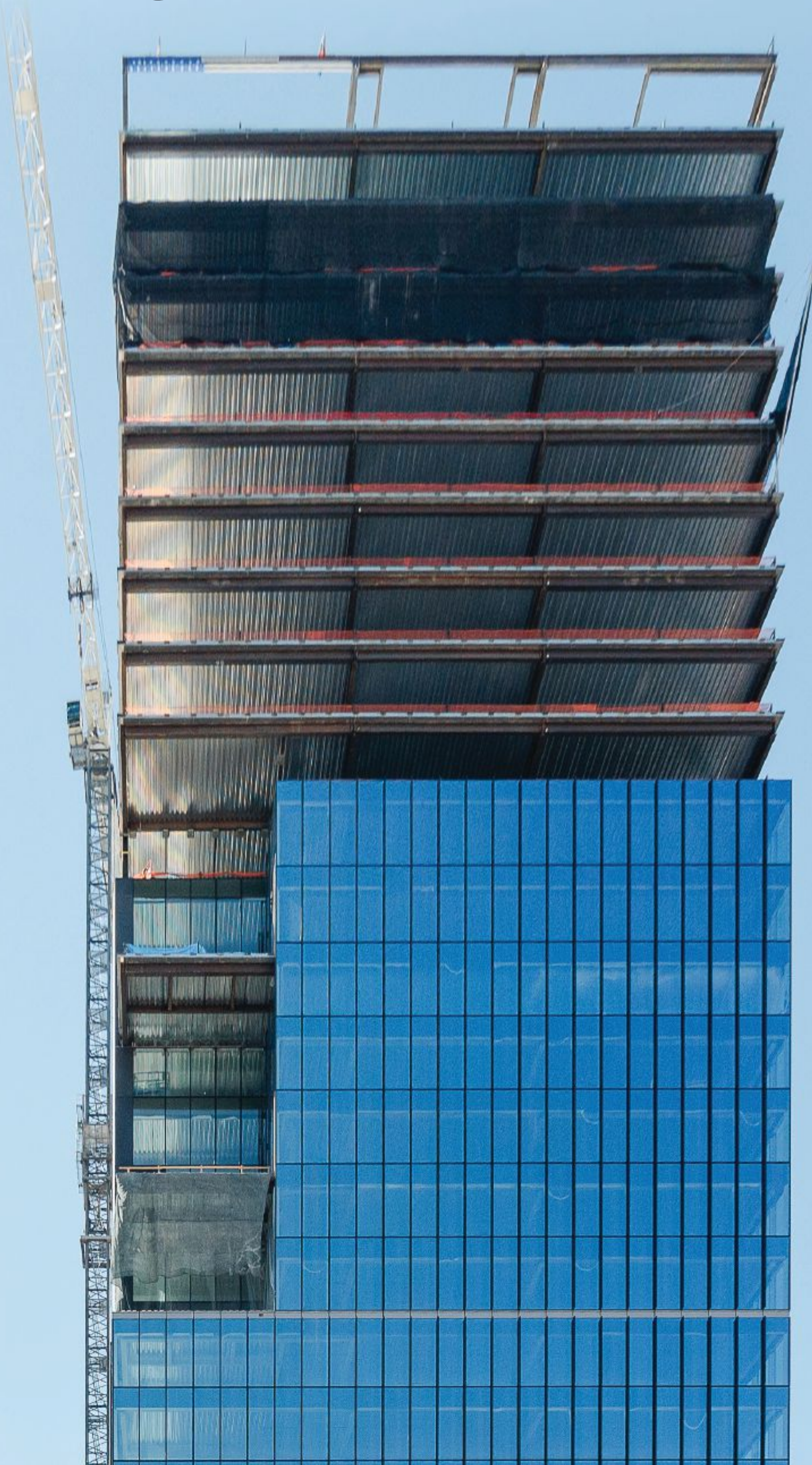
Modern Steel Construction

November 2023

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ON THE COVER: Denver's newest commercial high-rise, which just topped out, is expected to elevate the office experience, p. 32. (Photo: Riverside)

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editor's note

This past summer, a day or so after school let out, my family and I took a trip to the Northeast.

We packed a lot into our 10 days away from home. We stayed in New York for a couple of nights (right after the smoke from the Canadian wildfires temporarily turned the city orange), Boston for another two nights, Burlington, Vt., for one night, and then spent the last four nights on the coast of Maine, just outside of Acadia National Park. I love all of these places for different reasons, and I highly recommend Acadia, where I could have spent the entire summer scrambling along the rocky coastline, eating seafood, and drinking beer and blueberry soda. (Those were in different glasses, although now that I think about it, a blueberry shandy sounds like it might be worth a try.)

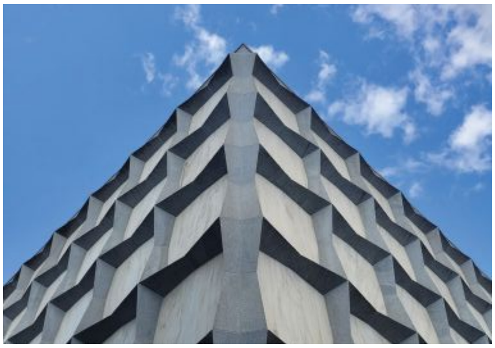
It was a fantastic trip in a year of fantastic trips for me. We saw a lot. We ate a *lot*. We walked a LOT. While a big part of the trip was simply experiencing those places, as well as the places we made our way through in between, navigating a meandering trail of college campuses was the trip's main purpose. Our daughter is graduating from high school in the spring and is centering her college search in the Northeast.

One of our stops between New York and Boston was New Haven, Conn., home to Yale University (and New Haven-style pizza, which any pizza lover should try). When we were walking around, marveling at the intricate Collegiate Gothic-style buildings, we noticed one that bucked this trend, a windowless Modernist rectangular edifice that we learned was the steel-framed Beinecke Rare Book and Manuscript Library. Why no windows? Because it houses a six-story glass-enclosed tower that contains more than 180,000 volumes, with underground stacks that can house an additional one million volumes. Instead of windows, the geometric façade features translucent marble panels that diffuse sunlight in order to avoid damage to the books yet let in just enough to make the panels appear to glow. The effect is impressive, and the design is both clever and practical.

Speaking of clever, impressive, modern, steel campus building designs that draw the eye, this issue of *Modern Steel* features the winners of this year's AISC/ACSA Steel Design Student Competition. While the competition features an open category every year, this year's main category tasked students with designing community-based spiritual spaces on college campuses. You can read about and see images of all the winners starting on page 42.

Sticking to the student theme, check out our news section on page 60 to see a list of this year's AISC scholarship recipients, all of whom will hopefully be involved in creating impressive modern steel structures of their own one day.

Geoff Weisenberger
Editor and Publisher



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If you've ever asked yourself "Why?" about something related to structural steel design or construction, *Modern Steel*'s monthly Steel Interchange is for you! Send your questions or comments to **solutions@aisc.org**.

Horizontal Brace Load Path

Do I need to consider the axial load from the brace in the beam-to-beam (Figure 1a) or beam-to-column (Figure 1b) connection?

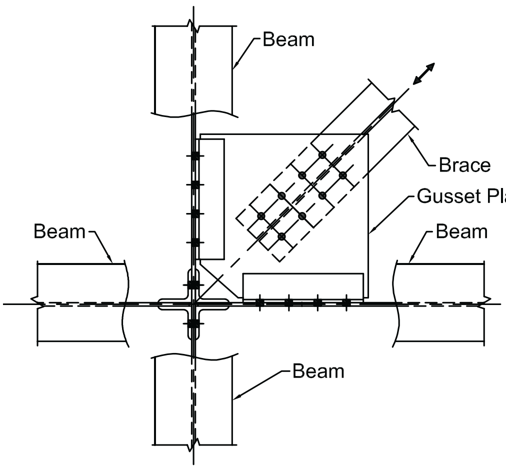

Fig. 1a. Horizontal bracing details, plan view: beam-to-beam configuration.

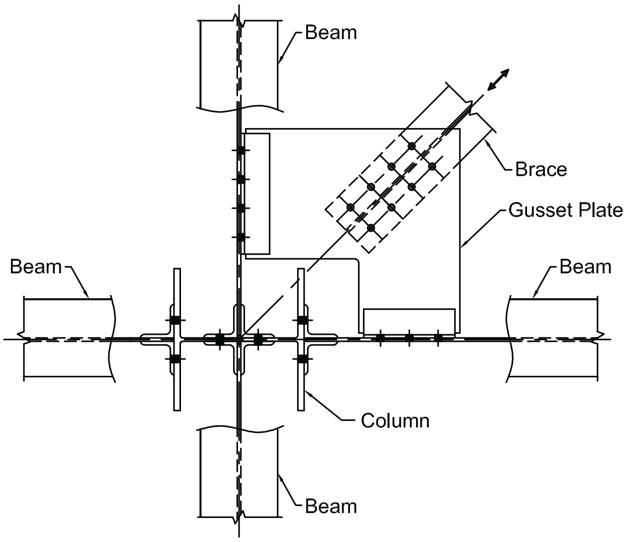

Fig. 1b. Horizontal bracing details, plan view: beam-to-column configuration.

The axial force from the brace is transferred to the other framing elements in the system, so its load path must be considered. The load from the horizontal brace can be resisted by many different load paths, including:

1. The load can be resisted by an axial load at either end of the beam, or partially distributed to both ends.
2. The load can be partially or completely transferred to a floor or roof system through the top flange.
3. The load can be partially or completely transferred through another vertical or horizontal brace connection somewhere along the beam length.

The connection design engineer cannot guess what the load path is. The structural engineer of record must determine the axial transfer forces at the beam-to-beam and beam-to-column connections. These forces should be communicated to the connection design engineer as required in the 2022 AISC *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303). Section 3.2.3 states, "When Option 2 or 3 is specified, the owner's designated representative for design shall provide the following connection design criteria in the structural design documents and specifications: (c) Data concerning the loads including shears, moments, axial forces, and transfer forces that are resisted by the individual member and their connections, sufficient to allow selection, completion, or design of the connection details while preparing the approval documents." Options 2 and 3 relate to cases where the owner's designated representative for design (ODRD) has not shown complete connection designs in the design documents and delegates connection designs to an experienced detailer or licensed engineer working for the fabricator.

The axial force mentioned in the question is a "transfer force" in the system. A transfer force is defined in the *Code* as "A force local to the intersection of structural members that is required to be transferred across that intersection through a connection and its elements to assure the continuity of the load path in a structural frame."

If a transfer force is not indicated in the contract documents, it would not be correct to assume that the horizontal brace force transfers through the nearest beam end connection. If an obvious condition exists where a transfer force is required for static equilibrium but is not indicated in the contract documents, the structural engineer of record should be notified and asked to provide the forces required to design the connection adequately. This is consistent with the requirement in Section 3.4 of the 2022 *Code*, "When a discrepancy is discovered in the

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contract documents in the course of the fabricator's work, the fabricator shall promptly notify the owner's designated representative for construction (ORDC) so that the discrepancy can be resolved. Such resolution shall be timely so as not to delay the fabricator's work."

Bo Dowswell, PE, PhD

Rusted Edge Responsibility

There are rusted edges on some erected steel members that had been shop-primed. Is the fabricator or erector responsible for repainting these areas?

No, unless either was specifically contracted to do so. Primer applied to structural steel is only intended to protect the steel from rusting for a short period of time. Primer is not a finish coating for structural steel.

Importantly, there is little reason to paint structural steel unless the steel is architecturally exposed, exposed to the weather, or in a high-humidity interior condition. See the AISC Technical Advisory about painting interior steel at aisc.org/paint.

The 2022 AISC *Code* addresses shop cleaning and painting in Section 6.4.

Section 6.4.4 states, "The fabricator is not responsible for deterioration of the shop applied paint when the paint is exposed to atmospheric conditions or corrosive conditions that are more severe than the intended use of the paint; or when painted members are stored for unanticipated durations due to project delays not caused by the fabricator. Damage during handling or transportation is not the responsibility of the fabricator unless the painted material is under the direct control of the fabricator or a subcontractor of the fabricator."

Note also, section 7.17 of the *Code* states: "Neither the fabricator nor the erector is responsible to paint field bolt heads and nuts or field welds, nor to touch up abrasions of the shop coat, nor to perform any other field painting."

Section 3.1(c)(6) indicates that the party responsible for field touch-up must be specified in the structural design documents and specifications issued for construction. Unless the contract with the fabricator or erector requires that they perform touch-up painting in the field after installation, neither the fabricator nor erector is responsible for touching up the rusted steel areas.

Larry Kruth, PE

Surveying Responsibility

Does the 2022 AISC *Code* address who is responsible for performing field measurements? Can the fabricator rely on the approved approval document information for dimensions without any field verification of measurements?

The *Code* addresses who is responsible for performing on-site surveys, including field measurements. The fabricator can rely on approval documents that have been approved by the ODRD and ODRC for dimensions that require field verification.

For surveying existing structures, Section 1.9.3 of the *Code* says, "Surveying or field dimensioning of an existing structure is not within the scope of work that is provided by either the fabricator or the erector. Such surveying or field dimensioning, which is necessary for the completion of the approval documents and fabrication, shall be performed and furnished to the fabricator in a timely manner so as not to interfere with or delay the work of the fabricator or the erector."

Section 7.5.4 states, "All work that is performed by the ODRC shall be completed so as not to delay or interfere with the work of the fabricator and the erector. The ODRC shall conduct a survey of the as-built locations of anchor rods, foundation bolts, and other embedded items, and shall verify that all items covered in Section 7.5 meet the corresponding tolerances. When corrective action is necessary, the ODRC shall obtain the guidance and approval of the ODRD." Additional commentary is included in this section, which states, "Few fabricators or erectors have the capability to provide this survey. Under standard practice, it is the responsibility of others."

If the fabricator is not furnished with field dimensions "in a timely manner so as not to interfere with or delay the work of the fabricator or the erector," then the fabricator would likely assume that the project team has decided that surveying or field dimensioning was unnecessary for the completion of the approval documents and fabrication documents. It is best practice to confirm this with the ODRC before proceeding.

Larry Muir, PE

Larry Kruth, AISC's former vice president of engineering and research, **Bo Dowswell**, principal with ARC International, LLC, and **Larry Muir** are consultants to AISC.

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Trimble

steel quiz

The gold standard for steel design and construction has been updated! Test yourself on the updates to the newly published 16th Edition AISC *Steel Construction Manual* (you can purchase your own copy today at **aisc.org/publications**). This month's questions and answers were developed by Jack Zheng, an AISC intern and student at the University at Buffalo.

1 Which conditions have high galvanic corrosion risk and should be avoided?
a. A small anode coupled to a large cathode with high electrical potential difference between the two materials
b. Fasteners that are anodic with respect to the material they are fastening (e.g., aluminum rivets in a steel bridge)
c. A relatively small cathode is electrically coupled to a much larger anode, such as a fastener in a steel beam
d. a and b
e. All the above

2 **True or False:** Discussion of phased array ultrasonic testing (PAUT) is now included in the 16th Ed. *Manual*.

3 Eccentrically loaded weld groups can be designed using which method(s):
a. Instantaneous center of rotation method
b. Plastic method
c. Elastic method
d. a and c
e. All the above

4 **True or False:** For rectangular connection elements with in-plane and out-of-plane loads, the biaxial state of stress can be evaluated on an elastic basis using the general form of the von Mises equation when the applied member stress is known.

5 Which of the following simple shear connection types are well-suited for resisting combined shear and axial forces?
a. double knife plate
b. single plates
c. all-bolted double angles
d. double angle using bolts on the outstanding legs
e. All of the above

6 Which design consideration is used to describe forces local to the gusset region of a V-, inverted V-, or X-type braced frame?
a. Second-order effect
b. Chevron effect
c. Whitmore effect
d. Skew effect

7 **True or False:** In Tables 10-2 and 10-3 in the 16th Ed. *Manual*, the elastic method is the procedure used for determining the available weld strength for double-angle connections welded to the supporting member.

TURN TO PAGE 14 FOR ANSWERS

steel quiz ANSWERS

Everyone is welcome to submit questions and answers for the Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or **solutions@aisc.org**.

Answers reference the newly published 16th edition of the AISC Steel Construction Manual. *Hint: The Preface to the* Manual *contains a list of major changes and improvements included in this edition.*

1 **d. (a and b).** New sections discussing galvanic corrosion have been added in Part 2 under corrosion protection. Guidance is given on when galvanic corrosion is generally not a concern, which includes condition "c" when a relatively small cathode is electrically coupled to a much larger anode, such as a fastener in a steel beam. Guidance is also given on conditions that have high galvanic corrosion risk and should be avoided. These include condition "a," a small anode coupled to a large cathode with high electrical potential difference between the two materials, and condition "b," fasteners that are anodic with respect to the material they are fastening.

2 **True.** Discussion of phased array ultrasonic testing (PAUT) has been added in Part 8 for welding inspection. PAUT is an ultrasonic testing (UT) technique that uses the sequential discharge of multiple transducers in a single search unit to adjust the focus and angle of the sound path through the inspected element. PAUT finds the same type of discontinuity that normal UT finds, but the encoding and directional control of the sound path can potentially offer improved results. PAUT is recognized in Annex H of AWS D1.1/D1.1M: 2020 – *Structural Welding Code*.

3 **e. All the above.** Eccentrically loaded weld groups can be designed using various methods, including the instantaneous center of rotation method, the plastic method, and the elastic method. Discussion of the plastic method in Part 8 used as one alternative for designing eccentrically loaded weld groups has been revised and expanded for clarification in the 16th Ed. *Manual*.

4 **True.** A new section, Biaxial Stresses on Connection Elements, has been incorporated into Part 9. The section includes an approach for rectangular connection elements with in-plane and out-of-plane loads, where the biaxial state of stress can be evaluated on an elastic basis using the general form of the von Mises equation when the applied member stress is known. This approach is intended for assessment of stress at local attachments to the webs and flanges of members in locations away from discontinuities and stress concentrations on an elastic basis, and to assess the need for stiffeners at these attachment points.

5 **d. All of the above.** The new *Manual* includes a new part Part 12, Design of Simple Connections for Combined Forces. Discussion of the design of simple shear connections subjected to axial force is included. The following simple shear connection types are described as being well-suited for resisting combined shear and axial forces: double knife plates, single plates, all-bolted double angles, and double angles using bolts on the outstanding legs.

