May/June 2022
Vol. 35, No. 3

CRB

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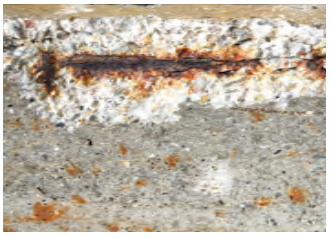


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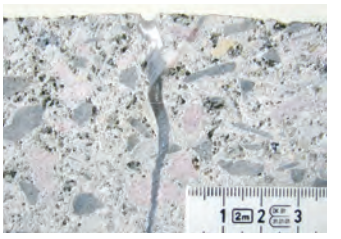

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NOTE FROM THE EDITOR

Summer is here and the construction season has become very busy for many of our members. ICRI chapters have begun holding regular meetings and golf outings are starting up.

This issue of the *Concrete Repair Bulletin* features the 2022 40 under 40 Award Winners. Articles are also included about Holding Effective Meetings, Industry Testing Protocols for Successful Waterproofing Projects, Condition Evaluation of Concrete Structures, and Evaluation and Repair of 100-Year-Old Concrete Structures.

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. Please make sure you let Dale Regnier know about your chapter events and remember to check the ICRI website for the schedule of upcoming events.

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

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

PRESIDENT'S MESSAGE

Celebrating Wins and Looking Ahead

A joint message from the ICRI President and Executive Director


JOHN MCDOUGALL


ERIC HAUTH

We write this column following another amazing ICRI Spring Convention. Over 300 concrete repair professionals gathered recently in Baltimore for three days of networking, education, and celebration.

A random Google search on "celebrating wins" brought up a good, short read on the subject (https://www.reliableplant.com/Read/22191/reasons-leaders-celebrate#).

Number one on the list is a great place to start: "Celebrating wins... *reminds you of the goal you set and why you set it in the first place.*" ICRI prides itself on being the organization that uniquely brings together contractors, material suppliers, and design professionals to network, have fun, and create new ways to improve our great industry. That's why our conventions are central to ICRI's mission.

As the first step in celebrating this win, we want to thank some folks for making this convention a success. First, our biggest "thank you" goes to ICRI's Baltimore-Washington Chapter for serving as our host and throwing down two incredible social events, including a Tuesday evening social at Sagamore Distillery.

Second, we thank our many Supporting Members, convention sponsors, and exhibitors. We simply could not do what we do without your support.

Third, thank you to our first-time attendees! The Spring Convention saw a record-setting 81 first-time attendees. These individuals represent the future of ICRI, and we could not be more excited about their participation.

Fourth, thank you to all the committee chairs and committee members for your commitment to the critical technical and administrative work of ICRI. The hard work that takes place in these committees shapes the future of our industry and we couldn't be more grateful.

Finally, thank you to everyone who attended this convention and brought the ICRI spirit of collaboration and fun to this event. Our organization exists to inspire new connections that advance our great industry and the attendees in Baltimore brought that energy in spades!

The work of ICRI doesn't stop here, of course. We're very focused on the future of ICRI and celebrating more wins soon. Here are just a few of the exciting initiatives underway.

New ICRI Committee Chair Training

Spearheaded by ICRI's Technical Activities Committee (TAC), ICRI has launched a new program to train technical and, eventually, administrative committee chairs to ensure greater consistency and meeting effectiveness. We think this will also prove to be great value-added leadership training for ICRI members that translates back to their full-time roles.

Related to this initiative, we've included in this edition of CRB an article, *Meeting More Goals with More Effective Meetings* by Baker Communciations, which includes some important insights you can put to work right away.

New ICRI Mobile Apps
We brought back a convention mobile app for Baltimore. We plan to build on this platform by creating ICRI's first full association mobile app. That means having critical information at your fingertips, including technical resources, chapters and national events and full access to upcoming committee meetings. We plan to launch the new app this Fall.

We're also looking forward to launching new technical mobile apps for use on the jobsite, including a new app to assess rebar cleanliness. We're very excited about this app and believe it will pave the way for future technical apps that will significantly increase the impact of ICRI technical guidance in the field.

Concrete Slab Moisture Testing—Online Modules
ICRI will soon launch new online educational modules for this popular education/certification program. These new modules will allow ICRI to significantly increase the reach of this program, while we continue to offer live educational programs throughout the country.

These are just some of the programs ICRI is investing in to grow our association and build an even stronger ICRI for the future. We can't wait to celebrate even more wins with our members in the months and years ahead!

Thank you for your continued commitment to ICRI, and don't hesitate to reach out to either of us with your insights and suggestions.

John McDougall, CCSRT
2022 ICRI President

Eric Hauth
ICRI Executive Director

ICRI Mission and Strategic Plan Benefit Members and the Industry

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

- Develop industry professionals
- Professional networks
- Champion innovation and safety

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

- Expand certification
- Quality programs and products
- Enhanced product program services

ICRI Vision: ICRI will be the center for repair leadership supporting a profession built on science and craftsmanship making the built world safer and longer lasting.

ICRI Mission: ICRI provides education, certification, networking and leadership to improve the quality of repair, restoration, and protection/ preservation of concrete and other material systems.

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

- Engage members
- Strengthen chapters
- Grow staff capacity and capabilities
- Serve members

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

- Strengthen strategic partnerships
- Strengthen brand
- Engagement of diverse participants

TACTALK


MARK NELSON

ICRI TAC Goal for 2022—Increase Local Chapter Member Involvement in Technical Committees

The second of our four ICRI Technical Activities Committee (TAC) goals for 2022 is to implement a program to increase local chapter member involvement in our technical committees. We plan to accomplish this goal through a grassroots campaign effort at local chapter meetings to inform chapter members that they can get involved in our technical committees without having to attend our national conventions.

ICRI technical committee meetings are open to all ICRI members. While we continue to have technical meetings at the annual conventions, the majority of our technical committee work is accomplished between conventions with virtual meetings. Even the technical meetings at conventions are now hybrid sessions that include a virtual option for members unable to attend the convention. At the recent Baltimore convention, we had as many virtual attendees as we had in-person attendees.

Joining an international technical committee has many benefits for our members. First, the committee members get the chance to learn about new materials and unique applications of those materials from other members around the world.

Second, the committee members get a chance to network both professionally and socially with some of the best and brightest repair minds in our industry.

Third, through work in the technical committees, members get the chance to participate in improving the industry by assisting in the creation of technical documents, videos, guidelines, and other technical offerings.

Finally, please remember that when you join a technical committee, you do not have to commit to any responsibilities. You will have the ability to simply sit in on meetings to learn more about that segment of the repair industry. If you want to get involved you can speak up, but if you just want to learn from other members, you are free to sit back and listen to the discussions.

The task group responsible for completing this goal is led by Liying Jiang, STRUCTUAL Technologies. Liying has been meeting with Jim Cox of CA Lindeman, ICRI Technical Director Dave Fuller, and me to create a plan to get the information out to the local chapters. However, the best way to get local members to sign up is to simply ask them. If you are a local chapter leader, please ask your chapter members at your next meeting if they want to join an international technical committee.

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**, *STRUCTURAL Technologies*
  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
- **Joshua Lloyd**, *SGS-TEC Services, 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).*

ICRI committees are open to all and they are looking for your involvement.

Lend your expertise and help improve the industry!

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CERTIFICATIONUPDATE

Getting Back to Work!

ICRI is pleased to report that its two certification programs are really ramping up again. Over the past several months as the pandemic has eased, ICRI staff, trainers, and volunteers have been hard at work deploying both the Concrete Slab Moisture Testing (CSMT) and Concrete Surface Repair Technician (CSRT) programs at sites around the country.

The CSRT program provides fundamental education in concrete repair and serves as a great on-ramp program for individuals interested in gaining best practices and knowledge of our industry. The CSMT program offers students a critical understanding of slab moisture testing in accordance with relevant ASTM standards.

In December 2021, ICRI held a successful CSRT live performance exam (LPE) for employees of RTC Waterproofing in Carrollton, Texas—the first LPE since November 2019! The LPE is the final step in the process for students to achieve full CSRT certification.

In March of this year, we offered an onsite LPE exam for employees of ICRI Supporting Member company Vector Construction in Decatur, Illinois. We look forward to conducting another LPE for employees at its Edmonton, Alberta, location in the coming weeks.

On the CSMT front, this year alone, staff and ICRI subject matter experts led by Peter Craig have conducted a number of successful education and LPE testing programs that include programs at World of Concrete, The International Surfaces Event, the Flooring Contractors Association, the National Wood Flooring Association, and at ICRI Supporting Member company Terracon.

In short, these programs continue to gain momentum and impact. ICRI stands ready to help you, your chapter, or your company host education and certification programs onsite.

For more information, contact ICRI Program Director Dale Regnier, daler@icri.org.

Concrete Slab Moisture Testing (CSMT) Program

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- ✓ Build a foundation for concrete surface repair, inspections, and testing
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- ✓ 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)

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

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Rehabilitation of Concrete Structures—Problems and Opportunities: Condition Evaluation Stage

by Alexander M. Vaysburd and Benoit Bissonnette

After water, concrete is the most widely used substance on the planet earth. The volume of in-place concrete in the U.S. is estimated at 7 billion m³. Almost 1.5 m³ per person are placed every year to support the U.S. infrastructure.[1] This article is about the number one construction material in the world, concrete, and the repair of deteriorated, distressed concrete structures. The authors will discuss the process prior to concrete repair design and implementation, with emphasis on condition evaluation. An attempt will be made first to "silt the grain from the husk."

HISTORICAL USE OF CONCRETE

Literally rivers of concrete were poured after World War II, when concrete offered an inexpensive and relatively simple and fast way to rebuild cities in Europe and Japan that were left devastated. The material invented by Romans about 2000 years ago is a foundation of modern development, putting roofs over the heads of billions of people and providing a vital infrastructure for transport, energy, industry, and healthcare. A good example is provided by Japan, which embraced concrete in the second half of the 20th century with such enthusiasm that the country is often dubbed by its citizens as the "*doken kokka*" (construction state).[1] Modern concrete took our civilization upwards, up to 163 stories high in the case of the Burj Khalifa skyscraper in Dubai. Concrete allowed man to tame the North Sea and better exploit its floor, with gravity-based platforms exceeding 300 m (980 ft) in depth. To power a fast-developing China, the Three Gorges dam "choked" the Yangtze with a then-world record 27,200,000 m³ (35,580,000 cubic yards) of concrete.

Through its fascinating development and history, concrete served us well, but not without problems. "*There is no honey without bees*," as Niccolo Machiavelli famously said in the 16th century. Over time, concrete structures age and deteriorate.

MODERN CONCRETE DEVELOPMENT

A great emphasis on the speed of construction that began in the second part of the 20th Century prompted major changes in concrete chemistry, handling, and curing. Such a critical issue as cracking was practically ignored; after all, as often heard, "*concrete is meant to crack.*" The main interest was, and unfortunately in many cases still is, focused on the short-term performance and benefits of construction products. The cost of this approach, in terms of multiple repairs or replacement of prematurely deteriorated concrete structures, is incalculable.

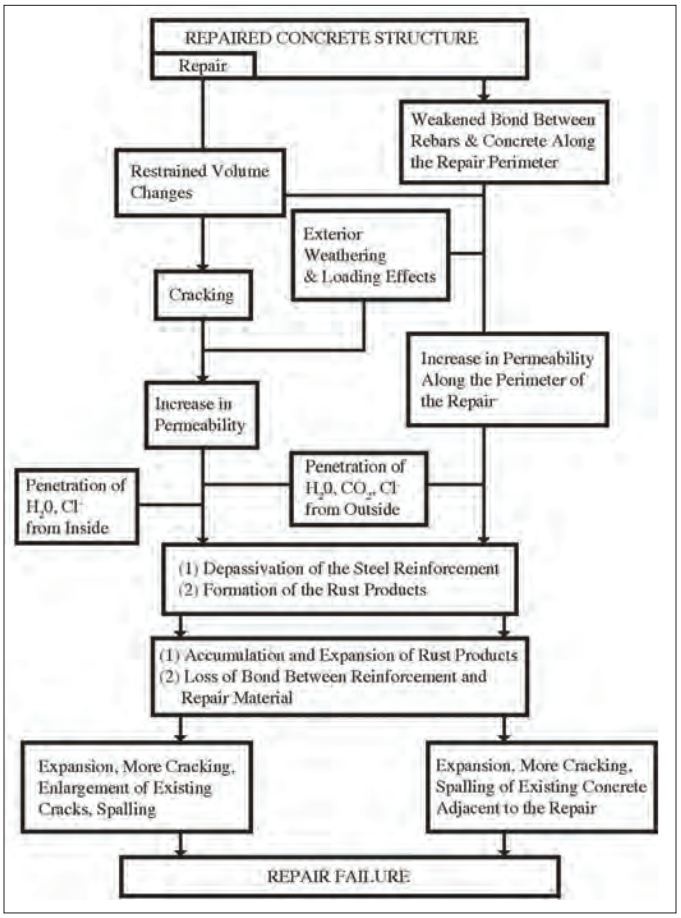

Fig. 1: Holistic model of concrete repair failure[4]

At the end of the 20th Century, we entered a new era, a new beginning in concrete technology—that of *high-performance concrete* (HPC). Whoever came up with this term, this contemporary Machiavelli deserves much credit for the research money flow generated, which effectively led to improvements of some properties of concrete, repair materials, and other cement-based composites. This trend has evolved from *high* to *very high*, then *extra high* and, recently, *ultra high*-performance cementitious materials. At the same time, the condition of our existing infrastructure has kept getting worse.

