface of the TDC will experience abrasion due to wheel racking and traffic exposure. The wear is intensified with the presence of excess gravel/sand. This wear can weaken the coating, leading to premature failure. The first indication of wear is aggregate pop-out (Fig. 12). This is when abrasion has worn through the top of the wear course and is now contacting the embedded aggregate. As the aggregate encounters vehicle wheel forces, it can become dislodged from the coating system, leaving behind a pocket in the lower layer of the wearing surface.

Once this occurs, abrasion wears through the second layer of the wearing surface until the underlying waterproofing membrane is exposed. The last phase of wear is abrasion through the membrane to concrete substrate (Fig. 13), leading to debonding failures and potential for moisture to infiltrate into the slab top surface.

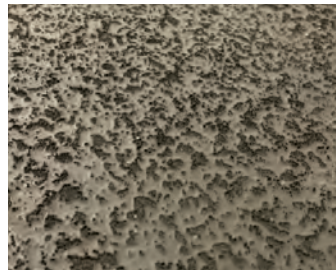


Fig. 12: Aggregate "pop-out"



Fig. 13: Excessive wear through entire coating system

MAXIMIZING SERVICE LIFE THROUGH LAYERS OF SUCCESS

Layer 1—Surface Preparation: Proper surface preparation is crucial for a successful TDC installation. Shot blasting is recommended to achieve an ICRI Concrete Surface Profile (CSP) 3-4, which removes micro-fractures and laitance from the concrete surface (Fig. 14). This provides a sound, open-textured surface with the surface area required for sufficient coating adhesion. In a repair program to an existing system, abrasive blasting also removes the top surface of concrete, which can contain grease, rubber from tires, or contaminants that have migrated into the concrete slab. Wear course that is being upgraded with additional material should be shot blasted to remove the items noted above. When concrete is exposed and being prepared to receive coating, surface preparation lighter than a profile of CSP 3 will likely not remove the concrete laitance and concrete micro-fractures/contaminants, leading to premature debonding and failure. A profile rougher than CSP 4 creates large and inconsistent impressions that the coating will have to fill, creating potential for thin areas and the need for additional material application to achieve specified

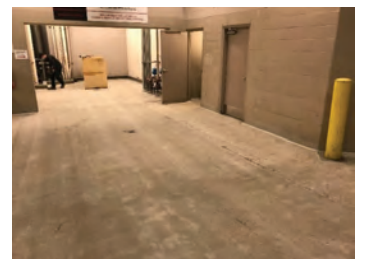


Fig. 14: Shotblasted concrete

minimum thickness. An epoxy grout coat can be utilized to overcome a rougher profile in advance to allow for a more even nominal base coat thickness. This methodology is often used in rained out slabs or slabs encountering over-finishing (top surface delamination).

Layer 2—Application Environments: Consider the service life conditions and specific requirements of the project and material during design/material selection phase. Thicker wearing surfaces may be necessary for high-traffic areas (drive aisles and turning areas) or in loading dock/industrial areas, possibly requiring a more robust wearing surface in lieu of standard aggregate (alumina-oxide aggregate, hybrid TDC systems with epoxy wear courses, or more robust systems such as polymethyl-methacrylate (PMMA) or polyurethane-methacrylate (PUMA) systems). Turnaround times and curing temperatures are also important considerations during installation. Improper phasing of the work can lead to the system curing in overnight low temperatures or being applied to a substrate too late/early, affecting its bond strength and durability. During repairs, portions of the parking facility may be required to remain open, creating potential for vehicles to contact the work site. Proper signs, barricades, and site presence can help mitigate site contaminants from vehicles.

Layer 3—Thickness and Testing: Verifying the product is being placed/applied in conformance with specifications or manufacturer requirements is key to ensuring a long-lasting service life of the coating. When placing material on new concrete, concrete repairs, or exterior applications, moisture content of the substrate should be measured (Fig. 15) and compared against specification/manufacturer requirements. As the coating is a water barrier, trapped moisture within the slab will create vapor drive with temperature fluctuations, potentially causing the coating to debond from the concrete substrate.

Thickness testing is also important as a system that is too thin will gouge and debond in wheel racking or turning areas prematurely. Because the coating is elastic, if the coating is too thick, it will deform with use, causing debonding and cracking. Applying the coating too thickly, and beyond the recommended thicknesses, can also create additional shear-stress in the coating layer. When wheels are turned



Fig. 15: Moisture testing concrete



Fig. 16: Thickness testing using mil gauge

in place (for a non-moving vehicle), the added stress could shear the over-thickened coating layer. For two component products, wet film thickness testing is useful as these types of products are typically +90% solids and have minimal shrinkage when curing, with little effect on thickness results. This allows testing to occur when material application is in progress (Fig. 16). This also allows for deficiencies to be addressed quickly by simply adding more material within the deficient area. Cut testing is necessary when using a single component product, as the wet to dry thickness of these types of compounds can differ due to being typically +/-70% solids. Cut testing provides an accurate in-situ dry film thickness, however it involves puncturing the new waterproofing system and is limited when determining the extent of deficient coating thickness, requiring multiple cut tests at different locations, which then need to be repaired.

Adhesion testing can be completed to ensure the newly applied coating has sufficient bond strength. CSA A23.2-6B provides standards for testing concrete overlays and involves adhering a steel puck/plate to the coating, cutting a certain depth into the concrete around the test area, and applying upward force with a jack until failure. This can help provide insight on whether the bond to the concrete substrate is sufficient and consistent, or if areas may have bonding issues from improper surface preparation, or temperature fluctuations from curing, etc.

Layer 4—Tricky Details: Placing a new coating in the field (centre) of a concrete slab is relatively straightforward; however, improper design/installation of terminations and perimeters of coating repairs can make coatings susceptible to failures. Rather than relying on a lap with the existing coating when doing repairs, ground/saw cut reglets can provide additional mechanical

adhesion while providing physical separation between the new repair coating and the surrounding existing TDC (Figs. 17 and 18). The coating fills the reglet during install and helps to embed the membrane as well as create a barrier from the surrounding environment. Should water penetrate and migrate under the existing coating, as it migrates

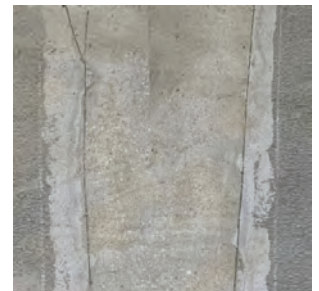


Fig. 17: Sawcut reglets at perimeter of new TDC

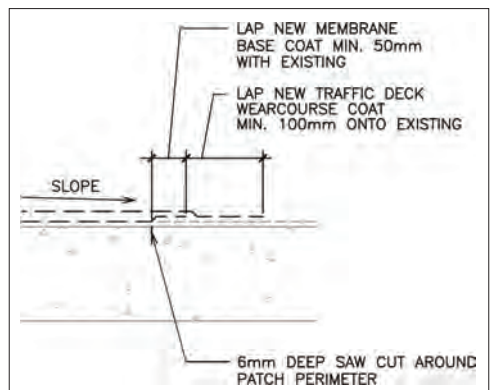


Fig. 18: Typical TDC full system repair with reglet at perimeter

along the slab top surface it will contact the reglet installed around the repair perimeter, mitigating potential for water to migrate between the slab top surface and the repair.

Detailing at cracks and upturns prior to large scale TDC application also prevents moisture that gathers at the bases of columns, walls, and curbs or at flexural cracks from bypassing the traffic deck coating system. Concrete is a stiff material that cracks under deflection (i.e. at column bases and wall transitions) and from thermal expansion/contraction. Providing a double application of membrane at cracks and upturn locations (Figs. 19, 20, and 21) can help provide a thicker, more elastic waterproofing membrane that will have a higher resistance to elongation/flexure. Providing a two-component sealant heel bead at the base of upturn transitions can provide additional moisture ingress protection as well as provide a slope for the traffic deck coating to transition on vertically (rather than trying to apply the coating into a 90° corner).

Base plates for fences, railing, bollards, etc., are typically anchored into the concrete slab, penetrating through the traffic deck coating system. This creates the potential for moisture to migrate between the baseplate and concrete slab, into the anchor openings, and deteriorate the structural connection (Fig. 22). Placing a heel bead and TDC around the base plate perimeter (Fig. 23) can help mitigate corrosion and deterioration of the baseplate structural connection. Note that prior to sealing by heel bead and TDC application, surface preparation of baseplates requires removal and abrasive blasting of corroded surfaces in order to prevent corrosion from reappearing, bleeding



Fig. 19: Detail coat at floor-to-wall intersection Fig. 20: Detail coat at cracks

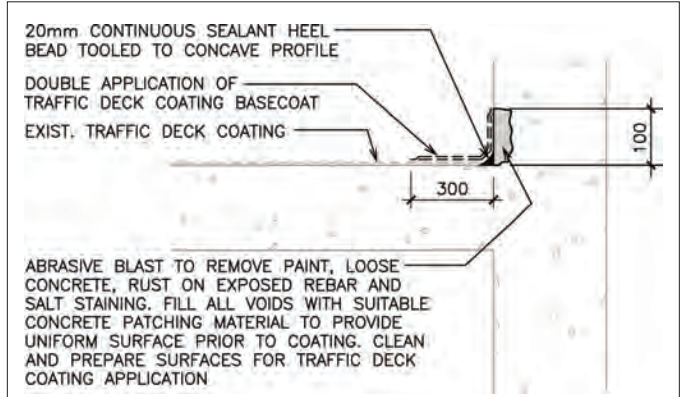


Fig. 21: Application at upturn

through the coating, and causing unsightly stain. If corroded embeds are left in place, even if exposed surfaces are blasted clean of corrosion, the latent corrosion in between concrete/steel will bleed through.

Downturns at slab edges terminating into the drip edge (Fig. 24) can help mitigate concrete deterioration as well as help mitigate loose/unsound concrete from falling at height, creating potential hazards to the public below.

