CONCRETEREPAIR

November/December 2017 Vol. 30, No. 6

BULLETIN

A Bimonthly Publication of the International Concrete Repair Institute



















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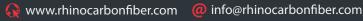


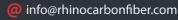












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CRB EDITORIAL DEADLINES

March/April 2018-January 2, 2018 Theme: Docks, Locks and Canals

May/June 2018-March 1, 2018 Theme: Health and Safety in Concrete Repair

July/August 2018-May 1, 2018 Theme: Sustainability and Re-purposing

September/October 2018-July 2, 2018

Theme: Seismic Solutions



ON THE COVER: 2017 Project of the Year Alcatraz Quartermaster Building. See page 17.

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- Paradise Island East Bridge Repairs & Renovations
- Chats Falls Dam Rehabilitation
- Gold Bar Influent Channel No. 2 Repair and Long-Term Protection

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- Refinery Sump Repairs
- · Port of Canaeral North Cargo Piers
- Apeejay House, Repair & Restoration
- Point East Association, Inc.
- Mitchell Student Center Preservation
- · Brandeis Parking Garage
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· Carnegie Lake Dam, Princeton University

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NOTE FROM THE EDITOR



The end of the year is rapidly approaching for ICRI. Our members are starting to catch their breath and look back at the year. The 2017 Fall Convention was held in New Orleans, LA and featured this year's Project Awards. A total of 38 projects were submitted for the 2017 ICRI Project Awards Program. This year's submittals covered many different categories of projects and included projects from six countries. This issue features the 2017 Project of the Year-Alcatraz Quartermaster Building. The issue also features 2 Project of the Year finalists, 7 Awards of Excellence,

and 10 Awards of Merit.

ICRI is planning a busy year for 2018. The year will start with the Annual Kick-Off Party at World of Concrete and continues with the Spring Convention in San Francisco. ICRI will hold Concrete Slab Moisture Testing and Concrete Surface Repair Technician Certification classes throughout the year. There has been a Learning and Certification Center added to the ICRI Website that will assist with these training programs and future programs as they are developed and implemented.

I hope you have all had a successful year and are looking forward to 2018!

Jerry Phenney Editor, CRB MAPEI Corporation

PRESIDENT'SMESSAGE



BRIAN DALEY

This will be the final *Concrete Repair Bulletin* message in my role as the 2017 president of the International Concrete Repair Institute, so I'd first like to express what a true privilege it has been to serve in this position. I've had the opportunity to meet and engage with ICRI members from across the country, work with smart and enthusiastic executive committee and board of directors members, and

play a part in sustaining existing activities and starting some new ones that improve our industry and organization.

The growth and ongoing success of ICRI, as detailed in ICRI Executive Director Mike Levin's "State of the Institute Report" published in the Sept/Oct 2017 CRB, is due to commitment and concern on the part of hundreds of involved members, dozens of businesses that contribute their employees' time and significant money as sponsors and supporting member companies, as well as ICRI staff and our association management company, Ewald Consulting. As current President-elect Ralph Jones assumes the responsibilities of president for 2018, I am confident in his focus on ICRI's mission of being the preeminent source of delivering best industry practices and professional networks in the concrete repair industry. I wish Mr. Jones and the entire ICRI Board of Directors for 2018 great success, and invite all of you to contribute your time and energies at your Chapter level and at international conventions to be part of that mission.

But I'm not completely done with being president and I am very much looking forward to the ICRI Fall Convention in New Orleans, November 15-17. My personal experience in

the concrete repair industry has largely been limited to buildings, garages and plazas, so the convention's theme of "Docks, Locks and Canals" will undoubtedly offer many opportunities to learn and expand my knowledge base. Retrospectives of what went wrong during the Hurricane Katrina crisis will provide a context for presentations detailing new technologies and improvements to local water management facilities with lessons learned from that event. Members can attend and participate in committee meetings on a variety of topics where the real work of ICRI's guidelines and other products are done. And perhaps most important, business ties and friendships can be formed and strengthened at a variety of social events planned through the several days of the conference.

As we all scramble to finish our last projects in 2017 and plan our workloads for next year, I hope each of you feels that ICRI provides benefits that justify the investments of your time and your money. All of us who are allowed the stewardship of the organization work to help you achieve your goals in this industry.

Thank you for your involvement through 2017 and have a safe and happy holiday season and winter!

Sincerely,

Brian Daley 2017 ICRI President

In Ochle

ICRIINFORMATION

UPCOMING ICRI DATES & EVENTS

CERTIFICATION CLASSES

Concrete Slab Moisture Testing Certification Program

- January 24-25, 2018—Las Vegas, Nevada (World of Concrete)
- January 30-31—Las Vegas, Nevada (TISE West)

2018 ICRI KICK-OFF PARTY

January 22, 2018 VooDoo Lounge Rio Hotel & Casino, Las Vegas, Nevada

WORLD OF CONCRETE 2018

Exhibits: January 23-26, 2018 Seminars: January 22-26, 2018

Las Vegas Convention Center, Las Vegas, Nevada

2018 ICRI SPRING CONVENTION

April 11-13, 2018

Theme: "Seismic Solutions"

InterContinental Mark Hopkins, San Francisco, California



ICRI is Hiring!

ICRI Certification Product Manager

(New Position Description)
See page 91.

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ICRI would like to thank all of our Supporting Members, whose dedication to ICRI is greatly appreciated.

Their continued support has greatly enhanced programs both within ICRI

and the concrete repair industry as a whole.

TACTALK



FRED GOODWIN

This issue's TAC Talk is an introduction to the members of TAC (Technical Activities Committee). It is amazing the talent and passion that we have in ICRI and especially in TAC. In addition to serving on TAC, each member is also a member of the Coordination Committee that facilitates communication and partnership between the different technical and administrative committees of ICRI as well as the Secretariat.

Fred Goodwin, with BASF Construction Chemicals, has served as a TAC member twice, first from 2003 to 2007, and then again from 2014 to present as chair of TAC, succeeding Kevin Michols. He has also served as chair of the Coordination committee since its inception in 2010 until handing it off to Rick Edelson this year. In addition to remaining a Coordination Committee member, he is a non-voting member of the ICRI Executive Committee and Board of Directors, and Vice-Chair of the ICRI Secretariat. Fred is a chemist with over 30 years of experience in the construction chemicals industry and has been with BASF and its predecessors for over 28 years. In addition to ICRI, he is an active member of ACI, ASTM, NACE, SDC, and SSPC; a Fellow of ASTM, ACI and ICRI; an Honorary Member of ASTM C1 & C9; current Chair of ACI 090 TRRC, SSPC 8.3 Commercial Floor Coatings; and a member of ACI TAC. Fred was awarded the ASTM Award of Merit in 2016; the JCPL Editors Award in 2006, 2010, and 2012; the ACI 2011 Delmar Bloem Distinguished Service Award; and the ACI Foundation—Strategic Development Council—2015 Jean-Claude Roumain Innovation in Concrete Award. He is a NACE certified Corrosion Technologist and was named as a Top 25 Innovative Thinker by Technology Publishing Co. He heads the BASF Construction Chemicals Global Corrosion Control Competency Center.

Mark Nelson has been the president of Nelson Testing Laboratories in Elmhurst, IL, since 2004. He has been a member of TAC since 2014 and was appointed as TAC Vice-Chair in 2016. He is the current chair of the ICRI Secretariat and is the TAC contact for ICRI 710 Coatings and Waterproofing. He has a JD degree in law from the John Marshall Law School and a degree in Finance from University of Illinois Champaign Urbana. He is a Fellow of ICRI; past chair of the Chapters' Awards and 710 Coatings and Waterproofing committees; and past president of the ICRI Chicago Chapter. He is an Executive Board member of ASTM C15, past president of the Chicago chapter of the Construction Specification Institute, and an active member of The Masonry Society. He holds certifications from the Construction Specification Institute as a Construction Document Technologist, and previously was a business development manager for Degussa Building Systems, the president of Hydro/Environmental Products, and a practicing attorney for Charles Brusso & Associates.

James (Jim) McDonald, with McDonald Consulting, has served TAC in various capacities for more than 20 years including Member, Secretary, Technical Advisor, and Reviewer/Review Chief for almost all documents submitted for TAC approval prior to publication. He is a Charter and Honorary member of ICRI; a member of the ICRI Gulf States Chapter; an ICRI Fellow; a recipient of the ICRI Distinguished Service Award; served as ICRI President in 1999; and is a voting or consulting Member of all ICRI technical committees. He previously chaired ICRI 320 Concrete Repair Materials and Methods and was instrumental in development of the current system for committee and document number designations for technical committees adopted in 2008. He completed the original draft of the ICRI Concrete Repair Terminology (CRT) document in 1998 and converted the CRT into an interactive database as well as drafted the original ICRI Task Group Manual in 1997 including revisions in 2002, 2005, 2008, 2011, and 2015 (now known as the Technical Committee Manual, or TCM). He has developed and conducted training sessions to encourage technical committee officers to take advantage of the TAC website during development and balloting of committee documents and was a primary contributor to the first edition of the joint ICRI/ACI Concrete Repair Manual. He has served as the Secretary of the Coordination Committee since it was organized in 2010 to facilitate harmonization of document development and committee operation processes among all ICRI Committees and provide a central repository for documents and tools that can be used by ICRI technical and administrative committees, and was a member of the ICRI Strategic Implementation Committee. He is a Life Member of the American Society of Civil Engineers (ASCE), and during his 42 years of service in the US Army Corps of Engineers was inducted into ERDC-WES Gallery of Distinguished Employees, received the Department of the Army Meritorious Civilian Service Award and the Department of the Army Research and Development Achievement Award.

Ken Lozen has been on staff as ICRI's Technical Director since August 2013 and is a non-voting member on TAC. As Technical Director, Ken oversees the technical aspects of ICRI; provides technical support to the board, committees and members; assists in technical articles for the *Concrete Repair Bulletin* and speakers for ICRI conventions; assists in the development and implementation of certification programs and education products; and is a consulting member on all ICRI technical committees. Prior to ICRI Technical Director, Ken was a Principal Engineer/Associate for NTH Consultants, Ltd in Michigan. He has over 30 years of experience in restoration engineering and consulting, construction materials quality control, concrete technology and troubleshooting, project

management and litigation, and structural rehabilitation. Ken is a Charter member and original Treasurer of ICRI, and served on the ICRI Board of Directors. He is an ICRI Fellow and has served on many ICRI committees, including ICRI TAC. He was Chair of the task group that produced the original and updated versions of ICRI Technical Guideline No. 210.3R-2013, Guide for Using In-Situ Tensile Pulloff Tests to Evaluate Bond of Concrete Repair Materials. Ken is also a Fellow of the American Concrete Institute (ACI); received the ACI Chapter Activities Award in 2007; and serves on several ACI Committees, including ACI 546 Repair, ACI 563 Specifications for the Repair of Structural Concrete in Buildings, and E706 Concrete Repair Education. He also served on the ACI Greater Michigan Chapter board for 26 years where he received the Chapter's Arthur Y. Moy Award in 2012 for outstanding service in the field of concrete technology. Ken has authored articles on repair, restoration, demolition, and maintenance of concrete structures. He received his Bachelor of Science degree in Civil Engineering from the University of Detroit, Detroit, Michigan.

Peter DeNicola of Evonik Corporation is the Marketing Manager-Americas Region at Evonik Corporation and has been with Evonik since 2000 working as a scientist with his degree in chemistry. He has been a member of TAC since 2015 and is the TAC contact for ICRI 510 Corrosion. Peter is an expert on bridge preservation and maintenance, also having a deep expertise with concrete deck sealers. Along with his many commitments, he chairs ICRI 160 Life-Cycle and Sustainability and is Secretary of ICRI 510 Corrosion. Pete is also active in ASTM, SWRI, TRB and NACE.

Ashish Dubey with USG Corporation has been on TAC beginning in 2017, serves as the Chair of ICRI 320 Concrete Repair Materials and Methods, and is TAC contact for ICRI 160 Life Cycle and Sustainability. He is an active member of ICRI 310 Surface Preparation and ICRI 710 Coatings and Waterproofing. Ashish obtained his Bachelor of Engineering degree in Civil Engineering from Devi Ahilya University, Indore, India and Master of Applied Science and Doctor of Philosophy degrees in Civil Engineering from the University of British Columbia, Vancouver, BC, Canada. At USG Corporation, he is in a senior R&D role at the Corporate Innovation Center located in Libertyville, Illinois, and has been active in the concrete and concrete repair industry for more than 25 years. He has conducted significant research and development work on fiber reinforced, lightweight, and ultra-high performance concrete, rapid setting cements, and geopolymer binders. He is an author or co-author of more than 40 US Patents on advanced cementbased materials, composites, and building systems. Ashish is also a member of ACI, ASTM, and RILEM; is a Fellow of ACI; and a Past Chair of ACI 549 Thin Reinforced Cementitious Products and Ferrocement. He organized international technical symposiums on special concretes and is an editor of four ACI Special Publications on thin reinforced cementitious composites, textile reinforced concrete, and fiber reinforced concrete.

Eric (Rick) Edelson, PE, joined Tadjer-Cohen-Edelson Associates, then known as Tadjer Cohen Associates, in 1968 through Drexel University's cooperative engineering work/study

program and was a Principal of the firm until his retirement in January 2014. He is now with Edelson Consulting Group LLC. Rick is an ICRI Fellow, served on ICRI TAC from 1996 to 2011 (Chair from 2002 to 2007), and rejoined TAC in 2016 where he serves as the TAC contact for ICRI 210 Evaluation. Rick has specialized in forensic analysis of buildings and building envelopes including residential projects, industrial, commercial and educational buildings, hotels, apartment and office buildings of structural steel, reinforced concrete, pre-stressed and post tensioned concrete, and wood for over 30 years. He has designed repairs for more than 20,000,000 square feet of garages, and designed the restoration for thousands of balconies and façades, roofs, and plazas. After participating in Vision 2020 creating the "roadmap" for the repair industry, Rick served as the Chair of ACI 562, Chapter 7 Structural Repair during the creation of the first edition of the ACI 562 Repair Code. He remains an active member on the ACI 562 Committee and served on the task group that developed the joint ACI/ICRI Guide to the Use of the ACI 562 Repair Code. Rick currently serves on the ACI TRRC Committee, and is one of the newly appointed ICRI Secretariats and incoming Chair of the ICRI Coordination Committee. He is also a former Chair of the Structural Committee for the Building Code of the District of Columbia. Rick received his Bachelor of Science Degree in Civil Engineering from Drexel University, and is a registered PE in numerous states.

Paul Farrell is the Business Development Manager for Carolina Restoration and Waterproofing, Inc. which is the Southeastern Region of C.A. Lindman Inc., and has been a member of TAC since 2016, serving as the TAC Contact for ICRI 120 Environmental Health and Safety. As Marketing Manager for Carolina Restoration and Waterproofing, his responsibilities are branch public relations, meeting with current and potential customers, estimating, and negotiating contracts for the Southern Virginia, North Carolina and South Carolina markets. He has over 30 years of experience in exterior facade restoration, as well as extensive hands on experience with specialty coatings, EIFS and Stucco applications. He has extensive experience in estimating, planning and project management. Paul holds a BFA/AMA from Edinboro University of Pennsylvania, and is a

Continued on page 10...TAC Talk



member of SSPC, BOMA, WCA, NPS, Carolinas Parking Association, and ICRI. For the past 11 years, Paul has been a member of the ICRI Virginia and Carolinas Chapters. He has served as an Officer and Board Member for both chapters and is a Past President of the Virginia Chapter (2015 & 2016) and the Carolina Chapter (2016).

Peter Kolf, PE, is a Principal Structural Engineer with CTL Group in Chicago, Illinois, and has been a member of TAC from 2010 to 2016, accepting reappointment in 2017. In his 30 years at CTL Group, he has been involved in structural evaluation and design, failure analysis, strengthening, rehabilitation, troubleshooting of construction-related problems, and durability enhancement. Peter has performed engineering for several projects that have won ICRI Awards of Excellence and one project that was awarded both ICRI Project of the Year as well as an Award of Excellence from the Post-Tensioning Institute. Peter has been active on ICRI 210 Evaluation and 320 Concrete Repair Materials and Methods for nearly 20 years, and is an ICRI Fellow. Peter is also a member of the American Concrete Institute (ACI), the American Institute of Steel Construction (AISC), and the American Society of Civil Engineers (ASCE).

Kevin Michols, **PE**, is a Principal and Director of the Janney Technical Center at Wiss, Janney, Elstner Associates, Inc. (WJE). Kevin has served on TAC since 2004, was TAC Chair from 2008 through 2013, and currently serves as TAC contact for ICRI 320 Concrete Repair Materials and Methods. He is an ICRI Fellow and active in ICRI technical committees 120 Environmental Health and Safety, 210 Evaluation, 310 Surface Preparation, and 320 Concrete Repair Materials and Methods. Kevin has 35 years of experience in evaluation of existing structures, troubleshooting construction problems, and repair/rehabilitation design. His focus areas include structural condition assessment, structural integrity evaluation, service life extension, strengthening design, durability enhancement, materials evaluation, and nondestructive testing. Project experience includes buildings, bridges, stadiums, tunnels, piers, cooling towers, tanks, dams, utility structures, and industrial facilities. Kevin has presented at numerous seminars and workshops on the subjects of structural evaluation and concrete repair. He holds professional registrations in 16 states and in addition to ICRI, his professional affiliations include the American Concrete Institute (ACI), American Society of Civil Engineers (ASCE) and Structural Engineers Association of Illinois (SEAOI).

Karl Rickert, PE, with Rickert Engineering, Inc., has been a TAC member since 2015 and is the TAC contact for ICRI 410 Masonry. Karl has worked for over 40 years as a structural engineer consulting on a wide range of building projects. After joining ICRI in about 1994, he became active in the ICRI Baltimore Washington Chapter. Activities included the dinner meeting committee, the board of directors and eventually the president in 2005. As a result of the requirement that chapter officers attend the conventions, Karl became active in the ICRI Guide Specifications and Masonry committees. During the last almost 6 years, Karl has served as Chair of ICRI 110 Guide

Specifications where he helped to usher the publication of ICRI's first guide specification on Structural Concrete Repairs.

Monica Rourke with Dry Works, Inc., is currently the US Waterproofing and Injection Systems Manager for Mapei Corporation's Underground Tunneling Team and has been a member of ICRI TAC since 2015 and is the TAC contact for ICRI 330 Strengthening and Stabilization and liaison for the ICRI Certification Committee. She has over 25 years of experience in concrete waterproofing and leak repair working as a contractor, consultant and manufacturer's representative on tunneling projects and repair of leaks and cracks in existing concrete structures. Monica is a Fellow of ICRI; was ICRI President in 2008, and is a board member and Past President of the ICRI Connecticut Chapter. She co-authored the ICRI Technical Guideline No. 340.1-2006, Guide for the Selection of Grouts to Control Leakage in Concrete Structures, and was Chair of the ICRI Certification Committee from 2008 to 2016. Monica has been a member of ICRI for 26 years, served 11 years on the Board of Directors and participates as a speaker at ICRI conventions as well as at many ICRI Chapter Meetings throughout the country. She has presented her expertise at ICRI, TRB (Transportation Research Board), the Rilem—2nd International Symposium, the Deep Foundations Institute (DFI); was inducted into "Who's Who of International Professionals" in 1997; and served as the 2005-2006 Honorary Chairperson for the State of Connecticut National Business Advisory Board. She is a member of APWA (American Public Works Association), ASCE (American Society of Civil Engineers), DFI (Deep Foundations Institute), UC of SEM – Society for Mining, Metallurgy and Explorations, Inc., and the FHWA Transportation Research Board's committee on Tunnels and Underground Structures.

Matthew Sherman, PE, is a Senior Principal with Simpson Gumpertz & Heger, Inc. (SGH) in Waltham, Massachusetts; and has been a member of TAC since 2016 serving as the TAC contact for ICRI 110 Guide Specifications. He is Chair of ICRI 510 Corrosion and is active in various technical committees. He is a registered Professional Engineer in Connecticut, Illinois, Indiana, Kentucky, Massachusetts, New Hampshire, North Carolina, and Pennsylvania, and was recently named a Fellow of the American Concrete Institute (ACI). Matt received his B.S. in Civil Engineering from Cornell University in 1991 and his M.S. in Civil Engineering (Structural) from The University of Texas at Austin in 1993. Matt has over 20 years of experience in consulting and heavy construction throughout the United States. His specialties include concrete materials, thermal and durability simulation, non-destructive testing, corrosion mitigation, and concrete repair. At SGH, he has led major projects such as repairing leakage in the "Big Dig" tunnels in Boston, restoring The University of Notre Dame's football stadium, designing overlay repairs at multiple projects nationwide, and investigating statewide aggregate problems in Connecticut, New Hampshire, Kentucky, and Massachusetts. Prior to joining SGH, he was a project engineer at J.F. White where he worked on the "Big Dig" overseeing the underpinning of the existing elevated structure passing through Boston's North End. He is

active in ACI where he serves on Committees 349 (Nuclear), 201 (Durability), and FAC (Financial Activities).

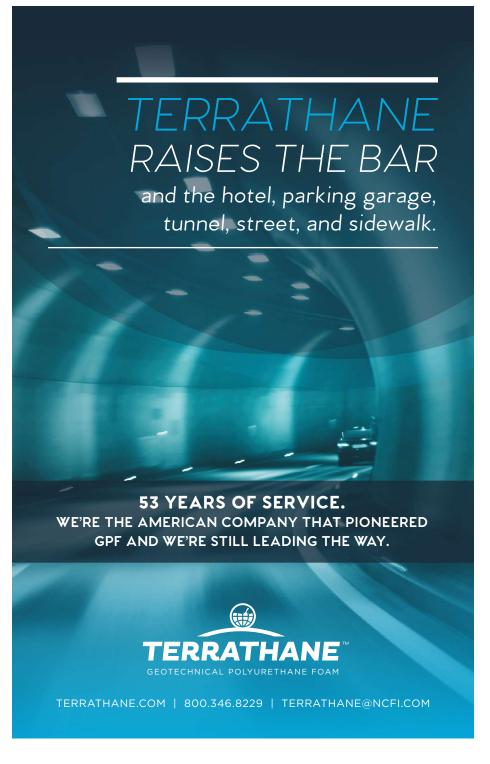
Aamer Syed is Director of Product Management-Refurbishment for Sika Corporation and has been a member of TAC since 2013 while serving as the TAC contact for ICRI 310 Surface Preparation. Aamer received a B.S. in Mechanical Engineering in 1995 from NED Engineering University in Karachi, Pakistan. Aamer completed his M.S. Management Program at Stevens Institute of Technology in 2003. Aamer's work experience includes representing

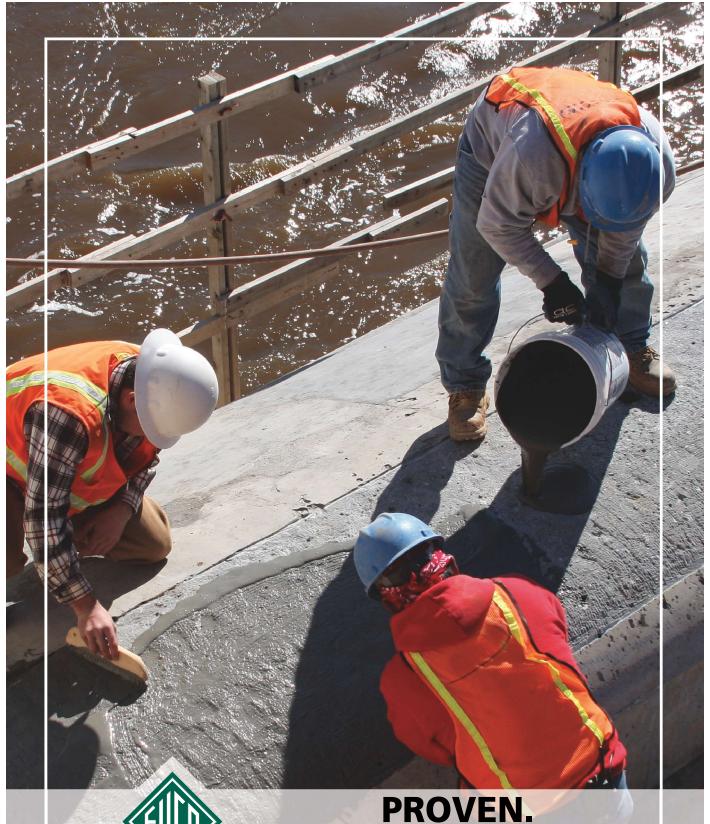
Hilti Corporation for four years. Aamer joined Sika Corporation in 1998 as a Test Engineer. His current responsibilities include overseeing Product Management of Sika's target market Refurbishment. Aamer is a member of ICRI, ACI, NTPEP, ATSAA and PTI where he participates on various national technical committees. Aamer has been actively involved in ICRI for more than a decade. He is a member of ICRI 320 Concrete Repair and ICRI 310 Surface Preparation. He has authored several articles for the Concrete Repair Bulletin over the years and has been a regular contributor for submitting projects for the annual ICRI project awards, receiving many awards of Merit, Award of Excellence and Project of the Year awards for Sika.

