



State President's Message

Andy DiLeo, PE, SE
SEAOA State President



Hello SEAOA,

I hope you're all well and keeping busy. I think we can say that our first virtual conference was a success! We had better than expected attendance and no major technical glitches. I'd like to thank everyone involved in planning and all of those who attended. We should all give thanks to our Administrative Assistant Sarah Betts for everything she does to make our conventions run smoothly. Planning is already underway for next year's conference which we all hope will be back to normal

and in person in Tucson.

As we prepare to start another year at SEAOA we will soon be holding elections for the following positions on the State Board: State President, Tucson Chapter Director (2021-2023), Central Chapter Director (2021-2023), and Director At Large (2021-2022). An email announcement will be sent out soon asking for nominations. Elections will be held the week of August 16th with the winners announced on the 23rd. Please nominate yourself or a member you believe will be a good candidate to get involved at the state level and help support SEAOA.

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TUCSON CHAPTER
MEETINGS TBD



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CENTRAL CHAPTER
MEETINGS TBD

Central Chapter Chairperson's Message

David Grapsas, P.E., S.E.
Central Chapter Chair



I hope everyone had a great first half of 2021.

SEAOA put on a great virtual conference in June with very informative and educational presentation. I sure did miss seeing everyone in person, but the

conference appeared to be well attended.

We are currently planning a joint meeting for Wednesday, September 15 with ASCE and GI organizations. We hope to have Fred Nelson give a presentation on the Champlain Towers South Condo collapse in Florida as he was there for 8 days to assist with structural inspections during the search and rescue efforts. The venue will be announced once it is finalized.

The Central Chapter is continuing to monitor the ongoing situations and the ever-changing events and executive orders. We are currently planning for in-person/hybrid meetings for this fall.

Please check the SEAOA website for updates and calendar of events.

Tucson Chapter President's Message

Jennifer McMahon Patronski, PE, SE
Tucson Chapter President



Happy Summer SEAOA Members! I hope with the warm weather and summer months, we have all taken a moment to relax, refresh, and renew!

Plans are still in development to kick off the Tucson Chapter's new year with September's

Tucson Chapter Lunch Meeting. The goal is to formalize plans and arrangements for hybrid meeting option, with consideration of the ever-changing pandemic. Membership will be informed as those plans become solidified. We hope to present a discussion on the Champlain Towers South Condo collapse and to host a round-table or

panel discussion on how our industry may be affected by such tragedies.

The Tucson Chapter has opted to maintain the same Board Members and Directors as last year. Big *THANK YOUs* are extended to our Board for their continued service. A number of our Board Members are veterans and have served on the Board for multiple years. We welcome those interested in participating to please reach out to me (jmpatronski@scice.com) or anyone of our Board Members to express your interest and find out how to get involved!

I foresee a boost in activity in the local SE community regarding Arizona State Legislation, enforcement of special inspections (in particular concrete...thank you ACI for your collaboration!), and a return to some in person meetings and networking. We hope to see you all there!

YMG President's Message

John Heck, PE, SE
YMG President



Hello! I hope everyone has been staying healthy and keeping busy at work. COVID has obviously created difficult and unique circumstances for everyone and also our SEAOA YMG organization. I think we set the record for

the longest time in between Young Member Group meetings! Our last meeting was at the end of February 2020, nearly 18 months ago! I remember attending our quarterly happy hour and planning our annual Spring Training game. I bought tickets for everyone to a Giants game the day after our happy hour. This happened just a few days before the entire Cactus League unexpectedly closed down for the entire season. Thankfully the refund process was quick and painless, quite different than the

conversations I had with my airline about refunding my honeymoon flights.

With the vaccination rates steadily increasing, I would like to announce our next YMG Happy Hour! Please join us at Fate Brewing Company – South (the location just west of Skysong). This will not be a socially distanced event, I plan on reserving a large table for our group. If you are feeling sick or are not comfortable in large groups please do not attend. Along with our usual socializing, I would like to talk about open positions within the YMG Leadership Team. After chairing the YMG starting in 2019 up to the start of COVID, I would like to step down in order to get fresh leadership and new engineers in our group.

