March/April 2022
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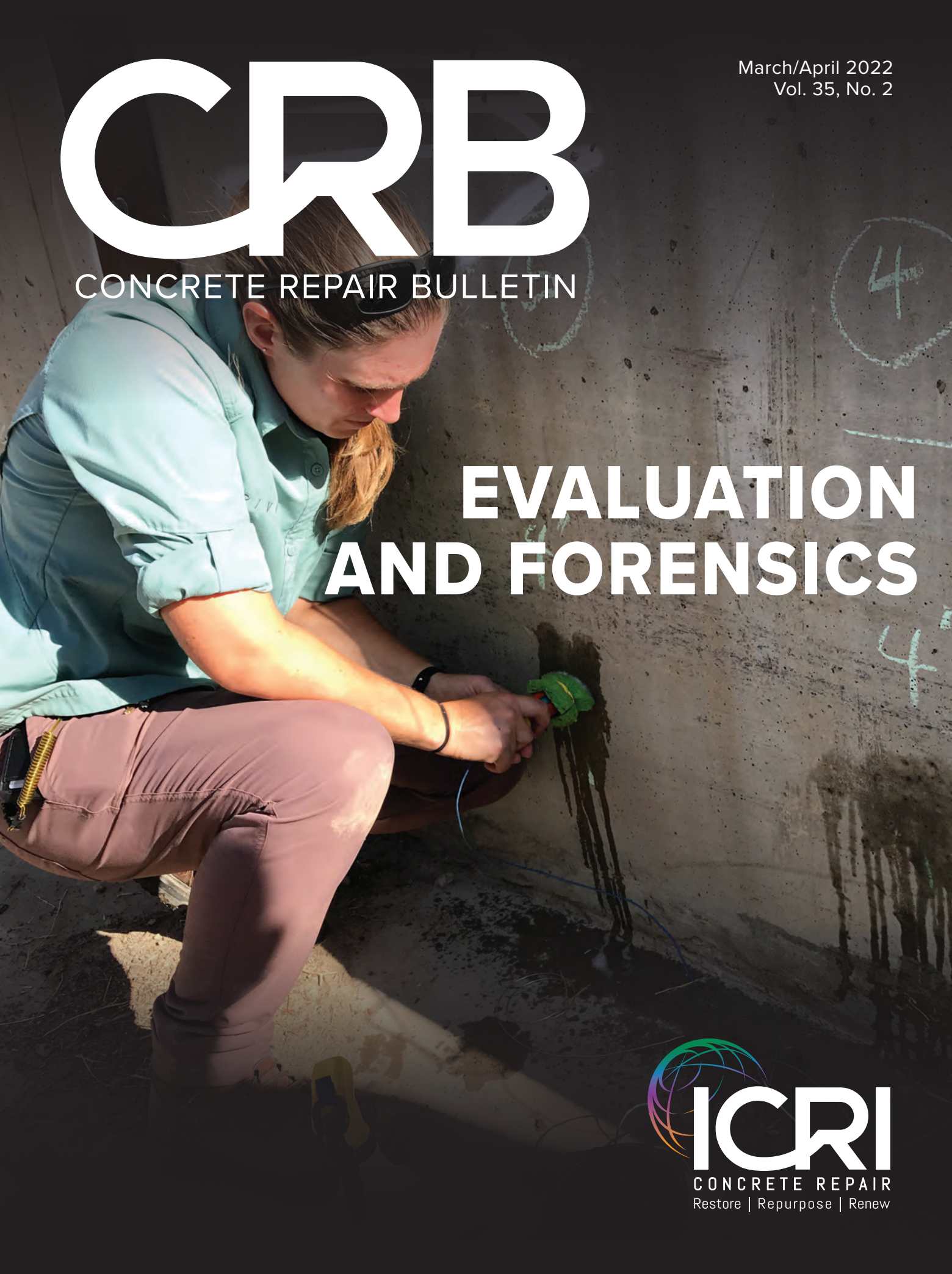
CRB

CONCRETE REPAIR BULLETIN



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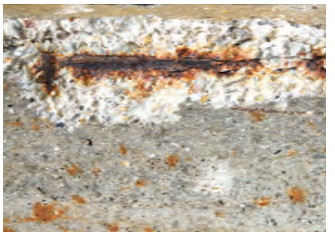


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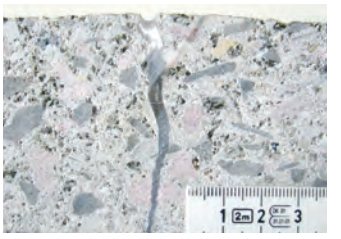

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ON THE COVER: Half-cell potential—one of three NDT methods used to evaluate localized corrosion activity. See article *Localized Corrosion: A Veiled Threat To Reinforced Concrete*, pg 20.

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FEATURES

DEPARTMENTS

NOTE FROM THE EDITOR

Spring is in the air and Summer is rapidly approaching. COVID seems to be slowing down as the construction season is ramping up. The ICRI Spring Convention, hosted by the Baltimore-Washington Chapter, is April 4-6 at the Baltimore Marriott Waterfront. Local chapters are holding meetings, starting to hold golf outings, and other social events. Life appears to be returning to normal. Check the ICRI website for the schedule of upcoming events.

This issue of the *Concrete Repair Bulletin* features articles about Localized Corrosion in Reinforced Concrete; the Forensic Engineering Process for Structural Failures; a Case Study of Concrete Façade Restoration Project with Access Challenges; and an Introduction to the new ICRI Technical Guide No.110.3-2021, *Guide Specifications for Cementitious Bonded Overlays*.

ICRI is continually looking for articles for the *Concrete Repair Bulletin*. Topics and article guidelines are available on the Resources tab on the ICRI website. We ask that you continue to send information about your chapter events to Dale Regnier.

I hope you all continue to have a safe and productive 2022!

Jerry Phenney
RAM Construction Services
Editor, *Concrete Repair Bulletin*

PRESIDENT'SMESSAGE

"Five"

A joint message from the ICRI President and Executive Director


JOHN MCDOUGALL


ERIC HAUTH

Next year, 2023, will mark the 35th anniversary of ICRI! This will be an incredible milestone and one we plan to celebrate throughout next year.

As we head toward this important anniversary, 2022 is a great time to think about what ICRI means to each of us and how we can contribute to its success for many more years to come.

At its most basic level, your membership in ICRI is our why. It's the reason why ICRI exists, why we're able to help shape the future of the industry, and why we're able to give you something back that helps your career, your company, and the industry.

You invest your time, energy, and money as a member of ICRI. Whether it's volunteering on a committee, participating in local chapter events, or taking advantage of ICRI education and training, there's something about ICRI that gives you value. We can't thank you enough for your commitment to ICRI. At ICRI, we are focused on never taking your membership for granted and we're always striving to build on the legacy of all those members and leaders who came before us.

So, why did we title this column "Five?" This is our call to action for 2022!

Right now, we are asking you to think of five people in your company and professional networks who are not ICRI members and who you think would benefit from being part of this great organization. Reach out and encourage them to join ICRI! No one is a better salesperson for ICRI than a current member. If each of our members tapped just five people and asked them to join ICRI, think of the groundswell we can create!

ICRI has been a steady and strong organization for years. Despite the headwinds over the past two years, we're stronger than ever—with more streamlined processes to create and launch technical offerings, more ways to connect with our members, and better platforms for webinars and other educational offerings.

With the world opening up again, growing ICRI is the path toward even stronger chapters, better resources to advance our industry, and new ways to support our members in the field. Here are just a few of the projects we're working on for 2022 that we believe will continue to grow the value of ICRI:

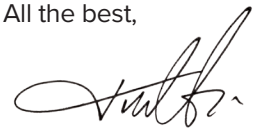
- Creating and launching a new association app to enable easier and better access to ICRI events and resources on the fly
- Building new technical apps for use on the jobsite (more on these in the months to come!)
- Improving our membership pricing and value model for all members.

As we write this article, winter is giving way to spring and that means ICRI's Spring Convention is right around the corner. If you haven't been able to take advantage of a live ICRI convention lately, don't miss the chance to join us for what promises to be an outstanding event in Baltimore on April 4-6.

We intentionally chose this location to allow as many of our members to participate as possible. We are incredibly grateful to ICRI's Baltimore-Washington Chapter for serving as the convention host. We have incredible speakers, social events and all the great networking ICRI is famous for. So, register today at www.icri.org and experience what makes ICRI such a unique organization.

Thank you for your continued commitment to ICRI and we look forward to seeing you at a future ICRI event!

All the best,



John McDougall, CCSRT
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TACTALK


MARK NELSON

ICRI TECHNICAL ACTIVITIES COMMITTEE (TAC) GOAL FOR 2022

Technical Committee Chair Training

In the last edition, we introduced the Technical Activities Committee's four goals for 2022. The first of our four TAC goals is to implement a Technical Committee Chair Training Program. The purpose of the program will be to make sure our Technical Committee Chairs are armed with the tools needed to run meetings in today's virtual meeting world.

ICRI's new Technical Director, Dave Fuller, will lead the task group that will include Fred Goodwin, Ashish Dubey, Dale Regnier, and me. The details on the training will be announced at the upcoming Spring Convention and will be rolled out at the Fall Convention.

By providing this training, we will create uniformity throughout our technical committees along with making the choice of running a committee less intimidating for members who have never done so. Thank you to all of the task group members for working to accomplish this important task.

New TAC Members

In 2022, we welcome three new TAC members for 3-year terms—Jim Cox, Mark LeMay, and Charles Mitchell. We look forward to having Jim, Mark, and Charles bring their vast industry experience to our ICRI TAC committee.

Jim Cox

Jim resides in Boca Raton, Florida, where he has been in the role of business development and estimating for CA Lindman's South Florida branch since 2014. He has been a board member for the ICRI Southeast Florida Chapter since 2018 and a member since 2014. Jim has been a Certified Licensed General Contractor (CLGC) in the State of Florida since 2011 and has held several positions in the past including project manager, site superintendent, and company qualifier prior to focusing on business development for CA Lindman. Jim is also a veteran of the US Army—serving four years as a Combat Engineer—and a graduate of San Francisco State University.

Mark LeMay

Mark is a Registered Architect in Texas and has been in the restoration and repair industry for 40 years. He became a member of ICRI in 2006, served as President of ICRI's North Texas Chapter in 2009, and continues to serve the NTX Chapter as Chair of the Nomination Committee. Mark is a voting member of ICRI's Coatings and Waterproofing Committee and helped develop the 710.2—*Guide for the Waterproofing of Horizontal Traffic Surfaces*. He served four years as the Region 7 Representative on ICRI's Board of Directors before being elected to ICRI's Executive Committee, serving as ICRI President in 2020. Mark has recently retired from his full-time Principal position at JQ Engineering, LLP, but plans to continue with JQ on a part-time consulting basis.

Charles Mitchell

Charles is Director of Testing & Inspection at SK&A Structural Engineers and is responsible for the management and oversight of the technical aspects of Testing & Inspection (T&I) services in SK&A's Repair and Restoration Division. He has been involved with construction services on structural design projects for over 40 years, the last 14 years with SK&A. Charles serves as a co-chair of ICRI's Committee 210—Evaluation and is a member of the ICRI Surface Preparation, Concrete Repair Materials and Methods, and Coatings and Waterproofing committees. He is a past president and serves on the Board of Directors of WACEL (Washington Area Council of Engineering Laboratories).

ICRI Technical Committee Chairs

Following is a list of the ICRI Technical Committee Chairs. If you want to become more active in ICRI and the repair industry, please feel free to contact them directly to learn more about their committees.

- **Liying Jiang**, *Jensen Hughes*
  Committee 110—Guide Specifications
- **Paul Farrell**, *Carolina Restoration & Waterproofing*
  Committee 120—Environmental Health and Safety
- **Marthe Brock**, *Master Builders Solutions USA*
  Committee 130—Contracts, Warranties, and Agreements
- **Vincent LaPointe**, *SIMCO Technologies*
  Committee 160—Life Cycle and Sustainability
- **Charles Mitchell and David Rodler**, *SK&A*
  Committee 210—Evaluation
- **Peter Haveron**, *Texas Concrete Restoration*
  Committee 310—Surface Preparation
- **Mark Kennedy**, *Construction Sales Group, Inc.*
  Committee 320—Concrete Repair Materials and Methods
- **Tarek Alkhrdaji**, *Structural Technologies*
  Committee 330—Strengthening and Stabilization
- **Jason Coleman**, *Wiss, Janney, Elstner Associates, Inc.*
  Committee 410—Masonry
- **Jorge Costa**, *Durability, Inc.*
  Committee 510—Corrosion
- **Eric Muench**, *Sika Corporation*
  Committee 710—Coatings and Waterproofing

***Mark Nelson** is chair of the ICRI Technical Activities Committee (TAC).*

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CERTIFICATIONUPDATE

Ken Lozen Retires

ICRI Technical Director Ken Lozen officially retired on January 31, 2022. Ken was here at the beginning—serving as ICRI's first treasurer when the organization was formed (formerly the International Association of Concrete Repair Specialists). After a long career as a consulting engineer, Ken joined the ICRI staff as Technical Director. For the past 9 years has 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. He also paved the way for a seamless transition to his successor, Dave Fuller.

