July/August 2023
Vol. 36, No. 4

CRB

CONCRETE REPAIR BULLETIN

AESTHETICS IN REPAIR AND PROTECTION

ICRI CONCRETE REPAIR
Restore | Repurpose | Renew

35th YEAR ANNIVERSARY

Protectosil®

Shields Million Dollar Artwork in World Trade Center Subway Station

Protectosil®

"CHORUS," a marble mosaic by multimedia artist Ann Hamilton, New York City

A TACTILE SURFACE INVITES SUBWAY RIDERS TO TOUCH THE MARBLE MURAL AS THEY PASS. THIS PHYSICAL CONTACT REMINDS PEOPLE OF THE EMOTIONAL AND HISTORICAL SIGNIFICANCE OF THE AREA AS THEY TAKE IN THE CIVIC IDEALS MEMORIALIZED THERE.

Evonik Protectosil® products were applied days before the grand opening of the stop in 2018, which marked the 17th anniversary of the September 11 terrorist attacks.

The WTC Cortland Street subway station in New York City is located on the World Trade Center grounds. The station's reopening is viewed as a major milestone in recovery for the neighborhood impacted by events of that tragic day.

A white, monochromatic marble mosaic by multimedia artist Ann Hamilton was designed with the adjacent World Trade Center Transportation Hub in mind. Commissioned by Metropolitan Transit Authority Arts & Design, "CHORUS" spans a total of 4,350 square feet across the walls of both platforms and comprises small marble tesserae forming a white-on-white surface of text from the 1776 Declaration of Independence and the 1948 United Nations Universal Declaration of Human Rights. The piece has been valued at more than $1 million.

Evonik Protectosil® products provide this meaningful artwork a safeguard against physical contact and exposure to the elements. Protectosil® SC 100 and Protectosil ANTIGRAFFITI® SP keep "CHORUS" free from water damage, staining, and graffiti, for the long term.

"It was a great honor to be part of this very special project," said Pete DeNicola, Marketing Manager Americas, for Evonik. "The reputation of Protectosil® as a surface protector is unmatched in the industry and we are confident that "CHORUS" will be enjoyed by travelers and commuters for many years to come."

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ICRI CONCRETE REPAIR Restore | Repurpose | Renew 35th YEAR ANNIVERSARY

ON THE COVER: Image from technical article "Design for Longevity: A Look Back at Concrete Rehabilitation and Preservation at Shipyard Village Condominiums" on page 16.

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FEATURE ARTICLES

DEPARTMENTS

ICRI Mission and Strategic Plan Benefit Members and the Industry

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

PRESIDENT'SMESSAGE

ICRI President & Executive Director Joint Message


PIERRE HÉBERT


ERIC HAUTH

The former CEO and business guru, Jack Welch, said: "Change before you have to."

One of the true strengths of ICRI is that we manage to stay faithful to our important role as a consensus-based technical organization, while looking ahead and adapting to the changing needs of the industry and our members.

Even though consensus-based associations aren't built for speed (creating consensus takes time and trust, which can't be rushed), they still must keep an eye focused squarely on the future. No organization, if it wants to be successful, can assume that today's reality means tomorrow's success.

As we celebrate ICRI's 35th Anniversary Year, your ICRI leadership takes this responsibility to heart. That's why the Board of Directors made a bold decision at the Spring Convention in Vancouver to significantly invest in the build of a much more robust association management system (AMS) and the launch of a new ICRI website. This decision came after extensive feedback from our members that the current platform simply doesn't match the needs of a dynamic and growing organization like ICRI.

In reaching this decision, we also leveraged the insights from an expert consultant who evaluated our technology needs and created a roadmap that led us to our new vendor/partner Rhythm AMS (www.rhythmsoftware.com). After extensive vetting of Rhythm AMS, we're confident we have a strong technology partner to help us power the future of ICRI.

This decision also means building a new website coupled to the AMS system. ICRI's new Marketing and Membership Manager, Marissa Esguerra, identified several potential website partners through her extensive association management network. From that work, we've also landed on a firm with extensive and almost exclusive focus on associations—AS Creative (https://ascreativeservices.com).

ICRI staff, led by our Executive Director, Eric Hauth, have begun the 6–8-month process to migrate from our current system and website to a technology platform that will power our future growth. Here are some of the exciting benefits we expect from this new system:

- **Much improved ICRI chapter support!** With this new system, chapter leaders can generate real-time membership reports directly from the platform, creating visibility into chapter membership rosters. In addition, Rhythm AMS allows for chapter event registration through the ICRI national platform, allowing ICRI national to partner with chapters on non-member recruitment following chapter events.
- **Single sign-on for Supporting and Company members**. The new system will resolve what has been a real limitation for our Supporting and Company member contacts—allowing a single sign-on for membership renewals. This capability will greatly improve the join and renewal experience for our members.
- **Full integration with ICRI's committee platform (Causeway and ICRI's Learning Management System)**. The new system allows for much stronger integration with these platforms that are so important to ICRI's success—committee management through Causeway and e-learning through our LMS.
- **A new, much more engaging, and flexible website.** The new website will be current, compelling, and easier to navigate. Our virtual "storefront" will be a place that industry professionals will want to visit.

These are just a few benefits that we look forward to when we launch at the beginning of 2024!

A famous philosopher once said that the only constant in life is change. That's true for ICRI as well, and we're sad to announce that ICRI's Technical Director, Dave Fuller, is leaving the organization to take on a new role in the industry. Among his other accomplishments, Dave helped ICRI build a roadmap for our professional development programs and improve technical committee effectiveness with a new technical chair training program. As we write this, we're actively recruiting for his replacement and look forward to welcoming that person to ICRI in time for the Fall Convention in St. Petersburg, Florida (October 16–18). Speaking of which, you won't want to miss this event, where ICRI will celebrate its 35th Anniversary in style! Be sure to save the date and keep an eye out for the registration information later this summer!

As we celebrate this milestone anniversary, we're so excited about supporting our member and chapters in the months and years ahead. We're here because of you and we're here for you! Don't hesitate to reach out with your feedback anytime at info@icri.org. Your messages will be sent on to us.

As always, thank you for your continued support and commitment to ICRI.

Pierre Hébert
Pierre (Pete) Hébert
2023 ICRI President

Eric Hauth
Eric Hauth
ICRI Executive Director

PEDESTRIAN DECK COATING SYSTEMS

MIRAFLEX XL

Where to use:

- Over interior/exterior concrete surfaces
- Mixed-use, residential and commercial
- Waterproofing of existing topping slabs over sandwich membranes
- Vented and unvented metal pan deck slabs

Advantages:

- Vapor permeable - allows substrate to breath without blistering
- Wide array of slip resistant textures, colors and finishes
- Lower maintenance and life cycle costs vs. other flooring types
- VOC and LEED-compliant, low odor and fast cure time

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

MIRAFLEX II

Where to use:

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

Advantages:

- Monolithic, seamless protection – waterproofing membrane
- One-hour fire rated over plywood (ICC ESR 1714 listing)
- VOC and LEED-compliant, low odor and fast cure time
- Wide array of slip resistant textures, colors and finishes

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MIRACOTE

TACTALK


MATT SHERMAN

ICRI's valuable work is focused on what our members do. By keeping that focus, we can add value, move more quickly, and more directly impact our work world. To support this, the third TAC objective for this year is to help committees focus on our industry's needs.

Focusing on our industry supports two of the pillars of our strategic plan—Industry Leadership and Professional Development. These pillars specifically call for "delivering best industry practices," "developing industry professionals," and "expanding certification." ICRI is doing this through its committees, its certification programs, and its webinars and presentations.

To support this focus on our industry, our TAC coaches are helping committees focus on things that the industry needs—faster response, clear guidance, establishment of best practices, better and safer work environments, education, training, and certification. All of these help lift up the work that we all do.

To accomplish this, ICRI leadership and TAC have improved our processes for webinar selection and review and are looking to further streamline the process. We are also working to keep the objectives and goals of our work product more "front of mind" to our committees to avoid scope creep and to keep the needs and desires of the end users visible as we develop our products. In particular, we:

- Encourage our ICRI members to bring their knowledge and perspectives of our industry to our technical committees and discuss the industry needs. More information about our committees is easily found on the ICRI Committee websites. (Note that committees now provide a virtual attendance option.)
- Offer TAC's coaching and mentoring to committee leadership to help focus on specific industry needs and provide narrow but practical offerings that can be effectively produced and quickly meet industry needs.
- Strive to be flexible about new types of offerings. We currently have apps, documents, trainings, specifications, and certifications, but those may not be the only options.
- Continue to streamline our processes to act more as coaches and less as referees.

We want ICRI to be at the forefront of relevance and we need to listen to industry to get there. Keeping our work relevant helps industry, is rewarding to the volunteers and staff that work to put the information together, and helps improve the overall quality and effectiveness of concrete repair overall.

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

Volunteer

Why Volunteer?

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

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

Follow Your Interests

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

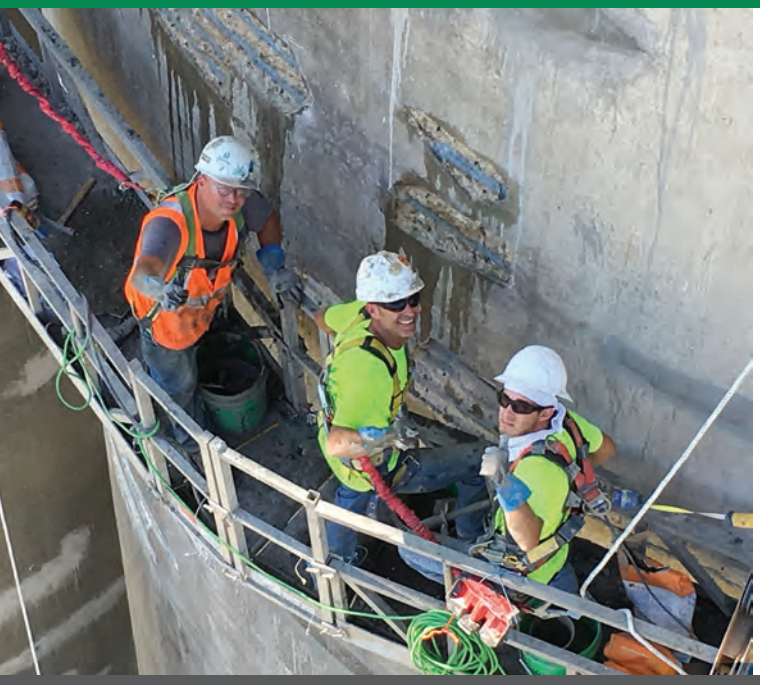
Length of Commitment

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

COMMITTEE 120: ENVIRONMENTAL HEALTH AND SAFETY

MISSION STATEMENT

Committee 120 is dedicated to building a culture of safety through training and education. We strive to minimize accidents in our concrete repair community, and our passion for safety awareness, health, and personal responsibility promotes wellbeing and a higher quality of life.