Please keep an eye out for the official happy hour email. I am tentatively planning it for Thursday August 12th after work. Please reach out to me at john.heck@schaefer-inc.com if you do not receive an email.

2021 - 2022 SEAOA Board Members and Committee Chairs

State Board:

President: OPEN
Past President: Andy Dileo
At-Large Director/Treasurer: OPEN
Tucson Director/Secretary: Jennifer Patronski
Tucson Director: OPEN
Central Chapter Director: OPEN
Central Chapter Director/Treasurer: James Newhall

Committees and Chairs:

Awards: Sal Caccavale
Finance: James Newhall, Mike Lu and Brady Notbohm
Code: Paul Scott and George Stevenson
Convention Planning: Andy DiLeo
Legislative: Mike Lu
Membership: Tye Havey
Newsletter: Sal Caccavale and Mark Sipes
SEER: David Troxell and Derek Hanson
YMG Chair: OPEN

Central Chapter:

Chairperson: David Grapsas
Past Chairperson: James Newhall
Treasurer: Diane Eisenbacher
Secretary: Bob Brown
Director: Mark Forman
Director: Jan Dunkelberg
Director: OPEN
Director: Adam Boucher

Tucson Chapter:

President: Jennifer Patronski
Vice President: Brent Woods and Steven Hess
Treasurer: Manuel Naves
Secretary: Sergio Pelayo
Director: Andy DiLeo
Director: Ron Schneider

SEAOA 2021 Virtual Conference

Over the past year, we've all had to learn to be flexible and adaptable in this ever-changing world while continuing to grow in the structural engineering industry. After careful thought and planning, the SEAOA Board of Directors determined a virtual conference would best serve the SEAOA membership this summer.

June 10th and 11th of this year marked the first SEAOA Virtual Conference. Nearly 90 structural engineering professionals registered to take part in a very different kind of SEAOA Conference. It was an opportunity to bring structural engineering professionals together to increase knowledge in our field and to learn about the vendors in our industry and the services they provide. Due to the ease of providing virtual presentations, we were able to offer ten different engaging and informational seminars with a total of 15 PDH credits. Seminar topics included an Overview of the IBC 2018/ASCE 7-16, Construction Collaboration in Virtual Environments, and an Overview of Mass Timber Products Based on IBC 2018. And thanks to the participation of all those who joined, there were also great live discussions after each presentation.

As always, a large part of the success of our conference due to the support of our generous sponsors and exhibitors. Between seminars, we heard from eight different vendors who helped to sponsor the 2021 Conference. They were given a chance to showcase their products, share their industry experience and give us a point of contact when we need to reach out to someone we know in the event of a project challenge.

The SEAOA's Annual Conference is the main funding source that SEAOA uses to fund our outreach efforts to

Arizona's universities, high schools, and middle schools. It also supports our efforts to make sure Arizona's concerns are heard at a national level with rule making bodies and code officials. Our convention committee focuses on keeping the attendee costs reasonable and a great value for those attending and looking for PDH credits.

The SEAOA is grateful for the speakers who took time to join us, present for us and teach us about your expertise. Thank you to all that were able to attend and for those that missed it, please consider making plans to attend next summer in Tucson.

Thank you as well to all who helped plan this great conference. If there's anything you would like to see at the 2022 Convention, please consider joining the SEAOA Conference Planning Committee and let your ideas be heard by sending an email to info@seaoa.org! See the [SEAOA - SEAOA Convention](#) website for more information on the 2021 Virtual Conference.

SEAOA Convention Committee Members:

Committee Chair and SEAOA President:

Andy DiLeo

Sponsor Exhibitor Sub-Committee Chair:

Mike Lu

Venue Sub Committee Chair:

Andy Dileo

Speaker Sub-Committee Chairs:

Arpan Tailor and Stephanie Templeton

SEAOA Administrative Assistant:

Sarah Betts

REQUEST FOR NEWSLETTER ARTICLES

The SEAOA Newsletter committee always appreciates input from the membership about articles and information that you'd like to see in upcoming newsletters. The newsletter is an excellent place for the SEAOA membership to share opinions, ideas and information with the rest of the association. Also, anyone who could volunteer a little time every quarter to help publish the newsletter is most welcome. One easy way to help would be to "proof" the newsletter before it's published. Please contact Sal Caccavale (secbc@cox.net) or Mark Sipes (mark_sipes@tempe.gov) if you have any articles that you'd like to submit, if there are any topics you'd like to see in future SEAOA Newsletters or if you'd like to help with publishing the newsletter.