At the January ICRI Board Meeting held during World of Concrete, the Executive Committee and staff presented Ken with a cake, a gift card to get him ready for his new boating lifestyle (once the weather in Michigan improves), and a variety of messages sent in from members and colleagues who were unable to attend in person. As you can see, we sent Ken off in style! But he will most certainly be missed.

Is it the delicious-looking cake? OR is it the prospect of his imminent (and well-deserved) retirement? We may never know, but that smile says it all


As the ICRI Executive Committee and staff wished Ken well on his retirement, his replacement, Dave Fuller, pulled Ken aside to answer a few more questions about ICRI's technical activities


One part of Ken's retirement celebration was dinner at one of his favorite places, Piero's. Ken really took a bite out of their infamous desert tray


Ken's final Moisture Testing Technical program was held during World of Concrete in Las Vegas. This group has participated in that program in one form or another almost since it began. Thanks to (left to right) Scott Tarr, Ken Lozen, Roland Vierra, and (seated) Peter Craig for all their hard work presenting, judging, and perpetuating the CSMT program

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2022 PRESIDENT'S AWARD

The last official act as ICRI President gave me the honor of selecting a recipient for the 2022 President's Award. This award acknowledges the extraordinary dedication, unparalleled achievement, and substantial efforts of an ICRI member who has gone above and beyond with their time and their knowledge in giving back to the repair and restoration industry.

Monica Rourke, you are my friend, my mentor and colleague, and you made this decision easy. I am honored to present this award to you. Looking back on the 16 years I have spent in this industry, I have always felt accepted and respected, despite women continuing to be in the minority. Thank you for giving women and men in this industry the confidence to use their voices and find a seat at the table.

Monica joined the association in 1991—back when ICRI was called IACRS. In her time as an ICRI member, she has served numerous positions both locally and nationally. Monica was often the only woman in the room, but that didn't stop her from speaking up and getting involved. Over the past three decades, Monica cemented the following firsts:

- FIRST Woman ICRI President
- FIRST Woman ICRI TAC Member
- Founder of WICRI Committee

Eyes were on her to be different. Monica leads with truth, and commands the best from all of us. In addition to her "firsts," Monica's list of ICRI contributions is extensive. She was a founding member of

the Connecticut Chapter, where she still serves on the local Board of Directors and served two terms as President. She has attended National Conventions all over the country (and some international) and participates on both administrative and technical committees. Many of you might know her as "the Grout Lady" because she has given countless technical presentations on the many methods of chemical grouting to control water. Some of her favorite ICRI experiences are visiting local chapters as a technical speaker.

I asked Monica about her greatest accomplishments in our industry. She humbly stated she's honored to be looked at as a mentor and friend to members of our association. I know I and other members of ICRI have experienced Monica's voice in committee meetings and presentations, and she is the definition of a leader. This leadership earned her the distinguished title of ICRI Fellow—an award given to her by her peers. We also touched on "Why ICRI?" and her response rang clear and true: "Why I joined and why I stayed are two different reasons. I have made personal friends at ICRI and I don't think that's possible at every organization."

Looking forward, Monica is energized to bring new voices to the table within ICRI. She challenges us to keep pushing for diversity and inclusion and to always fight for what makes us stronger as an industry and association.

For these and many more reasons, I am so proud to present Monica Rourke with the 2022 ICRI President's Award!

Elena Kessi
2021 ICRI President

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ICRI would like to thank its Supporting Members, whose dedication to ICRI is greatly appreciated, and...

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“L”-evating Concrete Façade Restoration to a New Level: A Case Study with Access Challenges

by Christopher Kottra

Fig. 1: State Place Tower

The tower façade repairs completed at the State Place condominiums in Chicago, Illinois, posed multiple challenges to those involved with this project. Adjacent tracks from the local transit system limited access to an entire elevation on the building. By using a “plan for the worst, hope for the best” approach, maximizing efficiency and selecting the proper materials, the project team was able to not only complete this difficult project, but come in under budget as well.

BACKGROUND

State Place is a multi-building residential and commercial development completed in 2003. The development consists of four buildings including a 23-story high-rise building (Tower) at the north side of the development, and three 7-story mid-rise buildings to the south of the Tower (Fig. 1). The four buildings are connected at their base with a 3-story parking garage and commercial structure. The ground level consists of commercial space, entrance lobbies to each building, loading dock, mechanical/electrical rooms, engineer’s office, and a garage ramp. The second and third floors consist of commercial and residential parking respectively.

Chicago Transit Authority’s (CTA) elevated train tracks (“L”) run alongside the east elevation of the property (Fig. 2).

There are 243 residential units in the development, 159 of which are in the Tower. The Tower is a concrete frame structure with a façade consisting of cast-in-place concrete walls, and direct-applied exterior finish system (DEFS) infill panels. The Tower exterior includes several set-back and cantilevered balconies. In addition, there are four terrace areas over occupied spaces at the penthouse level and 11 low-slope roof sections with varying roofing and waterproofing systems.

EXISTING CONDITIONS

Water leakage had been reported in several Tower units, including several units on the east elevation over the "L" tracks. A building envelope evaluation was performed in 2016 to identify potential sources for the water leakage. An up-close review of the façade was performed from swing-stage scaffolding on the center section of the north and south elevations. An up-close visual review was also performed at the eastern- and western-most tiers of the south elevation using an unmanned aerial system (UAS or drone) (Fig. 3 and 4). Advanced deterioration of concrete slab edges and sealant components were identified during the up-close reviews.

PROJECT CHALLENGES

Use of a UAS was not permitted over the "L" tracks. Initial discussions with the CTA revealed that there would be significant costs involved and a great deal of red tape to have swing-stages on the east elevation. As such, it was not considered practical to pursue the up-close review of the east elevation. However, given the number of units reporting leaks on the east elevation, it was assumed that similar deterioration could be expected on this elevation. It was clear that time and cost considerations would have to be planned for well in advance of any façade repairs on the east elevation.

SCOPE OF WORK

Repairs were designed in late fall of 2017 in preparation for a 2018 construction project. The base scope of work included the following repairs:

1. Localized partial depth concrete repairs;
2. Acrylic protective coating application on vertical concrete surfaces and undersides of balcony slabs;
3. Elastomeric membrane system application on skyward facing concrete surfaces;
4. Crack repairs in DEFS panels with pre-formed silicone strips;
5. Elastomeric coating application on DEFS panels (Fig. 5);
6. Traffic-bearing membrane system application on balconies; and
7. Localized replacement of window perimeter sealant, glazing sealant, and sealant at joints between dissimilar materials (i.e., between concrete and DEFS panels).

OVERCOMING THE CHALLENGES

Many of the repairs were unit-price items with estimated total quantities extrapolated from observations during the

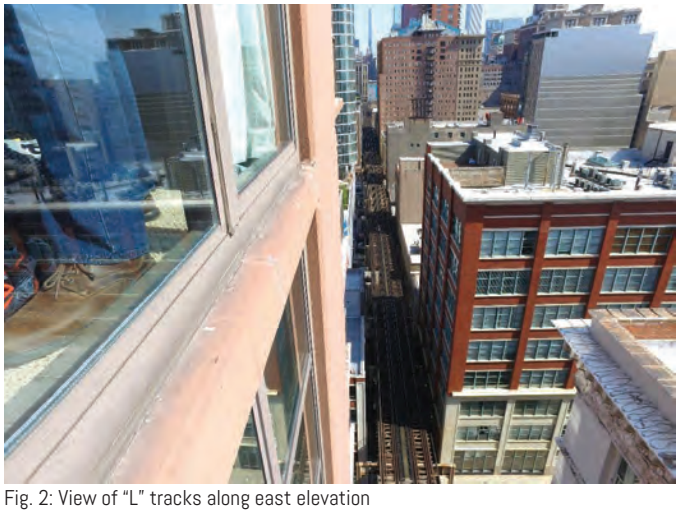


Fig. 2: View of "L" tracks along east elevation

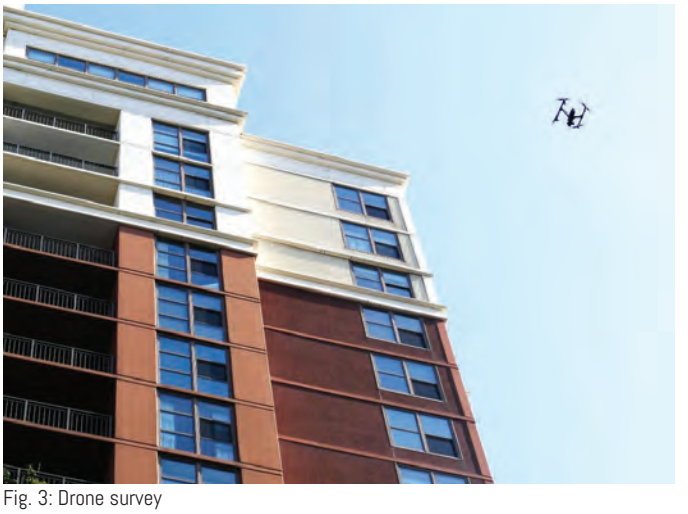


Fig. 3: Drone survey

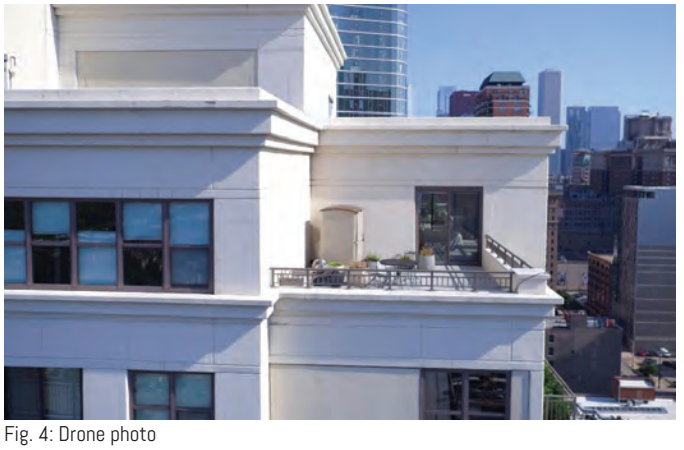


Fig. 4: Drone photo

Fig. 5: DEFS crack repair and elastomeric coating; Concrete coating

building envelope evaluation. Because most of the façade had not been reviewed up-close, there were many unknowns that could affect the overall cost of the project. In some cases, deterioration was not observed during the 2016 building envelope evaluation but could be reasonably anticipated based on experience with similarly constructed buildings. As such, the scope of work included unit price repairs to address such conditions, creating a "plan for the worst but hope for the best" approach to a comprehensive façade repair project.

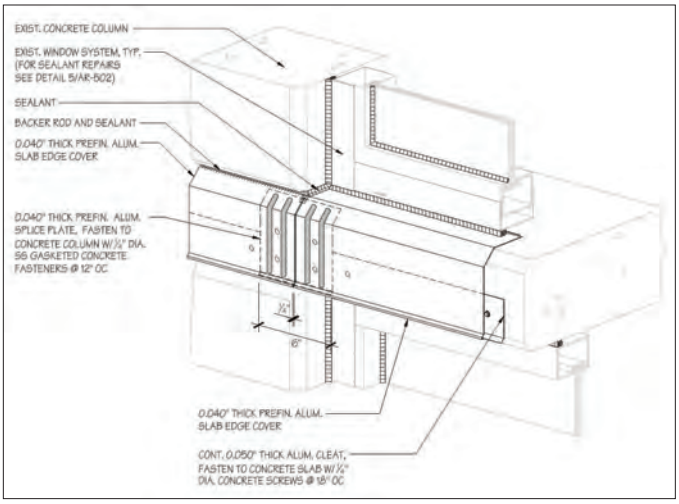


Fig. 6.: Slab edge cover detail


Fig. 7: Slab edge cover at east elevation


Fig. 8: Swing-stage work on south elevation

To evaluate good, better, and best repair options, alternatives for applying an elastomeric coating or installing sheet metal slab edge covers over exposed slab edges were included in the scope of work for each elevation. Considering aesthetics, durability, anticipated future maintenance, life cycle costs, and other factors, the association's Board of Directors selected an upgrade to an elastomeric coating at exposed slab edges on the north, south, and west elevations. Sheet metal slab edge covers were selected for the east elevation (Fig. 6 and 7). Although the initial cost of the slab edge covers was significantly higher than the other options, limiting future access costs over the "L" tracks made the investment worthwhile. The Board also elected to replace 100 percent of the window perimeter sealant on the east elevation to proactively lower future access costs.

REPAIR PROGRAM:

The construction contract was awarded in March 2018. One of the contractor's first tasks was to understand what CTA's requirements would be for work to be completed on the east elevation. CTA required a deposit upfront for the full amount of anticipated labor costs to provide flaggers and supervisors during times when work would be performed on the east elevation. The section of "L" tracks affected by this work was a heavy traffic area, especially during rush hours in the morning and afternoon commutes. CTA limited the contractor's working hours on the east elevation to minimize disruption of the tracks during their heaviest traffic times. As a result, the contractor was only given between 4 and 6 hours each day to work on the east elevation. The amount of time varied each day due to the availability of CTA supervisors, weather conditions, and the extent of other construction projects elsewhere along the "L" tracks.