DECAY OF CONCRETE INFRASTRUCTURE AND NEED FOR REPAIR

There is a widespread concern at the moment of functionality and safety of the crumbling infrastructure. In a *Vision 2020* initiative document, it was reported that "*slightly more than 50 percent of the concrete repairs performed satisfactorily on the U.S. Army Corps of Engineers projects.*"[2]

A similar unsatisfactory situation was found in the UK.[3] Among 215 repair project case studies, only 50 percent were successful. The main failure causes ascribed were:

- incorrect diagnosis of the original cause of deterioration;
- incorrect design and service life prognosis;
- selection of inappropriate material;
- poor workmanship.

In the last three decades, the situation in the concrete repair industry has changed substantially and a greater emphasis has been put on durability. Unfortunately, as unsatisfactory performance data show, all changes were not necessarily implemented using the right approach.

Concrete repair is not a bandage to cover up problems in concrete structures. This incorrect view has lent credence to the belief that concrete repair is so simple that almost anyone can do it, which, unfortunately, still too often ends up being the case. Most of U.S. construction can be characterized as "low-bid, hard-dollar contracting" and, as stated in the *Engineering News Record's* editorial of December 1988, "*clients that want cheap will get cheap*." Yet, it can be easily conceived that in most situations, the cost to design and implement durable repairs ought to be relatively low in comparison with the recurrent cost of endless Band-Aid repairs.

Repair failure analysis from around the world shows that despite the significant advancements in understanding various chemical and physical phenomena responsible for repair failures, the trend towards low-performance repaired structures has yet to be reversed. Unfortunately, our achievements in improving field performance and prolonging the service life of new and repaired concrete structures do not appear yet to be proportional to the efforts spent in research or to the number of papers published on the subject.

Nevertheless, if aging and deterioration of concrete are unavoidable, it is possible and necessary to intervene in some way to keep the rate of these processes as low as possible. In that regard, to paraphrase Shakespeare: to battle, or not to battle for the survival of our crumbling infrastructure? In modern industrialized countries, infrastructure makes up a significant fraction of the public wealth, and an overwhelming proportion is built with concrete.

CRACKING AND CONCRETE DETERIORATION

Deterioration/distress of repaired concrete structures is a result of a variety of physio-chemical processes, such as corrosion of embedded reinforcing steel, freezing and thawing, alkali-aggregate reaction, etc. The holistic model of concrete repair failure is shown in Figure 1.[4]

The most serious deterioration processes that lead to repair failures are caused by cracking of the repair. Restrained contraction of the repair materials, the restraint being provided through bond to the existing concrete substrate, is a major factor leading to cracking, delamination, and failure of repair. In simple terms, the repair material cracks when the restrained deformation exceeds their tensile strain capacity. While the development of tensile cracks may be favorable from the point of view of stress distribution in the repair, the situation becomes very different when judged from the point of view of the repair durability and its capacity to retard the penetration of moisture and aggressive agents into the element. Cracks are life-threatening wounds in concrete and repair bodies.

The problem of cracking in new concrete structures and concrete repairs has become more widespread, notably as a result of the use of *high-performance* concrete and repair materials with higher brittleness and therefore cracking potential. Increasing strength alone can lead to increased brittleness and decreased resistance to cracking. Cracks form because of the brittle fracture and may then propagate. Unfortunately, we have kept losing ground in the battle for survival of our concrete infrastructure and to reverse course and ultimately win, we need to achieve "high performance" in engineering design, material design and production, and construction practices.

CONDITION EVALUATION

Concrete repair is generally defined as an action taken to reinstate to an acceptable level the current functionality of a structure or its components that are defective, deteriorated, degraded, or damaged in some way; and, as much as possible, it should be completed without restriction upon the materials or methods employed.[5]

Repairing a deteriorated or distressed structure is somewhat analogous to treating an ill person. Before any effective treatment can be prescribed, the illness must be

diagnosed, and sufficient tests must be performed so that the physician can develop a thorough knowledge of the disease(s). Similarly, the engineer must conduct sufficient tests and analysis to determine the extents and causes of deterioration. It is also necessary to determine the incidental sources of distress as well as the primary cause.[6] The overall condition evaluation process is summarized in Figure 2.[4]

Face-to-face with the existing structure and its definable or indefinable qualities, the engineer must determine the structure's conditions, problems, causes, and suitability of use. Decisions must be based on personal experience, experiences documented by others, test results and analysis. In general, the engineer will rely on a combination of visual assessment, suitable NDT methods (typically percussion soundings, sometimes more sophisticated methods), representative sampling, and laboratory tests to obtain information enabling the identification, quantitative evaluation, and explanation (causes) of deterioration/distress in the structure.

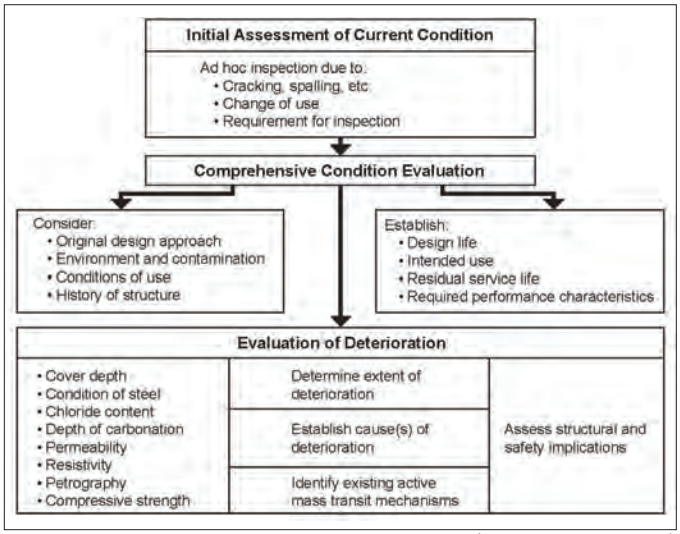

Fig. 2: Flowchart of the condition assessment prior to repair (adapted from reference[4])


Fig. 3: Deteriorated concrete near expansion joint


Fig. 4: Example of corrosion of reinforcement

STRUCTURAL DESIGN CONSIDERATIONS

The overall condition of a concrete structure is very much influenced by the structural system itself. For example, structures with many jointed elements are in general significantly less durable than more monolithic structures. In the case of bridges and piers, joints are generally the components that are most vulnerable to premature deterioration. Material deterioration adjacent to leaking expansion joints (Fig. 3) is common and it often affects zones of high shear in the structural components. This further complicates the structural assessment, as shear failures are generally brittle and can be triggered with little visual warning. Corrosion may instigate debonding well in advance of significant loss of reinforcement section, so incipient spalling can be the first sign of a reduced factor of structural safety.

While it is no secret that the most deteriorated concrete structures involve corrosion of embedded reinforcing steel, determining the real causes of corrosion can be quite complex (Fig. 4). The complexity arises not only from the composite makeup of the concrete itself, but to a large degree from the multifaceted influences of global and local climatic conditions.

There is always a strong interaction between the local exposure conditions and the structural details. Vulnerable elements or areas within the structure (e.g., zones with inadequate cover, cracks, or congested reinforcement) may be contributing factors to deterioration/distress. This means that there is a direct link between durability, or absence of such, and structural design and detailing.[7]

ENVIRONMENTAL CONSIDERATIONS

An almost infinite combination of moisture, temperature, and air flow will yield wide ranges of mass (water and ions) and thermal exchanges. For instance, wetting and drying cycles may lead to a buildup of potentially deleterious substances precipitating near the exposed concrete surface. A member with one face exposed to drying and the opposite face exposed to a source of moisture will experience a one-way flow of water with dissolved products, from the wet to the drying face. Evaporation on the latter will promote precipitation and increasing concentration of the transported products.

Transport of substances through and within the structure result from a complex combination of the following pro-

Fig. 5: Rehabilitation work on a concrete arch bridge (courtesy of D.W. Fowler)

Fig. 6: Form and Pour application on concrete arch bridge (courtesy of D.W. Fowler)

Fig. 7: Deterioration of a reinforced concrete beam due to corrosion (courtesy of Transports Quebec)

Fig. 8: Deterioration of reinforced concrete half joint (courtesy of SIMCO Technologies)

cesses: liquid flow through macro and microcrack systems, capillary transport, diffusion, and osmotic effects. The contribution of each process to deterioration/distress needs to be considered in each situation. The effects of variables such as the actual location in the structure; the chemical environment; the amount, size, and distribution of cracks; the temperature and moisture distributions; and the stress history need to be considered.

Knowledge of the internal environmental condition and transport processes prevailing in the existing structure, based upon adequately performed and documented condition assessment, is necessary to evaluate as reliably as possible the potential transport and deterioration processes likely to develop in a new composite repair system. Ultimately, the general principle is that reducing mass transport within the structure will generally improve its overall durability.

USING THE CONDITION EVALUATION RESULTS

Adequate condition evaluation, the engineering task of finding the exact problems affecting the existing concrete structure, allows one to understand the enemy's plan of attack and develop defensive tactics and alternative solutions. Defensive maneuvers are not limited to pre-emptive frontal attacks. Sometimes, it's sufficient to make a flanking move or simply keep watch on the enemy's actions. Based on comprehensive appraisal of the condition evaluation results, one may:

- do nothing;
- monitor;
- apply protection;
- perform repairs;
- implement strengthening; or
- replace the structure.

Combinations of these actions are also possible.

CONCLUSION

Concrete is a dynamic, living system. And as such, it can rearrange itself in the face of some disturbances threatening its useful service. However, if the destructive forces are severe and unremitting, it begins to deteriorate irreversibly and progressively loses its integrity, as depicted in the diagram of Figure 1. In a sense, it becomes self-destructive, and the only options are repair or, ultimately, replacement.

The purpose of the repair to a concrete structure in trouble is well defined by Young.[6] In repair, after all, the purpose should be that of the Mikado of Gilbert and Sullivan's famous opera, which was to make the punishment fit the

crime. Therefore, to meet such a purpose, the crime must be comprehensively established. Otherwise, the design of the repair project becomes an exact solution to an approximate problem, too often ending with premature failure. It must rather be the "best" solution to the exact problem. The very best design, repair materials, and workmanship will fail if the exact problems of the structure and their causes are unknown and only symptoms are addressed.

Engineers performing inspections and reporting on the condition of the concrete structure must understand the materials they evaluate. Otherwise, a formalistic application of durability provisions without an adequate knowledge of pathological mechanisms and mass transport phenomena may lead to gross errors and threaten the performance of repaired structures.

Unfortunately, questionable rules and guidelines sometimes replace experience-based analysis, logical thinking, and sound engineering judgment. This is almost unavoidable, because of the natural temptation to get the maximum results with the minimum effort, spent time and responsibility.

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Industry Field Testing Protocols for Successful Waterproofing Projects

by Zach Duggan and Rob Cordova

There are many variables on a construction site that can influence the successful installation of waterproof coatings on concrete and masonry structures. These variables include substrate conditions, substrate strength, moisture content, and installation methods such as application thickness and surface preparation. These substrate and environmental conditions contribute to the selection of material and the means in which contractor professionals will install them. Planning to perform the right field tests and conducting these tests correctly is best practice for all professional installations. Product performance is dependent on method of installation and the proper environment. This article will outline some key field tests, material tolerances, and provide practical guidance in the use of these tests to make informed decisions on a job site.

WHY FIELD TEST?

There are many variables we can't control on projects such as unpredictable weather conditions and trade schedules. There are, however, conditions we can control, such as time of install, speaking up, proper planning prior to installing a material, and confirming the installation is consistent with the manufacturer's recommendations. This can be achieved through proper use of industry-accepted field tests. Whether employing the use of these tests during installation or as part of the mockup process, it is important to standardize these tests to provide a consistent benchmark. Specific information, such as location and number of tests required, is typically found in the testing protocols and should be included in project specifications as part of an overall quality assurance program.

The material formula is rarely at fault when a waterproofing project fails. Contributing factors to failures include the substrate condition, surface preparation, installation techniques, or ambient conditions before, during, and soon after installation. Industry-accepted ASTM protocols and testing guidelines from organizations such as ICRI, SWRI, IIBEC, AMPP, and ACI are used to evaluate these factors.

SUBSTRATE TESTING

Working for a manufacturer, we have evaluated many projects over the years. A large portion of product complaints

Fig. 1: Using an electronic non-destructive moisture meter

are caused by the condition of the substrate. A deteriorating substrate, high moisture content, or an improperly prepared substrate can have a high potential for failure when coated with a waterproof coating. Determining substrate moisture levels, properly preparing the substrate for a coating, and determining the absorption rate of a masonry surface can all be accomplished using industry-accepted field tests.

SUBSTRATE MOISTURE

Surface moisture content, moisture vapor transmission, and relative humidity within a concrete slab can all impact a waterproof coating. It is important to understand how field tests determine these real-world conditions, but also to understand the impact each of these conditions may have on a coating.