Layer 5—Compatibility: When applying polyurethane-based TDCs, compatibility with existing surfaces is necessary to ensure the coating and overall detail performs as intended. When repairing the existing coating, understanding if the existing coating is a similar polyurethane-based product, or a bitumen-based product, etc., will help with repair material selection, ensure compatibility, and ensure proper service life of the repair. When transitioning from slab surface to building envelope at balconies, down-turning a surface coating onto the vertical foundation wall waterproofing, or transitioning from a plaza assembly to interior parkade at a trench drain, the TDC may come into contact with bitumen-based

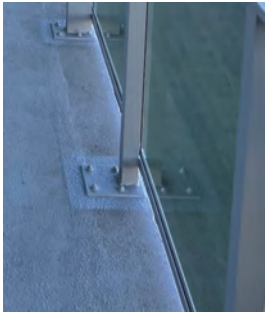


Fig. 22: Typical installation at balcony railing support

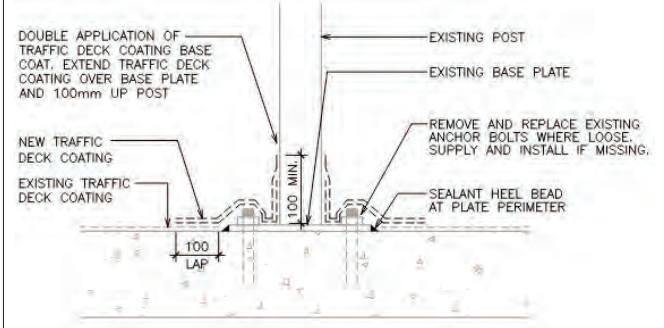


Fig. 23: Recommended installation at balcony railing support

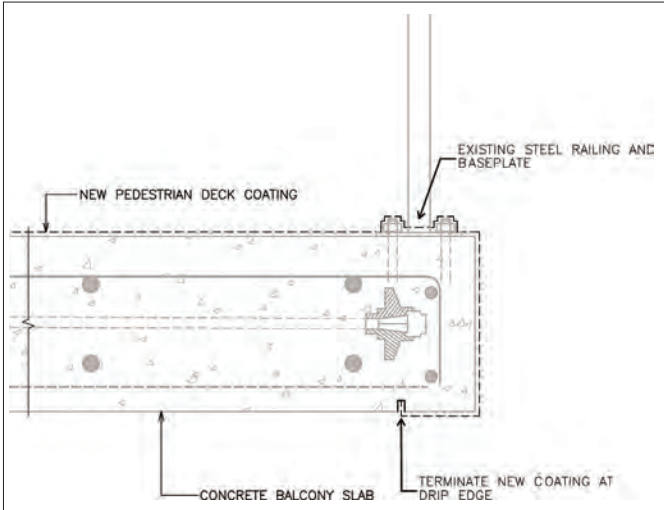


Fig. 24: Application at downturn—slab edge

products. Polyurethane alone is stable with bitumen (there are polyurethane modified bitumen waterproofing systems in production); however, the plasticizers that make the TDC flexible and elastic are not. Bitumen tends to attract the plasticizers within the TDC system, causing it to discolour and become brittle—creating potential for cracking. As the plasticizers interact with the bitumen-based product (self-adhered membrane, mop-on rubberized waterproofing, etc.) the bitumen becomes soft and if in a vertical application, can bleed/run.

The most effective way to have a TDC lap with bitumen-based products is to have an intermediate layer to separate them. This can be a steel termination bar that the TDC laps onto (Fig. 25), a flashing or an intermediate material

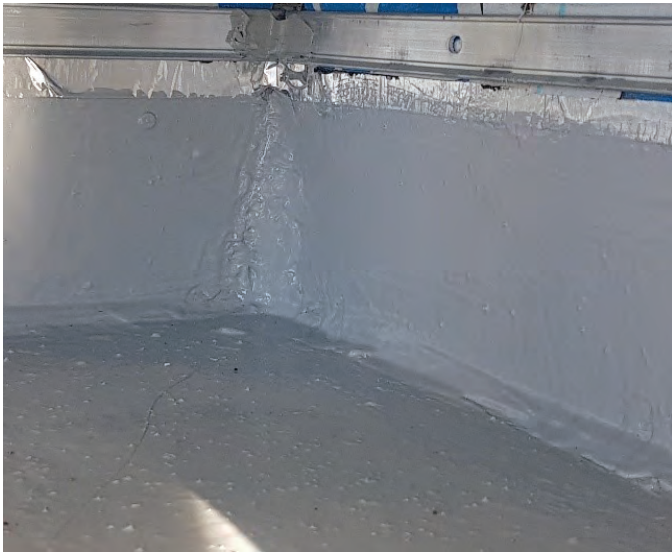



Fig. 25: Upturn tie-in to building envelope with metal termination bar

compatible with both TDC and bitumen-based systems such as some PUMAs/PMMA. In trench drains, using galvanized steel angle and reglets to separate the trench/plaza waterproofing from parkade traffic deck coating can also be effective.

CONCLUSION

Proper specification, design, application, and assessment of traffic deck coatings is necessary to ensure the coating performs as intended to protect the concrete and is maintained throughout its service life. Annual condition reviews by a Consultant, as recommended by CSA S413, can help identify and address typical wear and use items before they exacerbate costly concrete/structural repairs. Consideration of materials, environment, surface preparation, detailing, and monitoring installation aid in having a successful project and help limit risk of warrantable items.

By understanding the causes of concrete deterioration, addressing common failures, and following best practices, the service life of traffic deck coatings can be significantly extended. 



Bryant Bartolotto-Freeman is a graduate of the University of Calgary, and is an Engineer-In-Training with RJC Engineers. Bryant's previous experience in general contracting provided him with a solid background in the management of construction projects. Working alongside RJC's Building Science team, he has gained valuable experience providing project support, field review and coordination, and enhanced his technical knowledge in investigating building issues, as well as design and implementation of repair programs.

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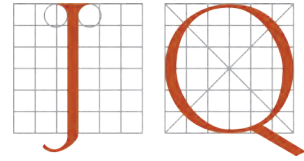
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A Forensic Investigation of a Four-Story Building in Nassau, Bahamas, Following Hurricane Matthew

by Chris Dumford



Fig. 1: 4-story bank building in Nassau, Bahamas

Buildings are much like human beings. Whereas human beings have a skeletal structure protected by an outer epidermal layer, buildings have a structural skeleton protected by an outer building envelope. If the outer building envelope (roof structure, exterior walls and coatings, windows, doors, etc.) is compromised, it often allows water intrusion that can cause major damage to the structural elements. Once damage begins to occur to the main structural elements of a building, it can endanger the structural integrity of the building and result in expensive repairs to correct the damage and reestablish the structural integrity.

Structural failures in buildings usually fall into one or more related categories. These categories can be poor workmanship or design issues, natural causes, lack of maintenance, or man-made issues (acts of terrorism or war). In my experience, after investigating dozens of building structural failures over a career that spanned over 40 years, most fall within the category of natural causes or lack of maintenance. By far, the biggest culprit in these two categories is water intrusion. Probably the epitome of this culprit was evidenced by a four-story bank building located in Nassau, Bahamas. (Fig. 1)

On October 6, 2016, Hurricane Matthew made landfall in Nassau before traveling northward toward the Caro-

lina coast. The Category-5 hurricane caused somewhere north of \$16.5 billion in damage and took the lives of over 500 people. As Matthew lingered over Nassau, the winds, which exceeded 115 miles per hour, blew detritus and extensive salt spray against the outer envelope of the bank building. Failure of the building envelope allowed water intrusion that resulted in extensive damage to the building structure. About a year after the hurricane event, a British engineering firm was contacted by the building owners to evaluate the overall condition of the building. The British firm performed an initial site survey and determined that additional non-destructive testing would be required. This led to them contacting our company. In May of 2018, I and another material consultant from our firm flew to Nassau to assist in the building structural assessment. (Fig. 2)

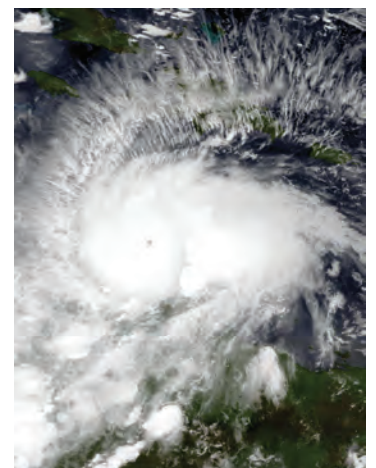


Fig. 2: Satellite photograph of Hurricane Matthew

Our assessment was divided into several different disciplines. We performed a visual assessment of the building, followed by extensive non-destructive testing of the various structural elements. The final element of our investigation was a historical investigation of the materials used in the building construction, as well as construction methods. Unpeeling each layer of the investigation gave us an increasing level of understanding of the overall building condition. Our data were collated into a single report delivered to our client, allowing them to make recommendations to remedy the building damage. Our investigation proceeded as follows:

VISUAL ASSESSMENT

A complete interior and exterior visual assessment was performed first. The assessment revealed that the outer envelope of the building was compromised in several areas. The building itself was entirely a reinforced concrete structure consisting of concrete beams and pans encased in a concrete shell. The roof consisted of a reinforced concrete deck covered in a waterproof mastic tar paper with aggregate ballast. The exterior of the building was coated in a waterproof elastomeric coating. The elastomeric coating on the exterior of the building was damaged at several locations, mainly in the southwest quadrant of the building. Numerous spalls were observed on the outer faces of the exterior walls. Many of the caulked control joints between the exterior concrete panels had failed. The roof mastic had also failed across most of the roof structure. Significant spalling which exposed the reinforcing steel was observed in the roof deck in several locations. The interior of the building exhibited water damage on the upper floors. The undersides of the 4th floor and roof deck exhibited spalling and delamination of the concrete, primarily in the southwest corner of the building. One area of loose concrete, approximately 30 feet long by 10 feet wide and about 4 inches thick on the underside of the 4th floor was observed. The loose concrete section was situated right above a line of secretaries' desks that were currently in use. Tapping on the surface of this loose concrete with a hammer to determine the spall limits resulted in a several hundred-pound section of concrete becoming detached onto several of the desks. These desks had been occupied only a few hours earlier. Fortunately, no one was injured. (Fig. 3)

The visual observation also revealed that all the exposed reinforcing steel on the roof level and the undersides of the roof slab and 4th floor were extensively corroded and exhibited major loss of section. Some bars were completely severed. (Fig. 4)

NON-DESTRUCTIVE INVESTIGATION

Non-destructive testing consisted of impact-echo testing, corrosion potential testing, locating reinforcing steel, rotary percussion testing of the undersides of the slabs, phenolphthalein testing of concrete fragments, and chloride



Fig. 3: Typical condition of the undersides of the 4th floor and roof



Fig. 4: Photograph of the roof. Note the complete failure of the roof membrane and extensive corrosion of the exposed reinforcing steel

testing of concrete samples extracted from several locations within the building.