Construction began in spring 2018. The contractor started with the south elevation to meet the association's requirements to reopen an adjacent common pool area for the summer months (Fig. 8). Work progressed to the west and parts of the north elevation after completion of the south. The contractor saved the east elevation until after the west elevation and west side of the north elevation were complete. This was done intentionally to help ensure efficient completion of the work, and to give more notice to CTA in the hope of getting their full cooperation when needed. The contractor also created a built-in back-up plan by starting the east elevation prior to completing the north elevation or starting work on the penthouse walls. The contractor worked on other drops and penthouse walls during early mornings and late afternoons when work was not permitted on the east elevation to maximize efficiency. This flexibility proved invaluable for the contractor due to the daily uncertainty of working on the east elevation. The consulting engineer also had to be flexible and available

to review the drops initially to mark repair locations, and to review the completed work. Follow-up water testing was performed at several locations to verify the effectiveness of the repairs. With limited access availability, the water testing had to be completed efficiently without compromising the integrity of the testing.

The contractor juggled crews from multiple trades to complete the work on each swing-stage drop. The east elevation was especially challenging in this regard—not only because of the CTA limitations, but also because colder temperatures arrived earlier than normal in Chicago. With numerous temperature-sensitive materials involved in completing the repairs, monitoring environmental conditions became crucial. The contractor and engineer worked together to help ensure materials were applied during suitable environmental conditions recommended by the material manufacturers without sacrificing quality.

SUMMARY

When construction began, the project was anticipated to be complete in approximately 30 weeks. Despite changes in the scope of work, excessive weather delays, and unanticipated CTA scheduling challenges, the project was completed in 32 weeks.

In some cases, deterioration was less severe than anticipated. More significant deterioration was identified at other locations. As such, overall repair quantities did vary from the original projections. However, by planning for the worst-case scenario, the overall project finished under budget despite these variations. While future smaller-scale façade repairs are anticipated, the association took steps during this project to implement repairs that met their current budget without sacrificing future funding. By selecting the repairs with a longer anticipated service life on the east elevation, the schedule for accessing this elevation during future projects has been deferred.

"L"-evating Concrete Façade Restoration to a New Level: A Case Study with Access Challenges

OWNER
State Place Condominium Association
Chicago, IL

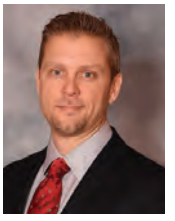
DESIGN PROFESSIONAL
Building Technology Consultants, Inc. (BTC)
Arlington Heights, IL

CONTRACTOR
The W.J. McGuire Company
Northbrook, IL

MATERIAL MANUFACTURERS
Master Builders Solutions Construction Systems US, LLC
Shakopee, MN

Dow Silicones Corporation
Auburn, MI

Sherwin-Williams
Cleveland, OH



Christopher Kottra, PE, REWC, is a Principal at Building Technology Consultants. Mr. Kottra has over 18 years of experience with evaluation, repair, structural design, and analysis of a variety of structures. Evaluation projects include parking garages, City of Chicago critical façade examinations, and miscellaneous building enclosure or structural deficiencies. He is a licensed Professional Engineer in the State of Illinois (PE), a Registered Exterior Wall Consultant (REWC), and a Certified Construction Contract Administrator (CCCA). Christopher is currently a member of ICRI, SWR Institute, BEC, and APRA. He is a past president of the Chicago Chapter of ICRI and is currently a member of ICRI Committee 410—Masonry.

The Forensic Engineering Process for Structural Failures

by Kevin Goudarzi

Fig. 1: Structural failure of a concrete structure (Photo: TEEX, www.flickr.com/photos/teex/4166709041)

Forensic structural engineering involves the investigation and determination of the causes of a failure of structures such as bridges, buildings, industrial structures, and metro stations. (Fig. 1). Along with understanding the legal procedures and giving testimony, forensic structural engineers use their knowledge and experiences in these investigations to act as a detective, investigator, and expert witness when confronted by attorneys and other opposing experts during the litigation process.

FIRST STEPS AFTER A STRUCTURAL FAILURE

1. Safety and Structural Stability Assessment

Safety is the first priority after a structural failure. Safe routes through the debris should be identified for the investigation. There may be areas to avoid until stabilized and components and elements that are in danger of further collapse. The structure should be investigated for stabilization and any protection required for public access should be implemented to provide safe public traffic. In addition, alternatives for demolition phasing should be examined and evaluated (Fig. 2).

2. Preserve Destructible and Perishable Evidence

Forensic engineers know that after a collapse, any condition and circumstances of the site could be potential evidence; therefore, they document the evidence that could possibly change. Durable evidence may remain unchanged for a period of time, and perishable evidence must be documented immediately after collapse. An example of a perishable evidence is the weight of the snow accumulation on the roof or other horizontal areas of the structure such as balconies. This is very important as it may indicate whether the failure was due to a design or construction error, or any unforeseen overload (Fig. 3).

3. Reserving Samples

In large size structural failures, it's not practical to reserve the entire structure; therefore, the forensic engineer needs to take samples of both failed and non-failed elements and key components of the structure.

4. Documentation of Conditions

The documentation of the failure can be in the form of field notes, photographs, video, or other methods of recording.

5. Interviews

Interviews with witnesses and other persons on site can provide valuable information for the forensic engineer. The interviews should be performed as soon as possible after the collapse as they help to identify and locate the witnesses, receive fresh information, and assist in formulating the scenarios for investigation.

6. Cooperation with Other Forensic Engineers

When multiple specialties are involved in the investigation, establishing a common system or program so all parties can use the resources can avoid and minimize misidentification and debates. Pooling resources can avoid duplica-

tion of efforts and establish a common knowledge base. For instance, different parties could agree at the beginning that destructive testing should be performed on certain components of the structure and all parties use the same testing protocol during the investigation process.

7. Initial Document Gathering

Forensic engineers need to collect and review the project documentation such as design drawings, specifications, boring logs, engineering calculations, shop drawings, submittals, inspection reports, daily and weekly reports, test results, correspondence, and any other pertinent information related to the structure.

8. Preliminary Evaluation

After the initial information is collected during the above steps, the forensic engineers may be able to provide a preliminary evaluation and develop failure scenarios, a testing program, and perform the preliminary structural analysis. The engineers may also identify the missing documents, additional required expertise, and more individuals to interview after the first steps are completed.

LEGAL PROCESS AFTER A STRUCTURAL FAILURE

The legal process may simply consist of assembling the investigative and legal response team, developing an action plan, establishing a plan to protect confidentiality, cooperating and dealing with public agencies such as the Occupational Safety and Health Administration (OSHA) and Federal Emergency Management Agency (FEMA), dealing with media, and providing for special consideration of interested parties.

ENGINEERING INVESTIGATION OF A STRUCTURAL FAILURE

Project Initiation and Assembling the Investigation Team

The project objective, scope of work, and the investigative plan will be established by all parties to start the investigation process. To avoid conflicts of interest, the investigative team should not have any relation with the parties involved on the loss such as contractors, designers, or other initial project interests.

Investigative Process

The structural analysis of a new design is different than the analysis in a structural failure investigation. Passing the yield point, nonlinear behavior, reaching out to ultimate capacity point, and load redistribution should be taken into account by the forensic engineer. A common mistake by the forensic engineer may be not examining and considering all failure scenarios due to their experience with similar investigations in the past. They may jump to the conclusion that the failure is the same as a previous investigation and may ignore other hypotheses and scenarios for the failure. The loads and capacity of the structure should be evaluated and calculated through the structural analysis with hand calculations or computer software.

Document Review

Forensic structural engineers may need to review the following documents throughout the investigation process:

- Contracts and Revisions
- Contract and As-built Drawings
- Material Strength Reports or Certification
- Project Correspondence
- Consultant Reports
- Engineering Calculations
- Contract Specifications
- Shop Drawings and Other Submissions
- Maintenance and Modification Records and Other Documents

Field Investigation and Laboratory Analysis

Further field investigations, sampling of the materials and components, field tests, interviews, and laboratory tests may be needed in the investigation process and may be performed per the forensic engineer's request (Fig. 4).

Structural Analysis

From a simple hand calculation to the complicated finite element calculations using computer software, various computations are used by the engineers to investigate a

Fig. 2: Collapsed concrete slabs in a steel structure (Photo: BJ&C, www.bjc4ga.com)

Fig. 3: Structural failure due to the heavy snow (Photo: www.twincities.com)

Fig. 4: Insufficient welding on the gusset plate observed on site

failure. Determining the loads and strength of the structure is the main task in this stage. In many cases, there may be parameters regarding the strength of the structure that are not precisely known. In these cases, sensitivity analysis may be performed, and the engineer may use the probable low and high values as the input for the unknown parameters to evaluate the sensitivity of the calculation result.

Determining Structural Failure Causes and Report

As the investigation moves forward and the results, facts, and calculations advance, the failure scenarios and hypotheses are dropped and rejected or approved. New scenarios may emerge through the investigation process. In some cases, all failure scenarios may be eliminated except one and in other cases, the results are not straightforward. Multiple causes may lead to a critical combination of the load and capacity that finally cause the failure. After narrowing down the potential causes of failure to one or a few, all evidence should be examined to determine whether it does or does not support the finding cause(s). Finally, the investigation team provides a report including an introduction and background, description of the structure, field investigation, laboratory tests, calculation results, discussion, conclusion, and recommendations.

Kevin Goudarzi, PE, is a Forensic Structural Engineer at EFI Global in Chantilly, Virginia, and has a Master's degree in civil engineering. Kevin has over 24 years of experience in forensic engineering, building envelope restoration, historic preservation, seismic retrofitting, and rehabilitation of a variety of structures like commercial and residential buildings, bridges, metro stations, and industrial buildings. Kevin has been serving for three years on the Board of Directors of the ICRI Baltimore/Washington Chapter and chairs the chapter's Industry and Community Outreach Committee. He is a licensed professional engineer in Maryland and Virginia and a member of ICRI and ASCE.

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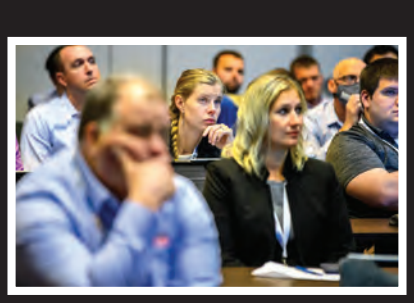

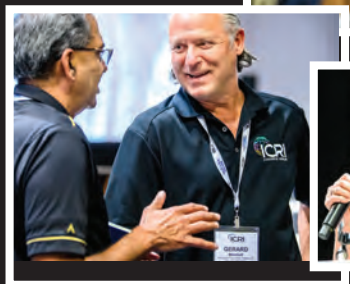

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LOCALIZED CORROSION: A VEILED THREAT TO REINFORCED CONCRETE

by Kerry Kreitman and Alex Meucci

Fig. 1: Wall failures within two different channels.

Localized corrosion of steel reinforcement can weaken some concrete structures without producing the cracking and spalling typically associated with corrosion. This can lead to structural failures with little to no warning. An example of this type of sudden failure is the collapse of several sections of rectangular reinforced concrete flood control channel walls in Southern California, where a construction joint at the bottom of the wall was susceptible to localized corrosion (Fig. 1).

Because localized corrosion of steel reinforcement does not always cause obvious distress, it can be quite difficult to identify and evaluate without using destructive methods. Although verification by destructive means has been found to be the most reliable method to identify and evaluate localized corrosion, destructive evaluation is typically not practical on a large scale.

Through extensive investigation of the subject flood control channels, visually observed conditions were linked to the risk of localized corrosion, and the effectiveness of nondestructive testing (NDT) methods for identifying localized corrosion were evaluated. The findings of this investigation were used to develop a methodology for prioritizing channels based primarily on visual observations to identify channels at most risk for localized corrosion and in potential need of repair.

The investigation and findings regarding localized corrosion are the primary focus of this article, although these efforts were part of a larger project aimed at preventing failures and improving the service life of a large network of flood control channels.

CHANNEL DESCRIPTION

Rectangular reinforced concrete channels comprise approximately one-quarter of a nearly 200-mile (322-km) system of improved flood control channels. These rectangular channels are constructed by first placing the invert (slab) and then placing the two vertical walls, creating a horizontal construction joint near the bottom of the walls at or a few inches above the invert. The channels within the inventory vary significantly in size, age, construction, detailing, and external conditions. Fig. 2 shows a typical cross section of a channel with two mats of reinforcement in the walls and invert and a keyed construction joint near the bottom of the wall. Fig. 3 shows a cross section of a channel with one mat of reinforcement in the walls and invert and a roughened construction joint near the bottom of the wall.