BENEFITS OF COMMITTEE MEMBERSHIP:

- Promote, identify, and correct hazards before they can cause injury.
- Promote safe working practices and facilitate safety training.

WHAT WE DO:

- Provide our association with a learning experience that promotes a safety awareness culture.
- Provide our association members with education that mitigates safety concerns in the concrete industry.

GOALS/DELIVERABLES

1. Updating and promoting our Safety Guidelines.
2. Promoting and administration of the ICRI Safety Award.
3. Developing innovative ways to promote a safety culture among our community.
4. Working on an interactive app that will tie into our safety database and link other informational sites.
5. Developing short YouTube safety videos.

www.icri.org/page/committees | info@icri.org | +1 651.366.6095 | www.icri.org/page/job-board

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SUPPORTING MEMBERS

...your continued support greatly enhances programs both within ICRI and the concrete repair industry as a whole.

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2023 ICRI Fall Convention | October 16–18

TradeWinds Island Resorts | St. Pete Beach, Florida

Don't miss this opportunity to join your friends and colleagues to expand your understanding of concrete repair, protection, and restoration through networking, technical sessions, and participating in ICRI committee meetings. **Exhibit and Sponsor options are available.**

Visit icri.org for details.

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"If You Are not Testing, You Are Guessing" (On How to Properly Repair or Restore Your Concrete Structure)

by Paul Kane

Over the past 30-plus years in the concrete repair and waterproofing materials business, the materials have evolved, gotten safer to use, have longer warranties, and are better than ever before. During these past 30 years being a member of the International Concrete Repair Institute (ICRI) and the International Institute of Building Enclosure Consultants (IIBEC)—formerly the Roofing Consultants Institute (RCI)—has helped to keep building consultants and technical product representatives up to date with the latest technologies to repair, waterproof, and extend the service life of these structures for their owners. Following is a list of some items that have been introduced in Hawaii during this time:

- Polymer modified concrete repair materials
- Breathable, waterproof, elastomeric coatings
- FRP rebar
- Corrosion inhibiting admixtures and repair mortars
- Corrosion resistant rebar coating and primers for spall repair
- Fluid applied silicone roof coatings
- Fluid applied urethane roof coatings
- 45-minute cure times on fast-setting repair mortars for vehicle traffic
- CFRP and GFRP external concrete strengthening (carbon fiber reinforced polymer & glass fiber reinforced polymer)
- BFRP (basalt filament fiber reinforced polymer) rebar that is stronger than and costs less than steel
- GFRP (glass filament fiber reinforced polymer) rebar that is 2 times stronger than steel in a smaller diameter and costs less
- 2-hour fire resistant, water resistant, insulating, one coat stucco at 1 inch application with 24 hour cure time

Also during this time, as a technical product representative for a number of these products that have been introduced in Hawaii, I have assisted with the design and use of these technologies with engineers, architects, consultants, and building owners.

When asked for assistance with the repair or restoration of a building or structure, the first thing needed is any documented history of the structure—such as original plans and specifications. Hopefully as-built-drawings from the original construction and a current building envelope survey are available. If none of these documents are available, then you start with a thorough building envelope survey with photos and measurement documentation, at minimum with a handheld 3D imager, but preferably with testing.

Several years ago Dick Elsner, a professor at University of Hawaii (UH) at Monoa and one of the named principles in the national building envelope and consulting firm Wiss Janey Elsner (WJE), was quoted as saying, "If you're not testing, you're guessing," on how to repair and waterproof a structure. Dick was correct, because I have never met anyone who can give me quantitative test data regarding a number of factors regarding its building or structure from just looking at it.

Think of seeing a building envelope consultant as you would going to see your doctor or dentist. When you see your doctor or dentist they will always ask, "How are you doing today and is there anything that you're concerned with or that hurts?" If the answer is yes and the area that hurts or is sore is not visible on the surface of your body, the doctor or dentist will usually order X-rays, an MRI, or blood tests to better understand what is going on inside you so they can make a good diagnosis and plan a course of action with options to fix what ails or hurts you. Same goes for your building or structure and your building envelope consultant. Sure, it has leaks and spalls, but what is the root cause of why this is happening? That's what testing can tell you.

Testing lets the consultant prepare various options of repair based on the building owner's budget and immediate needs. Here are a few examples of what testing can tell you.

Water testing can be as simple as spraying a hose and charting leaks, to very sophisticated spray racks that document where the leaks are, at what pressure they leak, and

how many ounces or gallons per minute or hour they leak. If water is getting into your steel-reinforced concrete structure then corrosion, cracks, spalling, and eventual concrete and structure failure are imminent if not corrected. Water testing can also include IR scans and moisture detection scans to map moisture within roofs and walls. Leak detection and water testing should always be the first part of one's building envelope survey after visual and photo documentation. There are 10 or more ASTM Standards for leak detection testing; the correct one to use depends on existing conditions and structure size.

The next test to be considered for your concrete structure is **pH testing**. ASTM F710, *Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring,* includes pH testing. Healthy concrete is high in pH (Table 1). New concrete is highly alkaline—and when reinforcing steel is in an alkaline environment with a pH 12 or higher, the steel in that concrete will not corrode or would corrode at a very slow rate. Once pH levels drop below 10, corrosion is imminent. Carbon dioxide is a reason for the drop in pH in concrete. Coatings are available that are elastomeric, breathable, waterproof, and provide a carbon dioxide screen, which will help the concrete structure maintain a high pH.

Are there **chlorides** in your concrete? ASTM C1218, *Standard Test Method for Water-Soluble Chloride in Mortar and Concrete,* is the test method that should be used for any major concrete repair project. Chlorides are salts that when made fluid with water intrusion/leaks, accelerate the rate of corrosion of reinforcing steel in concrete. When reinforcing steel corrodes, it expands at a force much greater than the tensile strength of the concrete (concrete is very strong in compression, but weak in tension pulling or expanding within it) causing the concrete to first crack. If not repaired then, it will continue to expand and then spall (a spall or spalling is when chunks of concrete fall off or become dis-bonded from a concrete structure, usually due to reinforcing steel corrosion). Knowing the chloride levels is critical. If the chloride levels are above 6.5 pounds of chlorides per cubic yard, no repair mortar or concrete (with or without corrosion inhibitor) will work or last any length of time. Chloride levels get that high and much higher in Hawaii.

Here are a couple of examples as to how testing was used to make repair recommendations and options for some well-known Hawaii projects.

The Turtle Bay Hotel on the North Shore of Oahu was built in the late 1960s and opened in the early 1970s. During a change of ownership in the late 1990s and early 2000s, the hotel structure was found to be severely damaged by corrosion, with spalls all over and some dangerous lanai and railing conditions. Because the chloride levels were so high, 8 to 20 pounds per cubic yard, the lanais needed to be removed. New pre-cast concrete lanais were made

Table 1: Reported pH Values for Concrete-Related Materials

Category	pH
Fresh cement	>12.5
Low alkali cement	12.7 to 13.1
High alkali cement	13.5 to 13.9
High alumina cement	11.4 to 12.5
Mixing water for concrete	6 to 9
Sea water	7.5 to 8.4
Hardened cement paste with ingress of sea water	12.0
Range of phenolphthalein solution (colorless to red)	8 to 10
Class F fly ash	>13.2
Silica fume slurry (equal mass of water & silica fume)	5.5
Reduction in pH due to 10% silica fume	0.5
Reduction in pH due to 20% silica fume	1.0
pH of silica fume concrete	>12.5

with corrosion inhibiting admixture and re-installed on ledger blocks and grouted in-place as to not connect the new steel in these lanais to the older corroding steel still in the adjacent walls. These lanais/balconies are still in use almost 20 years later.

Another example is the **Waikiki Natatorium War Memorial**. In the late '90s it was falling apart and the decorative cast sculptures atop the walls were spalling along with the rest of the place. The project was to make it safe to enter and use the restrooms—which meant the decorative items in this historic structure had to be restored. The sculptures were taken down and rubber molds were cast over the sculptures which include detailed eagles' heads. Testing for pH and chloride told us they could bot be saved, and that is why FRP rebar within the sculptures and new corrosion inhibiting repair mortars and grouts were used for the spall repair of the concrete. The Natatorium restrooms are is still in service today.

Aloha Tower, another historical site, had a thorough visual survey and physical sounding of the surface to determine the location of corrosion and spalls. Because all repairs were done to ICRI repair standards and some of the best polymer modified mortars were used, this is another structure coming up on 25 years since its last major restoration.

So, who does concrete testing and analysis in Hawaii? There are few local materials testing labs locally here in Hawaii. Most good consulting firms will do double blind testing, taking a minimum of two samples from specific areas of a building. One will go to a local lab and one to a larger mainland lab for comparison. This was the process used at Turtle Bay and other projects that we've been involved with.

The future of concrete reinforcement is trending to use-more FRP rebar and products. The advancements in FRP rebar products and the different types of fibers offer more

options than ever before. With this advancement, the manufacturing with GFRP and BFRP that can be produced at well over 250 linear feet per minute. It means FRP reinforcement costs less than steel and will never corrode.

In 2018, #3 BFRP rebar was approved by the City and County of Honolulu for curb, gutter, sidewalks, and concrete paving on C&C projects and will be approved when designed into project by a licensed engineer or architect for their projects. As more sizes of BFRP rebar become available and more testing and state specifications will call for FRP—and specifically BFRP—GRFP rebar will become a standard and commodity just like steel is now.

