ASCE Hawaii Section Outstanding Civil Engineering Award

The American Society of Civil Engineers (ASCE) Hawaii Section is pleased to announce the 2018 Outstanding Civil Engineering Achievement (OCEA) Award winners. The purpose of this award program is to recognize projects that demonstrate important outstanding civil engineering accomplishments by Hawaii’s design and construction professionals. To be eligible, projects were required to have been designed or constructed in Hawaii and completed within the last two years. Some of the key judging criteria included: Resourcefulness in identifying and solving design challenges; Contributions to the wellbeing of people and communities; Pioneering use of materials and construction methods; Inventive or new application of civil engineering technologies; Protection of and reducing impacts to natural resources; Beneficial effects of the project, including aesthetic value.

The following projects and project teams were honored and presented with awards at the ASCE Hawaii Section OCEA Awards Banquet, held at Waialae Country Club on Friday, November 2, 2018.

2018 OCEA Grand Award and Best Building & Structural Systems Project

Pacific Manor is a nine-story condominium built in the early 1970s, located in Honolulu, Hawaii. The structure is a post-tensioned concrete structure with a suspended parking deck, lobby level deck and recreation deck at the lower levels. The decks consist of post-tensioned slabs spanning to reinforced concrete walls and columns. Significant spalling of the suspended parking, lobby and recreation decks that were exposed to the weather had occurred in the early 2000s due to corrosion of the embedded post-tension reinforcing, resulting in extensive repairs several years ago, including the installation of new post-tension tendons to replace fractured tendons. However, as corrosion and fracturing of the tendons and the accompanied spalling continued to occur at a significant rate after these repairs, a second design team engaged by the condominium association (AOAO) instituted immediate shoring of portions of these decks as well as closing and emptying of the pool at the recreation deck and recommended complete removal and replacement of the parking, lobby and recreation decks. As this work would be very costly and would require that the residents vacate the condominium during the construction, further increasing costs to the unit owners, the AOAO engaged MKE Associates LLC to investigate the cause of the continued spalling, the effect it had on the structural integrity of the decks, and develop alternate repair and/or retrofit measures that could reduce costs.

Some of the tasks performed during the investigative and subsequent design work on this project included the following items:

- **Field survey to visually observe and sound portions of the decks to obtain information on the extent and location of spalling and cracks, and location, size, spacing and reinforcing condition.**
- **Measurement of slab deflections to confirm whether there were any excessive deflections.**
- **Limited rebar scanning to verify reinforcing location and spacing.**
- **Material testing of concrete to obtain information about the concrete quality and possible causes of deterioration.**
- **Locating tendons using ground-penetrating radar (GPR).**
- **Excavating tendon inspection recesses at selected locations.**
- **Visually inspecting and recording the condition of the PT cables in newly excavated recesses and in previously exposed areas at concrete spalls.**
- **Performing screwdriver tension tests on PT cables.**
- **Testing electrical continuity between PT cables and any exposed mild steel reinforcing, and between PT cables themselves.**
- **Testing half-cell corrosion potentials: native and instant-on by temporary anodes.**
- **Measuring protective current flowing between PT cables and temporary anodes.**
- **Testing air communication along selected PT cables.**
- **Structural analysis of the existing decks, based on the information gathered about as-built conditions during the survey.**
- **Development and implementation of a retrofit scheme.**

Although post-tension tendon corrosion and concrete spalling has occurred throughout the decks, previous repairs appeared to have repaired much of the broken tendons, corrosion, and spalling. Therefore, it was believed a scheme could be developed to repair the remaining spalling, arrest future corrosion of the original tendons and mild reinforcing, and to provide supplemental reinforcing and steel framing that will provide adequate strength to address current and future isolated corrosion of reinforcing and broken tendons.

From our initial observations, a significant amount of tendons had fractured to the degree that the shoring and reducing loads over the portions of the lobby level deck was warranted until either deck repairs or replacement could be performed. Additional observations included the following items:

- **The post-tension tendons are an early variant used in later buildings.**
- **Cracks and spalls were oriented primarily in the longitudinal (tendon) direction.**

Continued on Page 6
NOMINATIONS WANTED

The Hawaiian Council of Engineering Societies and its member societies are requesting your nominations for several annual engineering awards. Nomination forms for the Engineer of the Year are available at the HSPE website of www.hspe-hi.org. Or, please contact Kurt Kunimune at kkunimune@bowersandkubota.com for nomination forms or with questions. Nominations are due by December 28, 2018.