6 **b. Chevron effect.** The "chevron effect" is a term used to describe forces local to the gusset region of a V-, inverted V-, or X-type (also termed chevron) braced frame. The 16th Ed. *Manual* incorporates new discussion of the chevron effect in Part 13. This effect results from the eccentricity of the joint between the gusset and the beam, and the work point at the intersection of brace centerlines.

7 **False.** The procedure used for determining the available weld strength for double-angle connections welded to the supporting member has been changed from the elastic method to the instantaneous center of rotation method. The updated design method will provide higher tabulated connection strengths.

STEEL SOLUTIONS CENTER

A Fresh Look at Composite Members

BY ABDULLAH ALGHOSSOON, PHD

A new AISC *Specification* appendix includes provisions for designing with high-strength concrete-filled composite members.

FILLED COMPOSITE MEMBERS made of high-strength materials are gaining attention as a promising cost-saving, higher-performance element for mid- to high-rise buildings.

These members can be used in seismic applications as part of the lateral force-resisting system and in non-seismic applications such as a gravity-only member (leaning columns). And until now, the design of composite members was limited by material strengths: concrete specified compressive strength (f_c') up to 10 ksi for normal-weight concrete and specified minimum yield stress of structural steel (F_y) up to 75 ksi.

But using the most recent AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-22, **aisc.org/specifications**), designers can now take advantage of higher concrete and structural steel strengths for rectangular filled composite members.

What are filled composite members?

Filled composite members, also known as concrete-filled tubes (CFT) and concrete-filled steel tubes (CFST), are composite structural elements composed of a steel box or hollow section filled with concrete. This combination of materials provides synergistic benefits by melding the compressive strength and mass of concrete with the high tensile strength and ductility of steel to create a robust and efficient structural member. The steel tube serves as the exterior element in a concrete-filled tube member, providing strength, stiffness, and confinement to the concrete core. The concrete fill enhances the member's overall load-carrying capacity, improves fire resistance, and provides additional resistance against both local and member buckling. CFT members are widely used in various construction applications, including columns and beams in buildings, bridges, and offshore structures. The most common cross-sectional shapes are square, rectangular, and round.

What's new in Appendix 2 design equations?

The new Appendix 2 applies to only rectangular and square filled composite members, but there are plans to expand to round members in future versions of the *Specification*. While the appendix allows for design beyond the material strength limitations in Chapter I, the provisions are only applicable for f_c' up to 15 ksi (normal weight concrete only) and F_y up to 100 ksi.

Unlike the conventional CFT design equations in Chapter I, the streamlined approach in Appendix 2 for designing high-strength CFT members eliminates the need for section classifications into compact composite, non-compact composite, and slender-element composite sections. Appendix 2 provides one strength equation each for compression and flexure rather than a unique strength equation for each classification. Furthermore, the plastic stress distribution results in a simplified and efficient calculation of available strength, as shown in the stress distributions in Figure 1. The complex behavior of the composite section and the reduction due to local buckling is accounted for using F_n in Equation A-2-2, where F_y is the steel yield strength and λ is maximum width-to-thickness ratio of the compression steel elements multiplied by $\sqrt{F_y/E}$.

$$F_n = (1.0 - 0.075\,\lambda)F_y \quad (\textit{Spec.}\ \text{Eq. A-2-2})$$

Appendix 2 provides a procedure to determine available strength of a filled composite member if the concrete and/or steel strength properties exceed the limitations of Section I1.3. The applicability of Appendix 2 is established if the limitations of Section 2.1.1 are met.

To avoid repeating provisions, only the unique aspects of design are presented in Appendix 2. However, this can lead to tricky navigation through the *Specification* when calculating available strengths. For example, the available compressive strength can be calculated in the following

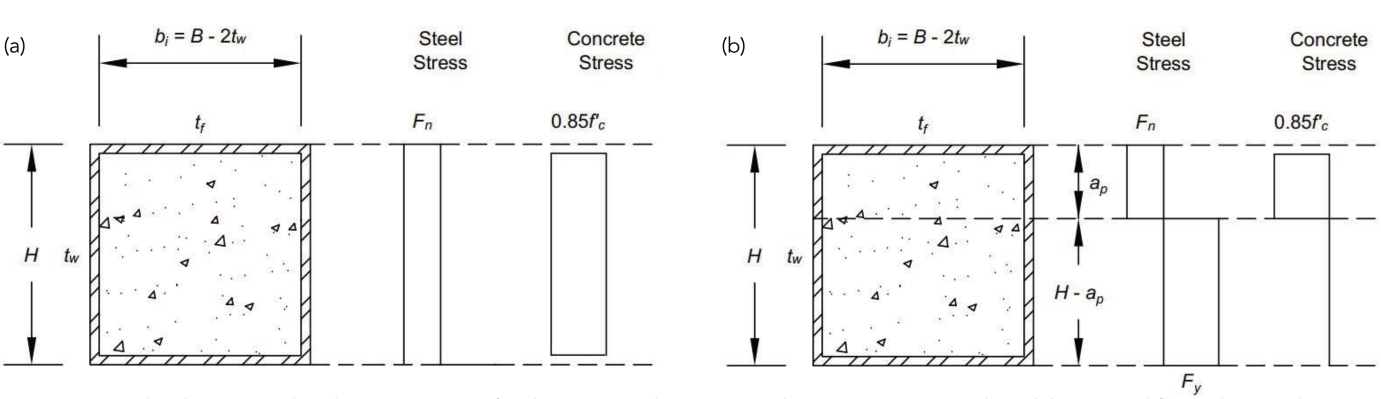


Fig. 1. Stress distributions outlined in AISC 360-22 for determining the (a) nominal compressive strength and (b) nominal flexural strength.

steps using provisions from Sections 2.1.2, I2.2b, and I2.1b.

- Compute the critical buckling stress for steel section of filled composite members, F_n (*Spec.* Eq. A-2-2)
- Compute the nominal axial compressive strength without consideration of length effects, P_{no} (*Spec.* Eq. A-2-1)
- Compute coefficient for calculation of effective rigidity of a filled composite compression member, C_3 (*Spec.* Eq. I2-13)
- Compute effective stiffness of the composite section, $(EI)_{eff}$ (*Spec.* Eq. I2-12)
- Compute elastic critical buckling load, P_e (*Spec.* Eq. I2-4)
- Compute nominal axial compressive strength, P_n (*Spec.* Eqs. I2-2 or I2-3)
- Apply resistance factor of $\phi_c = 0.75$ or safety factor of $\Omega_c = 2.00$ defined in Section I2.1b

The nominal flexural strength (M_n) is determined using a stress distribution over the cross-section shown in Figure 1. The resulting nominal flexural strength is factored by 0.9 to account for potential unconservative error in the assessment of interaction strength.

For combined flexure and axial force, the equations in Section I5 can be used with modifications to coefficients c_p and c_m given in Section 2.1.4.

Looking Ahead

The design equations for high-strength CFT members achieve a commendable balance between simplicity and accuracy. Consequently, there is potential to adopt the high-strength CFT design equations universally. This new approach may provide a framework for a broader set of rules to establish a single set of strength equations rather than multiple equations based on filled composite section classification. This could be extended to round filled composite members with high strength materials and eventually to all filled composite members covered in Chapter I. ■

A planned second edition of AISC Design Guide 6: Load and Resistance Factor Design of W-Shapes Encased in Concrete *(**aisc.org/dg**) will provide additional explanation on the topic of filled composite members with high strength materials including a design example. The revised Design Guide, which will also cover encased composite columns and filled composite columns with conventional strength materials, will be available in 2024.*

Abdullah Alghossoon (**abdullahm_ab@hu.edu.jo**) is an assistant professor in civil engineering at The Hashemite University in Jordan.

The Camera Eye

INTERVIEW BY GEOFF WEISENBERGER

Architecture professor and 2023 AISC Lifetime Achievement Award winner Terri Meyer Boake has become a respected voice on architecturally exposed structural steel due in no small part to her masterful photography skills.

Michael Kowalek

Field Notes is *Modern Steel Construction*'s **podcast series**, where we interview people from all corners of the structural steel industry with interesting stories to tell. Listen in at **modernsteel.com/podcasts**.

TERRI MEYER BOAKE became a prominent figure in the steel industry by pairing her lifelong love of photography with her structural engineering background.

Boake, an architecture professor at the University of Waterloo in Canada, teaches a steel design course and gives lectures on architecturally exposed structural steel (AESS). Her steel photography skills, though, have helped her gain international recognition as an AESS photographer. She has written several books that feature her pictures and focus on specific aspects of steel design. She travels the world to find new steel projects—particularly AESS—and captures them through her camera lens.

Boake is one of this year's Lifetime Achievement Award winners. She was honored at the 2023 NASCC: The Steel Conference for her significant contributions to AESS, education, and her service to AISC.

Let's start from the beginning. How did you become an expert in this field and the person that I associate with AESS?

I really didn't get into thinking that much about steel until the mid-1990s, which was more than a dozen years into my teaching career. There was a forum for educators in Canada—where I'm from—by CISC, AISC's Canadian counterpart. They took us through some slides of the construction of BCE Place (now Brookfield Place) in Toronto, a Santiago Calatrava project, and they showed us all the fabrication and how things were going together.

I thought, "Wow, I've never really thought of it that way." Then I started to go to whatever events I could get to that would have a site tour to take photographs

Seattle Central Library

Terri Meyer Boake

and show my students how things work together. I was learning on the fly. I went through architecture school and nobody taught us anything like that.

We were taught how to size a beam, size a column, and learned buckling rules. But to actually understand how buildings go together—that's when I started to really run with it. When I was doing some work with CISC, they started their roundtable on AESS, and they were working with the fabricators, the engineers, and some architects. They pulled me on board.

I had been working on photography for them and their website for a short time, and I told them they can't have all these text-based documents. You're never going to convince the architects. We need photos. We need pictures. We need to really be able to believe in something because we've seen it. That's when I did the illustrated guide for them.

I just kept going to building sites and doing building visits. I started with books, which really brought all my work to a crescendo when an editor from Birkhauser in Germany emailed me out of the blue and asked if I wanted to do a book on steel. First, you think it's one of those scams where I have an uncle in Nigeria who's been kidnapped. You want me to write a book? Is this for real?

I ended up meeting with him. He came to North America. I went to Berlin and ended up writing the book—it was just going through my entire slide collection, images, and case studies, and trying to put together the first book. It got me my first special achievement award in 2012.

I was on a roll after that. At first, I thought I was done after that first book—I depleted all the good shots that I had. He said, "No, you're not, we've got three more books to do."

Was there some fine print that you didn't see at the beginning?

The editor had mentioned at the beginning this possibly being one of four books. But when you look in the repository that you're pulling from and feel you've depleted it, you wonder what else you can write.

But I had one chapter in the first book (*Understanding Steel Design*) that I did on diagrid structures, which were novel then. There weren't any diagrid books. There weren't many projects. There were only about 22 diagrid projects in the whole world. I thought I could come up with something there because there was no diagrid methodology. Students were doing them all the time, and I figured they were probably doing them wrong, but they looked cool. It was interesting, so that was the next one I did.

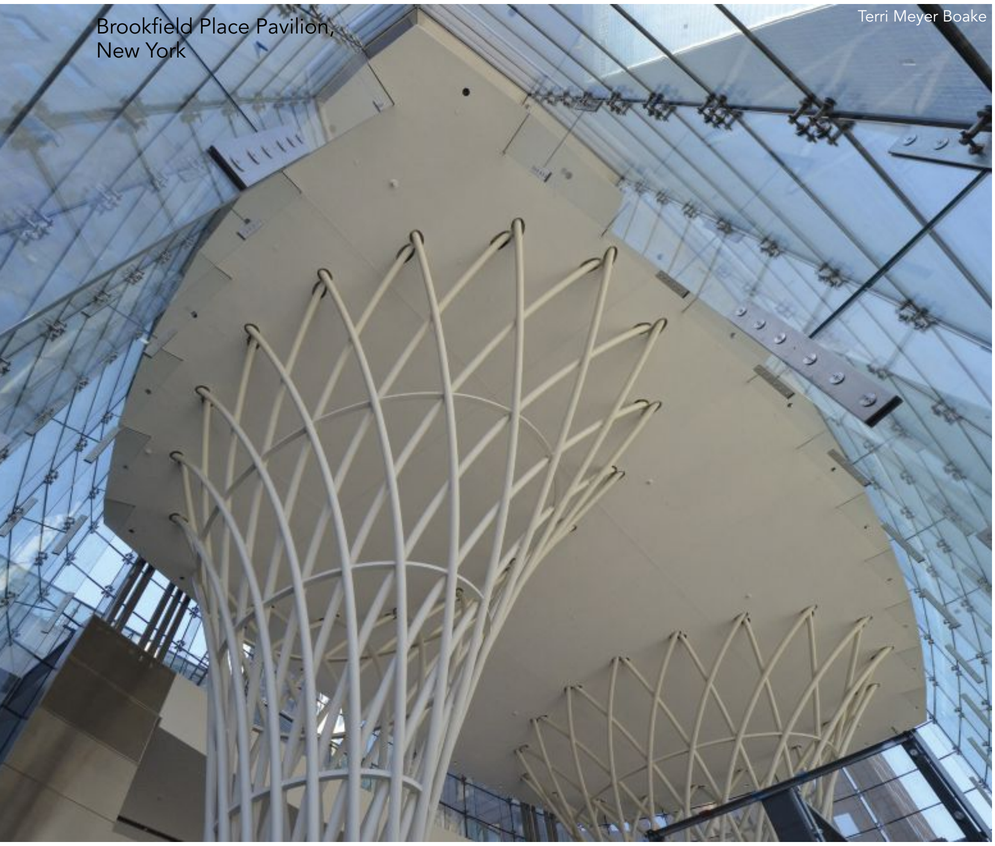
I did a bit of travel associated with collecting a few more photos because when you start to write books, you need photographs. For anybody out there who's thinking of doing it, if you take your own photographs, you don't have to pay the tiny bit of money you get from writing the book to the photographers. The last book I wrote was $500 for photographs here and $500 there. When you're only getting a couple thousand dollars, you could spend it all on photos.

For me, the fun part of the whole exercise is the research and travel. I'll go to a conference and scope out the architecture and the projects going up. What photos can I gather while I'm here? It's much more enjoyable taking photos and travelling. It becomes more personal because I think many writers spend time on places they've not visited and buildings they've not seen. A lot of people who write architecture theory don't write from first-person experience.

I have a whole course now on steel. I have 12 three-hour lectures on AESS. I have more material than I could possibly incorporate in that class. But the students like the anecdotes. We can read the textbook in any class. What can I give you that you can't get by just reading? There's always a value-add on a project.

When I take photographs, I get different photographs than if I were to buy them off the internet, because a lot of architectural photographers are taking shots of the finished building. I want the construction shots because those are fleeting.

Once the building is done, it's done. You can see if the paint is peeling or not,


Brookfield Place Pavilion, New York

Terri Meyer Boake


Lou Ruvo Brain Institute, Las Vegas

but you can visit it any time. Getting on the construction sites, getting the process shots, there's so much information and learning in it that you can't see in a completed building.

It sounds like a perfect situation. It starts with the practical—you're saving money on the photos. But you get to take a trip, see things you've never seen, and the anecdotes are special.

Students always like the stories of me going into buildings I'm not supposed to be in. But the site tours are the most special part. That's the big part of the draw—and to learn. I'm always learning. That's what's important to impart upon everybody. That's why people are here. They're not here just to get continuing education credits. People are here because they're learning. That's why I like to go to conferences. In fact, that's why I like to go to The Steel Conference—because there are things I keep learning and I can take them back.

I don't go to as many basic architecture conferences because I'm not getting the material that's going to help me with what I'm doing. A lot of architects in architectural conferences aren't interested in technology or construction. They're more interested in the theory of the finished image than the process. But the process can make or break a project.

With all the travel, what's your next trip planned?

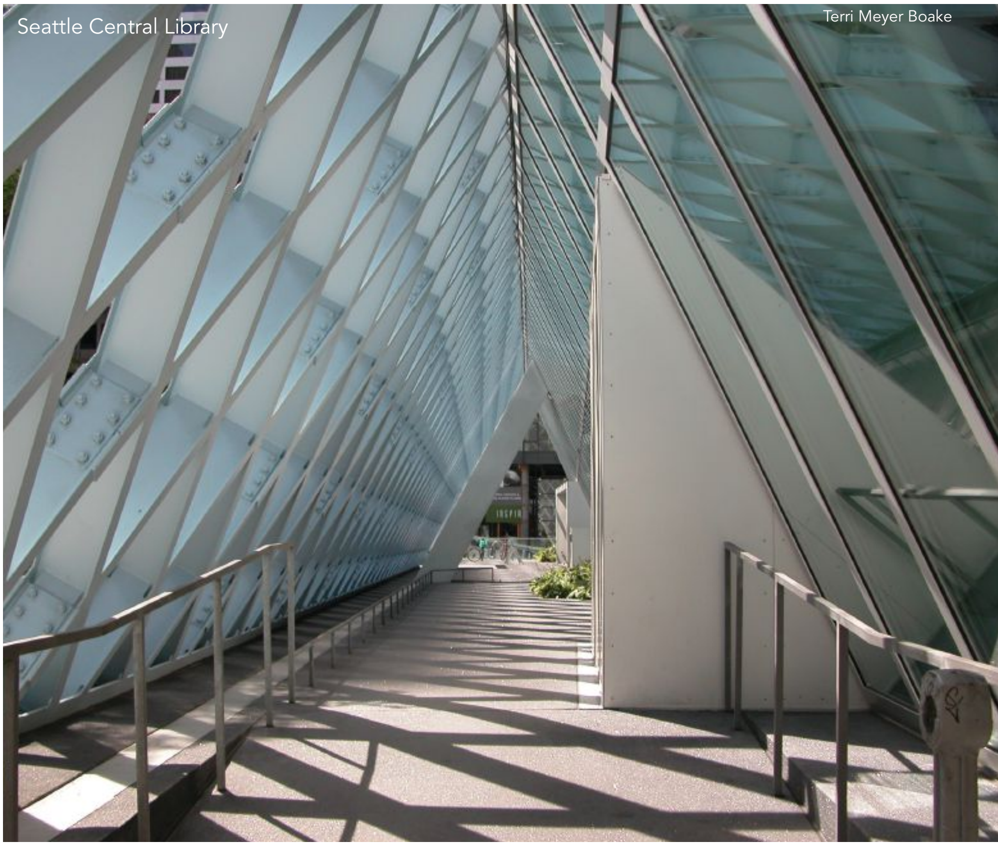
My daughter lives in Japan, and I was going there a lot before COVID. They were closed longer than anybody else. They just finally opened up. I went in December. I'm continually going back and forth there, just tracking new projects going up, because they're always building something new.