The Florida DOT has released its FRP specifications for bridge and highway work similar to what Transport Canada did in 2015 after 8-year testing of FRP reinforcement in their bridge toppings. It should be noted that steel rebar does not have nearly as much testing as FRP rebar. FRP rebar has been held to a higher standard because of its relative newness, while engineers have designed with reinforced steel for over 100 years.

Recent advances with composite rebar include the release of ICC AC-454 in December 2020; and then the first ICC ESR in compliance with ICC AC-454 was issued in March 2021. In 2022, ACI revised ACI 440 to ACI 440.11-22 to include this and reflect some of the requirement of ICC AC-454 in the ACI 440 document. ASTM has followed suit as well with updates to D7957 in 2022.

Building surveys and testing are the best way to know exactly what is needed to repair a structure and provide an owner with various options of repair based on service life and budget.

Testing is always advancing, just like materials and solutions to building envelope problems.

REFERENCES

ASTM F710, *Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring*, ASTM International, West Conshohocken, PA, 2017

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ACI 440.11-22, *Building Code Requirements for Structural Concrete Reinforced with Glass Fiber-Reinforced Polymer (GFRP) Bars*, American Concrete Institute, Farmington Hills, MI 2022

ASTM D7957, *Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement,* ASTM International, West Conshohocken, PA, 2020

Paul K. Kane, CSI, CDT, is the owner of Aloha Marketing Manufacturers Representatives, LLC, Build Pono, LLC, PKK3 Professional Services, LLC. He has an over 30-year career as a technical building material and product sales representative advising and consulting to specialty construction products manufacturers, contractors, consultants, architects, and engineers in Hawaii and the West Coast. Paul is the "consultant's consultant" in Hawaii. He is active in the Construction Specifications Institute, with his certification as a Construction Document Technologist and International Concrete Repair Institute Concrete Repair & Waterproofing Specialist, the Building Industry Association of Hawaii and the National Association of Home Builders, Mason Contractors Association of Hawaii and the Hawaii Walls and Ceilings Industry Association. Paul's building materials and product career started in a concrete products testing lab learning about cement chemistry and the manufacturing and testing of concrete, mortars, grouts, and the ASTM testing of these products to assure they far exceed the ASTM minimum standards.

Most recently, Paul has worked as the Construction Services Administrator for the Bergeman Group, a regional building restoration consulting firm based in Hawaii, while overseeing his other business interests. Paul is available for consultation with a focus specializing in protection and restoration of the building envelope.

Design for Longevity: A Look Back at Concrete Rehabilitation and Preservation at Shipyard Village Condominiums

by David G. Tepke, Nicholas B. Tribble, and Stephen P. Robinson

Fig. 1: 2023 photos: courtyard side of Building A (left) and ocean side (right)

INTRODUCTION

A repair project totaling approximately $8.5 million was undertaken 2009-2011 at Shipyard Village Buildings A and B in Pawleys Island, South Carolina, including concrete repair and replacement, cathodic protection (CP), coating installation, guardrail replacement, and fenestration replacement. Repairs and preservation strategies were primarily conducted to address corrosion-related distress that resulted in significant structural deficiencies and to extend service-life in the harsh coastal environment. Figure 1 shows pictures of Building A from the courtyard and ocean side.

STRUCTURAL SYSTEM

Shipyard Village Buildings A and B are five story, forty-unit beachfront sister condominiums constructed in the mid 1980s. The ground level beneath the building serves as an open parking area. The structural system includes prestressed hollow-core panels (PHCP) with topping slabs supported by load bearing concrete masonry walls and reinforced concrete beams. Both buildings are comprised of three structures joined by walkways with expansion joints at the separations between the structures.

The buildings are oriented such that the central portion, with two units in plan, is parallel with the coastline and the north and south towers, each with three units in plan, are angled away from the coast. Balconies for each unit are approximately 20 feet long by 6.5 feet deep and are generally separated and supported by load bearing privacy walls. Balconies in the center tower were supported by tapered cantilever beams on one side. Large tapered concrete haunches at Level 1 support the load-bearing masonry balcony walls above.

Walkway panels are supported on load-bearing masonry walls and reinforced concrete beams, including tapered 16-inch deep cantilever beams that support panels at the center tower and portions of the end towers.

CAUSE OF DISTRESS

While no original construction drawings were available for review, a condition assessment was performed that included review of previous test reports, visual observations, and corrosion-related testing to evaluate cover, chloride contents, and distress at selected representative locations. Heightened chloride levels were characteristic

at the level of reinforcing and prestressing steel at various locations, particularly at ocean front locations and at the walkway areas adjacent to the separations between the structures. Areas with high chlorides coincided with areas of visually observed distress in varying quantities. Windy conditions were characteristic of the walkway locations near the building separations, indicating that the increased chloride levels were likely from increased exposure to airborne salts.

Chloride levels at walkway areas away from the separations were mixed; however, reduced amounts of distress were observed in these areas. Distress was also variable at slab edges supporting curtain walls (Fig. 2). Shoring and supplemental supports (Fig. 3) were necessary in some locations to make conditions temporarily safe for occupant use prior to commencement of the repair project.

GENERAL REPAIR METHODOLOGY

The ownership was interested in exploring available technologies for addressing damage and proactively addressing future corrosion for extending service-life. Given the economic climate in 2009 during the Great Recession and associated competitive nature of construction costs, the project cost of $8.5M (likely about $13M to $15M in today's dollars and construction climate) was a considerable investment by the owners. From the beginning, communication of needs and wants from the owners and technical possibilities from the engineering team were key.

To determine an appropriate repair methodology, the design team reviewed the data, distress patterns, and general costs for various approaches. The complexity and time associated with intricate repairs on the thin section, hollow core panels was a key consideration. It was decided to remove and replace panels in areas with heightened observed distress and/or elevated chloride levels (ocean-side balcony panels and courtyard-side panels in the central portion of the condominiums) and implement limited repairs and a preventative protection strategy at remaining panels with a thermal spray CP system.

Refer to Figure 4 for a schematic repair strategy. Costs associated with removal and replacement of cantilever beams with variable amounts of distress at walkway and balcony locations and slab edges supporting curtain walls on the ocean-side were also favorable compared to widespread implementation of individual concrete repairs and CP strategy at these areas. Ocean-side haunches were patched and galvanically protected with patch zinc anodes. Fenestrations were also replaced during the repair project and coatings were installed at vertical and horizontal components. The buildings were unoccupied during the renovation work. Work was primarily conducted between September and May of successive years (2009-2010, 2010-2011), with much of the concrete replacement and repair being conducted in the months of December through March.

Fig. 2: Corrosion damage: prestressed hollow core panels at Level 1 walkway soffit (top left), balcony prestressed hollowcore panel during construction demolition (top right), balcony cantilever beam (bottom left), and walkway beam (bottom right)

Fig. 3: Example of supplemental supports prior to project to make conditions temporarily safe

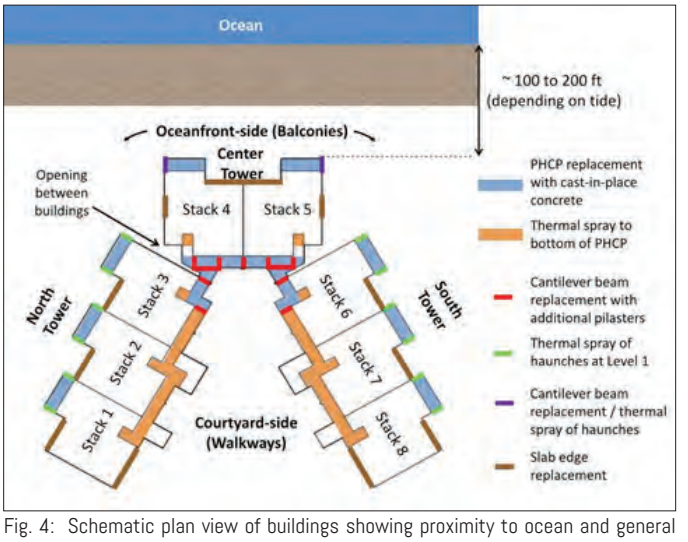

Fig. 4: Schematic plan view of buildings showing proximity to ocean and general repair methodology

SLAB EDGE REPLACEMENT

Swing stages were utilized for slab edge replacement (Fig. 5). Slabs were demolished approximately 6 to 8 inches to remove contaminated concrete and provide clearance behind reinforcing steel bars for replacement. The variation in existing alignment in both horizontal and vertical planes required specific attention to placement tolerances. Surfaces were prepared using an abrasive sandblasting. Horizontal reinforcing steel bars were spliced or doweled into existing grout-filled masonry walls, as necessary. Existing reinforcing steel that served as anchors between the PHCP topping slab and slab edge were re-used when possible. Due to the condition, placement and limited amount of existing reinforcing, dowels were adhesively anchored into the hollow core sections at the end of the slabs. Tensile testing was conducted at representative anchors to verify anchor installation.

Pre-packaged repair materials were used in replacement. Draped protection and radiant heat from distanced lights were used to maintain the concrete at appropriate temperatures during cold weather. Coatings and new curtain walls were installed after the slab edges were placed and cured.

CONCRETE SLAB REPLACEMENT AT BALCONIES AND WALKWAYS

Cast-in-place ready-mix concrete was used to replace the PHCP due to access, code requirements, and general control in the durability of the mixture properties and installation afforded by ready-mix concrete. There were several technical challenges with PHCP removal and installation of ready-mix concrete, including:

1. achieving access,
2. providing support to a new slab without compromising aesthetics,
3. reducing cracking tendency in the 20 ft long, fully restrained balcony sections and up to 60 ft long walkway sections with re-entrant corners and no control joints,
4. achieving total weight comparable to the PHCP and topping so that the structure is not overloaded, while still achieving adequate stiffness to resist deflections,
5. constructing components with similar thicknesses and elevations to meet existing components to remain,
6. providing adequate slope from working points to properly drain water, and
7. requirements to meet provisions of the current code, including loading.