Nomination forms for the Young Engineer of the Year are available through FALEA at their website www.falea.org. Nominations are due by December 3, 2018.

Nomination forms for the Lifetime Achievement Award are available by contacting Joanne Hiramatsu at jhiramatsu@bchdesign.com or by phone at 846-3309. Nominations are due by December 18, 2017.

The Student Engineer of the Year will be selected by the faculty of the University of Hawaii at Manoa College of Engineering.

Nominations are due by December 28, 2018. For nomination forms, or with questions. Please visit http://hi.swe.org/scholarships.html for information on Mae Nakatani Nishioka’s legacy and how to make the donation. Thank you for your support.

SWE-HI is actively seeking donations for the Mae Nakatani Nishioka Scholarship Fund. Our goal is to raise $28,000 to endow the scholarship, which will be awarded yearly to women engineering students in the state of Hawaii. With the Nakatani Nishioka family’s generous matching up to $15,000, we are $8,000 away from reaching our goal. Please visit http://hi.swe.org/scholarships.html for information on Mae Nakatani Nishioka’s legacy and how to make the donation. Thank you for your support.

The Hawaiian Islands section hosted a successful professional development event on Work/ Life Balance in Maui on 11/08 at Daniel K. Inouye Solar Telescope (DKIST). Many thanks to DKIST that the meeting was live so people who didn’t live in Maui were able to call in to listen to the meeting. The section also hosted a leadership training for the professional and collegiate officers and members at the University of Hawaii Manoa on 11/10. We learned about leadership traits and qualities and learned how to apply them at work/ school as well as in professional societies.

The Society annual conference was held in Minneapolis, MN from October 18-20. It hosted over 14,000 attendees from 33 countries. It offered hundreds of professional development, technical, and leadership sessions. It also provided a lot of networking opportunities for professionals and collegiate members. Members from the Hawaiian Islands professional section (from Maui, Big Island, Arizona, California, Missouri) and the University of Hawaii Manoa collegiate section met up at the conference for networking and mentorship. We will share notes on what we have learned soon. See you at WE19 conference in Anaheim, CA from November 7-9.

The Society annual conference was held in Minneapolis, MN from October 18-20. It hosted over 14,000 attendees from 33 countries. It offered hundreds of professional development, technical, and leadership sessions. It also provided a lot of networking opportunities for professionals and collegiate members. Members from the Hawaiian Islands professional section (from Maui, Big Island, Arizona, California, Missouri) and the University of Hawaii Manoa collegiate section met up at the conference for networking and mentorship. We will share notes on what we have learned soon. See you at WE19 conference in Anaheim, CA from November 7-9.

The Society annual conference was held in Minneapolis, MN from October 18-20. It hosted over 14,000 attendees from 33 countries. It offered hundreds of professional development, technical, and leadership sessions. It also provided a lot of networking opportunities for professionals and collegiate members. Members from the Hawaiian Islands professional section (from Maui, Big Island, Arizona, California, Missouri) and the University of Hawaii Manoa collegiate section met up at the conference for networking and mentorship. We will share notes on what we have learned soon. See you at WE19 conference in Anaheim, CA from November 7-9.

For additional information and on-line registration, please visit the HWEA website: www.HWEA.org

Sponsors: HWEA and AWWA

Dates: February 19-21, 2019

Location: Hawaii Convention Center

Program: Tuesday – Pre-conference workshops (5 tracks)
Wednesday and Thursday – Five tracks of presentations, exhibits, Ops Challenge, Pipe Tapping, Top Ops, including lunch
Friday – annual golf tournament
Saturday morning – community service event

For additional information and on-line registration, please visit the HWEA website: www.HWEA.org

Next Quarterly Luncheon Meeting
Program: Election of 2019-2020 Officers
Speaker TBA – please visit www.hwea.org

Date: Thursday, January 23, 2019
Location: Dave & Buster’s Honolulu

Time: 11:30 a.m. – Check In
11:45 a.m. - Lunch
12:15 p.m. - Program
1:00 p.m. - Adjourn

Menu: Buffet
Cost: $20.00 for HWEA Members
$10.00 for Students

Program: Tuesday – Pre-conference workshops (5 tracks)
Wednesday and Thursday – Five tracks of presentations, exhibits, Ops Challenge, Pipe Tapping, Top Ops, including lunch
Friday – annual golf tournament
Saturday morning – community service event
an environment of continued professional guidance and support to students. Activities shall include networking events and tours with students in mind. ASME-HI has existed to promote mechanical engineering, and we recognize that it all starts with the mechanical engineering education. A close relationship with the College of Engineering and students is essential.