Impact-Echo Testing: Impact-echo testing (ASTM C1383) was utilized to determine the perimeter of spalls and delaminated areas on the undersides of the slabs. The delaminated areas were located by performing soundings with a rotary percussion instrument (ASTM D4580). Extensive delaminations of the undersides of the slabs on the roof level and 4th floor were detected, concentrated most heavily in the southwest region of the building.

Corrosion Potential Testing: Corrosion potential testing (ASTM C876) was performed on the interior faces of the exterior walls and undersides of the various slabs. The results indicated that the area of the building with the greatest corrosion potential was in the southwest corner of the building. This correlated with the noted high concentration of spalls and delaminations, as well as the previously observed damage to the exterior elastomeric coating, most evident in the southwest section of the building. (Fig. 5)

Rebar Locating: An eddy current reinforcing steel detector was utilized to map out the reinforcing steel location

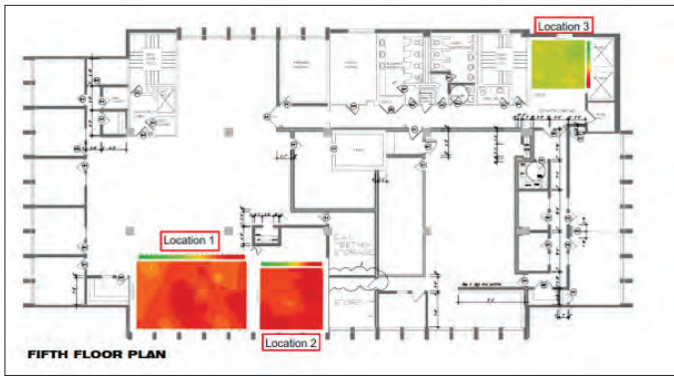


Fig. 5: Corrosion potential map of the 4th floor of the building

and orientation, primarily in the building columns. This was performed at the request of the client.

Phenolphthalein Testing: Phenolphthalein was utilized to determine if any of the concrete was carbonated. Testing indicated that much of the exterior wall concrete was highly carbonated. The carbonation was quite deep and was expected given the age of the building. (Fig. 6).

Water Soluble Chloride Testing: Water soluble chloride testing indicated that every concrete sample tested contained high levels of chloride concentration. The high concentrations were found throughout the entire thickness of the concrete samples tested. This was unexpected. Because the building had been exposed to years of salt spray, especially concentrated spray at high velocities during Hurricane Matthew, we expected the chloride concentrations to be greatest at the surface level to an inch or two below the surface.

HISTORICAL STUDY

The historical study revealed that the concrete was mixed and placed on-site. Coarse aggregate and cement were procured from Florida and shipped to Nassau on barges during construction. The fine aggregate was procured from local beaches and was not washed prior to being mixed into the concrete. This explained the high chloride concentration throughout the concrete samples. The encapsulated chloride was activated every time the building structure was exposed to water intrusion. This caused the corrosion of the reinforcing steel.

RESULTS OF THE INVESTIGATION

The accumulated data was provided to our client in a report. The report noted that the roof structure was extensively damaged. Large areas of the roof surface had delaminated and the reinforcing steel (especially around the column heads) was largely corroded through, with many of the bars exhibiting complete loss of section. The underside of the roof exhibited extensive spalling, and the bottom reinforcing steel mat was also extensively corroded. The southwest section of the building from the roof to the third floor exhibited high corrosion potential espe-



Fig. 6: Carbonation testing of concrete samples using phenolphthalein indicated extensive carbonation

cially between the fourth floor and roof. Thus, the building suffered from the perfect storm of several categories of structural failure. The first was poor workmanship. Utilization of salt-contaminated fine aggregate resulted in the salts being activated every time the building experienced water intrusion. The second was lack of maintenance. The issues with the roof mastic coating were far older than a single event. The damaged roof covering was certainly exacerbated by the hurricane, but the concrete damage and extensive loss of the roof reinforcing steel was evidence of a long-term issue that was ignored. The hurricane was a natural event that contributed to the building damage to a great degree. Finally, water intrusion was the primary culprit in most of the damage.

We were informed sometime later by the client that they had recommended razing the top floor and roof down to the fourth-floor level, transforming the fourth floor into a roof level, recaulking all exterior joints, repairing spalls in the exterior walls and reapplying a new elastomeric coating on the exterior of the building. These repairs were intended to extend the service life of the building for several years. We were not given the opportunity to see the completed work. All-in-all, this project was an excellent opportunity to showcase modern forensic investigative processes to assess an existing structure. 🗨️



Chris Dumford is Senior Scientist/Senior Materials Consultant with Terracon Consultants. Mr. Dumford has been in the Materials Testing and Inspection industry for over 43 years. His experience includes working in the Nuclear Industry, Military Industry, and the Commercial Industrial Construction Industry. His expertise includes metallurgy, non-destructive testing, and forensic investigations of structural failures as well as building assessments.

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There Is No Panacea When It Comes to Wall Coatings

by Keith C. Howard

Elastomeric coatings sound like the solution for all situations because there is a perception that they are the only waterproof option for above grade concrete and masonry applications. Elastomerics have become prevalent in many specifications, but do we understand what an elastomeric wall coating is, what it's supposed to do, and when we should use them? Wall coatings vary greatly in their ingredients, chemistry, and performance. Understanding when an elastomeric coating is appropriate for a specific project is key to the successful performance and protection of the wall section.

An elastomeric coating is a high-build coating that is manufactured with special resins that can stretch (elongate). The function of elastomeric coatings is to bridge small hairline cracks in substrates that are subject to thermally dynamic movement or have existing cracks.

Thermal dynamic cracks are common in stucco on wood, metal framing, or Exterior Insulation Finish Systems (EIFS). These substrates are not monolithic and act as a "shell" installed over a wall's framing or structural elements. The hairline cracks experienced by these substrates are typically 1/16" or less and will vary with ambient temperature. As the outside temperature falls, the cracks in the stucco will widen; as the outside temperature rises, these same cracks will narrow or even close. (Fig. 1)



Fig. 1: Crack in exterior stucco

Quite often, the word elastomeric is used as a generic term. Two key physical properties should be reported to evaluate actual elastomeric coatings: elongation and recovery. Elongation of 300% is considered the minimum for good performance. Regarding recovery, many products do not even list their recovery value on the data sheet. A tested recovery value (%) is essential for long-term performance. Without it, your coating is like a rubber band that stretches and stays stretched out.

It is also important to understand how much movement (crack bridging) can be expected out of a typical elastomeric coating system. A typical two-coat elastomeric coat-

ing with 300% elongation applied at a 16-mil total dry film thickness (DFT) is going to be able to move about 1/32". At 600% elongation, the movement allowance would be approximately 1/16". All existing cracks should be treated/detailed according to the manufacturer's recommendations before the application of any coating. When evaluating crack bridging properties, don't forget the other essential physical property of recovery percent. Elongation is useless without recovery (ASTM D412, D2370) (Fig. 2).

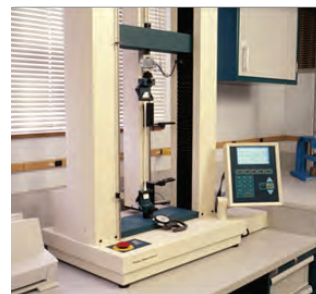


Fig. 2: Elongation testing

What if elongation is not necessary? What coating type is best for monolithic substrates like concrete and masonry? Drying shrinkage, settlement, mortar, or structural cracks often found in single wythe CMU, poured-in-place concrete, tilt-up concrete, or precast concrete walls (Fig. 3) are typically not thermally dynamic cracks and should be treated differently than stucco/EIFS cracks.



Fig. 3: Typical cracks in concrete

The cracks found on these monolithic substrates are typically far less frequent and may not change much with temperature when compared to stucco on framing. Cracks in concrete walls could be indicative of larger structural issues or lack of proper expansion joints and should be properly repaired or filled with a paintable sealant before the coating application.

Recommending elastomeric coatings on these types of substrates is not the best recommendation for either the owner or the structure. The selection of the coating based on the substrate type and wall construction is critical to long-term performance.

One of the primary functions of high-performance exterior wall coatings is to protect the structure from the damaging effects of water or moisture ingress.

Properly applied elastomeric coating systems are excellent at bridging hairline cracks in stucco/EIFS, thus keeping wind-driven rain out of a structure. There are, however, some trade-offs when using elastomeric vs. high build (flexible) non-elastomeric acrylic wall coatings, the most important of which is vapor permeability.

Elastomeric coatings are susceptible to backside moisture because they are softer, more flexible, and less vapor permeable than high build waterproof acrylic non-elastomerics. The increased flexibility does not permit the same tenacious physical bond to the substrate that a high-build acrylic non-elastomeric can achieve, and the lower vapor permeance does not allow any trapped moisture to escape, often resulting in the water blisters (Fig. 4). For this reason, most experts never recommend the use of elastomeric on the underside of balconies or soffits.



Fig. 4: Water dripping from behind blistered coating

Water can be trapped behind an elastomeric wall coating resulting in water blisters on the walls or loss of adhesion of the coating. This is a symptom of a larger problem where moisture got behind the coating due to any number of other issues such as inadequate flashing, cracks that exceeded the coating's movement capabilities, roofing or parapet design flaws, improper window installations, or failed joint sealant, et. al. In these cases, the elastomeric coating may be working against the building by keeping the moisture in, not out of the structure.