Under normal conditions, the channel walls act as cantilevered retaining walls, holding back the adjacent soil while the channel interior remains open. From a structural strength perspective, the vertical reinforcing bars in the wall that provide the tension component of the flexural strength are of primary importance. For channels with two mats of wall reinforcement, these are the vertical bars nearest the back (soil-side) surface of the wall. For channels with one mat of wall reinforcement, these are all vertical bars in the wall.

These vertical bars are susceptible to localized corrosion where they cross the construction joint near the bottom of the wall, especially when conditions conducive to corrosion are present. This is also the location where the structural demands are greatest. While reinforcement embedded in concrete is passively protected against corrosion by the high pH of concrete, this protection is not continuously provided at a poor-quality construction joint where the bar is not fully encased in concrete (e.g., partially consolidated concrete or a poorly prepared joint). Additionally, water can easily penetrate through such a joint to reach the reinforcement and drive the corrosion reaction.

INVESTIGATION

A 6-week field investigation was performed, covering approximately 14 miles (22.5 km) of rectangular channel. The investigation was intended to evaluate the condition of the channels and aid in developing the prioritization of the inventory for repair or replacement. The investigation included visual observations, NDT, and determination of cross-section loss by destructive means. While many important conditions were evaluated during the investigation—inward wall rotation, alkali-silica reaction, carbonation-induced corrosion, shrinkage and diagonal cracking, spalling, and distress from unexpected surcharge loading—localized corrosion at the construction joint was the primary cause of the wall failures and is the focus of this article.

OBSERVED LOCALIZED CORROSION

Localized corrosion of reinforcement at the construction joint was identified and quantified using destructive methods to directly expose the reinforcement for observation. The reinforcement was exposed either by locally chipping the surrounding concrete (for shallower bars) or by removing a core through the thickness of the wall, extending just beyond the depth of the reinforcement (for deeper bars). Any section loss due to localized corrosion of the vertical reinforcement crossing the joint was either measured directly or estimated at the exposed bars. Locations where reinforcement was exposed by destructive means were selected based on visual observations and NDT results, which are discussed later in this article.

Reinforcement cross-section loss ranged from no loss (uncorroded) to the loss of 100% of the bar's cross section due to localized corrosion. Examples of bars with 5%, 20%, and 75% section loss due to localized corrosion are shown in Fig. 4.

The construction joint profile through the thickness of the wall was typically visible within the chipped areas and the cores. Joint conditions on the wall surface and interior are also shown in Fig. 4 for the same three locations as the bars with 5%, 20%, and 75% section loss. The joint was more difficult to visually distinguish from the surrounding concrete at properly constructed, good-quality joints. Poor-

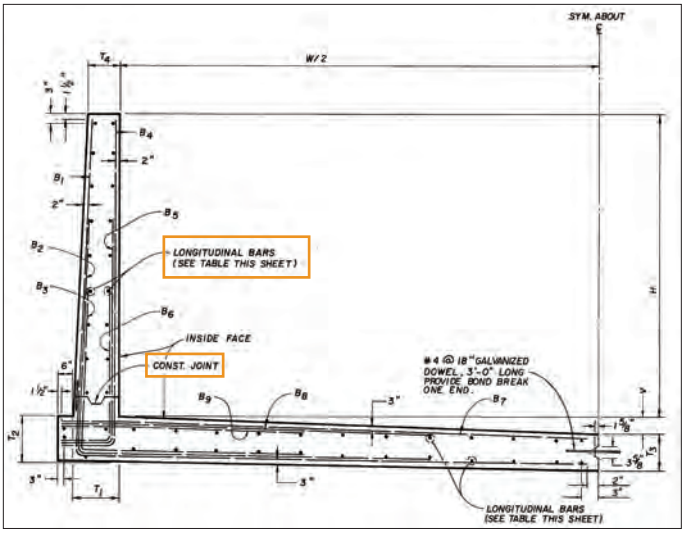


Fig. 2: Typical cross section of a channel with two mats of reinforcement (Image courtesy of the Ventura County Public Works Agency—Water Protection)

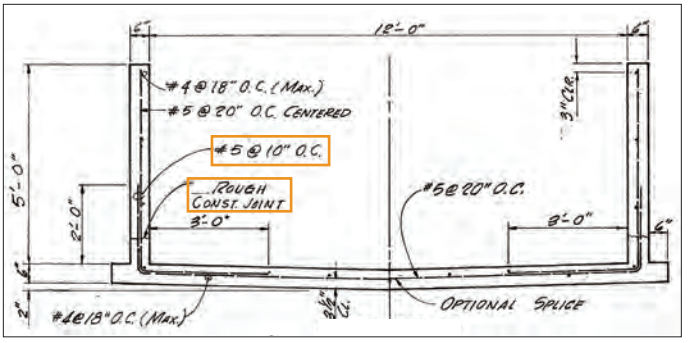


Fig. 3: Example cross section of a channel with one mat of reinforcement (Image courtesy of the Ventura County Public Works Agency—Water Protection)

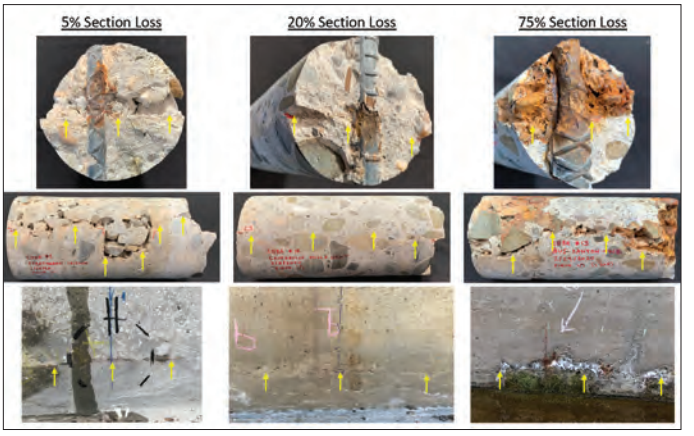


Fig. 4: Examples of bars exposed by coring with 5%, 20%, and 75% section loss at the horizontal construction joint (yellow arrows) due to localized corrosion. Note the varying surface and interior joint conditions, as well as the wet conditions and corrosion staining at the bar with 75% section loss.

quality joints consisting of partially consolidated concrete or weak bond across the joint were observed throughout the investigated channels. The quality of the joint on the interior of the wall often differed from the surface conditions, as illustrated by the bar with 5% section loss in Fig. 4. The joint quality (internal or surface) did not always correlate with the observed level of corrosion.

VISUAL OBSERVATIONS

Prior to performing destructive work to expose select reinforcing bars, visual observations were performed throughout the channels. These visual observations were then compared to the observed corrosion at reinforcement exposed at openings or cores. The visual observations that indicated the highest risk of localized corrosion at the joint were (1) corrosion staining at the joint and (2) wet conditions at the joint. Examples of these conditions are shown in Fig. 5, as well as in Fig. 4 for the bar with 75% section loss. Corrosion staining at the joint provides an obvious indication of corrosion activity, which is most likely corrosion of the steel reinforcement crossing the joint. Due to variable groundwater levels in the soil behind the channel walls, the wet conditions needed to facilitate corrosion may be seasonal. An additional consideration for wet conditions is the elevation of the horizontal construction joint. Construction joints at higher elevations above the invert are not exposed to water under low flow conditions, which are common in many of the channels. Standing water may also accumulate within a channel due to debris or an improperly sloped invert (inverts are typically sloped away from the walls to prevent this from occurring).

Poor joint quality visible on the surface of the channel wall (e.g., partially consolidated concrete, as shown in Fig. 5) was also found to indicate an elevated risk of localized corrosion, but to a lesser degree than corrosion staining and wet conditions. This highlights the importance of moisture to fuel the corrosion reaction; even at very poor-quality joints, minimal section loss was observed at locations with dry conditions.

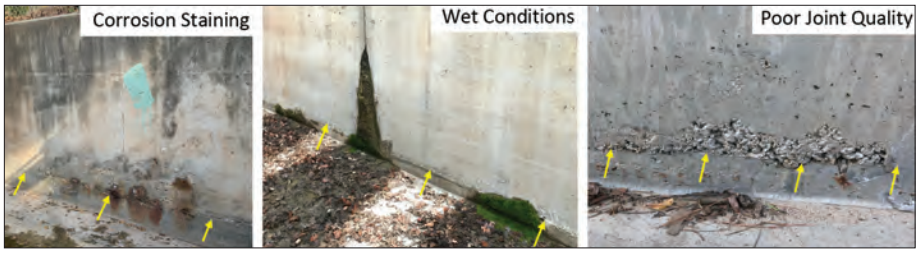


Fig. 5: Visual observations indicating an elevated risk of localized corrosion at the joint (yellow arrows).

Fig. 6: Nondestructive techniques implemented.

NONDESTRUCTIVE TESTING

Following the visual observations, three NDT methods (Fig. 6) were used to evaluate localized corrosion activity prior to exposing select reinforcing bars for direct observation: corrosion rate, concrete resistivity, and half-cell potential (ASTM C876-15).[1] Half-cell potential was the only method that proved to be an effective indicator of the observed localized corrosion at exposed bars, with some limitations. Half-cell potentials were measured along vertical bars crossing the horizontal joint so that a gradient (change) in potential near the joint would be expected to indicate localized corrosion activity (Fig. 7). At most locations where half-cell potential measurements exhibited gradients, subsequently exposed bars had significant section loss due to corrosion, as expected. However, an important caveat to this correlation is that when measuring half-cell potentials in a wall with two mats of reinforcement, observed gradients reflect corrosion of the reinforcing bars in the front mat only. Corrosion of the back mat (soil-side) bars, which are of primary importance for strength, can only be indirectly inferred from the condition of the front mat bars. Additional limitations of half-cell potential testing are: (1) the results reflect the instantaneous conditions at the time of measurement only, so seasonal corrosion activity may not be captured, and (2) at locations with high reinforcement cover, the sensitivity of the measured potentials to corrosion activity is reduced.

Concrete resistivity values were typically very high, exceeding 100 kΩ-cm in nearly all cases. This is likely due to the relatively dry concrete and generally dry climate. No correlation was found between concrete resistivity and localized corrosion. Corrosion rate was only able to be measured in a few locations, likely due to the high concrete resistivity, especially where concrete cover was considerable. Although the number of measurements was small, no significant correlation was found between the measured corrosion rate and localized corrosion.

Other NDT methods, including surface penetrating radar, ultrasonic pulse velocity, and impact-echo, were also used during the investigation. While effective for assessing other conditions and distress, these methods were not found to be effective in identifying localized corrosion or related indicators (i.e., partially consolidated

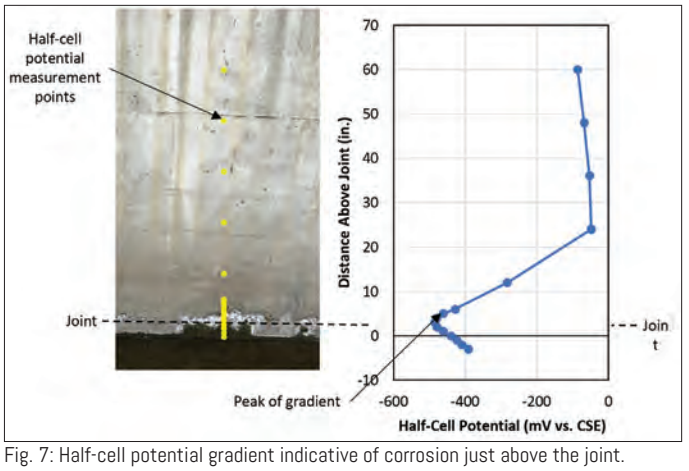


Fig. 7: Half-cell potential gradient indicative of corrosion just above the joint.

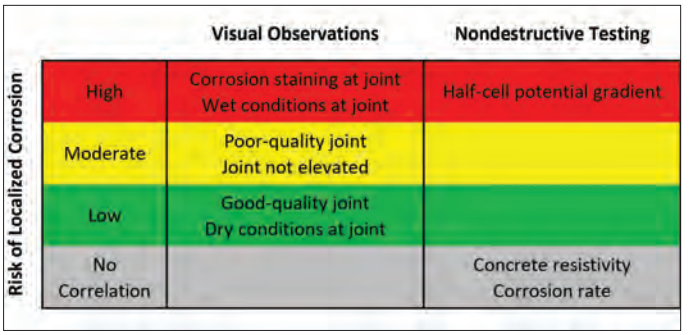


Fig. 8: Risk of localized corrosion based on visual observations and nondestructive testing

joint) at the construction joint in these channel walls. With prior knowledge of the challenges in identifying localized corrosion using NDT, all methods discussed here were evaluated both in the field as well as on representative mock-up specimens with known joint quality and corrosion conditions.