I do work with the Council on Tall Buildings and Urban Habitat—more photography. I started working with them when I was doing the diagrid building book. I was combing through their online database looking for information and trying to figure out which buildings are diagrids so that I knew which ones to travel to see. I ended up finding deficiencies there. I do volunteer not-for-profit work for them—taking photographs and populating the database.

You said you started noticing steel, so to speak, a little later into your teaching career. But is taking pictures a lifelong hobby?

My dad gave me an Instamatic camera when I was 11. I got my first single-lens reflex when I was about 18. I was always interested in photography. I needed it anyway for my teaching. The dual projectors with tiny slides that I used for many years was an expensive medium. I didn't take as many photos as I did digitally because they were expensive. I'd go to a building and take five photographs.

But digital, it's basically free. I invested in a 300-mm zoom lens, which meant I could stand on the ground, snap the ironworker on the 12th floor and see what he was doing. I also incorporated video so we could see a bit of motion. It was a perfect collision because as I was taking off with this work, steel buildings started to go up more and more. We saw a transition from all reinforced concrete stuff to the beginnings of AESS, which was already in my book. Now there's a real proliferation of interesting steel buildings out there. It's great. There's lots of material to photograph.



The other thing that I really like about AESS is if I can't shoot it when it's under construction, it's still exposed. You can still dissect it even if you weren't on site when it was going up. It's engaging even if you don't have construction photos.

I'm sure you probably get some situations where you've got before and after AESS shots, which is nice because you see it with the finishes.

Absolutely. And at sites that I've been on, the ironworkers are just amazing people, particularly on some of these more complicated jobs. They have such patience.

I often walked past Daniel Libeskind's addition to the Royal Ontario Museum in Toronto, a diagrid crystal with no vertical columns. I watched them and everything was different. There wasn't a diagram showing where the lifting hooks and points went. It was all by feel. The lead ironworker looked at the pieces, arranged the hooks, and then figured out the lengths. They'd put it up, and if it didn't quite fit, they would just calmly lay it down, adjust it, and try it again. It was breathtaking to watch because of the dexterity, the patience, the perseverance, and the calmness about something that would make most people go, "Oh, you're kidding."

As an architecture professor, were you ever an architect for hire?

Waterloo was a co-op program, so there's paid work while you're going through school. I did my share of architecture co-ops. We had six four-month work terms. I graduated into the big recession of 1982. And although I found work, I returned to an employer I had before co-op.

But two professors at Waterloo went on simultaneous sabbatical, which was odd planning, and they taught structures courses. I was an A-plus structures student. When I got accepted into architecture, I was also accepted into civil engineering, so the closet engineer was always in me. They gave me those courses to teach because I had taken them and did well.

I morphed some of them into building construction courses, which I still teach. I went to get a master's degree because I needed one to teach. I started teaching full-time in 1986.

Do you ever have thoughts about designing something?

I used to, but I don't anymore now that I'm distanced enough from the details of practice. I don't think I would find that engaging. I'd rather travel more and shoot more buildings that I've seen in magazines or movies and continue bringing that to whatever outlet I have. ■

This article was excerpted from my interview with Terri. To hear more from her, check out the November 2023 Field Notes podcast at ***modernsteel.com/podcasts****.*

Geoff Weisenberger (**weisenberger@aisc.org**) is editor and publisher of *Modern Steel Construction*.

The Dos and Don'ts of Hiring

BY RICH CAMACHO

Hiring is hard, but there are several key steps business owners can take to ensure it's no more difficult than it needs to be.

WHEN IT COMES TO hiring, connections are key—and we all need help making them at one point or another.

Since leaving the Army over eight years ago, I've been incredibly fortunate to help companies of all sizes across North America connect with exceptional talent as the CEO of a direct-hire marketplace for skilled trade workers wanting to build their careers and companies seeking their talent.

The average blue-collar job requires four times more hard skills than white-collar roles. The recruiting system for each industry is virtually the same, though. That's why it's important to remove the inefficiencies of résumés and job posts and focus on the skills and experiences that matter. The ability to adjust to the needs of the construction industry and its skilled workers gives businesses a competitive edge in this incredibly challenging labor market.

One Size Doesn't Fit All

There are countless job boards and websites for finding talent: LinkedIn, Indeed, ZipRecruiter, and BlueRecruit, to name a few. However, each serves a very different market and specializes in different talent pools.

If you're trying to hire salespeople, I recommend starting with LinkedIn. At the same time, I cringe when I see human resources managers posting welding jobs on LinkedIn. Use the appropriate platform for the job(s) you're trying to fill.

Pro Tip: Employee referrals produce the highest retention rate of any form of recruiting. No one wants to work with a jerk. Provide financial or PTO incentives for referrals (or both).

Text, Don't Call

I needed a while to be comfortable sending job seekers text messages. For years, I felt that texts were too personal and inappropriate in the workplace. But I was wrong. If you still think the way I did, here are some facts to help change your mind:

- 99% of all texts are read (imagine if 99% of people read your emails or answered your cold calls)
- 78% of people say sending them a text is the fastest way to reach them
- All age groups now prefer receiving a text message versus a phone call

If you are relying on attracting talent by sending emails or leaving voicemails, you will never fill your talent needs. On BlueRecruit, all messages between employers and job seekers are sent through our app, email, and texts. Our job seekers initially view 99.1% of these messages as text. Failure to adjust to this change in communication habits will put your team at a disadvantage.

Pro Tip: If your recruiters or hiring managers are uncomfortable using their cell phones, use an outdated phone and purchase an inexpensive text messaging plan for your recruiting efforts.

Messaging Matters

You may be shocked to hear that the ability to earn more money is not the number one reason tradespeople change jobs. It's the desire for a flexible schedule. Earning more money ranks third, following job satisfaction. While you must conduct thorough research to ensure you're paying appropriate market rates, it is more important to offer schedules that accommodate life's needs.

The pandemic caused millions of traditional office workers to work from home. While working from home is not practical in the trade industry, a culture shift is occurring among tradespeople too. Most skilled workers now seek employers that are willing to adjust their schedules to allow them to meet their needs and their family's needs better.

One of my favorite examples from a customer was an automotive garage in Maryland that allowed a newly hired mechanic to take each Thursday afternoon off to attend his son's lacrosse games. Such a display of empathy has created an employee with incredible loyalty and gratitude.

Pro Tip: Stop offering sign-on bonuses. They are incredibly detrimental to retention and upset long-term employees who often view them as disrespectful toward loyalty. Save that money and use it towards your referral program.

All About Speed

If I can leave you with one last nugget of advice—at least until we meet at next year's NASCC: The Steel Conference in San Antonio, where I'll be presenting—it's that the ability to hire in this climate comes down to speed. When I say speed, I mean how quickly you reach out to talent that applies to your open roles (hopefully, talent that you connect with on BlueRecruit) and how quickly you get the job seeker through your interview process.

First, as soon as someone applies who you feel could be a fit, call them, email them, and, of course, text them.

Second, a massive study conducted by Google found that four interviews is the magic number of interactions to determine whether someone is a good fit. A candidate does not necessarily need to come in four times, but four qualified individuals should speak with that person.

Pro Tip: Conduct a phone or video screen with applicants. For folks who pass the screen, bring them in for an onsite interview. If someone is promising, do a site tour and if possible, take that person out for a meal. By the end of that process, decide one way or another—trust your gut. Another interview will not help with the decision, and the math proves it. ■

Rich Camacho (**rich.c@bluerecruit.us**) is the CEO and co-founder of BlueRecruit.

Speedy Delivery

BY ALEX HESSE, PE, GREG REINDL, PE, AND HEATH STEIN, PE

A CHILDREN'S HOSPITAL EXPANSION PROJECT met an aggressive 16-month speed-to-market schedule in part because it chose a steel framing system.

Children's Hospital Colorado (CHCO) services Northern Colorado, Wyoming, western Nebraska, and western Kansas. The organization felt its previous 48,000-sq.-ft space did not meet its standards for serving the area with top-notch child-centric health-care and sought more room.

The Broomfield, Colo. hospital's expansion project—which more than quadrupled the space to 200,000 sq. ft—is comprised of a five-story medical office building, a two-story inpatient building, and a one-story imaging building. The project's designers picked structural steel for the superstructure because of its future flexibility, construction cost, and speed to market—all of which were key in adhering to the compressed design and construction schedule.

Steel helped a Colorado children's hospital expansion project team create and stick to a rapid construction timeline.

Children's Hospital Colorado completed its 48,000-sq.-ft expansion project in just 16 months.

Sanders Park

Flexibility is critical in healthcare projects. Steel met all the project objectives and took other materials, such as concrete, out of consideration. All told, it allowed all parties to maintain a schedule and budget and meet the owner's conditions of satisfaction.

Time savings started before construction. Using steel allowed structural engineer KL&A to overlap the shop drawing process with the design phase and make changes during and after final drawings were issued to fulfill owner-requested tweaks. KL&A's specialty is integrating the design and construction process, which is achieved in part by having the steel detailer sit next to the structural engineer. That collaboration was crucial in the fast speed of delivery because it resolved any coordination issues before they became part of the final shop drawings. There were zero RFIs on the steel, another factor in successfully sticking to the project schedule.

KL&A


KL&A

above: The design team used Nucor's RediCor modular stay-in-place formwork, which has elevator components and stairs preinstalled in the shop.

left: The building's steel superstructure.

The building has approximately 1,000 tons of structural steel, plus several other metals used in the stairs, railings, rooftop screens, canopies, and veneer supports. It follows CHCO's desire to have a unified look, feel, and function across its facilities. Two steel-framed cantilevered entry canopies were also key to maintaining CHCO's brand on the building.

The exterior façade has extensive glass and brick, plus metal panels that require integrated structural support within the building's steel frame. The other metals supporting glazing and masonry veneer were installed with the steel. KL&A used a bolted system that allowed erector LPR Construction to bolt up the framing before concrete pouring, then make adjustments and final welds after pouring to allow for dead load deflection and ensure façade support was at the correct levels.

The new building's elevator and stair cores were built with a modular stay-in-place formwork system. Bay sizes varied, but were approximately 30 ft by 30 ft. Columns were

HSS6×6, HSS8×8, and HSS10×10. Typical floor framing was W16 through W24.

The team also used Nucor's RediCor modular stay-in-place formwork to help meet the ambitious schedule. RediCor has elevator components and stairs preinstalled in the shop, which slashed six weeks off the timeline and was key to hitting the owner's desired occupancy dates. It also provided safe access to the floors under construction because the stairs are shop-installed in the modules—eliminating the need for ladders that provided temporary access to decks under construction.

The entry canopies follow the segmented curvature of the building entry and cantilever 17 ft off a single-column line. They are constructed with tapered HSS20×12×⅝ tubes as the main outriggers. The canopies are topped with dovetail deck that is exposed on the soffit.

KL&A's design software choice also helped the project move faster. At the time,

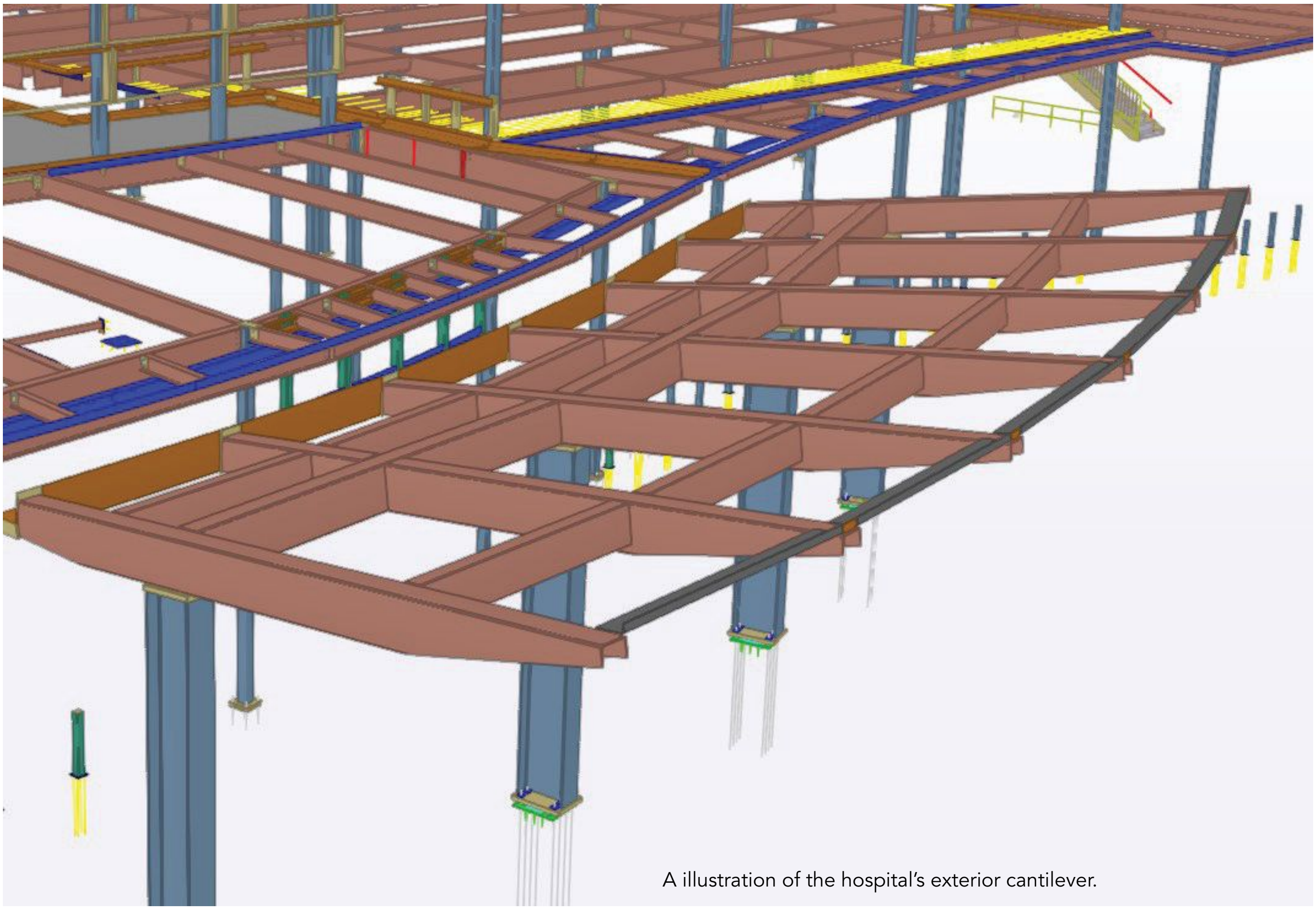
above: Using RediCor shaved six weeks off the construction timeline.

below: The floor plan for Level 1.

The hospital's new wing was built on a greenfield site, which eliminated logistical challenges in steel delivery, laydown, and erection.

KL&A

A closer look at the brick and glass exterior.



A illustration of the hospital's exterior cantilever.

BIM360 was a fledgling product in the design and construction world. Using it allowed the design team to maintain an integrated 3D model with real-time changes and react quickly to changes as they arose during the project. Hospitals have higher-than-normal MEP requirements and a higher probability of clashes. BIM360's ability to scope the MEP, framing, and ceiling helped the design team review and react to changes rather than iterate on the design in silos. It also gave the material detailers up-to-date design drawings as each material became the critical path to the project.

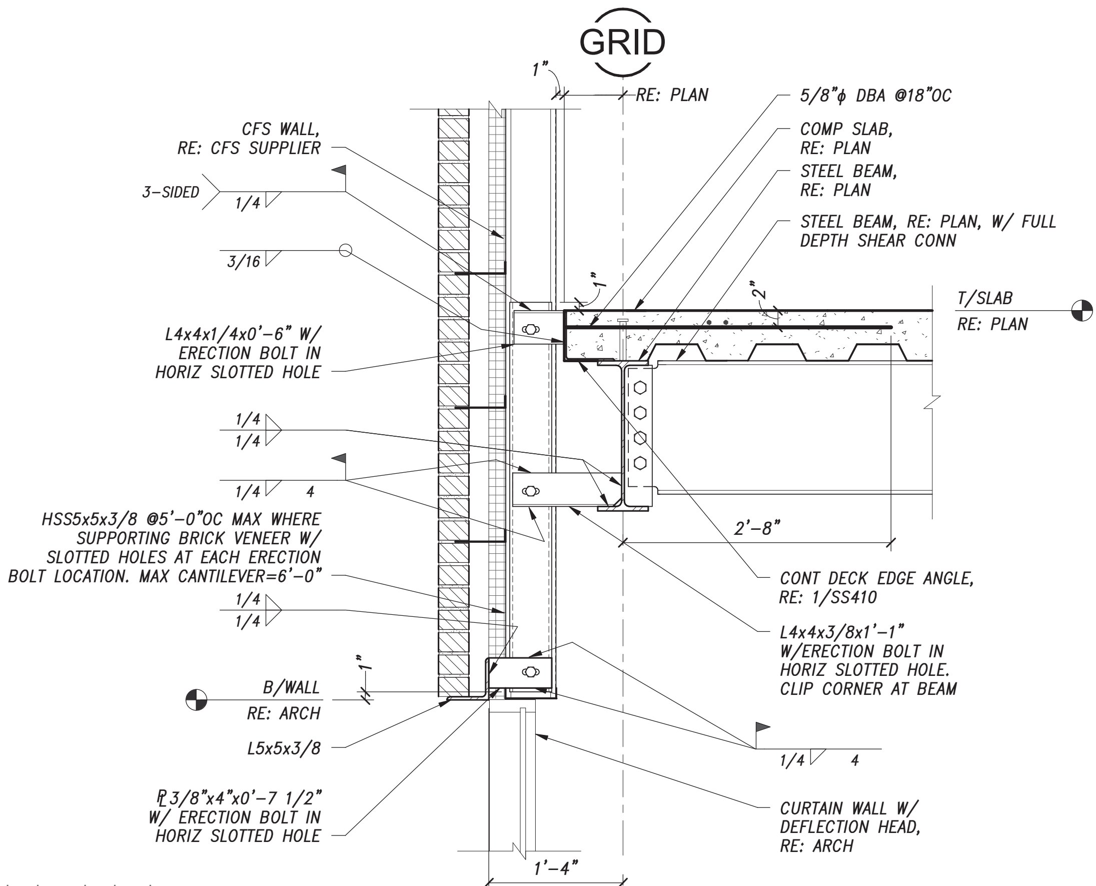
The project was delivered under a multi-party agreement, or IPD contracting method. With that delivery method, key design and trade partners all signed the same contract as the owner. KL&A was a single signer as structural engineer of record and steel trade partner. This contractual arrangement permitted the trade partners to be brought on board during schematic design. It also allowed contractor feedback to be integrated into the design of the building and provided real-time budgeting that helped determine the right time for choosing partners.