New slabs were approximately 7 to 8 inches thick with two mats of reinforcing, and were tied into existing components, including supporting cantilever beams and privacy walls, as applicable. Specifications for concrete permitted the use of performance requirements or prescriptive alternates. Specifications were developed to provide concrete with low shrinkage, low chloride-ion penetrability, increased chloride threshold or both, resistance to freezing and thawing, resistance to alkali-silica reactivity, reduced unit weight to limit additional dead load, adequate strength and adequate elastic modulus to maintain acceptable deflections. Refer to Table 1 for specification requirements and proportions.

At the balconies, existing PHCP slabs acted to laterally brace the structure; therefore, temporary braces were needed at each level prior to removal of the slabs to prevent out of plane buckling of the walls. Slabs were removed by demolition onto installed scaffolding below or removed by crane. Scaffolding was constructed full height to provide access for trade work. At balconies, three pockets 8 to 12 inches wide, 8 inches deep and the thickness of the slab were excavated into the wall on each side of the balcony that was approximately 7 feet wide. The tabs were reinforced to transfer loads from the slab to the load-bearing wall. A beam was formed at the sliding glass door to form the header and threshold for the door installation. Balcony slab removal and replacement was sequenced to reduce impact to project schedule. Figure 6 shows lateral bracing during construction and balcony slab reinforcement.

Where cantilever beams supported the slabs (limited locations at the balconies and most locations on the walkways), they were placed integrally with the slabs. Where hollow cells were observed at the locations where con-

Fig. 5: Replacement of balcony slab edges from swing stage (left), example of corrosion of reinforcing steel during demolition (center), and example of thermal control (right)

nections were made to the masonry walls, or at other locations as necessary to transfer loads for the repair, they were grouted. At walkways, supplemental steel supports were installed at the limited locations where existing panels were supported by the walls and the new cast-in-place concrete required a bearing surface.

Concrete was pumped into place. Emphasis was placed on ensuring that concrete was well consolidated in the bearing tabs at balconies and at cantilever beams and pilasters at walkways, as described below. Fresh concrete testing was conducted from samples obtained at point of placement for all batches delivered on site. A sample

Table 1: Specification Requirements for Lightweight Concrete Slabs and Implemented Mixture

Required Properties	
Min Comp. Strength	5,000 psi at 28 days
Maximum w/cm	0.40
Equilibrium Density	108 to 112 lbs/ft^3
Nom. Max. Aggregate Size	0.75 inches
Air Content	5%
Slump	4 inches
Corrosion Alternatives	ASTM C 1202 (mod curing): 800 Coulombs max at 28 days or 30% fly ash + 7% silica fume or 25% fly ash + 5% silica fume + Corr. inhibitor to increase cl^- threshold to 7.5 lbs/yd^3 or Corr. inhibitor to increase the cl^- threshold to 15 lbs/yd^3
Shrinkage Alternatives	ASTM C 157 (mod curing): 300 microstrain max at 35 days (7 days curing followed by 28 days drying) or Max cementitious materials: 660 lbs/yd^3; w/cm between 0.35 and 0.4; and use of commercially available shrinkage reducer to reduce long-term shrinkage by 50%
Min Elastic Modulus	2,800,000 psi at 28 days
Alkali-Silica Reactivity	ASTM C 1260 or ASTM C 1567: 0.1 percent max at 16 days
Submitted and Implemented Mixture Proportions	
Type I/II Cement	465 to 500 lbs/yd^3
Class F Fly Ash	165 lbs/yd^3
Silica Fume	30 lbs/yd^3
Lightweight Coarse Aggregate	925 lbs/yd^3
Normal Weight Fine Aggregate	1208 lbs/yd^3
w/cm	0.40
Calcium Nitrite Corrosion Inhibitor	2.5 gal/yd^3
Shrinkage-Reducing Admixture	0.5 to 1.5 gal/yd^3

Fig. 6: Lateral bracing necessary for removing balcony slabs (left) and reinforcing layout at balcony (right). Note tabs at privacy wall used to support the new slab. Not easily visible in the figure is the tab nearest the threshold

of compiled quality assurance data for strength and unit weight for all lightweight concrete used in beams, slabs and pilasters is provided in Figure 7. Slabs were fogged with an atomized fogger as necessary to resist plastic shrinkage cracking. Slabs were broom finished and immediately wet cured for a minimum of seven days. Heat and insulating blankets were used to maintain appropriate curing temperatures in cold weather. New exterior concrete masonry walls were installed on the concrete curbs and beams. Slabs were coated with a breathable cementitious coating after work was completed. Figure 8 shows general replacement operations at a typical central walkway area and balcony.

CANTILEVER BEAMS AND PILASTERS

Cantilever beams were replaced where the PHCP were replaced on the walkway-side and where present on ocean-front-side balconies. To replace the beams, the beams were either cut and reinforcing steel later mechanically spliced with shear wedge and screw splices, or concrete demolition was conducted around the bars, thus preserving them for re-use after abrasive blast cleaning. Several challenges were uncovered in reworking the beams, including:

1. many of the cantilever beams had low or no cover to the steel from the reinforcing cages not being properly supported during the original construction,
2. top bars in the cantilevers were lower than appro-

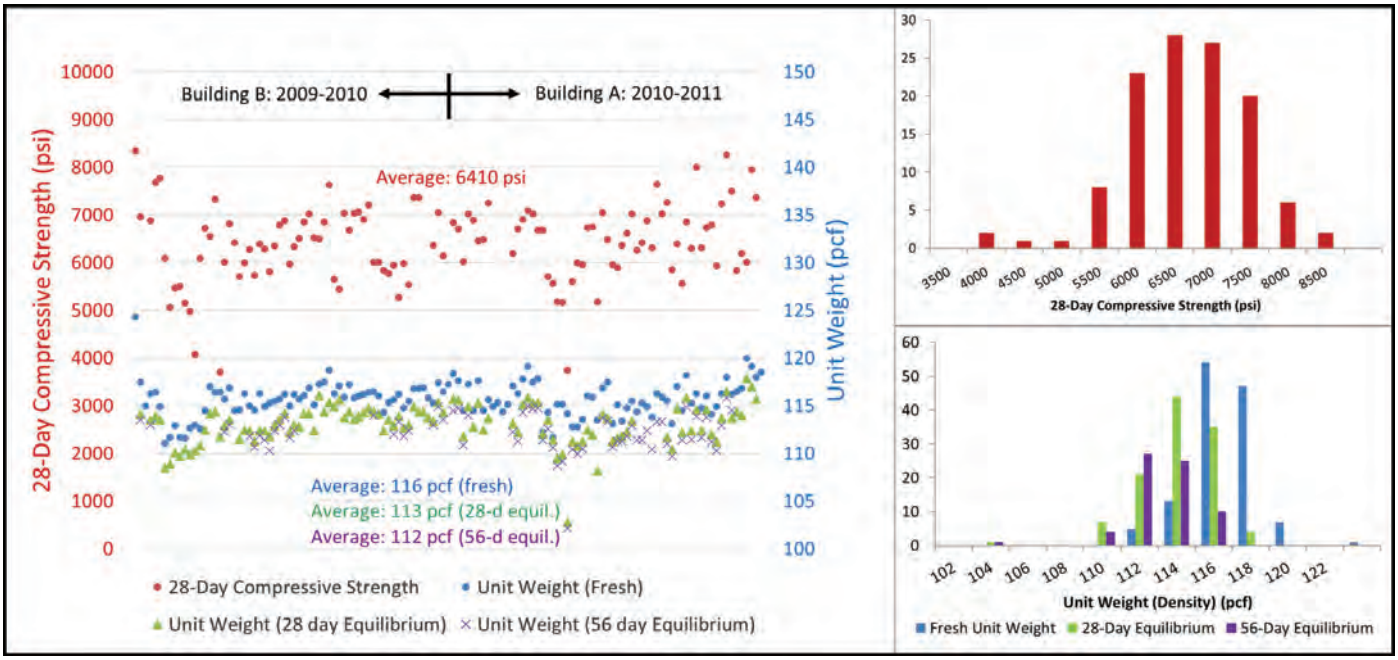

Fig. 7: Quality assurance data for 28-day compressive strength and unit weight (density) for batches of concrete delivered to site for both buildings


Fig. 8: Illustration of replacement of portion of walkway slabs (left) and balcony (right). Note the fogger at right of craftsman, used after finishing and prior to implementation of wet burlap and plastic for moist curing and insulating blankets when necessary

priate and/or undersized for resisting code applied loads, and

3. new installations were required to meet current code provisions (increased live load).

Beams were widened where necessary and deepened where possible to increase cover. Limited opportunity to deepen beams was available due to code required minimum overhead heights. Where possible, additional reinforcing was anchored to the existing portion of the beams above existing top reinforcing steel to increase capacity to meet current code load requirements. While this was acceptable in marginal situations, the use of pilasters tied to the masonry walls to reduce cantilever span was necessary in many cases on the walkway sides.

Hollow cells were grouted at pilasters to transfer load where grout was omitted during original construction. Galvanic point anodes were installed into a pocket of low-resistivity repair material attached to the existing portion of the cantilever beam to remain. Beams and pilasters were formed and placed concurrently with the slab systems. Figure 9 shows a removed walkway cantilever beam and reinforcing, partial forming of new beam and pilaster, and finished work after installation and coating application.

THERMAL SPRAY CATHODIC PROTECTION (CP)

Thermal spray CP was chosen for application on the bottoms of PHCP on the walkway-side of the building in areas away from the building separations, where slabs were generally well protected, but exhibited variable levels of chlorides at the level of the steel. Specifications required a minimum of 12 mils thickness, or as required to provide a service-life extension of 15 to 20 years. Existing coatings were stripped from the panels. The panels were quite sensitive to coating removal and surfaces were rather rough in some places. Repairs at spot locations were completed. Excavations to the prestressing steel were made near the panel ends in a staggered fashion to make two connections per strand. An alloy of aluminum, zinc, and indium was applied to the surface by thermal spray and connected at the excavated sites by spraying into the excavations. Epoxy repair material was used to patch the excavations. A breathable coating was applied after the thermal spray was applied for aesthetics.

Haunches at Level 1 on the oceanfront-side were also protected with thermal spray galvanic protection. Steel plates were used as connections for thermal spray to reinforcing steel. A skim coat was applied in some places prior to installation, and a breathable coating was applied thereafter. Figure 10 shows thermal spray application at PHCP and current condition at haunches.