SUMMARY: FINDINGS, PRIORITIZATION, AND REPAIR

While no visual or NDT method was completely reliable for identifying localized corrosion, the risk of localized corrosion associated with various visual observations and NDT methods was established through extensive investigation of the flood control channels. As summarized in Fig. 8, corrosion staining at the joint, wet conditions at the joint, and half-cell potential gradients were determined to be the most reliable visual and NDT indicators of localized corrosion of steel reinforcement in these flood control channels. Construction joints of poor quality or joints that are not elevated above the invert indicated some risk of localized corrosion, but significant section loss is not likely to occur unless wet conditions are also present to drive the corrosion reaction. A good-quality joint and dry conditions present a low risk of localized corrosion. Concrete resistivity and corrosion rate NDT methods were found to have no correlation with localized corrosion activity in the channel walls.

These findings were used to develop a methodology for prioritizing the channels for potential repair based primarily on visual observations. A regular inspection program was established to update the prioritization as conditions in the channels change over time. Conceptual repairs were then developed to combat the effects of localized corrosion, prevent failures, and extend the service life of the channels. Two repair approaches were recommended: (1) utilize the current channel wall, considering any reinforcement section loss, and limit future corrosion, or (2) strengthen the existing channel wall to compensate for current or future corrosion.

Repair options included, but were not limited to:

1. Mitigating ongoing corrosion activity with anodes, sacrificial devices that are consumed by corrosion, rather than the existing reinforcement.
2. Injecting poor-quality joints with high pH grout to restore the passive protection of the reinforcement against corrosion from the concrete and limit the ingress of water.
3. Strengthening the channel walls with the addition of new concrete and reinforcement to supplement the existing walls, or by providing an alternate load path to reduce the demands on the existing walls (e.g., steel bracing across the channel, soil nails, and tiebacks to drilled piers behind channel walls).

REFERENCE

1. ASTM C876-15, *Standard Test Method for Corrosion Potentials of Uncoated Reinforcing Steel in Concrete*, ASTM International, West Conshohocken, PA 2015

Kerry Kreitman, PhD, PE, is a Project Engineer with Pivot Engineers who specializes in structural forensics. Her experience includes failure investigations, corrosion evaluations, condition assessments, nondestructive testing, and repair of all types of structures. Kerry received her B.S. degree from Washington University in St. Louis and her M.S. and Ph.D. from the University of Texas at Austin, all in Civil Engineering.

Alex Meucci is a Staff Engineer with Pivot Engineers. He has a diverse background in structural engineering and specializes in diagnosing and repairing problems identified within existing structures. Alex has extensive experience implementing destructive and nondestructive evaluation methods and has been involved in the design and implementation of many innovative structural repairs. He received his B.S. and M.S. degrees in Civil Engineering from the University of Florida.

An Introduction to ICRI's New Guide No. 110.3-2021

Guide Specifications for Cementitious Bonded Overlay

by David Rodler, Liying Jiang, and Horace Willis

Repairs utilizing a cementitious bonded overlay involve the placement and bonding of a layer of cementitious material on top of a sound concrete surface (Fig. 1). The bonded overlay can be uniform or variable in thickness. The installation of the bonded overlay on a concrete slab is a commonly used method, with examples such as:

- Adjustment of top surface elevations to provide a slope to drainage or to achieve new slab elevations needed for building modifications and renovations;
- Replacement of an unbonded or otherwise deteriorated topping slab;
- Structural strengthening of a slab by introducing a bonded overlay incorporating reinforcing steel; and
- Addition of a bonded overlay as a sacrificial layer to protect critical structural components such as bridge decks, roadway underpass, or precast parking decks.

Fig. 1: Installation of a bonded cementitious overlay (photo courtesy of Jensen Hughes Inc.)

Slabs receiving a bonded overlay may or may not have corrosion-related concrete deterioration. Partial-depth and full-depth concrete repairs may involve removal of slab concrete around the original slab reinforcing bars. In some cases, a bonded overlay is used in combination with the partial- and full-depth repairs.

ICRI has published the new Guide No. 110.3,[1] *Guide Specifications for Cementitious Bonded Overlay* (Fig. 2) that provides guidance for specifying cementitious bonded overlay materials and methods that incorporate best practices used in the concrete repair industry and are essential to an effective repair program.

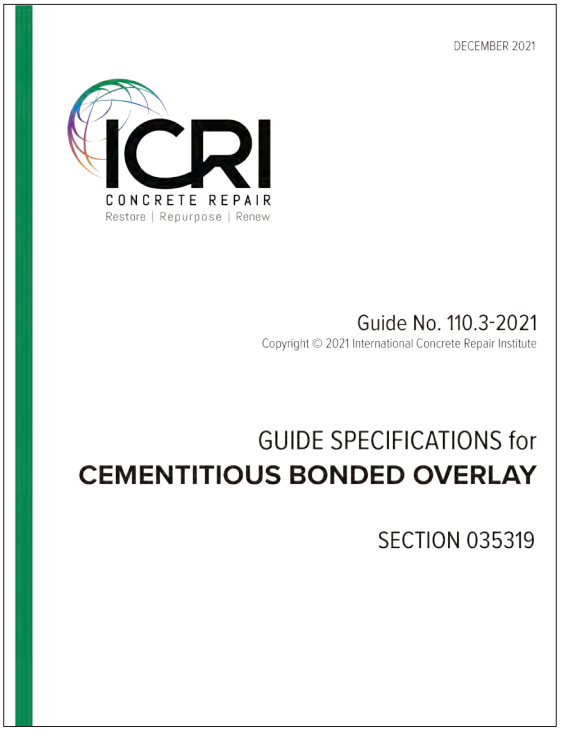


Fig. 2: ICRI's new Guide No.110.3-2021

The cementitious bonded overlay guide specifications are intended to assist the design professional in the preparation of technical specifications, can be easily included into construction contracts that involve cementitious overlays as part of the repair program, and apply to cementitious bonded overlays with microsilica and latex-modified. Polymer and polymer-modified bonded overlays are not covered by this guide specification.

FORMAT

The guide specification's intended use is as a technical specification section in a complete and coordinated project manual that includes the applicable Division 01 General Requirements Sections such as Bidding Requirements, Unit Price, Quality Requirements, and other relevant Division 01 Sections which are cross-referenced in the cementitious bonded overlay technical specification section.

The cementitious bonded overlay guide specification (Section 035319) is not a stand-alone technical specification. Due to the large amount of applicable information in

ICRI 110.1-2016, *Guide Specifications for Structural Concrete Repairs*[2] (Section 030130), Committee 110 decided to link these two sections by extensive citations in the cementitious bonded overlay section to Section 030130. This will assist the users of the documents to avoid repetitious language. As such, this specification must be used with ICRI 110.1.

The primary focus of the guide specifications is to provide an outline for developing the three parts of the specification through suggested text, references and commentary for evaluating alternatives. The document follows the 3-Part MasterSpec and other industry standard specification formats as follows:

PART 1 – GENERAL

PART 2 – PRODUCTS

PART 3 – EXECUTION

Figure 3 shows the Table of Contents for the guide specifications document. Three text colors have been used throughout the document to distinguish the purpose of the text. Black text is specification text, indicating to the specification user the essential requirements that are generally accepted as industry standards. Blue text indicates optional requirements or situations where the specification user must make a choice between multiple options based on the needs of the project. Blue text must be accepted or modified and changed to black text prior to issuing the document to avoid confusion regarding multiple alternatives or suggestive language. Red text indicates commentary to the specification and serves to explain and clarify the technical requirements of the specification section. To facilitate the use of the guide specifications, ICRI provides a Word-format document in addition to the color-coded hard copy or PDF-format documents, wherein the red text is formatted using "hidden text" within the Word document, allowing it to be turned on or off during viewing and printing.

TABLE OF CONTENTS

Fig. 3: Table of Contents for the guide specification document

USING THE GUIDE SPECIFICATION

Cementitious bonded overlays can be implemented for a variety of purposes and can be reinforced or unreinforced, uniform in thickness or variable thickness, and can include a variety of boundary conditions. The area to receive the overlay may contain areas in need of partial-depth or full-depth concrete repairs. Overlays may remain as the finished concrete surface or may be specified to receive a coating. Because of the varying nature of these applications, the Cementitious Bonded Overlay Guide Specification includes language to coordinate drawing details and other specification sections such as Structural Concrete Repairs, Joint Sealants, and Traffic Coatings. The following sections highlight some of the more unique features of Specification Section 035319 – Cementitious Bonded Overlay and offer practical examples of using the guide specification to create a specification section that can be integrated into the overall project manual to meet the needs of the project.

PART 1 – GENERAL

Article 1.4 LUMP SUM AND UNIT PRICES of the guide specification includes guidance on the pay basis for the work. It is noted that Article 3.8 PAY BASIS may be deleted if reference is made to Division 01 unit price definitions. These articles discuss and highlight that unit price work such as partial-depth and full-depth concrete repairs may be conducted within the limits of the bonded overlay (Fig. 4).

If the bonded overlay is considered best specified as a lump sum using the limits defined on the drawings, then work performed within this area should be given a pricing structure based on the potential for cost efficiency in the demolition and surface preparation for partial-depth and full-depth slab repairs. Examples of these efficiencies include not needing saw cuts for partial- and full-depth repairs, and the lack of surface preparation required for the overlay in the areas receiving partial- and full-depth slab repairs. The overlay itself in the areas being repaired would simply involve placement of the additional concrete.

One solution to this issue would be for the specifier to provide a lump sum basis for the bonded overlay with unit prices for concrete repairs, such as partial and full depth, required within the overlay area. In this way, any efficiencies in conducting these repairs within the overlay can be realized at the time of the bid.

Fig. 4: Localized full-depth concrete repair within the limits of the bonded overlay (photo courtesy of SK&A)

Fig. 5: Deck overlay substrate preparation by hydro-demolition (photo courtesy of SK&A)

PART 2 – PRODUCTS

A key requirement of cementitious bonded overlays is the surface preparation of the concrete substrate (Fig. 5 and 6). Article 2.1 EQUIPMENT in the specification outlines possible means to achieve the surface profile required to achieve an acceptable bond. ICRI Guideline 310.2R[3] provides alternate equipment and evaluation techniques for concrete surface profiles including the use of hydro-demolition.

Fig. 6: Insufficient substrate preparation (photo courtesy of Jensen Hughes Inc.)

Repair material considerations and curing remain consistent with the use of these materials in ICRI 110.1, *Structural Concrete Repairs* (Section 030130) and are therefore tied to that section by reference.

These requirements are described in further detail in PART 3; however, they relate to the maximum aggregate size of the concrete to be used, and therefore coordination of the repair materials and the repair details for the bonded overlay is needed.

PART 3 – EXECUTION

The final section of this guide specification contains important information regarding bonding of the overlay and reinforces the preparation and bonding by providing the following commentary:

The bond of the repair material to the existing concrete is critical to a successful repair. Section 030130 provides requirements for concrete removal geometry, undercutting of corroded reinforcing bars, saw cutting of repair perimeters, and bonding of the repair material. Bonded overlays may be specified for a variety of circumstances which could include a bonded overlay over areas with existing concrete delaminations. Bonded overlays may also be placed with a variety of boundary conditions such as tapered edges and may be reinforced. The provisions of Section 030130 should be retained here and used in conjunction with details provided on the drawings. Execution of all contraction joints and expansion joints in the bonded overlay should include replication of those joints which exist in the concrete substrate and additional required contraction joints, as submitted and approved in accordance with Subparagraph 1.5B.4.

As noted above, a critical aspect of a successful repair is the bond of the repair material to the existing concrete. Several important issues that may affect the bond include the tapered edges at repair perimeters, and the use of control joints, boundary conditions, and reinforcing steel. The recommended approach to these issues involves the use of details on the repair drawings to supplement the requirements of the specification.

A minimum thickness of 1-1/4 in (32 mm) for latex modified and micro-silica cementitious overlays, and 2 in (50 mm) for all other cementitious bonded overlays is common in the repair industry. Depending on the type and thickness of the bonded overlay, surface profile requirements should be in accordance with product manufacturer's requirements and be included in the specifications.

It is important to remember that coordination of the specification and the repair drawings is important when specifying bonded overlays, and to consider the pricing structure of other concrete repair work being done within the overlay area. Finally, an assurance that the overlay material has achieved an integral bond to the original concrete substrate should be confirmed by testing procedures outlined in ASTM C1583/C1583M[4] and ICRI Guideline No. 210.3R[5] (Fig. 7).

Fig. 7: Bond testing equipment (note specimen pull-off within overlay concrete matrix (photo courtesy of SK&A)

FUTURE WORK

ICRI Committee 110—Guide Specifications continues developing guide specifications to aid design professionals in the preparation of technical specifications for inclusion directly into a project manual for the repair of structural concrete and related items using materials and methods that are in line with the state-of-the-art practices, materials, and methods used in the concrete repair industry. Committee 110 is currently developing guide specifications for masonry repairs and shotcrete.