Another consideration when specifying coatings is dirt pick-up. Some buildings are more prone to dirt pick-up when located in warm, humid climates, or in proximity to pollution. Buildings located near industrial plants, major traffic areas, airports, or seaports are more susceptible to environmental dirt pick-up.

Elastomeric coatings require softer resins to give them their elongation properties, but this leaves them more susceptible to dirt pickup when compared to high-build non-elastomeric coatings. Silicone elastomeric coatings tend to have higher dirt pick-up due to their chemistry (ionic charge).

There are also potential issues with recoating elastomeric coatings. Some silicone elastomeric coatings must only be recoated with the same silicone elastomeric, further reducing the permeability of the wall as additional coats are added. Once an elastomeric has been applied, it is not advisable to apply a non-elastomeric because of the dissimilar movement capabilities of the different coatings. A non-elastomeric applied over an elastomeric is susceptible to cracking, leading to blistering or delamination. In short, once an elastomeric has been applied, there may

not be any going back without the costly removal of prior coatings.

Elastomerics are typically reserved for extreme cracking of stucco where water intrusion from wind-driven rain is an issue. So, what's the best coating for monolithic concrete and masonry walls that are not susceptible to thermal cracking? (Fig. 5)



Fig. 5: Coated precast concrete panel

High-build waterproof acrylic coatings are both waterproof and flexible (ASTM D522). These coatings resist wind-driven rain, resist chalking, withstand freeze-thaw cycles, and have excellent UV resistance. (ASTMs D4214, D1729, G23). Their tenacious adhesion and permeability allow moisture vapor to escape. Dirt pick-up is minimized, and color retention is outstanding long-term. These coatings provide excellent protection for concrete and masonry buildings.

Coatings play a vital role in protecting reinforced concrete structures from carbonation, a process that can cause significant deterioration and weakening of the concrete over time. Carbonation occurs when carbon dioxide from the atmosphere reacts with the alkaline components of concrete, reducing its pH and compromising its protective properties. By applying a suitable coating to the surface of reinforced concrete, the ingress of carbon dioxide can be minimized, thus preserving the integrity and longevity of the structure.

One of the primary ways high-performance coatings protect reinforced concrete from carbonation is by creating a waterproof barrier that limits carbon dioxide penetration into the concrete matrix. High-quality coatings act as impermeable shields, preventing direct contact between the concrete and the surrounding atmosphere. This barrier effect significantly slows down the carbonation process, reducing the exposure of alkaline materials in the concrete to carbon dioxide. As a result, the pH of the concrete remains relatively high, maintaining its protective passivating layer and preventing the corrosion of the reinforcing steel within.

Furthermore, coatings can offer additional protection by providing a physical barrier against other deleterious agents, such as moisture and chloride ions. Moisture can facilitate carbon dioxide transport into the concrete, accelerating the carbonation process. Waterproof coatings serve as effective moisture barriers, preventing the intrusion of water and, consequently, reducing the carbonation rate. This further enhances the durability of the reinforced concrete by preventing the initiation and progression of corrosion, which can be exacerbated by the carbonation process.

Coatings play a crucial role in safeguarding reinforced concrete structures from carbonation. By forming a protective barrier against carbon dioxide, limiting moisture ingress, and providing corrosion inhibition, coatings help maintain the alkalinity and durability of concrete. These protective measures significantly extend the service life of reinforced concrete structures, ensuring their structural integrity and minimizing the need for costly repairs or replacements. To provide a protective barrier, the wall coating needs to be applied as a continuous pinhole free membrane. Making sure the contractor understands the proper application is critical to extending the life of the building.

Application techniques for any high build wall coating are different than typical paint applications. Pay close attention to the manufacturer's recommendations, and when in doubt, contact the manufacturer's local representative!

When applying one of these coatings, it is best to have the frame bend facing the correct direction. If you are applying from North to South, you need to have the bend of the frame facing towards the South because this is where the pressure is applied on the roller cover to make sure you get proper application consistency.

For proper roller application, the coating should be applied in an M or W pattern, doubling back to fill in the pattern. The roller application should be overlapped by two or three inches (Fig. 6). The finish stroke should be in a downward application starting at one end of the wall following all the way down the wall to a natural stopping point.

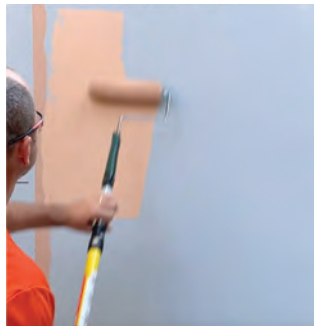


Fig. 6: Coating application with proper overlap

When cutting in a high build coating with a brush, it is best to go back and lightly stipple with the brush to add texture (Fig. 7); this will help blend in the roller stipple.



Fig. 7: Match stipple texture at brush-applied cut-ins

Before applying a high build wall coating, it is best to mix the material in the bucket and then box mix the pails together to achieve proper color consistency. Boxing is done by pouring half of the mixed material into an empty pail and then pour half the bucket of the next pail into the half pail and repeating as you apply the material. (Fig. 8)



Fig. 8: Box mixing demonstration to achieve color consistency

Mock-ups should always be conducted to check for adhesion and aesthetics, especially in recoat applications. The standard adhesion test is ASTM D3359, *Adhesion by Tape Test* (Fig. 9). This testing may help determine if a primer is needed or if a special surface preparation is required. Full surface preparation and a sealant joint should be included in the mock-up.

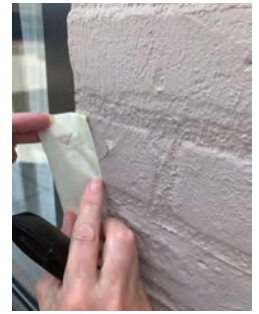


Fig. 9: Performing tape adhesion test

When selecting a wall coating, there are several questions that should be considered. Is the substrate bare concrete/masonry or is there an existing coating? What is the wall assembly; is it monolithic? What is the level of exposure to UV, thermal cycles, and other environmental conditions? How will the contractor access the building and how will that affect application technique? The bottom line: Every building is different, so one wall coating type will not be suitable for every application (Fig. 10).



Fig. 10: Properly coated concrete parking structure

ACKNOWLEDGEMENTS

Keith would like to acknowledge his coworkers Patrick Jorski, Marthe Brock, Lori Proops, and Dan Kime who assisted him with this article. If you are interested in more information or would like to participate in the 710.4 Sub-committee on Wall Coatings, please contact Marthe Brock.



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2023 ICRI State of the Institute

by Eric Hauth, ICRI Executive Director, and Pierre Hébert, ICRI President

We write this annual report mid-year of ICRI's 35th anniversary year. What an incredible accomplishment! From its humble beginnings in a hotel conference room in Naperville, Illinois in 1988, ICRI has grown into an international brand recognized as the source for the highest quality guidelines, education, and networking for concrete repair professionals and companies.

With 39 chapters and approximately 2,200 members—including a record-high 47 Supporting Member companies—ICRI has reached this remarkable milestone because of the many current and past ICRI leaders, members, and volunteers who have invested their time, money, and talent in this great organization. There is simply no organization in our industry with a more passionate membership than ICRI!

And while it's important to celebrate what got us to this point, every organization needs to adapt to meet the opportunities of the future. Concrete repair professionals have never been more important to addressing the needs of aging infrastructure and realizing ICRI's mission "to make the built world safer and last longer." ICRI leadership firmly believes that this organization will grow in membership and impact if we're adaptable and relentlessly focused on the needs of our members. Over the past fiscal year, ICRI has embarked on a path to do just that through critical investments necessary to propel the organization forward.

These investments include:

- Identifying, selecting, and now building a powerful membership database platform through our vendor, Rhythm AMS, that will fuel ICRI's future growth.
- Contracting to build and launch a new, much more engaging website through our vendor, AS Creative.
- Building our first-ever online learning modules for the Concrete Slab Moisture Testing program (CSMT), allowing us to scale this signature ICRI program.
- Producing and launching ICRI's new promotional video (which by now you should see on our website and on social media).
- Completing ICRI's first technical app—an app designed to aid in the assessment of rebar cleanliness on the jobsite.

The first two are our biggest and most fundamental changes. They will ensure a much easier and more seamless membership experience; provide better support to ICRI chapters; create an easier way to join and stay an ICRI member; ensure a compelling website presence; and better integrate our membership platform with ICRI's learning management system.

In addition to charting this critically important pathway for ICRI, other notable accomplishments this past fiscal year include:

- Hiring ICRI's first full-time Marketing and Membership Manager, Marissa Esguerra.
- Growing overall ICRI membership by approximately 5 percent.
- Streamlining ICRI's administrative committees, including the merger of Education and Certifications into a new Professional Development Committee.
- Holding successful national conventions this past Fall (Atlanta) and Spring (Vancouver).
- Formally joining the National Concrete Bridge Council as a voting member, providing ICRI a unique opportunity to better connect with and support bridge repair professionals.

The following report highlights critical activities and accomplishments of ICRI over the past fiscal year (July 1, 2022 – June 30, 2023).

Four key pillars anchor the work of ICRI: **Organization Strength**, **Industry Leadership**, **Organization Credibility**, **Professional Development**. We discuss ICRI's latest initiatives guided by these pillars in the following report.



ORGANIZATION STRENGTH

ICRI will have the resources, staff, and structures to fully support its strategic priorities.

Overall Financial Performance

ICRI is building a path for future growth. As detailed below, the organization has made several strategic investments over the past fiscal year including a significant investment in new core technology; investment in ICRI's first-ever digital app (Rebar Cleanliness

App); investment in creating new online learning modules for ICRI's Concrete Slab Moisture Testing program; and creating a new, professionally produced membership promotion video.

Three key factors most strongly influenced ICRI's overall year-end financial picture.

1. Significant, atypical investments in ICRI's future (noted above).
2. Greater than anticipated inflationary pressures impacting travel and convention costs.

Taken individually, ICRI would have likely ended the fiscal year on or ahead of budget. However, taken together, these factors resulted in a net income loss of approximately \$200,000. Given the anticipated expenses, ICRI leadership anticipated a net loss due to our strategic investments, pre-approving a draw on ICRI reserves up to \$150,000 as needed.