John Weisbarth is the Director of Marketing Projects and Analytics for The Euclid Chemical Company and has been a member of TAC since 2014. He serves as the TAC contact for ICRI 130 Procurement Methods and Relationship Arrangements. He has been involved in the construction industry for over 20 years, contributing to numerous ACI and ICRI Committees. The majority of his career has been spent with Architects and Engineers working on project specifications and providing educational seminars. He has been the Secretary of ICRI Guide Specifications since its inception. He is an active member of the ICRI Northern Ohio Chapter.

Fred Goodwin is Chair of the ICRI Technical Activities Committee (TAC).









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SECRETARIATUPDATE



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Over the last three issues of the *Concrete Repair Bulletin* we have explained how the Secretariat operates. Our goal is to improve your ICRI experience by supporting ICRI national committees through improved communication as well as making the national ICRI organization open and accessible to all ICRI members with our new IDEA submittal program.

During our few months of existence, we have received more than 25 new ideas from members. Some have created task groups, some are creating webinars, and some have initiated the creation of new certification programs. Others have simply suggested better ways to do business. The Secretariat provides the executive committee with a written update of what is happening, and presents updates to the board of directors during the conventions at the board of directors meetings. Committees and task groups convene to address the idea, finalize a go-to-market assessment, and develop a return on investment (ROI) model (if applicable).

With all of the new and exciting challenges within our organization come increased opportunities for our members. Once an IDEA is submitted, reviewed, and approved by the Secretariat, it will be assigned to either an administrative committee or a technical committee for development. Sometimes a new task group is required to begin the process.

It would appear that the IDEA program has been widely accepted based on the number of submissions to the Secretariat. We appreciate everyone who volunteers for service to the ICRI organization. The loyalty and contributions of our members are vital to our success. Perhaps you know someone new to ICRI who is not familiar with how to get more involved. If you know of such a person, or if you yourself are looking for new opportunities within ICRI, please go to the ICRI website, click on "Committees" link, and then click on the "IDEA Summary" link for the list of all current initiatives that are being developed. Here you will find opportunities to work on the creation of new webinars, challenges facing the development



of new certification programs, the need to expand our education programs on concrete repair, and many more areas where your expertise could be put to good use.

There are many benefits to volunteering—connecting with others, making new business contacts, team building, good for your career, and of course, good for ICRI. One of the better-known benefits of being an ICRI volunteer is the impact on the organization. Our committee and task group members are often the glue that holds our organization together. Volunteering for a task group offers you the chance to try out a new committee without a long-term commitment. Volunteering can also help you build upon skills you already have.

Still not sure which is the best committee to utilize your time and talent? You can start by contacting an ICRI staff member:

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Do YOU have a new idea for ICRI?

Bud Earley is an ICRI Secretariat and a past president of ICRI.

ICRI Mission and Strategic Plan Benefits Members and the Industry

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

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

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2017 PROJECT OF THE YEAR

HISTORIC CATEGORY

Alcatraz Quartermaster Building Restoration Project

SAN FRANCISCO, CA SUBMITTED BY SIKA CORPORATION

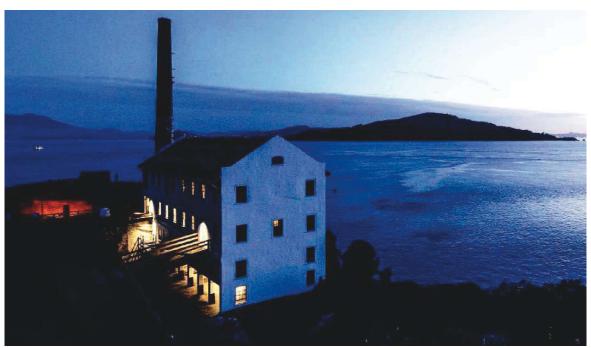


Fig. 1: View of Quartermaster warehouse on Alcatraz island

The rich history of Alcatraz is a world of information in itself. A structure as old as this, which was transformed and repurposed for use, is a fascinating example of sustainability at its best. Civil War fortress, infamous federal prison, bird sanctuary, first lighthouse on the West Coast, and the birthplace of the American Indian Red Power movement—these are just a few of the fascinating stories of the Rock. Alcatraz Island is a designated National Historic Landmark for its significant contribution to the nation's history.

Alcatraz prison is one of the most famous penal facilities in the world. Constructed in 1909 as a military prison, it became a maximum-security federal prison in the early 1930s. The 22 acre (8.9 hectare) island, which is situated about 1.2 miles (1.9 km) from San Francisco, is home to many structures that were built for different reasons over different periods of time.

The Quartermaster Warehouse is a reinforced concrete structure with two upper floors over a mezzanine and basement (Fig. 1 and 2). It was originally constructed as a multi-use building by the US Army in 1921, and remains in active use as a storage, office and workshop facility (Fig. 3).

The majority of the Quartermaster Warehouse structure consists of reinforced concrete. The exterior board-formed concrete walls are covered with a thin cement parge coat throughout. Interior columns are reinforced concrete at the basement, mezzanine, and first floor, with wood at the second floor. Floor slabs are concrete at the upper two floors, and wood frame at the mezzanine level.

In 1963, Alcatraz prison was classified as surplus government property, and the unused structure was placed under the stewardship of the General Services Administration. In 1972, the island and prison became part of the newly formed Golden Gate National Recreation Area administered by the National Park



Fig. 2: Map of Alcatraz island (red circle identifies location of Quartermaster warehouse)



Fig. 3: Quartermaster Building, west elevation, circa 1935 (photo courtesy of NPS, Golden Gate National Recreation Area, Water Collection)



Fig. 4: Deteriorated Quartermaster Building, circa 2013 (prior to restoration)

Service. In 1986, Alcatraz Island became a National Historic Landmark District, with the Quartermaster Warehouse identified as a contributing feature.

This article will detail the process undertaken in recent years to perform repair, restoration and historical preservation on the Quartermaster Building. It includes the means and methods to determine the root cause of concrete degradation, corrosion mitigation of steel reinforcement, concrete repair, and upgrading and strengthening to meet today's seismic building code—all while preserving the rich history of Alcatraz.

EXISTING CONDITIONS

While the Quartermaster Building remained in use as a storage and workshop space, the hostile marine environment of the San Francisco Bay took a significant toll on the structure by the late 20th century.

By 2010, deterioration was visible at nearly all concrete elements, including large spalls and exposed corroded reinforcing steel at the walls, beams, columns, and floor slabs (Fig. 4, 5 and 6). Deterioration was most severe at the exterior walls, but also visible throughout the interior. In many cases, rebar was observed very close to the surface at cracks and spalls.

Starting in the late 1990s, a series of assessments evaluated the building's structural systems, which were inadequate under current seismic and structural codes. Additional strengthening was designed in the form of new shotcrete at select interior walls and Fiber-Reinforced Polymer (FRP) reinforcement at walls and some floor slabs. For the new strengthening systems to succeed, extensive concrete repairs were also necessary.

REPAIR STRATEGY

Concrete repair systems were evaluated based on their compatibility with the existing historic concrete and finish system. Conditions were typically either severe or good—there was very little small-scale or shallow repair. For example, there were large areas of severely deteriorated concrete, with large surface spalls, crumbling concrete substrate, and heavily corroded exposed rebar, but just a few feet down the wall the concrete would be completely intact and undamaged. For these reasons, a comprehensive repair system that could be used for all levels of repair and coatings was sought. In addition, the repair system needed to be able to blend with the historic concrete finishes, and cost was a concern due to the large volume of repairs needed.

A repair system, consisting of a large-repair concrete mix product, small-scale repair mortar, repair mortar for the parge coat, bonding agents, and a series of protective finish coatings, was used to create a comprehensive repair strategy (Fig. 7).

CHALLENGES

In addition to the historic preservation requirements of the project, a number of other special conditions, both anticipated and unanticipated, added to the complexity of the project.

Cold Joint

It is assumed that the Quartermaster Warehouse was constructed using Army prison labor, and the building's original craftsmanship was accordingly low in quality. During demolition of the deteriorated concrete and parge coat, it was discovered that the building's four stories had been placed in separate lifts and were not structurally connected to each other. The discovery of these cold joints (Fig. 8) required the modification of repair details, including the addition of FRP reinforcement at each horizontal joint (Fig. 9). The FRP was ultimately concealed behind the new parge coat, allowing for repair without any visual change to the historic façade.

The engineer selected Glass Fiber-Reinforced Polymer (GFRP) in the design in two areas, first applied on the top side (walking surface) of elevated concrete floor decks to function as structural chord and collector elements carrying seismic lateral forces. Installed in this manner, these GFRP zones on the floor areas were completely concealed in the fully installed and finished condition by feathering these elements into the surrounding floor area with leveling compounds. At the top level, where there is no roof level concrete diaphragm, the same function was provided by installation of a GFRP band provided at the top of the full perimeter of the exterior wall. This GFRP was similarly concealed by inclusion in the polymer-modified parge coat overlaid on the perimeter wall. The surface selected for application of the GFRP (top vs. bottom, interior vs. exterior) was for the purpose of avoiding penetration of beams or columns.

NPS Working Constraints

In addition to the difficulties posed by working on an island without a permanent water connection, the National Park Service (NPS) restricted work on the exterior to protect nesting birds. The east side of the building is located next to a steep slope that extends down to the San Francisco Bay, creating an ideal nesting area for wildlife. Per NPS requirements, exterior



Fig. 7a: Interior area before restoration



Fig. 5: Deteriorated Quartermaster building in 2016 (prior to restoration)



Fig. 6: Exterior concrete deterioration in 2016 (prior to restoration)



Fig. 7b: Interior area after restoration

construction had to be coordinated to prevent disruptions during water bird breeding season, which lasts from February 15 until all young in the area have fledged, typically around September 15.



Fig. 8: Cold joint revealed during parge coat demolition



Fig. 9: Repair application of FRP at horizontal joint prior to new parge coat



Fig. 10: Deteriorated conditions at locations of political statement in 2014 (prior to repairs)

HISTORIC GRAFFITI

In November 1969, a small group of Native Americans crossed the bay in boats and landed on Alcatraz Island. Soon, many other Native Americans joined them, including students and families, in what became known as the Alcatraz Occupation. Citing the 19th century Treaty of Laramie, which stipulated that unused Federal lands could be returned to Native Americans, the occupiers offered \$24 in exchange for Alcatraz Island. To promote their cause and solidarity, occupiers painted political statements (also referred to as graffiti) with surplus paint found in prison buildings onto building walls, signs, and water towers. The Alcatraz occupation became a symbol of the Native American struggle for autonomy and was covered in the national press.

The Quartermaster Warehouse has several painted political statements throughout the building. Most significantly, on the east elevation, the words "Indian Land" are written in yellow paint. The concrete substrate that the political statement was painted on was deteriorated and needed to be included in the concrete repair project (Fig. 10 and 11). The NPS maintains an agreement to work with a council of Native Americans when rehabilitation could impact the painted political statements, and they were consulted as part of the repair project.

In addition to the concrete deterioration, the painted words were fading. Working directly with the Native Americans, the NPS proposed three alternatives:

- 1. Preserve and protect the failing painting in place;
- 2. Remove the painting for display in the Alcatraz museum collection; or
- 3. Restore the painting by repairing the concrete and parge finish and repainting the Political Statement.

Alcatraz Quartermaster Building Restoration Project

SUBMITTED BY Sika Corporation Lyndhurst, NJ

OWNER

Dept. of the Interior - NPS - Golden Gate National Parks Conservancy

San Francisco, CA

PROJECT ENGINEER/DESIGNER

AECOM

Oakland. CA

REPAIR CONTRACTOR

SST Pullman Services - The Structural Group
Benicia, CA

MATERIALS SUPPLIER/MANUFACTURER
Sika Corporation
Lyndhurst, NJ

The decision was unanimous, to restore the painting after repair of the exterior wall surface. The Political Statement was recorded with a full size tracing of the lettering created with the support of a decorative painter. After repair of the wall surface, the tracing was transferred to the wall surface by the Contractor for the rehabilitation project (Fig. 12). In March 2016, Native Americans from various tribes gathered to complete the painting. The political statement is now more visible and rests on a stable, repaired concrete substrate.

Fig. 11: Close-up view of deterioration at location of political statement in Figure 10

CONCLUSION

Alcatraz is at the intersection of building technology and culture: the evolution of concrete, reinforcement, and historical preservation. A project like this is the best advertisement of how concrete repair is a synonym for sustainability. With the knowledge and technology, we are able to protect, re-purpose and maintain an almost 100-year-old structure (Fig. 13). As an industry, we have to be proud of this achievement.



Fig. 12: New tracings of political statements on repaired concrete substrate



Fig. 13: View of Quartermaster Building after restoration the project to identify efficient and effective solutions to the planned repairs and unforeseen conditions

FINALIST - 2017 PROJECT OF THE YEAR

PARKING STRUCTURES CATEGORY

Harvard Towers Parking Garage Concrete Repair and Waterproofing

CAMBRIDGE, MA

SUBMITTED BY SIMPSON GUMPERTZ & HEGER, INC.

he Harvard Towers parking garage located in Cambridge, Massachusetts, is a two-level below-grade cast-in-place (CIP) concrete structure built around 1962, with an overall footprint of about 16,000 sf (1490 sm) that holds approximately 200 vehicles. The northern portion of the garage is located below a ten-story apartment building and the southern portion is located below a plaza at street level. The lower and upper parking levels are identified as Level G2 and Level G1, respectively, with the ceiling of Level G1 identified as the Plaza Level.



Fig. 1: Concrete deterioration at existing concrete joist.

The elevated decks (Level G1 and Plaza Level) consist of three-span CIP concrete pan-joist systems. Each pan-joist system is comprised of 3 in (76 mm) thick slabs on 12 in (305 mm) deep joists at 25 in (635 mm) on center, supported by two lines of CIP concrete beams and a CIP concrete foundation wall. The lowest parking level (Level G2) is a 5 in (127 mm) thick CIP concrete slabon-grade.

The parking garage underwent concrete repairs in previous years. In general, the repairs involved repair of beams and joists on Level G1 and the Plaza Level, and placement of a 1 in (25 mm) thick concrete topping slab over the entire surface of Level G1. The majority of these repairs had failed. The elevated parking decks exhibited numerous signs of distress and deterioration to varying degrees including cracked, delaminated, and/or spalled concrete on the topside and underside of the slabs, joists, and beams; delaminated and/or spalled concrete on the columns and walls; failed previous concrete repairs; debonded topping slab at Level G1; and active leakage through the foundation walls.

CONDITION ASSESSMENT

A condition assessment of the parking garage structure was performed to identify the extent and causes of deterioration, and to identify alternatives for remedial work intended to repair existing deterioration. Readily accessible portions of the parking garage structure were visually surveyed and sounded to document the types and approximate extent of deterioration and distress. Exploratory openings were made on the Level G1 topping to observe hidden conditions.

The parking garage had been exposed to chlorides for more than 50 years by significant quantities of deicing salts brought into the garage by vehicles. This exposure caused corrosion of the embedded steel reinforcement, and subsequent delamination and spalling of the concrete. Findings included the following:

 Concrete deterioration in the slabs and joists of the pan-joist system of Level G1 and Plaza Level was widespread and severe in several instances (Fig. 1 and 2). Approximately 90 percent of the surveyed slabs and joists showed signs of moderate to severe concrete deterioration or distress, mostly at previous repairs;

- The thin concrete topping on Level G1 was debonded from the original concrete slab, allowing moisture infiltration to the underlying structural elements; and
- Damage in the concrete columns, beams, and foundation walls was localized. Previous repairs to the foundation walls had failed with some showing active leakage.

REMEDIAL WORK

Repair System Selection

Based on the results of the condition assessment, and considering the widespread concrete deterioration observed at Level G1, several remedial alternatives for concrete repairs of that level were identified and included replacing the Level G1 slab and performing conventional

concrete repairs on the remaining joists and beams at that level (Alternative 1); replacing the Level G1 pan-joist system (slabs and joists, leaving the beams) with a new pan-joist system (Alternative 2); and a combination of the first two, with full pan-joist system replacement occurring only at the drive lanes (Alternative 3).

Based on the construction cost estimates and expected service life of the repairs, the Owner decided to proceed with Alternative 2. The general scope of the remedial work involved the following:

- Replacing the entire Level G1 panjoist system (leaving the beams) with a new pan-joist system;
- Performing conventional concrete repairs at the beams at Level G1, at the Plaza Level pan-joist system, and at the columns and walls at Level G2 and G1; and
- Installing a new vehicular-traffic-bearing waterproofing (VTBW) system on Level G1 and a new plaza waterproofing system on the Plaza Level.

Temporary Lateral Bracing of the Existing Structure

Removal and replacement of the Level G1 deck created a big challenge for the construction process, since the existing deck provided lateral bracing to the existing foundation walls supporting lateral soil loads, and to the existing columns supporting gravity loads from the Plaza Level and building above.

To reduce the number of lateral braces required, and minimize impact on construction activities, a cost-effective temporary lateral bracing system was developed that required demolition and reconstruction of Level G1 in two phases to utilize portions of the existing and then new deck structures as reaction and load transfer elements, as described below:



Fig. 2: Concrete deterioration at existing concrete beam.

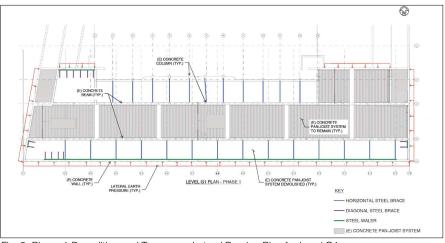


Fig. 3: Phase 1 Demolition and Temporary Lateral Bracing Plan for Level G1

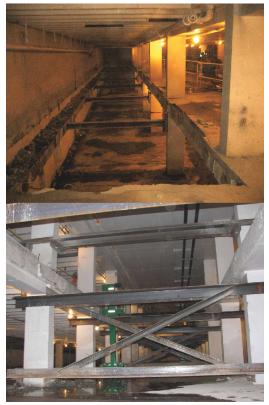


Fig. 4: Demolition and temporary lateral bracing in Phase 1

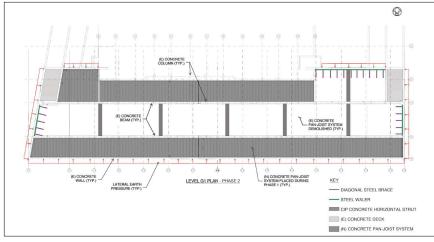


Fig. 5: Phase 2 Demolition and Temporary Lateral Bracing Plan for Level G1



Fig. 6: Demolition and temporary lateral bracing in Phase 2



Fig. 7: Large-scale demolition during Phase 2



Fig. 8: Detail demolition during Phase 2

Phase 1 (Fig. 3 and 4)

- Install Phase 1 lateral bracing system, comprised of horizontal steel walers along the foundation wall, horizontal steel struts bracing the walls and columns, and diagonal steel braces at the garage corners;
- Demolish the outer two spans of Level G1 (with the existing middle span of Level G1 remaining);
- Demolish strips within the middle span of Level G1 for construction of concrete struts (to be utilized during Phase 2); and
- Construct a new pan-joist system in the outer two spans of Level G1 and in the middle span at concrete strut locations.

Phase 2 (Fig. 5 and 6)

- Install Phase 2 lateral bracing system, comprised of horizontal steel walers along the foundation walls, and diagonal steel braces at the garage ends;
- Demolish the inner span of Level G1 (with the new outer spans and concrete struts at the inner span remaining); and
- Construct a new pan-joist system in the inner span of Level G1.

Demolition, Surface Preparation, and Concrete Repairs

Large heavy-duty sawcutting and jack-hammering machines were utilized to perform the large-scale demolition. The pan-joist system was sawcut along the beams and allowed to collapse to Level G2 below (Fig. 7). Chipping guns were utilized for most of the demolition detail work (Fig. 8). Hydrodemolition was utilized to remove the concrete from the topside of the existing beams.

A new reinforced concrete pan-joist system was designed for Level G1, connected to existing concrete elements (Fig. 9 and 10). Due to the phased demolition, continuity of the top steel reinforcement was provided at the topside of the existing beams to remain through use of form saver couplers and threaded steel bars.

Special surface preparation requirements were specified at existing concrete elements to remain (i.e., foundation walls and beams). In addition to dowels, all existing concrete in contact with new concrete was roughened and keyed to provide a "seat" for the new pan-joist system.

Structural Strengthening

During construction, it was discovered that one of the concrete beams supporting the Plaza Level had previously been cut for installation of a ramp at the front entrance to the building. Close to half of the top portion of the beam, including reinforcement, had been cut. In addition, two joists had been removed to allow installation of the ramp. The structural alteration made during this previous project resulted in the need for structural strengthening of the beam and adjacent joists.

The structural strengthening of the beam required concrete section enlargement with new shear reinforcement ("U" bars) and a

combination of longitudinal steel bars with externally bonded carbon fiber reinforced polymer (CFRP) laminates on the beam underside. The structural strengthening of the joists adjacent to the ramp involved joist section enlargement and CFRP laminates on the joist underside. CFRP laminates were not an option for shear strengthening because the structural inadequacy exceeded limits for the use of CFRP strengthening.

Waterproofing

To protect the new and existing concrete elements and reduce water intrusion to the new repairs on the underside surfaces and to the elements below, a VTBW system was installed on Level G1 (Fig. 11).

As part of the apartment building renovation project, the topside of the Plaza Level was developed and landscaped to include unit pavers and green roof plantings (Fig. 12). Below the new landscaping elements, a plaza waterproofing system was installed to reduce water intrusion and protect concrete elements below.

CONCLUSION

The Harvard Towers Parking Garage Repair project was unique in that it required extensive structural support to existing structural elements. The concrete repair procedures required the design and installation of temporary structural systems (lateral bracing) to provide support to existing structural elements (foundation walls and columns) during demolition and reconstruction of an entire elevated parking level.

Given the challenges of the repair and lateral bracing approaches, the owner, architect, engineer, and contractor worked closely throughout

the project to i dentify efficient and effective solutions to the planned repairs and unforeseen conditions.



Fig. 9: Steel reinforcement for new pan-joist system (Phase 1)



Fig. 10: Steel reinforcement for new pan-joist system (Phase 2)



Fig.11: Vehicular traffic-bearing waterproofing (VTBW) system installed on Level G1



Fig. 12: New landscaping on the Plaza Level topside)

Harvard Towers Parking Garage Concrete Repair and Waterproofing

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FINALIST - 2017 PROJECT OF THE YEAR

SPECIAL PROJECTS CATEGORY

Chase Field Repairs

PHOENIX, AZ SUBMITTED BY GERVASIO & ASSOCIATES INC.



Fig. 1: Interior view of Chase Field

hase Field (f.k.a. Bank One Ballpark) is located in Phoenix, Arizona, with a seating capacity of 48,633, and is home to the Arizona Diamondbacks Major League baseball team (Fig. 1). The stadium was constructed in 28 months and completed in 1998. The structural systems consist of reinforced concrete frames supporting concourses/seating areas, cantilevered steel raker trusses supporting overhanging seating areas, high strength threaded rebar tieback anchors connect steel raker trusses to the cast-in-place concrete frame, and precast prestressed concrete seating risers span between raker trusses or concrete raker beams/ walls.