2021, 18th Annual, Excellence in Engineering Awards

Sal Caccavale
SEAOA Awards Program Chair

The SEAOA takes great pleasure in announcing this year's SEAOA Excellence in Structural Engineering Awards recipients.

Excellence in Structural Engineering Awards went to the following entries:

PROJECT	FIRM	CATEGORY
Banner University Medical Center Hospital Tower	Martin White & Griffis Structural Engineers	New Buildings, Over \$10M
Mirabella, Arizona State University	PK Associates, LLC	New Buildings, Over \$10M

Merit Awards in Structural Engineering Awards went to the following entries:

PROJECT	FIRM	CATEGORY
Pima Community College Transportation Center	DLR Group	New Buildings, Over \$10M
Creighton University Health Services Campus	PK Associates, LLC	New Buildings, Over \$10M
Phoenix Suns Verizon 5G Performance Center	PK Associates, LLC	New Buildings, Over \$10M
Asante Park Library	Pangolin Structural LLC	New Buildings, \$2M to \$10M
Supima Agave Center	Pangolin Structural LLC	New Buildings, \$2M to \$10M
Valleywise Health Central Plant	Martin White & Griffis Structural Engineers	Forensic/Renovation/Retrofit/ Rehabilitation
Airport I-10 Restoration (Building Foundation Stabilization & Restoration)	PK Associates, LLC	Forensic/Renovation/Retrofit/ Rehabilitation

Thank you to all who helped judge the 2021 Excellence Award submissions:

Paul Scott – Central	Janelle Perry – Tucson
Brent Woods – Tucson	Andrew Netupsky – Central
Greg Bakkum – Central	Allan Ortega – Tucson

More information on the awarded projects, the Excellence in Engineering presentation can be found here: [SEAOA 2021 Excellence Awards Presentation](#)

For a complete list of all SEAOA Excellence in Engineering Awards past winners, see the Awards Committee page: <http://seaoa.org/awards/>

The newsletter will be providing feature articles on each of the award winners during the 2021-2022 year. Three award articles are included in this newsletter edition.

2021 SEAOA Excellence in Structural Engineering Award Winner. Martin, White & Griffis Structural Engineers, Inc.

New Buildings > \$10 Million: Banner University Medical Center Hospital Tower

When Banner Health purchased the University of Arizona Medical Center in 2015, facilities were in disrepair, and the community was distrustful of the facility. A revitalization plan for the 1970's era campus included a new nine-story 670,000 square-foot clinical tower on the southeast end of the existing hospital. MWG devised a flexible structural system that capitalized on processes and timing resulting from integrated project delivery. (IPD) MWG provided solutions to keep the project and schedule within the \$350M budget despite the many site challenges. The new Hospital Towers' goal was to accommodate future growth and become a world-class academic medical teaching facility.



Banner UMC Tower - Entry View

Constructability Challenges

Driving much of the team's structural ingenuity were strict policy and program regulations, the new tower's location over an existing University utility tunnel, and site storm drains. The building's columns and foundations were placed away from the existing tunnel; this helped ensure the smooth operation of both components. Drilled piers for the new tower accommodated future underground piping once the foundations were installed.

Complexity and Innovative Applications

Banner's accelerated design schedule, which lasted 38 months from design to project completion, resulted from client agreements, funding, and anticipated expanded hospital revenue. It was vital that MWG's structural team, needed to respond to complexities by applying efficient and forward-thinking principles to get construction moving. From the outset, the team envisioned multiple bid packages for foundations, the shell, and curtain walls as separate components, which allowed work to

commence on the structural shell before internal systems had to be finalized. The process also facilitated simultaneous work across structural teams to stay ahead of other disciplines yet coordinate everything via a central BIM model. Because the price of steel was also a significant consideration, a mill order submittal was placed very early. Uniform design assisted with efficiency, as did early in-depth analysis of all vibration-sensitive areas, general framing, and elevator support framing that might require additional structural support. Even small approaches aided efficiency and schedule adherence, such as designing the ambulance canopy as a separate component from the main tower to allow for delayed design decisions by the Owner and offsite prefabrication.