However, no one could have reasonably predicted the considerable inflation over the past year, especially in the hospitality arena. Significantly higher than expected expenses for convention food and beverage, audio visual, and staff travel all led to lower than expected net income for our Spring and Fall conventions.

In addition to growth strategies, early in the fiscal year, ICRI approved 7.5% dues increase (effectively July 1, 2023), a prudent but still relatively modest increase relative to overall inflation. This is the first dues increase since 2018. In addition, going forward we are analyzing and adjusting, as needed, our prices for certifications and conventions.

ICRI Membership

In 2021, ICRI set an ambitious goal to grow membership by 50 percent by FY 26/27. Since establishing that goal, ICRI overall membership has grown nearly 10 percent (from 1,999 to 2,186 today). For the past fiscal year, ICRI membership has grown nearly 5 percent (Chart 1, below).

These are encouraging numbers and trending in the right direction. But we know we can do even better. The scope and scale of the repair industry in North America and throughout the world—coupled with the tools, resources, and networking opportunities offered by ICRI—strongly point to significant growth potential. ICRI's leadership is focused on several key initiatives (detailed in this report) to provide even greater value for current members and those considering ICRI membership.

Chart 1: Year-Over-Year June 2023 Membership Report

Membership Breakdown	June-22	June-23	% Growth
Overall Membership	2,088	2,187	4.7%
United States	1,794	1,900	5.9%
Canada	204	208	2.0%
International	90	78	-13.3%
Company Membership	378	401	6.1%
Supporting Membership	40	47	17.5%
Individual Members	998	1,028	3.0%
Government Members	20	24	20.0%
Retired Members	22	22	0.0%
Student Members	50	85	70%
Honorary Members	5	6	20.0%
Additional Company Members	299	356	19.1%
Additional Supporting Members	240	217	-9.6%

Chart 2: Membership Income by Year

	Budget	Actual	Net Actual to Budget
FY 21/22	\$692,500	\$679,930	-\$12,570
FY 22/23	\$700,000	\$717,249	\$17,249
Net Year to Year		\$37,319	

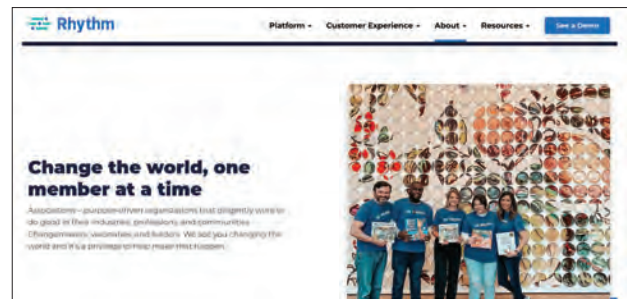
ICRI's Technology Strategy

In the influential book on associations, *Race for Relevance*, the authors state: "Associations must have a comprehensive technology plan for several reasons. First, the role of technology is increasingly critical to an association's relevance and importance. Second, the rate of technological advances continues to accelerate...(finally), the associated exposure to risk will increase. These conditions will be very unkind to an unprepared association."

ICRI has been utilizing technology that is simply unable to keep up with the growing needs of this organization. For ICRI to serve its members and chapters, things needed to change. Over the past year, ICRI has taken critical steps to pivot from our current technology to new systems that enable the organization to fully meet the needs of our members. Chart 3, presented to the Board of Directors earlier this year, compares our current association technology with the new platform (Rhythm AMS) that we're in the process of implementing, with expected launch in January 2024.

Chart 3: Core Technology Today (Current) vs. Future (Rhythm) Core Technology Today (Current) vs. Future

Requirements	Current	Future	Impact
Single sign on regardless of membership type	No	Yes	Improvement from current; eliminates dual logins for "included individuals," improving member experience and reducing staff time assisting on this issue. Future allows use of other logins to access portal (e.g., LinkedIn).
Easy, complete, and flexible membership data reporting	Yes/No	Yes	Current allows basic membership reporting. Rhythm offers much better, more intuitive member portal; appropriate data fields (e.g., phone, company name); does not "expire" data once lapsed.
Single sign on across AMS, LMS, Causeway	No	Yes	Easier use of LMS and Causeway; significant staff time savings; better member experience.
Complete Engagement History	Yes/No	Yes	Current history is limited; Future allows committee history and complete product purchase history with ICRI (certifications, webinars, etc.).
API Data Integration with LMS	No	Yes	Future bi-directional data flow.
API Data Integration with Causeway	No	Yes	Future bi-directional data flow.
Integrated Website	Yes	No	Future: No integrated website; requires securing 3rd party developer.
Flexible Website Design	No	Yes	Outside, 3rd party required (WordPress site) providing greater flexibility; significant new investment but significant upgrade in ICRI online presence.
Non-Member Admin	No	Yes	Future allows non-member admins to administer company memberships.
Direct Chapter Membership Reporting	No	Yes	Future allows designated chapter reps to easily run real-time membership reports.
Chapter Event Registration Option	No	Yes	Future gives ICRI national ability to offer chapters event register, enabling integration with national database and visibility into non-member registration data.
Integrated Email	Yes	No	Future requires 3rd party platform; however, these are typically easier/improved over current.



ICRI's New Vendor – Rhythm AMS

Together, with a new, more engaging, and responsive website, ICRI is adopting a "technology first" approach to ensure that we have the "structures to fully support its strategic priorities."

INDUSTRY LEADERSHIP

ICRI will be a state-of-the-art, trusted, and reliable source of delivering best industry practices and professional networks in the repair industry.

ICRI Chapters

Our 39 chapters continue to be the heartbeat of this organization. Most are continuing to produce a variety of in-person meetings, events, and social outings to ensure they are meeting the needs of their local membership. In addition, chapters like Arizona and Connecticut have made strides toward revitalization. This past year saw another significant gain in chapter membership as the number for 2023 soared past 2,600 for the first time. The growth from 2,378 in 2022 to 2,618 in 2023 is an increase of 10.1%.

Chart 4: Chapter Membership Trends



Technical Activities

With respect to technical activities, ICRI launched the following technical products in the past fiscal year, designed to advance the quality of repair across the industry:

- Guideline 210.3R-2022, *Guide for Using In-Situ Tensile Pull-off Tests to Evaluate Concrete Surface Repairs and Bonded Overlays.*
- Guideline 210.5-2023, *Guide for Selecting and Specifying Reinforcing Bar Cleaning Levels.*

In addition, we updated the following important guidelines:

- Guideline 320.3R-2022, *Guideline for Inorganic Repair Material Data Sheet Protocol.*
- Guideline 710.2R-2023, *Guide for Horizontal Waterproofing of Traffic Surfaces.*
- Guideline 710.3-2022, *Guide for the Mitigation of Moisture in Concrete Floor Slabs.*

Technical Tools

FY 23/24 saw the beta launch of ICRI's first digital app. The app (image right), with expected launch this fall, is a field-based tool based on the recently released ICRI 210.5R-2023, *Guide for Selecting and Specifying Reinforcing Bar Cleaning Levels.* ►

This project—a real first for ICRI—will put an important tool in the hands of professionals on the jobsite. It also points the way to new approaches to deploy actionable tools that benefit the industry. Well-deserved kudos go to Committee 210 for their work in the development of this important guideline and their insights that guided the development of this new, exciting tool.

National Concrete Bridge Council (NCBC)

As noted elsewhere in this publication, earlier this spring, the ICRI Board of Directors unanimously endorsed joining NCBC.

The council consists of allied industry organizations dedicated to:

- Promoting quality in concrete bridge construction.
- Gathering and disseminating information on design, construction, and condition of concrete bridges.
- Establishing communication with federal and state departments of transportation, city and county public works departments, and consulting engineers.
- Providing information on behalf of the concrete industries to codes and standards groups.

ICRI is very proud to participate in this important collaboration (see page 10 for more information).

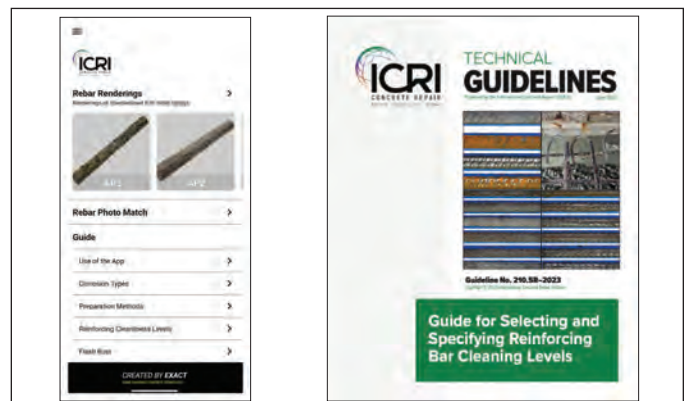
ACI 562 Repair Code Adoption Efforts

ICRI continued working with ACI and other partners throughout the last fiscal year on the critically important work of further code adoption of ACI 562. Significantly, this past year saw the adoption of new language in revisions to the International Existing Building Code (IEBC) referencing ICRI's Concrete Surface Repair Technician (CSRT) program, including this certification program in permissive code language (although not mandatory). ICRI will continue its efforts to promote code adoption throughout the U.S. in collaboration with ACI.

Fall and Spring Conventions

As the world continued to return to normal following the COVID-19 pandemic, ICRI conventions continued to get back on track. The Fall 2022 Convention in Atlanta attracted 280 registrants, while the Spring 2023 Convention in Vancouver (rescheduled from the pandemic cancellation in 2020) brought in 247 registrants, as well as 32 student registrations from local students organized by the ICRI BC Chapter.

However, while both conventions saw a positive net income, neither met net income expectations, due to significantly higher than expected onsite costs (e.g., food and beverage and A/V). ICRI is keeping an eye on these costs and evaluating approaches to ensure that our conventions continue to contribute to the overall financial health of the organization.