PROBLEMS THAT PROMPTED REPAIR

Moisture infiltration resulted in corrosion damage to reinforcing steel, prestressing strands, embedded steel connection plates, structural steel members, connections and steel guardrails/handrails. In 2011, when the stadium was only 13 years old, a facility assessment identified corrosion-related damage to concrete and steel members. It has been under repair ever since.

The reason for the corrosion damage was not weather-related or atmospheric. Phoenix is in a hot, dry desert. Stadium cleaning methodology after each

event is a thorough wash-down with pressure washers that caused severe corrosion damage from the following:

- Frequent wetting/drying cycles (over 100 cleanings per year);
- High temperatures (corrosion rates double for every 18°F [8 degrees C] temperature rise);
- High chloride contents from salted peanuts, where the shells are dropped onto the floor and washed down; and
- The stadium was built without any type of waterproof protective membrane in seating areas. Failing joints between precast members

(both caulk joints and building-expansion joints) allowed water infiltration to critical structural members and connections.

Although the original design did not include waterproofing, it did include an extensive "rain gutter" system beneath the precast joints to collect water if joints leaked, diverting it into uninhabited spaces (Fig. 2). Because leaking water never created a "problem" (or puddle) on the floor, the full extent of the leaking was not recognized, but there were efflorescence stains on the columns and raker beams. Further investigation and implementation of repairs led to discovery of the full corrosion extent. Evaluation and testing methods utilized visual evaluation; hammer sounding; ground-penetrating radar (GPR); destructive investigation; petrographic examination; chloride and carbonation testing; and air entrainment, density, and compressive strength testing.

FIRE PROTECTION COMPLICATIONS

Repairs were located in areas requiring up to 3-hour fire ratings. The original fireproofing (spray applied cementitious, or mineral wool), absorbed moisture, never drying out, while holding it against structural elements, thereby promoting corrosion (Fig. 3-5). Repairs included intumescent epoxy coating (¼ to ½ in [6 to 13 mm] thick waterproof epoxy) on all steel raker trusses and threaded rebar anchors to achieve the required 3-hour fire rating (Fig. 6). Instead of moisture-absorbing mineral wool, fire rated building-expansion joints or intumescent tape were used at precast caulk joints to achieve floor-floor fire ratings. A standard UL rated fire caulk assembly was not possible because the bottom side of the joint was over the concrete raker beam/wall and inaccessible.

REPAIRS

A wide range of materials/methods were used and included ready-mix cast-in-place concrete (including corrosion inhibitors, silica fume, and shrinkage reducing admixtures), form and pour, form and pump, hand patching, and epoxy injection. Various protection methods, both integral to the repairs themselves and superficial to prevent continued infiltration, were also implemented to provide the longest life possible.

Raker Truss Tieback Connections

Large cantilevered steel raker trusses support the first 11 rows of seating at the Upper Concourse and are connected to concrete columns with



Fig. 2: Bottom side of seating riser at support—seating riser bearings and seismic restraint plates are visible on the bottom side. Moisture penetration through building expansion joint into mineral wool (each side of L-shaped plate) resulted in severe corrosion. Rain gutter system completely corroded through as it enters uninhabited space.



Fig. 3: Raker truss tieback anchor—connection between steel raker truss and concrete frame with sixteen 1-3/8" (35mm) diameter high strength threaded rebar anchor rods. Connection is completely hidden between two masonry walls in a dead space with leaking precast joint directly above. Spray-applied fireproofing absorbs water and never dries out.



Fig. 4: Threaded rebar anchor nut—Severe deterioration of the nut. Corrosion of the threaded anchor rod is not visible due to fireproofing and debris.



Fig. 5: Threaded rebar anchor—large mound at end of tape measure is peanut shells and debris washed through failed joint above.

high-strength threaded rebar. Sixteen threaded anchor rods are embedded into concrete columns and raker beams to transfer the 200,000 lb (90,720 kg) tension force from the steel raker truss to the concrete. The raker truss and tieback connections are concealed in a small inaccessible "dead space," with leaking precast caulk/building-expansion joints directly above. Spray-applied fireproofing absorbed moisture, never drying out, causing severe corrosion.



Fig. 6: Raker truss tieback anchor connection—completed repair with epoxy intumescent fireproofing to achieve 3-hour fire rating and provide corrosion protection to the beam and threaded rebar anchors.



Fig. 7: Precast joint repairs—typical example of demolition required to repair the joints between the precast seating sections. Seismic restraint plates have been completely removed for replacement. Bearing repairs for stems have not started. Nearly every row was affected.

The upper seating level has 32 tieback connections. All locations were investigated, prioritized, and 19 locations have been repaired. None of the anchor rods had experienced enough corrosion yet that repairs were required to restore the rod's tensile strength. Severely corroded nuts required replacement.

Precast Joints

Leaking precast joints resulted in extensive damage to raker trusses, concrete beams/walls, embeds, bearings, seismic connections, tieback anchors and other structural connections. Joint repairs encompassed numerous repair steps, products, and methodologies to properly protect elements from repeated exposure/deterioration.

Much of the repair work involved precast seating risers and structures below them, due to leaking joints between precast sections. Leaking joints included transverse (between ends where they butt together), longitudinally between sections, and building-expansion joints. Damage from frequent power washing and the extreme Phoenix sun ultraviolet radiation resulted in accelerated deterioration of polyurethane joint sealants and building-expansion joint covers.

Precast seating risers are supported at the ends by steel raker trusses or concrete raker beams/walls. Water leaking through deteriorated joints corroded precast connections and supporting structure including threaded rebar anchors. Water also dripped down from the joint onto the top and down the face of the beam/wall, into precast bearing areas, before collection into gutters below. As a result, substantial damage occurred to supporting members.

Precast Connections

Precast is supported by typical embedded plates at bearings. Bearing plates in precast members, steel shims, and bearing plates in supporting members experienced various corrosion levels. Repairs varied from simply sandblasting exposed surfaces of the bearings and epoxy coating, to chipping out both precast and supporting members, replacing bearing plates/pads, re-pouring, sandblasting/epoxy coating exposed surfaces, and recasting (Fig. 7).

To restrain seismic loading, large epoxy-coated steel embed plates, cast into the seating riser's horizontal portion directly adjacent to transverse joints, deteriorated severely (Fig. 8 and 9).

Building expansion joint repairs utilized pre-compressed siliconeimpregnated foam expansion material providing a long-lasting waterproof joint, with walking surfaces suitable for high-heeled shoes without metal cover plates.

Prestressed Seating Riser Strand Corrosion

Concrete cracking and spalling was observed on the bottom side of precast seating risers in two locations revealing severe corrosion of prestressing strands. Repairs consisted of installing an epoxy-coated full-length steel channel, bolted to the back side of the seating riser supporting the weight, chipping out concrete exposing corroded strands, sandblasting, epoxy coating, form and pour back, and protection with a urethane deck coating.

Elephant Trunk Door Repair

The main vehicular field access is through the right-field bullpen. Increasing clearance height for large vehicles, a portion of the seating lifts up, similar to half a drawbridge (called the elephant trunk door).

Mobility of this seating riser results in large joints where it butts into the adjoining precast. Years of wash-down resulted in severe deterioration of adjacent concrete beams and columns. Investigation revealed spalling and loss of corbel ties directly under a large girder bearing. This required emergency shoring to support the 45,000 lb (20,410 kg) load throughout the season until off-season repairs (Fig. 10).

COST CONTROL

Because much of the damage is concealed, it's impossible to accurately predict the level of deterioration for each location, and therefore the associated repair/cost. Accordingly, typical repair conditions which repeat throughout each year's repair program had details developed with two or three different scenarios corresponding to varying levels of deterioration: minor, moderate and severe. Each location was identified with an anticipated quantity and level of deterioration. Unit costs were obtained for each item prior to construction. As the repairs progressed, and levels of deterioration were determined, most of the repair details had already been developed and costs established, therefore eliminating delays in waiting for design and their related costs.

The \$4,000,000 contract in 2016/2017 contained over 150 individual unit cost items. The drawings identified each unit cost item, carefully defining the scope of work to avoid overlap. For each unit cost repair item, an extensive spreadsheet tracked predicted vs actual quantities/locations, and automatically multiplied these out by the unit costs and projected the actual total costs to compare with anticipated budget. The spreadsheet template was provided by the Owner, and updated by the contractor with actual quantities, resulting in final cost updates weekly. This expedited monthly payment applications, and identified overall project savings that were rolled into additional scope of work. Because this process streamlined and accurately predicted savings, additional scope was added early and completed before opening day.

CONCLUSION

This project consists of over \$16,000,000 in repairs performed to the most severely deteriorated portions at Chase Field over the last 6 years. Although repairs were performed during the baseball off-season (October-March), each year events that occur during the construction schedule that required the work be completed/put back together/ cleaned-up for the event, only to be torn apart the next day, resulting in mini-phases which had to be completed prior to the event. Repairs are anticipated to continue in upcoming years.

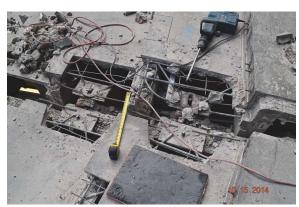


Fig. 8: Typical Precast Joint Repairs—Water leaking through building expansion joint between precast seating sections was absorbed by mineral wool fireproofing in the joint, resulting in severe deterioration. Large steel plates are seismic restraints.



Fig. 9: Typical precast joint repairs—seismic restraint plate (embed with bolt) and precast bearing seat assembly (below prestressing strands) after existing plates replaced, rebar welded back, and sandblasted prior to epoxy coating and pour back.



Fig. 10: Elephant Trunk Door Repairs—Water leaking between the door and precast resulted in severe corrosion, requiring emergency shoring during the baseball season.

Chase Field Repairs

SUBMITTED BY **Gervasio & Associates Inc.**Phoenix, AZ

OWNER

Maricopa County Stadium District

Phoenix, AZ

PROJECT ENGINEER/DESIGNER
Gervasio & Assoc. Inc.

Phoenix, AZ

REPAIR CONTRACTOR
Restruction Corp.
Tempe, AZ

MATERIALS SUPPLIERS/MANUFACTURERS

Sika Corp.

Lyndhurst, NJ

Neogard Dallas, TX

Child's Restaurant at Coney Island & Seaside Park

NEW YORK, NY SUBMITTED BY PULLMAN



Fig. 1: View of Ford Amphitheater at Coney Island

he former Child's Restaurant, located at 21st Street and the Riegelman Boardwalk in Coney Island, is a rare remnant of the old Coney Island of the early 20th century. The building is a deceptively large masonry box that has recently found new life as back-of-house facilities, the stage and box office for the Ford Amphitheater (Fig. 1). It also houses a 500-seat restaurant with a 90 ft (27 m) bar, and a rooftop event space along with several kitchens and refreshment centers.

The building was constructed in 1923 by the Child's Restaurant Corporation, a chain that was part of a wave of restaurants providing "reasonably priced meals" for "common people"—a new concept in the service world. Built before air conditioning, the large-windowed structure had kitchens in the cellar, patron facilities in the small area at the north end of the building, and the two-story main floor had food service along the west wall with the remainder of the space open to patrons. A baking station for biscuits was installed inside one of the large picture windows along the boardwalk as a not-so-subtle marketing ploy. As revolutionary as the inside was, the outside was also constructed to pull patrons west from the more active and populated sections of the boardwalk including Luna Park, Parachute Jump, Steeplechase and other attractions.

The landmark building was designed as if it washed up out of the sea; sand colored stucco walls dripping with exquisite terra cotta ornaments that included ships, seaweed, fish, crabs and lobsters, snails and Neptune which captured the imagination and wallets of passers-by. Elements of Spanish Colonial architecture, popular at several exhibitions, were incorporated to express the openness of the seaside and the welcoming nature of a comfortable, safe place to eat away from home or picnic basket.

The restaurant eventually closed after WWII, and the building was used for candy manufacturing before sitting vacant for a long period of time. Efforts to resurrect the vacant structure were undertaken, including its intermittent use as a roller rink. There were also several different attempts to

redevelop the property. In 2012, city-owned adjacent land and former street beds to the west of the structure would join to provide space for 5,000 seats and a one+ acre park.

DETERIORATION AND RESTORATION PROGRAM

Due to the building's close proximity to the ocean, it has been highly affected by corrosion, erosion, biological growth, and freeze/thaw cycles. The result of the water effects was most prominent on the ornamental terra cotta pieces and stucco on the exterior walls, where erosion and biological growths caused the glazing to shake off the terra cotta bisque itself (Fig. 2). In addition, the western wall acted as a firebreak for a massive multi-block fire in 1932. The physical damage to the brick required the removal and replacement of the exterior wythe of brick. Salvaged common brick with similar physical properties was located and installed—reclaimed brick from Detroit was used that closely matched the moisture content and firing of the original brick for seamless integration.

A layer of incompatible 1960s stucco was removed from the south and east walls along with all asbestos-containing waterproofing materials, resulting in the discovery of numerous cracks related to deteriorated steel roof framing and miscellaneous steel installations including lintels. All of the façade steel had to be either repaired or replaced. Three cartouches surrounding the window openings on the corners of the building suffered the effects of steel deterioration from both the lintels and the decorative grilles (Fig. 3).

The terra cotta was also affected by biological growth and modifications to building openings to accommodate changes in use. Although many pieces were suitable for reuse, new cartouches, rondels and window and door surrounds were required. Existing pieces were removed from the building and sent as models for reproduction of color and sculpture. The original backup masonry walls were removed and rebuilt with salvaged common brick to their original five wythe widths. The sophistication and humor of the installation became apparent within the terra cotta pieces. Photographs from a 1924 American Architect article were extremely helpful in determining some of the very subtle differences in what appeared to be identical ornamentation.

Each of the medallion infill pieces had a gold luster glaze. Thirty-six glazes were developed from over 600 samples and a total of 752 new pieces were replicated for the building; 102 were salvaged and reset, and 171 were repaired on site. Extreme care was taken to match the original as closely as possible (Fig. 4). The assemblies were also laid out onsite in the yard and fit with other components such as the window grilles and plywood templates of openings to aid in proper placement and dimensional tolerances for each piece in an assembly (Fig. 5). Highly damaged terra cotta stones were replaced with newly replicated ones. The replication process began with printing a model of the original piece from a CNC machine which allowed a mold to be cast around the model. On-site, the pieces were carefully installed with modern stainless steel anchors and tied



Fig. 2: Water damage of ornamental terra cotta pieces



Fig. 3: Steel deterioration near window openings





Fig. 4: (a) Terra cotta detail before, (b) and after

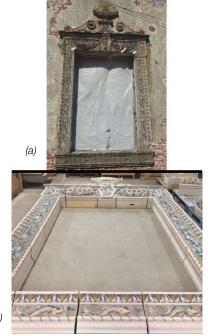


Fig. 5: (a) Original window before, (b) and window replica



Fig. 6: Scaffolding was erected and re-erected numerous times throughout the project



Fig. 7: New rooftop restaurant

in with the new reclaimed brick. It was essentially a large, three-dimensional jigsaw puzzle.

The stucco was chosen to match the current beach sand color after six different stucco mockups were performed and given a rough wood float finish to match the original design intent. Existing metal grilles were restored; and new replacement slate was installed in the "blank" window at the east elevation.

On several occasions, scaffolding had to be built, worked on for several weeks, and then dismantled to make way for another critical path item—only to be rebuilt right after to continue the exterior work (Fig. 6). Custom scaffold towers were built to lift up to 950 lbs (430 kg) terra cotta units in place. The overall job was performed on traditional pipe-frame scaffolding.

CONCLUSION

The project is a great example of adaptive reuse. A blighted brick box, adorned with some of the most spectacular terra cotta ever conceived (much less created and installed) was renovated to become a community center, restaurant, and amphitheater. The original themes and historic fabric were honored and restored, and the original use of a restaurant incorporated into the new design (Fig. 7).

The pre-construction phase of the project started in Fall 2014. The amphitheater, park, and remaining dining room restaurant opened in Summer 2016. The project was completed in 4,800 man-days, or 38,400 hours, without a safety incident. After decaying for years, the flagship of the Child's Restaurant chain now is ready for a new, year-round life along the Coney Island boardwalk.

Child's Restaurant at Coney Island & Seaside Park

SUBMITTED BY
PULLMAN
New York, NY

OWNER
Seaside Park LLC for NYC EDC
New York, NY

PROJECT ENGINEER/DESIGNER
WSP Cantor Seinuk
New York, NY

REPAIR CONTRACTOR
PULLMAN
New York, NY

MATERIALS SUPPLIERS/MANUFACTURERS **Boston Valley Terra Cotta**New York, NY

AFI Glass & Architectural Metal Poughkeepsie, NY



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Unity Temple Restoration

OAK PARK, IL SUBMITTED BY CTL GROUP



Fig. 1: View of front (north) elevation of Unity Temple after restoration

onstructed circa 1908 for approximately \$69,000, Unity Temple is a masterpiece rendered inside and out in reinforced cast-in-place concrete. The Unity Temple complex consists of three interconnecting structures: Unity Temple/Sanctuary, Unity House, and Foyer. It is one of Frank Lloyd Wright's earliest designs using reinforced concrete construction, and represents his innovative use of concrete with exposed aggregate finish as both a structural and decorative material. To this day, Unity Temple remains a high point in Wright's Prairie Period and an icon in modern architecture. It remains in use as the home of the Unitarian Universalist congregation for which it was designed and built. A Registered National Historic Landmark building, it is listed on the National Trust for Historic Preservation's 11 most endangered historic places, and Landmarks Illinois' "Most Endangered Historic Places in Illinois."

A restoration master plan was developed in 2000 to 2006 to address the building's exterior and interior deterioration. The master plan was implemented in 2015 with a \$25 million restoration project that was completed in May 2017 (Fig. 1). This project will focus on the concrete restoration component.

INVESTIGATION AND RESTORATION PROGRAM

After 100 years of service, the building exhibited widespread concrete deterioration and considerable water damage (Fig. 2 and 3). In 2008, concrete pieces fell from the Sanctuary ceiling. Due to the advanced state of deterioration and associated life safety concerns, a comprehensive survey and evaluation was performed to define existing condition of the concrete structure, evaluate causes of concrete deterioration, and provide an appropriate restoration plan to ensure long-term building performance for review and approval by Unity Temple Restoration Foundation and Landmarks Illinois.

Inspection and Evaluation Methods

The investigation consisted of the following components:

- 1. Reviewing historical documents, archival photographs, and Wright's drawings to understand Wright's design intent, types of concrete specified, and construction details.
- Conducting a condition survey to document the condition of exterior and interior concrete elements, utilizing NDT methods and localized exploratory openings.
- 3. Removing core samples from exterior walls and roof slabs for laboratory examination and testing.
- Performing a structural analysis of cantilevered roof slabs to evaluate structural capacity and determine if strengthening was necessary.

Findings

Wright's original specifications included different types of concrete, and their use was confirmed in the core samples: Portland Cement Facing Mortar (PCFM), Stone Concrete, Structural Cinder Concrete, and Structural Concrete.

In 1973, deteriorated areas of Wright's PCFM on exterior walls were replaced with shotcrete. Condition surveys from 1999 to 2015 revealed considerable cracking, delaminations, and spalling of this shotcrete layer on exterior walls, parapet walls, chimney, cantilevered roof slabs, and ornamental planters. Potential falling hazards from loose shotcrete posed a threat to public safety (Fig. 2).

In 2002, the cantilevered roof slab fascias and soffits were restored. The 2015 survey indicated that the 2002 repairs were performing well; however, shrinkage cracks developed along the fascia perimeter of roof slabs (Fig. 2). Structural analysis indicated that roof slabs were structurally adequate and strengthening was unnecessary.

Observed concrete delamination and water damage at interior concrete structural elements were generally localized (Fig. 3) and due to water infiltration through roofs. Several terrace panels exhibited spalling, creating potential tripping hazards; this was attributable to shrinkage cracking, soil settlement, and cyclic freezethaw of panels with moisture saturation from poor drainage.

REPAIR SYSTEM SELECTION

At parapet and chimney walls, 100% shotcrete replacement was performed due to extensive deterioration. At other exterior walls and ornamental planters, localized shotcrete repairs were performed to blend with the surrounding wall. Innovative crack repairs were also performed to blend with the surrounding wall. A penetrating silane sealer was applied to mitigate future moisture intrusion.

At the cantilevered roof slab, localized concrete repairs were performed using the form-and-pour method, utilizing supplementary reinforcement and discrete galvanic anodes. Wright incorporated inverted U-shaped transfer beams spanning between corner columns in the Sanctuary to support a skylight structure, parapet walls and cantilevered roof slabs. The Owner opted for a new skylight structure spanning over the original skylight. To support the new skylight structure, the transfer beams were strengthened.

Localized concrete repairs of interior concrete beams were performed and 100% of foyer terrace panels replaced using airentrained concrete for freeze-thaw durability and installed with positive drainage slope.

FIELD MOCKUPS

Extraordinary measures were taken in designing trial mixes and constructing field mockups (Fig. 4) as matching the exterior wall surfaces was of paramount importance on this landmark project. Exterior wall areas were cleaned to provide basis for comparison of color and texture.

Following shotcrete mix design acceptance by the Owner, all materials were purchased in quantities sufficient for the entire project to ensure consistency in the concrete mix design throughout the restoration program. A custom concrete mix design was also developed to closely match properties of the original structural cinder concrete for roof slab repairs.

Field trials were performed to assess suitability of sealant materials, variations of aggregate/sand materials applied on sealant, routed



Fig. 2: Concrete cracking and deterioration on exterior walls and cantilevered roof slabs—loose spall at corner of parapet wall (arrow) was removed and covered to address potential falling hazard prior to restoration



Fig. 3: Concrete deterioration of concrete beam (blue arrows) and water damage to plaster finish at interior of Unity Temple Sanctuary—roof slab underside delaminations were removed and covered with plywood (red arrows) to address potential falling hazards prior to restoration



Fig. 4: Field mockup shotcrete panels compared to cleaned original concrete specimen



Fig. 5: Weather enclosure at front (north) elevation of Unity Temple during restoration

groove profiles/widths, sealant tooling techniques, etc. Results from the trials were successful in visually blending mockups with the surrounding wall.

Field trials were also performed to assess the effectiveness of various cleaning methods: soda blasting using common baking soda, grit blasting using fine-grade crushed aggregates, and a proprietary cleaning technique using micro-abrasives. All three methods produced desired results, and the Owner selected grit blasting for economic reasons.

REPAIR CONSTRUCTION LOGISTICS

To meet the project schedule, a weather enclosure was installed over the entire building to allow for continuous construction activities through winter and rain, and to control airborne debris (Fig. 5).



Fig. 6: Localized exterior wall repair using wet-process shotcrete



Fig. 7: Routed and sealed construction joint repair (arrows point to completed joint repair)—crack repair was similar

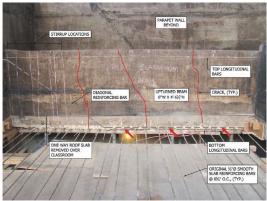


Fig. 8: Unity House classroom after roof slab removal (red arrows point to horizontal splitting above longitudinal bars of upturned beam in zone without stirrups)

Exterior walls were cleaned using fine-grade grit blasting prior to shotcrete repairs to facilitate matching of new localized shotcrete repairs against cleaned wall areas.

Wet-process shotcreting was employed with specific hose air pressure and nozzle distance to work area (Fig. 6). Grit blasting after cure achieved the desired exposed aggregate finish to match the surrounding wall. Wall crack repair included placing select aggregates in the sealant to match the adjacent wall surface (Fig. 7).

Localized cantilevered roof slab soffit repairs were performed using the form-and-pour method. Access holes were cored in roof slabs to facilitate placement of repair concrete from the slab topside.

UNFORESEEN CONDITIONS

Serious structural problems were discovered at roof slabs and supporting upturned beams of Unity House east and west classrooms (Fig. 8). The one-way slabs exhibited extensive deterioration and significant deflection. Structural analysis indicated that slab reinforcement was deficient by 50% of that required to support code-prescribed minimum snow load.