REFERENCE

1. ICRI 110.3, *Guide Specifications for Cementitious Bonded Overlay*, International Concrete Repair Institute, St. Paul, MN, 2021, 19 pp.
2. ICRI 110.1, *Guide Specifications for Structural Concrete Repairs*, International Concrete Repair Institute, St. Paul, MN, 2016, 48 pp.
3. ICRI 310.2R, *Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair*, International Concrete Repair Institute, St Paul, MN, 2013, 48 pp.
4. ASTM C1583/C1583M, *Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)*, ASTM International, West Conshohocken, PA, 2020.
5. ICRI 210.3R, *Guide for Using In-Situ Tensile Pulloff Tests to Evaluate Bond of Concrete Surface Materials*, International Concrete Repair Institute, St. Paul, MN, 2013, 20 pp

David Rodler, PE, is Principal-in-Charge of SK&A's Structural Repair and Restoration Division and manages day-to-day operations for projects undergoing repair, rehabilitation or renovation. David has over 30 years of experience performing structural materials analysis as well as preparing specifications and drawings for repair operations to concrete and masonry buildings and other exposed construction. He has evaluated, monitored, and tested post-tensioned and conventionally reinforced concrete and structural steel structures. David is experienced in managing garage, façade, repair, and maintenance programs, in addition to many historic renovation projects. He was named an ICRI Fellow in 2013. In 2019, David became a Co-Chair of the ICRI Evaluation Committee and continues serving on the ICRI Publications and Guide Specifications Committees.

Liying Jiang, PE, is a Senior Civil Engineer with Jensen Hughes and is a registered Professional Engineer in Massachusetts. She has over 13 years of professional experience in the construction and engineering field performing evaluations of existing structures, assessing and evaluating concrete materials, designing repair and rehabilitation measures, and developing management strategies for structures affected by alkali-silica reaction (ASR), corrosion, and other materials-related distresses, in addition to 2 years of experience in the precast industry. Liying is experienced in technical specifications, repair drawings, and construction administration of large-size concrete structure repair projects. She is also skilled in state-of-the-art concrete-related NDT technologies, such as Ground-Penetrating Radar (GPR), Impact Echo (IE), and Impulse Response (IR). Liying currently serves on the Board of Directors of the International Concrete Repair Institute (ICRI), is Chair of ICRI Committee 110, and is a voting member of several technical committees/subcommittees of ICRI and American Concrete Institute (ACI).

Horace Willis is a Senior Associate with SK&A for over 34 years. Horace is the Vice Chair of ICRI Committee 110. He pioneered the development of SK&A's envelope consulting services with the introduction of industry standard software and analytical tools, such as WUFI to improve consulting services deliverables. In his current capacity, Horace has conducted numerous structural and façade evaluations; feasibility studies related to the expansion of existing parking structures; and building envelope evaluations and appraisals, including recommendations for repair opinions.

CONCRETE REPAIR CALENDAR

MARCH 24, 2022
Concrete Slab Moisture Testing
Biloxi, Mississippi
(Following the FCICA Annual Convention & Commercial Flooring Trade Show)
Website: www.icri.org

MARCH 27-31, 2022
ACI Concrete Convention
Orlando, FL
Website: www.concrete.org

APRIL 4-6, 2022
2022 ICRI Spring Convention
Baltimore, MD
Website: www.icri.org

APRIL 12-14, 2022
National Wood Flooring Association Expo
Tampa, FL
Website: www.nwfaexpo.org

INTERESTED IN SEEING YOUR CONCRETE INDUSTRY EVENT LISTED HERE?

Events can be emailed to editor@icri.org. Content for the May/June 2022 issue is due by April 1, 2022, and content for the July/August 2022 issue is due by June 1, 2022.

INDUSTRY NEWS

STRUCTURAL ACQUIRES RESTRUCTION

Structural Preservation Systems, LLC (STRUCTURAL), the largest concrete repair and maintenance provider in the United States, has acquired Restruction Corporation's business. With offices located in Colorado, Arizona, and Utah, Restruction is a contracting company that specializes in concrete repair and structural strengthening.

The combination of STRUCTURAL's national presence, 20 offices across the country, and Restruction's strong reputation in the mountain west provide a great complement of expertise and industry knowledge that will allow us to better serve our clients.

For more information, go to www.restruction.com or www.structural.net.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

Email your 150-200 word industry news to editor@icri.org. Content for the May/June 2022 issue is due by April 1, 2022, and content for the July/August 2022 issue is due by June 1, 2022. ICRI reserves the right to edit all submissions.

Get Certified...

...and stand out from the crowd!

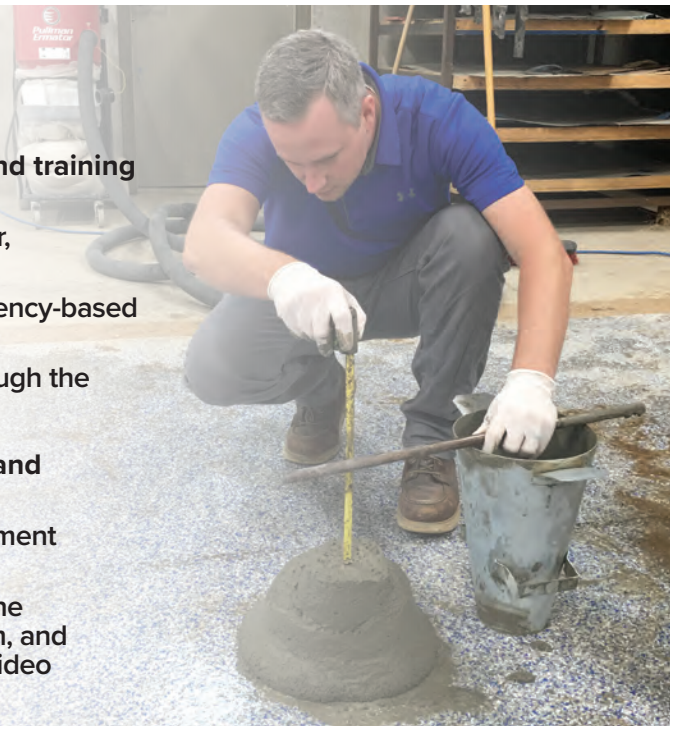
Concrete Slab Moisture Testing (CSMT) Program

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

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)

ICRI
CONCRETE REPAIR
CERTIFICATION

Learn more at **www.icri.org**

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

ASSOCIATIONNEWS

ACI CONCRETE CONVENTION IN ORLANDO, FLORIDA, USA, WITH VIRTUAL OPTION

Engineers, contractors, educators, manufacturers, and suppliers will convene at the ACI Concrete Convention in Orlando, Florida, USA, March 27-31, 2022, 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 live or on-demand to attendees who choose to attend virtually.

The ACI Concrete Convention showcases companies, projects, research, and offers 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.

Technical and educational sessions will be presented live with on-demand viewing available afterwards, providing substantial opportunity to advance knowledge. The sessions will be available to those that registered for the in-person ACI Concrete Convention in Orlando or those that register for the ACI Concrete Convention's Virtual Technical Sessions. All technical sessions will be available virtually through the convention platform and will be available for on-demand viewing after premiering live at the convention.

Throughout the convention, ACI will hold over 300 committee meetings, 45+ technical sessions, an industry trade exhibition, networking events, and much more.

For more information visit aciconvention.org.

ARAMCO BECOMES OFFICIAL FOUNDING MEMBER OF NEW CENTER OF EXCELLENCE FOR NONMETALLIC BUILDING MATERIALS

NEx: An ACI Center of Excellence for Nonmetallic Building Materials announces Aramco as its Founding Sustaining Member. The two organizations will work together to achieve more sustainable building solutions through advances in nonmetallic technologies.

Aramco is already a leader in the use of nonmetallic materials, deploying nonmetallic solutions within their oil and gas facilities for more than two decades. The company sees the potential for using nonmetallic advanced polymetric materials far surpassing the oil and gas sector, leading to this initiative with NEx as part of a broader strategy to enter new markets, leveraging its hydrocarbon resources and technology to deliver advanced polymeric materials solutions across industries.

NEx looks to draw additional partners from leading government agencies, technical societies, standard bodies, manufacturers and professionals. To learn more visit nonmetallic.org.

ACI PUBLISHES NEW CONCRETE FIELD TESTING TECHNICIAN—GRADE I WORKBOOK

The American Concrete Institute (ACI) has released a new, 40th edition of its most popular certification publication, CP-1: Technician Workbook for ACI Certification of Concrete Field Testing Technician—Grade I. The newly released edition takes a significantly different and enhanced approach to preparing potential candidates for ACI certification as Concrete Field Testing Technicians.

The concrete construction industry has increasingly employed the ACI Concrete Field Testing Technician certification for nearly four decades as a credential requirement for new hires, many of whom are entirely new to the industry. To support this use, ACI has modified the educational approach and content of the new CP-1 Workbook to present the responsibilities of Technicians as described by the Job Task Analysis, developed by ACI Certification Committee C610—Concrete Field Technician Certification, providing background and clearer context for the standard procedures and test methods successful certification candidates are qualified to perform in the field.

All content is compliant with ASTM Standards versions provided on the certification program description page. Reprints of ASTM Standards referenced by the program are no longer included in the workbook. For more in-depth basic concrete technology, CP-1 may be purchased as a package with ACI CCS-0, Concrete Fundamentals.

For more information, visit ACICertification.org.

AMERICAN CONCRETE INSTITUTE RELEASES NEW REPAIR CODE

The American Concrete Institute (ACI) has released ACI CODE-562-21 Assessment, Repair, and Rehabilitation of Existing Concrete Structures - Code and Commentary in print and digital formats. The Code was developed to provide design professionals with a code for the assessment of the damage and deterioration, and the design of appropriate repair and rehabilitation strategies.

ACI CODE-562-21 was written specifically to be integrated into building codes as a mechanism for building officials to have increased confidence that repairs are performed in a manner that provides an acceptable level of protection for the public. Previous versions of ACI CODE-562 have already been adopted by North Carolina, Hawaii, Ohio, and Florida.

ACI CODE-562 is immediately available to subscribers of both the online ACI Collection of Concrete Codes, Specifications, and Practices and the ACI Concrete Repair Subscription, or can be purchased individually in print or digital formats.

For more infor,mation visit concrete.org/aci562

CONCRETE INDUSTRY MANAGEMENT PROGRAM BREAKS ALL PREVIOUS RECORDS AT 2022 AUCTION AT WORLD OF CONCRETE

The National Steering Committee (NSC) for the Concrete Industry Management (CIM) program – a business intensive program that awards students with a four-year Bachelor of Science degree in Concrete Industry Management – is pleased to announce they raised more than $1.740 million in gross revenue at its annual auction, held in conjunction with the World of Concrete on Wednesday, Jan. 19.

"This year's auction was a tremendous success, both in terms of the value of donated items and the Auction participants," commented Ben Robuck, CIM Auction Committee Chairman. "The results are indicative of the high value the concrete industry places on the CIM program. We thank the concrete industry for their tremendous support. In addition to a concrete

mixer truck donated by Mack® Trucks, Inc. and McNeilus®, a truck-mounted concrete pump donated by Alliance Concrete Pumps, a truck chassis donated by NORCAL Kenworth and Kenworth Truck Co., a high-performance mixer donated by Con-Tech Manufacturing, Inc., an S-485 Laser Screed® donated by Somero Enterprises and a Shumaker Industries' Load and Go Ready Mix Truck Wash® system, we had a variety of items targeted specifically for the concrete industry."

"In addition to the above-mentioned items, we were pleased to have cement donations from cement industry leaders like CEMEX, Holcim, Lehigh Hanson, Inc., Argos Cement, St. Marys Cement, Inc., Roanoke Cement Company, GCC, Martin Marietta as well as admixture donations from CHRYSO, Inc., Master Builders Solutions, Sika USA and GCP Applied Technologies," said CIM Marketing Committee Chairman Brian Gallagher.

In addition to the live auction, a silent auction was also held. This year CIM had record proceeds from the silent auction. Live and silent auction items included cement, concrete saws, drills, mixers, vibrators, safety equipment, screeds, decorative concrete tools, water meters, pumps, generators, training sessions, reference books, iPads and laptop computers, sports travel packages and golf and vacation travel packages.

STATEWIDE CONCRETE DESIGN AWARD WINNERS

Wisconsin Ready Mixed Concrete Association recognizes excellence in concrete design

The Wisconsin Ready Mixed Concrete Association has recognized the winners for the 40th Annual Concrete Design Awards.

The awards are a part of a prestigious program highlighting best uses of ready-mixed concrete in Wisconsin and Michigan's Upper Peninsula (UP). The Wisconsin Ready Mixed Concrete Association (WRMCA), Acuity Insurance, Carew Concrete & Supply, County Materials, Euclid Chemical, Oshkosh Corporation, Premiere Concrete Admixtures, Schmitz Ready Mix, Sika Corporation & the Wisconsin Chapter of the American Concrete Institute cosponsored the annual award program. Award winners were determined by a distinguished panel of Wisconsin/UP construction professionals.

This year's award-winning projects exemplify innovative design in concrete for a diverse range of projects in Wisconsin and Michigan's Upper Peninsula

For the 40th Annual Concrete Design Awards, projects highlighted represented winners that included owners, architects, engineers, contractors, and ready mixed producers.

To view the award's presentation, go to https://www.youtube.com/watch?v=gHWKuJgBkQ0.

To view the winning projects, go to https://wrmca.com/2021-wrmca-concrete-design-awards/.