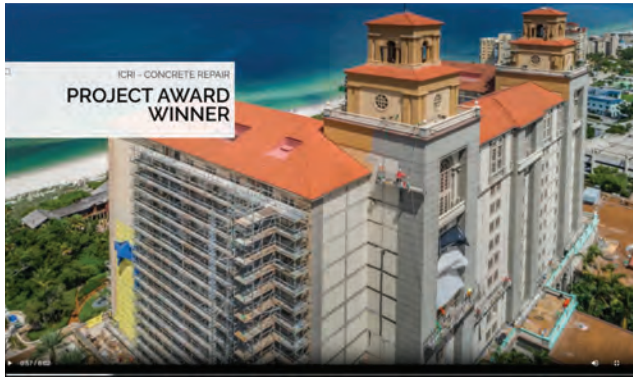
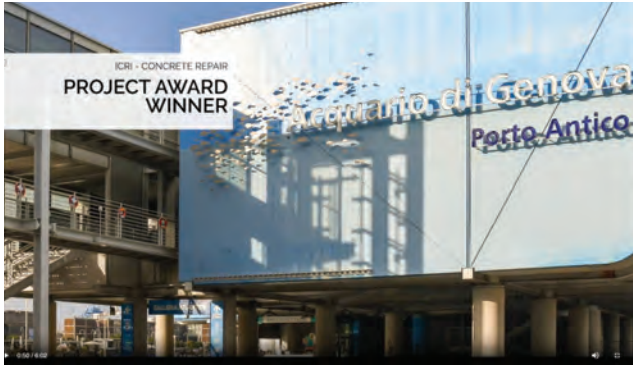
ORGANIZATION CREDIBILITY

ICRI will be a well-connected organization backed by a recognized and respected brand locally, nationally, and internationally.

New Promotion and Membership Video

The 35th anniversary of ICRI provided a perfect catalyst to heighten awareness about the organization and promote membership in this great organization. After extensive discussion and planning by the ICRI Marketing Committee, we've just launched a new, professionally produced video that tells the story of ICRI and the "why" of the organization (see the following screen shots from the video).

This important new promotion and recruitment tool is currently being promoted widely through our chapters, social media, and ICRI communications. We are grateful for the extensive efforts of the Marketing Committee and staff team who worked hard to get this video produced and launched. New ICRI video screenshots below. ▼



PROFESSIONAL DEVELOPMENT

ICRI will develop and deliver programs, products, and services that provide knowledge, build skills, and validate expertise.

Webinars

FY 2022-23 was a banner year for ICRI webinars. We held 10 professional development webinars on a wide range of concrete repair-related topics, surpassing our goal of 8 webinars for the year. Importantly, these webinars attracted a total of 1,192 registrants—consisting of 52 percent ICRI members and a remarkable 48 percent non-members. These numbers clearly show the demand across the industry for ICRI's high-quality content.

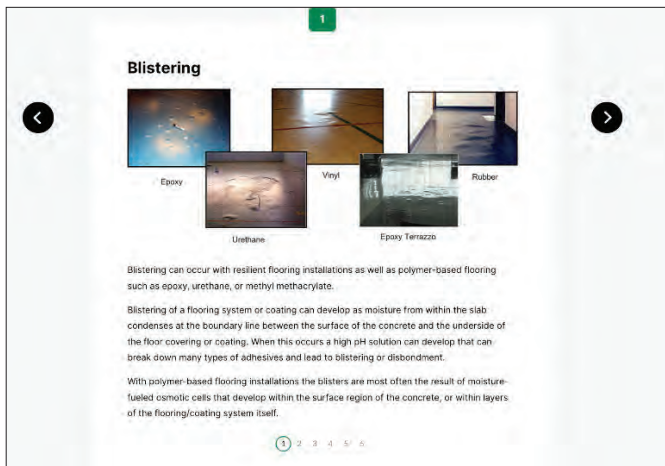
ICRI will continue offering technical webinars and working to convert as many non-member registrants to ICRI members as possible in the future.

Chart 5: Summary of Webinar Registrations

Date	Webinar Title	Webinar Presenter(s)	Total Registrations	Members	Non-Members
7/12/2022	Specifying Clear Water Repellents	Andrew Jones	53	31	22
8/2/2022	Understanding Traffic Bearing Waterproof Membranes	Eric Muench, Dan Wald Dave Fuller (Mod)	77	42	35
9/6/2022	Troubleshooting Protective Coatings and Sealers for Concrete	Dave Fuller, Dan Wald (Mod)	86	60	26
10/4/2022	Panel Discussion: How ACI CODE 562-19 Impacts Stakeholders in the Concrete Repair Industry	Keith Kesner, Dave Tepke, John Landry, John McDougall, Aamer Syed Dave Fuller (Mod)	259	101	158
11/1/2022	Basics of Post-Tensioning Repairs for Restoration	Baruch Gedalia, Dave Fuller (Mod)	128	70	58
3/7/2023	Concrete Repair 101	Fred Goodwin, Dave Fuller (Mod)	161	82	79
4/11/2023	Corrosion in Concrete Structures	Jorge Costa, Dave Fuller (Mod)	79	51	28
5/9/2023	Understanding Cracks in Concrete, Preventing Their Occurrence, and Effectively Repairing Them	Rick First Dave Fuller (Mod)	139	63	76
6/13/2023	Understanding the Technology, Process, & Application of Using Hydro Demolition to Remove Concrete	Belin Wills, Ethan Namink Dan Wald (Mod)	97	54	43
7/11/2023	Concrete Repair: Exploring Effective Techniques, Materials, and Expert Insights	Peter Tarara Chris White	113	62	51
		Total Participants	1,192	616	576

Self-Directed (Online) Learning

As noted above, ICRI invested significantly in building new, online modules for the Concrete Slab Moisture Testing (CSMT). Serving as an important adjunct to live training, these modules allow us to reach new audiences with easy to access online learning on this important topic. Marketing and promotion of this exciting new tool—which can be found on ICRI’s learning management system—is currently underway. CSMT Online Module Screenshots ▼



Certification Programs

The Concrete Surface Repair Technician (CSRT) online certification program has grown slightly in this fiscal year. The number entering the CSRT Online Certification program has grown slightly, with 17 becoming certified and another 31 somewhere in the process of completing the modules. For those seeking Education only, the number entering the modules has increased by almost 42 percent over last year with another 53 completing the modules and the number somewhere in the process also increasing by 63 individual participants.

On the CSMT front, staff and ICRI subject matter experts led by Peter Craig conducted a number of in-person programs across the country again in 2022–2023. This list includes successful programs at World of Concrete and The International Surfaces Event. ICRI has also collaborated with Ardex, which hosted programs in Texas and California. In addition, ICRI worked with the National Wood Flooring Association on a program in Milwaukee and hosted programs in Edmonton, Canada; St. Louis, Missouri; and Northbrook, Illinois.

Chart 6 and Chart 7, right, show the overall numeric impact of these efforts and total participation since program inception. ►

These programs represent one of ICRI’s biggest areas of opportunity and growth. With the continued adoption of ACI 562, CSRT provides an essential concrete 101 for professionals in the field and a great refresher for seasoned professionals.

CSMT has for years has been the gold standard training program for slab moisture testing with significant untapped growth. However, it should be noted that adoption of the CSRT program has not met recent projections. Further, post-COVID, we have seen class size for CSMT down, limiting net income and profitability of the program. Therefore, we will maintain our focus in the coming months on analyzing how best to promote and deliver these programs to even more professionals in the field.

Future Hands-On Applicator Training

Over the past year, ICRI identified a clear need for hands-on training for applicators, based on the fundamentals of concrete surface repair. Many professionals in the field are looking for this kind of training, and ICRI believes our practical approach to concrete repair represents a real opportunity to launch this new offering and partner with local ICRI chapters to scale it.

To realize this goal, a task group has led the effort to develop a pilot program, slated for launch in December of this year. ICRI will leverage the insights gained from this initial training program to improve it and deploy more broadly.

SUMMARY AND CONCLUSION

This is truly an exciting time for ICRI and the concrete repair industry! With the future launch of our new technology, more focused strategic initiatives, and greater support of chapters—coupled with ICRI’s incredible base of support and member involvement—the organization is poised for even greater growth and impact.

But we need you to help us get there. If you’re a chapter member, recruit others in your network to join ICRI. If you haven’t attended an ICRI convention, make that a priority in the future—you won’t regret it. If you’ve never participated on a national technical committee, we welcome your expertise—whether you’re an applicator/contractor, engineer, or material professional. ►

Chart 6: CSMT Program Dashboard

Newly Certified	Recertified	Total FY21-22 Impact	Number of Programs	Total Current Certified Since Inception
110	322	132	10	535

Chart 7: CSRT Program Dashboard

Net New Certifications	Net New in Certification Program	Total Certified Since Inception	Total in Certification Program
17	31	170	469
Net New Completed Education	Net New in Education Program	Total Completed Education Program	Total in Education Program
60	63	182	267

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- Epoxy Grout
- Abandoned Utility Grouting
- Slurry
- Light-Weight Concrete
- 3/8" Ready Mix Concrete



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The International Concrete Repair Institute is the leading resource for education and information to improve the quality of repair, restoration, and protection of concrete.