High surface moisture can impede a material's ability to penetrate and absorb into a substrate. It can also lead to delamination and improper curing or coalescence of a material. Most coating manufacturers publish thresholds for surface moisture. This is typically between 12 percent for acrylic coatings and sealers to 4-5 percent for non-permeable membranes and overlays. A low-cost surface moisture meter can determine these levels in accordance with ASTM F2659, *Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-Destructive Electronic Moisture Meter*.[1] The process is quite simple. One places the meter pins down on the substrate and the meter will provide a percentage of moisture (Fig. 1). With this information you can consult the material manufacturer for their published threshold of surface moisture for the selected coating material.

ASTM D4263, *Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method*,[2] has been a standard moisture test for many non-permeable waterproof coatings (Fig. 2). It relies on an 18" x 18" (46 cm x 46 cm) 4 mil minimum piece of plastic adhered to a prepared horizontal concrete substrate, for a minimum of 16 hours. After the 16 hours has elapsed, the sheet is removed, and the underside face of the sheet and substrate are checked for visible signs of moisture. The mat test is a "go/no-go" standard test and widely recommended within the industry to determine if a slab is sufficiently dry. If no visible signs of moisture are present, installers generally may proceed with installation. Although this is a widely used test, and many manufacturers reference the mat test in installation guidelines, this test does not provide any quantitative data.

Fig. 2: Performing a plastic sheet moisture test

ASTM F1869, *Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride*[3] provides quantitative data. For this method, a kit is used to determine the rate of moisture vapor exiting a concrete slab (Fig. 3). These calcium chloride kits can be purchased at most commercial flooring vendors and are widely available. To conduct this test, the substrate is properly prepared and a small cylinder of calcium chloride, which has been previously weighed, is placed on the floor under a sealed protective cover. The calcium chloride "puck" remains in place for a minimum 72-hour period. The cylinder is then weighed again, and a calculation is used to determine how many pounds of moisture vapor is exiting the slab in a 1,000 sq ft (305 m²) area over a 24-hour period. The protocol recommends three tests for areas up to 1,000 sq ft (305 m²) and one test per 1,000 sq ft (305 m²) beyond. Most manufacturers will have thresholds for their materials based on this test. If the test results surpass their threshold, another material should be used or additional drying methods should be considered.

Fig. 3: Using an Anhydrous Calcium Chloride test

Another test, increasingly used more recently, is ASTM F2170, *Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes*.[4] This method involves drilling a small hole, minimum of 40 percent of the overall depth of the concrete substrate, and placing a sensor into the hole. The hole is sealed for a period of 24 hours at which time the sensor is read using a Relative Humidity (RH) probe also contained in this testing kit. This provides the RH percent in the depths of the slab. This value is used to determine the potential for moisture issues in the future. Again, manufacturers will provide thresholds for their materials for this test.

It is important to understand that while these tests are industry recognized, many of these tests are a snapshot in time and cannot account for changes in conditions over time. It is also important to note that these tests measure different conditions, and the material manufacturer or specifier should always be consulted to determine what tests are appropriate for a project.

SURFACE PREPARATION

Proper surface preparation is the most critical step of any successful coatings project. Improper surface preparation is a leading cause for issues with waterproof coatings. Adequate surface preparation for coatings requires a clean, sound, profiled, and dry substrate. ICRI 210.3R, *Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair*[5] is a valuable, industry-accepted guide which provides proper tools, processes, surface profiles, and important condition assessments as part of the surface preparation process (Fig. 4). Various materials require different levels of surface preparation. This guideline will aid in selecting the correct surface preparation for a project including the mechanics of preparation, chemical treatments, and the use of heavy impact/pulverization tools. The technical guide further explains micro-fracturing or "bruising" of the substrate and the effects this can have during surface preparation. Choosing the correct tools and/or understanding what corrective action to take if this condition occurs can help to reduce the potential for issues.

The ICRI technical guide also covers concrete surface profiles (CSP) (Fig. 5). The CSP numerical scale measures the roughness or texture left behind after surface preparation. Most manufacturers recommend a certain CSP for their materials to ensure proper adhesion. The ICRI CSP guide ranges from a CSP 1, which is fairly smooth, to a CSP 10, which is extremely rough with peaks and valleys over ¼

inch (.64 cm) deep. This guide also provides insight on the types of coatings, their general CSP recommendations, and the tools to accomplish these profiles.

SUBSTRATE ABSORPTION

The last test related to the substrate is testing for the surface absorption characteristics of a substrate. Using a RILEM tube before and after installing a sealer or water repellent can show the effectiveness in the application of these types of materials.

The tests use a straight or L-shaped tube depending on whether you test a horizontal (straight) or vertical (L-shaped) surface. The wide opening of the tube is adhered to the substrate using a "plumbers-type" putty. Water is then added to the tube and monitored. As the water level drops, a volume of water absorbed over time can be calculated and the effectiveness of a treatment can be confirmed.

When installing water repellents, the RILEM tube test can offer guidance for how well the penetrant will absorb into the substrate and is highly recommended during the mockup phase.

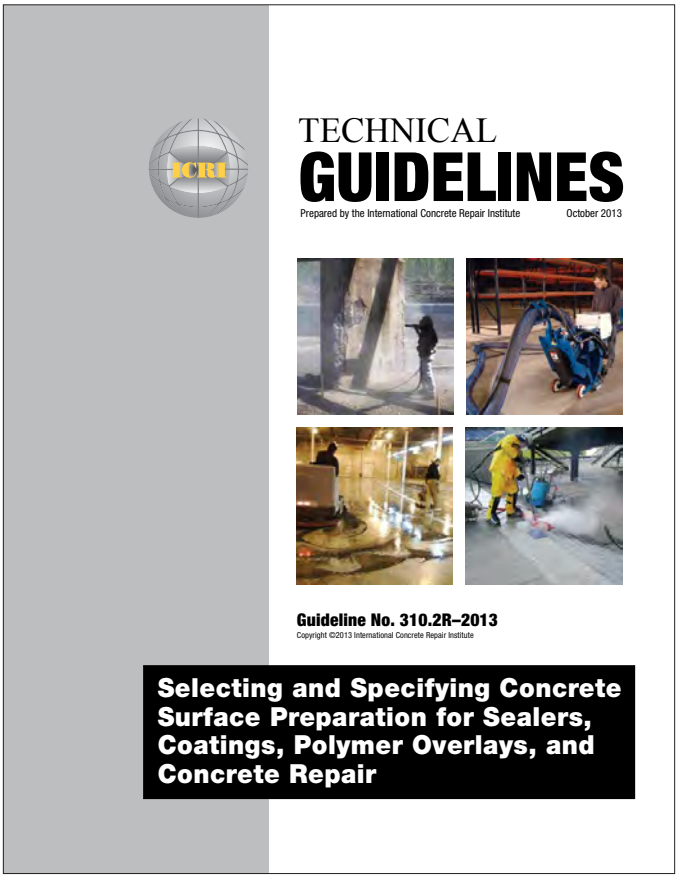

Fig. 4: ICRI 310.2R, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

Fig. 5: ICRI 310.2R Surface Profile Chip Set

INSTALLATION TESTING

While a thorough understanding of the substrate and its preparation is vital to avoiding costly efforts to remove and/or replace materials that have dis-bonded or otherwise failed due to issues related to the substrate, various adhesion tests can also confirm proper surface preparation as well as uncover any material incompatibility.

FIELD ADHESION TESTING

When applying a waterproofing membrane, confirming proper surface preparation and bond is critical to achieving adequate adhesion. A common membrane adhesion test used in the field is referred to as the "cheesecloth" test. In this test, the contractor applies the membrane to the substrate at the recommended thickness, fully embeds a piece of "cheesecloth" or similar fabric into the wet material, and once fully cured, pulls the cloth to observe the adhesion of the membrane. Like many other field tests, this observation test will not provide exact quantitative results. The result of this test provides the observer an assumption that the coating adhesion is greater or less than the strength of the fabric.

If you are looking for more data-driven results, using a pull-off adhesion tester in accordance with ASTM D 7234, *Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers*[6] allows one to evaluate the adhesive strength of a coating over a concrete substrate. This test involves adhering metal dollies onto the coating surface with an appropriate adhesive, coring through the substrate around the dolly and applying a load to the dolly until a failure occurs (Fig. 6). This test will provide a mode of failure (limited by the strength of the adhesive, substrate, and coating adhesion) and psi rating when the failure occurs. ASTM D 7234 is a standard test that is both performed in the field and in laboratory environments and can assist in determining whether proper adhesion has been achieved.

Fig.6: Performing ASTM D 7234 pull-off adhesion test

CROSS-CUT ADHESION TESTING

ASTM D-3359, *Standard Test Methods for Rating Adhesion through Tape Test*[7] can be a valuable tool to confirm adhesion of a waterproof coating on concrete and masonry surfaces as well as over previously coated surfaces. Although the intended use for ASTM D-3359 is for ductile coating films over metal substrates, most material manufacturers and industry organizations widely accept the ASTM D-3359 testing protocol as an acceptable field test to evaluate coating adhesion. While D-3359 is a qualitative test, ASTM does provide a visual key used to evaluate the amount of coating removed while conducting the test (Fig. 7). There are two methods within the protocol.

ASTM D-3359 Measuring Adhesion by Tape, Method A

5A	No peeling or removal,
4A	Trace peeling or removal along incisions or at their intersection,
3A	Jagged removal along incisions up to 1.6 mm (1⁄16 in.) on either side,
2A	Jagged removal along most of incisions up to 3.2 mm (1⁄8 in.) on either side,
1A	Removal from most of the area of the X under the tape, and
0A	Removal beyond the area of the X

Fig. 7: ASTM D-3359 Evaluation Chart

Method A consists of cutting a 2 inch "X" through a cured, high build coating, (a similar method is used to evaluate thin mil coating), with a sharp razor knife. A specific tape is then placed through the center of the cuts and rubbed with a blunt object (an eraser works well for this) to ensure good contact between the tape and the coating. The tape is then removed directly off the coating and visually inspected. The test protocol supplies a grid that is broken down into classifications from 0A, coating removed from the entire area of the X, to a 5A, where no peeling is observed. Coatings manufacturers will provide recommendations of what value should be obtained prior to the installation of their materials. Typically, this will fall somewhere between a 3A and a 5A.

Method B, which is recommended for coatings five mils and less, uses a cross hatch template that is used to create a grid pattern cut into the coating prior to adhering the tape.

Several contributing factors determine test results, such as cure time of the coating and the type of tape used. The coating manufacturer and specifier should be consulted on these critical items. Using ASTM D-3359 as part of the mockup process on any coatings project can help to avoid costly issues related to delamination and coating incompatibility. Additionally, using ASTM D-3359 throughout the duration of the project can help avoid potential project issues broader than the mockup area.

MATERIAL THICKNESS

When applying waterproofing materials, adhering to the manufacturer's recommended thickness is essential. Various issues can occur if these coverage rates are not followed. Moisture curing urethanes can blister and bubble if applied too thick and over-applied vertical coatings can sag on a wall or fail to properly cure. When these same materials are applied too thin, they can result in failure due to early wear or tearing when exposed to movement.

In the field, a simple tool can be used to measure the wet film thickness of a coating on the wall or floor. A Wet Film Thickness (WFT) gauge is a rectangular tool that uses notches marked in mils (a mil is 1,000th of an inch, 25.4 microns), and is placed at a 90-degree angle into the fresh wet coating (Fig. 8). These gauges can be used for both vertical and horizontal surfaces and a typical gauge will range from 1 to 80 mils. The gauge is placed into the wet coating and the teeth corresponding to each mil are observed. The last tooth that shows evidence of wet coating is the wet film thickness in that spot. The test is outlined by ASTM D-4414, *Standard Practice for Measurement of Wet Film Thickness by Notch Gages*.[8]

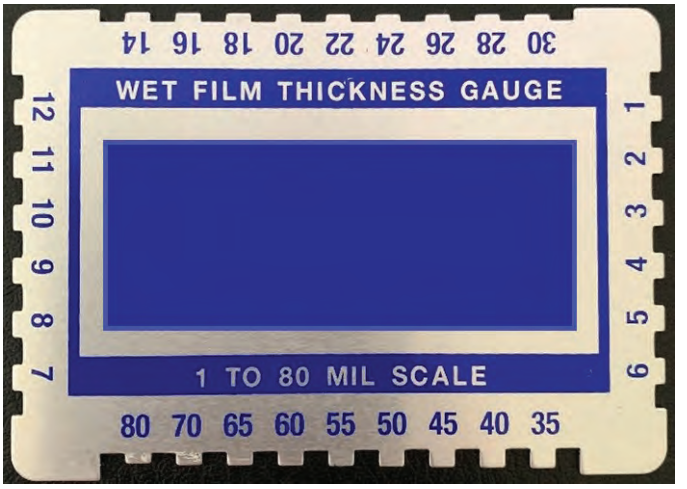

Fig. 8: Wet Film Thickness Gauge

Using WFT gauges can help prevent issues related to coating thicknesses on a project. Keep in mind the wet film gauge can be difficult to use on textured coatings or surfaces due to the aggregate misrepresenting the coating thickness and higher CSP substrates making it difficult to reach a flat surface.

CONCLUSION

Issues related to substrate conditions, surface preparation, and installation techniques can all be minimized using industry-accepted field-testing practices. Various ASTM protocols as well as testing guidelines through industry organizations such as ICRI, IIBEC, SSPC, SWRI, and ACI are used to evaluate a number of these factors. If these practices are used before a project commences and consistently during the installation, they can avoid issues that can become damaging once the project is underway or completed.