The result was a streamlined schedule, allowing the team to hit the owner's target occupancy dates. Specifically with the structural steel, shop drawings began well before the design process ended because KL&A's engineering team, construction manager, and detailer all sat next to each other two or more days a week during the design and shop drawing phase. This not-previously-reached level of colocation collaboration within the company streamlined communication on the project.

In addition, the project location was a greenfield site, which eliminated typical logistical challenges with material

A close-up of the exterior cantilever.

Sanders Park



A detailed look at the brick support.

The building has approximately 1,000 tons of structural steel.

The waiting rooms inside the new Chidren's Hospital Colorado facility.

delivery, laydown, and erection—further contributing to the design and construction teams' ability to meet the aggressive schedule and allowing the hospital to offer expanded services as quickly as possible. ■

Owner
Children's Hospital Colorado, Aurora, Colo.

General Contractor
GH Phipps, Greenwood Village, Colo.

Architect
TreanorHL, Denver

Structural Engineer and Steel Detailer
KL&A Engineers and Builders, Golden, Colo.

Steel Team

Fabricator
Western Slope Iron, Grand Junction, Colo.

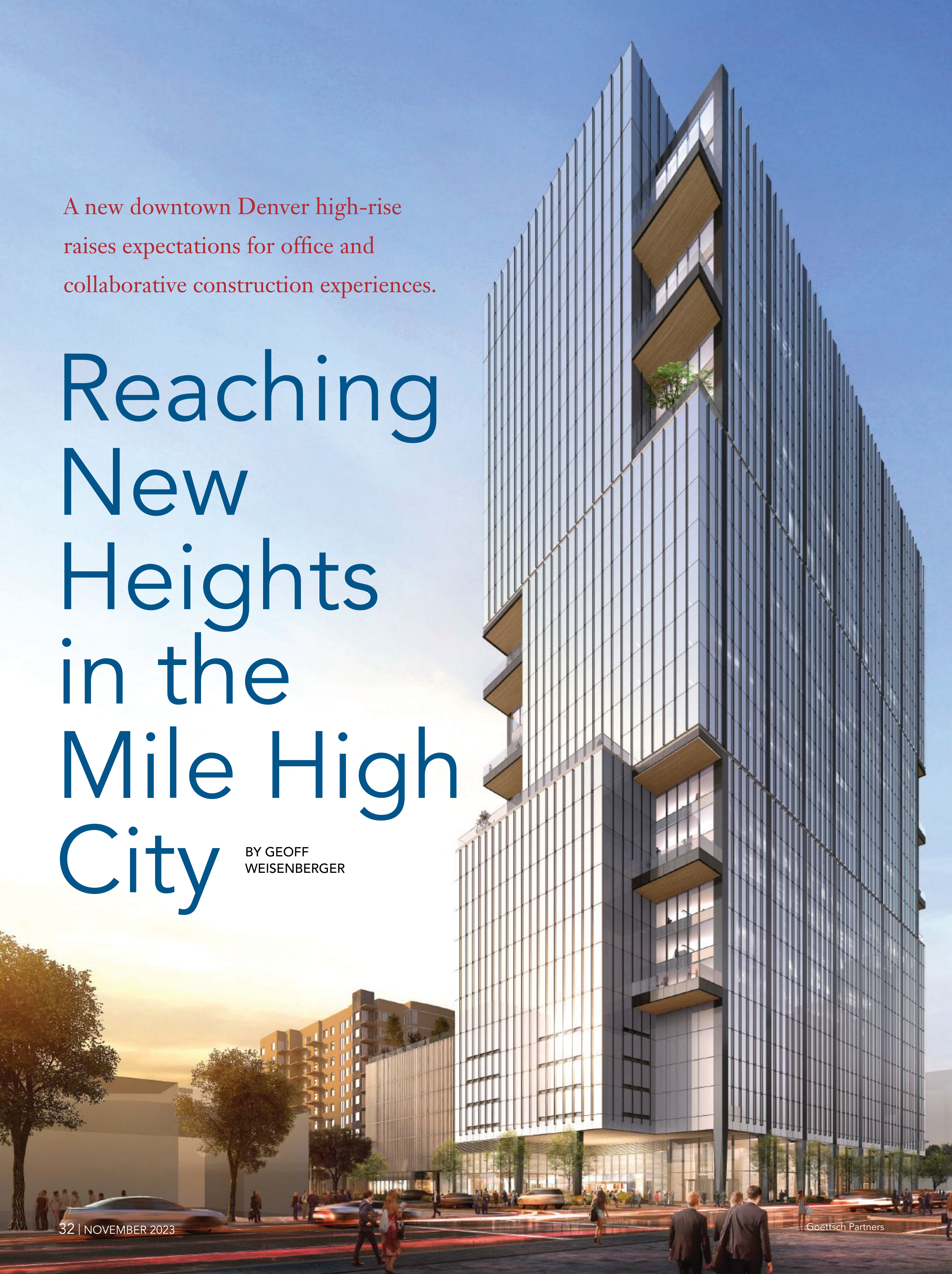
Erector
LPR Construction, Loveland, Colo.

Alex Hesse (**ahesse@kla.com**) is a structural engineer, **Greg Reindl** (**greindl@kla.com**) is a principal construction manager, and **Heath Stein** (**hstein@kla.com**) is a principal engineer, all with KL&A.

A new downtown Denver high-rise raises expectations for office and collaborative construction experiences.

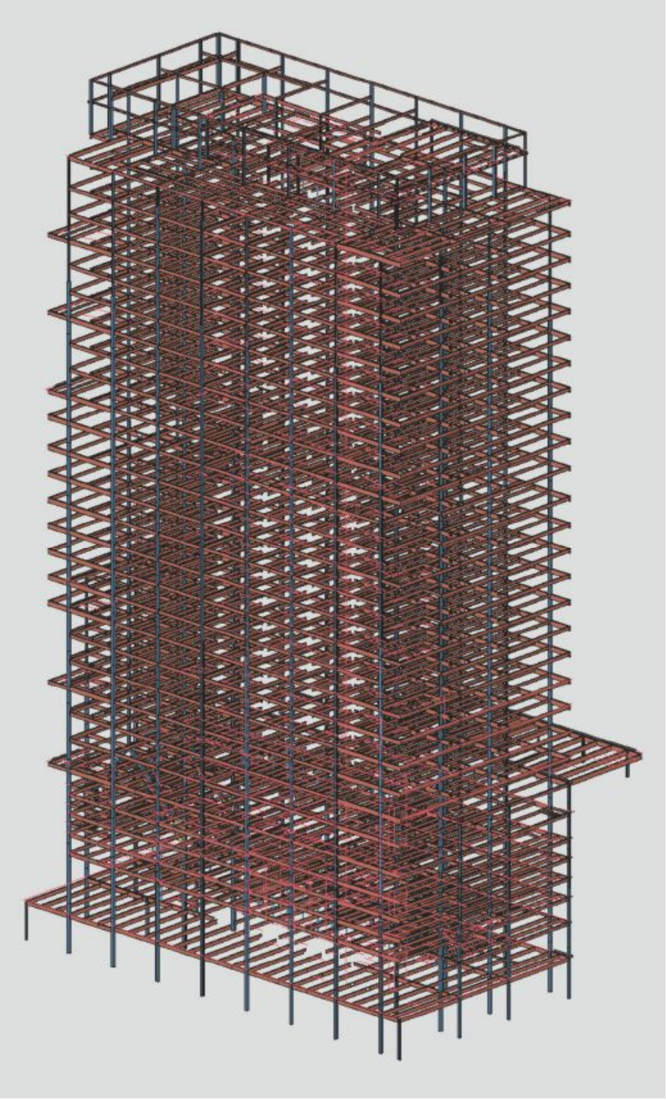
Reaching New Heights in the Mile High City

BY GEOFF WEISENBERGER

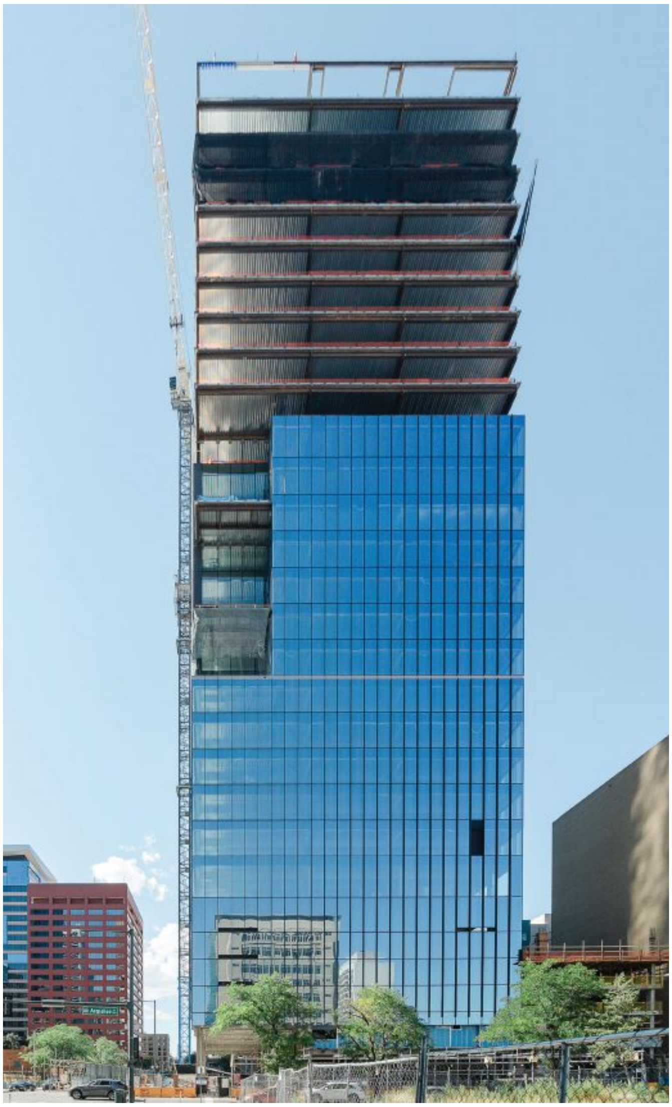


Goettsch Partners

A 3D model of the framing system, which uses 4,571 tons of steel.



The topped-out tower.



DENVER'S ELEVATION HAS ALWAYS BEEN a point of pride for its residents, and steady growth for over two decades—punctuated by one spike in the early 2000s and another in the 2020s, the latter resulting from the COVID-driven "Great Relocation—has resulted in another impressive number for the Mile High City. Between 1999 and 2023, the population has gone from under 500,000 to well over 700,000.

The growth is apparent throughout the city and the greater metropolitan area, but perhaps no more so than the area immediately north of the central business district, where multistory residential buildings have been and continue to be built at a rapid rate.

Many of these buildings are viewable from an under-construction office tower called 1900 Lawrence. And some of their residents will likely end up working there.

The 30-story building, which topped out in September, will reach 400 ft in height and add 720,000 sq. ft of office space (and 1.1 million gross sq. ft) to downtown Denver. And it's not typical office space. The exterior of the steel-framed building, which is clad in high-performance glass that facilitates abundant natural light, is punctuated by multiple terraces, an amenity that's more common in residential buildings than office towers. On the inside, a hospital-grade filtration system and a compartmentalized air supply approach (in which air isn't recirculated from other floors) facilitate the highest quality of indoor air.

Thanks to the steel framing system, the interior area is maximized, with 30-ft bay spacing, a 43-ft column-free stretch between the building core and exterior on all sides, and six corner opportunities on multiple floors due to "cut-outs" at two corners of the building.

The building's location also scores high in amenities and transit, boasting a walkability score of 96, a cycling score of 95, and a transit score of 98 (all out of 100). It's a short walk from Union Station, the River North Art District (RiNo), Coors Field, and the rest of downtown Denver and its surrounding areas.

But what about the structural steel framing system? Is it as impressive as the rest of the building? Members from Magnusson Klemencic Associates, Martin/Martin, and Puma Steel—the project's structural engineer, connection designer, and steel fabricator, respectively—shared how and why they think it is.

1900 Lawrence is adding more than 1 million gross sq. ft to Denver's growing downtown area.

Why was the project built?

Rob Chmielowski, MKA: The developer, Riverside Investment and Development, saw an opportunity for a new Class-A office building in the vibrant downtown Denver neighborhood LoDo (Lower Downtown).

What's the total steel tonnage?

Wade Lewis, Puma: We show 5,969 tons, including structural (4,571), deck (1,200), stairs (156), and miscellaneous (42).

The building has some retail space and a massive lobby space at the base. Was any long-span steel required?

Chmielowski: The expansive 27-ft-tall lobby exists on the south side of the building only. The balance of the tower footprint is dedicated to retail and plaza space. The western plaza's openness is achieved by transferring two full-height tower columns. Each column is transferred via a three-story transfer truss within the parking levels, providing a 66-ft by 121-ft column-free space at the ground level. The transfer of the tower columns also benefited circulation with the parking levels by keeping the columns out of the drive aisles.

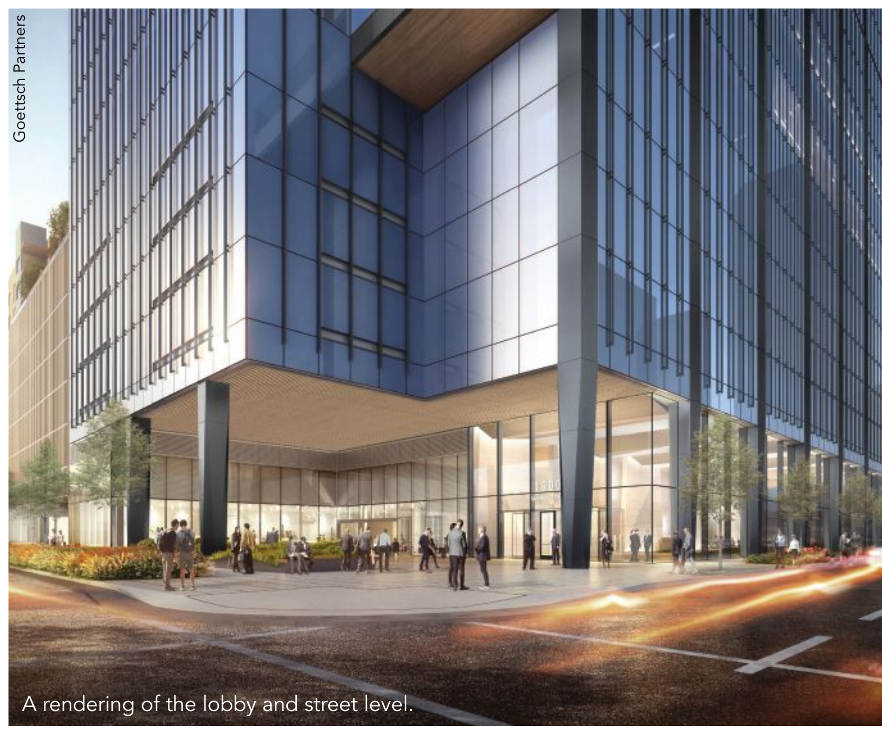
There are a lot of balconies and cantilevers. Is that to provide more amenity space? What were some of the longest cantilevers?

Chmielowski: Cantilevers are commonly used in office buildings to provide highly desirable column-free corners. A typical office floor in this project contains six separate locations where cantilevering of the steel offers column-free corners. Cantilevered framing is also used to create the ten terraces that extend from the building façade at the southeast, southwest, and northwest corners. The terraces provide amenity space for the tenants and are generally 14 ft long.

How well do the glass façade attachments integrate with the steel framing?

Chmielowski: Curtain wall attachments are achieved via a connection to the slab-on-metal-deck, which cantilevers beyond the perimeter spandrel beams. This is a standard installation method. MKA and the general contractor, Hensel Phelps (HP), worked together to develop an agreed-upon structural movement monitoring plan to assess the position of the structure at various stages of construction. The field survey results were compared to MKA's column shortening analysis that was based on the specific stage of construction at the time of survey and, if necessary, adjustments were made in the field. This collaborative process ensured that the structure behaved as anticipated and promoted level floor slabs once the building was topped out.

A zoomed-out rendering of the entire building.



A rendering of the lobby and street level.

A portion of the lobby is two stories.