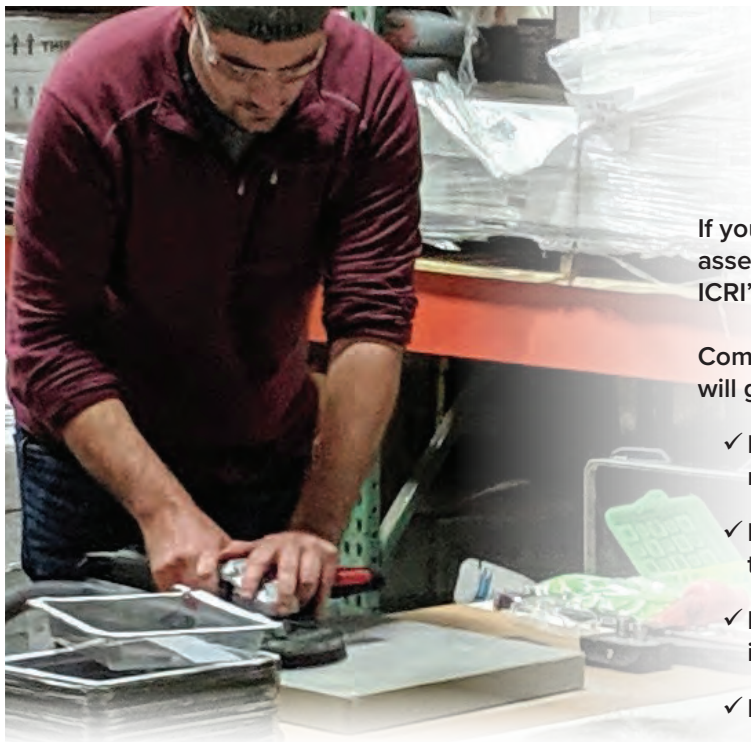
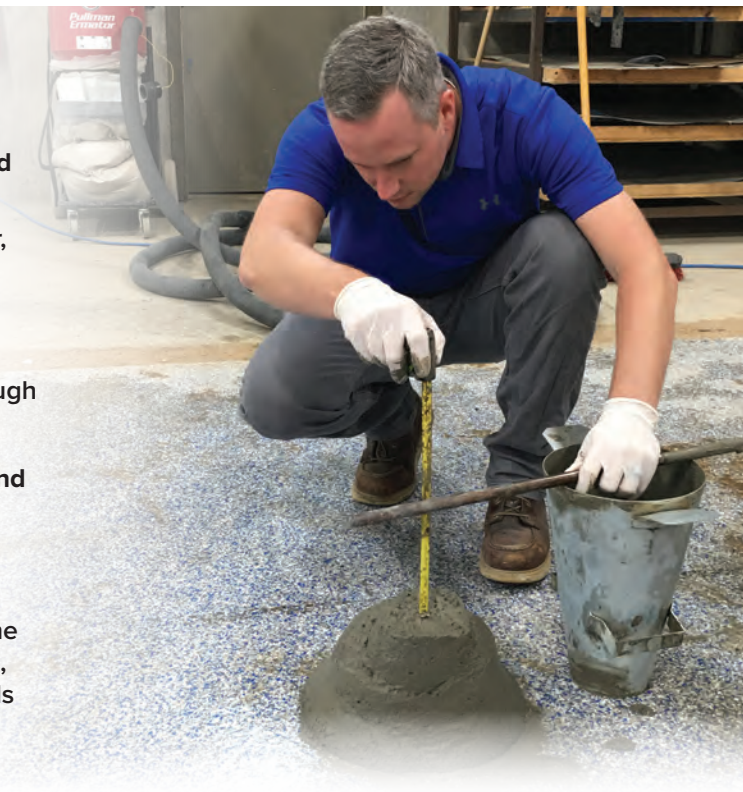
Concrete Surface Repair Technician (CSRT) Program

Education Course—Gain essential knowledge and training from your office or home

- ✓ Build a foundation for concrete surface repair, inspections, and testing
- ✓ Full online training that includes five competency-based modules
- ✓ Take this course by itself or get certified through the certification course

Certification Course—Demonstrate knowledge and competency to stand out from the crowd

- ✓ Qualifies you to perform pre- and post-placement inspections and testing
- ✓ Includes the five online training modules in the education course, an online knowledge exam, and performance exam on ASTM test methods (video recorded or live)



Concrete Slab Moisture Testing (CSMT) Program

If you are involved with the measuring or assessment of moisture in concrete floor slabs, ICRI's CSMT program is for you!

Comprehensive Education and Certification Courses will give you the knowledge and skills to:

- ✓ Improve the performance of concrete slab moisture testing
- ✓ Report more consistent, accurate, and reliable test results
- ✓ Make better decisions on when a concrete slab is ready for a floor covering installation
- ✓ Reduce risks for your clients and your team



Learn more at www.icri.org

Questions? Contact ICRI Program Director Dale Regnier at daler@icri.org

CONCRETE REPAIR CALENDAR

SEPTEMBER 12, 2023

ICRI Webinar

Forensic Investigation of a Five Story Concrete Building

Website: www.icri.org

OCTOBER 16–18, 2023

2023 ICRI Fall Convention

St. Pete Beach, Florida

Website: www.icri.org

OCTOBER 29–NOVEMBER 2, 2023

ACI Concrete Convention

Boston, Massachusetts

Website: www.concrete.org

JANUARY 22–25, 2024

World of Concrete

Las Vegas, Nevada

Website: www.worldofconcrete.com

INTERESTED IN SEEING YOUR CONCRETE INDUSTRY EVENT LISTED HERE?

Events can be emailed to editor@icri.org.

Content for the November/December 2023 issue is due by October 1, 2023, and content for the January/February 2024 issue is due by December 1, 2023.

ASSOCIATION NEWS

REGISTER FOR THE FALL 2023 ACI CONCRETE CONVENTION IN BOSTON, MA, USA

The American Concrete Institute is pleased to bring the ACI Concrete Convention to Boston, Massachusetts, USA. Known as the world's gathering place for advancing concrete, the convention will take place October 29–November 2, 2023.

Engineers, contractors, educators, manufacturers, and material representatives will convene at the ACI Concrete Convention to collaborate on concrete codes, specifications, and practices. Technical and educational sessions will provide attendees with the latest research, case studies, best practices, and the opportunity to earn Professional Development Hours (PDHs). Select programming will also be available on-demand to attendees who choose to attend virtually.

The in-person event showcases companies, projects, research, and more, plus numerous networking events where you can expect to meet with many of the concrete industry's leading professionals. Attendees may also visit the exhibit hall to learn more about the many products and services offered by exhibitors.

The convention will have a robust schedule that includes over 300 committee meetings, 60+ technical sessions, an industry trade exhibition, networking events, and much more. The committee meetings are open to all attendees. Select programming will also be available on-demand to attendees who choose to participate remotely.

Technical and educational sessions will be presented live with on-demand viewing available afterwards, providing substantial opportunity to advance concrete knowledge through the convention platform to both those who registered for the in-person event

or Virtual Technical Sessions. To learn more about the ACI Concrete Convention visit aciconvention.org.

ACI FOUNDATION SCHOLARSHIP AND FELLOWSHIP APPLICATIONS

The ACI Foundation is accepting applications from graduate and undergraduate students for the 2024-2025 academic year. Eight new fellowships and one new scholarship have been added, bringing the total annual awards to 46.

ACI Foundation fellowships are offered to both undergraduate and graduate students pursuing a concrete-related degree or program at an accredited institution in the US, Canada, and now Mexico.

ACI Foundation scholarships are also offered to graduate and undergraduate students pursuing a concrete-related degree or program. International students are eligible to apply for most scholarships. Each ACI Foundation scholarship includes an educational stipend of \$5,000 USD and recognition in Concrete International and on the ACI Foundation's website and social media.

The deadline for application is November 1, 2023, at 11:59 p.m. EST. To learn more about

our awards or to apply please visit acifoundation.org/scholarships.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

Email your 150-200 word association news to editor@icri.org. Content for the November/December 2023 issue is due by October 1, 2023, and content for the January/February 2024 issue is due by December 1, 2023. ICRI reserves the right to edit all submissions.



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INDUSTRY NEWS

MCCANN INDUSTRIES ACQUIRES CHANNAHON TRACTOR, LLC

McCann Industries, Inc., is pleased to announce that they have purchased the assets of Channahon Tractor LLC, located in Channahon, IL. Channahon Tractor is an equipment repair business that has been operating in the region for over 40 years. The new McCann Industries location will offer the Kobelco and Takeuchi lines of equipment for sale and for rent, plus used equipment, in addition to continuing to

provide parts and service for heavy equipment.

Channahon Tractor has been a family-oriented, customer-focused construction equipment repair center with a team of talented shop and field technicians. Their reputation for quality workmanship has been the foundation of their business for over four decades. They have a wealth of experience servicing a wide variety of heavy construction equipment and trucks and have consistently found solutions for the

most complex repairs. The company actively services all the well-known brands of equipment; in the shop or in the field.

The Channahon, IL location is McCann Industries' tenth regional location. While the McCann Channahon branch will continue to focus on construction equipment and truck repairs, it will also inventory and service Kobelco excavators, Takeuchi track loaders and excavators, offer construction equipment rentals, and parts sales. Visit www.McCannOnline.com for more information.

PRODUCT INNOVATION

PERI 3D CONSTRUCTION STARTS EUROPE'S FIRST 3D PRINTED PUBLIC BUILDING—A TWO STORY FOOTBALL CLUBHOUSE

Project showcases 3D construction printing's potential beyond low-rise residential housing, utilizing COBOD's BOD2 printer.

Leading the charge for using innovative-building technology in the form of 3D construction printers, PERI 3D Construction is set to create Europe's first-ever 3D printed football club facility and public building. This initiative, located in Nordkirchen, Germany, exemplifies the transformative shift towards 3D construction printing in various sectors beyond residential construction.

Utilizing the largest printer configuration to date by PERI 3D Construction, a COBOD BOD2 model measuring 25 meters (83 feet) long, 15 meters (50 feet) wide, and 10 meters (33 feet) high, the future SC Capelle football clubhouse will boast a usable floor space of approximately 330 m² (3,550 SF). The estimated completion time using 3D printing technology is projected to be only approximately 140 hours, highlighting the technology's potential for rapid, efficient, and sustainable construction.

The unique design for the building is the creative work of Steinhoff Architekten, an innovative architectural firm known for embracing forward-thinking construction methods. The clubhouse will be used by SC Capelle playing in the third division in Germany.

This ground-breaking project sets the stage for the continued evolution of construction methodologies, proving that 3D construction printing is a viable option not just for low-rise housing, but for larger,

more complex structures across various building sectors

Visit www.cobod.com/ for more information.

FIVE QUESTIONS TO OPTIMIZE MCI® / WATER REPELLENT SELECTION!