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Evaluation and Repair of 100-Year-Old Concrete Structures

by David Schnerch

Fig. 1: Deformed, square cross section of reinforcing bar

The current trend toward the revitalization of many cities' downtown districts has resulted in changes in use of reinforced-concrete industrial buildings to condominiums or office buildings. Many cities also have bridges and other civil engineering structures that are approaching (or have surpassed) 100 years in age. Evaluation of these structures is necessary due to this change of use particularly when additions or alterations result in increased stresses or different load paths. Additionally, repair may be necessitated by the deterioration of reinforcement or concrete over time, variation in the original quality of the materials, or deleterious degradation mechanisms caused by using unsuitable materials.

HISTORY OF REINFORCED CONCRETE STRUCTURES

Although concrete technology was developed and used since Roman times, reinforced concrete structures were uncommon in the United States before 1905, but the use of reinforced concrete for large structures quickly became an economic means of construction.[1] Additionally, more and more factories, warehouses, and agricultural facilities began to use this "new" material in the 1910s and 1920s to avoid the flammability issues ascribed to timber structures. Development of standards and material specifications occurred in parallel with the growth in the use of reinforced concrete. The Joint Committee on Reinforced Concrete was established in 1904 before the founding of the National Association of Cement Users (later to become the American Concrete Institute)[2] to organize the various entities researching concrete properties, develop uniform methods for analysis and testing, and support research. The first attempt to develop a code for reinforced concrete occurred in 1907. By the 1920s, codes established by the American Concrete Institute were being routinely discussed and revised based on the assemblage of applied research and developing industry practice. Additionally, local building codes, such as those available for Boston, New York, and Chicago provided allowable concrete stresses together with minimum design loads that would have been utilized in the respective jurisdictions.

Concrete reinforcement became readily available beyond 1900 and specifications for these bars were developed by the Association of American Steel Manufacturers in 1910 and were later adopted by the American Society for Testing and Materials in 1911.[3] Steel reinforcing was available in

round and square bars with deformed round bars available from ¼ to 1-inch (.64 to 2.54 cm) diameter and square bars available in ½, 1, 1⅛, and 1¼-inch sizes (1.27, 2.54, 2.86, and 3.18 cm). Wire fabric of cold-drawn steel and other proprietary systems were also commonly available for the reinforcement of concrete floors.

GUIDANCE FOR EVALUATION OF EXISTING CONCRETE STRUCTURES

The American Concrete Institute published ACI 562-21, Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures[4] to provide minimum requirements for evaluating existing concrete structures and subsequently developing repairs. The first edition of this document was published in 2013 as a joint ACI/ICRI document with subsequent editions released by ACI in 2016, 2019, and 2021. The intent of this document is to improve concrete repair practice by providing design professionals and others guidance on the evaluation of existing and historic reinforced concrete structures in the interim. The exact evaluation process undertaken will depend on the planned use for the building, the extent of deteriorated conditions, and the impact of changes to the load path.

Evaluation of a structure generally includes a review of the available documents, if available. Construction documents may provide useful information about the size and spacing of reinforcement, basic geometry, and detailing at connections. Review of historical building codes and standards applicable at the time of construction can also provide information useful to the evaluation of the structure.

It is important to consider that changes may have been made during or after the original construction such that the available construction drawings are no longer accurate. Information about the original construction may have also been lost over time, such that verification of the original structure is required. This may require one or more evaluation methods including visual inspection, measurement, and ferromagnetic or ground penetrating radar surveys of the reinforcement. Any non-destructive technique to assess conditions that cannot be directly observed at the surface should also be verified by a more limited number of destructive investigation openings that can be repaired as part of a subsequent phase.

The onsite evaluation should determine the extent of any distress or deterioration and the corresponding extent of required repairs. Close-up visual inspection is the most frequently used evaluation technique and provides a great deal of information about the condition of the structure but is limited to exposed and accessible surfaces. Visual observation techniques can be supplemented with mechanical sounding to identify locations of underlying shallow concrete distress, such as delamination occurring due to corrosion of the underlying reinforcement.

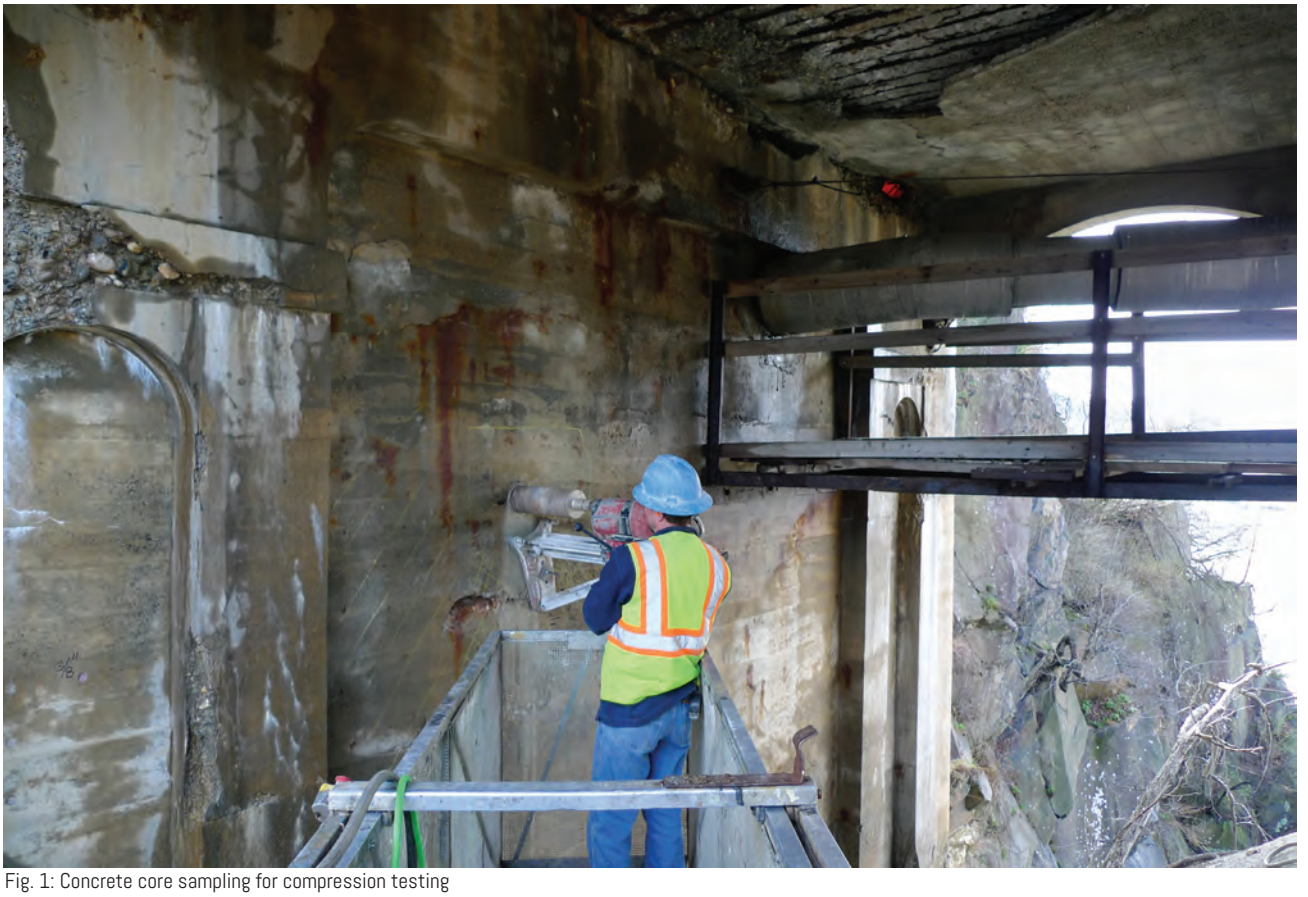

Fig. 1: Concrete core sampling for compression testing

Concrete cores may be obtained and tested in compression to assess the concrete strength. Minimum values of concrete compressive strengths are provided in ACI 562-21. Similar information is available to determine the minimum tensile yield and ultimate strength of reinforcing bars. Tensile testing may be warranted if an accurate assessment of the structural capacity is required.

There are multiple field and laboratory tests that can be applied to historic concrete structures to identify potentially problematic conditions. This includes carbonation testing, chloride testing, and petrographic analysis. Carbonation testing can be used to assess the potential for accelerated corrosion of the reinforcement. Carbonation is a slowly occurring process whereby concrete (in the presence of moisture) reacts with carbon dioxide in the air, thereby reducing the pH of the concrete. Over a century, the carbonation depth may be on the order of several inches depending on the quality of the concrete. If reinforcing bars are present within the carbonated concrete, the protective oxide film normally present in concrete is absent, leaving the surface of the steel potentially active for corrosion.

Chloride testing may be performed using powder or core samples so that the chloride content can be determined at multiple depths. If the chloride content is relatively uniform at each depth, this may suggest that the chloride may have been included as an admixture or introduced through the materials. A decreasing chloride profile with depth would suggest that the chlorides are being introduced over time from the surface by sea spray or deicing salts. Guidelines are available to identify if the level of chloride at the depth of the reinforcement is sufficient to result in corrosion.

Petrographic analysis of lapped core samples may be used to identify many types of concrete material distress including alkali-aggregate reactions and sulfate attack, among others. It can also be used to qualitatively assess the presence of entrained air. Air entraining admixtures were not developed until the mid-1930s.[5] For older concrete structures or structures where air-entraining admixtures were not used, much of the void structure of the concrete is due to entrapped air rather than entrained, and the ability to resist freeze-thaw distress may be diminished.

COMMON ISSUES

Reinforcement

Corrosion of the existing reinforcement is the most encountered condition in historic reinforced concrete structures. Corrosion of the reinforcement can result in delamination and spalling of the concrete, particularly where the reinforcement has minimal cover. A thorough understanding of the cause of the corrosion and whether the rate of corrosion is likely to increase is important to develop repairs that will reduce the rate of corrosion.

Concrete Aggregates and Admixtures

Early concrete structures often utilized aggregates found locally. The ability of the concrete to protect the reinforcement from corrosion was not fully understood when reinforced concrete structures began to be widely constructed and sodium chloride present in batching water or fine aggregate was not limited by initial building codes provided that the chlorides did not reduce the compressive strength of the concrete, as can occur at very high concentrations. Calcium chloride was also widely used because it drew moisture from the air to assist with curing and accelerated the rate of strength increase of the concrete.

Aggregate gradation was not as closely controlled as in current practice. Very large aggregate, including baseball size or above, is sometimes observed in reinforced concrete structures from a century ago—though ACI limited the maximum size of aggregate (the size of which 95 percent by weight of the material can be passed) to not larger than one-fifth of the narrowest dimension between forms or three-fourths of the minimum clear spacing between reinforcing bars (6). Aggregate gradation can also affect the relative proportion of cement paste.

Placement

Placing concrete was performed without internal vibration. As such, consolidation of the concrete through spading or tamping was required periodically throughout the concrete placement. Together with variation in aggregate gradation, this placement method can result in significant regions of voids or honeycombing. Honeycombing can result in discontinuity of the load path if the size of the voided region is significant. Additionally, the voids result in less concrete cover over the reinforcing bars and can cause increased moisture retention.

Construction joints are frequently observed in historic concrete structures at locations where they may not be typically found today. Although available codes required that laitance and unsound material be removed before placing new concrete in contact with previously placed concrete, cracking, leaks, and efflorescence are frequently observed along these joints.

REPAIRS

There are multiple considerations regarding repair design. These considerations not only reflect the technical constraints but also the cost and the appropriate level of durability of the repair that is desired by the owner. Too often, the compressive strength (particularly achieving a high strength at an early age) is given too much importance. While restoring the overall capacity of the structure is important, it is generally not necessary to use very high strength (and correspondingly high stiffness) repair materials that are not compatible with the existing historic concrete. The selection process for a repair material must consider the transfer of stresses through the bonded interfaces at the perimeter of repairs, the potential for shrinkage of the repair mortar, and the ability of the new repair mortar to protect the reinforcement.

Reinforcement that is exposed during the repair may be protected, supplemented, or replaced depending on its condition upon being exposed during the repair process. There are many methods for protecting existing reinforcing bars from additional corrosion. Each method must be considered based on the properties of the concrete, the exposure of the building to the environment, the current level of chlorides, and the depth of carbonation. Establishing procedures for maintaining continuity of the existing reinforcement must also be considered during the design process particularly since the use of smooth (or non-deformed) reinforcing bars was much more prevalent.

The aesthetics of the repairs may be of more concern in a historic structure than a modern structure. Irregular boards and light gauge metal forms were frequently used. Modern form materials, which are generally much smoother, may not be appropriate. The use of historically appropriate form materials will result in the repair locations being much less evident but will add to the overall repair cost. Concrete colors can also be adapted if carefully controlled. Even with these factors accounted for, it can be difficult to replicate the effect of 100 years of natural weathering on the finished surface.

SUMMARY

Evaluation of historic concrete structures requires careful consideration of the material, detailing, and construction aspects as reinforced concrete technology was quickly emerging in the last century. A thorough evaluation is necessary to develop appropriate repairs. The longevity of these structures demonstrates the suitability of reinforced concrete as a building material. Appropriately designed repairs should ensure that these impressive structures can be maintained well into the future.