Testing associated with the galvanic systems included thickness measurements, substrate bond testing, and

Fig. 9: Walkway cantilever beam showing removed concrete, low cover to bottom of beam, excessive cover to top tension reinforcing steel, and voids (top left), partially placed and formed reinforcing steel for reconstructed beams and pilasters used to reduce the stresses in the beam (top right), and completed pilasters and beams cast integrally with the new concrete slabs (bottom). The pilaster was tied to the wall. Note the mechanical splices used to tie to existing steel for this beam.

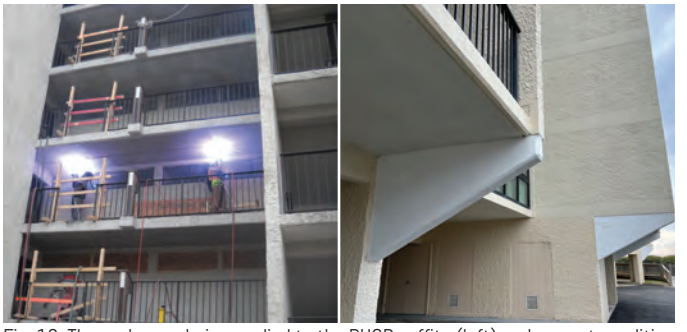

Fig. 10: Thermal spray being applied to the PHCP soffits (left) and current condition of haunches after thermal spray and coating application (right)

Fig. 11: Test station for CP testing at panel

monitoring stations to measure the effectiveness of the CP system during construction and in the future. These stations were installed on panels and haunches. Long-term monitoring equipment included embedded reference electrodes. Figure 11 shows a typical test station at a PHCP.

Fig. 12: Installation of self-consolidating concrete at a beam under a slab by pumping

OTHER REPAIRS

Other repairs were implemented at the project. Self-consolidating concrete was used to replace deteriorated beams at level one with limited access (Fig. 12). The Contractor submitted a mixture design and installed plastic windows in the form to verify consolidation. Testing was conducted on-site to demonstrate flowability and stability. Other repairs included replacement of PHCP at the roof level, replacement of a deteriorated stair section and installation of prefabricated panels with incorporated galvanic CP on selected beams.

PERFORMANCE SUBSEQUENT TO REPAIR PROJECT

Both buildings were reviewed in 2017 and 2023, approximately 7 and 13 years after the primary repair project. New concrete balcony and walkway slabs and beams, as well as PHCP, beams and haunches subjected to cathodic protection, generally were performing well. Cathodic protection test systems were reviewed in 2017 and showed excellent protection to the instrumented hollow-core panel. Haunches and beams generally showed at least partial

Fig. 13: Examples of current conditions: walkways (top left and right), soffit with thermal spray and coatings (bottom left) and replaced balconies with thermally sprayed haunches (bottom right)

cathodic protection where test stations were functional, though results were more variable.

Approximately $300,000 (3 to 4 percent of the primary project cost) in maintenance and repairs were completed in 2018 to address minor issues. Of this was about $100,000 (approximately 1 percent of the primary repair project cost) for concrete and coating repairs / maintenance to address grinding some corrosion stains associated with tie wires on concrete surfaces, sealants, and concrete repairs. Concrete repairs were ascribed primarily to limited reinforcing steel that was inadvertently not connected into the cathodic protection system as well as minor stray steel. Other repairs included coatings on guardrails and typical sealant work. No significant corrosion-related damage to protected or newly installed components from 2008 was observed during a visual review in 2023. Example photos of the buildings as of 2023 are shown in Figure 13.

SUMMARY

A pragmatic approach was used to cost-effectively replace and preserve portions of the structure to extend the service-life of a coastal condominium. This included replacement at locations combined with complex repairs and protection of other members where warranted. A high-performance concrete mixture was used to provide a viable solution for replacement of PHCP. Galvanic protection was used to protect areas of the structure with limited distress. After 11-13 years, observations indicate that the 2010-2012 repairs are performing well; minor maintenance and limited localized areas of discontinuous reinforcing steel have been addressed.

ACKNOWLEDGEMENTS

This project received an ICRI Award of Merit in 2012. The authors would like to thank the Shipyard Village Board of Directors for permission to publish this case study and acknowledge the project team that included SKA Consulting Engineers Inc. (Engineer) and Structural (Contractor), as well as K.A. Diehl (Management Company), S&W Ready Mix Concrete (Concrete Supplier), Electrotech CP (Thermal Spray Cathodic Protection Supplier), Sika Corporation (Pre-Packaged Repair Material Manufacturer), Vector Corrosion Technologies (Patch Anode Manufacturer), and S&ME, Inc. (Construction Testing Agency). The authors would also like to acknowledge Tourney Consulting Group for conducting a preliminary durability assessment prior to the repair project.

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CONCRETEREPAIRCALENDAR

JULY 11, 2023
ICRI Webinar
Understanding the Technology, Process & Application of Using Hydro Demolition to Remove Concrete
Website: www.icri.org

OCTOBER 16 – 18, 2023
2023 ICRI Fall Convention
St. Pete Beach, Florida
Website: www.icri.org

INTERESTED IN SEEING YOUR CONCRETE INDUSTRY EVENT LISTED HERE?

Events can be emailed to editor@icri.org. Content for the September/October 2023 issue is due by August 1, 2023, and content for the November/December 2023 issue is due by October 1, 2023..

ASSOCIATIONNEWS

ACPA'S SAFETY CAMPAIGN MICROSITE WINS HERMES CREATIVE AWARD

The American Concrete Pumping Association (ACPA) announced that WeAreSafer-Together.org was recognized with a Gold Award by the Hermes 2023 Creative Awards. Marketing consultant and association management services firm AOE worked with the ACPA to develop the microsite as a key component of a safety campaign that brings heightened awareness of ASME B30.27, the safety standard for material placement systems, to concrete pumpers and contractors.

The campaign highlights the responsibilities of each trade working with or around a concrete pump under the standard, with the ultimate goal of keeping every person on a job site safe. The microsite serves as an educational resource that provides job site responsibilities by trade, videos, downloadable flyers, testimonials, FAQs and much more.

Those interested in learning more about the campaign and joining the coalition can visit the award-winning microsite at https://www.wearesafertogether.org/join.

THE ACI FOUNDATION'S 2023-2024 FELLOWSHIP AND SCHOLARSHIP RECIPIENTS

The ACI Foundation is pleased to announce its 2023-2024 fellowship and scholarship recipients. The ACI Foundation is a nonprofit 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.

Since the inception of the Foundation's Fellowship program in 2008, the ACI Foundation has provided financial support, mentorship, and internship opportunities to over 275 students.

This year the ACI Foundation was able to award 19 fellowships and 14 scholarships to students from 27 different institutions.

For the list of the 2023-2024 recipients and additional information about each fellowship and scholarship is available at acifoundation.org/scholarships.

ANTONIO NANNI ELECTED PRESIDENT OF AMERICAN CONCRETE INSTITUTE

The American Concrete Institute (ACI) announces its 2023-2024 president, vice president, and four board members.

Antonio Nanni has been elected to serve as president of the Institute for 2023-2024, and Maria Juenger 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: Oscar R. Antommattei, Peter Barlow, Arturo Gaytan Covarrubias, and Carol Hayek.

Antonio Nanni, FACI, is Professor and Chair of the Department of Civil and Architectural Engineering at the University of Miami, Coral Gables, FL, USA. He has been an active member of many ACI committees, including 318, Structural Concrete Building Code; 440, Fiber-Reinforced Polymer Reinforcement; 549, Thin Reinforced Cementitious Products and Ferrocement; the International Advisory Committee; and the Committee on Codes and Standards Advocacy and Outreach. Nanni also serves as a Trustee for the ACI Foundation. His past service to ACI includes membership on the Board of Direction, Technical Activities Committee, Educational Activities Committee, and Financial Advisory Committee. He has been recognized by ACI for his many contributions with the 2021 Arthur J. Boase Award, 2018 Joe W. Kelly Award, 2006 Chapter Activities Award, and 1999 Delmar L. Bloem Distinguished Service Award. Visit concrete.org for additional information

ACI FOUNDATION ANNOUNCES NEW TRUSTEES AND RE-ELECTION OF THE CHAIR OF TRUSTEES

The ACI Foundation announced new Trustees and re-election of an existing Trustee to its Board. The Trustees re-elected the Chair of Trustees—Jeffrey Coleman and elected new Trustee—Brett McMahon. New ACI Vice President, Maria Juenger, also joins the Trustees as part of her new role. The ACI Foundation is honored to have these outstanding individuals continue the work of the ACI Foundation. They join Khaled Awad, Ronald Burg, Robert Frosch, Keith Kesner, Michael Paul, and William Rushing on the ACI Foundation Board of Trustees. Learn more at ACIFoundation.org

AMERICAN CONCRETE INSTITUTE TO HOST THIRD ANNUAL 24 HOURS OF CONCRETE KNOWLEDGE

Registration is open for the third 24 Hours of Concrete Knowledge, organized by the American Concrete Institute (ACI). 24 Hours of Concrete Knowledge is a free, virtual conference that brings together 24 ACI international chapters and industry

partners. Each chapter and industry partner will moderate one hour of the 24HCK by engaging regional concrete experts to present the latest research, trends, and studies to the concrete world.

This year, the event returns to the original concept where each co-host can select the two best concrete-related research papers/presentations from their country or region. The conference will begin on July 11, 2023, at 2:00 PM (Eastern Daylight Time) and will end 24 hours later on July 12, 2023, at 2:00 PM (Eastern Daylight Time). Visit concrete.org for additional information

REGISTRATION OPEN FOR ACI FOUNDATION'S 2023 TECHNOLOGY FORUM

The ACI Foundation's Concrete Innovation Council (CIC) will host its next Technology Forum on August 29 - 31, 2023, in Portland, OR. This year's highly anticipated forum offers fifteen presentations that highlight new technologies, advances in research and new test standards. NEU–An ACI Center of Excellence for Carbon Neutral Concrete is sponsoring the group lunch which will be followed by several carbon neutral topics. The event will conclude with a debate that discusses new technologies for determining concrete strength and how such methodologies can find a path to be used in acceptance criteria for concrete. The forum topics include:

For information about the technology forum including registration, updates to the agenda, and schedule visit acifoundation.org/technology.