International Concrete Repair Institute

CONCRETE INDUSTRY MANAGEMENT (CIM) PROGRAM RELEASES ANNUAL REPORT FOR 2020 – 2021

The Concrete Industry Management (CIM) program—a business intensive program that awards students with a four-year Bachelor of Science degree in Concrete Industry Management—is pleased to announce the release of their 2020-2021 Annual Report. Compiled by the National Steering Committee (NSC), the report was distributed recently at World of Concrete in Las Vegas.

Highlights of the 2020-2021 CIM Annual Report include:

- Committee reports (Education, Finance, Marketing, Auction, Recruitment, Membership, Long-Range Planning and MBA program update)
- Institutional reports from all CIM programs
- Profiles of CIM students, graduates, faculty and industry Patrons

"The CIM Annual Report is a summary of amazing achievements of the CIM programs. It reflects the commitment, dedication and effort of the CIM program leaders, faculty and students," said Brian Gallagher, chairman of the CIM Marketing Committee. "Each year, I am more impressed with the quality and amount of activity completed by the CIM faculty and students."

For more information about the CIM program and to view the 2020-2021 annual report, or to see the annual reports for the last 12 years, visit https://www.concretedegree.com/about/cim-annual-report/

ASSOCIATIONNEWS

ACI SLABS WEEK COMING TO NEW RESOURCE CENTER

The ACI Resource Center—Southern California will host the inaugural ACI Slabs Week at its San Bernardino, CA, location April 26-29, 2022. The week will include educational seminars, certification review sessions and exams, and offers a special opportunity to earn an ACI Specialty Commercial/Industrial Concrete Flatwork Finisher and Technician certification.

The first two days of ACI Slabs Week focus on educational seminars led by subject matter experts from around the country. Engineers, designers, and contractors can expect to interact with experienced and knowledgeable peers and earn CEUs.

For more information visit https://www.concrete.org

ACI ADOPTS NEW POSITION STATEMENT ON ENGINEERING CURRICULA

The American Concrete Institute has recently approved a new position statement on the topic of civil/architectural/structural engineering curricula. The Institute now has a total of thirteen position statements on various topics supporting policy positions along with state, federal, and international programs, rules, and regulations.

The new position statements includes: **Civil/Architectural/Structural Engineering Curricula:** Encourage colleges and universities with civil, architectural, or structural engineering curricula to retain or include material and structural courses on design and code compliance in accordance with recognized consensus-based standards developed by accredited standards development organizations.

The Institute's position statements are focused on advocacy efforts related to code development and adoption; and future statements may focus on other ACI programs, services, and activities. The process of creating ACI position statements was created by the ACI Board to better allow ACI to actively engage in advocating for ACI code adoption.

Learn more at concrete.org/positions.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

Email your 150-200 word association news to editor@icri.org. Content for the May/June 2022 issue is due by April 1, 2022 and content for the July/August 2022 issue is due by June 1, 2022. ICRI reserves the right to edit all submissions.

ICRI**CHAPTER**NEWS

CHAPTER CALENDAR

ICRI Chapters are starting to host events again in 2022. Be sure to check with individual chapters by visiting their chapter pages to determine if they have made any plans after this publication was published.

CAROLINAS
May 5-6, 2022
SPRING CHAPTER CONFERENCE
Education Events, Social Events, Networking
Cambria Hotel, Charleston Riverview
Charleston, SC

CINCINNATI
March 16, 2022
CHAPTER MEETING
TPC River's Bend
Mainville, OH

April 20, 2022
CHAPTER DEMO DAY
LRT Restoration Technologies
Monroe, OH

CONNECTICUT
March 9, 2022
CHAPTER MEETING
Topic: Expansion Joints
Best Western Hotel
North Haven, CT

April 13, 2022
CHAPTER MEETING
Topic: Tunnel Boring & Waterproofing
Best Western Hotel, North Haven, CT

DELAWARE VALLEY
April 20, 2022
STUDENT NIGHT
Embassy Suites by Hilton
Philadelphia, PA

GEORGIA
March 24, 2022
CHAPTER LUNCHEON MEETING
Topic: Utilization of Drones
Maggiano's Perimeter
Atlanta, GA

May 16, 2022
CHAPTER SCHOLARSHIP GOLF TOURNAMENT
Heritage Golf Links
Tucker, GA

INDIANA
March 10, 2022
TECHNICAL EVENT
Topic: Concrete Moisture and Mitigation Strategies
The Wellington Fishers Conference Center
Fishers, IN

April 14, 2022
SOCIAL EVENT
Indianapolis Indians Game
Victory Field
Indianapolis, IN

METRO NEW YORK
April 28, 2022
CHAPTER SPRING SYMPOSIUM
Topic: Tying it all Together
Club 101, New York, NY

MINNESOTA
March 18, 2022
9th ANNUAL FUNSPIEL CURLING EVENT
Chaska Curling Club
Chaska, MN

ROCKY MOUNTAIN
March 4, 2022
ANNUAL SKI/SNOWBOARD DAY
Loveland Ski Resort
Dillon, CO

VIRGINIA
April 28, 2022
ANNUAL GOLF OUTING & SCHOLARSHIP FUNDRAIDER
Viniterra Golf Course
New Kent, VA

CHAPTER ACTIVITIES

INDIANA CHAPTER LEARNS DETAILS ON PROJECT OF THE YEAR WINNER

The Indiana Chapter started 2022 with an exciting and informative presentation entitled, *Jump Starting the Ford Building*. It was presented by Logan Cook, Senior Associate and Unit Manager of WJE's Indianapolis office. Logan went into detail about the restoration of this 1914 Model T assembly plant in downtown Indianapolis. Candid conversations took place about the eventual decision to use shotcrete repair in lieu of form and pour, and the redesign of corbels to hold new large precast members—just to name a few of the repair topics related by this project. The Indiana Chapter is proud to say that WJE's submission for this project was named 2021 ICRI Project of the Year.

Logan Cook, Senior Associate at Wiss, Janney, Elstner, presents to the Indiana Chapter


Indiana Chapter members asked great questions and were very interested in hearing about the details for the 2021 ICRI Project of the Year winner

DELAWARE VALLEY ALSO USES AN "AXE" TO OPEN 2022

On January 27, 2022, the Delaware Valley Chapter hosted a member appreciation night. A great time was had by all at the Chapter's first event of 2022. More than 30 chapter members gathered for this free membership appreciation event at Splitting Edge Axe Throwing in Malvern, PA. Food was provided by BOMBA Taco + Bar.

The evening began with casual axe throwing, spirited conversation, and plentiful refreshments. After dinner, the competition got serious with a thrilling single-elimination axe throwing tournament. After the splintered wood had settled, Matt Mowrer of O'Donnell and Naccarato had vanquished all challengers to win the tournament! Congratulations to Matt and thanks to everyone who attended.

Delaware Valley gathers for Member Appreciation Night

FLORIDA WEST COAST PUTS AN "AXE" INTO SOCIAL EVENT

The Florida West Coast Chapter hosted its kick-off for 2022 on January 12 at St. Pete's Axe & Ale. The social event brought in almost 40 attendees. The leadership and guests had the opportunity to recognize 2021 Board President Tom Buffington and the leadership team that brought the chapter through a difficult, yet successful, 2021. In addition to letting off steam with a few good throws of an axe, the chapter was thrilled to welcome a new platinum sponsor, took pride in introducing the leadership team for 2022, and announced its upcoming technical event on shoring. The board and committee chairs also took time to encourage active participation, better meeting attendance, and the active recruitment of new members. Everything was well-received and the chapter is looking forward to a successful 2022 with positive engagement by all.


Chapter members gather to recap 2021 and look forward to 2022


Axe throwing is a great way to relax and network with friends and colleagues

ICRI CONCRETE REPAIR CHAPTERS

CHAPTER ACTIVITIES

MINNESOTA HOSTS ANNUAL MEGA DEMO

The recent Minnesota Chapter 2022 Mega Demo was a huge success! The chapter welcomed members from across the industry, including 21 contractors, 18 restoration engineers, 20 distributors, 12 manufacturer representatives, and 4 education professionals. The 2022 Mega Demo focused on plaza repair and restoration with an emphasis on waterproofing. The day consisted of classroom presentations, live demonstrations, the announcement of new chapter board members, local awards, as well as time for breakfast, lunch, and Q&A with concrete repair and restoration experts.

2022 Chapter President Brad Westerberg welcomed attendees as they settled into their seats with hot coffee and donuts. To start, Brad introduced the 2022 Chapter Board of Directors. Then, as tradition dictates, each attendee had the opportunity to introduce themselves and share their years of service to the industry. The years of service ranged from 1 to 45 years. It was truly remarkable to see all of this experience gathered in one room!

Kicking off the education was presenter Justin Long from SK&A Structural Engineers/Washinginton DC. Justin is a structural engineer and project manager with SK&A's Repair & Restoration Division. With over 10 years of professional experience in the structural design and restoration of residential, commercial, and institutional buildings, Justin provided an in-depth presentation about the plaza restoration case study. Hls presentation touched on every stage of the process from initial assessment to design, budgeting, bidding, construction, and closeout. Next, Brent Anderson with Structural held a learning session about the types of waterproofing systems that can be used for plazas. He described the different types of waterproofing materials and the methods involved with each type. The learning session touched on opinions of construction costs, repair scenarios, documents, and performing the repairs.

Next, the 2022 Minnesota Chapter Apprentice Award was granted to three individuals for each of the trades represented at the union hall: bricklayer, cement mason, and laborer. The award is a $500 credit to Esch Construction Supply to purchase tools or equipment.

In 2021, the chapter lost a dear friend, Terry Babcock. Terry was instrumental in starting and maintaining the chapter and received

Continued on page 36, Minnesota

(Minnesota, continued from page 35)

the lifetime achievement award in 2019. The chapter honored Terry's memory and legacy by renaming the annual golf tournament to the Terry Babcock Memorial Golf Tournament. Terry was also named an honorary member of Local 633 by Dave Schuta and Tom Reger. Terry's wife Laurie and son Hunter, were present to accept the honors.

Attendees had the opportunity to check out samples and literature from the vendors. There was time to catch up with colleagues and meet some of the new (and old) faces represented at the Demo. After lunch, the 2022 ICRI Minnesota Chapter Lifetime Achievement Award was presented to Marthe Brock from Master Builders Solutions. Marthe has been a friend to many in our business and it was an honor to watch her receive the award. Marthe has been an integral part of the Minnesota chapter and instrumental in the creation of the mega demo.

Dan Wald, representative with Watson-Bowman Acme and Master Builders Solutions was on hand for the first hands-on demo in the afternoon. Dan presented new industry technology that can be used to give any plaza deck a face lift. This demonstration was a tribute to how far traffic coatings have come from the standard gray. Lastly, Brian Farmer, technical director for Local 633, presented on "Concrete Resurfacer." Brian filled in for PJ Vaughan, of Ardex, who was unable to attend. Brian showcased concrete products that can be applied directly to a concrete surface and can be used to re-level the surface or just give it a new look. Brian showed off the different designs that can be performed.

The day concluded with Brad Westerberg and David Grandbois raffling off a multitude of gifts provided by our sponsors, vendors, and the chapter board. The chapter is eternally grateful to the Cement Masons Local #633 for allowing the use of their training center and for their hospitality. The Chapter would also like to thank all their sponsors. Sponsorships help make this great event possible and ensure reasonable pricing for attendees.

Justin Long, PE presenting on plaza restoration

Guest presenter Brent Anderson presenting on plaza waterproofing

Incoming Chapter Vice President Tony Marchiafava tends to the registration table

Members and guests arrive for the 2022 Minnesota Mega Demo


Dan Wald is seen here during his plaza traffic coating demo


Brian Farmer performing his plaza concrete resurfacer demo

CHAPTERS COMMITTEE CHAIR'S LETTER

MICHELLE NOBEL
Chapters Chair

I can't believe spring is right around the corner. It's Florida's most beautiful time of year. The sun is shining, the flowers are blooming, the birds are chirping, and the weather is fantastic. It's no wonder tourists and snowbirds flock to our shores. In the poetic words of Ralph Waldo Emerson, *"The earth laughs in flowers."*

The spring also brings the 2022 ICRI Spring Convention! This year it's in Baltimore, April 4-6. I hope you have a delegate and can join us at the Baltimore Marriott Waterfront. The hotel offers perfect panoramic views of surrounding Baltimore and the famous Inner Harbor. The Baltimore-Washington Chapter has been busy making plans for social and networking events:

Monday, April 4
12-4 pm Bowling at Mustang Alley's
4-5 pm Women in ICRI Reception

Tuesday, April 5
6–10 pm Tuesday Night Event at Rye Street Tavern

For more information, go to the ICRI website: https://www.icri.org/page/2022-spring-conv-home

This is a convention that you don't want to miss!

We're also planning a Spring ICRI Roundtable. We haven't decided if we'll hold it virtually or live, but it's guaranteed to be captivating and enlightening. Details about this event are coming soon, so keep an eye out for email updates.