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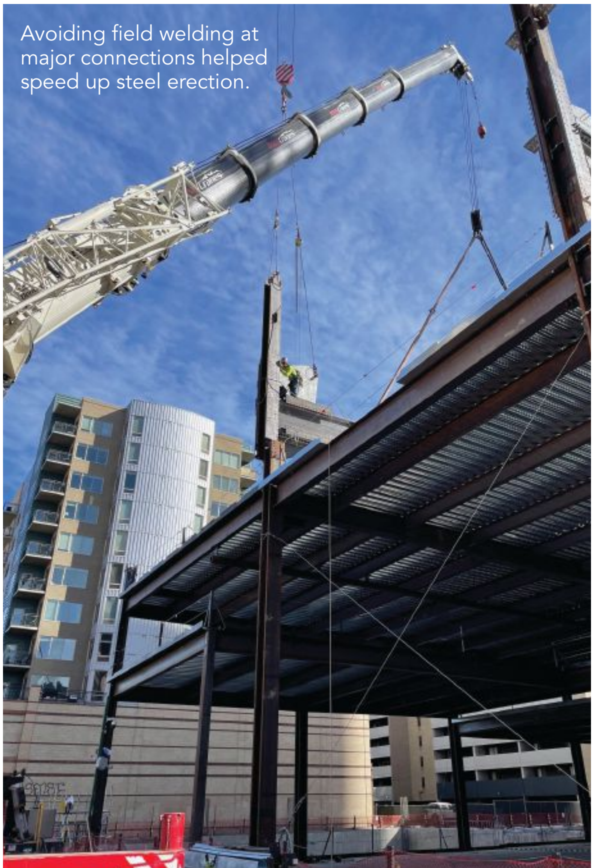
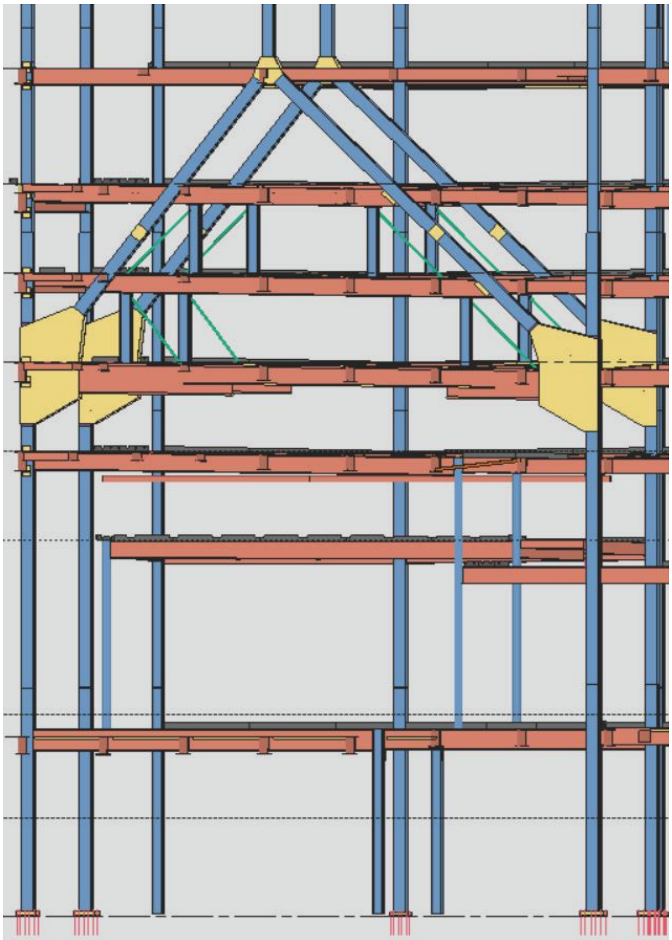
Lifting the bottom chord of the transfer truss.

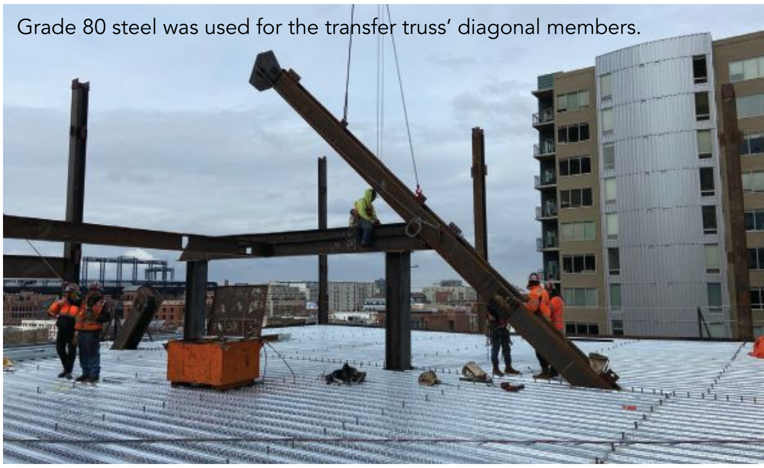
A notched W40 girder was used to improve clearance in the parking garage.


Avoiding field welding at major connections helped speed up steel erection.


Cantilevered framing was used to create the ten terraces that extend from the building's façade at the southeast, southwest, and northwest corners.



A 3D model highlighting the three-story transfer truss that opens up column-free space at ground level.



Grade 80 steel was used for the transfer truss' diagonal members.

Steel framing supports the below-grade parking garage.

What grades of steel were used for the project? I understand that there was more than just 50-ksi. And was the higher-strength steel generally limited to the columns?

Chmielowski: MKA used higher-strength steel (greater than 50-ksi) for most columns to reduce project tonnage. Early collaboration with and feedback from Puma and their material suppliers determined which grade of steel was used for various sizes of columns since, due to material availability, not all sizes are produced in higher grades. In a first for Denver, A913 Grade 80 was used for columns W14×159 and larger. Columns ranging from W14×90 to W14×145 used A913 Grade 65, and columns smaller than W14×90 used conventional A992 Grade 50. Going with higher-strength steel required less fabrication and saved 275 tons of total steel for the columns.

Can you talk about the transfer truss details?

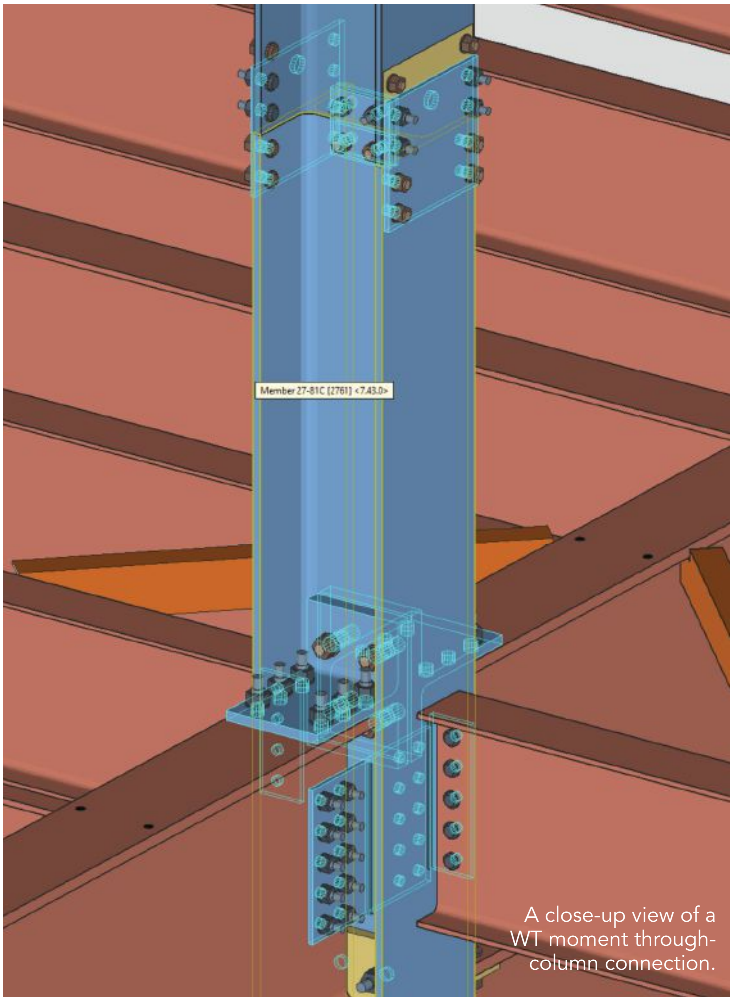
Chmielowski: The transfer trusses are three stories deep and span 66 ft. Each truss supports the force from the base of a tower column. Because the columns are located on the building face, controlling the deflection of the trusses became an important design consideration since excessive column displacement could impact the building façade above. The trusses used standard wide-flange sections (W40×392 for the bottom chords and W14×500 Grade 80 for the diagonals) oriented to simplify the connections.

The transfer trusses improved the openness of the plaza at the ground level and made circulation at the parking garage more efficient. The notched bottom chord alleviated a low head height condition without having to adjust floor-to-floor height at the level under the transfer truss.

What was the thought behind the concrete deck on the steel columns in the lower levels of the garage?

Chmielowski: This is an interesting component of the project. The owner wanted to construct the below-grade parking levels in concrete. A normal construction sequence would involve constructing the below-grade levels before proceeding with the steel framing for the above-grade tower. In other words, cast the concrete columns atop the foundations, then cast the elevated concrete slab, then cast the next lift of columns.

In this sequence, tower construction cannot begin until the below-grade levels are complete. Rather than incur the schedule impacts of this conventional sequence, the project team used an "up-up" construction sequence, which allowed the below-grade levels *and* the tower to be constructed simultaneously. Once the foundations were complete, two-story steel columns were erected to support steel framing at the ground level. Once the ground-level steel was erected, the steel tower could proceed normally. At the same time, the steel columns below grade were encased in concrete, which later would support the cast-in-place elevated parking slab. This sequence saved six weeks of construction time.



A close-up view of a WT moment through-column connection.


The building is located in the northwest portion of downtown, close to Union Station, Coors Field, and the River North Art District.

I noticed a lot of beam penetrations when touring the building. What went into that design choice?

Chmielowski: Beam web penetrations through the W30 girders keep the MEP systems within the beam pocket, which minimized the floor-to-floor height and reduced curtainwall costs.

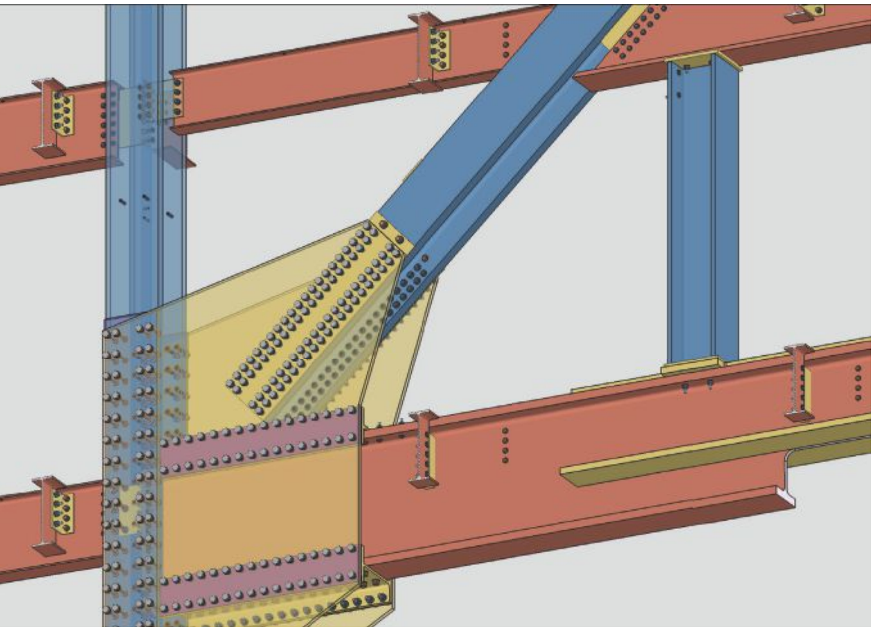
Patrick McManus, Martin/Martin: While MEP systems were generally located below the typical W18 filler beams, haunches in many beams were necessary to maintain the lower floor-to-floor height.

What was connection design like on a project like this, especially when it came to the jumbo sections?

McManus: Puma is a highly automated shop with a general preference toward shop bolting. However, connecting to jumbo sections warrants unique considerations over a simple decision of welding versus bolting. Once Puma became involved, Martin/Martin was immediately engaged because of their intimate knowledge of Puma's practices and preferences through a longstanding relationship. Martin/Martin and Puma worked to develop connection concepts for the most typical connections on the project and the most critical unique connections, such as for the transfer trusses and stepped moment connections. The key connection criteria included:

- Avoid field welding at major connections, which facilitated the speed of erection and allowed for reduced cost
- Avoid complete-joint-penetration (CJP) welds in the shop or field, which eliminated the need for ultrasonic testing (UT) and avoided the need for Charpy V-notch testing of the columns
- Keep welding relegated to the columns, which helped facilitate fit-up to the flanges of the jumbo columns (mitigates flange tilt as an issue) and created a desirable mix of work in the shop. The A913 steel used on this project did not require preheat for flanges greater than 2 in. thick and facilitated this approach to connection design at all levels throughout the structure

In an early predesign meeting, MKA and Martin/Martin came to the table fully prepared. We collaborated effectively to establish a complete understanding of connection criteria (including integrity requirements), agreed on connection concepts to achieve those criteria, and made framing adjustments to facilitate those concepts (such as rotating certain columns). MKA then took the initiative to bring those concepts to the architectural team soon after the collaborative meeting to verify geometries were acceptable, thereby avoiding coordination issues later in the project. One transfer truss connection in particular, which involved orthogonal bolted moment connections, really illustrated the effectiveness of this collaborative effort.



above: A model of the transfer truss connections.

below: The actual bolted connections.

below: The construction team took advantage of an emply street adjacent to the project for crane staging and material delivery and laydown.

above and below: Two views of the cut-out portion of the transfer truss, which was designed to alleviate a low head height condition without having to adjust the floor-to-floor height at the level under the transfer truss.

The space between two buildings to the north of 1900 Lawrence staged the crawler crane. Was it also used for material laydown? That seems like a great situation in a downtown area.

Chmielowski: Since the podium to the (plan) north was off the critical path for the project, its construction could lag compared to the tower. Thus, once the ground level was complete, it could be used for deliveries, laydown, and shakeout, which is highly valuable in tight downtown sites.

Were all connections shop-bolted (i.e., no field welding)?

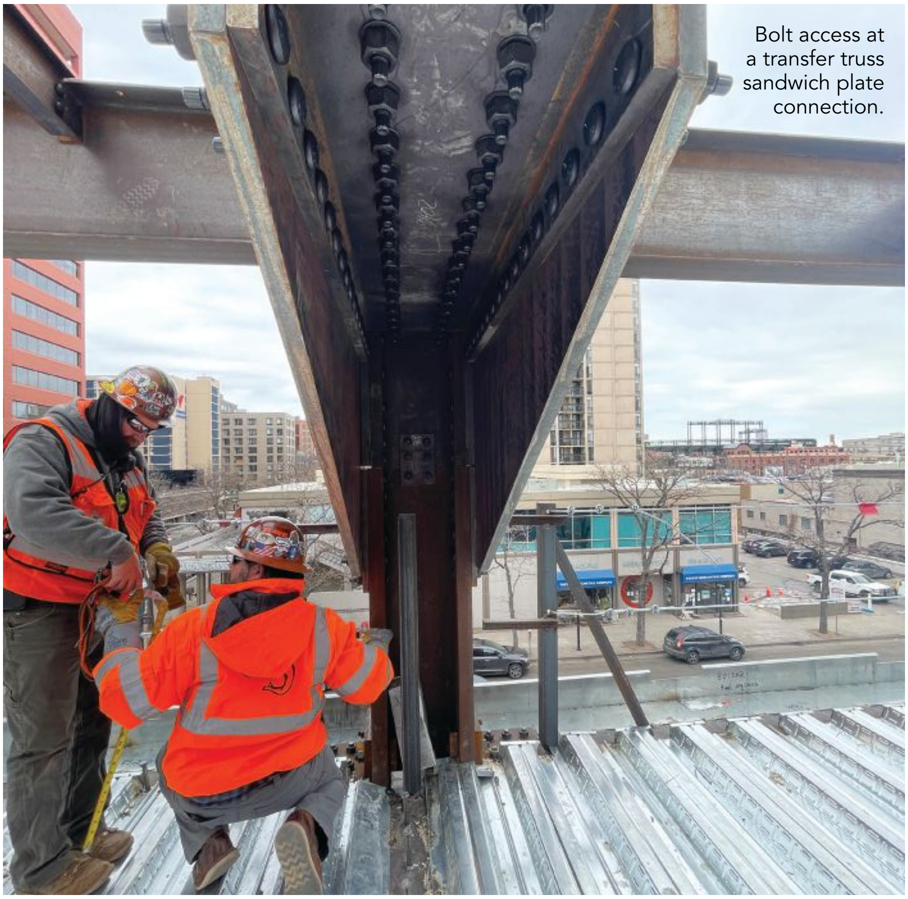
McManus: Shop-bolted extended bent plate connections were used for beam-to-girder connections, and shop-welded single-plate connections were used to connect beam webs to columns. Shop-bolted WTs were used at the beam flanges of most moment connections, except stepped connections where shop-welded flange plates were used at the top flange and shop-bolted WTs at the bottom flange.

At typical cantilevers through columns, the columns were rotated such that the connections could be made to the column web, thereby eliminating the need for continuity plates. In situations where connections were made to the column flanges, a bolted continuity plate was created by welding the stems of two WT sections. Transfer truss connections were shop-bolted, and using these connections avoided field welding at all steel-to-steel connections. The only field-welded connections were at the beam-to-concrete core connections, which was necessary to handle the axial loading and relatively high shear demands in shallow connections at several locations.

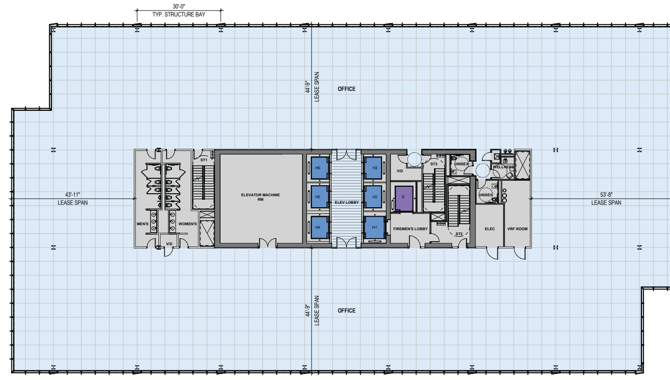
This project involved a lot of collaboration with the engineer and others. When was early collaboration particularly beneficial?

McManus: Much of what made 1900 Lawrence successful was that the experienced design and development team and the experienced steel construction and specialty design team came together with open minds and a true willingness to collaborate effectively.