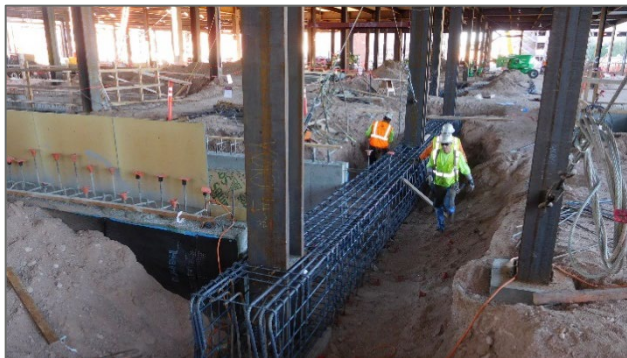


Steel framing (erected by two large cranes) started after foundation was complete. Slab on grades were not poured until after steel was erected.

The creativity of Structural Design

Structural creativity was a critical factor that required managing decisions with flexibility and speed. Examples of this ranged from designing exterior stud framing to allow contractors to start exterior framing early to operating room floors designed for imaging equipment not yet selected by the Owner. New elements or adjustments to the project were being made at virtually every turn, so staying fluid and nimble was vital. For instance, the hospital was initially designed for 11 stories, but only nine stories were built due to construction costs and a utilization study by Banner. Additionally, beyond the tower as a significant hospital addition, a new \$35M

central utility plant was designed and built ahead of schedule. While the team knew that this component was a part of the long-range campus plan, the design began 12 months into the tower project to reduce overall costs and reliance on outside entities for power.



Concrete grade beams are used to fix the moment frame column bases. Grade beams were designed to allow installation after the steel was erected.

To mitigate the changes and maintain the project's forward momentum, the team chose to adhere to a few central tenants that offered a solid, fiscally approved framework but facilitated continual adjustment and flexibility that include the following:

- ❖ the fourth level designed for a mechanical equipment loading over the total area

- ❖ operating floors designed with a separation between OR space and imaging equipment
- ❖ elevated MRI areas designed with 12" deep concrete topping to facilitate in-floor conduits and ducts
- ❖ structural-designed exterior stud framing to allow for early slab edge fabrication
- ❖ drilled shaft foundations near the existing storm drain piping to accommodate replacement in the unlikely event of underground pipe failure

Material and Labor Efficiency

Sustainable and efficient use of materials and labor was one of the factors that led to Banner's integrated delivery. Participation of up to three-and-a-half days a week in "the big room" was just the beginning of that process. The primary methodology was the shared use of the structural steel BIM model with the steel fabricator. Doing so early in the process meant that as evaluations and analysis coincided with pricing estimates, the fabricator could offer input, ultimately saving material costs. Additionally, a vigorous value engineering process was implemented that resulted in materials being wasted. The team was able to secure a savings of over \$1 million due to studying side plate connections and W24 column moment frames that were more cost-effective.

SEAOA 2021 – 2022 Membership Renewal

Membership in the SEAOA automatically enrolls you into the NCSEA which gives you access to free and discounted online NCSEA webinars as well as a 1-year subscription to STRUCTURE magazine. Additionally, SEAOA membership provides discounts at Chapter meetings and the State conference, PDH credits for all SEAOA meetings, networking opportunities, and leadership opportunities at national, state and local levels.

The SEAOA wants to remind our membership that annual dues for the 2021-2022 year are due in August 2021. Email announcements regarding renewal were recently sent out on July 2nd to all members. Dues can be paid online through the SEAOA (seaoa.org) website by logging into your profile and click on "view profile" to renew your membership online or print a renewal invoice.