AMERICAN CONCRETE INSTITUTE ANNOUNCES NEW EXECUTIVE VICE PRESIDENT

The American Concrete Institute (ACI) announced Frederick H. Grubbe, MBA, CAE, currently President and Chief Executive Officer of the National Precast Concrete Association (NPCA), has been named Executive Vice President of ACI.

Current ACI Executive Vice President, Ronald G. Burg, will retire from ACI in August after 13 years of service to the Institute.

AMERICAN CONCRETE INSTITUTE HIRES CONFORMITY ASSESSMENT AND CERTIFICATION ENGINEER

The American Concrete Institute (ACI) has hired Mahmut Ekenel, PhD, PE, FACI, to support, promote, and assist in the development of certification and conformity assessment programs. Ekenel's primary focus will be assisting NEU: An ACI Center of Excellence for Carbon Neutral Concrete, and NEX: An ACI Center of Excellence for Nonmetallic Building Materials.

Ekenel brings extensive experience in developing acceptance criteria for the evaluation of building materials in accordance with the model building codes, building code development, and a working

ASSOCIATIONNEWS

knowledge of International Standards Organization (ISO) standards and quality control inspections.

Prior to joining the ACI Staff, Ekenel served as Senior Staff Engineer for the International Code Council Evaluation Service (ICC-ES) and was employed by ICC-ES for 17-plus years. He is a licensed civil engineer in the State of California and a licensed professional engineer (PE) in the States of Ohio, Michigan, and Pennsylvania. Ekenel received his PhD from the Missouri University of Science and Technology and is also a Fellow of ACI.

ACI FOUNDATION ANNOUNCES NEW FELLOWSHIP HONORING RONALD G. BURG

The ACI Foundation has created a new Fellowship to honor the retirement and legacy of ACI Executive Vice President, Ronald G. Burg. Burg has held the position of ACI Executive Vice President for 13 years and his visionary leadership has initiated substantial positive changes in ACI, one of which was strengthening the ACI Foundation, its impact, and the culture of philanthropy within the ACI community.

Burg became ACI Executive Vice President in 2010 and is the seventh person to hold that position in ACI history. During his time as ACI EVP, Burg has championed the philanthropy of the ACI Foundation to ACI members, by actively supporting student scholarships, research grants, and innovation forums. His passion for supporting students recently resulted in him joining with Past President Jeff Coleman to fund the ACI Foundation Burg-Coleman Iowa State 77 ACI Fellowship.

The new fellowship, once fully funded, will be available for student applicants who are graduate or undergraduate students studying in any concrete-related field. The award funding will be distributed in increments of $15,000 to benefit one student annually. A $10,000 educational stipend will go to the student to cover tuition, books, and supplies, and $5000 to cover expenses to attend three ACI Concrete Conventions, one of which will include an in-person interview with the Scholarship Council.

ACI FOUNDATION FUNDS 11 NEW RESEARCH PROJECTS

The ACI Foundation's Concrete Research Council (CRC) selected 11 research projects to receive grants this year. The CRC seeks concrete research projects that further the knowledge and sustainability of concrete materials, construction, and structures in coordination with ACI Technical Committees.

Alternative End-Specimen Conditions to Characterize Compressive Strength of Ultra-High-Performance Concretes

Behavior of Slab-Column Connections under Wind Demand

Direct Tension Test Results and In-Situ Response in Reinforced UHPC Beams: Relationship and Design Implications

Evaluating Residual Strength of Corrosion-Damaged Reinforced Concrete Members

Nano-Modified Calcined Clay-Based Cement Concrete: A High Modulus Concrete with Low Carbon Footprint

Novel Concrete Containments for Nuclear Reactors: Delamination Testing of Curved Wall Sections

Proposal to Investigate ICF Wall Construction Meeting the Requirements of NFPA 285 – Phase II

Rheological Behavior of Fresh Ultra-High-Performance Concrete (UHPC) Enhanced by Nano-Additives and Data-Driven Approaches

Strut-and-Tie Design of Disturbed Regions Utilizing Internal Fiber-Reinforced Polymer Reinforcement

Sustainable and Safe Reinforced Concrete Retaining Walls

The Role of Testing Conditions and Concrete Durability Issues in Chloride Binding and Desorption of Cementitious Systems

Additional information about this year's awarded projects is available at ACIFoundation.org/research.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

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

INDUSTRYNEWS

DOKA USA RELOCATES HEADQUARTERS TO NEW FACILITY

Doka USA—a leader in providing innovative formwork and safety solutions—has moved to a new location for the USA Corporate Headquarters and Northeast Branch office. Located in Kenilworth, New Jersey, the 19-acre property will better serve customer's formwork, shoring, and scaffolding needs while providing greater capacities for pre-assembly, reconditioning, standard material stock, material delivery and returns, as well as training.

As part of a "Pathway to Growth" strategy in the USA, Doka is upgrading and expanding facilities across the USA to better service customers. Establishing this new home for the USA headquarters is part of the expansion. The property will house Doka's Northeast New York Branch team and Support office team. It includes over 10 acres of formwork storage capacity, reconditioning, and preassembly, including even more expansion. With 23,000 sq. ft. of office space, the new location will house Doka's 150+ employees with additional space for new recruitments.

The new facility is located just 20 miles from New York City and will support Doka's team in delivering high-quality, innovative formwork solutions and services to clients across the Northeast from Maine to Pennsylvania.

Doka's new address is 251 Monroe Ave, Kenilworth, New Jersey, 07033. Phone number (201-329-7839) and email (usa@doka.com) remain the same.

INDUSTRYNEWS

NATIONAL BIM STANDARD-US VERSION 4 OPENS FOR PUBLIC COMMENT

NBIMS-US V4 has been three years in the making; it will be unveiled at Building Innovation 2023 in September

The National Institute of Building Sciences, Building Information Management (BIM) Council, partners, industry experts, and members have been working hard to complete the core modules of the next version of the National BIM Standard-United States (NBIMS-US).

This fall, NBIMS-US V4 will be unveiled at Building Innovation 2023 (BI2023) in Washington, DC.

The BIM Council recently held its All Members Spring Meeting. There, the council presented a number of modules nearing draft ballot status to be released to the NBIMS-US Project Committee (PC).

The NBIMS PC ballot comment period and public review opens June 8, and is scheduled to run through July 6.

All cmments submitted during the Ballot Comment Period will be discussed and resolved during the July 18 virtual NBIMS PC Comment Resolution Meeting. The NBIMS PC Ballot Voting Period will commence on August 7 through September 1.

Visit the BIM Council for more information.

PEOPLEONTHEMOVE

ROSOCO ANNOUNCES FOUR NEW HIRES IN SALES AND SUPPORT ROLES

Jeff Stepheson is the new Tech Specialist for PROSOCO's Concrete Flooring Group and Consolideck brand. He brings 35 years of experience in the areas of surface preparation, moisture mitigation, cementitious underlayments, decorative toppings, and specialty finishes. Stepheson, who will be based out of northern California, provides technical support for customers in California, Oregon, Washington, Arizona, Utah and Nevada.

Judy Riling has been hired as PROSOCO's Inside Sales Support Specialist covering the northern half of the U.S. Riling's experience includes 20 years of sales and business development with a focus on customer service.

Brittany Parish is PROSOCO's new Sales Administrator for the Clean and Protect Group. Her previous work experience includes sales support roles in real estate and retail.

Shea McEnerney has joined PROSOCO as its new Preservation and Architectural Support Specialist. His background includes historic structure analysis, rehabilitation and building documentation. Professionally trained in Charleston, S.C., and Dublin, Ireland, McEnerney most recently worked with STRATA Architecture in Kansas City.

In addition, ***Melissa Frierson*** has been promoted to Senior Inside Sales Support Specialist, covering the southern half of the U.S. Frierson has worked for PROSOCO since January 2020.

BASHIR PARVANEH JOINS ECS PACIFIC

Bashir Parvaneh recently joined ECS as a Facilities Associate and has played an important role in opening our first office in California (Walnut Creek). With 5 years experience, Bashir is dedicated to establishing a strong presence for ECS Pacific in California. Bashir has his Bachelor of Arts in Architecture from the University of California, Berkeley. He also is a member of the Associate American Institute of Architects (AIA) and the International Concrete Repair Institute (ICRI).

Bashir's expertise lies in various areas, including building enclosure consulting services, historic preservation, capital replacement planning, and quality assurance evaluations. He excels at reviewing design documents for contemporary new construction and evaluating existing and historic building enclosure systems, such as cladding and windows. Bashir's skills extend to water intrusion diagnosis testing, architectural design consultation, and developing effective waterproofing remediation solutions. He is well-versed in assessing diverse building cladding systems, ranging from wood and brick masonry to metal, stone, stucco, and exterior insulation finish systems (EIFS). Additionally, Bashir is experienced in overseeing the installation of remediation systems, meticulously monitoring progress, and providing detailed reports based on his observations.

COBOD INTERNATIONAL

Experience the power of 3D construction printing live with the brand new COBOD-virtual reality solution

COBOD, the leading global manufacturer of 3D construction printers, is pleased to announce the launch of its unique Virtual Reality (VR) solution for 3D construction printing. This innovative solution allows potential customers to experience live 3D construction printing in real-time, right in front of their eyes in virtual reality.

At many occasions, it is not practical or convenient for people to experience real-time printing of buildings due to their location or timing. With COBOD's new VR solution, individuals can watch many of the company's real printed buildings being constructed in a virtual residential area, complete with trees, cars, and other objects, for an even more realistic experience.

With the help of technology, people get into the heart of an already well-known and widely used program, the COBOD Configurator. Virtual Reality helps people experience the real size of a 3D concrete printer in different configurations. Also, individuals can witness close up of the gantry printer work and see how layer by layer the house is created.

COBOD will be presenting this new VR solution at the UK's largest built environment event, UK Construction Week, in London from May 2nd to May 4th. Attendees can visit the company's booth F510 and try out the VR solution for themselves.