The upturned beams exhibited diagonal shear cracks and horizontal splitting above bottom longitudinal bars at slab-to-beam connections in beam regions without stirrups. Due to continuing deterioration, roof slab collapse appeared imminent if left unaddressed. A new roof system and structural strengthening of upturned beams was designed.

CONCLUSION

The restoration program succeeded in restoring distressed concrete elements of this historic treasure and preserving it for future generations. Besides meeting stringent aesthetic requirements, structural integrity and long-term performance of building elements were enhanced.

Unity Temple Restoration

SUBMITTED BY CTLGroup Skokie, IL

> OWNER UTP, LLC Oak Park. IL

PROJECT ENGINEER/DESIGNER
CTLGroup
Skokie, IL

REPAIR CONTRACTOR

Berglund Construction

Chicago, IL

MATERIALS SUPPLIERS/MANUFACTURERS

Zera Construction

Niles, IL

South Chicago Heights, IL

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Certification Program Development Resulting from Industry Demand and Code Language



Plaza Deck Post Tensioning Repair, External Strengthening, and Waterproofing Rehabilitation

ALEXANDRIA, VA

SUBMITTED BY STRUCTURAL REHABILITATION GROUP, LLC



Fig. 1: Condominium building and elevated plaza structure over the garage

he Templeton of Alexandria Condominium is a 15-story cast-in-place concrete residential structure that features a landscaped elevated plaza deck (Fig. 1). The plaza deck utilizes a cast-in-place posttensioned reinforced concrete slab constructed over a one-level garage structure. The garage provides approximately 23,000 sf (2137 sm) of on-grade parking located immediately below the elevated plaza structure. The garage utilizes a reinforced concrete structural slab supported by grade beams that span to caissons (deep foundations). The subject of this project is the elevated plaza structure over the garage (Fig. 2).

The elevated plaza structure previously underwent a renovation in the 1990s. At that time, the repairs included replacement of the waterproofing with a sheet-applied rubberized asphalt membrane system, repairing some of the post-tensioning cables at isolated locations, and installation of landscaping and hardscaping treatments.

In 2014, the Owner's original project goals were to implement targeted waterproofing repairs to isolated areas of the plaza that had been experiencing water intrusion over an extended period of time. The project goals expanded during the rehabilitation work to include strengthening the plaza structure to meet the Owner's desired future use and to update the appearance of the plaza's landscape/ hardscape architecture.

EVALUATION

Based on the age and type of the post-tensioning system, the system was evaluated to confirm that it was functioning as intended prior to spending financial resources on a targeted and limited waterproofing repair program.

Visual inspection at the underside of the elevated plaza slab revealed various cracks, concrete spalling, grease staining, and electrical conduits that were compromised by water. The superimposed dead loads (SDL) in place at the plaza level (consisting of planters, pavers, soil, plantings and hardscaping) were measured (field verified) and determined to exceed the published design capacity noted on the original design documents. The structural drawings indicated that the original plaza structure was designed for a SDL of 50 psf (2.4 kpa) while loading estimates for portions of the plaza were as much as 300 psf (14.4 kpa). The following is a brief summary of significant findings from the survey work and analysis:

- The soffit of the post-tension plaza slab exhibited numerous areas of distress in the form of cracking and water leakage (Fig. 3); corrosion of embedded steel reinforcing, electrical conduits, and surface-mounted junction boxes; and leakage around drainage pipe penetrations;
- Discoloration of the concrete resulting from grease leaking from the un-bonded tendon sheath/covering; and
- 73 post-tensioning tendons were exposed, of which 13 were found to have lost post-tensioning force and 9 were found to have a partial loss of the stressing force.

The results of the investigation revealed that the loss in post-tensioning force significantly compromised the structure's load carrying capacity and the existing post-tensioned slab was not code compliant to today's standards given a number of deficiencies in the slab construction. As such, the structure was severely overloaded and the plaza and garage needed to be closed due to life safety concerns and shored to protect the public and workers.

EMERGENCY LOAD REDUCTION

The vehicular parking was closed under the plaza deck below the greenscaped and landscaped areas. Shoring was installed (Fig. 4) and a zero live load plaza restriction was mandated for the area, so the parking bays below the tennis court area could be reopened. The plaza level remained closed to pedestrians; however, pedestrian access at the garage level was restored in a defined walkway to accommodate building access.

When the emergency load reduction work was completed, it was revealed that the renovation performed in the 1990s included the addition of concrete topping materials to enhance drainage (Fig. 5). A network of troughs/trenches remained where the prior site walls existed. These troughs were problematic in detailing the waterproofing system, and the topping slab/overlay represented additional dead load on a deck that was already overloaded and under-designed. In evaluating the options to address the topping/deck profile issues, three remedial options were considered including removing all toppings down to the structural deck, leaving the existing topping in place and infill the trough/trench areas, and leaving the existing topping in place and prove by testing and analysis that the toppings were acting compositely with the existing structural slab. The topping slab pull off tests revealed sufficient adhesion to confirm that the toppings were well bonded and could be considered to be acting compositely with the structural slab.

STRUCTURAL, ARCHITECTURAL AND OPERATIONAL IMPROVEMENTS

The plaza deck analysis revealed a severely limited load carrying capacity. To restore the integrity of the original design, 69 post-tensioning tendons were repaired (spliced) or completely



Fig. 2: Bird's eye view of the plaza (planters, pavers, soil and hardscaping)



Fig. 3: Cracking of the concrete slab aligned with the electrical conduits at mid-span



Fig.4: Shoring for plaza during the emergency load reduction phase



Fig. 5: Plaza demolition revealed topping slabs that overlaid the structural deck



Fig. 6: Steel column collar brackets and intermediate deviators were installed



Fig. 7: Up slope hydrostatic water test performed to validate the waterproofing system installation



Fig. 8: Completed amenity space with hardscaping

replaced, and external reinforcing installed. The rehabilitated post-tensioned and externally reinforced slab was designed to safely support a live load of 100 psf (4.8 kpa) along with a SDL of 100 psf (4.8 kpa).

The use of external strengthening at targeted bays with longer spans facilitated the repurposing of the elevated plaza structure with increased capacity to accommodate the Owner's desired amenities and hardscaping/landscaping. Steel column collar brackets were installed to anchor the tendons and provide supplemental shear reinforcement at the column-to-slab connections. Mid-span deviators were installed to provide sufficient profile geometry for the tendons while maintaining head room in the garage space (Fig. 6).

The plaza deck was then covered with a reinforced hot rubberized asphalt membrane and the membrane was covered with an aggregate surfaced cap sheet as a protection layer (Fig. 7).

CONCLUSION

The project was a challenging plaza deck structural and strengthening rehabilitation. The Owner's initial desire was to perform targeted leak repairs to the plaza deck with the intent to defer the cost of a plaza waterproofing project for as long as possible. The pre-design evaluation revealed that the structure was not safe, requiring emergency stabilization and structural repairs.

The achieved results included a greatly extended service life, reduced future maintenance costs of the plaza deck/garage structure, and the opportunity to create an updated amenity space that will be serviceable and serve the building users well into the future (Fig. 8). The plaza has become an active and vibrant centerpiece for the occupants of the building, revitalizing the plaza into a meeting place and outdoor activity center for the community.

The Templeton of Alexandria Condominium Plaza Deck

SUBMITTED BY
Structural Rehabilitation Group, LLC

Montgomery Village, MD

OWNER
Templeton of Alexandria
Alexandria, VA

PROJECT ENGINEER/DESIGNER Structural Rehabilitation Group, LLC Montgomery Village, MD

REPAIR CONTRACTOR

Commercial Restoration Group, Inc.

Cheverly, MD

MATERIALS SUPPLIERS/MANUFACTURERS

Suncoast Post-Tension, Ltd. Henry Companies

Woodbridge, VA El Segundo, CA

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Post-Tensioned Garage Repairs

TORONTO, ONTARIO, CANADA SUBMITTED BY EDISON ENGINEERS. INC.



Underground parking garage structure at 275 Bamburgh Circle in Markham, Ontario.

ust north of the provincial capital of Toronto is the growing city of Markham, Ontario. Among many condominiums built in the mid-1980s is 275 Bamburgh Circle. The 18-story building's underground, two-level, parking garage structure was in need of repair to restore its structural integrity, protect the structure, and improve aesthetics. The 86,000 ft² (8,000 m²) garage consists of a slab-on-grade and an intermediate suspended slab which is ½ conventionally reinforced and ½ post-tensioned (PT). Built in 1986, the suspended slab was constructed using a first-generation extruded PT system. This PT system is characterized by extruded plastic sheathing along the cable length and bare strand at the anchors. The garage had poor protection from moisture and salt, with caulked expansion joints and a penetrating sealer on the intermediate slab. After almost 30 years, it was time for the PT system to be assessed.

CONDITION ASSESSMENT

PT shop drawings were located in archived files from the original structural designer. Using these drawings, cables could be easily identified and located and made the investigation process more efficient (Fig. 1). During the garage assessment, a visual review was performed to identify locations where PT cable deterioration is more likely, such as leaking expansion joints. Forty-four (44) cables were assessed using penetration testing with a screwdriver and hammer. The test involves trying to wedge a flat-head screwdriver between the wires in a PT cable (Fig. 2). If penetration is achieved, the cable is likely not tensioned enough. The PT cables were categorized as totally loose, appears under-stressed, or appears adequately stressed. Three PT strands were found to be totally loose and in need of repair.

RESTORATION PROGRAM

As expected, the cables that were found to be totally loose were heavily corroded at anchors at leaking expansion joints. In addition, cables that had not initially been identified as loose at another expansion joint were severely corroded and individual wires in the strand had ruptured. Due to the heavy corrosion of the wires, the wires had bonded with each other and the failure was not identified by the penetration test carried out several feet away from the anchor.

During the repair project, concrete removals for conventional delaminated concrete repairs exposed additional cables, allowing for further PT testing within these open excavations. These new test openings revealed 11 additional loose cables in need of repair. After investigation, it was evident that many of the loose cables had not been damaged from corrosion.

Damaged Cables

Previous contractors' work had apparently drilled, cored, jackhammered and cut concrete without knowing that the slab was posttensioned. At one location, the rupture location was traced back to a slab penetration for an electrical conduit (Fig. 3).

Another cable rupture was traced back to a locker room in the garage. This area was only exposed to foot traffic and was generally dry. The drilling of the anchors for the cage lockers was found to be the cause of the rupture.

Finally, there were previous concrete repair areas that were found to be the source of PT cable deterioration (Fig. 4). The cables that intersected these repairs were severely corroded, the sheathing was damaged, and no waterproofing protection was applied to the surface. This condition allowed water and chlorides to reach the cables, causing aggressive corrosion.

Repairs

As is typical for PT repairs, each cable repair had to be customized to suit site conditions and the cause of failure. In addition to innovative repair methods, state-of-the-art repair materials were used to maximize durability while minimizing repair costs and disruptions.

For cables that had been damaged by drilling but were otherwise in good condition, a splice repair was completed (Fig. 5), and the remainder of the cable including the anchors were salvaged. This repair saved time and was more economical than cable replacement.

Within some concrete repairs, there was minor corrosion of anchors and cable tails. In this case, sacrificial galvanic anodes were installed to reduce corrosion rates and extend the life of the PT system (Fig. 6). Within some previous concrete repairs, cables were found to be locally corroded due to poor cable protection. It is likely that the sheath was damaged during old concrete removals, and not properly sealed before placing concrete. At these locations, splice repairs were completed to salvage the remainder of the cable.

One area included corroded anchors and cables along a construction joint in the slab. In order to safely repair the hollow sounding (delaminated) concrete at the intermediate anchors, fifteen (15) existing cables were de-tensioned and re-tensioned following the repairs. Temporary shoring would have been needed along the entire length of the affected cables. In order to avoid this costly repair, a zinc sheet was installed on the soffit of the slab (Fig. 7) to sacrificially corrode instead of the anchors and cables. Holes were drilled through the slab to reach the bottom of the anchors, and the zinc sheet was electrically

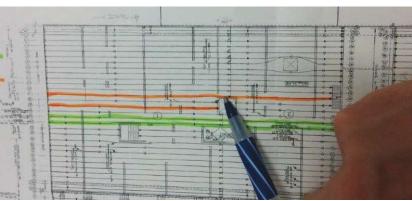


Fig. 1: Marked up PT shop drawing



Fig. 2: Penetration testing on PT cable



Fig. 3: Electrical conduit (red arrow) and PT cables from top of slab



Fig. 4: Localized corrosion in previous concrete repair



Fig. 5: "Dogbone" splice coupler



Fig. 6: Galvanic anodes in concrete repair area



Fig. 7: Sacrificial zinc sheet at slab soffit



Fig. 8: New encapsulated PT anchors at expansion joint

connected to the intermediate anchors. The zinc sheet was approximately 20 ft (6 m) long. This repair provided a safe, cost-effective and timely solution for the Owner. The cables connected to the zinc sheet have test openings that can be re-tested in the future to check their tension. Eventually, the zinc sheet will need to be replaced but in the meantime, it will help protect the PT anchors and cables from corrosion.

Waterproofing Protection

Where new anchors were required, fully encapsulated and watertight anchors were installed (Fig. 8). Caulked expansion joint seals, that had failed many years ago, were replaced with new preformed neoprene glands.

Lastly, an elastomeric traffic deck coating system was installed to protect the concrete slab and the embedded PT system. A thinner light duty coating was used for the parking stalls which see less traffic, and a thicker coating was used for all drive lanes and turning locations.

CONCLUSION

Overall, the project finished under budget and on schedule. The cooperation between the owner, contractor and engineers allowed tailored solutions to be implemented successfully. A PT monitoring program has been implemented to test the cables periodically and will allow the condominium corporation to appropriately plan for repairs and have more confidence about the integrity of the PT system.

Post-Tensioned Garage Repairs

SUBMITTED BY Edison Engineers Inc. Markham, Ontario

OWNER DEL Property Management Toronto, Ontario

PROJECT ENGINEER/DESIGNER Edison Engineers Inc. Markham, Ontario

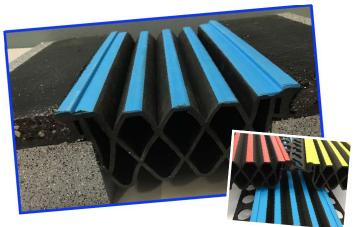
> REPAIR CONTRACTOR Structural Contracting Gormley, Ontario

MATERIALS SUPPLIER/MANUFACTURER **Vector Construction** Milton, Ontario



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Due to the unique design and technology of the **Iso-Flex Cap Seal System** it has been filed with the US Patent Office and is patent pending.



Paradise Island East Bridge Repairs and Renovations

NASSAU. BAHAMAS SUBMITTED BY SIKA CORPORATION

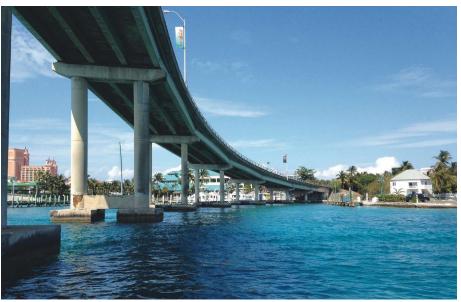


Fig. 1: East Bridge connects Nassau and Paradise Island

aradise Island, a tourist resort, is an island in the Bahamas with an area of 685 acres (277 hectares) located just off the shore of the city of Nassau. It is best known for the sprawling resort Atlantis with its extensive water park rides, pools, beach, restaurants, walk-in aquarium and the Caribbean's largest casino.

Paradise Island is connected to the island of New Providence by two bridges that cross Nassau Harbour. The Paradise Island East Bridge (Fig. 1) is the older of the two bridges, and opened to traffic in 1967. The East Bridge is owned, operated, and maintained by The Bridge Authority, Commonwealth of The Bahamas as a toll facility and provides one-way egress from Paradise Island to New Providence. Millions of tourists and residents traverse the bridge annually to vacation at or visit the Atlantis and other resorts located on the island.

The bridge has an overall width of 36 ft (11 m) and carries two lanes of traffic, along with a sidewalk on each side of the carriageway. It is 1,560 ft (475 m) in overall length and consists of 15 concrete approach spans and 3 high elevation main channel spans.

PROBLEMS THAT PROMPTED REPAIR

The tropical salt water environment had taken its toll on the reinforced concrete superstructure and substructure causing corrosion-induced cracking and spalling on the various structural elements of the 50-year-old bridge (Fig. 2).

In 2011, a detailed bridge inspection was carried out in accordance with the 2011 AASHTO Manual for Bridge Evaluation (Second Edition), and found that the structure was generally in good condition. However, several of the bridge components exhibited varying levels of deterioration due to corrosion of the embedded steel reinforcement which would require rehabilitation and subsequent regular maintenance.

REPAIR STRATEGY

The Bridge Authority considered two options regarding the safe operation of the bridge: replace the bridge at an estimated cost of \$40-50 million, or repair and protect the existing concrete bridge at a cost of approximately 10-15% of the replacement cost.

The Bridge Authority decided to move forward with the concrete repair option and extend the service life of the existing structure. In March 2016, concrete repair work began on the East Bridge. The work took 12 months to complete at a cost of \$5.6 million. While the majority of the work involved concrete repair to the bridge columns (Fig. 3), other work included repairs to cast-in-place and precast concrete elements such as abutments, beams, piers, columns and deck; repairs to bridge railings, lights and signage; repairs and replacement of deck joints; underwater repairs to pile caps; repairs and/or replacement of portions of the fender systems; repairs and/or replacement of drainage system; and supply of maintenance platform and application of protective coatings.

CHALLENGES FACED DURING THE PROJECT Access

Getting access to many of the deteriorated areas on the underside of the bridge presented significant challenges since more than 75% of the spans were over water and at a significant height above the waterline, at up to 55 ft (17 m). A swift tidal current under the bridge also did not allow much space on the water for a work barge to be floating adjacent to a pier while hundreds of recreational and commercial boats passed under the bridge each day.

Time Constraints

Heavy traffic on the bridge meant that no lanes of traffic could be closed between 7 and 9 am or from 3 to 6 pm. From 9 am to 3 pm, one lane of traffic could be closed to allow for the contractor's equipment. In order to complete the work within the 12-month time frame, the contractor worked two shifts, with most of the work being done at night.

Load Limitations

Due to weight limits on the bridge deck and limited space on the water beneath the bridge, ready-mixed concrete was not an option. Instead, 12,000 bags (6,000 cf, 170 cm) of self-consolidating concrete (SCC) was placed by hand to encapsulate the columns from the pier caps to the beams.

VALUE ENGINEERING AND REPAIRS

The original design called for encapsulation of all columns from the pier cap to a height of 20 ft (6 m) and individual spall repairs on deteriorated concrete areas above that height. A sprayapplied migrating corrosion inhibitor was also specified to help protect the column areas that were not being repaired. Soon after construction began, it was agreed that more value could be gained by totally encasing the columns above the 20 ft (6 m) height. As a result, most of the trowel-applied column spall repairs and the migrating corrosion inhibitor were eliminated from the project and instead the columns were totally encased with new, corrosion resistant concrete from top to bottom. This revised approach saved time, provided significant strengthening of the columns, and provided full protection for the column against corrosion by increasing concrete cover by 6 in (152 mm)



Fig. 2: Column deterioration during the bridge inspection



Fig. 3: Repair work at one of the columns



Fig. 4: Swinging platform to perform spall repairs and apply coating



Fig. 5: Concrete repairs performed from swinging platform



Fig. 6: Protective coating installation at bridge underside



Fig. 7: Completed repairs at East Bridge

over 100% of the column surface area. In addition to providing corrosion protection by increasing column diameters, the concrete mix also contained corrosion inhibitor, silica fume, and polymer to provide a significantly higher level of corrosion protection than typical ready-mix concrete.

In addition to the column encapsulation work, approximately 2,000 sf (185 sm) of isolated spalls on columns, beams, and piers were repaired utilizing a "trowel-applied" technique with a non-sag, polymer modified repair mortar with integral corrosion inhibitor. To get access to these areas, a trailermounted, retractable, self-propelled swinging platform was used and allowed workers to climb from the bridge deck to a secure working platform under the bridge deck (Fig. 4). From the platform, workers were able to perform hand-applied spall repairs (Fig. 5) as well as apply protective coatings.

To defend against chloride and moisture infiltration, a total of 220,000 sf (20,440 sm) of columns, beams, abutments, piers, and the underside of the bridge deck were protected with polymer-modified cementitious coating (Fig. 6). A secondary benefit of the protective coating was that it provided an aesthetically-pleasing finished product by giving the newly repaired bridge a monolithic/uniform appearance that made the bridge look new again.

CONCLUSION

The Paradise Island East Bridge rehabilitation project was completed on time and for a fraction of the cost of replacement (Fig. 7). By using the right combination of methods and materials, and by choosing to not only repair but also protect the reinforced concrete against the deleterious effects of chloride-induced corrosion, it is expected that the service life of the Paradise Island East Bridge has been extended by 25 years.

Paradise Island East Bridge Repairs and Renovations

SUBMITTED BY Sika Corporation Lyndhurst, NJ

OWNER The Bridge Authority, **Commonwealth of The Bahamas** Nassau. Bahamas

PROJECT ENGINEER/DESIGNER **ETS**

Nassau, Bahamas

REPAIR CONTRACTOR ISD

Nassau, Bahamas

MATERIALS SUPPLIER/MANUFACTURER **Sika Corporation**

Lyndhurst, NJ



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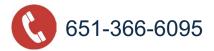
COMMITTEE ACTIVITIES

CONVENTIONS/EVENTS

ONLINE MEMBERSHIP DIRECTORY

CONCRETE REPAIR BULLETIN

CONTACT ICRI





Chats Falls Generating Station

FITZROY HARBOUR, ONTARIO, CANADA SUBMITTED BY KING PACKAGED MATERIALS COMPANY



Fig. 1: Barge and deck

he Chats Falls Generating Station is located near the village of Fitzroy Harbour, Ontario, and spans the Ottawa River. The dam was originally constructed by the Chats Falls Power Company. Following a comprehensive survey of the surrounding area and landscape, construction of the dam began in 1929 and was put into service during 1931 and 1932.

Today, the facility is jointly owned by Ontario Power Generation (OPG) and Hydro Quebec. The concrete portion of the dam, which was a tremendous undertaking at the time, is approximately 2.9 miles (4.6 kilometers) in length, making it one of the longest dams in North America. The dam includes five spillways which allow OPG to effectively control the water levels that flow through the eight massive turbines housed in the generation building. These eight turbines have the capability of producing up to 192 megawatts of clean renewable energy.

CHALLENGES AND SITE VISIT

The Chats Falls Dam spans the Ottawa River and lies in both the Ontario and Quebec provinces, with the larger portion lying on the Quebec side. The only road access to the dam is from the Ontario side. All construction scheduling had to be coordinated with OPG in order not to interfere with the operation of the generating station. A large portion of the construction materials and equipment

had to be transported across the Ottawa River. The majority of the river crossings were made by boat and barge (Fig. 1); however, during periods when the spillways were open, some of the materials and equipment had to be transported by helicopter (Fig. 2). While work was being performed on the Quebec side, workers on the project had to travel back and forth daily from the staging area to the work stations using boats.

DAM REHABILITATION PROGRAM

The deterioration of the 80-year old concrete was primarily due to age, water infiltration and freeze-thaw attack. The critical areas requiring intervention were sections of the decks, gravity dam surface areas, downstream vertical walls, and submerged face sections of the dam.

Chats Falls Dam required a significant refurbishment to improve both safety and performance and extend the service life of the dam. The multi-year refurbishment started in Spring 2012 and was completed in Fall 2016. Numerous items were completed such as removal and replacement of portions of the 80-year-old deteriorated concrete, replacement of handrails to bring them up to code, pinning some cracked sections of the dam, underwater epoxy crack injections to mitigate leakage, and required electrical upgrades. Due to the limited access many of the concrete repairs had to be completed working from barges.