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Since joining WJE in 2005, **David Schnerch, PhD, PE**, has completed a wide range of failure investigations, structural evaluations, load tests, and repair designs of buildings, bridges, parking garages, and other structures. This work has included the evaluation of reinforced, prestressed, and post-tensioned concrete as well as masonry, steel, and wood structures. Before joining WJE, Dr. Schnerch studied the repair of concrete and steel structures using ultra-high modulus fiber reinforced polymer (FRP) materials. This work focused on the repair and strengthening of existing structures and has been published in the Journal of Bridge Engineering, Transportation Research Record: *Journal of the Transportation* Research Board and other publications..

2022

40 UNDER 40

Tomorrow's Leaders in Concrete Repair

ICRI CONCRETE REPAIR
Restore | Repurpose | Renew

ICRI congratulates these 40 individuals who exemplify dedication to the concrete repair industry. Nominated by their peers, these individuals have demonstrated their commitment to continued professional growth, high potential for continued success in leadership roles, and a strong passion for—and commitment to—the mission of ICRI.

Ali Abu-Yosef, PhD, PE, SE

Senior Engineer
Pivot Engineers

Ali Abu-Yosef is a structural engineer who, specializes in the assessment and repair of existing structures. He has been involved in the repair of numerous concrete structures including bridges, parking garages, high-rises, and water treatment facilities. During his tenure at Pivot, Ali performed forensic investigations, structural assessments, and designed structural repairs. He has also performed corrosion assessments of major structures and designed structural health monitoring systems. Ali has led award-winning repairs including the Austonian Slab Edge Repairs, which received the ICRI 2020 Project of the Year Award.

Abhishek Aggarwal, PE

Senior Associate
Walter P Moore

Abhishek has been a passionate industry champion in contributing to the growth of the concrete repair and restoration industry since 2013. The numerous repair and restoration projects Abhishek has been involved with, and those he has led, have offered a unique opportunity for him to grow as a valuable repair industry member. He is focused on increasing the use of repair standards developed by industry leaders involved in local and national ICRI membership. Abhishek is a significant contributor to the ICRI North Texas Chapter, where he currently serves as the President. He regularly presents concrete restoration training internally and is an active leader within the restoration and renovation practice area at Walter P Moore.

Daniel Aleksov, P.Eng., BSS

Principal
Leading Edge Building Engineers, Inc..

Daniel has been active with the local ICRI Toronto chapter since its inception. He has been working in the engineering industry for the last 14 years with most of his career in engineering consulting firms. In 2014, he obtained his professional engineering designation. He has published three articles related to concrete repair and waterproofing and has presented on these topics as well. Daniel volunteers for the Ontario Building Envelope Council as a board member and vice president. In June 2020, Daniel co-founded an engineering firm specializing in the assessment and restoration/renewal of existing buildings. He is a Principal and responsible for all engineering projects from the investigation, design, and construction management phases.

Gloriana Arrieta Martinez

Consulting Engineer,
Simpson Gumpertz & Heger

Gloriana has been an active member of the Metro New York Chapter of ICRI since 2019. She has been a part of various committees, including communications, programs committee, education/scholarship committee. She is currently a board member, and this year will serve as the secretary. Gloriana joined the New York City office of Simpson Gumperz & Heger (SGH) as a structural engineer in 2016, right after she graduated from the University of Texas at Austin with a doctorate degree. She works with the company's forensic engineering group and particularly enjoys working on concrete repair projects. Since she joined SGH, Gloriana has grown from the role of project engineer to managing small and medium projects.

Clay Broyles

Sales Representative
The Euclid Chemical Company

Clay has been a valuable contributor to the North Texas Chapter of ICRI since 2015. He has served on the Chapters' Special Events Committee since 2015 and chaired the Committee in 2018 and again in 2022. Clay has served on the NTX Board of Directors since 2015 as a Director, Secretary, Vice President, President Elect and as Chapter President in 2020. For the last seven years, Clay has worked as a Construction Products Sales Representative for the Euclid Chemical Company, supporting North Texas, Oklahoma, and Louisiana. He is also a member of the Structural Engineers Association of Texas.

Cesar Carrillo, PE

Project Manager, Associate
Walter P Moore

Cesar has been an active member of the Southern California ICRI chapter since 2017. In 2018, he was nominated to be a member of the Executive Board for the Southern California ICRI chapter. Since joining the board he has organized many events which have encouraged analytical discussions between Contractors, Designers, Distributors, and Manufacturers. Cesar began at Walter P Moore in 2017 as an entry level engineer and quickly rose to the Project Manager role. He is a licensed Professional Engineer who specializes in the evaluation and restoration of existing buildings structural and building enclosure components to extend the buildings service life.

Mohamed Chroufa, Eng. M.Sc

Business Development Manager
Sika Canada

Mohamed has been involved in the concrete repair industry for several years and is passionate about his career as an engineer. He is involved at the QP Chapter level on the BOD and attends many of the local chapter events, frequently encouraging guests to attend. Mohamed holds an Eng. M.Sc degree and began at Sika as a Technical Sales Representative while also providing engineering support to customers. His hard work and dedication were acknowledged as he was rapidly promoted to Business Development Manager for Concrete Repair materials for Canada's Eastern Region.

Dave Clark

San Francisco Branch Director
Pullman SST, Inc.

Dave has been involved with ICRI for several years and has greatly contributed to the NorCal chapter. He began his career in the concrete repair industry with Structural Group as a project engineer about 17 years ago. His hard work and passion for the industry led him to many achievements throughout his career as he managed various large-scale repair and restoration projects throughout the nation and abroad. As a result of his ability to manage highly technical repair projects along with his mentoring and leadership capabilities, he made great career progressions and now serves as Branch Director for PULLMAN San Francisco.

Tayton Eggenberger

Project Manager
Restoration Systems Inc.

As a project manager for Restoration Systems Inc. (RSI), Tayton plays a critical role as the go-to for estimating and managing major concrete restoration projects in the Minneapolis metro and surrounding areas. He is currently leading Restoration Systems Inc. through a multi-state expansion, handles high-profile projects and organizational improvements, and is known throughout the team as a dependable solution architect who is always willing to help others. He has been an enthusiastic active member of the ICRI MN Chapter for the past 4+ years and regularly encourages additional RSI employee involvement.

Stephen M. Garrett, PE

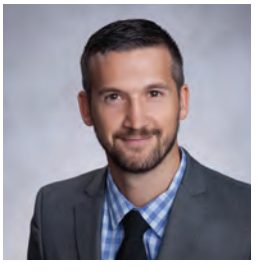
Senior Associate—Durability and Corrosion
Wiss, Janney, Elstner Associates, Inc.

Stephen is an active consulting member in ICRI committees 210, 320, and 710, and a voting member in 510 and 160. He currently serves as Vice Chair of Committee 160 and is scheduled to be Committee Chair in 2023. He has given several technical presentations on nondestructive evaluation and material durability to ASNT chapters and at ASNT national conferences. Stephen joined WJE in 2014 and has been involved in a variety of assessment and repair projects for various reinforced concrete structures, including: parking garages, residential and commercial buildings and facades, industrial facilities, and infrastructure systems. Serving as both technical lead and project manager for many of these projects, he has demonstrated proven leadership and technical abilities in condition assessment, nondestructive testing, laboratory testing, repair design and construction period engineering services.

Steve Genovese

Senior Branch Manager-Chicago
Western Specialty Contractors

Steve has been in the concrete repair industry with Western Specialty Contractors for his entire 15-year career since graduating from Illinois State University with a degree in Construction Management. Since 2012, he has been an active member in the ICRI-Chicago Chapter and has held the following board positions: 1st & 2nd Year Director, Secretary, Vice-President, President, and Past-President. In 2015 under Steve's leadership Western's Chicago Branch was awarded the George N. Bishop Award which is given to the top performing branch within Western.



Peder Hals, PE

Associate, Senior Project Engineer
RDH Building Science, Inc.

Peder joined ICRI and the New England chapter about six years ago. Since then, he has served as Secretary, Vice President, and President of the NE chapter. He currently remains active on the board of directors. Peder is a licensed structural PE working for RDH Building Science. Prior to that, he has ten years of professional experience with WJE and two years of professional experience with HNTB. His profession focuses are masonry repairs, façade investigation, condition assessment, and waterproofing.

Brittany Hill

Strategic Account Manager
Master Builders Solutions

Brittany is a longtime member of ICRI and greatly involved in the local chapter. This year she has accepted the role of Chapter President for the First Coast Florida Chapter. She has been in the construction industry for over 19 years. She holds a Master's in global business and has completed her CDT. Brittany has experience in R&D, marketing, communications, purchasing, training, and sales. Her knowledge spans across roofing, wall coating, waterproofing membranes, sealants, and concrete repair.

Sonja Hinish, PE

Senior Associate
BC&E, LLC

Sonja has been a member of Rocky Mountain ICRI since 2019 and immediately joined the board as the treasurer. She is experienced in a variety of practice areas including failure and damage investigation; bridge inspection and repair; assessment, repair, and rehabilitation of both contemporary and historic structures; and structural analysis. She has extensive experience performing ground penetrating radar and is familiar with many other types of non-destructive testing techniques. She is well known in our community and actively leading in our industry.

Sarah Horton

Preservation Manager
Berglund Construction

Sarah Horton is a preservationist and assistant project manager with Berglund Construction in Chicago and has a Master of Science in Historic Preservation from the School of the Art Institute of Chicago. She recently contributed to several high-profile, award-winning projects. Sarah became an active participant in the ICRI Chicago Chapter in late 2019 and in 2020 joined the Chapter Board, where she immediately began contributing to the Social and Scholarship committees. Sarah also volunteers her time to the Association of Preservation Technology Western Great Lakes Chapter, where she has been the Treasurer since 2018.

Reid Johnson, P.Eng

Managing Director
Strategic Building Advisors, Inc.

Reid Johnson has been an active participant in the Repair and Renewal of Existing Buildings in the Greater Toronto Area for the last 11 years. Reid has actively participated in the Toronto ICRI chapter since its inception, and frequently encourages other WSP Canada colleagues to attend events and become more involved in the local industry. Reid has also been an active participant in other local associations including the Sealant and Waterproofing Association of Ontario (SWA) and the Building and Concrete Restoration Association of Ontario (B&CRAO). He was on the board of directors for SWA of Ontario for five years. Reid is taking the knowledge that he has amassed during his career and has recently started a new company, Strategic Building Advisors Inc., which will provide repair and renewal services for existing buildings in the Greater Toronto Area.

Westin T. Joy, PE

Senior Civil Engineer, Concrete and Structural Laboratory, Bureau of Reclamation

Westin Joy, PE, has been a member of ICRI since 2013. He is a voting member of ICRI committee 320 and has recently been providing expertise on identifying and repairing concrete cracks as part of sub-committee 320E. For over 12 years at the Bureau of Reclamation, Westin has led in the design and implementation of over 17 major concrete repair projects and countless smaller projects within the Bureau and for other federal agencies, including several emergency repair projects. Westin is widely recognized as a lead expert in concrete repair throughout Reclamation and he was a senior editor on the 2nd Edition of ***Reclamation's Guide to Concrete Repair***, which is referenced internationally. He is an active member in both the national American Concrete Institute and ACI Rocky Mountain Chapter.

Danielle Kennedy

Structural Restoration Design Engineer
Read Jones Christoffersen Ltd.

Danielle is a board member of the local BC Chapter. She contributes heavily to growing the chapter membership and coordination of local chapter events. She attends, and is involved with planning, most of the local chapter events. Danielle currently works as an Engineer In Training for a Structural Consultant specializing in concrete repair and restoration.

Adrienne Larson

Senior Associate
Wiss, Janney, Elstner Associates, Inc.

Adrienne is a current second year director and has served on the Rocky Mountain Board for the last four years. She stepped up as a leader to run the communications committee and greatly contributes to board meetings and all local events. Adrienne is a licensed civil engineer specializing in Forensic Engineering. She was recently promoted to Senior Associate at Wiss, Janney, Elstner Associates. She is actively on job sites helping to engineer solutions for Plaza Decks, Waterproofing Repairs, Expansion Joints, and Balconies. Adrienne is well known in the Denver Engineering and ICRI community and a standout leader within our industry.

Andrew Lobbestael

Senior Associate
Wiss, Janney, Elstner Associates

Andrew joined the ICRI Michigan chapter in 2012 and has served on the board since 2015. From 2017 through 2019, he served as President of the local chapter. He is currently an at-large member on the board and serves on the Membership Committee. Andrew joined Wiss, Janney, Elstner and Associates, Inc. fifteen years ago. He currently serves as Senior Structural Engineer, Senior Project Manager, and mentor in the Detroit office. Andrew is a licensed Professional Engineer in the State of Michigan. He completed a Master Civil Engineering degree (structural emphasis) in 2014 and obtained a Bachelor of Science dual-degree in Architecture and Civil Engineering in 2010.

40 UNDER 40

Kirk MacDougall

President
Atlantic Building Restoration Ltd.

Kirk has been promoting the values of quality concrete repair across Atlantic Canada for many years. As a new company based in Halifax, Nova Scotia, Canada, Kirk and Atlantic Building Restoration have invested in their growth through membership in ICRI. They teach their crews using the ICRI guidelines, educate their clients and design partners using the guidelines as well. Kirk and Atlantic will be a voice for ICRI throughout Atlantic Canada for years to come.