Chmielowski: The up-up construction sequence required careful coordination between the design and construction teams. Because the below-grade steel columns were left unbraced for two stories until the elevated parking slab was constructed, the design team checked the column designs for a temporary condition with a two-story



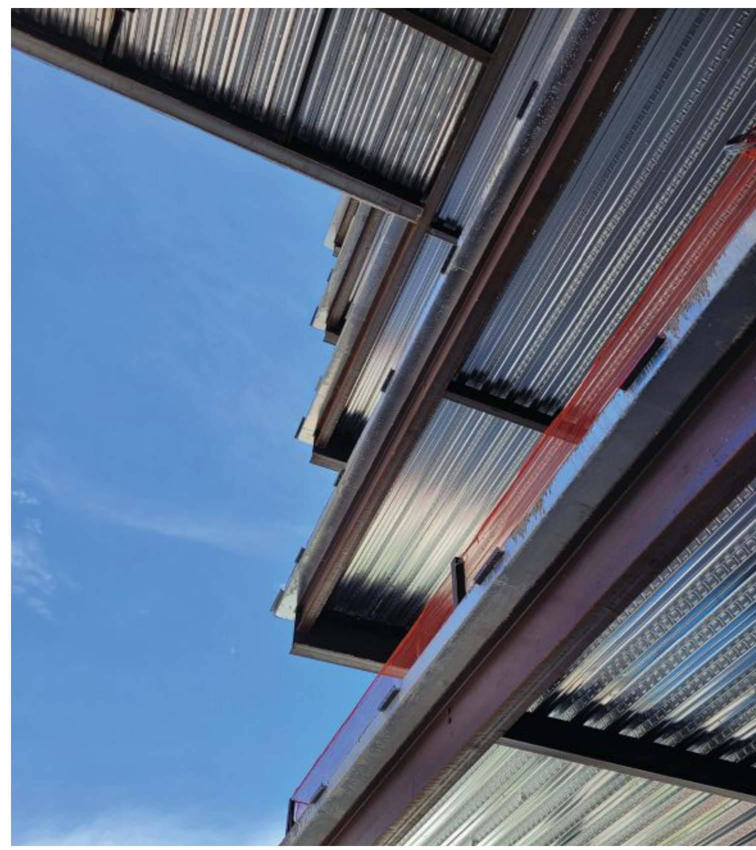
Bolt access at a transfer truss sandwich plate connection.



above: A floor plan of Level 21, a "six-corner" level.

left: Each office floor features 30-ft bay spacing and a 44-ft column-free stretch between the core and exterior on all sides.

below: The building has six corner opportunities on multiple floors due to "cut-outs" at two corners of the building.



below: Steel framing attaching to the concrete core.

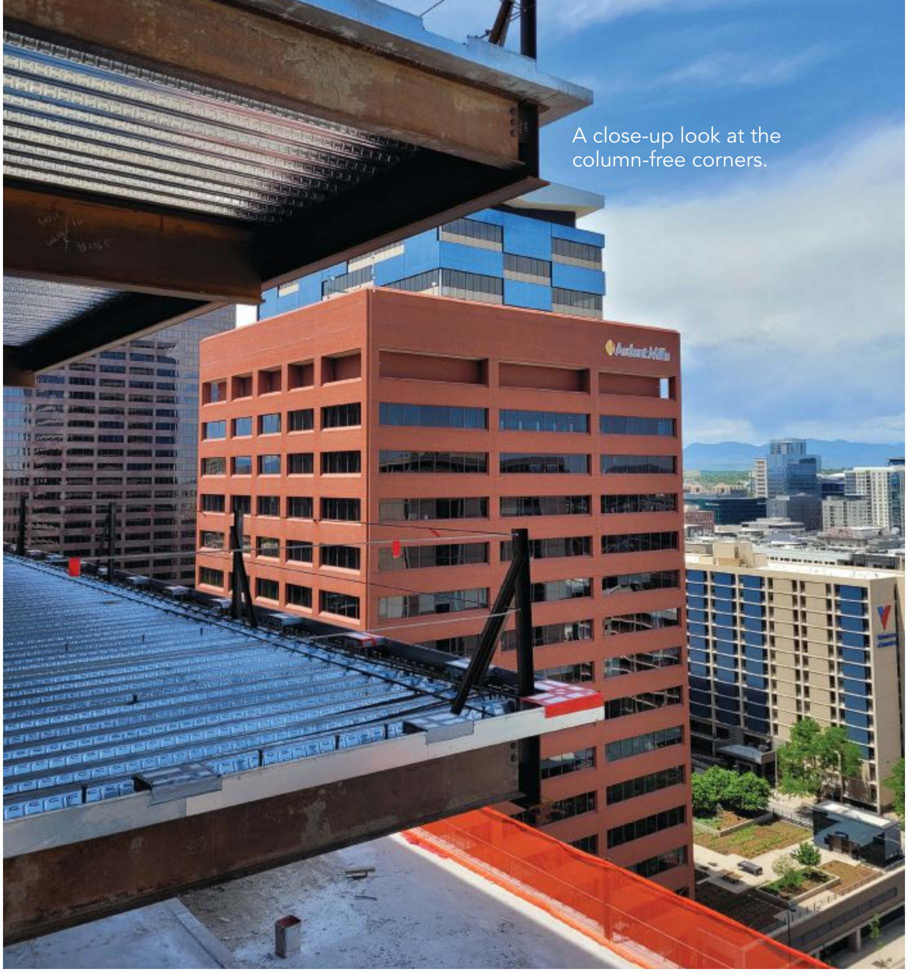
unbraced length but without the full design load, and the final condition with a single-story unbraced length with the full design load. Understanding HP's construction schedule was critical for this exercise.

The design of the columns for various material grades to provide an economical column design required coordination with and buy-in from Puma Steel.

Before construction, MKA and HP worked together to develop a structural movement monitoring plan that was implemented during construction. During construction, the top of column elevations were surveyed after each tier. MKA compared the survey to the expected elevations from our analysis based on the progress of construction and advised if any corrective action was needed prior to the placement of the next tier of columns. The team worked together to share data in real time, with MKA responding to the column surveys within hours.

Lewis: MKA's expected elevations analysis, along with fab and erection tolerance, were spot on. Zero columns had to be modified for any elevation issues.

Chmielowski: Soon after Puma was selected, MKA collaborated with them on several items that improved the fabrication and connection efficiencies. MKA reoriented tower columns to work more efficiently with Puma and steel erector Total Welding's preferred field moment connection detail. They strategically added two beams per floor to match the deck supplier's preferred decking layout and optimized the deck design. At



A close-up look at the column-free corners.

The building topped out in September.

the time, due to pandemic-related supply chain issues, decking costs and lead times increased dramatically. Adding two beams per floor to address decking supply-chain nuances netted cost savings to the project. ■

Owner
Riverside Investment and Development

General Contractor
Hensel Phelps

Architect
Goettsch Partners

Structural Engineer
Magnusson Klemencic Associates

Connection Engineer
Martin/Martin

Steel Team

Structural Fabricator and Detailer
Puma Steel (AISC Certified Fabricator), Cheyenne, Wyo.

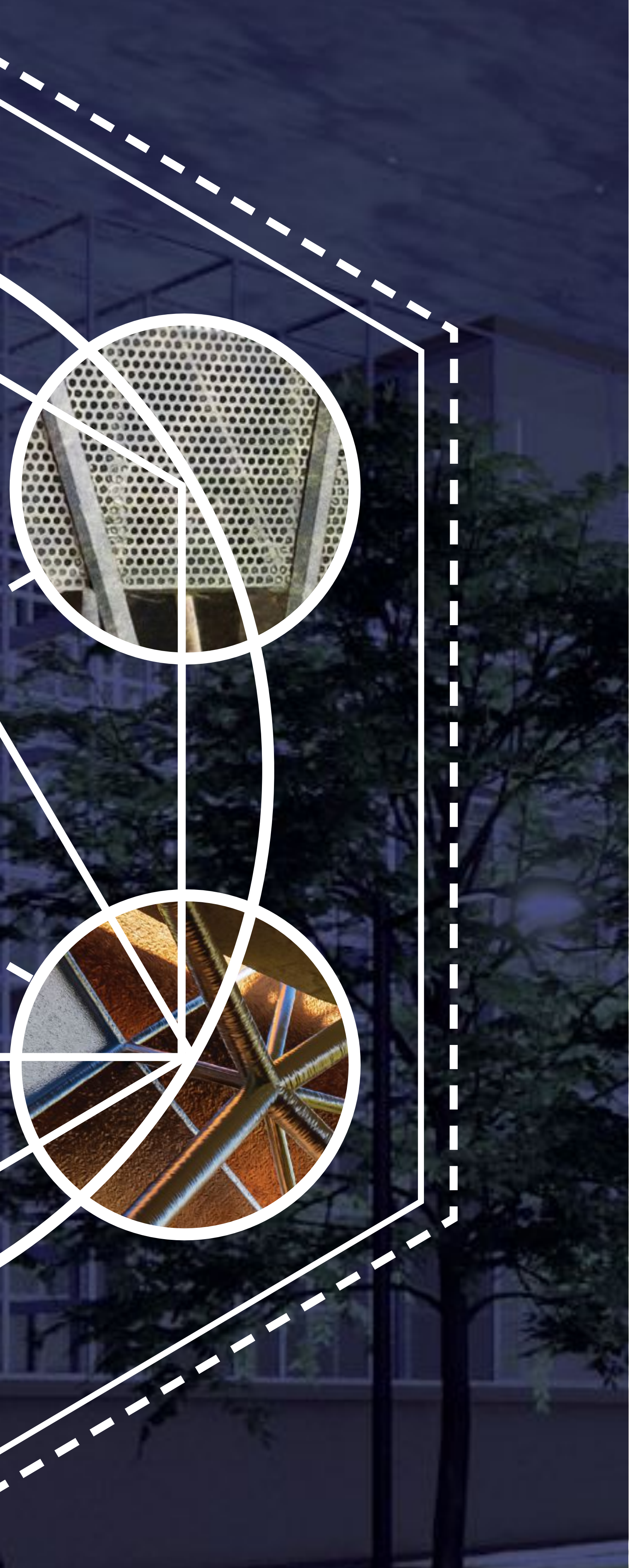
Stair Fabricator
Pacific Stair Corporation (AISC Certified Fabricator), Salem, Ore.

Erector
Total Welding, Inc. (AISC Associate, AISC Certified Erector), Bennett, Colo.

Geoff Weisenberger (**weisenberger@aisc.org**) is editor and publisher of *Modern Steel Construction*.

Rob Chmielowski (**rchmielowski@mka.com**) is a Senior Principal with Magnusson Klemencic Associates. **Patrick McManus** (**pmcmanus@martinmartin.com**) is a Principal with Martin/Martin. **Wade Lewis** (**wade.lewis@pumasteel.com**) is a Vice President with Puma Steel.

Spirited Steel



The 2023 Steel Design Student Competition challenged students to design campus spiritual spaces that welcome visitors of all backgrounds.

A COMMUNITY GATHERING SPACE is crucial in fostering spiritual expression and learning, especially on a college campus.

The 2023 Steel Design Student Competition (SDSC) challenged participants to create a welcoming campus structure that encourages spiritual expression and education in a diverse campus community. It also featured an open category. This year was the 23rd iteration of the competition, which is sponsored by AISC and the Association of Collegiate Schools of Architecture (ACSA).

Eleven winners were selected from this year's two categories. The winning spiritual space projects range from outdoor areas with steel covers to glistening steel edifices. Open category winners included a coral reef restoration hub and a soccer stadium that aims to impact the surrounding neighborhood beyond game day.

More than 1,000 students from 48 schools submitted concepts between the two categories. Students and faculty sponsors who worked on the winning projects won cash prizes that ranged from $500 to $4,000.

The winning projects were chosen by a panel of distinguished jurors:

CATEGORY I: SPIRITUAL SPACE

- Cristobal Correa, Buro Happold
- Michael J. Crosbie, University of Hartford
- Dr. Anat Geva, Texas A&M University

CATEGORY II: OPEN

- Parbi Boodaghian, John A. Martin & Associates, Inc.
- Nesrine Mansour, South Dakota State University
- Maria Isabel Oliver, American University of Sharjah

CATEGORY I: SPIRITUAL SPACE

This category asked students to design "A Place for the Spirit" on a campus, welcoming to all, where members of the campus community and visitors can learn about and express spirituality. Program spaces include places for worship, meditation, learning, and fellowship.

1st

The Sylvan Hideaway

Student: Ludwig Rodriguez
Faculty Sponsor: Gerard Smulevich
Institution: Woodbury University

The Sylvan Hideaway, situated on a suburban university campus in the San Fernando Valley, allows one to find spirituality, peace, and nature. Nearby infrastructure, including freeways and a railroad right-of-way, divides campus from urban parks, and campus is devoid of significant green spaces. The hideaway offers views of the surrounding area and provides student-oriented space and spiritual experiences.

Site contexts of the campus and identifying heavily used walkways helped determine a path that can lead users directly to the site. The site is located at the furthest point on campus, where suburban intersects with the natural world through the nearby mountains. Oak trees wrap the building in a densely covered canopy, creating a calming spiritual environment.

Each floor has a different purpose. The ground floor contains the spiritual space and the multipurpose room, and the second floor houses all administrative offices and entries to the building. The third floor offers student-oriented spaces, like study rooms, a library, and meditation rooms.

Three key concepts about the hideaway were integrated with the design.

A place for the spirit. The spiritual space is located on the ground floor of the building and offers a peaceful indoor-outdoor ambiance to help users feel nourished and relaxed. The 50-ft span allows for a large open area with high ceilings, where the spatial ramp hovers within to integrate the spirit along the ascending journey throughout the building. An outdoor environment that's both inviting and relaxing helps create an enchanted ambiance to go along with the spirit.

The spatial journey. Navigating through the building is a key part of finding the spirit. The spatial ramp is inspired by Le Corbusier's interpretation of an "architectural promenade," which links two floors together to create a space with shadows, light, and

shapes to surprise the viewer. It was integrated into the building as an alternative way to reach all floors and the spirit. At select levels, two landings hover into the spiritual space and serve as a pause point for visitors to peek into the space.

Student-oriented spaces. The third floor was designed specifically for students. A 16-ft-high ceiling allows for a section of study rooms to have a mezzanine level above, where students can study with large tables and peaceful views of the groves. The gallery space, study rooms, and reading spaces are all part of an open floor plan that helps create multiple interaction options through nearby classrooms, reading areas, and casual conversations. For those looking for isolation, two meditation rooms face the spiritual space and the outdoors for a calming meditation environment, ultimately creating a place for the spirit and the student.

CATEGORY I:
SPIRITUAL SPACE
Winners

2nd

The Structural Grove

Student: Grahm Mapes
Faculty Sponsor: A. Katherine Ambroziak
Institution: University of Tennessee-Knoxville

The University of Tennessee-Knoxville's campus master plan called for an existing green space to be replaced with a new interdisciplinary building that includes education and spiritual components. The building will provide a central gathering location for students and preserve most of the green space that would have been removed to make way for a more traditional academic building.

Designers are typically informed by the built elements of the structure and how they influence the occupants, movement patterns, sightlines, and views. The existing natural elements are often not considered in the same dialogue as the built environment. This design aims to create a structure in collaborative dialogue between the built and natural landscape of the selected site.

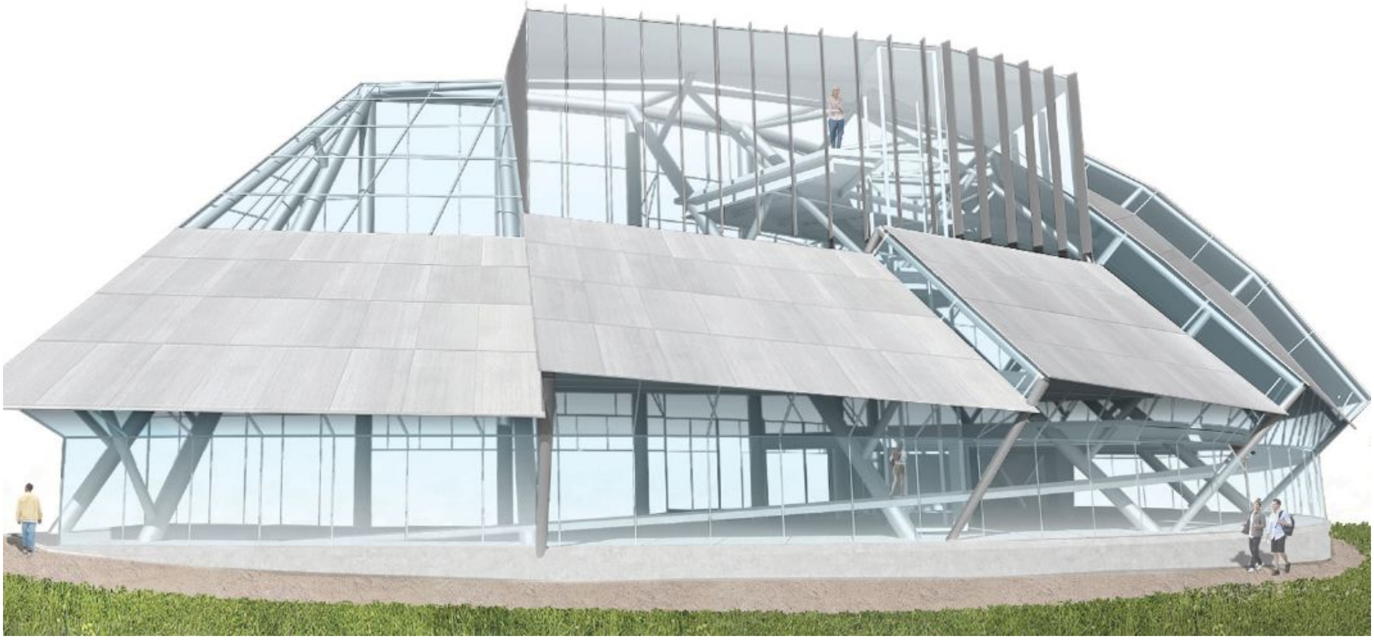
Diagrams were developed based on the natural characteristics of the site and the patterns of human occupation, which helped reveal a common grid for all trees on the site and acknowledged that occupancy followed seasonal patterns. This discovery led to the decision to implement a grid layout that references the grove. Steel columns create an abstract representation of the trunk, while soaring trusses mimic the branches holding the flowing canopy above. The dialogue between the structure and site creates a form better integrated in the natural landscape whose experiential qualities both enhance and are enhanced by the environment.

The project is split into two distinct programs: a spiritual structure and an educational structure. The former houses spiritual space, multipurpose space, and major offices for spiritual directors. The educational structure contains classrooms, study rooms, and a library. Both are organized to accommodate current patterns of traffic on the site and reference the structural grove and the major existing regulating lines. A series of solid blocks of the program are placed in the void of each structure created by the free plan layout. Some of these blocks have been carved out to create a void within the solid moments. This carving process extends to the exterior facade to create outdoor spaces, revealing the structure that supports the building.

The design embraces the existing landscape and hardscape, molding how occupants interact with these spaces. Its materiality and unique structure defines the spiritual space. The dihedral design supports weathering steel cladding that envelopes the entire spiritual space and the suspended roof with a 70-ft span. Pedestrians funneled through the newly defined open-air environment are welcomed by the calming presence of the spiritual space, a pocket of sorts that is impenetrable from the exterior while dissolving within. The meditative and quiet spaces push further into the existing tranquility of the grove, encouraging nature and spirituality to coincide.