- **Tours**: The mattress manufacturing plant tour with students is still in the planning phase.
- **Presentation for the Evening**: Latest Centrifugal Chiller Design by Froilan Garma. Garma described and explained the components for a Generic Chiller plant and did a walk-through of basic heat exchanger operation. He talked about magnetic bearing centrifugal chillers which allow for a drive line that is physically suspended to reduce rotational friction and promotes higher efficiency and reduced maintenance costs.

**ASME STUDENT SECTION ADVISOR DR. SANGWOO SHIN**

We welcome new Student Section ASME Advisor Dr. Sangwoo Shin. He takes over for Dr. A. Zachary Trimble. Dr. Shin joined the Department of Mechanical Engineering faculty in February 2017 as an Assistant Professor. He obtained his BS and PhD in Mechanical Engineering from Yonsei University, Korea in 2005 and 2012, respectively, followed by three years of postdoctoral research at Princeton University. His research focused on problems related to the area of Thermofluids with an emphasis on energy, environmental and biological systems. Dr. Shin writes, “I am thrilled to be a part of ASME-HI. As a mechanical engineer, I highly value empirical engineering design and field experience which are often underappreciated in classrooms and research laboratories. I would like to take this opportunity as a faculty advisor to actively reach out to both the students and the Professional Section to bring a closer and stronger tie between the two.”

**ANOTHER PEARL HARBOR BOAT TOUR**

Member Stanford Yuen again conducted his Pearl Harbor Boat Tour on November 8, 2018, including about 12 Student Section participants. This was an hour and a half educational boat tour around Ford Island and Pearl Harbor highlighting major features. This free tour is narrated by the Navy Region Hawaii and Joint Base Pearl Harbor Public Affairs Office and Stanford Yuen (former Senior Advisor to the Admiral). Yuen organizes this free tour frequently.

HIGHLIGHTS OF THE OCTOBER ASME-HAWAII JOINT MEMBERSHIP MEETING

Chairman Froilan Garma presided over the October 16, 2018 meeting in Holmes Hall Room 244, University of Hawaii at Manoa. Attendees included College Dean H. Ronald Riggs, PhD, outgoing ASME Student Advisor Dr. A. Zachary Trimble, incoming Advisor Dr. Sangwoo Shin, and Student Section officers including President Chris Li. Dean Riggs is also an ASME Fellow. The meeting minutes included the following:

- HCES Report by Froilan Garma: Engineers Week Banquet duties to be assigned by HCES. Current plans call for providing Engineers Week brochures.

- Student Section Report by Chris Li: Professional networking event in planning phase and scheduled for November 10. Have list of companies to seek professional representation. Event is free for professionals and at-cost for students. Mentorship week to be conducted in November to assist ME students in selecting classes and when to take them. An Oceanair tour was planned for October 19.

- UHM DME Report by Dr. Sangwoo Shin: Added a new ME lab that hosts simulation software and multiple 3D printers. Lab will be used by undergraduates to progress projects. Renovations completed to several undergraduate labs, including fluid mechanics and machine shop. Made several additions to the faculty, including Marvin Young, formerly Vice-President for AerOJet Rocketdyne, who will be involved with new class focused on systems engineering.

- New Business: The Professional Section (aka Senior Section) is re-evaluating section goals to foster a more student-centered agenda, aimed at having professionals more involved in development of up-coming engineers and to grow

HAWAII SFPE SEMINAR PRESENTATION

**NFPA 13 (2019 edition) INSTALLATION OF SPRINKLER SYSTEMS**

The Hawaii Chapter of the Society of Fire Protection Engineers is sponsoring this excellent three-day seminar through a special arrangement with the National Fire Protection Association.