Deteriorated and unsound concrete was removed using handheld concrete breakers to a specified ICRI Concrete Surface Profile (CSP), in accordance with ICRI Guideline No. 310.2R, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair, prior to the placement of the concrete repair material. The perimeter of the repair areas was saw cut to a minimum depth of 34 in (19 mm) and the substrate was cleaned using 4000 psi (2.8 MPa) pressure washers. Galvanized mesh with a 4 in (102 mm) x 4 in (102 mm) pattern was placed in all areas that required only a 3 in (76 mm) overlay, while the 4 in (102 mm) and deeper repair sections were reinforced using epoxy coated dowels and reinforcing steel. The substrate was saturated with clean potable water while leaving the surface dry and free of standing water in order to achieve surface-saturated-dry (SSD) condition for adequate bonding.

The downstream vertical walls were formed and placed with a high performance, pre-packaged, self-consolidating concrete (SCC) mix to provide low shrinkage, low permeability and good compatibility with the existing concrete (Fig. 3 and 4). The 26 in (650 mm) slump flow of the SCC provided a fluid mix without bleeding or segregation. The forms were left in place for a minimum of 7 days for curing. Since there were many large repair sections, it was important to protect the repairs from water evaporation to reduce the potential of shrinkage cracking and to ensure the durability of the repaired concrete. The horizontal top slab of the dam was placed with a high performance, pre-packaged, concrete mix to provide low shrinkage, low permeability and good compatibility with the existing concrete (Fig. 5 and 6). The concrete was trowel finished with magnesium trowels. In total, over 28,250 cf (800 cm) of concrete was replaced.

Various sections of the dam were strengthened with steel reinforcement. Holes were drilled through the concrete and into the bedrock and 1.4 in (35mm) high strength steel pins up to 39 ft (12 m) long were inserted. The pins were then secured



Fig. 2: Helicopter transports materials and equipment



Fig. 3: Placing concrete into wall forms



Fig. 4: Concrete formwork

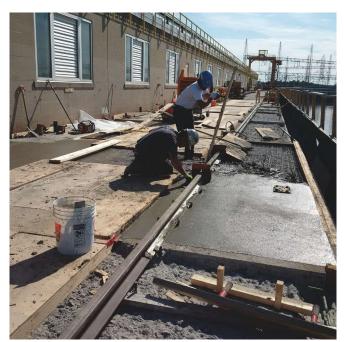


Fig. 5: Finishing deck concrete



Fig. 6: Placing deck concrete



2018 Project Awards

ICRI conducts an awards program each year to honor and recognize outstanding projects in the concrete repair industry. Entries are received from around the world, and the win-

ning projects are honored each year at the annual ICRI Awards Banquet at the ICRI Fall Convention.

The application process for the 2018 awards will open in May 2018.

using an un-sanded, washout-resistant, anchoring grout injected under pressure into the holes to encapsulate the steel.

Numerous underwater concrete repairs were also completed by divers using a washout-resistant, underwater repair mortar. After locating and sealing the face of the below grade cracks, the team of divers would drill into the voids in the concrete and inject a two-part epoxy resin to seal the many hundreds of feet (meters) of cracks that had developed over the long lifespan of the structure.

ENVIRONMENT & SAFETY

OPG is considerate of both the environment and other users of the waterways. Protection of the environment was a serious concern during construction and all work was scheduled and completed to not create any negative impact on the surrounding environment. Safety is also a prime concern to OPG and a large portion of the concrete replacement was to facilitate installation of new safety rails along the entire length of the dam. The project served two purposes: to reinstate the structural integrity of the dam and provide many more years of service, and to create a safe working environment for the technicians who manage the water levels and flows according to approved water management plans.

CONCLUSION

Chats Falls Dam generates clean, renewable electricity 24 hours a day, 365 days a year, and is part of OPG's clean energy portfolio which is more than 99 percent free of greenhouse gas and smog emissions. The refurbishment will ensure many more decades of safe and reliable power generation.

Chats Falls Generating Station

SUBMITTED BY King Packaged Materials Company

Boisbriand, Quebec

OWNERS

Ontario Power Generation

Fitzroy Harbour, Ontario

Hvdro Quebec

Quebec

PROJECT ENGINEER/DESIGNER

WSP

Ottawa, Ontario

REPAIR CONTRACTOR **GDB Constructeurs**

Lively, Ontario

MATERIALS SUPPLIER/MANUFACTURER King Packaged Materials Company

Boisbriand, Quebec

CONCRETE **REPAIR CALENDAR**

NOVEMBER 15-17, 2017

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JANUARY 22, 2018

ICRI 2018 Kick-Off Party

The Rio Las Vegas, NV

Website: www.icri.org

JANUARY 22-26, 2018

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Las Vegas Convention Center

Las Vegas, NV

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JANUARY 30-31, 2018

ICRI Concrete Slab Moisture Testing Certification

TISE West

Mandalay Bay Convention Center Las Vegas, NV

Website: www.tisewest.com

APRIL 11-13, 2018

2018 ICRI Spring Convention

The InterContinental Mark Hopkins

San Francisco, CA Theme: Seismic Solutions Website: www.icri.org

INTERESTED IN SEEING YOUR EVENT LISTED IN THIS **CALENDAR?**

Events can be emailed to editor@icri.org. Content for the March/April 2018 issue is due by January 2, 2018 and content for the May/June 2018 issue is due by March 1, 2018.



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Gold Bar Influent Channel No. 2 Repair and Long-Term Protection

EDMONTON, ALBERTA, CANADA

SUBMITTED BY READ JONES CHRISTOFFERSEN LTD.



Fig. 1: Extensive depth of concrete deterioration on channel walls



Fig. 2: Column and ceiling deterioration

he Gold Bar Influent Channel No. 2, constructed in 1979, consists of a reinforced concrete rectangular tunnel that transports raw wastewater influent to the wastewater treatment plant's screen and pretreatment areas. The tunnel is in excess of 295 ft (90 m) long, with interior width varying from approximately 7 to 10 ft (2.1 to 3 m), and interior height varying from approximately 6.5 to 10.75 ft (2 to 3.3 m). The channel structure is entirely below grade, with 12 in (305 mm) side walls, a 15 in (381 mm) floor slab foundation, and a roof slab. Some portions where the channel roof structure also forms the main floor of a process building include 12 in (305 mm) wide reinforced concrete beams. Channel construction includes several expansion joints along the length of the buried concrete structure, a fiberglass-lined venture flume that aids in the measurement of wastewater flow rates, an isolation gate, and several roof access hatches.

UNIQUE CAUSES OF DETERIORATION IN WASTEWATER TREATMENT PLANTS

The repair and protection of concrete infrastructure in wastewater environments poses unique challenges to common restoration techniques and protection measures. Raw influent in wastewater treatment plants (WWTP) produces high concentrations of hazardous and corrosive gasses and acids that deteriorate concrete materials and metal components.

Concrete influent channels are often exposed to the harshest corrosive environments within the WWTP. These channels transport raw wastewater from the WWTP to grit tanks, screen chambers, and initial pre-treatment areas. Raw and partially treated wastewater contains high concentrations of hydrogen sulfide (H₂S) gas, which forms sulfuric acid in the presence of moisture, oxygen, and bacteria. Sulfuric acid attacks concrete by exposing the concrete matrix and underlying aggregate, and

eventually the embedded reinforcing steel. Typically, the concrete deterioration due to H_2S gas and sulfuric acid exposure is observed to be most severe within the enclosed portions of WWTP structures. The rates of concrete deterioration and microbial corrosion vary depending on the concentrations of sulfides in the wastewater, the flow rate and the level of turbulence, and the subsequent rate of H_2S release.

INSPECTION RESULTS

In 2014, an interior inspection of the tunnel identified significant concrete deterioration and erosion. The inspection identified between 1.25 and 3 in (32 to 76 mm) of deteriorated and unsound concrete on interior surfaces of the channel walls, columns and roof members (Fig. 1 and 2). Significant erosion and loss of concrete wall thickness, often to the depth of the reinforcing steel, was noted. The concrete cover on the underside of the roof slabs had deteriorated exposing the lower mat of reinforcing steel. Beam stirrups and bottom layer reinforcement steel were exposed and heavily corroded, with loss of cross-sectional area.

Original construction details showed approximately 1.5 to 2 in (38 to 51 mm) of concrete cover over the embedded steel reinforcing steel. The severe extent of concrete cover loss, the resulting reduction in concrete member thickness, and the loss of reinforcing steel cross-sectional area were considered of structural concern, indicating a significant reduction in load-carrying capacity.

The inspection also revealed that expansion joint seals were missing or damaged and no longer effective, and that metal gratings and handrails were severely corroded above the wastewater flow level.

REPAIR SYSTEM SELECTION AND EXECUTION

A repair protection program was planned and designed to restore the load-carrying capacities; to provide increased load-carrying capacity in localized areas for current loading and usage requirements; to incorporate enhancements that improve the overall structural durability and minimize the vulnerability of smaller-dimension structural members to sulfuric acid and cross-sectional loss; and to incorporate a protective coating or liner assembly that provides long-term protection for the concrete channel structure against H_2S and sulfuric acid exposure.

The structural restoration and protection program undertaken included the following measures:

- Removal of deteriorated and unsound concrete, and cleaning and preparation of substrate surfaces in preparation for the repair assembly;
- Installation of a cast-in-place, bonded, reinforced concrete overlay to the channel's interior roof and wall surfaces;
- Casting a proprietary high density polyethylene protective liner assembly into the surface of the concrete overlays, providing a significantly longer service life than that of typical surface applied coatings when exposed to H₂S and acid attack while providing improved wastewater influent flow rates;



Fig. 3: Reinforcing installation within channel



Fig. 4: Overlay reinforcement at overflow weir



Fig. 5: Wall liner, reinforcement, and formwork

- Providing a highly durable, sulfate resistant, selfconsolidating concrete mix to provide a low shrinkage, low permeability concrete overlay construction; and
- Replacement of expansion joints with a multi-layer assembly, neoprene gasket, and proprietary rubberencapsulated metal cover plate assembly in areas vulnerable to impact from stones and debris.

DESIGN DETAILS AND CONSTRUCTION CHALLENGES

The structural design of the new concrete overlay was intended to provide fully composite behavior between the undamaged



Fig. 6: Formwork and bracing



Fig. 7: Trial fit of HDPE liner prior to erection of formwork



Fig. 8: Nearing completion of overlay and HDPE liner assembly at overflow weir

portions of the existing structure and the new concrete overlay through material bonding and sufficient reinforcement dowelling at the shear interface (Fig. 3 and 4).

Integration of the new HDPE protective liner into the outer surface of the concrete overlay provided some design and construction challenges. Although manufacturers' recommendations and guidelines were available for typical splices, corners and transitions, it was necessary to develop details for numerous project-specific requirements.

Construction of the bonded overlay and HDPE protective liner assembly provided further unique challenges for the contractor (Fig. 5 and 6). It was required that formwork and bracing systems introduce the fewest possible penetrations through the protective liner to minimize liner patching required before returning the channel into service. The lack of formwork tiebacks into the concrete substrate introduced the further challenge of ensuring that the HDPE liner did not wrinkle or warp during placement of the self-consolidating concrete overlay materials (Fig. 7).

CONCLUSION

The construction of a new bonded concrete overlay with integral HDPE protective liner assembly (Fig. 8) was successful in restoring and enhancing the channel's load-carrying capacity, and to provide appropriate long-term protection against the corrosive environmental exposure.

Repair construction began October 1, 2014 and was completed May 31, 2015, an ambitious schedule considering the magnitude of the project. The project was completed on time and on budget due to the collaborative efforts of the owners, design team and contractors. The facility owners expressed great satisfaction with the project results.

GOLD BAR INFLUENT CHANNEL NO. 2 REPAIR AND LONG-TERM PROTECTION

SUBMITTED BY

Read Jones Christoffersen Ltd.

Edmonton, Alberta

OWNER

EPCOR Water Services Inc.

Edmonton, Alberta

PROJECT ENGINEER/DESIGNER Read Jones Christoffersen Ltd. Edmonton, Alberta

REPAIR CONTRACTOR

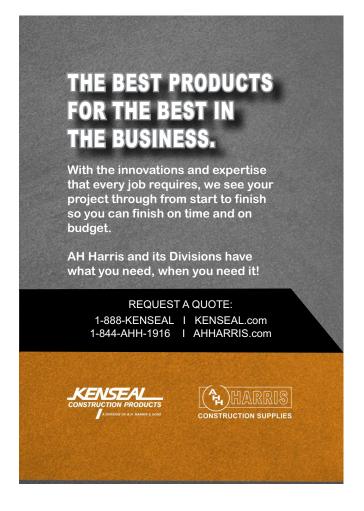
Sure-Form Contracting Ltd.

Edmonton, Alberta

MATERIALS SUPPLIERS/MANUFACTURERS **AGRU America Inc.** *Georgetown, SC*Sika Canada Inc. *Edmonton, Alberta*







Bawdsey Radar Transmitter

FELIXSTOWE, SUFFOLK, ENGLAND SUBMITTED BY CONCRETE RENOVATIONS LTD.

In 1936, the world's first operational radar transmitter was put into service at RAF Bawdsey, Suffolk, England and has played a pivotal part in the Battle of Britain and ultimately helped to change the course of world history. The Bawdsey Radar array consists of 4 main receiver masts and a transmitter block which is surrounded by 13 ft (4 m) high concrete blast walls with 4 ft (1.2 m) toe and earth banks to the outside elevations. The timber

walls to fall into a state of serious disrepair, leaving much of the top layer of reinforcement exposed to the elements. The restoration plan was to create a long-lasting repair to the concrete blast walls without changing their appearance. In other words, being a National Heritage Site, major structural repairs were completed with products that did not alter the appearance of the 1930s concrete.



Specifically, concrete repairs were modified using colored mortars and washed aggregates to simulate the color of the original concrete. Day joints and shuttering board marks were incorporated into the concrete surface to reproduce the original construction techniques. The 80-year aging process was simulated by flashing the repair surfaces with a fine grit-blasting media. Finally, a migrating corrosion inhibitor and an impregnation cream were installed as part of the 25-year maintenance plan.

masts have long since gone, but the transmitter block is now part of the Bawdsey Radar Trust. Funds were raised by the Trust and the transmitter block is due to be opened to the public in Fall 2017 as a museum and visitors center.

Due to the secretive nature of the work carried out at RAF Bawdsey, little or no maintenance work was performed since the transmitter was taken out of service after WWII. This allowed the concrete blast



Bawdsey Radar Transmitter

SUBMITTED BY Concrete Renovations Ltd.

Peterborough, Cambridgeshire

OWNER

Bawdsey Radar Trust

Felixstowe, Suffolk

PROJECT ENGINEER/DESIGNER Freeland Rees Roberts Architects

Cambridge, Cambridgeshire

REPAIR CONTRACTOR

Concrete Renovations Ltd.

Peterborough, Cambridgeshire

MATERIALS SUPPLIER/MANUFACTURER

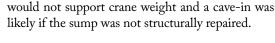
Remmers UK Ltd.

Crawley, West Sussex

Refinery Sump Repairs

BELLE CHASSE, LA SUBMITTED BY STRUCTURAL

When a refinery's sump was deemed unrepairable, our team was asked to evaluate the structural integrity of the sump and develop a safe repair plan. The scope of the restoration consisted of roof replacement and the repair of an exposed wall section inside the 20 ft (6 m) x 20 ft (6 m) x 20 ft (6 m) in-ground sump. The original contractor had removed a section of the roof to begin the initial repair plan only to discover that the concrete walls were extremely deteriorated



New structural walls were constructed and a stay-inplace shoring system was incorporated utilizing vertically-installed soldier beams along the sump walls that were permanently embedded in the repair. The new structural walls consisted of two mats of reinforcing that were welded to the middle of the

> soldier beams. By utilizing a rapid curing specialty concrete mix, a 5-layer corrosion resistant coating system was applied to the sump within 48 hours.

> Once the new structural walls were completed, two steel I-beams coated with a corrosion protection system were installed. An engineered formwork system was utilized for the new 12 in (305 mm) thick roof which consisted of 13 penetrations. Once the concrete was installed, a 5-layer corrosion resistant coating system was applied to the soffit of the roof.



and much of the original reinforcing was corroded, and in some places, non-existent.

A structural assessment of the sump pit was performed and a repair plan developed to bring the sump pit back to an as-designed state. The cause of the sump deterioration was chemical attack of the cement paste due to a deteriorated chemical lining system and embedded metal corrosion. It was determined that the sump in its current condition



Refinery Sump Repairs

SUBMITTED BY **STRUCTURAL**

Prairieville, LA

OWNER

Phillips 66 Belle Chasse Alliance Refinery Belle Chasse, LA

> PROJECT ENGINEER/DESIGNER STRUCTURAL Technologies Columbia, MD

> > REPAIR CONTRACTOR **STRUCTURAL**

Prairieville, LA

MATERIALS SUPPLIERS/MANUFACTURERS STRUCTURAL Technologies Columbia, MD

> **Elray Kocke Concrete Services** Donaldsonville, LA

LONGEVITY CATEGORY

Port of Canaveral: North Cargo Piers Cathodic Protection 10 Years Later

CAPE CANAVERAL, FL

SUBMITTED BY VECTOR CORROSION TECHNOLOGIES

The North Cargo Piers at the Port of Canaveral consist of four wharves that handle bulk cargo such as cement, slag, salt, automobiles, and lumber. Each wharf consists of square prestressed concrete piles, cast-in-place concrete pile caps and beams, and prestressed hollow-core deck units with a cast-in-place topping slab.

After years of exposure to the corrosive saltwater environment, a major rehabilitation was conducted concrete deck units were protected using activated arc sprayed zinc applied to the deck soffit.

Completing this project on an operating port facility on the ocean created many unique challenges to overcome, including having the piers remain operational at all times; dealing with tides; and at times, moving work areas or delaying work to avoid impacting marine life such as manatees, pelicans and sea turtles in the Port.



Over the last 10+ years, the North Cargo Piers have continued to be subjected to the corrosive marine environment and the portions of the structure that were repaired and received the galvanic cathodic protection are showing no signs of corrosion-related deterioration. Other areas which were not repaired and protected have continued to deteriorate and are now in need of repair. Accordingly, the repairs and cathodic protection systems are meeting the owner's goals of providing a long-term, operator-free, maintenance-free protection to the piers in the Port.

during 2005-2006 to extend the service life of the busy piers. The scope of work included concrete repair and galvanic cathodic protection for the piles, pile caps, and the prestressed deck units with an estimated design service life of 20 years. The original repair program consisted of: galvanic pile jackets to protect 668 piles; the lower portion of the cast-in-place pile caps were removed and activated distributed galvanic anode strips were installed; and, the undersides of the pre-stressed



Port of Canaveral: North Cargo Piers Cathodic Protection 10 Years Later

SUBMITTED BY Vector Corrosion Technologies Winnipeg, MB

OWNER
Canaveral Port Authority
Cape Canaveral, FL

PROJECT ENGINEER/DESIGNER
CH2M

Cape Canaveral, FL

REPAIR CONTRACTOR Vector Corrosion Technologies Tampa, FL

MATERIALS SUPPLIER/MANUFACTURER
Vector Corrosion Technologies
Winnipeg, MB

Apeejay House, Repair and Restoration

MUMBAI, MAHARASHTRA, INDIA

SUBMITTED BY LEAKSEAL

The Apeejay House, a reinforced concrete structure built in the early 1970s, is the exclusive corporate headquarters office for the Apeejay Surendra Group Mumbai Division. It consists of a ground floor and six upper stories.

Because the building faces the sea, the hostile marine environment, corrosion control conditions, and poor maintenance led to severe deterioration of the building's external concrete façade. In some locations, concrete



application of new sealants and coatings. The project consisted of repairs and replacement of major areas of the external façade, and repair to exposed portions of concrete elements, such as slab edges and columns. In addition, repairs included rehabilitation of the external façade treatment, replacement of façade render, repair/ replacement of concrete members/slabs, jacketing of columns, corrosion control, and casting of concrete cornices and delicate architectural elements, including

> application of an external synthetic plaster with a unique and innovative paint pattern to match the existing building appearance.

> The entire repair, which took over one year to complete, had a 100% safety record with manpower working during day and night shifts on a daily basis including Sundays. Executing the work without disturbing the cars parked below and completing the façade work while keeping the offices fully functional in one of the busiest commercial districts in India were challenges that were overcome. The project was completed in May 2016 on schedule and under budget.

chunks started falling from beam and balcony areas. The sanitary installations were also leaking heavily—creating algal and fungal residues that were damaging the building, coupled with a potential health risk. Visible cracks on the external side of the building also contributed to leakage of water within the building.

It was determined that extensive restoration work was needed, including concrete repair, strengthening of structural members, corrosion protection, and the



Apeejay House, Repair and Restoration

SUBMITTED BY

Leakseal

Mumbai, Maharashtra, India

OWNER

Apeejay Surendra Group Mumbai, Maharashtra

PROJECT ENGINEER/DESIGNER **Apeejay House Private Limited** New Delhi, Delhi

> REPAIR CONTRACTOR Leakseal

Mumbai, Maharashtra, India

MATERIALS SUPPLIERS/MANUFACTURERS

BASF India Limited

Mumbai, Maharashtra

Sherwin-Williams (BJN Paints India Limited) Mumbai, Maharashtra

Point East Association, Inc.

NEW SMYRNA BEACH, FL

SUBMITTED BY THE EUCLID CHEMICAL COMPANY

Point East Association is a 5-building, 3-story condominium complex located in New Smyrna Beach, on the east coast of Florida. The buildings were constructed in 1972. Each structure consists of a slab on grade, CMU walls, and double H block at each level, intended to create lintel beams on which the next floor is supported. The structures were exhibiting severe cracking in many areas as well as window and sliding glass door perimeters.

Upon initial investigation of one of the buildings, emergency shore posts were required and a repair program initiated for the building. After shoring was in place, window perimeters, headers, sliding glass door perimeters and new lintel beams were constructed with new reinforcing steel. Several balconies were found to be deficient in the amount of rebar and spacing, and were demolished and recast. A urethane waterproofing coating was installed on all horizontal surfaces after



repairs were completed, and exterior vertical surfaces painted.

The repaired building has become a five-phase project with Phases 1,2, and 3 completed. Phase 4 is currently underway and scheduled to be completed in 2017. Phase 5 is scheduled for 2018.

For Phases 2 and 3 (the scope of this project), the

Owner was looking to restore the structure to building code requirements while maintaining a safe and livable environment for the tenants. Major reconstruction was required for spalled and cracked reinforced vertical masonry. Masonry repairs were made to window and door rough openings, tie-beams, headers, lintels and building/unit corners.

The most important benefit received from this project was restoring the structure to code-compliance. Replacing the damaged masonry helped restore the structural integrity of the walls, providing the intended support to the upper floors.

Point East Association, Inc.

SUBMITTED BY The Euclid Chemical Company Cleveland, OH

OWNER

Point East Association, Inc. New Smyrna Beach, FL

PROJECT ENGINEER/DESIGNER **KWA Engineers, LLC** Port Örange, FL

REPAIR CONTRACTOR A.A.T. Restoration Group, Inc. Port Orange, FL

MATERIALS SUPPLIER/MANUFACTURER The Euclid Chemical Company Cleveland, OH

Mitchell Student Center Preservation

ROCHESTER, MN

SUBMITTED BY BUILDINGS CONSULTING GROUP, INC.

The Mitchell Student Center is near the center of the Mayo Clinic's Rochester, Minnesota Campus, built in 1937 as the Rochester Public Library, and is on the National Register of Historic Places. The one-story building was built in the 1800s English Tudor revival, or "Jacobethan" architectural style, which is a style that was favored by many local leading citizens. The building features several impressive decorative features including quarried faced ashlar limestone wall cladding, with carved trim at windows and doors.



replacement stone sources were found for the damaged stone. For the window openings, new replica replacement windows were fabricated using aluminum framed thermal glass with replica muntins. Decorative hardware, such as hinges and locks, were also fabricated.

The project began in 2015 with stone masonry replacement. Window mockups, final selection, and manufacturing were accomplished during the Winter and Spring of 2015-2016. Window installations and

> the remainder of the stone masonry restoration was completed in Summer 2016.

> The Mitchell Student Center façade preservation demonstrates that repairing existing historic structures is a complex project that requires extensive preplanning and knowledge of historic methods of construction. Repair involves many unknowns and potential surprises, and the team must be responsive to unanticipated conditions. Retaining the historic integrity of a building is a responsibility requiring a thorough and well-thought-out design that will provide the intended results.