The structural concept for this project is a free plan design with a column grid referencing the existing tree grid. The structure is partially buried in the ground as it approaches the grove's grid pattern, creating an additional layer of dialogue through the integration of natural landscape and the newly built environment.

Lastly, the design also strives for a high-performance building, and a massive south-facing curtain wall incorporates a series of louvers to reduce the solar gain within. These horizontal and vertical louvers, coupled with light shelves, will reduce solar gain within the structure by 63% and only reduce daylighting by 9%.



Luminae Sanctum: Bend, Diffuse, Self-Reflect

3rd
Student: David Covarrubias
Faculty Sponsor: Gerard Smulevich
Institution: Woodbury University

Luminae Sanctum orchestrates steel and light to craft a spiritual haven. It carefully captures and diffuses sunlight, harnessing it to evoke a greater sense of self and provide a moment for reflection. It has a diverse range of indoor and outdoor spaces and aims to create a welcoming environment where individuals from various religious backgrounds can explore and express their spirituality.

The project objective is to promote the selfless sharing of one's spiritual dimension. The design incorporates educational spaces to facilitate learning about different religions and belief systems, as well as areas for worship, meditation, and refuge. The goal in placing the building near the campus entrance and diagonal to the main quad is to foster inclusivity and curiosity.

The design has ample natural light that ideally evokes different moods and inspires self-reflection. It incorporates anHSS structure that supports an exterior façade system, creating a sundial effect with the sun. Overset panels allow bands of harsh light to enter the spaces, enhancing the overall atmosphere.

Luminae Sanctum takes inspiration from the dedicated trees of the university's forefathers, using their path as a starting point for the spiritual journey. The manipulation of light through the building's shell guides the internal journey and allows for bending and diffusion of light at different times of the day. The journey culminates at sunset when direct light beams into the main spiritual space through the façade and merges with the diffused light from the north.

The qualities of light in each area determined the arrangement of programmatic spaces. The south-facing façade acts as a protective shield, sparing the interior spaces from harsh light, heat, and sound from the surroundings. The overset skin panels maintain this shield function while letting beams of south light through. The north-facing curtain wall runs along the interior curve, enabling diffused north light to illuminate all spaces.

The façade serves as a medium for characterizing the interior spaces, with the main spiritual space being the brightest and most dramatically lit. This central space is visible from all other levels, creating a focal point within the structure. The direct light perfectly gleams through the space at sunset.

CATEGORY I: SPIRITUAL SPACE
Honorable Mentions

Along the Spine – Using Recycled Materiality to Induce Spiritual Splendor

Student: Julia Goodman
Faculty Sponsor: A. Katherine Ambroziak
Institution: University of Tennessee-Knoxville

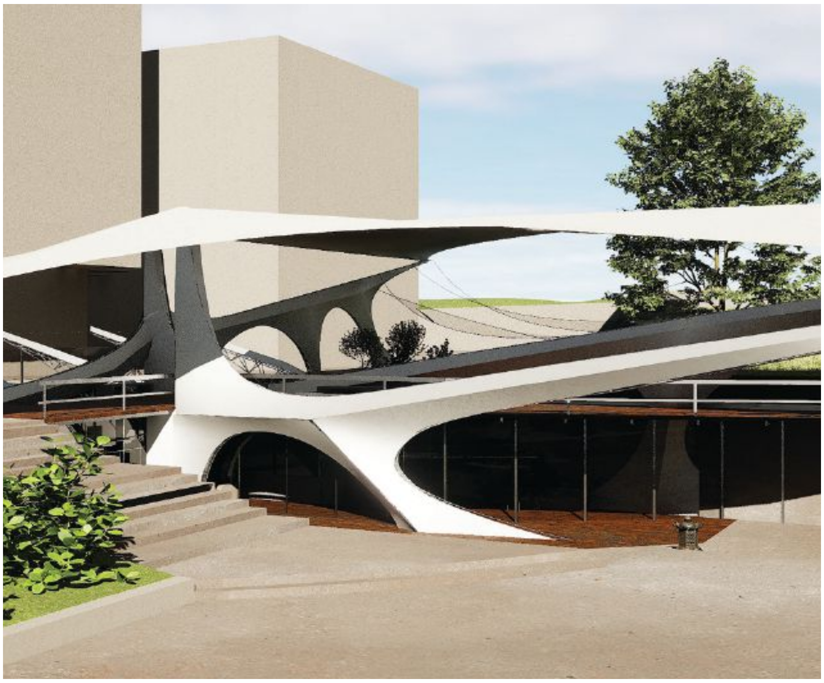
The University of Tennessee-Knoxville's campus has plenty of spaces that promote student physical and social well-being. None, though, provides the experience of spirituality and purpose. This project aims to draw students into a spiritual space that embeds itself within the existing spaces of the site, mimicking how a search for spirituality and purpose is embedded within our nature.

A space along the spine of campus blends modular function with supernatural form. Its many dualities intentionally tap into those of spiritual practice, organizing itself to induce the desired conditions on its occupants. Form emphasizes the split condition of sound qualities in the space. Reverberating curved steel panels stretch out a tensile roof that appears almost weightless in the more open and inviting spaces, promoting conversation and music. This condition transforms into the recycled space of the parking garage, supported by raw steel cantilever ribs and rammed earth that soaks up sound and induces a meditative state of mind. Lighting also purposefully exercises this polarity, the reflective nature of steel and the openness of the supertrusses being directly in contrast to the darker, more secluded qualities of the subterranean levels.

The space is situated at the heart of campus and lends itself to drawing in students. Its natural slope allows for a visually interesting change in elevation. It's bustling with energy yet can still successfully provide meditative qualities through the recycled use of the subterranean parking garage.

The spiritual space defines itself by structure and materiality. The structure emulates a sense of otherworldly yet understandable form using force-load-based organic super-trusses that extend upwards to the already bustling amphitheater.

Materials used would complement the site and reground the complex structure by maintaining a simple balance between steel and concrete, a material already heavily present on the site. The community gathering spaces and classrooms are within light, vibrant, and reverberating steel arms that promote conversation and music. The meditative and quiet spaces are situated within the dampening calm of the existing parking garage, which has been carved out to emulate a cathedral-style hall.



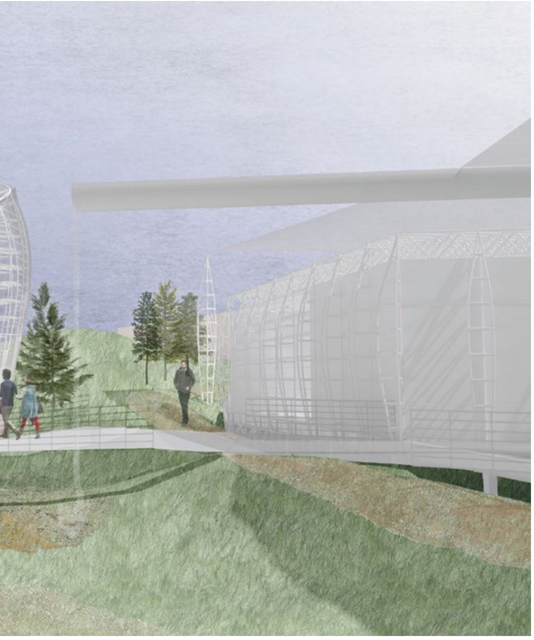
The Steel Collector: Reclaiming Landscapes

Student: Elsie O'Connell
Faculty Sponsor:
A. Katherine Ambroziak
Institution: University of Tennessee-Knoxville

For many people, nature is spiritual. For others, it's a connection to what came before. As the environment becomes threatened worldwide, colleges with densifying campuses are cognizant of their dearth of green space and the lack of value placed on the student experience and student health. A spiritual space introduces the interconnectivity modern campuses seek while making students feel seen no matter their identity. Green space becomes more than a space to occupy—it's a way to amplify and serve a spiritual center.

Knoxville's third creek separates The University of Tennessee's agricultural campus from the main campus, creating a plot of land encircled by water and spanning out to cliff sides and mountains. This pocket of land is viewed as an archeological artifact and possesses layered histories of value toward the environment.

This site was also chosen as a final resting place for what is estimated to be the Hamilton indigenous tribe, whose burial mound dates to about 640 A.D. The university has not always made efforts to preserve the mound, and in the 1980s, built a parking lot just 50 ft away with a small park dedicated to the mound.



This project proposes a reclaiming of the parking lot to restore it to a public greenspace that will be home to an energetic spiritual center. The architectural landscape ties people through heightened awareness of the natural resources of this region through a structural expression of local wind, water, and sun patterns. The landscape preserves existing circulation while the remaining earth falls away, forming soft craters holding programmatic spaces. Views of the mound from the public entrance of the UT Botanical Gardens are reinforced through earthen paths and the framing of woven steel spaces.

The structure takes on a complex dialogue of a small cityscape, with normative spaces adapting piered trapezoidal forms to engage southern orientation and allow the ground to remain landscape. The spiritual space functions as a sundial enclosed in glass, with rammed earth floors and seating that rests upon the ground. Inspired by the earthen mound, the height of spaces is dependent on sacredness, with the most sacred touching the earth and the most mundane being lifted farthest from it. Roof systems collect and channel water into dry creek beds, while the structure filters sun and expresses wind through a vertical truss and cable system.

The proposal is in part a steward of the landscape, inviting sustainable strategies and the use of plants in service. It's also a spiritual collector of rain, sun, and wind. Steel provides an extremely lightweight delicacy and woven rhythm incomparable to any other structural material.

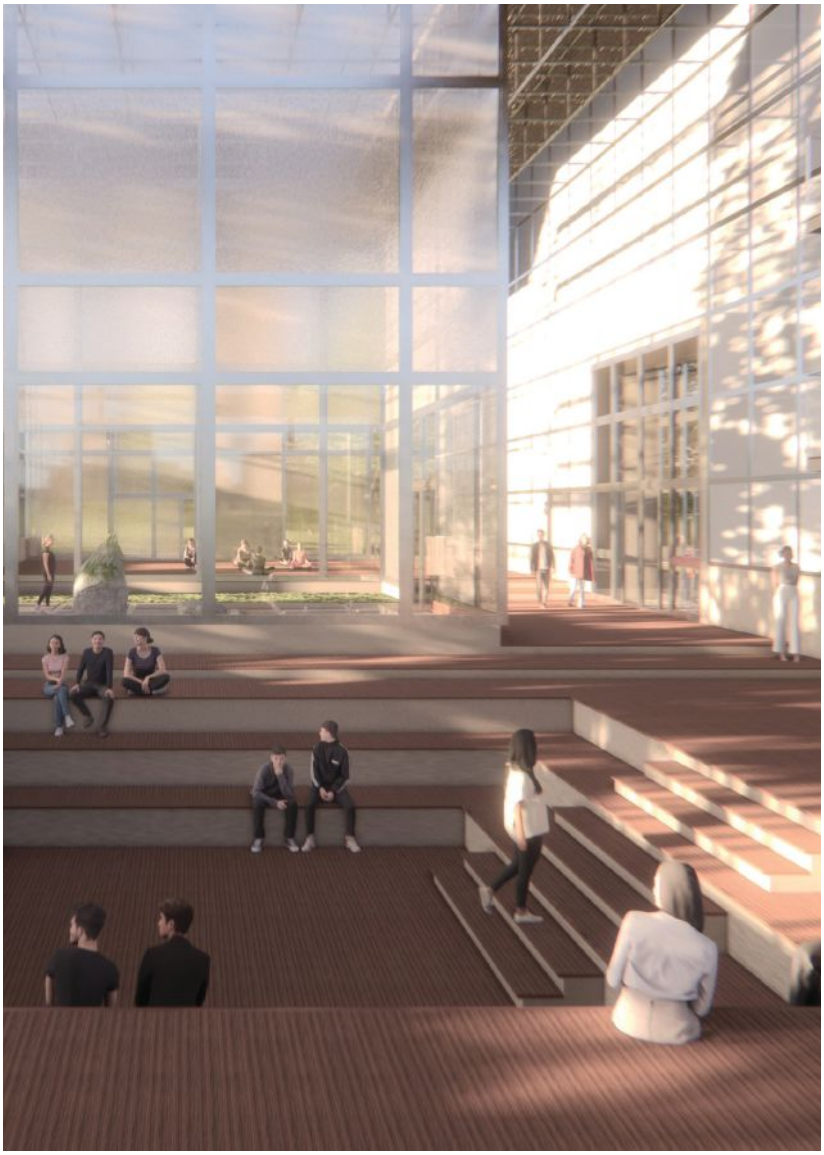
Gridded Minutia

Student: Becca Northey
Faculty Sponsor: Timothy Gray
Institution: Ball State University

This project embraces spirituality through a sense of simplicity and connection to a site.

The simplicity is portrayed by referencing the grid origin of steel structures. But out of simplicity arise subtle complexities. The project is a primary welcome point to the north campus, and its programmatic elements are divided into two volumes. The two buildings complement each other and meet at the courtyard, a node reminiscent of an embrace. The courtyard is designed around an existing old-growth maple tree, which informed the siting of the built components.

A relatively simple building that houses the functional components of the program celebrates the unique quality of the more complex sanctuary building through contrast. The two buildings define an exterior courtyard and are connected through a below-grade passage. The dynamic between the two halves acts as a spiritual acknowledgment and acceptance of life's good and the bad moments and allows for thoughtful transitions between the interior and the exterior. The project explores lightness and darkness by transforming radically between day and night.



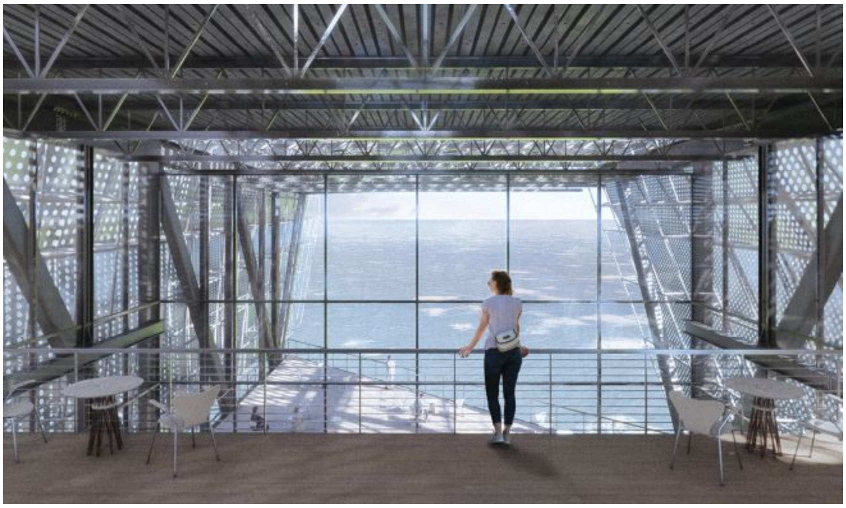
CATEGORY II: OPEN

Architecture students selected a site and building program using steel as the primary material. This competition category permits the greatest amount of flexibility for any building type.

1st

Coastal Canvas

Students: Nolan Courville and YunIn Jeung
Faculty Sponsor: Pasquale De Paola
Institution: Louisiana Tech University



Located on the coast of Australia near the Great Barrier Reef, Coastal Canvas serves as a hub for coral reef restoration, research, and art. The building's expressive steel structure is designed to coexist with coral reefs and promote their growth. It represents the harmony between steel and nature, showcasing the potential for innovative design that contributes to environmental conservation.

The site has a steep slope with little to no coral growth, meaning construction will not damage existing reefs and should improve coral growth conditions. The building's cantilever over the ocean minimizes its contact with the ocean floor and reduces its potential impact on the marine environment.

CATEGORY II: OPEN
Winners

Beneath the water, rebar protrudes from the building's concrete foundation and offers conditions suitable for coral growth. It acts as a canvas for local artists to create and display rebar sculptures. Artists are invited to stay and work on their coral-inspired creations while researchers and visitors experience the beauty of the coral ecosystem through scuba diving or snorkeling. The building's focus on art and science creates a unique space for people to connect with coral while learning the importance of preserving it.

Research has shown steel rebar's rough surface provides an ideal substrate for coral larvae to attach and grow, which fuels up to five times faster growth rates than traditional growth methods. Using steel as a symbiotic material with coral emphasizes the importance of protecting marine habitats.

2nd

La Bella Vita

Student: Maiten Rodriguez
Faculty Sponsors: Awilda Rodriguez, Paolo Sanza, and Blake Mitchell
Institution: Oklahoma State University

A new stadium should consider the before and after of a big soccer match, not just the match's duration. It should aim to become a staple of the community's everyday life.

La Bella Vita in Milan, Italy is meant to improve the experience of visitors and the local community and create a coexistence between nature and technology. Local families and town visitors are welcome to gather at the stadium plaza any day or at any time. It's a place for people to meet and get away from Milan's busy downtown. This is not only a soccer stadium that could fit any other city in the world, it's a design that would truly belong to the site and to Milan.

Milano Innovation District (MIND) is an urban development seeking a more sustainable future for the community of Milan with an integration between nature and functionality. MIND's main concept is to create a unique and connected open environment extending through

the whole ground floor, achieved in part with buildings designed for maximum permeability at street level. Following MIND's goal, the stadium has an almost fully open ground floor, bringing nature directly inside. A simple yet elegant steel structure inspired by Milan's elegance and style holds the stadium tiers and roof. A second structural system separates the skin from the tiers, creating a circular-shaped stadium. Its bowl is rectangular, allowing maximum seating area and proximity to the field.