- **Date**: Wednesday December 5 to Friday December 7, 2018
- **Time**: 8:00 AM - 5:00 PM each day
- **Location**: Hale Ikena, the Golf Clubhouse at Fort Shafter, Honolulu
- **Cost**: Early Registration (on or before Friday November 23, 2018) $1295 ea (for 3 or more from same organization $1095 ea). After Friday November 23, 2018, $1495 ea

**ONLINE REGISTRATION & PAYMENT AVAILABLE AT**

http://sfpehawaii.memberlodge.org

For more information contact: Sam Dannaway, Program Chairman, Hawaii Chapter SFPE

Tel (808) 526-9019 / Email: dannaways@coffman.com
2018-2019 ASCE Hawaii Section Officers
President: Eric Arakawa, P.E.  
email: earakawa@ascehawaii.org
President-Elect: Jason Kage, P.E.  
email: jkage@ascehawaii.org
Vice President: Dayna Nemoto-Shima, P.E.  
email: dnemoto@ascehawaii.org
Treasurer: Clifford Lum, P.E.  
email: clum@ascehawaii.org
Secretary: Reyn Hashiro, P.E.  
email: rhashiro@ascehawaii.org
Immediate Past Pres: Lara Karamatsu, P.E.  
email: lkaramatsu@ascehawaii.org
YMF President: Nicole Nakaoaka, P.E.  
email: nnakaoaka@ascehawaiiymf.org

EXECUTIVE COMMITTEE MEETING
Last held: Nov 1, 2018  
Next meeting: Dec 12, 2018

ASCE HAWAII SECTION DINNER MEETING
There will be no dinner meeting in December. Please have a safe and happy Holiday season.

Our next dinner meeting will be in January 2019. Check our website at ascehawaii.org for updates and an email will be sent out to membership with more information.

Committee Positions
ASCE Hawaii is looking for volunteers to fill the following committee positions: History & Heritage Chair, Advocacy Captain, Student Practitioner Advisor, and OahuMPO CAC Representative. If you are interested or have questions on any of these positions, please contact President Eric Arakawa, earakawa@ascehawaii.org.

MEMBERSHIP
If you haven’t already done so, please renew your ASCE membership. You can renew your membership at www.asce.org.

ASCE JOB LISTINGS
The following job listings are currently posted on the ASCE Hawaii Section website:
• Booz Allen Hamilton (Senior Civil Engineer and Wastewater Specialist)
• City and County of Honolulu (Civil Engineer V (Geotechnical), Civil Engineer III, V, VII, Mechanical Engineer V)
• HartCrower (Geotechnical Engineers – Principal Level & Project Level)
• Kennedy/Jenks Consultants (Project Manager, Staff Engineer for Honolulu Office and Staff Engineer for Hawaii Office)
• Nagamine Okawa Engineers Inc. (Structural Engineer)
• PGH Wong (Change and Claims Manager, Change and Claims Specialist, Civil/Building Inspector, Office Engineer, Scheduler)
• SSFM (Civil Engineers V, Structural Engineer IV)
• US Army Corp of Engineers (USACOE) (Interdisciplinary Project Manager, GS-12)
• Zane & Associates, LLC (Facility Planners)
For further information, please visit http://www.ascehawaii.org/job-listings.html.

2017-2018 YMF Officers
Jordan Urabe, President  
email: jurabe@ascehawaiiymf.org
Nicole Nakaoaka, Vice President  
nakaoaka@ascehawaiiymf.org
Austin Wong, Treasurer  
wong@ascehawaiiymf.org
Kapiolani Street, Secretary  
kstreet@ascehawaiiymf.org
Norman Leong, Past President  
nleong@ascehawaiiymf.org

YMF General Meeting
The next YMF general meeting is scheduled for Wednesday, December 5th, 2018 at 6:00 pm at Tipsy Pig II Bar & Grill. If you are interested in attending and learning more about the various professional, social and service opportunities available through YMF, please contact YMF at ymf.hawaii@gmail.com.

ASCE Younger Member Group Award
The ASCE Hawaii Section YMF is the proud recipient of the ASCE 2018 Younger Member Group Award for Small Groups during the 2016-2017 year. The award was handed out in Denver, Colorado on October 14th 2018 at the ASCE Annual Convention. A special thanks to all of our members who made this award possible and we’re looking forward to another great award winning year.

YMF at Waimanalo Judd STEM Night
The Waiolani Judd STEM night took place on October 19th and featured a number of industry and organization partners who provided various STEM related activities for the students. Six YMF volunteers spent their Friday night helping students with the activities at the ASCE Hawaii sponsored stations. The ASCE Hawaii YMF station featured three activities: pompon catapults to teach kids about construction and projectile motion, cloud in a cup make the rain cycle an exciting concept to learn about, and spaghetti towers to test each kid’s problem solving abilities.