A condition study identified many and varied deteriorated areas needing repair, determined the types of materials necessary to restore the historic façades, and established a repair sequence and budget. Several problems had to be solved: 1) replacing the corroded steel-frame windows and providing new energyefficient windows that kept the appearance of the historic windows; 2) replacing damaged stone masonry while maintaining the historic appearance; and 3) reconstructing the limestone entry stairs. Matching



Mitchell Student Center Preservation

SUBMITTED BY **Buildings Consulting Group, Inc.** Minneapolis, MN

> **OWNER Mayo Clinic** Rochester, MN

PROJECT ENGINEER/DESIGNER **Buildings Consulting Group, Inc.** Minneapolis, MN

REPAIR CONTRACTOR **Building Restoration Corporation** Rochester, MN

MATERIALS SUPPLIER/MANUFACTURER W. L. Hall Company Hopkins, MN

Brandeis Parking Garage

OMAHA, NE

SUBMITTED BY SIKA CORPORATION

The Brandeis eight-story building was built in 1905 to serve as the flagship location for the Brandeis Department Store chain in Omaha, Nebraska. Designed in the Neo-Renaissance style by architect John Latenser Sr., the building is unique for its intricate masonry work where every floor of the building has a different outward appearance. The adjoining eight-story parking garage with over 700 parking stalls was built in the early 1960s to accommodate increased vehicle traffic. The Brandeis Department Store chain

With a commitment by TAB to bring the building up to code, the structures were given a new lease on life.

Repair of the parking garage, consisting of cast-inplace concrete with a pan and joist system, was performed while the adjoining building was occupied and functional, and the project had to be completed in one year.

In total, over 12,000 sf (1115 sm) of horizontal repairs

were performed in the parking deck. Repair materials included traditional ready-mix concrete, pre-packaged repair mortar, and pre-packaged dry-process shotcrete. All horizontal, vertical, and overhead concrete received protective coatings.

The building now serves as upscale, mixed residential and commercial space and will continue to be a major Omaha landmark for years to come. Despite being in a sorry state prior to renovations, the Brandeis building and its accompanying garage were given a second chance.



enjoyed major success in the 1960s and 1970s, before faltering in 1980. The building was placed on the National Register of Historic Places in 1982, two years after the department store's closing.

In the following decades, both the garage and store building underwent several alterations and minor renovations as ownership switched hands. By the time the properties were purchased by TAB Properties in 2015, the garage was in such disrepair that many levels were under threat of being condemned by the city.



Brandeis Parking Garage

SUBMITTED BY Sika Corporation Lyndhurst, NJ

OWNER **TAB Properties**St. Paul, MN

PROJECT ENGINEER/DESIGNER

AGA Consulting

Bloomington, MN

REPAIR CONTRACTOR

McGill Restoration

Omaha, NE

MATERIALS SUPPLIER/MANUFACTURER
Sika Corporation
Lyndhurst, NJ

Repairs of Woodbridge Wharf Dominica, West Indies

ROSEAU, DOMINICA, WEST INDIES

SUBMITTED BY GEMITE PRODUCTS INC.

The wharf at the main port, Woodbridge, in Dominica, West Indies, constructed in the mid-1970s and extended in 1989, was constructed using steel pipe piles, cast-in-place concrete beams, and concrete structural deck. The Woodbridge Port is the lifeline of the island and the point of all cargo imports and exports for the island. The main berth of the wharf is 800 ft (244 m) in length and is positioned parallel to the shore.

removed and sandblasted, the exposed reinforcing steel sandblasted, and cement-based materials used for protection and as a bonding slurry for repair mortars. Repair materials included hand-applied, polymer-modified, fiber-reinforced and shrinkage compensated mortar; and a wet process shotcrete mortar specially formulated for an extended open time, while allowing application from 0.5 in (12.7 mm) to several inches. The surface of the concrete deck received a thin surface overlay to waterproof

and protect the existing concrete against further salt penetration, while able to withstand heavy traffic and impact from heavy containers. The high-flow repair slurry mortar was spray applied in two coats for a total thickness of 0.25 in (6 mm) and broom finished.

Special challenges included performing the work from a floating platform, moving with sea and tide, making the installation extremely difficult. Over 60,000 sf (5575 sm) of surfaces were restored or protected, some underwater. The project started in 2015 and finished in 2016.

The tidal wave action caused concrete cracking in the structure, allowing water to penetrate the concrete resulting in corrosion of the reinforcing steel, severe concrete spalling, and significant delamination on the underside of the deck and structural beams. Many steel piles required structural repair because the corrosion compromised structural integrity.



The repair program included the following items: Cementbased rustproofing, with migrating corrosion inhibitor, was applied to protect steel surfaces. Deteriorated concrete was

Repairs of Woodbridge Wharf Dominica, West Indies

SUBMITTED BY

Gemite Products Inc. Mississauga, Ontario

viississauga, Oritario

OWNER

Dominica Air and Sea Port Authority

Roseau, Dominica

PROJECT ENGINEER/DESIGNER
Forster Construction Services LLC

New Orleans, Louisiana

REPAIR CONTRACTOR

CarMar Caribbean Group Corporation

Wilmington, Delaware

MATERIALS SUPPLIER/MANUFACTURER

Gemite Products Inc.

Mississauga, Ontario

Concrete Structural Repairs & Load Capacity Enhancements of an Access Bridge

JACKSONVILLE, FL

SUBMITTED BY PREMIER CORROSION PROTECTION SERVICES, INC.

The Northside Generating Station (NGS) uses natural gas, fuel oil, coal and petroleum coke in three large steam units and four small diesel-powered peaking units to produce more than 1300MW of peak electric capacity. NGS was originally placed into service in 1966.

As part of a design/build project to maintain NGS, a restoration program was developed to repair and strengthen the bridge beams, pile caps and slab on the

Over the years, considerable deterioration occurred at the pile caps and beams in the bridge, causing the bridge beams to torque, requiring structural reinforcement to meet the current code requirements and load specifications. During repairs, the underside of the bridge was accessed through three holes cut through the top of the bridge. Much of the work on the bridge was at or just above water level, requiring the crews to work aboard a system of 30 floating platforms that were

moved between the beams and pile caps as needed. Debris was captured on the work surface and disposed of according to regulations.

The physical aspects of undertaking the project were challenging due to the extent of the damage in the concrete structure, difficult access to the repair area, an aggressive environment, low clearance between the repair area and the water, and environmental regulations. The repair and rehabilitation of the Flume Road Access Bridge was completed on time and on



Flume Road Access Bridge that spans Nichols Creek and links the generating station to raw materials barges from the Port Authority.

The 960 ft (293 m) long access bridge incorporates precast double "T" slabs supported on 64 concrete pile/pile caps with 63 beams along one side and the other side supported on a precast concrete wall which is part of the discharge flume.



Concrete Structural Repairs & Load Capacity Enhancements of an Access Bridge

budget.

SUBMITTED BY

Premier Corrosion Protection Services, Inc. Tampa, FL

OWNER

Jacksonville Electric Authority (JEA)

Jacksonville, FL

PROJECT ENGINEER/DESIGNER **B Squared Engineering Group**Haddonfield, NJ

REPAIR CONTRACTOR

Premier Corrosion Protection Services, Inc.

Tampa, FL

MATERIALS SUPPLIER/MANUFACTURER

Mapei Corporation

Deerfield Beach, FL

Carnegie Lake Dam, Princeton University

PRINCETON, NJ

SUBMITTED BY JOSEPH B. CALLAGHAN, INC.

Princeton University's Carnegie Lake is iconic. Not only does it give home to competitive rowing at Princeton, it provides a haven for wildlife to flourish and serves as a retreat for the University's community. It is said that Albert Einstein was frequently seen boating and fishing on the lake. It is, without a doubt, one of Princeton's most treasured natural spaces.

was deemed in poor shape by the Division of Waters. In 1966, the dam was covered in a layer of gunite. Unfortunately, the dam continued to deteriorate over decades resulting in multiple areas of concrete spalling and cracking.

The repair of the Carnegie Lake Dam was challenging due to the active nature of the structure. Managing the water while not impacting the level of the lake

> or activities on the lake was a challenge. The biggest challenge was overcoming the removal of a century of incompatible repairs and hidden faults under the gunite layer.

A cofferdam was designed to dewater and expose the concrete for deeper assessment, repair and restoration. Once the concrete was exposed and the gunite layer removed, additional (more significant) damage was discovered, adding to the scale and scope of the project. Phase I and II of the project totaled \$6.8 million in construction costs and were completed in November 2016.



The lake would not be possible without an incredible feat of concrete—the Carnegie Lake Dam. Located at the intersection of the Stony Brook and Millstone River, Carnegie Lake Dam was constructed in 1907 with funds donated by Andrew Carnegie.

The dam is a steel-reinforced concrete buttress structure spanning 724 ft (221 m). Documented repairs to the dam date back to 1918 and surface spalling documentation as far back as 1922 when it



Carnegie Lake Dam, **Princeton University**

SUBMITTED BY Joseph B. Callaghan, Inc. Philadelphia, PA

> **OWNER Princeton University** Princeton, NJ

PROJECT ENGINEER/DESIGNER Joseph B. Callaghan, Inc. Philadelphia, PA

> REPAIR CONTRACTOR **Kyle Conti Construction** Hillsborough, NJ

INDUSTRYNEWS

SIMPSON STRONG-TIE SUPPORTS DISASTER RELIEF FROM HURRICANE HARVEY

Simpson Strong-Tie, the leader in engineered structural connectors and building solutions, donated \$50,000 to the American Red Cross Disaster Relief Fund to assist Hurricane Harvey relief efforts.

The devastating effects of Hurricane Harvey continue to be felt throughout Houston. Thousands of people were stranded while Harvey continued its harmful path as a tropical storm, dropping historic levels of rainfall in Texas. The Red Cross ranked Harvey a Level 7, the highest level of disaster designation within the American Red Cross. The organization mobilized disaster relief workers, emergency response vehicles and supplies throughout the area while continuously monitoring the situation to provide needed support.

"The number of people affected by this disaster is profound and devastating. We are actively pursuing additional ways we can help locally," said Simpson Strong-Tie CEO Karen Colonias. "We will keep the communities in Texas in our thoughts." To make a contribution and aid in disaster recovery efforts through the American Red Cross, visit redcross.org or send a donation to your local Red Cross chapter.

PROSOCO AND CONPROCO FORM NEW TRAINING ALLIANCE

Workshops will go "beyond the lunchand-learn"

PROSOCO and CONPROCO have reaffirmed their commitment to product training and support for restoration professionals by co-founding the Restoration Training Collaborative (RTC).

The RTC will develop and host a continuous series of joint training programs for the restoration industry at nationwide locations. The founding members of the RTC each bring a unique specialization required in the repair and maintenance of masonry substrates. PROSOCO makes cleaners and protective treatments for masonry, and CONPROCO provides

mortars and repointing solutions for masonry.

"We believe the way to make the restoration industry better is through quality training programs," said Larry Burkhardt, technical resource manager for CON-PROCO. "We're excited to have a partner in PROSOCO that shares our common goal of continuously elevating the craftmanship and quality of work in the masonry restoration industry."

RTC training sessions will go beyond the traditional lunch-and-learn, Morris added. Classes will be open to multiple disciplines within the restoration industry, and will include classroom learning as well as hands-on exercises.

"CONPROCO's state-of-the-art training facility in Maryland is the perfect location to host the inaugural RTC training sessions," said Sarah Holder, PROSOCO's preservation specialist. "Each attendee will have their own demo station where they will get hands-on experience on a variety of techniques in masonry restoration."

Learn more at https://restorationtraining.org/.

SMITH EQUIPMENT RESPONDS TO HURRICANE IRMA

Hurricane Irma brought devastation, heartache, and significant loss to many members of our community. During this difficult time, our community has shown courage, strength and kindness.

Our customers have inspired and moved us. We couldn't be more grateful. We are very fortunate to be open for business, and serving our customers and those affected by Hurricane Irma. Although we are up and running, others are down and in serious need.

To help those in need, SMITH has donated a percentage of September sales to the American Red Cross hurricanerelief efforts. To help our customers, we are offering a discount on new and used SMITH equipment. If you need equip-

ment, please contact your SMITH rep. for details. Thank you for your prayers, patronage, and support. We are grateful!

CHANEY ENTERPRISES NOW OFFERING LIMESTONE VIA RAIL

Chaney Enterprises, a ready-mix concrete, aggregates and construction supplies provider, announced it will now offer limestone to its customers, transported by a new railway just completed at the company's plant in Waldorf.

Chaney Enterprises is known for providing sand and gravel; the introduction of limestone to Chaney's product mix will expand the company's market for construction projects, especially those in Southern Maryland.

The 80-railcar train will transport materials in and out of Chaney's 520-acre facility on Acton Lane in Waldorf, serving as an efficient and cost-effective way of moving both the outbound loads and inbound loads of raw material supplies.

Chaney's dedicated railroad also means the company will reduce long hauls experienced in its trucking fleet—reducing safety risk, traffic and emissions. This strategic move is key in promoting efficient material movements and helping with the uncertainty of long truck hauling. It will also free Chaney's truck fleet to provide an even better level of customer service. Visit https://www.chaneyenter-prises.com/ for more information.

HISTORIC CHIMNEY IN BAKU AT THE HEART SHOPPING COMPLEX THANKS TO THE CINTEC INNOVATION

A demolition-threatened historic chimney in the Azerbaijan capital of Baku will now be the centre point of a multimillion pound new shopping complex thanks to the innovation of a Newport-based structural engineering firm. Cintec International has been commissioned to carry out complex structural preservation work on the chimney later this year in a £1 million contract.

INDUSTRYNEWS

Built in the 1900s the feature was the focal point of a regeneration project to establish Baku as an up-and-coming centre of commerce and technology.

Original designs for the development, which will be called The Twin Towers of Port Baku, planned to have the chimney pulled down to make way for the modern shopping complex. However, when the President of Azerbaijan saw the plans he requested that the historical chimney be restored instead and become a central feature of the development.

The result is a design which is representative of the futuristic vision for Azerbaijan whilst retaining important elements of its industrial history.

Cintec, which have been instrumental in the restoration of many of the world's most recognizable and iconic historic structures, were an obvious choice for the job and have already begun work on helping to preserve the chimney. The company will be using its unique patented anchor to secure the chimney by drilling into the structure from the top and feeding 24 metres of anchors in to the walls of the chimney to secure it for





generations to come. The chimney is one of the most delicate structures that Cintec have ever worked with and has required the company to design thinner connecting anchors especially for the project.

The circular structure of the building also means that Cintec will have to use laser keyhole technology to achieve the precision necessary to successfully position the anchors. The work is expected to take 12 weeks to complete.

The chimney is just one of Cintec's ongoing structural preservation projects. The company has worked in Egypt

restoring its historical buildings for 18 years and has undertaken restoration work on mosques, temples and both the Red and Step Pyramids. Cintec anchors have also been used to restore other historically significant buildings across the globe including Windsor Castle, the parliament building in Canada and even the White House.

SIMPSON STRONG-TIE LAUNCHES NEW MICROSITE FOR OSHA SILICA DUST REGULATIONS

In response to the new Occupational Safety and Health Administration (OSHA) regulations to protect workers from exposure to respirable crystalline silica dust, Simpson Strong-Tie, an industry leader in engineered structural connectors, anchors and fasteners, has launched a new silica dust microsite to help contractors, builders, engineers and other building professionals safely comply with the new construction standards.



INDUSTRYNEWS

Effective September 23, 2017, OSHA has mandated an 80% reduction in jobsite exposure to silica dust, a byproduct from drilling into concrete and concrete blocks. Specifically, the mandate entails reducing the permissible exposure limit (PEL) for respirable crystalline silica to 50 micrograms per cubic meter of air, as averaged over an eight-hour work shift.

The new Simpson Strong-Tie microsite is designed to enable users to quickly grasp OSHA's updated requirements via downloadable information and government documents — including a fact sheet, answers to common questions, and direct access to the silica construction regulations in both English and Spanish. Through these resources, building professionals can learn about the programs available to help them meet the stricter criteria, train employees on silica safety and provide flexibility to workers without incurring penalties or citations. The page also directs readers to details about Simpson Strong-Tie OSHA-compliant solutions to silica dust creation.

Prepare for the new OSHA requirements now by visiting strongtie.com/oshasilica. Additional information on OSHA's silica regulations can be found at osha.gov/silica.

JQ ENGINEERING LENDS MORE VOLUN-TEERS TO HELP WITH POST-HARVEY NEEDS; COMPANY'S DAY OF SERVICE INCLUDES PRO BONO ENGINEERING SERVICES IN ROCKPORT, TEXAS

As post-Harvey damage was still being assessed and prioritized, team members from JQ's offices throughout Texas stepped up to help. Project engineer Beth Anne Feero, EIT, in JQ's Austin office volunteered to work with the Structural Engineering Emergency Response group (SEER) in conjunction with the Building Officials Association of Texas (BOAT) to perform rapid building assessments in Rockport, Texas.

Working with another professional engineer, Feero was assigned a square mile area each day and assessed each building in that area. During the four days that

volunteers were in Rockport, more than 10,000 structures were assessed, according to Feero, whose two-person team provided assessments for approximately 450 structures while in town.

At the same time, JQ's Dallas and Fort Worth offices were involved in sorting and packing more than 600 boxes of food, totaling nearly 25,000 lbs. In Houston, the JQ team tackled the playground of Casa de Esperanza through landscape improvements and general clean-up of the site. Not to overlook nature's four-legged creatures, JQ's Austin team helped at the Austin Animal Center for the day.

According to JQ's CEO Stephen H. Lucy, PE, "Our Day of Service coincided with one of the most devastating events in Texas. There are many more individual







examples of our staffers donating time in their local communities post-Harvey. We are especially thankful to have a workforce with the desire and expertise to assist." Lucy volunteered to provide emergency consultation regarding an historic structure impacted by Harvey's winds and rains in order to recommend a stabilization plan.

JQ employees may sign up for a Day of Service each quarter with each office able to identify the community organizations that are important to them. The offices with a larger number of employees have more than one option, whereas regional offices typically choose one organization.

ACQUISITION OF GUNNAR MALM AND ASSOCIATES, INC. BY PIERCE ENGINEERS, INC.

As of September 11th, Pierce Engineers, Inc. (PE) has enhanced its concrete and masonry restoration practice by acquiring Gunnar Malm and Associates, Inc. (GMA) located in Madison, Wisconsin. Having J. Gunnar Malm and his staff join PE's Madison office and expanding its general practice area is an exciting next step for our firm.

Randy Elliott, PE's Managing principal, adds, "Meshing our two firms together will allow greater reach and expanded services to existing and new clients in need of forensic, restoration and investigation services related to concrete and masonry." PE will continue to serve its clients from its Milwaukee and Madison based offices, providing ingenious structural engineering services nationwide.





ASSOCIATIONNEWS

WILLIAM "BO" MILLS ASSUMES PRESIDENCY OF APWA 2017-2018 **NATIONAL BOARD OF DIRECTORS**

The American Public Works Association (APWA) announced that the City of Germantown, Tennessee's, Public Works Director, William "Bo" Mills, has assumed the Presidency of the National Board of Directors at the recent APWA PWX Conference held in Orlando, Florida, August 27-30, 2017. Elected by the association's nearly 30,000 members, Mills leads the association with APWA's new President-Elect, Jill Marilley, HDR Senior Construction Manager in Bellevue, Washington, and immediate Past President Ron Calkins, PWLF, Public Works Director (retired) of Ventura, California. Mills continues his six years of service on the 17-member Board of Directors, and will also serve as the Past President during 2018-2019.

Mills has a 32-year working career, and has been the Director of Public Works with the City of Germantown, Tennessee, for 13 years. His duties include the direct supervision of the programs and personnel associated with the following areas: Animal Control, Parks/ROW Grounds Maintenance, State Street Aid, Stormwater Maintenance, Street Maintenance, Water Production and Distribution, Sewer Collection, and many utilityrelated CIP projects. Prior to becoming the Director of Public Works, Mills served the City of Germantown as Assistant Director of Public Services for seven years and Solid Waste Coordinator for six years. He has spent his entire working career with the Germantown Public Works Department.

Mills has been an APWA member since 1989. At the chapter level, he served as the Tennessee Chapter's West Branch director for six years, working through the chapter's officer positions until becoming Chapter President in 2005. He served as the Chapter Delegate from 2000 through 2010, and has also served on the chapter's Membership, Awards, Education, and Past President's Advisory Committees. At the national level, Mills has served on the Board of Directors for the past six years as Director of Region III (five years) and President-Elect (one year). He served three years on the Membership Committee and two years on the Transportation Committee, chairing the Roadway Safety Subcommittee both years. He served as Board liaison to the Small Cities/Rural Communities Committee for two years, served as a member of the Finance Committee for the past two years, and served as Board liaison to the National Equipment Roadeo Exploratory Committee. In 2008, Mills was selected to the House of Delegates Executive Committee and was named HOD Chair in 2010-2011.

For more information on APWA President Mills, contact APWA Media Relations and Communications Manager, Laura Bynum, lbynum@apwa.net.

JASON WEISS AND ROBERT FROSCH TO SERVE AS EDITORS-**IN-CHIEF OF TWO ACI JOURNALS**

The American Concrete Institute announces the formation of Editorial Boards to oversee the ACI Materials Iournal and the ACI Structural Iournal.

Each Editorial Board will be composed of an editor-in-chief and four research expert members. The Editorial Boards will focus on the mission of making and keeping ACI's serial publications the premier place to publish for academic researchers in the field of concrete. The Boards' initial missions include identifying new topics for commissions, special editions, and advising on the direction for the journals, making suggestions for both subject matter and potential authors; providing content by writing occasional editorials and other short articles; overseeing journal quality; and more.

Iason Weiss serves as Editor-in-Chief of the ACI Materials Journal Editorial Board, with board members Zachary Grasley, Maria Juenger, Kamal Khayat, and Michael Thomas.

Robert Frosch serves as Editor-in-Chief of the ACI Structural Journal Editorial Board, with board members Catherine French, Michael Kreger, David Sanders, and James

The ACI Materials Journal and ACI Structural Journal have been publishing research on properties of concrete materials and design of structural concrete from many of the brightest minds in the concrete industry



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ASSOCIATIONNEWS

since ACI began publishing journals back in December 1912. The goal has always been to ensure that those who design and build with concrete have access to the most current and cutting-edge research and information on concrete. In many cases, research published in ACI's journals directly impacts the codes, specifications, and practices published by the Institute and other standards developing organizations.

To date ACI has more than 4,700 papers in the printed and digital ACI *Materials Journal* and ACI *Structural Journal*. Digital subscriptions to both journals are included with ACI membership.

AMERICAN CONCRETE INSTITUTE ANNOUNCES WINNERS OF ANNUAL EXCELLENCE IN CONCRETE CONSTRUCTION AWARDS

The American Concrete Institute (ACI) announced the winners of the 2017 Excellence in Concrete Construction Awards, who were honored during the Institute's Concrete Convention & Exposition, October 16, 2017 in Anaheim, California, USA.

The highest honor was presented to R·torso·C, Tokyo, Japan. This award is given to a project that demonstrates excellence in concrete innovation and technology, and stands out above all other entries.

This house is in the center of Tokyo, sitting on an area of 66 m² (710 ft²). The clients are a married couple, sharing a passion for architecture and art. When they found a rare corner lot of land in central Tokyo, they knew they wanted to build a home with unique materials and construction methods. In high-density residential districts, one way to architecturally build is towards the sky—creating a high-level insulated audiovisual room respecting nature and the environment. It is the only direction that captures the feeling of the vastness of nature. The project team has studied this approach towards the sky as an element of nature for many years, and for this project they pruned away the corner of a rectangular

volume to achieve this. For architecture on a small site, sectional and volumetric design becomes very important.

Cutting away the internal volume paradoxically creates a sense of spaciousness in the continuous four-story space inside. Large openings facing the sky are effective means to incorporate the feeling of vastness into the internal space. The chamfered corners not only provide a view to the sky from the internal space, but also for the people outside. There is a highlevel, sound-insulated audiovisual room in the basement, and a spacious gallery and a Japanese room on the first floor. Functionality was prioritized on the second floor with a living room, dining room, kitchen, and bathroom. The living room is a very small space, but a 5 m high ceiling and a large oblique triangular window-drawing in an abundance of external light-results in a cognition of spaciousness that is far greater than the actual space in terms of footage. The final design of this space was derived through a vast number of three-dimensional models.