Kyle Marston

Outside Sales Representative
Smalley and Company

Kyle joined ICRI recently and has stepped up in big ways. He asked to be a board member, he volunteers at all our events, he recruits new members to our chapter and is frequently asking: "How can I get more involved?!" Kyle recently earned a CSMT certification at WOC and is interested in leading future classes here in Colorado and becoming a certified instructor. He has shown tremendous dedication to the association and our local chapter.

Kelvin Miller

Principal Technician
Miller & Co Concrete Solutions, Inc

Kelvin is an ICRI BC Chapter board member and has been an ICRI member ever since starting his company. At his company, he promotes the benefits of using ICRI standards and specifications to his clients, to ensure they are getting quality work done by trusted contractors. When dealing with subcontractors, he also ensures that they have a level of understanding on par with ICRI guidelines to ensure projects are performed well. His promotion of ICRI is based on his desire to have structures repaired properly, whether his own firm does the work or not.

S. Parker Mink, PE

Senior Associate
Wiss, Janney, Elstner Associates, Inc.

Parker Mink joined WJE in 2013 and has worked on a wide variety of projects within the concrete industry. He has participated in ICRI over this time, subsequently becoming a member, and a local chapter Board Member. He has contributed to ICRI by being a technical resource, by his active participation, by his leadership, and by his support of various fundraising activities. His ICRI activities have included the following: Meetings: Approximately 20; National Conventions: 1; Chapter Board Meetings: 7; National Committee Meetings: 4; National Technical Sessions: 8; National Social Events: 1; Chapter Social Events: 2; Chapter Clay Shoot Fundraiser: 7; Chapter Golf Tournament: 8.

Melissa Mitchell

Project Manager
Concrete Protection & Restoration, Inc.

Melissa has been a member of ICRI since she started with CPR in July 2014. She attends many local chapter events, including quarterly dinner meetings, project award ceremonies, and group outings. She has a strong relationship with other members of ICRI. Melissa is also the individual in our office who is always encouraging newly hired employees to get involved with ICRI and inspiring them to attend local events and sign up for membership. CPR hosts an annual ICRI fall technical seminar at our headquarter location in which Melissa helps to organize and set up. Melissa also helps with the local ICRI Baltimore-Washington chapter golf outings, whether it be encouraging company sponsorships and signups or stuffing gift bags as giveaways.

James O'Malley

Project Engineer
Concrete Protection & Restoration, Inc.

Whether it be a dinner meeting or a fun group outing, James attends most of the local chapter events. You will find him socializing with other industry members at these events. In addition, he has submitted various projects to the Project of the Year awards on both a national level and at the local level. CPR hosts an annual ICRI fall technical seminar at our headquarters location, which he helps to organize and set up. He also helps with the local ICRI Baltimore-Washington chapter golf outings, including signing up golfers and encouraging sponsorships to assisting with day of setup and operations.

Michael Payne, PE, PMP

Senior Project Manager
Building Envelope Consultants & Scientists

Michael has been actively involved in ICRI since 2013. He spent nearly a decade as part of the Baltimore Washington Chapter. There, he actively attended meetings and other local events and eventually joined the board of directors. Michael acted as the chair for several local technical committees including the technical publications committee, where he was responsible for developing and publishing the chapter's quarterly news and technical bulletin, The Aggregate. In 2020, Michael moved to the Pittsburgh market to open a branch office for his company and quickly joined the local Pittsburgh ICRI chapter. Michael has worked diligently with the rest of the current board since that time in navigating the local chapter through the COVID pandemic and attempting to revitalize the chapter as 2022 begins. Most recently, Michael has coordinated with the national technical committee to act as a co-proponent of ICRI proposal for ACI 562 adoption into the IEBC.

Roman Prus
Construction Manager
Pullman SST

Roman embodies the vision of ICRI: He is a professional dedicated to craftmanship that makes the built world safer and longer lasting. He continually seeks new and better ways to execute repair work, never settling for what has always been. Roman will attend chapter events and promote attendance of peers for them to gain knowledge and networking experience. When the Delaware Valley Chapter hosted the most successful National Convention ever, Roman was proud to participate. He is looking forward to attending the Spring convention in Baltimore!

Shawn Quinn Jr.
Estimator/Project Manager
Quinn Construction, Inc.

Shawn is a champion for the restoration industry as an active committee member for ICRI and requires that our company be active members in other industry associations. As a long-term captain of the Quinn Construction ship, Shawn has close business relationships with most of the structural engineers in the tri-state area as well as the reps and leaders of the industry's manufacturers. Together they are able to provide the best products and service for the end-users' specific circumstance.

R. Grant Russell, PE, MSCE
Principal
Norton & Schmidt Consulting Engineers, LLC

Grant has over 6 years of experience in structural engineering and worked on over 100 individual properties through consulting, structural design, documentation, building diagnostics, restoration, and site observation. He works closely with other engineers, owners, and property managers in order to find ways to protect and preserve their assets while mitigating potential liabilities. Grant can restore building functionally and construction mistakes through Fiber Reinforced Polymers (FRP). Grant is a director for the ICRI Great Plains chapter and has assisted in putting together technical seminar topics as well as speakers. He has also presented on FRP at a technical session in St. Louis, MO. Grant has attended multiple local chapter meetings and events.

Corey Spitzer
Project Manager
Henson Architecture

From the time Corey joined and quickly got highly involved in ICRI's MNY Chapter, she has attended the vast majority of our events. This includes every in-person technical event since mid-2017; all the virtual events in 2020, 2021 and 2022 so far; 2019 golf outing; all Summer Socials (2017, 2018, 2019, 2021); Holiday Parties (2018, 2019, 2021); and our full-day Symposium (2018, 2019, 2021). Additionally, she has been the primary organizer for all virtual events in 2020, the full-day Symposia since 2018, summer socials, and many in-person events. She also serves as our technical support for all Zoom meetings, a role that is invaluable in our new world since March of 2020. I currently serve on two Boards (ICRI MNY Chapter and APTNE) with Corey and, to say she stands out among her peers is a major understatement. Any association would be lucky to have her.

K. Ryleigh Tatum
Estimator
J. J. Morley Enterprises, Inc.

Ryleigh has been an ICRI member for about 3 years and is the Vice President of the Gulf South Chapter. Ryleigh is on the Membership Committee, Speakers and Topics Committee, and the Membership Outreach Committee for the Gulf South Chapter of ICRI.

Kandace Thompson
Project Manager
Western Specialty Contractors

Kandace attended her first convention in Minneapolis as well as the ICRI Fall Convention in Baltimore. She is the secretary of the Central Texas Chapter, and she's trying to grow the chapter along with the current president. Kandace is an At-Large member on the national board and a young professional who will help to grow ICRI nationally. I think she's a great asset to the ICRI organization.

Kurt Tyler
Senior Associate
Wiss, Janney, Elstner Associates

Kurt has been involved with ICRI since 2009, shortly after joining WJE, first at the chapter level (Houston), where he served as secretary, treasurer, and vice president. In Spring 2016, he attended his first convention as the Houston chapter delegate. Since then he has become actively involved in two technical committees, 210 and 510. Kurt had the unique opportunity to relocate to Argentina for his wife's job, and while this necessitated him to pause his participation in the leadership of the Houston chapter, he remains actively involved in both 210 and 510, where he is secretary of both committees. Kurt offers strong practical engineering knowledge and diverse project experience to his active technical committee contributions. Kurt has attended nine conventions.

Eri Vokshi, PE
Sr. Product Engineer-CFRP and Corrosion Products, Sika Corporation

Eri's early work in product testing provided her an opportunity to collaborate with some of the top university and testing laboratories. This piqued her interest in research and development. She is actively working toward development of more widely recognized and approved FRP documents through ACI and ICRI. She is passionate about the development of FRP products to more efficiently and effectively solve some of the most challenging restoration and strengthening projects in our built world. Eri has attended more than 10 ICRI events over the years (and many more ACI events) and presented at the ICRI Spring 2022 Convention.

Justin Ward, B.A.Sc., P. Eng.

Project Manager
Synergy Partners Consulting Ltd.

Justin was instrumental in the formation of ICRI Toronto Chapter in 2016, bringing together his passion for the concrete repair industry, his enthusiasm for cultivating a shared knowledge base, and his aspiration for an inclusive, well-rounded technical community. He regularly helps organize technical seminars and networking events. His efforts have served to foster an enduring camaraderie among members of the local concrete industry and to strengthen the technical knowledge base of industry partners. Justin was instrumental in the early success of the chapter by raising awareness of Toronto's local chapter and bringing in many new members. Since its inception, Justin has attended at least 10 chapter planning meetings, at least 10 local chapter events and 1 national convention. His exemplary project work and technical expertise have equipped him to make valuable contributions to ICRI.

Eric Williams

National Sales Manager – US
Vector Corrosion Technologies Inc.

Eric champions ICRI within Vector Corrosion Technologies. He has attended 4 national ICRI events and numerous events at his local chapters, Delaware Valley and Baltimore-Washington, over the past 5 years. As a member of the Delaware Valley chapter, he supported the ICRI National Convention in 2019. Eric helps organize national ICRI events within Vector, coordinate attendance for Vector employees at ICRI events, evaluate ICRI sponsorship opportunities and ensures Vector takes advantage of ICRI member benefits. Eric sits on ICRI's Corrosion Committee and has helped write a number of guidelines. Eric has also assisted with the preparation and review of Vector's ICRI project award submittals.

Dave Wingard, PhD

Group Leader
The Quikrete Companies, LLC

Dave works as a member of multiple committees to give input from the materials perspective related to concrete repair. He attends the national convention and takes part in committee meetings as they come up throughout the year. Dave is a member of ICRI 320 and 210 and is involved with committees as they work toward guides for evaluating and repair of ASR affected concrete. He is also a member of TRB and represents QUIKRETE at ASTM and NTPEP.

Ryan Young

Project Manager
J.J. Morley Enterprises, Inc.

Ryan has been a driving force in the Georgia Chapter of ICRI. He was co-chair of our Social Committee, which did an excellent job making our Annual Scholarship golf tournament a huge success. He is also this year's Vice President and Social Chair. He has attended over 30 events for the local chapter of ICRI and stands out among his peers by representing his industry day-in-day-out, being involved with the executive board, and doing so while taking care of his expecting wife at home! He is what ICRI is all about.

Adam Zius

Arizona Division Manager
Restruction (a division of Structural Preservation Systems, LLC)

Adam is a member of the Arizona Chapter of ICRI. He actively participated in planning for chapter and fundraising events. Adam has worked his way through the chapter in leadership roles and became president of the chapter and has attended at least one national convention. Adam encourages and financially supports participation in chapter meetings and events for his team at the AZ office. Adam practices and supports ICRI standards for concrete repair and strengthening.

Do you know someone who stands out from the crowd?

40UNDER**40** nomination eligibility:

- Current member of ICRI (or work for a current company member) and employment within the concrete repair industry.
- Plan to continue in roles that aid the future of concrete repair.
- Exhibit characteristics that demonstrate continued success and leadership skills.
- Active participant in ICRI on either the chapter or national level.
- Under the age of 40 as of January 30 of the award year.

40 UNDER 40

Tomorrow's Leaders in Concrete Repair

Meeting More Goals with More Effective Meetings

Reprinted with permission from Baker Communications (www.bakercommunications.com)

Sometimes it seems like we spend entire days, even weeks, doing nothing but leading or participating in meetings. Management meetings, team meetings, one-on-ones, huddles, performance reviews, and coaching... it never seems to end!

Meetings are a big part of how we get our jobs done. We need to keep in close contact with our teams, our leadership, and other stakeholders in order to plan, direct, and track progress on all our projects and goals.

However, we all know that meetings don't always do what they're supposed to. Meetings that run overtime, get off track, or simply don't accomplish anything constructive can become a huge waste of everyone's time.

If people in our organization are moaning and groaning about going to meetings, chances are that the meetings aren't viewed as being useful or effective—and that defeats a large part of our purpose in having them at all. Our meetings will become even less effective if the participants aren't engaged.

So how do we ensure that our meetings are effective?

WHAT IS AN EFFECTIVE MEETING?

First of all, what does an effective meeting look like?

We can probably consider a meeting fairly effective if it takes a reasonable amount of time, and it achieves its purpose. It should also involve active participation from everyone present, and/or satisfy their needs—otherwise, the meeting is a waste of time for those participants.

Ideally, a meeting should also produce better ideas, solutions, or decisions than an individual would have come up with on their own. If it doesn't, what's the point of dragging everyone into a meeting?

WHY DO MEETINGS FAIL?

Meetings often fail to achieve their aims either because they lack a clear purpose, or they lack the necessary structure to accomplish it.

We often focus on the content for a meeting and neglect the process. When we don't plan effectively, meetings run long, conflicts arise, people digress and get off on tangents, and hidden agendas take over.

Keeping meetings focused, constructive, and short requires a bit more preparation, but it's worth it for the improved results.

4 STEPS FOR PLANNING AN EFFECTIVE MEETING

1. Before we even get started planning a meeting, we should first determine whether we really need one. What is our actual goal? If it's something that can be accomplished without calling a meeting, it would probably save time to use another method.