Europe's largest 3D printed building is being constructed in Germany

Europe's largest 3D printed building is initiated by KRAUSGRUPPE, a project developer, builder, investor, real estate manager, and broker in the Heidelberg area. The city has always been at the forefront of innovation as it is a city of science. Now, that the Campbell Barracks have been renovated, the city will have a ground-breaking testament of 3D construction printing technology that will revolutionize the building sector. This ground-breaking project is being built for Heidelberg IT Management GmbH & Co. KG, a cloud and data center provider.

The building is approximately 54m long, 11m wide and 9m high. The construction process started 31st of March and is expected to be completed by the end of July 2023. It will serve as an IT server hotel, and is set to become one of the most technologically advanced and innovative buildings in the region.

PERI 3D Construction, a pioneer in 3D construction printing industry, is providing the know-how for the 3D printing process, and is using COBOD's BOD2 3D construction printer to print the walls of the building. PERI is taking advantage of the high printing speeds of the printer, and plans to complete the printing of the walls of this large-scale project in just 140 hours, equivalent to printing 4 square meter of building per hour.

The architects from SSV Architekten and Mense Korte, who collaborated on the project, devoted a lot of attention to the design of the walls, which is very unique as seen in the renderings of the server hotel.

The first 3D printed medical center in the world completed in Thailand

Siam Cement Group (SCG), the largest and the oldest cement and building material company in Thailand and Southeast Asia, has recently revealed the successful completion of the first 2-story 3D printed building in ASEAN. What is more striking is the fact, that the building is the first 3D printed medical center in the whole world.

The stunning two-story medical center located in Saraburi, Thailand, was constructed using a state-of-the-art COBOD BOD2 3D concrete printer. This ground-breaking project boasts a total floor area of 345 m2 over 2 floors and is also the largest 3D printed building in the ASEAN countries.

The building immediately stands out on the horizon with its wavy walls. This design solution is made possible and was easy to implement thanks to the 3D construction printer and the design freedom it allows. Hence, the first 3D printed medical center features all benefits of the revolutionizing construction solution, specifically the free from design, increased building speed and reduced number of workers on site compared to conventional construction practices.

SCG now offers the market the chance to increase the construction efficiency, reduce the environmental footprint by generating less waste on the construction site, while improving the design. As an official distributor of COBOD in Thailand, SCG promotes the value of the innovative technology, which offers a range of benefits over traditional construction methods. The building was specifically designed to support seismic loads, and the use of 3D printing technology increased construction speed and reduced the amount of labor required compared to conventional building methods.

COBOD's 3D construction printing technology helps to rebuild Ukraine—first project is a 3D printed school in Lviv

A groundbreaking initiative to rebuild Ukraine has commenced in Lviv, Ukraine. This remarkable project is led by the humanitarian foundation Team4UA and carried out by the Danish 3DCP Group using COBOD's BOD2 printer and aims to address the pressing need for educational infrastructure in the country.

Ukraine has faced severe challenges due to the full-scale invasion of Russia, resulting in the destruction or damage of over 2,000 schools, with 277 schools completely demolished, as reported by the Ministry of Education and Science of Ukraine. In light of this crisis, the primary goal of this project is to swiftly respond to

the dire shortage of educational infrastructure in the country.

By introducing 3D printing technology into the construction process, the project initiators aim to expedite the creation of educational facilities and lay the foundation for the reconstruction of housing and vital infrastructure throughout Ukraine.

Visit https://cobod.com/ for more information on COBOD.

THE POWER OF MCI® CONCRETE ADMIXTURES AS GREEN BUILDING MATERIALS

How do MCI® admixtures extend the service life of a concrete structure? The means is corrosion inhibition. Corrosion of embedded reinforcement is one of the primary causes of concrete deterioration leading to repair or replacement. It is often caused by high chloride exposure in coastal environments or regions with severe winters where deicing salts are needed. It can also be the result of concrete carbonation, caused by the gradual loss of naturally protective high alkalinity levels after decades of exposure to the atmosphere. Corrosion products can cause the reinforcing metal to expand to several times its original size, pushing on the overlying concrete and making it crack or spall, which creates pathways for more corrosives to enter and continue the vicious cycle.

MCI® admixtures dosed into the ready mix at the time of construction fight the corrosion process by forming a molecular protective layer on the rebar. This interrupts the natural corrosion reaction, delaying time to corrosion and reducing corrosion rates once started. ASTM G109 testing has shown MCI® to reduce corrosion rates by five to 13 times when compared to untreated samples. This corrosion reduction can have powerful effects on a structure's service life and delay time to the first needed repair by the simple addition of a concrete admixture at a fraction of the entire structure's cost.

For more information visit https://www.cortecmci.com/contact-us/

TIPS FOR DEALING WITH RUSTY REBAR AT THE CONSTRUCTION SITE

Before deciding what to do about rebar rust, it is helpful to evaluate its severity.

1. Apply MCI® CorShield®. If the flash rust is light but the rebar will be sitting out in the open for some time, the next best option is to wipe off the flash rust and apply MCI® CorShield®, a clear non-tacky temporary coating that does not need to be removed before concrete placement. MCI® CorShield® will slow down the corrosion process until the rebar is installed or the rest of the concrete is placed.
2. Clean the rebar and apply MCI®CorShield®. If the rebar is moderately flash rusted, it may need to be cleaned off with a high-pressure rinse to remove most or all of the rust before coating. One of Corrosionpedia's suggestions for countering corrosion during the water blasting process is to add corrosion inhibitors to blast water. By their nature, the corrosion inhibitors in a cleaner such as MCI®-2060 fall under the guide's classification of "passivators," i.e., those corrosion inhibitors that leave behind a thin protective film to extend the window of time in which metal can be coated without flash rusting. Once the rust has been removed and the surface has dried, MCI® CorShield® can be applied for extended outdoor protection.
3. Remove loose rust and apply CorrVerter® MCI®. If the rust is moderate to heavy and more than can be removed with a good pressure wash, CorrVerter® MCI® Rust Primer is another excellent option. After removing loose rust and cleaning the rebar, workers can apply this water-based coating directly onto the rusty rebar. CorrVerter® MCI® converts existing rust into a hydrophobic passive layer and discourages re-rusting, leaving the rebar with a clean fresh start for concrete placement. While you cannot completely stop rust, you can fight it and prevent it from doing as much damage as it could do otherwise. Finding rusty rebar at the construction site is not the end of the story, but neither should it be overlooked. While proper treatment of rusty rebar is an art, evaluating its severity and applying appropriate methods of cleaning, protection, and passivation, should leave you and other contractors much less overwhelmed by the sight of rusty reinforcing bars on the jobsite.

For more information visit https://www.cortecmci.com/contact-us/

EASY MCI® PEEL-OFF COATING PROTECTS WINDOWS, DOORS, AND MORE!

MCI® Peel-Off Coating is an acrylic water-based coating for temporary protection of non-porous surfaces against physical abrasion, weathering, and corrosion. It is low VOC (0.2 lbs/gal [24 g/L]) and may be applied by spray, roll, or dip. When no longer needed, the coating can be peeled off the surface and disposed as solid waste. MCI® Peel-Off Coating can be tinted to several basic colors to blend in with or stand out from the surrounding environment. It offers UV resistance for outdoor applications, in addition to temporary protection from salt and chemical induced corrosion. Although water-based, MCI® Peel-Off Coating will not be softened or penetrated by most solvent-based paints.

There is more than one way to approach in-process damage on sensitive fixtures at the construction site. Rather than opting for damage control after scratches or corrosion has been inflicted, make life easier for yourself, construction workers, and facility owners by applying preventative measures from the start.

Visit www.cortecmci.com/contact-us/ for more information.

INTERESTED IN SEEING YOUR NEW PRODUCT IN THIS COLUMN?

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

ICRI**CHAPTER**NEWS

CHAPTER CALENDAR

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

CENTRAL FLORIDA
July 13, 2023
TECHNICAL PRESENTATION
Topic: Corrosion and Corrosion Technologies
Location: TBD

CHICAGO
August 17, 2023
35th ANNIVERSARY PARTY
LondonHouse Downtown
Chicago, IL

CINCINNATI
July 19, 2023
CHAPTER SUMMER SOCIAL
TopGolf Facility
West Chester, OH

DELAWARE VALLEY
July 10, 2023
SPORTING CLAY SHOOT
Lehigh Valley Sporting Clays
Coplay, PA

FLORIDA FIRST COAST
August 30, 2023
MILESTONE INSPECTIONS ADVOCACY
UNF Herbert Center
Jacksonville, FL

FLORIDA WEST COAST
August 3, 2023
CHAPTER TECHNICAL MEETING
Red Mesa
St. Petersburg, FL

GEORGIA
August 31, 2023
CHAPTER TECHNICAL LUNCHEON
Topic: Embedded Guardrail Posts
Speaker: Eric Gross of WJE
Maggiano's Little Italy – Perimeter
Dunwoody, GA

METRO NEW YORK
July 27, 2023
ROOFTOP SUMMER SOCIAL
230 5th Avenue Rooftop
New York, NY

MICHIGAN
August 2, 2023
SUMMER SOCIAL OUTING
West Michigan Whitecaps Baseball
LMCU Ballpark
Comstock Park, MI

MINNESOTA
July 18, 2023
ANNUAL GOLF TOURAMENT
Bunker Hills Golf Club
Coon Rapids, MN

NORTHERN OHIO
July 11, 2023
CHAPTER TECHNICAL PRESENTATION
Topic: Impact of Portland Cement Restrictions
Presented by: Euclid Chemical
Holiday Inn Cleveland South
Independence, OH

ROCKY MOUNTAIN
July 24, 2023
ANNUAL GOLF TOURNAMENT
Hiwan Golf Club
Evergreen, CO

ICRI**CHAPTER**NEWS

CHAPTER ACTIVITIES

PITTSBURGH HOSTS GOLF OUTING

The Pittsburgh Chapter held its 24th annual Chapter Golf Outing on June 2, 2023, at Birdsfoot Golf Club in Freeport, PA. The chapter welcomed about 50 golfers who participated with numerous companies supporting the event through sponsorships. The chapter is very thankful for everyone's support.