1. *Is the Project New Construction or Concrete Repair?*
2. *What Is the Current State of the Structure?*
3. *What Kind of Water Exposure Is Expected?*
4. *What Is the Desired Service Life and Maintenance Schedule?*
5. *What Is the Current Specification?*

Make the Most of Your Concrete Project:

There are many considerations that go into the choice of water repellents and corrosion inhibitors for new structures and concrete repairs. Asking the questions above can be a simple way to make the most of a concrete repair or new construction project by selecting the most helpful products and eliminating unnecessary or inappropriate ones. Contact Cortec® MCI® for further help choosing a tailored combination of MCI® and water repelling materials. For details visit www.cortecmci.com.

DUAL SACI AND CONCRETE SEALER SYSTEMS BY CORTEC®

Treating concrete with SACIs before applying a coating, sealer, or traffic membrane adds an additional level of corrosion protection. MCI®-2020 contains the highest corrosion inhibitor concentration among SACIs on the market and is therefore the most efficient choice for this application. Migrating Corrosion Inhibitors in MCI®-2020 penetrate concrete pores

and are attracted to metal surfaces to form a molecular layer that actively inhibits the corrosion reaction. This second line of defense is especially important if the physical barrier or coating fails, allowing water and corrosives to seep in and be trapped on the concrete surface. The presence of SACIs in the concrete can help mitigate the corrosion reaction.

While both sealers and SACIs can play a role in concrete protection, there is sometimes a concern for adhesion between layers when applying multiple products to a concrete substrate. If adhesion fails, the effectiveness of the applied system is jeopardized, leaving concrete exposed to water and other contaminants. Fortunately, the solution is as simple as proper application. Waiting 24 hours after applying MCI®-2020 gives more time for the corrosion inhibitors to work their way into the concrete pores, away from the surface. Testing according to ASTM D7234 has confirmed the compatibility of several traffic coatings and membranes with MCI®-2020.

Using MCI® SACIs is a great way to enhance routine maintenance or repairs by fortifying the concrete with Migrating Corrosion Inhibitors. For details visit www.cortecmci.com.

INTERESTED IN SEEING YOUR NEW PRODUCT IN THIS COLUMN?

Email your 150-200 word news to editor@icri.org. Content for the November/December 2023 issue is due by October 1, 2023, and content for the January/February 2024 issue is due by December 1, 2023. One (1) high resolution product photo may be included. ICRI reserves the right to edit all submissions.

ICRI CHAPTER NEWS

CHAPTER CALENDAR

Be sure to check with individual chapters by visiting their chapter pages to determine if they have made any plans after this publication went to print. You can also contact a chapter leader from any chapter about added events.

BALTIMORE-WASHINGTON

September 7, 2023
3RD QUARTER DINNER MEETING
Maggiano's Little Italy
Tyson's Corner, VA

October 5, 2023
ANNUAL GOLF TOURNAMENT
Waverly Woods Golf Course
Marriottsville, MD

CAROLINAS

October 12–13, 2023
FALL CHAPTER CONFERENCE
Embassy Suites by Hilton Charlotte Uptown
Charlotte, NC

CHICAGO

September 20, 2023
PUNCH BOWL SOCIAL
Punch Bowl Social
Chicago, IL

CINCINNATI

September 20, 2023
25TH ANNUAL GOLF CLASSIC
Aston Oaks Golf Club
North Bend, OH

DELAWARE VALLEY

September 13, 2023
SEPTEMBER DINNER MEETING
Maggiano's Little Italy
King of Prussia, PA

September 25, 2023
CHAPTER GOLF OUTING
Radley Run Country Club
West Chester, PA

FLORIDA FIRST COAST

November 6, 2023
SPORTING CLAY TOURNAMENT
Jacksonville Clay Target Sports
Jacksonville, FL

FLORIDA WEST COAST

October 4, 2023
CHAPTER TECHNICAL MEETING
Red Mesa
St. Petersburg, FL

October 27, 2023
SPORTING CLAY EVENT
Tampa Bay Sporting Clays
Land O' Lakes, FL

GEORGIA

September 28, 2023
CHAPTER TECHNICAL LUNCHEON
Maggiano's Little Italy – Perimeter
Dunwoody, GA

GREAT PLAINS

September 14, 2023
17TH ANNUAL GOLF TOURNAMENT
Shoal Creek Golf Course
Kansas City, MO

INDIANA

September 14, 2023
ANNUAL GOLF OUTING
Plumb Creek Golf Club
Carmel, IN

METRO NEW YORK

September 21, 2023
20TH ANNUAL FALL GOLF CLASSIC
Cedar Hills Golf & Country Club
Livingston, NJ

October 3, 2023
TECHNICAL SEMINAR—PETROGRAPHY PANEL
Club 101
New York, NY

MINNESOTA

October 12, 2023
FALL TECHNICAL SESSION
Digital Twin Technology
Coon Rapids, MN

NEW ENGLAND

September 12, 2023
CHAPTER ROUNDTABLE DISCUSSION
Topic: Plaza Deck Coatings
Granite Links Golf Club
Quincy, MA

October 10, 2023
SPORTING CLAY SHOOTING EVENT
Minute Man Sportsman's Club
Burlington, MA

NORTH TEXAS

September 14, 2023
MEMBERSHIP MEETING
Terracon Offices
Dallas, TX

October 6, 2023
JESSE POINTS MEMORIAL GOLF CLASSIC
Waterchase Golf Club
Fort Worth, TX

NORTHERN CALIFORNIA

October 20, 2023
CHAPTER TECHNICAL SYMPOSIUM
Bay Area Roofing & Waterproofing
Apprenticeship Program
Livermore, CA

OKLAHOMA

October 13, 2023
1ST ANNUAL SKEET TOURNAMENT
Snake Creek Shooting Sports
Beggs, OK

PITTSBURGH

September 15, 2023
DEMO DAY PRESENTATION
BAC Local 9 PA Training Center
Pittsburgh, PA

SOUTHEAST FLORIDA

October 20, 2023
26TH ANNUAL GOLF TOURNAMENT
Country Club of Coral Springs
Coral Springs, FL



INTERESTED IN SEEING YOUR CHAPTER NEWS & EVENTS LISTED HERE?

Chapter News & Event Deadlines

NOVEMBER/DECEMBER 2023 CRB
Deadline: September 1, 2023

JANUARY/FEBRUARY 2024 CRB
Deadline: November 1, 2023

MARCH/APRIL 2024 CRB
Deadline: January 1, 2024

Send Chapter News and Event by the deadlines above to Program Director Dale Regnier at daler@icri.org.

ICRI CHAPTER NEWS

CHAPTER ACTIVITIES

GULF SOUTH HOSTS FULL-DAY TECHNICAL MEETING

The Gulf South Chapter hosted its Full-Day Spring Meeting this past March. Held at the IP Casino Resort Spa in Biloxi, Mississippi, on Thursday, March 9, 2023, it was a change of scenery for the chapter but included a full complement of technical presentations. They started with the presentation “Assessment of Historic Masonry Dam Structure,” with Jeremiah Fasi of Wiss, Janney, Elstner and Associates (WJE). They then turned their attention to the program “Economic Development in the Gulfport Region,” presented by representatives from the Harrison County Development Commission. Just before lunch, the presentation “Auxiliary Spillway, Sidewall Concrete Overlay Repairs,” was given by Stephen Schmitt from WJE.

After lunch the presentations continued with “Legal Aspects of Contracting,” with local attorneys Larry Logsdon and Wallace Jordan. Then Andrea Moore, M2 Solutions, and David Tomley, Gulf Coast Pre-Stress Partners, presented “CFRP Repairs & Corrosion Mitigation of Reinforced Concrete Transportation Infrastructure Members.” The final technical presentation, “Corrosion Implication on Concrete Repairs,” was presented by Brian Wood from the University of Alabama.

The chapter was thrilled with the turnout for the day-long session. They even hosted a fellowship dinner the night prior with wonderful libations and excellent food.



Gulf South members and guests enjoyed a fellowship dinner the night before their day-long technical program



The chapter was thrilled with the turnout for their “Life in the Fast Lane” meeting where they were able to offer attendees a total of 6 full PDHs

ICRI CHAPTER NEWS

CHAPTERS COMMITTEE CHAIR’S LETTER



JON CONNEALY
Chapters Chair

Fall is my absolute favorite season. There are so many things to be excited about in the fall. Kids are going back to school—so my home office will be quiet during the day! Temperatures are starting to drop—so I won’t melt every time I visit a jobsite! Fish are biting, hunting season is just around the corner, and **football is back!** There are so many things that I love about Fall.

Not all of you are as excited about the things I listed above, and you may have other things that you get excited about that occur in the fall. One thing that we can all look forward to is the Fall Convention, October 16-18! I hope that you are planning to attend!

And, make sure that your chapter has selected their chapter delegate for the convention! Information for how to register as a chapter delegate was sent to chapter leaders back in August, but in case you missed it I have included it below. If you or your Delegate has any questions, please reach out to Dale Regnier (daler@icri.org).

Chapter Delegate Requirements:

1. The delegate must register using the delegate registration promo code provided to your chapter in the August communication. **No delegate will be given a refund if they register first and ask for the discount code later. No exceptions.**
2. **NEW for 2023.** The local chapter reception is on Sunday evening so the delegate should try to arrive on Sunday if possible.

The delegate must attend the First Timers/Delegate Breakfast meeting on Monday morning at 7:30 am where delegates and first-timers will get an introduction to the convention and how best to take advantage of their time in Florida. The delegate must also attend the Inter-Chapter Luncheon and Chapters Committee meeting—both are on Wednesday. **Please** schedule your departure for after 6:00 pm on Wednesday.

3. In addition, the delegate shall attend one technical or administrative committee meeting as well as a minimum of one technical session.
4. The delegate must be pre-registered in advance of the convention. **Delegate Registration Deadline is October 2, 2023.**
5. A delegate shall only be allowed to take advantage of the convention rate discount once every two years.
6. The delegate shall provide a written report recapping their convention experience. I should be copied when that report is sent.
7. If, at the last minute, a delegate cannot attend the convention, another member of the chapter may be designated as the delegate if no provisions are violated.
8. If the delegate fails to adhere to these rules, ICRI will invoice the chapter for the full registration fee. ICRI will send a reminder letter to the delegate and the chapter officers.

Jon Connealy, ICRI Chapters Committee Chair
BASF Master Builders Solutions USA

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