2. When we've determined what our desired outcome is, we also have the first part of our framework for the meeting plan: our purpose. This, in turn, gives us some parameters for the activity and content of the meeting, which will be based on achieving that outcome. Is our purpose to solve a problem, make a decision, gain understanding, or commit to a course of action?

3. We also need to make sure that we engage the right participants. If we have people at a meeting who don't need to be there, or if we neglect to include people whose approval or input would be useful, we have only created additional problems. Who would want or need to be involved? What roles should they have? Who should be present at the actual meeting, and who can we fill in later?

4. Developing and distributing an agenda—preferably well before the meeting, so participants have time to prepare—can be extremely useful for keeping everyone on track. An agenda can be simple or complex. It might include:

    a. The meeting subject and purpose
    b. Topics to be covered
    c. Process to be used for each topic
    d. Time allocated for each topic
    e. Topic leader or presenter
    f. How the participants should prepare
    g. Logistics (date, time, location)

PRESENTING AT A MEETING:

Running a meeting is a presentation skill, though we may not always think of it in those terms. After all, it involves speaking to a group, delivering important messages, and facilitating discussion. Even if we aren't in charge, many of our presentations will take place during meetings. When running a meeting or presenting at one, it is important to plan effectively and to have an established agenda. We should consider our goals for the meeting and plan accordingly. Best practice is to send the agenda out to all the meeting participants ahead of time, rather than just distributing it at the meeting. If the purpose and the agenda are clear, participants will come prepared—and hopefully motivated—for the task at hand. Stick to the agenda to keep things from running overtime or getting off track. Follow up afterward with a summary and an action plan to eliminate confusion and create accountability.

Bonus Tip: It's often beneficial to send the agenda out far enough ahead of time to allow participants to provide input or reactions. That way we can incorporate any suggestions or changes and help secure commitment and engagement from our participants. Sometimes we can even shorten the meeting because parts of the agenda get handled or eliminated ahead of time—and nobody ever complained about a meeting being too short!

CONCRETE REPAIRCALENDAR

OCTOBER 23-27, 2022
ACI Concrete Convention
Dallas, TX
Website: www.concrete.org

NOVEMBER 7-9, 2022
2022 ICRI Fall Convention
Atlanta, GA
Website: www.icri.org

JANUARY 16-19, 2023
World of Concrete
Las Vegas, NV
Website: www.worldofconcrete.com

JANUARY 31—FEBRUARY 2, 2023
The International Surfaces Event
Las Vegas, NV
Website: www.intlsurfaceevent.com

APRIL 2-6, 2023
ACI Concrete Convention
San Francisco, CA
Website: www.concrete.org

APRIL 17-19, 2023
2022 ICRI Spring Convention
Vancouver, BC, Canada
Website: www.icri.org

INTERESTED IN SEEING YOUR CONCRETE INDUSTRY EVENT LISTED HERE?

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

INDUSTRYNEWS

VECTOR CORROSION TECHNOLOGIES AND PULTRALL ENTER INTO DISTRIBUTION AGREEMENT

Vector Corrosion Technologies Ltd. (Vector) and Pultrall Inc. (Pultrall) announce that the companies have entered into a formal distribution agreement whereby Vector will promote and sell Pultrall's range of composite reinforcing bars for concrete.

Pultrall has been manufacturing V-Rod composite reinforcing bars since 1987 and has obtained ISO9001 and ISO14001 certifications. V-Rod's structural reinforcing bars meet applicable CSA and ASTM standards and are available in a wide range of shapes, sizes and guaranteed minimum tensile strengths.

Vector is the leading full-service supplier of technologies and services to mitigate corrosion and extend the service life of concrete and masonry structures. Vector staff work directly with engineers and contractors in North American market and works with over 25 distribution partners to service the international market.

For more information on Pultrall, visit www.fiberglassrebar.com.

For more information on Vector Corrosion Technologies, visit www.vector-corrosion.com.

COBOD AND PERI EXPAND 3D CONSTRUCTION PRINTING DISTRIBUTION COOPERATION

Danish COBOD International is well-known for being the market leader in the development and production of 3D construction printers, while PERI Group is a leading company globally within formwork equipment, scaffolding, tents and now also the distributor of COBOD 3D construction printers.

PERI has successfully been distributing COBOD 3D construction printers since 2019 following that PERI in 2019 became a minority shareholder of COBOD. Since 2019 PERI also successfully used COBOD's 3D construction printers on several projects, including the world's first 3-story apartment building in Germany.

COBOD and PERI is now expanding the successful cooperation, such that PERI in Europe beyond German speaking countries will also distribute COBOD's printers in Poland, Benelux and France. In the US, PERI will be the distributor for the states of Washington, Oregon, Nevada, Arizona, Illinois, Indiana, Michigan in addition to Texas.

For more information visit www.cobod.com.

ASSOCIATIONNEWS

AMERICAN CONCRETE INSTITUTE RENAMES ANNUAL AWARD GIVEN TO OUTSTANDING EDUCATORS IN THE FIELD OF CONCRETE MATERIALS AND STRUCTURES

The American Concrete Institute has memorialized University of Illinois Prof. Clyde E. Kesler by renaming an annual award given to outstanding educators in the field of concrete materials and structures. The ACI Clyde E. Kesler Education Award is a renaming of the ACI Joe W. Kelly Award that had been given annually since 1975 to a long list of ACI members.

Professor Emeritus Kesler (BS 43, MS 46) served on the faculty of the departments of both Civil Engineering and Theoretical and Applied Mechanics from the late 1940s until his retirement in 1982. Nationally recognized as Father of the Concrete Canoe, Kesler started the phenomenon of concrete canoe racing in the 1970s with a class project. In 1977, Kesler was elected to membership in the National Academy of Engineering, the highest honor that can be accorded to an engineer. In 1967 he was elected president of the American Concrete Institute, the youngest individual to hold that post up to that time. He died December 30, 2011.

The ACI Clyde E. Kesler Education Award was established by the initiative and financial support of University of Illinois Professors David A. Lange, Neil Hawkins, and Frances Young who fondly recall Clyde's friendship, leadership, and impact on the Department of Civil and Environmental Engineering.

For more information visit concrete.org.

ACPA ANNOUNCES AWARD RECIPIENTS

The American Concrete Pumping Association (ACPA) is pleased to announce the recipients of the 2022 ACPA Awards.

Lifetime Achievement Award: Dave Adams. Following a 15-year career in the aerospace industry, Dave Adams began working in the concrete pumping industry in 1996 for the concrete pump manufacturing company, Putzmeister America. Adams was named President and Chief Executive Officer of Putzmeister America in January 2000. Under Adams' leadership, Putzmeister America achieved significant success, including outstanding business growth, greatly expanded facilities in Sturtevant, Wisconsin, several innovative product line additions and new business developments in several countries.

Safe Operator of the Year: Steve Meyers
The ACPA is proud to announce Steve Meyers as recipient of ACPA's Safe Operator of the Year award. Throughout his 23-year career as a concrete pump operator at Cemstone, Meyers has proven to be one of the company's most valuable and safe pump operators.

For more information visit www.concretepumpers.com.

AMERICAN CONCRETE PUMPING ASSOCIATION ANNOUNCES EXECUTIVE BOARD

The ACPA is pleased to announce the election the new Executive Board. Elected to serve a one-year term, the newly elected Executive Board includes:

President: Wayne Bylsma
Cherokee Pumping, Inc.

Vice President: Art Fink
CF & T

Secretary: Eric Duiker
CanCrete Equipment

Treasurer: Nathan Germany
Tri-Way Concrete Pumping, Inc.

Past President: Gary Brown
R.L. McCoy, Inc.

The ACPA also announced results of recent elections for board positions. For more information visit www.concretepumpers.com.

AMERICAN CONCRETE INSTITUTE HONORS OUTSTANDING CONTRIBUTIONS TO THE INDUSTRY

The American Concrete Institute (ACI) recognized several professionals, groups, and companies for their outstanding contributions and dedication to ACI and the concrete industry. The 2022 honorees include the induction of Honorary Members, ACI's highest honor, which recognizes persons of eminence in the field of the Institute's interest, or one who has performed extraordinary meritorious service to the Institute. The following five individuals were inducted as Honorary Members:

- Bev Garnant
- Lawrence F. Kahn
- Luke M. Snell
- Roberto Stark
- William E. Rushing, Jr.

ACI also recognized 24 individuals for maintaining their membership and participating in ACI activities for at least five decades. Additionally, ACI honored 20 new Fellows for their outstanding contributions to the production or use of concrete materials, products, and structures in the areas of education, research, development, design, construction, or management.

Learn more about ACI awards and those recognized at concrete.org.

CENTER OF EXCELLENCE FOR NONMETALLIC BUILDING MATERIALS HIRES TECHNICAL DIRECTOR

NEx: An ACI Center of Excellence for Nonmetallic Materials has hired Aparna Deshmukh as Technical Director. She will be responsible for managing the technical and educational efforts of NEx.

Aparna brings nearly a decade of experience in structural engineering and materials research, previously working on projects involving additive manufacturing, cementitious inks, and smart concrete. Prior to joining NEx, Aparna worked as a structural engineer and lecturer while earning her MS in Structural Engineering from Pune University, Pune, India. She received her Ph.D. from the University of Wisconsin-Milwaukee, Milwaukee, WI, and is a member of the Precast/Prestressed Concrete Institute (PCI), ASTM International, and the Society of Women Engineers (SWE).

In addition to managing the technical and educational efforts, Aparna will be developing proposals for NEx projects, directing development of special engineering or educational products, reviewing NEx technical documents, and serving as a liaison for assigned committees and industry

partners. To learn more or to get involved with NEx, visit nonmetallic.org or contact info@nonmetallic.org.

AMERICAN CONCRETE INSTITUTE RELEASES 2022 ACI COLLECTION OF CONCRETE CODES, SPECIFICATIONS, AND PRACTICES

The American Concrete Institute has released the *2022 ACI Collection of Concrete Codes, Specifications, and Practices*.

The ACI Collection is the most comprehensive and largest single source of information on concrete design, construction, materials, and repair, with over 50 codes and specifications and more than 200 practices—including all guides and reports.

The ACI Collection features ACI 318 *Building Code Requirements for Structural Concrete*, ACI 301 *Specifications for Structural Concrete*, and ACI 562 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures and Commentary*.

The 2022 ACI Collection now includes more than 10 newly published documents ranging from codes on thermal bridge mitigation to specifications for polished concrete slab finishes, crack repair, and much more. Additional categories in the ACI Collection include concrete materials, properties, design, construction, reinforcement, specialized application, repair, structural analysis, and innovation, plus popular topics such as slabs, formwork, and masonry.

For details, to subscribe, or order, visit concrete.org/store.

SCA ANNOUNCES 2021 SLAG CEMENT IN SUSTAINABLE CONCRETE AWARD WINNERS

Thirteen projects were honored for exceptional use of slag cement in concrete construction.

The Slag Cement Association (SCA) announced the recipients of its 2021 Slag Cement In Sustainable Concrete Awards program. These awards were unveiled and celebrated during the American Concrete Institute Spring Convention.

Thirteen construction projects from across the United States were chosen to showcase the broad applications of slag cement and its impact on creating more durable and sustainable concrete. Two research projects on slag cement use were also honored in this year's program.

This year's winners include notable infrastructure and paving projects. All of these winners illustrate how slag cement works to improve the durability of concrete while lowering the embodied carbon associated with concrete production. To view the recipient projects, visit www.slagcement.org.

AMERICAN CONCRETE INSTITUTE LAUNCHES NEW CENTER OF EXCELLENCE FOR CARBON NEUTRAL CONCRETE

The American Concrete institute (ACI) announced the launch of NEU: An ACI Center of Excellence for Carbon Neutral Concrete. NEU aims to collaborate globally to drive research, education, awareness, and adoption of carbon neutral materials and technologies in the industry.

Located at ACI Headquarters in Farmington Hills, Michigan, USA, NEU will focus on transforming the concrete industry into a proactive, unified group actively engaged in developing and employing both existing and new technologies to reduce the carbon footprint of the concrete industry.

NEU also announces Baker Concrete, Inc. as the center's Initial Member. Baker Concrete is the largest concrete contractor in the U.S. and specializes in pre-construction, construction, and project management services. They provide expertise in civil, commercial, industrial, institutional, multi-family residential, and mission-critical buildings.

NEU is uniquely positioned to serve as a catalyst in incorporating ACI's breadth of knowledge into the further acceleration of carbon-neutral concrete in the built environment.

To learn more visit neuconcrete.org.

TACA HIRES MATTHEW POSEY AS MANAGER OF GOVERNMENT AFFAIRS AND EXTERNAL RELATIONS

The Texas Aggregates & Concrete Association (TACA) has named Matthew Posey as its manager of Government Affairs and External Relations. In this newly created Austin-based position, Posey is responsible for the development and implementation of public, regulatory and local and state government relations strategies and initiatives for the aggregate, cement and concrete industries in Texas.

Posey joins TACA after spending eight legislative sessions working in the Texas House of Representatives. Most recently, he served as the chief of staff to State Rep. David Cook for House District 96. When the legislature was not in session, Posey worked on a variety of state and federal campaigns, including as field manager for Dr. Ben Carson's presidential bid.