The ACI Excellence in Concrete Construction Awards were created to honor the visions of the most creative projects in the concrete industry, while providing a platform to recognize concrete innovation, technology, and excellence across the globe. In order to be eligible for participation in the Excellence Awards, projects needed to be winners at a local ACI Chapter level and submitted by that Chapter, or chosen by one of ACI's International Partners.

An independent panel of esteemed industry professionals judged projects and selected winners based on architectural and engineering merit, creativity, innovative construction techniques or solutions, innovative use of materials, ingenuity, sustainability and resilience, and functionality.

The winning projects were selected from among several possible categories, and included:

Repair & Restoration

1st: Market Street Parking Garage Restoration, Wichita, Kansas USA.

2nd: Chillon Viaducts, Veytaux, Switzerland.

Mid-Rise Buildings

1st: Denver International Airport-Hotel Transit Center, Denver, Colorado, USA.

2nd: Columbia University Medical and Graduate Education Building, New York City, New York, USA.

Decorative Concrete

1st: Ryerson University Student Learning Centre, Toronto, Ontario, Canada.

2nd: Lock 8 Skate and BMX Park, Port Colborne, Ontario, Canada.

Low-Rise Buildings

1st: R·torso·C, Tokyo, Japan.

2nd: Frick Environmental Center, Pittsburgh, Pennsylvania, USA.

High-Rise Buildings

1st: Embassy Lake Terraces, Karnataka, India. 2nd: Premiere on Pine, Seattle, Washington, USA.

Infrastructure

1st: Johnson County Gateway, Overland Park, Kansas, USA.

2nd: Winona Bridge, Winona, Minnesota, USA.

The winning project details can be found at www.concrete.org. Entries for the 2018 Excellence in Concrete Construction Awards are being accepted now through April 2, 2018.

Visit www.ACIExcellence.org for more information.

AMERICAN CONCRETE INSTITUTE ANNOUNCES WINNERS OF ECO CONCRETE, AND EGG PROTECTION DEVICE STUDENT COMPETITIONS

The American Concrete Institute (ACI) announces the winners of its Egg Protection Device Competition, and Eco Concrete Competition. The competitions took place at the ACI Fall 2017 Convention in Anaheim, California, USA. The first, second, third, and fourth place teams received cash awards.

The objective of the Egg Protection Device is to design and build the highestimpact load-resistant plain or reinforced concrete Egg Protection Device, and to learn about concrete's sustainable benefits related to durability, impact resistance,

ASSOCIATIONNEWS

and other real-life aspects which an EPD simulates.

1st Place—Universidad Nacional de Ingeniería: Kevin Arturo Laines Velarde, Ronald Bryan Valderrama Castro, Alex Condori Salluca, Christiams Jesús Santos Accor, Jason Luis Villalobos Pineda Faculty Advisor: Ing. José C. Masías Guillén

2nd Place—Universidad Autónoma Metropolitana - Azcapotzalco: Leiding Guadalupe García Gutiérrez, Allyson Melisa López Díaz, Juan Carlos Hernández Mora, Eduardo Osorio Rosas, Juan Carlos Trejo Juárez, José Luis Vivar Emiterio Faculty Advisor: M. E. José Juan Guerrero Correa

3rd Place—San Jose State University: Amer Zreika, Andrea Coto, Carmen Cutay, Jesus Ramos, Komalpreet Kaur, Rami Zayed

Faculty Advisor: Dr. Akthem Al-Manaseer

The objective of the Eco Concrete Competition is to promote the idea of environmental performance in concrete mixture design as an important aspect of sustainability. Teams had the mission to develop an innovative concrete mixture, which had the lowest possible environmental impacts while maintaining optimal mechanical and durability performances.

1st Place—University of Sherbrooke: Cedric Gauthier, Charles-Etienne Bouchard, Philippe Dubois, Sebastien Cloutier, Redha Esselami

Faculty Advisor: Arezki Tagnit-Hamou

2nd Place—Valparaiso University: Rebecca Valliere, Jeffrey Moore, Grace Jackson

Faculty Advisor: Jacob Henschen

3rd Place—New Jersey Institute of Technology: Jennifer Guerrero, Stephon De Silva, Nikolaos Benyamin, and Marco Fernandez.

Faculty Advisor: Anlee Orama

4th Place—California State University, Chico: Hayden Kaae, Cody Stauffer, Danny Lakowski, Steve Smythe, Damien Bonis

Faculty Advisor: Dr. Mohammed Albahttiti

For more information on ACI's Student Competitions, please visit www.concrete.org.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

Email your association news to editor@icri. org. Content for the March/April 2018 issue is due by January 2, 2018 and content for the May/June 2018 issue is due by March 1, 2018.



MCI®-2018 is 100% silane concrete sealer containing time-proven Migrating Corrosion Inhibitor (MCI®). The MCI® penetrates deep into concrete providing corrosion protection to reinforcing steel from water, chloride ions, and other contaminants. MCI®-2018 also provides water repellency by chemically reacting with the cementitious substrate under proper application, decreasing the ingress of additional aggresive materials.



PEOPLE ON THE MOVE

JO HIRES ADDITIONAL SENIOR PROJECT MANAGERS IN DALLAS AND HOUSTON, TEXAS: FIRM'S PORTFOLIO OF **ENGINEERING PROJECTS GROWING AT RECORD PACE**

JQ has hired two new Senior Project Managers to serve the firm's offices in Dallas and Houston, Texas, according to CEO Stephen H. Lucy, PE.

Says Lucy, "With our clients throughout Texas starting new projects, we continue to experience high demand for our engineering and technical services in these major metro markets. In building an outstanding team of engineers to support our clients' growth, we are able to respond with both the talent and experience that these projects require."

Mildred Bautista, PE, MLE Senior Project Manager, Buildings Dallas, Texas



Mildred brings more than 18 years experience to JQ as a structural and civil engineer. She has performed structural analysis and design of complex concrete and steel build-

ings, including commercial, industrial

and residential. During construction, she has performed work as a project supervisor, inspector and client representative.

A licensed engineer in Texas, Puerto Rico and the US Virgin Islands, Mildred earned her Bachelor of Science degree in Civil Engineering at the Universidad de Puerto Rico - Mayaguez and has completed graduate degree courses in structural engineering at Polytechnic University of Puerto Rico.

Current Projects:

- L-3 Addition, Arlington, Texas
- Cummins, Atlanta, Georgia
- Dallas County Record Complex Peer Review, Texas
- Athletic Complex, Arlington ISD, Arlington, Texas

Jigar K. Deliwala, PE

Senior Project Manager, Buildings Houston, Texas



Jigar K. Deliwala

Jigar has more than 14 years experience as a structural engineer, specializing in cast-inplace and precast, prestressed concrete buildings, including post-tensioned parking

garages, office buildings, hotels and multi-family podium structures.

A licensed engineer in Texas and California, Jigar earned his Bachelor of Engineering degree and Master of Engineering in Computer Aided Structural Analysis and Design from Gujarat University in Ahmedabad, India. He also holds a Master of Science degree in Civil and Structural Engineering from The University of Akron in Ohio.

Current Projects:

- STEM Building, The University of Houston, Victoria, Victoria, Texas
- Academic Building, The University of Houston, Katy, Texas
- 9500 Arboretum Improvements, PacTrust, Austin, Texas

INTERESTED IN SEEING YOUR PEOPLE IN THIS COLUMN?

Email your People on the Move announcements to editor@icri.org. Content for the March/April 2018 issue is due by January 2,2018 and content for the May/June 2018 issue is due by March 1, 2018.



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CHAPTER MEETINGS&EVENTS

ARIZONA

November 15, 2017

CHAPTER DINNER MEETING

Phoenix Airport Hilton Phoenix, AZ

BALTIMORE-WASHINGTON

November 2, 2017

CHAPTER DINNER MEETING

4th Quarter Dinner Meeting – Chapter Awards and Elections Maggiano's Little Italy at Tysons Galleria McLean, VA

December 7, 2017

FALL TECHNICAL SEMINAR

Topic: TBD Location: TBD

CENTRAL FLORIDA

November 8, 2017

CHAPTER MEETING

Topic: Safety and Safety Equipment Red Lobster Sanford, FL

CONNECTICUT

November 8, 2017

CHAPTER DINNER MEETING

Best Western Plus North Haven, CT

DELAWARE VALLEY

November 8, 2017

CHAPTER FALL SYMPOSIUM

Topic: Concrete Coatings Bricklayers & Allied Craftworkers Local 1 Philadelphia, PA

FLORIDA WEST COAST

November 9, 2017

SPORTING CLAY EVENT

Tampa Bay Shooting Clays Land O Lakes, FL

GEORGIA

November 16, 2017

CHAPTER LUNCHEON MEETING

Maggiano's Perimeter Atlanta, GA

December 5, 2017

CHAPTER HOLIDAY PARTY

Location: TBD Atlanta, GA

GREAT PLAINS

December 8, 2017

CHAPTER CHRISTMAS PARTY

Location: TBD

MICHIGAN

November 9, 2018

CHAPTER ANNUAL MEETING

MotorCity Casino Hotel Detroit, MI

MINNESOTA

January 3, 2018

CHAPTER 2018 MEGA DEMO DAY

Cement Mason Training Center New Brighton, MN

NORTH TEXAS

November 9, 2017

CHAPTER MEMBERSHIP MEETING

Chad Dabbs of TxDOT Mattito's Tex-Mex in Oak Lawn Dallas, TX

NORTHERN CALIFORNIA

November 14, 2017

CHAPTER LUNCHEON MEETING

Topic: 2016 Project Awards, Stanford Hoover Pavilion Scott's Seafood Grill and Bar Oakland, CA

PITTSBURGH

November 7, 2017

CHAPTER LUNCHEON MEETING

Topic: A Discussion with Past ICRI President Monica Rourke Buford's Kitchen Pittsburgh, PA

ROCKY MOUNTAIN

November 7 & 8, 2017

CONCRETE UNIVERSITY SYMPOSIUM

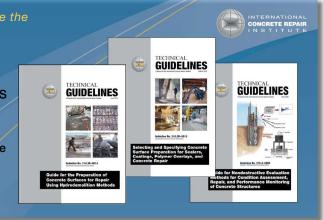
All Day Education Seminars Including Concrete Slab Moisture Testing Arapahoe County Fairgrounds Aurora, CO

FOR UP-TO-DATE CHAPTER ACTIVITIES AND FULL DETAILS ON THOSE LISTED HERE, VISIT WWW.ICRI.ORG.

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PDFs of ICRI Technical Guidelines* are FREE to MEMBERS! *Some exclusions apply.

The full list is available through the GUIDES/PUBLICATIONS drop-down menu on the ICRI website. Just click on the GUIDELINES FREE TO ICRI MEMBERS link; take a look at the list and download those ICRI Technical Guidelines you would like to have in your digital library. Hard copies must be purchased in the Bookstore. The free Technical Guidelines are only available through the special secure section and you must be logged in as a member.



NORTH TEXAS REMEMBERS LONG-TIME MEMBER AT ANNUAL GOLF OUTING

The North Texas Chapter remembered long-time Special Events Chairperson Jesse Points, who passed away earlier this year, at the 16th annual golf outing held at Waterchase Golf Club in Fort Worth. With a backdrop of perfect weather, the renamed Jesse Points Memorial Golf Classic kicked off with a moment of silence for Jesse, a perpetual fixture at every special event held by the Chapter since its inception in 2000.

The heated competition on the course resulted in a one-shot victory for the team from CMC with a score of 57. WJE's team garnered second place in a scorecard playoff against the BASF-1 team. Who says engineers can't play golf? Chapter Secretary Andy Bautz, from George D Alan Company, was victorious in the putting contest and with a closest-to-the-pin shot on #7. Brad Court exhibited a well-rounded game with the longest drive on hole #6 and his closest-to-the-pin shot on #12. Ben Grandbois from Western Specialty Contractors powered the longest drive down the fairway on hole #18. The BASF-2 team led by Chapter Director Eddie DeHaro ended the day with a pristine, unused eraser on their scoring pencil and now have the honor of decorating the "Most Honest" trophy for next year's event! Thanks go out to the NTX Golf Committee: Treasurer Peter Haveron, Past President Patrick Jorski, Chapter Director Clay Broyles, and long-time member Bob Scheelar.



Putting Contest winner and Chapter Secretary Andy Bautz (right) receives his winnings from Mark LeMay (left)



First Place Team from CMC (left to right); Jeff Wilhelm, Bobby Jones, Brad Court, and Dustin Dorssey



The Second Place WJE Team is (left to right) Jon Carrier, Bryan Staffel, Daniel Dodd, and Steve



NTX Past President Patrick Jorski, prom- Chapter Treasurer Pete Haveron (at podium) thanks the sponsors Third Place BASF-1 Team (left to ised to deliver the "Most Honest" Trophy and participants for their support to the BASF-2 team



right) Patrick Jorski, Don Moore, Andy Bautz, and Allison Lea (not pictured)

PITTSBURGH AWARDS FIRST SCHOLARSHIP PRIZE

The Pittsburgh Chapter was excited to award their first official chapter scholarship to Ms. Abby Severyn. Abby is currently majoring in Architectural Engineering (Structural Option) at Penn State University. She plans to graduate in two years with both a Bachelor's and Master's degree in Architectural Engineering. She looks forward to becoming a structural designer for renovation and adaptive reuse projects. Congratulations, Abby!

The Pittsburgh Chapter also reports that they recently held a panel discussion, "Blueprint for a Successful Project." The meeting was a follow-up from a previous panel discussion that focused on "lessons learned". The panel included an owner, engineer, contractor, and material supplier (all are ICRI members). Each member shared their thoughts and experiences regarding successful projects, and the moderator integrated questions and comments from the audience. The insights provided were appreciated by all.



ICRI Pittsburgh Past President Evan Rowles (right) presents the Pittsburgh Chapter's \$1,500 scholarship to Abby Severyn from Penn State University



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ICRI DUBAI CHAPTER HOLDS FIRST INTERNATIONAL EVENT

ICRI UAE held its first international event on Concrete Repair and Rehabilitation on October 25th, 2017 in Dubai. This event can be considered the first of its kind in the region and attracted all sectors of the construction industry, including but not limited to: Authorities from Dubai, Abu Dhabi, Sharjah and Ras Al Khaimah, Consultants, Main Contractors, Repair Contractors and Material Suppliers. Feedback about the event was very encouraging and they are hoping for more activities from the ICRI organization in the Middle East in the future. For more information on the ICRI Chapter in Dubai, contact Chapter Relations Director, Dale Regnier at 651-290-6278 or daler@icri.org.



Pictured top left is Nizar Marjaba, ICRI UAE Secretary giving the event welcome; top right is the ICRI UAE Board of Directors (I-r): Nizar Marjaba,

secretary; N. S. Moorthy, Treasurer; Dr. Mohamad Nagi, President; Dr. Ashraf Biddah, Vice President; Carsten Sodemann, Chapter Officer), bottom is Jessi Meyer, Cortec, ICRI member (and former ICRI Board member) giving a presentation introducing ICRI in the region.

NORTH TEXAS HOLDS PANEL DISCUSSION

The North Texas Chapter held a lively and informative panel discussion at its September meeting at Mattito's Tex-Mex Cantina in Dallas. Panelists were Past NTX Chapter Presidents Patrick Jorski, Parking and Restoration Specialist with BASF Construction Chemicals and Steve Lucy, PE, CEO and Managing Partner with JQ Engineering, LLP, and NTX Chapter Treasurer Pete Haveron, President of Texas Concrete Restoration. The panelists discussed the major changes they have seen in the concrete repair industry over their careers, the new technologies that excite them about the future of the industry, the major challenges they face in serving the needs of their clients, and what they want most from the other two segments of the industry represented



(left to right) North Texas Chapter President Julie Bolding, PE, and panelists Steve Lucy, PE, Pete Haveron, and Patrick Jorski



Moderator Mark LeMay (standing) and the three panelists take a question from an attendee

on the panel. Many attendees joined in the discussions and, though some frank and pointed comments were made, thankfully no violence ensued, and plenty of networking continued after the meeting.

VIRGINIA HOSTS ANNUAL FALL SYMPOSIUM

The ICRI Virginia Chapter hosted its annual Fall Symposium on September 21, 2017, at the Colonial Heritage Club in Williamsburg, VA. The Symposium topic was Repair, Restoration & Sustainability of Water, Wastewater & Pump Stations and over 50 attendees were treated to presentations by Bruce W. Husselbee, PE, Director of Engineering Hampton Roads Sanitation District; Mark Lemay, JQ Engineering; Jeff White, Commonwealth Epoxy Coatings, Inc.; Mike Mudrick, Velosit; and Mike Enoch, Tnemec. The day was capped off by the chapter's fall golf tournament on the award winning course at Colonial Heritage.

The chapter maintains a regularly updated website at www.ICRIV irginia.org. On the site, you can find details and registration for all upcoming events and meetings. While you are there, sign up for the chapter's email list to keep up to date with everything happening at ICRI Virginia.

NORTHERN CALIFORNIA HOSTS LOCAL PROJECT AWARDS

On September 19, 2017, the Northern California Chapter of ICRI hosted its local awards luncheon honoring those individuals and companies who were involved in special projects deserving of an award in each of the NCA project award categories. There



Owen Rosenboom (left) of Wiss, Janney, Elstner with Cruz Carlos, President of the Northern California ICRI Chapter



Carolyn Searls (left) and James Mendygral (center) from Simpson, Gumpertz & Heger with Cruz Carlos (right)



Owen Rosenboom (left) with Jim Bluse (center)



Travis Sawyer (left) of Robellen Contracting with Cruz Carlos



were approximately 40 attendees and two

We are pleased to announce the following local concrete repair projects were selected to receive Awards of Excellence: In the Historic Category was Hibernia Bank Building, submitted by Wiss, Janney, Elstner Associates with Owen Rosenbloom presenting; in the Non-Historic Category was 10-1C0904 Bridge Joint Rehabilitation; in the Longevity Category the award

went to the Joint Sealant Repair in Equal-

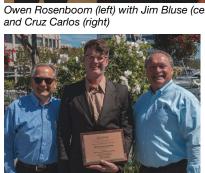
ization Basin; and in the Unique Category

The following concrete repair projects were selected to receive Awards of Merit: In the Historic & Unique Categories was PG&E, submitted by Simpson, Gumpertz & Heger with James Mendygral presenting on the project; Alcatraz Quartermaster Building was given an award in the Historic Category; Point Pinole Fishing Pier was awarded in the Non-historic & Longevity Categories; and Hall of Records in the

the award was given to Hoover Pavilion.

very interesting presentations.

Group photo after the awards (left to right): Megan Nazareno, SGH; Brad Kamin, Sika Corporation; Carolyn Searls, SGH; Deborah Blake, Sullivan Thompson Masonry; Janette Yamamoto, Roebellen Contracting; Travis Sawyer, Roebellen Contracting; Travis St. Louis, SGH; Lauren DiCenzo, SGH; and Jim Mendygral, SGH



Owen Rosenboom (center) of Wiss, Janney, Elstner with Jim Bluse (left) and Brad Kamin (right), both with Sika Corporation

METRO NEW YORK HOSTS 14TH ANNUAL GOLF CLASSIC

On Thursday, September 14, 2017 the Metro New York Chapter of ICRI hosted its 14th Annual Golf Classic at Cedar Hills Golf & Country Club in Livingston, New Jersey. The sold-out event began under bright and sunny skies, but the day turned cloudy and stormy. The day started out with registration, the driving range and a full brunch with Bloody Marys and Mimosas before everyone headed out on the course. At registration attendees received golf balls, cigars and a special gift. This year the chapter put together a Yeti tumbler with an aluminum power bank and put it all in a special Metro New York ICRI drawstring back pack. During play the sun was out, then the clouds formed and the rain came. It was a brief spurt, just enough to cool things off, and the sun returned. The dinner raffles consisted of iPads, Apple Watches, surround sound systems, 65" curved HD TVs, etc.

Our mainstays were all there taking 1st place, 2nd place, the Hacker award (named the Rebar Award) and finally for the presentation of the "Concrete Cup." Long Drive and Closest-to-the-Pin contests were back as was the 50/50, the silent auction, and local cigar rollers. Back by popular demand was Tom Moffatt crooning Frank Sinatra favorites during the cocktail hour.

New this year was on-course leader board scoring and a "Beat the Pro" contest. Held on one of the course's par three holes, LPGA Professional Susan Choi was on hand to challenge all who would take her on. Challengers were able to enter a raffle for a 65" curved screen TV. Nobody won either the \$25,000 or \$10,000 hole-in-one contents this year, but they came pretty close. It was a good day that would not have been possible without the help and support of all our Sponsors.



Registration time



Pete Wenz from Sika Corporation is seen here showing everyone how it's done



The Western Group supplied Arnold Palmers and John Daleys for the golfers. It appears that the John Daleys won the day



Metro New York Chapter President Stephen Franks, with Blok-Loc Limited, is here getting his first golf lesson. And it's from LPGA Pro Susan Choi



Enjoying the post-golfing cocktail hour



Trying to figure out where the ball went...



Cigars on the terrace



The winners of this year's coveted Concrete Cup are from Skyline Restoration and include (left to right); Doug Fenniman, Stephan Andreatos, and Rygo Foss



LPGA Professional Golfer Susan Choi (center, in pink) with a crowd including folks from Infrastructure Repair Services Group and Sika Corporation

GULF SOUTH HOSTS ALL-DAY SEMINAR

The Gulf South Chapter held an all-day fall meeting at the magnificent venue, The Club, in Birmingham, Alabama. Staying true to the theme, "Concrete Under Distress," speakers covered everything from hydro-electric dams to fire damaged structures to interstate bridge catastrophes as well as a rapid repair concrete materials demonstration. The event wrapped up with a presentation by the Economic Development Association of Alabama that highlighted a number of 2017 victories and provided some



Guest speaker Benjamin Byard speaking about the Tennessee Valley Authority (TVA) Bridge Program

tion about the 2018 landscape. The chapter would like to thank the speakers who took the time to prepare and present at this event. The speakers included: Benjamin Byard, PE, PhD, the TVA Bridge Program Manager; Dr. Nicole Braxtan, Assistant

useful informa-

Professor UNC Charlotte; Dr. Matthew Whelan, Assistant Professor UNC Charlotte; Randall Mullins, ALDOT Bridge Engineer; Scott Weidner, Head of Technical Sales at Aquafin; and Jim Searcy, Executive Director, Economic Development Association of Alabama (EDAA). Thanks also go to our exhibit table participants: BASF, Coastal One, Sika, and Prospec, as well as "Premier Sponsor" Aquafin as the lunch sponsor and Simpson Strong Tie as the breakfast sponsor.

The first-ever Gulf South Chapter Scholarship Awards were a highlight for this event and everyone is looking forward to it becoming an annual competition going forward. The chapter set an initial goal of offering scholarships way back at its inception and is very proud to now be in a position to offer two \$1,500 scholarships.

Scholarships were awarded based on student submissions that included a onepage written essay (50%), academic record (30%) and community service (20%). Juniors, seniors or graduate students in the areas of Civil Engineering, Construction or Architectural Engineering attending a four-



Gulf South Chapter Past President Bryan Wood (left), with scholarship recipient Lauren Townley (center), and Chapter Vice President Steve Lemay (right)

year program in Alabama, Mississippi and the Florida panhandle were eligible. Past scholarship recipients will be eligible for subsequent year scholarships with a new application each year. The chapter received more than a dozen applications and essays. The inaugural recipients were Lauren E. Townley from the University of Alabama Birmingham who is majoring in Civil Engineering with an Education Minor, and Ifezue Obiako from the University of South Alabama who is working towards a Bachelor's of Science in Civil Engineering and a Master's of Science in Civil Engineering.