Any questions can be emailed to info@seaoa.org

2021 SEAOA Merit Award in Structural Engineering Winner: **PKA Associates**

New Buildings > \$10 Million: Phoenix Suns Verizon 5G Performance Center

The Phoenix Suns Verizon 5G Performance Center is a one-of-a-kind training facility. At the heart of this 55,812 square foot building lies two NBA/WNBA regulation basketball courts with dedicated training space for both the Phoenix Suns and Phoenix Mercury. Outfitted with the latest technology in sport science and innovative performance amenities, this high-performance facility is a place for athletes to recover, relax, and enjoy time together while off the court.

Unique Conditions, Creative Solutions

The center gym features a stepped roof and a 130' x 122' open space, free from vertical structural elements. The upper roof consists of steel joists that span nearly 70', with 5.75' shoe extensions, supported by two 130' steel joist girders. Each lower roof consists of steel wide flange beams and angles that support the vertical roof loads and a suspended steel framed catwalk, while acting as a horizontal truss spanning the width of the gym, transferring lateral loads to a steel braced frame at either end.

Designed and detailed for efficiency, the girder top chord supports the top chord bearing joists of the upper roof while the girder bottom chord supports the wide flange beams of the lower roof. Low roof beams and upper roof joists align and define the vertical web locations in the joist girders.

At 130' long, the joists girders were shipped to the construction site in two pieces. The fabricated field splice was first tested in Vulcraft's shop to ensure proper fit-up before delivery to the site. After assembling the truss sections on site, each joist girder, weighing over 18 tons, was erected.

Collaborative Approach

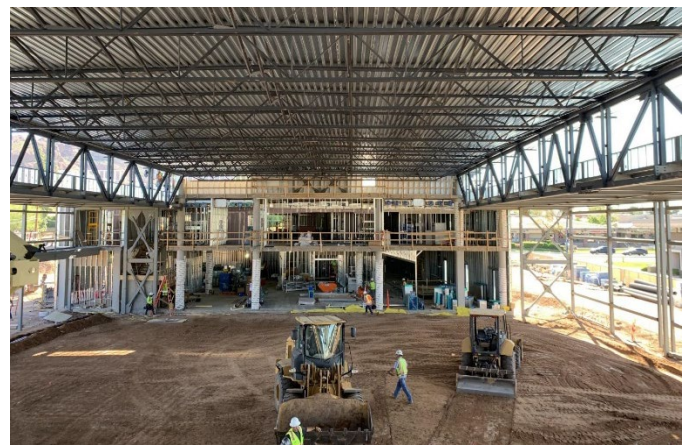
PK Associates Consulting Structural Engineers worked closely with Suns Legacy Partners, LLC, DFDG Architecture, AECOM Hunt Construction, Bell Steel, and Nucor Vulcraft to deliver this structurally complex project in only 18 months from inception to completion.



Exterior of Phoenix Suns Verizon 5G Performance Center



Interior of Phoenix Suns Verizon 5G Performance Center



Interior During Construction

2021 SEAOA Merit Award in Structural Engineering Winner: Arizona Foundation Solutions, PK Associates & Pangolin Structural *Forensic Rehabilitation > \$12M Restoration of 270,000 SF Tilt-Up Building*

In October 2017, Wentworth Properties contacted Arizona Foundation Solutions, Hogue & Associates, PK Associates, and Wespac Construction about a building located at 2050 E Riverview, Phoenix, that was constructed in 2015. It is a 279,000 sf tilt up industrial building located over a former pre-existing solid landfill that appeared to be experiencing problems due to excessive soil movements.

A **FIELD INVESTIGATION** was performed by PK & Associates and Arizona Foundation solutions. The following signs of distress were noted in the south and west portions of the structure located near the Salt River in Phoenix AZ.

- Significant building settlement, 15" max in several areas
- Gaps between some panels up to 8" in several areas
- Out of plane movement of the panels
- Bookending of some panels (where panels lean on each other similar to books on a shelf)
- Horizontal cracking of the interior slab (up to 2" wide) with elevation differences totaling 15" over the building length.
- Some joist & girders connections no longer connected as originally built.