Thank you to Waiolani Judd for inviting YMF to be a part of your event, we enjoy participating in it each year! We hope the students enjoyed the event and learned a lot about engineering. And thank you to our YMF volunteers who spent their Friday night at the event, we couldn’t do it without you!

Girl Scout STEM Fest
Girl Scout STEM Fest is an annual event featuring over 175 professionals hosting over 50 activity stations. This event aims to expose girls in the Girl Scout program to STEM professionals in hopes that it encourages them to pursue careers in the STEM industry. This year’s event was held on November 2nd at the Pacific Aviation Museum. The ASCE Hawaii YMF volunteers consisted of six female engineers who spent their morning teaching the girls about civil engineering while doing an activity involving spaghetti. The girls inspected their strand of spaghetti and asked to hypothesize if spaghetti could withstand a greater amount of horizontal or vertical loading. To test it, the girls each built a spaghetti bridge and a spaghetti structure using supports, then loaded both of them with a number of weights. Everyone was very surprised by how much weight spaghetti noodles were able to support!

ASCE Hawaii Section YMF would like to thank both the Girl Scouts for allowing us the opportunity to be a part of this special event and the six female engineers who made time on their Saturday morning to volunteer at the event. We really appreciate your commitment to helping spark an early interest in the STEM related careers!
CCMAA Hawaii Chapter
http://hawaiichapter.cmaa.org

2018 CMAA Hawaii Chapter Board
President Brock Conrey (CH2M)
Vice President Alex Pascual (Bow CM)
Secretary Ranelle Ho (SSFM)
Treasurer Emily Boirum (Bowers + Kubota)
Chap Past Pres Chandra Namumnart (EKNA Services)

CMAA Hawaii Chapter News:
Aloha CMAA Hawaii!
The 2018 National CMAA Conference & Trade Show was held at Aria Resort in Las Vegas from October 14-16, 2018. Hawaii was well represented with twenty-nine (29) attendees visiting the trade show and taking educational workshops. The workshops also count toward Certified Construction Manager (CCM) renewal points (RPs). Five local members attended the Train the Trainer workshop. These CCM’s are now certified to teach the PCM class. Congratulations to Tim Bramsen, Brook Conrey, Kelly French, Chandra Namumnart and Michael Young.

On Thursday, November 15th, the November luncheon was held at Dave and Busters. Olivia Pittman/Kirschner Contractors discussed the Five W’s of Construction Scheduling.

Be on the lookout for news of a Community Service Project on December 8, 2018 and Happy Hour on December 13, 2018.

As shared in the past, our chapter is here as a resource for all Construction Engineering and Management professionals, and the things that we do benefit not only our CM community but also the larger Ohana well. If you have any questions regarding any of our upcoming events, would like to join our Ohana and become more involved with the CMAA Hawaii Chapter or would simply like to be added to our email list, please email us at: hawaii.cmaa@gmail.com, or at our mailing address: CMAA Hawaii, PO Box 531, Honolulu, HI 96809.

Looking for a CCM? The current listing for all Hawaii CCMs can be found here: https://cmaa.net/certified-construction-managers-registry.

Section President Claire Fukuoka opened the meeting by initiating introductions from everyone in the group. Section Vice-President Cristina then introduced the speaker Kiana Otsuka, who is a transportation planner at Oahu Metropolitan Planning Organization (OahUMPO). She began her presentation by providing an overview of OahUMPO and the organization’s purpose. She went on to explain what “pricing solutions” are and how they can not only affect traffic congestion but also improve air pollution, as well as provide a source of revenue for other transportation or maintenance projects. However, some of the challenges in implementing pricing solutions include issues regarding feasibility implementation, concerns on its impact on low-income travelers, and political feasibility. She then presented a case study on London’s implementation of a pricing solution and how it has affected its urban core. An after study conducted found that there was a 30% decrease in the number of cars entering the urban core and 15% of circulating vehicles were reduced as result of the program. New York has also been considering pricing solutions for several years now but implementation has been unsuccessful thus far due to political reasons. The presentation concluded with a discussion on how feasible it would for a city like Honolulu to implement its own pricing solutions.