The view from "The Club" is one many locals don't often have the chance to appreciate



The chapter was very pleased with the turnout of interested concrete repair professionals for this event

2018 CHAPTER NEWS DEADLINES

MARCH/APRIL 2018 January 10, 2018

MAY/JUNE 2018

March 10, 2018

Send your Chapter News to Dale Regnier, Chapter Relations Director, at daler@icri.org

CAROLINAS CHAPTER GIVES BACK WITH SERVICE PROJECT

The 2017 ICRI Carolinas Chapter service project took place on Thursday, July 20, 2017, in Asheville, North Carolina, preceding the chapter's summer meeting. The beneficiary of the project was the Rainbow Children's Center. The Children's Center and school provides for the educational needs of youth with learning disabilities in the Asheville area.

The focus of this year's project was the repair of concrete walkways and stairs at the main entrance of the Rainbow Community Center. A team of volunteers from the chapter led by several board members spent the day providing the necessary repairs to the walkway. Concrete repair materials were generously provided by BASF and Sika.

The volunteers on the project, all from the Carolinas Chapter, included:

Bill Brickey, Terracon

Bob Crosser, Simpson Strong-Tie

Bruce Stoerkel, Statesville Roofing & Building Restoration, Inc.

Hayes Thompson, Lesco

James Clark, Guaranteed Supply

Jim Hadley, Sika

Nat Jones, Neogard

Scott Stephens, Simpson Strong-Tie

Stewart Swing, Terracon



Volunteers from the Carolinas Chapter in front of the Rainbow Community Center





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SEMINARS: 22-26

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*Online registrations only. Some restrictions may apply.

Discount only applies to new registrations and rates are subject to verification of business type.

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CHAPTERNEWS

CHAPTERS COMMITTEE CHAIR'S LETTER



JOHN McDOUGALL Chapters Chair

It's award season!

It's the time of the year to start working on your annual reports and awards. As your professional lives take a break over the holidays it's a good time to start on the annual reports. It's a two-stage set of forms

intended to provide a snapshot of the health of your chapter and provide a roadmap to chapter success. The awards program recognizes chapter success based upon individual growth and health, not as a ranking of the biggest. The structure rewards year over year stability and growth in membership and attendance; as your chapter grows in membership, attendance and revenues the awards become more challenging to attain. The growth is measured in percentage rather than volume. So you do not have to compete directly with chapters of larger or smaller size; your score is based on your growth and your attendance and how it compares with what you have done previously.

Deeper into the awards program are points for such activities as meetings with allied associations, participation by students and educators, membership spread across contractor, supplier and engineers on an even basis. We have seen in recent years a few struggling chapters take this awards program and embrace it as a chapter best practice road map. There certainly isn't a one-size-fits-all model for chapter operations, but there are universal best practices that have shown tremendous results.

While the report and awards program focuses on current progress and results, it's important to note the resources are out there to find guidance for most every chapter challenge. With our chapter count growing past 35 heading for 40, we have the ability to lean on each other and share experiences. Share the struggles and success stories, hopefully share a strategy to avoid a hard-learned lesson. This sharing happens in a few formats at convention through the inter-chapter luncheon and the Chapters Committee meetings, traditionally held on Friday afternoon at convention. Second is the Chapter Roundtable meetings, held semi-annually in one of four areas designed to congregate the leadership of chapters in each of the four corners of North America. We meet for two days and review every aspect of chapter operations.

Those two options are on a fixed time table. More available are the chapter leaders from neighboring chapters as well as leaders from across the map. Through the chapter resources page at ICRI.org you can reach out to any chapter leader and discuss challenges you are facing. The help is out there, the information is available. Do not hesitate to call me as the Chair of the ICRI Chapters Committee; Dale Regnier, ICRI Chapters Director; or any ICRI staff for guidance.

All the best,

John McDougall ICRI Chapters Committee Chair



For the latest ICRI Chapter information visit www.icri.org.

WAGNER METERS AND SITE-FOTOS PARTNER TO BENEFIT FLOORING PROFESSIONALS

Wagner Meters' concrete flooring division and Sitefotos, a software company, announced a partnership that enables integration of the Sitefotos photo documentation app with Wagner's Rapid RH® Bluetooth® Smart Reader. Wagner Meters is the first company in the flooring industry to use a Bluetoothenabled device to allow users to take ASTM F2170 compliant relative humidity (RH) readings.

This partnership allows flooring contractors and other users of the Sitefotos app to read Rapid RH® data via Bluetooth® and automatically upload the readings to the user's account in the cloud. The moisture readings, along with any photos, are tagged to the location and project. They are then time stamped and stored on the cloud for easy and quick retrieval by the project personnel.

Since 2005, the Rapid RH® system has been providing flooring professionals with extremely fast, accurate, and reliable moisture testing of concrete floor slabs before installation of finished floor products. Now, the superior, cutting-edge technology of the Rapid RH® can be paired with convenient, digital photo documentation at each jobsite.

Photo Documentation

When a flooring contractor's employees and subcontractors use the Sitefotos mobile app to take photos of flooring and project conditions, the app can now receive RH readings directly from the Rapid RH® Bluetooth® Smart Reader. This will eliminate the need to fill out paper forms and ensures that the data are categorized and time stamped to the correct project.

Open to Other Partnerships

According to Spangler, the success of this partnership could pave the way for integrating the Smart Reader with other apps in the market.

BOSCH GAX18V-30 18V/12V DUAL BAY CHARGER AND BOSCH GAA18V-24 18V PORTABLE POWER ADAPTER PROVIDE CONVENIENT JOBSITE CHARGING

Dual bay charger is compatible with all Bosch 18V and 12V Max Lithium-ion batteries; portable power adapter ensures mobile devices are always ready using an 18V battery

Speed is part of the success formula in any business and ensuring tools and devices are always powered is part of the secret. Dual-charging convenience allows Bosch users to charge 18V and 12V Max batteries simultaneously along with mobile devices using the Bosch GAX18V-30 18V/12V Dual Bay Charger. The Bosch GAA18V-24 18V Portable Power Adapter allows users to quickly power up mobile devices anywhere using an 18V Bosch battery.

The dual bay charger quickly charges batteries and provides LED indicators so users can monitor charging. It charges a fully depleted Bosch 18V 4.0 Ah battery in 85 minutes and a fully depleted Bosch 12V Max 2.0 Ah battery in 45 minutes. The charger also provides a 2.4 amp max USB port to power up cell phones and other mobile devices. The Bosch GAX18V-30 18V/12V Dual Bay Charger is compatible with all Bosch 18-volt and 12-volt Lithium-ion batteries.

The Bosch GAA18V-24 18V Portable Power Adapter works with all Bosch 18V Lithium-ion batteries to deliver power to any 5V USB or 12V DC devices. It's capable of charging two devices simultaneously.

Like all Bosch power tools, the portable power adapter is designed to withstand jobsite conditions and keep charging. Power adapter output is 2.4 amps to get phones and other devices ready to use in a hurry. If users simultaneously charge two devices each output is 1.2 amps. The adapter has a port compatible with Bosch heated jackets, which allows users to power heated jackets with 18V

Lithium-ion batteries to increase the heating zone runtime.

The Bosch GAA18V-24 18V Portable Power Adapter includes a metal belt clip for additional user convenience. It prevents overcharging by going into sleep mode after charging a device. The charger adapts to the device being charged to allow optimal charging current to the device. It has a power on button to activate the charger for each charging session and to begin powering the heated jacket.

To learn more about the Bosch GAX18V-30 18V/12V Dual Bay Charger and Bosch GAA18V-24 18V Portable Power Adapter or to find a local dealer, visit www.boschtools.com or call 877-BOSCH-99. Check out www. bethepro.com for additional tips and videos.

BOSCH GLI18V-300 AND BOSCH GLI12V MAX WORKLIGHTS ARE EASY TO CARRY, OFFER POWERFUL ILLUMINATION WITH LONG RUNTIME

Practical flexibility in 300 lumen lights that go anywhere

When light is in short supply on the jobsite, professionals look for a worklight that's not only powerful but also convenient. The Bosch GLI18V-300 18-Volt Articulating LED Worklight and GLI12V-300 12-Volt Worklight fit the requirement for compact, lightweight and bright cordless lights that can go virtually anywhere.

The Bosch GLI18V provides 10 hours of illumination with a 2.0 Ah Bosch SlimPack battery (not included), delivering 300 minutes of runtime for every battery amp hour (Ah). This flexible worklight illuminates up a large work area and it keeps the area well lit for hours. The six LED, 300-lumen light is bright and weighs less than .69 lbs. (tool only, not including battery).

The GLI18V-300 worklight features articulating action, which allows the user

to angle the light at a variety of positions. In addition, it includes a hanger that allows the light to be mounted or positioned overhead. The compact light easily folds for carry-along convenience. The Bosch GLI18V-300 Worklight is compatible with all Bosch 18V Lithium-ion batteries.

The Bosch GLI12V-300 12V Max Worklight also offers compact size and light weight to go with great jobsite illumination. It offers six hours of runtime with a 2.0 Ah battery (not included) – 180 minutes of runtime for every amp hour (Ah) that the Bosch 12V Max battery provides. The bright 300 lumen light with six LEDs weighs only 0.36 Lbs. (tool only, not including battery). The GLI12V-300 is six sided for flexible positioning and provides a hook for easy hanging.

To learn more about the Bosch GLI18V-300 Worklight, Bosch GLI12V-300 Max Worklight or to find a local dealer, visit www.boschtools.com or call 877-BOSCH-99. Check out www.bethepro. com for additional tips and videos.

BOSCH GBH18V-20 3/4" SDS-PLUS® CORDLESS ROTARY HAMMER OFFERS PERFECT MATCH BETWEEN EFFICIENCY AND PERFORMANCE

Lightweight tool carries big power to the jobsite; 5,850 bpm gets the job done in concrete and 1,800 rpm does the same in wood

Weight is important on the jobsite, especially for jobs in concrete that require long periods of drilling or chiseling. The Bosch GBH18V-20 ¾" SDS-plus® Rotary Hammer brings big power at 5,850 bpm, but weighs only 5.7 lbs. (bare



tool) – a combination that assures rotary hammer toughness to get the job done, but not at the expense of user fatigue.

The Bosch GBH18V-20 rotary hammer delivers 1.3 Ft.-Lbs. of torque in a tool with three modes for drilling, hammer drilling and chiseling. No-load speed for drilling comes in at 1,800 rpm. An efficient DC motor is easy to maintain with long-lasting carbon brushes.

Meeting Requirements for Typical Applications

The Bosch GBH18V-20 ¾" SDS-plus® Rotary Hammer is made for typical construction applications like screw fitting, drilling in concrete or wood, hammer drilling and chiseling. Its efficient motor/battery combination delivers a high number of holes per charge; up to 25 holes per amp hour. The Bosch GBH18V-20 offers variable speed performance with forward/reverse function. An LED work light is included for working in dark areas.

The Bosch Flexible Power System is one of the most versatile Lithium-ion battery platforms available. The system offers complete compatibility by allowing 18V FatPack and SlimPack batteries to be used with any tool. And Bosch 18V 2.0 Ah and larger batteries feature CoolPack technology, which offers a heat conductive housing to keep batteries cooler for superior runtime and up to 2X longer life. All Bosch batteries provide cold weather performance to -4°F. Each battery includes a fuel gauge.

The tool includes Bosch-exclusive Electronic Cell Protection (ECP) that protects the battery against overload, overheating and deep discharge for longer life. Likewise, Bosch Electronic Motor Protection (EMP) protects the motor against overload with integrated temperature management.

To learn more about the Bosch GBH18V-20 ¾" SDS-plus® Rotary Hammer or to find a local dealer, visit www.boschtools.com or call 877-BOSCH-99. Check out www.bethepro. com for additional tips and videos.

INNOVATIVE BOSCH CUSTOM CASE SYSTEM DESIGNED TO ENSURE IMPACT TOUGH™ BITS ARE ORGANIZED, EASY TO ACCESS

Users can customize a case to meet their specific needs on the job

The Bosch Custom Case System for Impact Tough™ bits offers better organization and customization features for trade professionals who demand best-inclass products that help them get the job done right.



The durable case provides tilt-in/tilt-out convenience for easy access to bits. This customizable organization system helps users increase productivity by reducing time spent searching for bits. Users also can take only the bits needed for a given job rather than the whole case because the Bosch Custom Case System has removable bit clips. The innovative system allows users to customize set configurations so they can make a set that fits the job and their specific requirements.

The Bosch Custom Case accommodates Bosch Impact Tough screw driver bits that deliver 10x the life versus standard impact bits. Impact Tough screwdriver bits have an Xtended Torsion Zone to absorb torque peaks to reduce stress and breakage, and are engineered to accommodate today's high-torque impact drivers. Torque stress at the impact point of the tip is transferred to the tension dissipation zone to ensure longer life. Bosch Impact Tough™ screwdriver bits are precision machined for better fit in the tool and better fit delivers more torque to the bit, reduces slippage and contributes to bit life. Better fit in the

tool delivers less breakage and better performance.

The Bosch Custom Case can be used with Bosch Impact Tough black oxide drill bits as well. Bosch black oxide bits offer superior durability, speed and can be used for a variety of general purpose drilling applications. These bits offer quality drilling in everything from metal and wood to plastic and composite materials.

To learn more about the Bosch Custom Case System for Impact Tough bits or to find a local dealer, visit www.boschtools.com or call 877-BOSCH-99. Check out www.bethepro.com for additional tips and videos.

BOSCH GOP12V-28 12V MAX EC BRUSHLESS STARLOCK® OSCILLATING MULTI-TOOL OFFERS COMPACT DESIGN, SURPRISING POWER

Professional tool that makes tasks like cutting door jams easy and hassle free

The Bosch GOP12V-28 12V Max Starlock® Oscillating Multi-Tool is a multiuse tool that boasts light weight and compact size combined with the surprising power of a Bosch 12-volt Max tool. The tool features the next-generation Starlock 3-D interface; the accessory connection is cupped and shaped like a bottle cap to provide more contact surface area for rock-solid blade grip and maximum torque transfer.



The oscillating tool's EC brushless motor delivers more power and enhanced efficiency versus the previous-generation tool's 12-volt motor. This tool produces a top speed of up to 20,000 oscillations per minute and has ample power for fine cuts and fast task completion. It has a 2.8° oscillating arc for better accessory

utilization and increased productivity. The variable-speed dial allows users to match the oscillating speed to the material and task at hand with a range of 5,000 to 20,000 opm (oscillations per minute). Bosch-exclusive Constant Response circuitry allows the tool to maintain the desired speed even as load increases.

The Bosch GOP12V-28 Oscillating Multi-Tool weighs in at 1.75 lbs. and measures 11.2 in. long, making it compact enough to reach into tight spaces like corners. The tool also features a flexible accessory orientation with positions at every 30 degrees for customizable accessory positioning. The GOP12V-28 provides a soft-grip handle for better control and greater comfort, plus no-mar plastic ribs that protect the front of the tool from scuffs or scratches. A hex wrench is included for changing blades. Magnets help hold the blade in position and simplify blade changes. The GOP12V-28 accepts all of the Bosch Starlock® range of oscillating multi-tool accessories, except for StalockPlus® and StarlockMax® accessories.

To learn more about the Bosch GOP12V-28 12V Max Starlock Oscillating Multi-Tool or to find a local dealer, visit www.boschtools.com or call 877-BOSCH-99. Check out www.bethepro. com for additional tips and videos.

BOSCH GSR12V-140FC 12V MAX FLEXICLICK™ 5-IN-1 DRILL/ DRIVER SYSTEM PUTS THE POWER OF MULTIPLE TOOLS INTO A COMPACT PACKAGE

Bosch all-in-one tool handles drilling and driving projects at virtually any angle

When the job is drilling and driving, speed is a key factor in success. It may impact everything from profitability to ensuring you get to the customer who's at the end of the day's schedule. The Bosch 12V Max FlexiClick™ 5-In-1 Drill/Driver System can help trade professionals meet the need for speed with a convenient tool that helps save time,



yet derivers mgn-quanty drining and driving.

Bosch's FlexiClick is a compact 12-volt tool with four professional-grade attachments: a ¾" keyless chuck, a locking bit holder, a right angle attachment and an offset angle attachment. These offer easy adjustment for screwdriving, drilling, right angle drilling/driving, and offset driving close to edges. The tool offers excellent flexibility for projects that range from hanging cabinets to electrical box installation to pre-drilling holes in hardwood. The Bosch FlexiClick Drill/Driver delivers 265 in.-lbs. maximum torque and a maximum speed of 1,300 rpm.

The right angle and the offset angle attachments can be rotated in 16 different positions using one hand and without the need to remove attachments from the tool. And the right angle attachment can be used in conjunction with three additional attachments or can be used alone. Additional attachments include a locking bit holder and the keyless chuck.

The Bosch GSR12V-140FC FlexiClick Drill/Driver is great for applications in tight spaces where other tools are too large. Also, the drill/driver features a compact design that ensures it's easy to use for overhead jobs or when arms are spread in uncomfortable positions.

To learn more about the Bosch 12V Max FlexiClick™ 5-In-1 Drill/Driver System or to find a local dealer, visit www.boschtools.com or call 877-BOSCH-99. Check out www.bethepro. com for additional tips and videos.

BOSCH GWS18V-45C 18V EC BRUSHLESS 4-1/2 IN. ANGLE GRINDER HAS DAY-TO-DAY POWER IN A PACKAGE THAT'S CONNECTED READY

Powerhouse cordless grinder includes advanced safety features as well

The Bosch GWS18V-45C 18V EC Brushless Connected-Ready 4½ in. Angle Grinder delivers the convenience of cordless grinder operation with advanced user control. The grinder features an EC brushless motor that offers maximum efficiency and low maintenance, plus connected-ready capability that delivers next-generation control like maintenance review and performance notifications.



The Bosch GWS18V-45C grinder delivers outstanding performance, including metal cutting, thanks to the powerful EC Brushless motor design. This Bosch-exclusive design provides greater runtime and more power than similar cordless grinders with brushed motors. That means professionals can rely on a cordless grinder that delivers 10,000 no-load rpm, but doesn't forego power in favor of maneuverability.

The grinder offers plug-in connected-ready capability by supplying an interface that works with the optional Bosch GCY30-4 Bluetooth® connectivity module. It provides next-generation user control by interfacing with the free Bosch Toolbox app on a mobile phone. Users can customize the grinder, changing the speed of the soft-start function, setting the brightness of the LED and receiving battery charge and KickBack Control status updates.

The grinder's advanced electronics provide features including drop control, which shuts the tool off if dropped, and KickBack Control that shuts down the grinder's motor should the tool become jammed. The grinder also has restart protection to prevent accidental start-up during battery insertion. Soft-start technology reduces start-up torque to ease into cuts.

The grinder features a two-position Vibration Control side handle, which provides greater control than previous generation Bosch cordless grinders. It also makes operation of the grinder less fatiguing for the user. The side handle can switch from left to right for additional control and a slim soft-grip design provides additional user comfort.

To learn more about the Bosch GWS18V-45C angle grinder or to find a local dealer, visit www.boschtools.com or call 877-BOSCH-99. Check out www.bethepro.com for additional tips and videos.

NEW TOWNHOUSES AT THE HERMITAGE CLUB CONSTRUCTED WITH SUPERIOR WALLS PRECAST CONCRETE FOUNDATIONS

Growth at the prestigious Hermitage Club means the construction of 16 new townhomes before the end of 2017. Priced at \$1.3+ million each, the luxury ski resort properties in southern Vermont are being built on the slopeside of Haystack Mountain starting with energy-efficient Superior Walls® Xi Plus™ precast concrete wall systems.



The Superior Walls Xi Plus wall systems selected by the Hermitage Club construction team include one-inch foam insulated concrete studs and one-inch foam insulation on the bond beams to

help ensure energy efficiency in the townhomes. Facing against the environment, the panels have a concrete face shell backed 4½" of expanded polystyrene rigid foam insulation and ½" DOW Thermax polyisocyanurate rigid board insulation.

Once the precast concrete foundations are in place, modular home components from Ritz-Craft Corporation will be installed to increase the speed and efficiency of construction.

Superior Walls products offer builders unmatched benefits with the most competitive foundation system available in the marketplace. The company's precast insulated concrete wall panels are dimensionally accurate and install quickly to provide a strong, energy efficient foundation for residential and commercial projects. For more details, visit www. superiorwalls.com.

PROSOCO INTRODUCES PEELABLE MASONRY CLEANER

A new, non-traditional cleaner from PROSOCO removes stains from a variety of masonry substrates in a rinseless, peelable formula.



Enviro Klean DriKlean is a gentle but powerful rinseless cleaning solution designed for interior spaces where traditional liquid cleaners can't go. In an easy-to-apply formula via spray, roller or brush, DriKlean safely removes dust, soot, oils and other surface soiling from limestone, sandstone, marble, travertine, plaster, terra cotta, concrete, mortar or brick. The cleaner and soiling easily peels off after drying.

DriKlean is also free of natural rubber latex, eliminating allergy concerns for users.

The new product is a perfect solution for interior restoration applications where rinsing isn't practical.

DriKlean is also low-toxicity and lowodor. Visit prosoco.com for more information.

GREEN CONCRETE INNNOVATION DELIVERS SAFER ECOLOGICAL SOLUTION

New CoolCure concrete admixture converts typical cement into a type iv, low-heat cement resulting in up to 80% less heat and 50% greater strength.

Portland cement, in addition to being a large user of energy in processing, is the #2 greenhouse gas contributor (CO₂) in the world today. In many years there have been no advancements in the concrete technology that have optimized its usage or chemistry.

In an effort to advance sustainablity and address the environmental impact of this dilemma, New Technology Solutions, LLC (A subsidiary of Silicone Solutions: Cuyahoga Falls, OH) has developed its patent-pending (PCT US15/11849) CoolCure—a major development that could potentially change the global environmental and productivity footprint of concrete technology.

CoolCure is a revolutionary new technology that significantly reduces/eliminates the heat of hydration. At the same time while reducing heat, major increases in compressive strength and working/placement time are enabled with CoolCure. Through the utilization of advanced technology, a more balanced stoichiometry and nanotechnology, this new technology will change the face of concrete technology today.

CoolCure works by balancing the chemistry. This minimizes byproducts and results in a more efficient reaction. While creating a more efficient reaction, more bonds are created that generate more strength. Increases in strength have been realized from 40 to 100%. The heat is reduced by minimizing the calcium hydroxide byproduct generation. Its exotherm is well known in chemistry. The calcium hydroxide is better utilized by creating more CSH (reinforcing bonds) instead of creating troublesome heat. Notably, CoolCure is a much safer solution than Portland cement which is caustic and can damage the skin. Workers in contact with wet Portland cement are at risk of chemical burns and developing skin problems. CoolCure does not burn the skin.

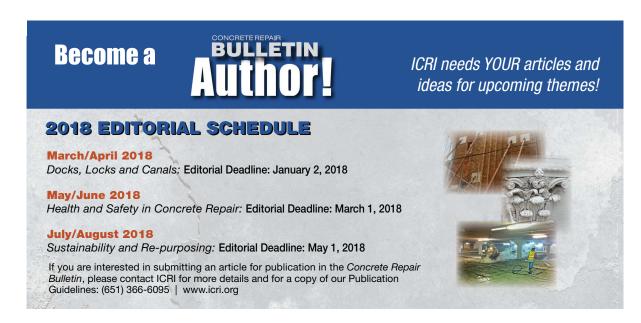
Cement plants are a significant source of sulfur dioxide, nitrogen oxide, and carbon monoxide which are associated with myriad health and environmental impacts. Reducing the environmental footprint of Portland cement production/usage and meeting future emissions regulations is of paramount concern to all concrete producers.

The CoolCure chemical cure system represents attaining a higher level of technology in practice, while obtaining a progressive leap forward is achieving a more environmentally-friendly cement, and increasing overall sustainability. These capabilities result in a very green product needed for the future. We view CoolCure as a major step forward in technology for the 21st century.

For more detailed information call 330-920-3125, or visit our website at: www. siliconesolutions.com. Or visit CoolCure at World of Concrete 2018: Booth #N569.

INTERESTED IN SEEING YOUR NEW PRODUCTS IN THIS COLUMN?

Email your new product information to editor@icri.org. Content for the March/April 2018 issue is due by January 2, 2018 and content for the May/June 2018 issue is due by March 1, 2018.



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