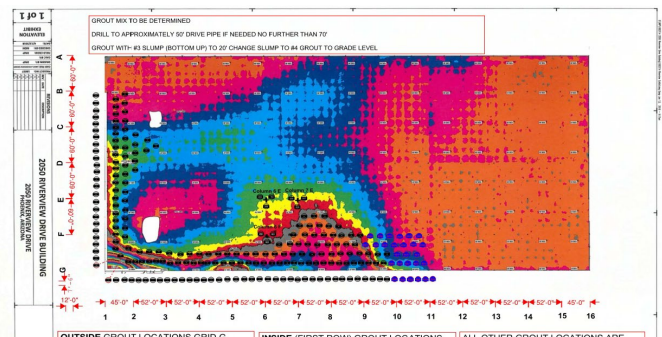
Typical panel movement of bookending with 5" elevation difference

AN EMERGENCY PLAN was immediately put in place because of fear of imminent collapse.

- Emergency shoring installed at panels and roof joists
- Soil exploration via drilled holes with down-in-the-hole hammer and subsequent camera exploration.
- After testing several types of piling, 60 piles were initially installed at the most critical locations. Later an additional 228 piles were added to the building and 92 piles to a site wall.

CHALLENGES:

- Building was built over a 60-foot-deep landfill of reinforced concrete and asphalt debris
- Deep Dynamic Compaction was used across originally the site which approximately compacted only the upper 20-feet
- Building movements continued during project.
- Extreme component weights, length of project, and extreme lifting requirements added to the repair problems. One example was yielding of the 3/2" slender pile sections below the brackets when the laterally unsupported lengths entered to 20-30" range.
- Deep spread footings under the walls became overburdened by the soil weight on top of them.



Topographical map showing the 15" floor elevation differences plus pile and grout locations depicted.

SOLUTIONS:

288 building piles were predrilled through the debris to a depth of 60-feet

- After predrilling, hydraulic push piles were installed to refusal below the debris field to an average depth of 75 feet
- Piles were installed on both sides of continuous spread footings to create centric loading.
- Pre-drilling to 60 feet and driving of compaction grout casing to refusal and injecting grout under pressure. (11 million total pounds of grout was injected at 380 locations.)

DISCUSSION: Raising the building once the piles were installed to depth proved to be an additional challenge. As the building was incrementally raised, the unbraced piling lengths below the 288 brackets increased, and became a buckling concern. Even though the footings were symmetrically supported, the 20” to 30” unbraced pile lengths below the bracket were susceptible to lateral deflections. Accordingly, a temporary lateral restraint system was developed and implemented to brace the in-place slender pipe sections in-place until the lifting was complete and before being encased in concrete slurry. The lifting required over 120-80K lifting cylinders to be simultaneously raised that were powered by several hydraulic power packs.

during this process. The 120 lifting jacks accounted for approximately one third of the building perimeter. Accordingly, jacking required a series of sequential lifts at each section before being moved to the next lift section.



Emergency shoring of roof and tilt walls

Overburden of soils over footings required excavating to enable jacking in some areas in order to allow the lift to proceed. The entire lifting process took several months to finalize, which included extra time needed to achieve visual aesthetics. At various locations the leveled floor did not match up with wall panel reveal lines so adjustments were made, using engineering judgement, to achieve acceptable visual effects.

To further complicate the lifting sequences, the building moved in unpredictable ways plus there were delayed responses both during and after the lifting process. To correctly compensate this required continual reassessment and adjustments. In a few locations the footings became overstressed during lifting operations and developed large cracks. This required strengthening repairs with dowels, epoxy injection, and concrete haunch over pours designed by Pangolin Structural.



Down in the hole pre-drilling



Project at completion

The building was deemed safe to occupy and is now back in service. Even with all final adjustments completed, survey monitoring continues to be on-going to ensure that any occurrence of additional movements will not go unnoticed.

For more interesting project facts and pictures go to <https://www.foundationaz.com/case-studies> .



Typical pile with lifting jack. The gap under the footing shows how much was lifted

As the tilt walls were raised, the roof shores and wall shores continually required adjustments to keep all the building components in place during lifting. Hubble Engineering continuously surveyed the walls, floors and roof sections