Posey graduated from Texas State University with a bachelor's degree in Political Science. During his time there, Posey co-founded and was president (consul) of the Sigma Chi chapter on campus. Additionally, he served as the external affairs chair for the Associated Student Government and as a member of the Texas State Honor Code Council.

THE ACI FOUNDATION'S 2022-2023 FELLOWSHIP AND SCHOLARSHIP RECIPIENTS

The ACI Foundation is pleased to announce its 2022-2023 fellowship and scholarship recipients. The ACI Foundation is a non-profit subsidiary of ACI that promotes progress, innovation, and collaboration in the concrete industry through strategic investments in ideas, research, and people to create the future of the concrete industry.

All Fellowship recipients receive a $10,000 (USD) educational stipend (Falconer fellowship receives $15K); paid travel expenses

and attendance fees to two ACI conventions; and assistance in finding an industry mentor. All Scholarship recipients receive a $5,000 (USD) educational stipend.

This year the ACI Foundation was able to award 16 fellowships and nine scholarships to students from 23 different institutions.

ACI Foundation Fellowship and Scholarship awards are made possible through generous contributions by donors from the concrete community. Additional information about each fellowship and scholarship is available at acifoundation.org.

CHARLES K. NMAI ELECTED PRESIDENT OF AMERICAN CONCRETE INSTITUTE

President, vice president, and board members elected.

The American Concrete Institute (ACI) announces its 2022-2023 president, vice president, and four board members.

Charles K. Nmai has been elected to serve as president of the Institute for 2022-2023, and Michael J. Paul has been elected ACI vice president for a two-year term. Additionally, four members have been elected to serve on the ACI Board of Direction, each for three-year terms: Robert C. Lewis, Anton K. Schindler, Matthew R. Sherman, and Lawrence L. Sutter.

Visit concrete.org for additional information.

ACI FOUNDATION ANNOUNCES NEW COUNCIL CHAIRS

New chairs have been announced for the ACI Foundation's Concrete Innovation Council, Concrete Research Council, and Scholarship Council.

Brian H. Green, FACI, is the new chair of the Concrete Innovation Council. Green is a Senior Research Geologist in the Research Group, Engineering Systems and Materials Division, Geotechnical and Structures Laboratory, U. S. Army Engineer Research and Development Center (ERDC), located in Vicksburg, Mississippi.

Sulapha Peethamparan, PhD, is the new chair of the Concrete Research Council. Peethamparan is a professor in the Department of Civil and Environmental Engineering at Clarkson University, Potsdam, New York.

Anton K. Schindler, PhD, PE, FACI, FASCE, is the new chair of the Scholarship Council. Schindler is Director of the Highway Research Center and the Mountain Spirit Professor in the Department of Civil Engineering at Auburn University, Alabama.

Visit acifoundation.org to learn more.

ACI FOUNDATION ANNOUNCES ELECTION OF NEW CHAIR AND TRUSTEES

The ACI Foundation is pleased to announce the selection of new chair of Trustees— Jeffrey Coleman, election of two new trustees — Khaled Awad and Keith Kesner, and the re-election of an existing trustee — Robert Frosch. The ACI Foundation is honored to have these outstanding individuals continue the work of the ACI Foundation. They join Ronald G. Burg, Joseph M. Bracci, Antonio Nanni, Michael Paul, and William Rushing on the ACI Foundation Board of Trustees.

Jeffrey W. Coleman, FACI, is a licensed professional engineer, Attorney at Law, and Principal Partner of The Coleman Law Firm, LLC, Minneapolis,

Khaled W. Awad, FACI, is the Chairman and Founder of Advanced Construction Technologies (ACTS), a material and geotechnical consulting firm based in Beirut, Lebanon, and operating in Qatar, Saudi Arabia, and several other countries of the Middle East.

Keith E. Kesner, FACI, is among a small group of Key Personnel at CVM Engineers, a multi-faceted professional engineering firm with a diverse staff of engineers, architects and materials scientists serving premier institutional and commercial clients.

Learn more at ACIFoundation.org.

PRODUCTINNOVATION

REDUCE YOUR CONCRETE CARBON FOOTPRINT WITH CORTEC® MCI® TECHNOLOGY!

Concrete is the world's most widely used construction material—and also one of its greatest contributors to greenhouse gas. The root cause is cement production, which alone accounts for approximately 8% of global CO2 emissions. MCI® Technology is one of those simple but powerful strategies that helps the construction industry take a pivotal step toward a smaller carbon footprint.

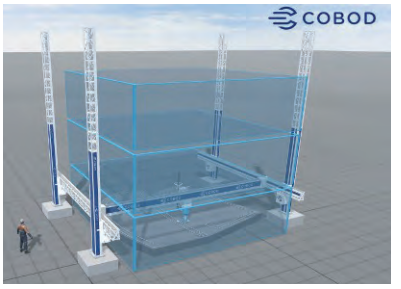
The way MCI® helps concrete structures last longer is by attacking one of the biggest enemies to concrete durability: corrosion of metal reinforcement. As rebar rusts due to carbonation, chloride exposure, and other environmental conditions, it expands and puts pressure on the concrete cover. This leads to cracking, spalling, and a vicious cycle of further exposure to corrosives and additional damage. Based on salts of amine carboxylates, MCI® Technology interrupts this process by migrating through the concrete pores to form a protective molecular layer on the rebar surface to delay and reduce corrosion. Service life models and lab and field studies have shown that MCI® can increase service life by three to four times. This translates into a comparable reduction in concrete's carbon footprint.

MCI® can be used at any stage in a structure's lifecycle, but the best course to pursue is early treatment. Ideally, this includes the choice of MCI® concrete admixtures, which can be added to new concrete at the ready-mix plant or construction site. In contrast to calcium nitrite admixtures, MCI® admixtures have a low dose independent of chloride loading and do not negatively affect concrete mix properties. Existing structures can be treated with MCI® in the form of surface applied corrosion inhibitors (with or without water repellent) and repair mortars. Once applied, the MCI® molecules migrate through concrete pores to protect embedded rebar in sound concrete, or to even out corrosion potential and interrupt the problematic ring-anode/halo effect between new patch repairs and old concrete.

Learn more about sustainability with Cortec® MCI® today: https://www.cortecmci.com/sustainability/

NEW TOOL FOR CONTRACTORS AND REAL ESTATE DEVELOPERS: COBOD RELEASES THE WORLD'S FIRST 3D CONSTRUCTION PRINTER CONFIGURATOR

More and more 3D printed buildings are showing up all over the world. With the world's first configurator for 3D construction printers, made by COBOD International, contractors and developers can now estimate the time to 3D print a specific building and calculate the amount of concrete materials needed. For instance, the configurator shows layer by layer how the printer can build a 170 m^2 (1.900 square feet) villa in just 26 hours.



COBOD International has launched the first live and 3D visualized configurator to create 3D construction printers. The configurator is available as an app for Android and iOS devices and as a web app edition. Headquartered in Denmark, COBOD has become a leading provider of 3D printers to the global construction industry and is behind the printers that made the first one, two and three floors 3D printed buildings in Europe, the first school and houses in Africa and the first 3D printed wind turbine tower pedestals made for GE Renewable Energy.

Users of COBODs new configurator can start by configuring their 3D printer, modifying the printer width, length, and height. The configurator also makes it possible to calculate the time it takes to print out a specific structure and calculate the quantity of materials needed.

According to the consulting company McKinsey , there is a potential for doubling productivity in the construction industry by realizing the automation potential. A potential that has made the global construction industry keenly aware of how robotic 3D printers will become standard equipment at the construction sites of tomorrow.

For more information visit www.cobod.com

WHEN AND WHY TO CHOOSE MCI®-2026 FLOOR COATING FOR CONCRETE LONGEVITY

Extending concrete service life takes a multi-faceted approach, but the underlying principles are always the same:

- Properly understand the conditions and environment
- Select the appropriate treatment
- Apply the chosen solution properly for best results

Many outstanding options exist in Cortec's line of MCI® Technologies, but not all treatments are equally suited to every application. It is therefore important to know when and why to choose a product such as MCI®-2026 Floor Coating for concrete longevity.

Often the biggest concern in an industrial environment is the risk of external concrete damage from heavy traffic and exposure to harsh chemicals. MCI®-2026 Floor Coating is an excellent first line of defense against these problems.

As for any coating, good surface preparation is critical to ensuring the best performance possible. MCI®-2026 Floor Coating should be properly mixed and applied at the right temperatures per manufacturer's instructions to work as designed.

By choosing to apply MCI®-2026 Floor Coating, facility owners and managers are left with concrete floors with a high degree of physical and chemical resistance. All this is achieved with a low VOC coating that can be used in federally inspected facilities.

Contact Cortec® to see if MCI®-2026 Floor Coating is the right choice for your industrial concrete floor application: https://www.cortecmci.com/contact-us/.

INTERESTED IN SEEING YOUR NEW PRODUCT IN THIS COLUMN?

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

NEWMEMBERS

SUPPORTING MEMBERS

ESCA Industries
Hatfield, Pennsylvania
United States
Jeff Paduano

COMPANY MEMBERS

BJB INC
Louisville, Kentucky
United States
Dennis Bolton

Canido Basonas Construction
Brooklyn, New York
United States
Miguel A Brion

Concrete Strategies LLC
St. Louis, Missouri
United States
Jim Orbin

Conjet
Charlotte, North Carolina
United States
Stephen Sistrunk

Cornerstone Restoration LLC
Sullivan, Wisconsin
United States
Kyle O'Brien

Golden Floor Preparation
Arvada, Colorado
United States
Ryan Harris

Power Shotcrete Structures Ltd.
Langley, British Columbia
Canada
Gary Hawkins

Smithson Solutions LLC
Middletown, New York
United States
Gabriel Smith

The Southeast Restoration Group, Inc
Port Orange, Florida
United States
Larry Kennedy

Uretek ICR
Fort Worth, Texas
United States
Scott Turnage

Western Specialty Contractors
Kent, Washington
United States
Dave Kimble

Wolfgang Commercial Painters
North Vancouver, British Columbia
Canada
Heinrich Schoeman

ADDITIONAL INDIVIDUALS FROM SUPPORTING MEMBER COMPANIES

Mark Ashcraft
Whitecap
Norcross, Georgia
United States

Chadi Bouzeid
Les Produits Daubois, Inc. - Division Quikrete
St. Leonard, Quebec
Canada

Michael Brown
Simpson Strong-Tie Company
Columbus, Ohio
United States

Dorothy Ciesielski
BASF Construction Systems / Watson Bowman Acme Corp
Lake Zurich, Illinois
United States

Wayne Lawrence
ESCA Industries
Hatfield, Pennsylvania
United States

Frank Maynard
ESCA Industries
Hatfield, Pennsylvania
United States

Christine Poulin
Sika Canada
Montreal, Quebec
Canada

ADDITIONAL INDIVIDUALS FROM COMPANY MEMBERS

William Currie
The Quikrete Companies
Perryville, Maryland
United States

Miljan Dejanovic
Valcourt Building Services
Lanham, Maryland
United States

Reynold Hamann
Sika EMSEAL
Saint Michael, Minnesota
United States

Christopher Heider
Coastal Construction Products, Inc.
Bensenville, Illinois
United States

Daniel Morrison
Florida Paints
Winter Garden, Florida
United States

Jason Norwood
Wiss, Janney, Elstner Associates Inc.
Irving, Texas
United States

Shane Ros
United Restoration and Preservation, Inc.
Mableton, Georgia
United States

INDIVIDUAL MEMBERS

Emilie Aime
Drummondville, Quebec
Canada

Dan Alberter
Beltsville, Maryland
United States

Michael Bader
Montgomery, Texas
United States

Murat Baykal
Austin, Texas
United States

Anthony Bertone
Naples, Florida
United States

Mathew Birney
Lancaster, Pennsylvania
United States

Stephanie Blanchard
Mascouche, Quebec
Canada

Mike Boulka
Mendota Heights, Minnesota
United States

David Clifton
Clearwater, Florida
United States

Michelle Dallhoff
New York, New York
United States

Caitlin Daniels
Medford, Massachusetts
United States

Rossana Diaz
South Miami, Florida
United States

NEWMEMBERS

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Norcross, Georgia
United States

Marc Goodman
Berlin, Connecticut
United States

Ryan Grant
Winder, Georgia
United States

Christopher Grapentin
Minneapolis, Minnesota
United States

Todd Halsey
Louisville, Kentucky
United States

Tran Hang
Quebec, Quebec
Canada

Mat Heard
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Canada

Peter Hulley
Guelph, Ontario
Canada

Serkan Karabiyik
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Turkey

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United States

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Overland Park, Kansas
United States

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United States

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United States

David Lundgren
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United States

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McKinney, Texas
United States

Siwin Online
Bengaluru, Karnataka
India

Anthony Orlando
New York, New York
United States

Garrett Overcash
Davidson, North Carolina
United States

Nicholas Poddam
Trenton, Michigan
United States

Timothy Quill
Mason, Ohio
United States

NEWMEMBERS

Subhajit Saraswati
Chinsurah, India
India

Michael Sewell
Woodinville, Washington
United States

Koushyar Shaloudegi
Chantilly, Virginia
United States

Bradford Smith
North Miami Beach, Florida
United States

Nick Smith
Lanham, Maryland
United States

Fahime Sokhangou
Quebec, Quebec
Canada

Mark Stover
Rockville, Maryland
United States

Thomas Swan
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