If I've said this once, I've said it a hundred times! The Women in ICRI Committee is always looking for like-minded women to join our distinguished group. We'd love you to join this group of women working in the concrete repair industry. We highlight the accomplishments of women from all around the world. If you would like to join the Women in ICRI Committee, please reach out to Tara Toren-Rudisill at TTorenrudisill@ThorntonTomasetti.com, Monica Rourke at MRourke@mapei.com, or me at mnobel@mapei.com.

March 8, 2022, is IWD (International Women's Day). The 2022 IWD campaign theme is: **#BreakTheBias**

"Imagine a gender equal world.
A world free of bias, stereotypes,
and discrimination.
A world that is diverse, equitable,
and inclusive.
A world where difference is valued
and celebrated.
Together we can forge women's equality.
*Collectively we can all **#BreakTheBias**."*

#BreakTheBias

Did you know that your chapter can receive rebates? Host an event at your chapter—you'll receive rebates if the participant identifies the chapter as the promotional source. How easy is that?!

In the rebate program, chapters receive a rebate of 15 percent of the paid member/nonmember registration fees for all participants who register for the CSMT/CSRT programs solely due to the chapter's marketing and promotion.

For the chapter to receive the rebate, the participant (during registration) must indicate that they heard about the CSMT/CSRT program from the chapter as the promotional source and then identify the specific chapter name in the appropriate drop-down menu.

The rebates apply to all ICRI CSMT/CSRT program courses and categories that the chapter promotes and gets registrants to identify the chapter as the promotional source (excludes registration fees for CSMT classes where registration is handled by others, like World of Concrete, TISE-Surfaces, and partner events). If a private partner program includes open registration and the chapter is asked to promote to fill the class, the chapter does receive the rebate if the participant identifies the chapter as the promotional source.

So, host a CSMT/CRST event and receive rebates for your chapter! It's educational and a fundraiser at the same time!

Dates to mark on your calendar are:

March 27-31	2022 ACI Concrete Convention, Orlando, FL
April 4-6	2022 ICRI Spring Convention, Baltimore, MD
January 16-19	2023 World of Concrete, Las Vegas, NV

Please, remember to email Dale Regnier at daler@ewald.com your chapter meetings and events so he can post them on the ICRI website and *Concrete Repair Bulletin*. It's a fantastic resource for members traveling. Check out the ICRI calendar to find out more! Spending time with fellow members and making new friends is a bonus when you're traveling.

Here's a link to the calendar on the ICRI website for more information: https://www.icri.org/events/event_list.asp

The ICRI staff, the Executive Committee, your Region and At-Large Directors, and your local leaders at your ICRI chapters are here to help. We want you to feel like "Norm" when he walked into Cheers. We want you to feel like family.

Remember always to be safe, be kind, and I will see all my "friends and family" in Baltimore!

Sincerely,

Michelle Nobel
2022 ICRI Chapters Committee Chair
MAPEI Corporation

INTERESTED IN SEEING YOUR CHAPTER NEWS & EVENTS LISTED HERE?

Chapter News & Event Deadlines

MAY/JUNE 2022
Deadline: March 10, 2022

JULY/AUGUST 2022
Deadline: May 10, 2022

Send your Chapter News by the deadlines to
Director of Chapter Relations Dale Regnier at daler@icri.org.

PEOPLE ON THE MOVE

CONCRETE PROTECTION & RESTORATION ANNOUNCES PROMOTIONS

Concrete Protection & Restoration is pleased to announce the promotion of Chris Glorioso from Senior Operations Manager to Vice President of Operations, Southeast Region. Congratulations are also extended to Bill Kunigonis on his promotion from Sr. Project Manager to Vice President of Operations, Southeast Region.

Chris Glorioso

Bill Kunigonis

In this role, Chris and Bill will plan, coordinate, and oversee operations activities in the organization, ensuring development and implementation of efficient operations and systems to meet current and future needs of the organization.

For more information on Concrete Protection & Restoration, Inc. visit www.concretecpr.com.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

Email your 150-200 word news to editor@icri.org. Content for the May/June 2022 issue is due by April 1, 2022. and content for the July/August 2022 issue is due by June 1, 2022. One (1) high resolution headshot/individual may be included. ICRI reserves the right to edit all submissions.

PRODUCT INNOVATION

MCI GRENADES—YOUR CONCRETE CORROSION INHIBITOR BACKUP PLAN FOR WORST-CASE READY-MIX SCENARIOS

MCI® Grenades are pre-packaged water-soluble pouches of MCI®-2006 NS that can easily replace MCI®-2005/MCI®-2005 NS liquid admixtures if needed. MCI® Grenades are extremely convenient, pre-dosed to treat one cubic yard of concrete per bag (one cubic meter per Metric MCI® Grenade™). As Jon Connealy, Regional Sales Manager for MCI® Central and one of ICRI's 2020 "40 under 40," explained, "Simply toss one grenade into your concrete truck per yard of concrete enclosed and your concrete will have all of the migrating corrosion inhibitors needed." This serves as an affordable backup plan for ready-mix providers who must always be on guard for unexpected liquid admixture dosing challenges that could devastate an already stressful situation.

Contact your local MCI® rep to learn more: https://www.cortecmci.com/contact-us/.

CORTEC® AWARDED PATENT FOR INNOVATIVE FIRE SPRINKLER CORROSION MITIGATION TECHNOLOGY

Cortec® is pleased to announce its newest US patent for corrosion mitigation inside dry sprinkler systems! While sprinklers are designed to fight fire, they themselves are at elevated risk for corrosion during their service life. Sprinkler corrosion problems are serious enough that National Fire Protection Agency (NFPA) standards for sprinklers call for corrosion risk evaluation at installation and periodic corrosion monitoring thereafter. Cortec® has developed its patented sprinkler protection process as a simple, cost-effective solution to this problem.

Cortec's patent covers a comprehensive system of protection that relies on Vapor phase Corrosion Inhibitors (VpCI® or VCI). This technology does not require the direct application of the corrosion inhibitors to every metal surface that needs protection. Rather, the vapor pressure of the corrosion inhibitors, delivered in powder or fluid form, will allow them to vaporize and disperse throughout the piping voids to access even difficult to reach spaces. Vapor phase Corrosion Inhibitors are attracted to metal surfaces, where they adsorb in a protective layer that interferes with the normal corrosion reaction fostered by the presence of oxygen and an electrolyte (e.g., residual water). These Vapor phase Corrosion Inhibitors are able to work in both the liquid phase and the vapor phase, allowing them to protect both wet and dry surfaces within the pipe.

At least two methods of Vapor phase Corrosion Inhibitor application exist. One option is to use VpCI® fogging fluid to deliver the corrosion inhibitors immediately through the dry pipes. The other employs more gradual vapor dispersion by placing dry Vapor phase Corrosion Inhibitors in a housing connected to a pressurized air system that constantly circulates the protective vapors through the piping. This comprehensive system also includes efficacy monitoring methods such as corrosion coupons or sensors.

The primary benefit of Cortec's fire sprinkler protection system is the mitigation of corrosion inside dry sprinkler pipes, helping the sprinklers last longer with less likelihood of failure. This significantly reduces the risk of leakage and clogging due to corrosion, in turn reducing the need for expensive and time-consuming repairs or pipe replacements. At the same time, the system is easy to install, requires little to no maintenance, and is economical and effective. Contact Cortec® to learn more about this exciting cost-effective sprinkler maintenance technology: https://www.cortecvci.com/contact-us/

PAVING THE WAY WITH DETECTABLE WARNING SYSTEMS' NON-REPLACEABLE ALERTCAST PAVER FEATURING ENGINEERED FLANGE

Detectable Warning Systems™ (DWS) has engineered and developed its groundbreaking AlertCast PAVER in response to air entrapment issues stemming from traditional ribbed paver designs. The AlertCast PAVER represents the most innovative paver in the field today, delivering minimal aggregate displacement by combining four side-flange vents and PENETRATOR

anchors which allow for easy and solid installations. Now a part of the proprietary product family of Mar-Bal, Inc. (Mar-Bal: Chagrin Falls, OH), DWS has been providing quality detectable warnings for over 28 years.

Whereas the rib designs of traditional pavers run center-to-center (north-to-south), AlertCast PAVER's design features four side-flange vents running right-to-left (east-to-west). The key to this design is to provide minimal air entrapment between the paver and concrete, ultimately resulting in an easier and quicker installation.

Made in the USA, the AlertCast PAVER is a glass reinforced thermoset composite detectable warning panel engineered for superior impact resistance, slip resistance, wear resistance, and long-term durability featuring truncated domes molded to ADAAG in-line dome spacing specifications. The panels can be used in a wide range of publicly accessible environments including: pedestrian crossings, railway platforms, and ADA curb ramps, among others.

DWS possesses one of the industry's most complete line of ADAAG and DOT compliant tactile warning products. The addition of DWS' new AlertCast PAVER further expands their portfolio of detectable warnings, offering a superior and installer friendly paver backed by a 5-year manufacturer's warranty.

GET AUTOMATED WITH THE DATAGRABBER®

When your time-stamped concrete RH and temperature readings get automated, how will you spend your extra time?

ASTM F2170 in situ concrete slab RH testing is scientifically proven to provide the most accurate and reliable indication of the concrete slab moisture condition at the time that flooring materials will be installed over the subfloor.

And, up to this point, you had to be on-site at the concrete slab to take an RH reading manually. And how often did you have the time to make that happen? And you know that if you could collect more data points, you'd have a better understanding of the slab drying time. The DataGrabber will give you those extra data points while you're out using your new-found free time to quote the next job or plan that overdue vacation. It's automated readings collection and storage in a fun-sized green pellet.

CORTEC® RELEASES QUICK START GUIDE ON DIRECT TO METAL COATINGS FOR CONSTRUCTION APPLICATIONS

Cortec® MCI® is pleased to release a new coatings guide designed specifically for the building maintenance and construction industries. This two-page handout gives a quick intro to Cortec® Micro-Corrosion Inhibiting Coatings™ Technology before getting down to basics on how and where to apply which coatings. The guide helps simplify coatings selection so workers can get down to the business of protecting their assets with a good coating combo for each specific application.

The new guide briefly outlines how to properly apply a system and it lists the specific features for each primer and topcoat.

The best part of the coatings guide is that it brings all the coatings together with a comprehensive chart of recommended system combinations for different applications.

Browse "Cortec's Coatings Guide for Construction Applications" here: https://www.cortecmci.com/mci-coatings-guide-for-construction-applications/

MCI®-2044: AN EXCITING ADDITION TO CORTEC'S 'MIX' OF MCI® CONCRETE REPAIR SOLUTIONS

The power of MCI®-2044 is its Migrating Corrosion Inhibitors, which work their way through concrete to form a protective molecular layer on embedded rebar. The MCI® molecules delay corrosion and reduce corrosion rates once started, helping the concrete patch last longer.

MCI®-2044 offers contractors greater flexibility and versatility when implementing the MCI® HPRS®. MCI®-2044 can be used in any form and pour repair applications from 1-8 inches (25-200 mm) deep, including horizontal, vertical, and overhead applications. It is ideal for full-depth and large volume repairs in practically any concrete structure.

With MCI®-2044, contractors and engineers now have a self-consolidating concrete mix to enhance the durability of their form and pour applications. To learn more about MCI®-2044, please visit: https://www.cortecvci.com/wp-content/uploads/MCI-2044.pdf

INTERESTED IN SEEING YOUR NEW PRODUCT IN THIS COLUMN?

Email your 150-200 word news to editor@icri.org. Content for the May/June 2022 issue is due by April 1, 2022. and content for the July/August 2022 issue is due by June 1, 2022. One (1) high resolution product photo may be included. ICRI reserves the right to edit all submissions.

NEWMEMBERS

SUPPORTING MEMBERS

CTS Cement Mfg. Co
Harmony, Florida
United States
Jose Ruiz

Watson Bowman Acme
Amhersta, New York
United States
Julie Spatholt

COMPANY MEMBERS

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Bonita Springs, Florida
United States
Nikki Young

Exotite
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United States
Andre Zeno

Garage Force Int.
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Roger Hackman

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Key West, Florida
United States
Daniel Ruiz

JACOR Contracting, Inc.
Kansas City, Missouri
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United States
Alex Kaufman

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United States
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United States
Cesar President

Schnell Contracting Limited, LLC
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United States
Stephen Steve

Technical Structural Repair Group, LLC
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United States
Damon DiBassie

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Richmond, British Columbia
Canada
Chantell Segal

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Brampton, Ontario
Canada

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United States

We are focused on the industry's future and **your success.**

ICRI
CONCRETE REPAIR
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ICRI is the center for concrete repair and restoration leadership, supporting a profession built on science and craftsmanship—making the built world safer and longer lasting.

1. Developing an industry of professionals through networking and best practices
2. Expanding certification programs and services to educate and build skills
3. Building strategic partnerships to strengthen the relevance of ICRI and the concrete restoration industry
4. Serving the needs of members and customers with staff, volunteers, and our chapter network

NETWORKING · EDUCATION · INFORMATION · CERTIFICATION
CONVENTIONS · COMMITTEES · INDUSTRY GUIDELINES

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