Attendees enjoyed a beautiful and calm sunny day starting with bagpipes playing over the rolling greens. Even with temperatures spiking into the 90s by noon, foursomes were not deterred and moved at a great pace with the help of lots of liquid refreshment. Following a successful morning on the course, a BBQ feast with awards presentation and door prizes ended the day.

For the second straight year, Graciano Corp foursome took home the low score prize. There were also several individual competition winners for longest drive and longest putt, and many in attendance left with a gift from the door prize drawings. The golf outing is one of the biggest events of the year for the Pittsburgh Chapter. In addition to helping fund other chapter initiatives, it is a way to give back and show appreciation to the members of the chapter.


Pittsburgh Chapter members networking during registration


The Chapter set the mood with bagpipes playing over the rolling hills to kick things off


The day was sunny and hot, a great day to play golf!

METRO NEW YORK SEMINAR: QUESTIONING CONCRETE DURABILITY


Professor Norman Wiess asking important questions of the Metro New York Chapter

On Tuesday, April 4, Professor Norman R. Weiss led the technical discussion at Club 101 on the topic "Questioning Concrete Durability: What Did We Know & When Did We Know It?" Professor Weiss took the audience back in time and explained how concrete has changed throughout the years. The presentation was filled with documentation showing exactly how concrete durability was viewed and recorded. This led to further discussion regarding the interrelated factors of carbonation, corrosion, and construction technology, as well as development of environmental science in a broader context. The lecture ended with questions from the audience, which Professor Weiss handled with poise. The ICRI-MNY Chapter wants to reiterate their thanks to Norman Weiss for preparing this presentation and providing such a riveting experience to our members.

OKLAHOMA HOSTS BUSY SPRING SCHEDULE

The Oklahoma Chapter hosted three consecutive technical meetings this spring.


Rob Cordova and John Neeson with Master Builders Solutions took time in April to join the Oklahoma Chapter in Tulsa for a presentation on the importance of Water Repellents. This meeting took place in Tulsa at the offices of Cyntergy


In March, the Oklahoma Chapter hosted Mark LeMay with JQ Engineering (and ICRI Past President) for his presentation on "What Happened to My New Concrete?" at the AGC facilities in Oklahoma City


In May, the Oklahoma Chapter welcomed ICRI Technical Director Dave Fuller for his presentation on moisture issues, complete with demonstrations and various moisture tests and techniques

ICRI CONCRETE REPAIR CHAPTERS

INTERESTED IN SEEING YOUR CHAPTER NEWS & EVENTS LISTED HERE?

Chapter News & Event Deadlines

SEPTEMBER/OCTOBER 2023 CRB
Deadline: July 1, 2023

NOVEMBER/DECEMBER 2023 CRB
Deadline: September 1, 2023

JANUARY/FEBRUARY 2024 CRB
Deadline: November 1, 2024

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

MINNESOTA TECHNICAL SESSION ON 3RD AVE BRIDGE

This year's Spring Technical Session was a combination platter of classroom learning, onsite tour, and firsthand observation. The Minnesota Chapter hosted its 2023 Spring Technical Session—about the Minneapolis 3rd Avenue Bridge repair project—at the Barrel House, a venue conveniently located across the street from the project entrance. The presentation consisted of information and slides provided by Tanner Swenson, Wiss, Janney, Elstner; Nicholas Drews, Vector Corrosion Technologies; and Blake Rago, RH Ward & Associates.

The 3rd Avenue Bridge was first opened to traffic in Minneapolis, Minnesota, June 14, 1918. In 1939 the bridge had its first rehabilitation performed, then fast forward 84 years and Ames construction along with its subcontractors are looking to complete this round of major rehabilitation by the end of 2023. The restoration project began with an extensive investigation by WJE that included delamination surveys, GPR to locate reinforcing steel, corrosion potential surveys, resistivity testing, carbonation testing, and ultrasonic thickness testing. The importance of a comprehensive condition assessment is paramount to the rehabilitation of a historic concrete structure. Historic concrete has unique deterioration mechanisms considerably different than for modern concrete. After the investigation period was finished, it led to the drafting of documents and creating the scope of work which included concrete repair, historic board finish, epoxy coated rebar installation, crack repair, and multiple types of anodes.

The primary need for these repairs was to address the significant structural deficiencies and condition issues that were found. The purpose for the rehabilitation is to address the condition issues and to achieve a service life of 50 years. All to preserve the historical condition of this epic Melan system arched bridge.

After the presentation, the group was given a brief safety orientation from Ames Construction, the general contractor. All attendees donned their PPE and walked from the Barrel House to the 3rd Avenue Bridge. Blake Rago led the group to the edge of the bridge at the first pier, down the stair tower to the suspended scaffold. We stood mere feet above the crested Mississippi River from the spring runoff on the suspended scaffold as we observed the repairs. The crew of RH Ward provided us with some entertainment as they showed us the shotcrete process on one of the prepped arches. Shooting shotcrete is an absolute artform, and a very labor intensive one at that. Seeing it performed in person really gave everyone a great appreciation for the men and women that work to repair our structures.

The view from the suspended scaffold as you take in the Mississippi River below

A special thank you to everyone involved in making this event an absolute success. After the event, the attendees were buzzing with appreciation for he knowledge presented on this project. Everyone involved walked away with greater knowledge and greater appreciation for the concrete repair industry.

Tanner Swenson with WJE presented on the 3rd Avenue Bridge restoration

Also presenting was Nicholas Drews with Vector Corrosion Technologies

ICRI Minnesota Members and guests finished with the safety orientation at the Barrel House and wait for the tour of the bridge to begin

Attendees are seen here with Blake Rago, from RH Ward & Associates, as he talked about the extensive restorations while on the suspended scaffold

ICRI**CHAPTER**NEWS

CHAPTER ACTIVITIES

METRO NEW YORK SYMPOSIUM ON REPLACEMENT MATERIALS

Metro New York recently hosted its annual Symposium: *Alternative Replacement Materials & Why They're Used (or Not)*. A full capacity room at Club 101 was treated to insightful presentations covering an array of materials.

The Symposium kicked off with the keynote address delivered by Erin Fisher, PE, from CANY and set a positive tone for a day filled with learning. Erin's presentation was followed by Chris Hill from Structural Technologies of New York, who discussed alternative materials, namely CFRP, that were used for a project at the West Point Barracks; and Perri Robinson from the Keim, who delved into mineral silicate concrete finishes. A short break followed to allow for attendees to walk around and visit the many vendor booths. The morning continued with three more presentations, first by Roel Gregorio from Pullman, who delved into the use of Microcotta in the restoration of the Waldorf Astoria Hotel. Danielle Pape from Jablonski Building Conservation then dove into multiple materials used to repair two large marble statues at the Woodlawn Cemetery. Fatemeh Shirmohammadi, PhD, SE, PE, and H. Aydin Pekoz, PhD, PE, wrapped up the morning session by speaking about their experiences and the alternate materials used for the strengthening of cast-iron columns.

Our afternoon session was kicked off by Tiffany Coppock, AIA, NCARB, CSI, CDT, LEEP AP, ASTM, RCI, EDAC, from Owens Corning discussing cellular glass insulation, followed by Eric Hammarberg from Henson Architecture who outlined the use of GFC as an alternative material for terra cotta. The second afternoon session was kicked off by Jason Oakley, PE, from Simpson Strong Tie with his discussion about the structural repair and retrofit using FRCM, followed by Michael P. Edison from Edison Coatings presenting on the use of latex-modified cementitious repair mortars. The third and final afternoon session was led by Aniket Borwankar from Simpson Strong Tie and his presentation on FRP anchors, and then Kevin Shepard closed out our series of presentation with a discussion about concrete sustainability.

ICRI Metro New York would like to thank all of our fantastic presenters for their time and for sharing their expertise with the industry on this very important topic. We also thank the many members and non-members who attended this year's symposium and made it a great success!

ICRI**CHAPTER**NEWS

CHAPTERS COMMITTEE CHAIR'S LETTER

JON CONNEALY
Chapters Chair

I'd like to start this off by asking you a question, and it is one that is coming up more and more. How are you making this industry a safer place? It seems like every meeting I attend these days has a safety brief before we get things started. After a while you start to get complacent with these safety messages, safety minutes, etc.

That is, until I heard the following story where safety training made a real difference. This is a true story that happened two days before I sat to write this article. I've been asked to keep names confidential.

A contractor was hired to do exterior façade work on a high-rise tower. They were in early stages of the job, just getting the swing stage set. In order to get to the penthouse rooftop, they had to take the elevator to the top floor, then climb two-and-a-half additional floors through tight stairways, hatches, and ladders. This is what you would consider a less-than-ideal location to have an injury, and an even worse place for someone to have a massive heart attack—which is what happened.

When this occurred, the worker's foreman acted quickly and began to perform CPR. He continued to perform CPR for well over 10 minutes as Fire and EMT made their way to the top of the building. When they arrived, it took multiple attempts with a defibrillator before the man's heart began to beat on its own. There is no doubt that had the foreman not stepped in and performed CPR that the man would not have survived.

CPR training is provided as part of this company's safety program. That training, and the foreman's attention during the training, made it possible for the man who suffered the heart attack to live another day.

So, what does this have to do with the Chapters Committee? Why am I telling this story to all of you chapter leaders? Because Safety needs to be a part of everything we do. Does your chapter do Safety Messages before your meetings? Do you do meetings on safety? Take a hard look at what you do within your chapter, and if safety isn't a part of what you do, I urge you to start. If nothing else, consider offering a CPR training as a chapter event. Providing that training could someday save a life.

Until next time—work hard, work smart, and work SAFE out there!

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

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United States

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Cement Masons & Plasterers Local 528
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United States

Bill Paxton
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United States

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

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35th YEAR ANNIVERSARY

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RE-CON LINE

SUSTAINABLE CONCRETE SOLUTIONS

Sustainable concrete production means reducing the consumption of natural resources and eliminating waste material streams. MAPEI has developed products and solutions that do just that:
RE-CON ZERO EVO transforms returned concrete into aggregates;
RE-CON DRY WASHING utilizes these aggregates to greatly reduce slurry from washing truck mixers;
RE-CON AGG helps use higher dosages of recycled aggregates or other demanding raw materials.

Transforming concrete production together – from linear to circular towards a sustainable future

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