WILIKI ADVERTISERS NEEDED

<table>
<thead>
<tr>
<th>Size</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>5&quot; x 2&quot;</td>
<td>$64.00</td>
</tr>
<tr>
<td>7¾&quot; x 3½&quot;</td>
<td>$160.00</td>
</tr>
<tr>
<td>2¼&quot; x 2¼&quot;</td>
<td>$20.00</td>
</tr>
<tr>
<td>7½&quot; x 5&quot;</td>
<td>$40.00</td>
</tr>
<tr>
<td>¼ page</td>
<td>$240.00</td>
</tr>
</tbody>
</table>

The price for the ads will be based on a 1½" x 2½“ module size which is 1/24th of the page, and be $20.00 per month with a 15% DISCOUNT for a 6-MONTH RUN.
Deadline for Wiliki is December 15th
at the bottom and top surfaces was 0.89 in. and 0.49 in. respectively, measured in the recreation deck sample.

- It appeared that there were galvanic couples between the strands and the rebars in which strands were corroding and protecting the rebars.
- Conductivity tests showed a significant amount of current could flow from the testing galvanic anodes to the tendons through the paper sheath. Therefore, the paper sheath was found to be a good conductor that promotes corrosion of the tendons.

- Tendons that had fractured due to corrosion could still be in considerable tension a few feet away from the break, in some respects behaving much like a prestressed bonded tendon due to the higher friction in the paper wrap combined with surface corrosion of the tendon. Therefore, it was not possible to tell which tendons had fractured unless they had visibly broken through the concrete cover and, if they had fractured, whether portions of the fractured tendon away from the fracture were still effective.

- Therefore, the tendon corrosion appeared to be due to the ingress of water, chloride ions and carbonation of the concrete to the depth of the embedded tendon reinforcing.

From the observed lack of transverse tension cracks at points of maximum moment in the deck, it appeared that the majority of tendons were still effective in maintaining the integrity of the decks to support the garage vehicular loading. Deflection measurements of the deck also indicated that many tendons were still intact as no areas of excessive deflections were identified. Therefore, it was decided to protect the tendons against future corrosion, but also to strengthen the decks so that if tendons were fractured, the decks still had sufficient strength capacity. The strengthening retrofit option was found to be feasible due to the large amount of mild reinforcing steel specified in the original design for most of the decks to the degree that only a small amount of additional reinforcing would need to be added by installing them in grooves cut into the deck. For one of the parking decks where this was not the case, steel beams were added under the deck as a precaution against significant fractured tendons. As these retrofits were provided only to provide adequate strength capacity, preservation of the existing tendons was counted on to maintain the slab deflections to acceptable limits.

At the suspended pool, due to the lack of height clearance and the large pool load, these retrofit options could not be employed. Therefore, instead, the pool walls were converted into upturn beams by adding reinforcing below the pool walls so that the span of the pool slab was greatly reduced and the point that existing slab reinforcing was adequate to support the pool in the case of total tendon failure.

To protect the tendons against future corrosion, it was decided to install embedded zinc anodes to provide cathodic protection to the tendons. It was anticipated that this protection in addition to properly repairing all spalled concrete and re-waterproofing the top surface of the decks will greatly mitigate future corrosion and keep the tendons largely intact.

The repairs were initiated in November 2016 and were completed in October 2017. To eliminate relocation costs and as parking was not available in nearby areas, repairs were phased so that the building could remain occupied at all times and so that the majority of parking stalls could be used during non-construction hours.

Subsequent testing has shown that the zinc anodes installed in the deck and connected to the tendons has provided cathodic protection to the tendons from corrosion, even with the paper wrap encasing the tendons. Therefore it is believed these repairs will protect the tendons from further significant corrosion over the expected remaining life of the building; however, if some tendons are already fractured or fracture in the future, the repairs also provide significant additional strength to compensate for any tendon failures. Therefore, this retrofit addresses the existing tendon condition in both a broken and intact state.

Retrofitting the decks provided the following advantages over deck replacement:
- As the affected decks are on the lower floors of the building, replacement of the decks would require temporary closure of the building, forcing all occupants to find alternate living and parking accommodations over a relatively long period of time. By implementing a phased repair, residents were allowed to live and park in the building at all times, sparing them the inconvenience of being displaced and saving them from considerable housing costs, in addition to the direct costs they saved from performing repairs instead of replacement.
- Salvaging and rehabilitation of the decks significantly reduced both the amount of demolished concrete to be disposed of as well as the amount of new replacement concrete required in the work.
- By performing repairs only to the underside of the pool structure, all new flooring and finish-
RETURN SERVICE REQUESTED