CATEGORY II: OPEN
Winners

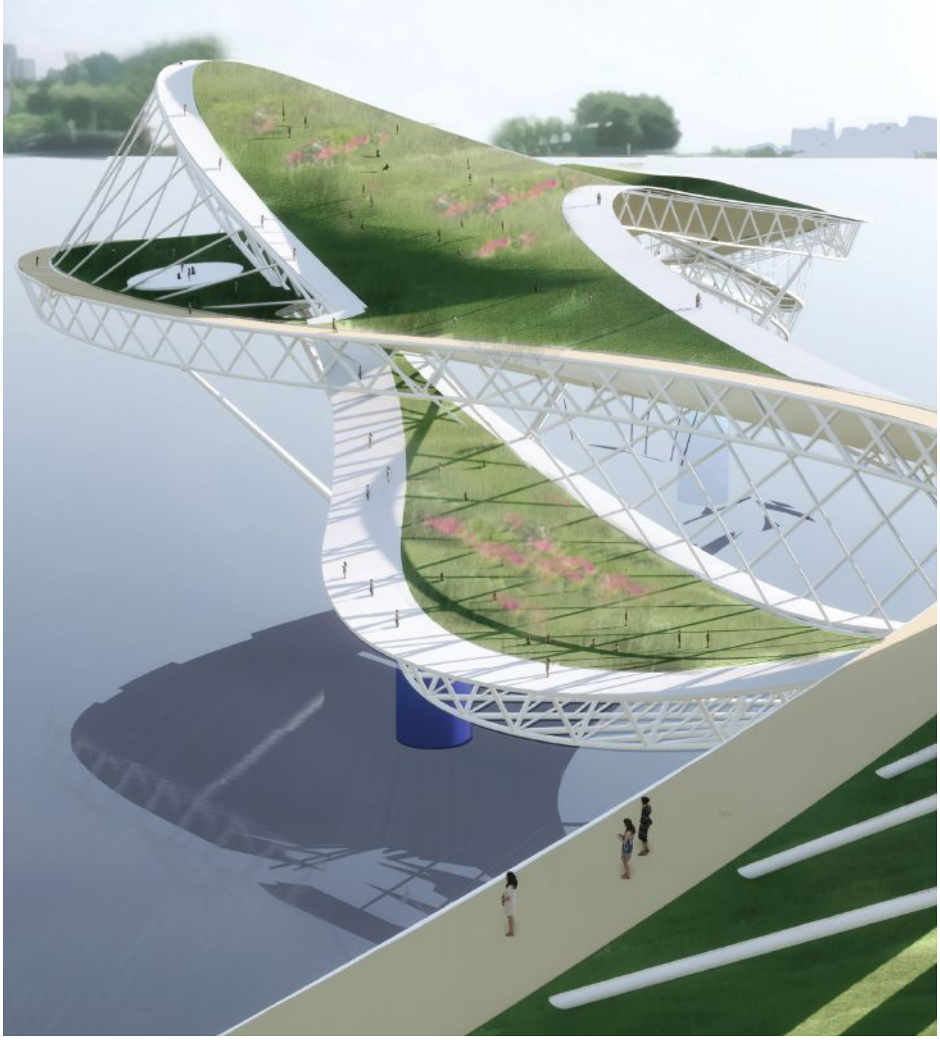
Back to the Nature

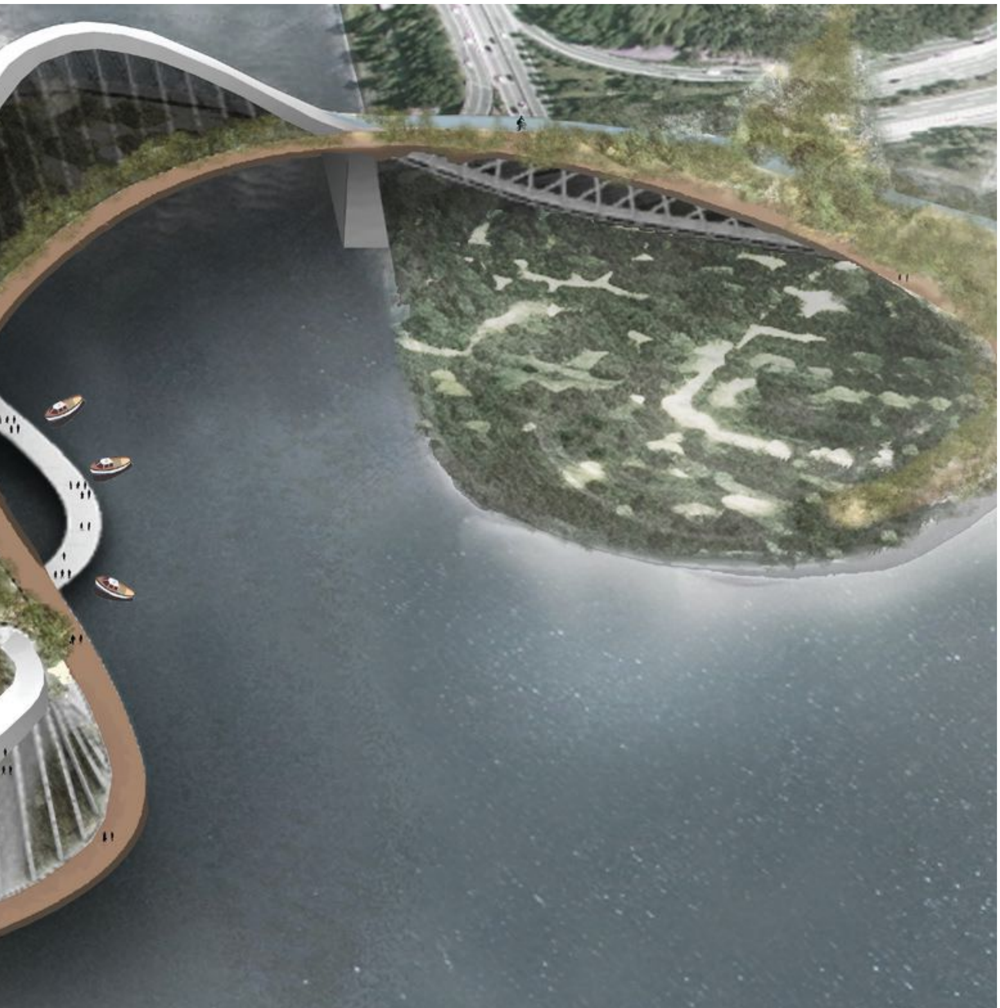
3rd

Students: Chunya Wu, Siwei Su, Yiwei Liu, Jiaqi Xu, and Matthew Lawson
Faculty Sponsor: Clark Llewellyn
Institution: University of Hawai'i at Mānoa

This structure in the densely populated city of Seoul, South Korea that spans a Han River tributary holds not only structural importance, but also social significance in the urban context. Its goal is to enhance the quality of life for residents by increasing green spaces and public areas, providing opportunities for connecting with nature and engaging in communal activities. This bridge serves as a vital link between green landscapes on each side.

The design incorporates the essence of a no-longer-present mountain range in Seoul. Historical maps reveal that the bridge's location was once part of a continuous mountain range, which was lost over time due to urban development. The project's objective is to restore the ancient topography of Seoul by reconnecting the mountains on both sides of the river, forming a seamless mountain range once again.





The surrounding area near the bridge's base currently boasts lush greenery that is fragmented and separated by the river. The bridge would serve as a unifying link between the green spaces, creating a vast habitat and enhancing the urban environment. The project aims to preserve and protect the surrounding plant life, fostering a thriving ecological system for the city. Moreover, the bridge can act as a catalyst for growth with branches extending into the city, inviting the entire community to embrace nature once more.

The bridge's main structure consists of a large curved truss, which provides essential support to the bridge deck through a combination of cables and additional trusses. The deck itself is also constructed using trusses. Visitors to the bridge can traverse along the curved trusses that yield panoramic views of the Han River from above and directly connect with the water below. The whole system consists of the main truss system with cables and pillars. In addition, there are connections between the facade and the structural system designed with common joints.

The bridge incorporates separate paths for bicycles and walkers, with a landscaped area in between. The Seoul living room and a greenhouse are on the bridge, offering generous space for a variety of activities. The living room serves as a versatile area where individuals can engage in diverse pursuits. The greenhouse provides an opportunity for the public to adopt a plot of land and cultivate their own crops, while also participating in nature education activities for children. Numerous public spaces are available for communal use along the pedestrian path and in the landscaped area.

Sigillum

Student: Ana Krekman
Faculty Sponsor: Daniel Brown
Institution: Savannah College of Art and Design

The Sigillum Planetarium is more than a celestial observatory. It's a place where curiosity and wonder converge, inviting everyone to join in the cosmic journey, transcending the boundaries of time and space, and leaving an indelible mark on the spirit of exploration.

Nestled in Asheville, N.C., it beckons individuals to embark on transformative journeys of discovery through the cosmos. This architectural marvel symbolizes a meteor leaving a lasting mark on the earth as a testament to our boundless fascination with the night sky.

At the heart of the design is Sigillum, a retractable dome that serves as the focal point and dynamically adapts to the day and night conditions. This innovative feature grants stargazers an unobstructed view of Asheville's mesmerizing night sky, allowing celestial wonders to unfold before their eyes. The vision for this project was to create a space that is equally vibrant at night as it is during the day, offering a safe and exhilarating environment for all who come. The planetarium seamlessly integrates with the surrounding park, fostering community engagement through observation decks strategically placed on and around the structure.

The ETFE double membrane panels adorning the façade serve a dual purpose. They protect the structure from heat gain and other external factors, and are also incorporated into dome-like shading structures scattered throughout the park. These panels offer shading during the day and emit a luminous glow at night, limiting light pollution and enhancing the experience of the celestial systems above. Observation decks are thoughtfully designed to ensure an optimal environment for observing the stars and other cosmic phenomena.

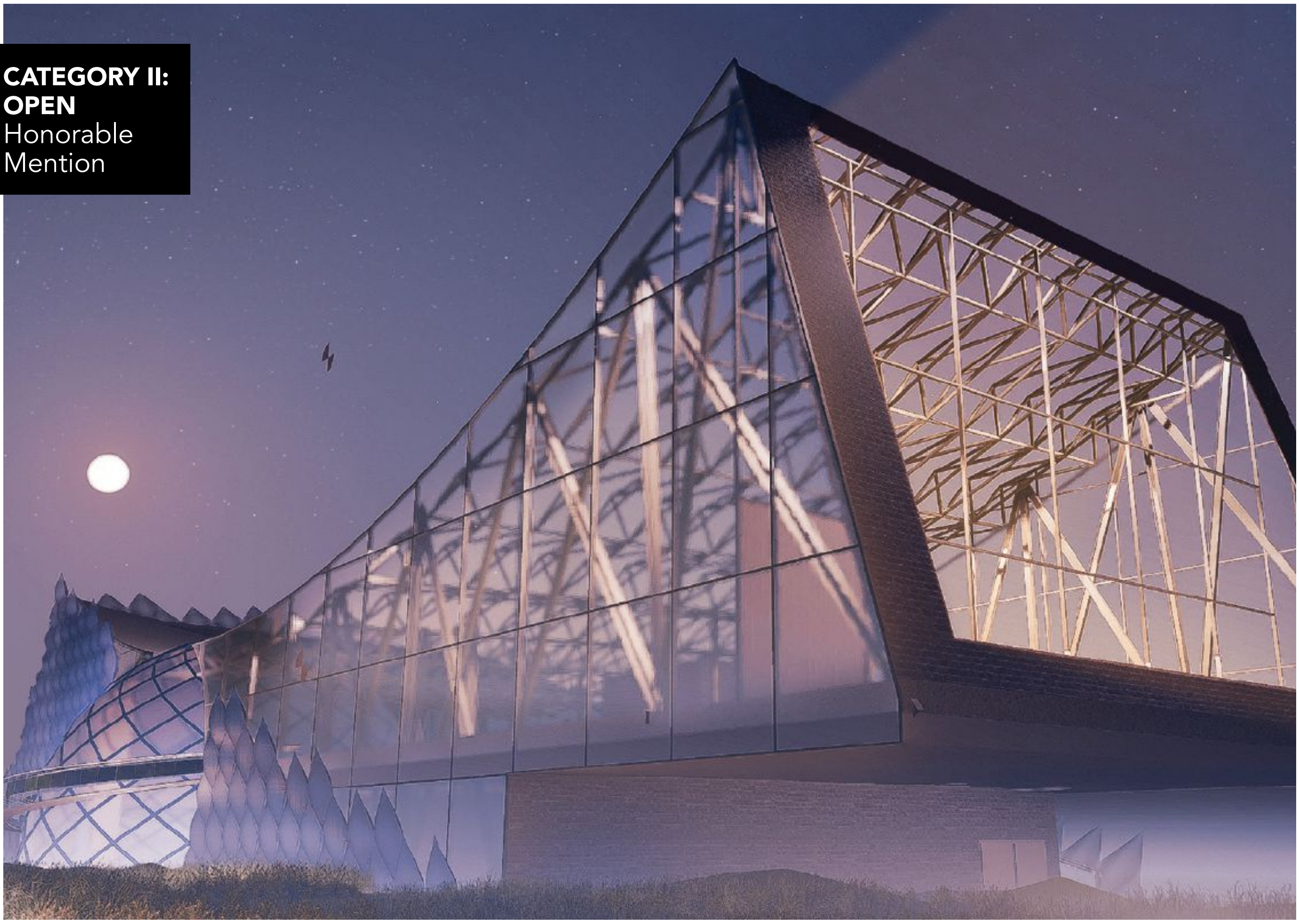
In line with the design philosophy, the park's pathways are divided into hard and soft surfaces, accommodating pedestrians and bicyclists. Potential patrons were categorized into leisure, culture, adventure, and growth to craft a holistic understanding of use when creating the spaces.

Inside Sigillum, spaces are meticulously intertwined based on function and practicality. Visitors move freely on ramps from the ground level (exhibition) to the basement level (education) and the top deck (experiential). ADA accessibility was of utmost importance and echoes the central theme of the structure: participate, not speculate.

To further enrich the ground level's purpose, the exhibition doubles as a hub for local artists from the Arts District across the river. The symbiotic connection between the planetarium and the local community reinforces the commitment to nurturing creativity and collaboration within Asheville.

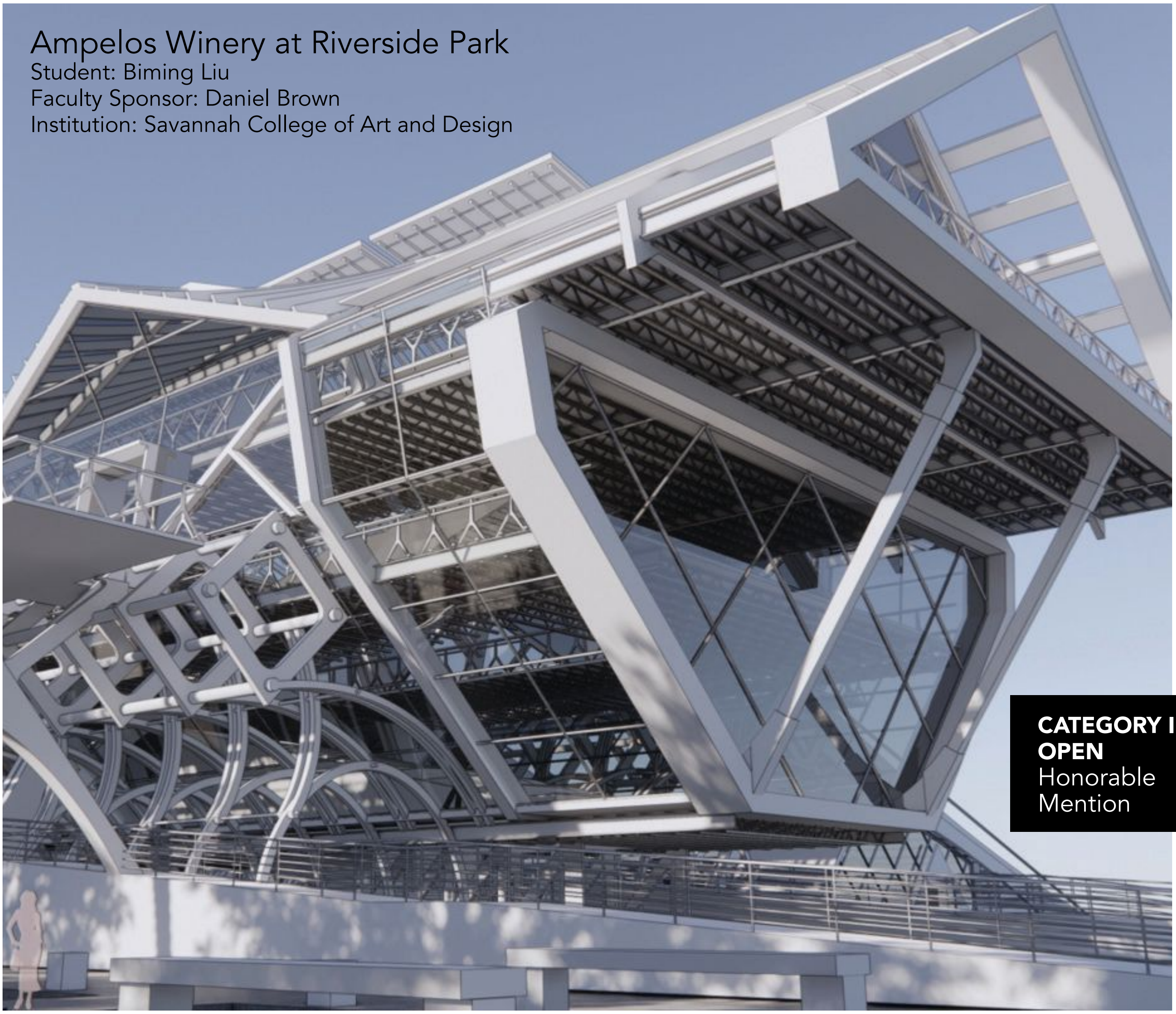
In a nod to sustainability and local pride, the structure's building blocks incorporate concrete made from barley malt waste, a byproduct of a local brewery. This not only minimizes material waste, but also serves as a symbolic link to Asheville's brewing heritage.

CATEGORY II: OPEN
Honorable Mention



Ampelos Winery at Riverside Park

Student: Biming Liu
Faculty Sponsor: Daniel Brown
Institution: Savannah College of Art and Design



CATEGORY II: OPEN
Honorable Mention

Ampelos Winery is at the heart of Riverside Park in Asheville, N.C. More than just a place to savor and craft exquisite wines, it stands as an ideal destination for exploring and indulging in nature, time, and culture.

The winery's architectural design melds multifunctionality, eco-friendliness, and a unique experience. The main building's elevated structure showcases originality. The steel arches on either side function as pathways for bicycles and epitomize the harmonious blend of modern material technology with classical architectural aesthetics. These arches elicit profound admiration for their craftsmanship and simultaneously serve as the building's façade, offering a visually striking appearance.

The sunken bicycle parking area—complemented by the surrounding green zones—presents the public with both a practical and pleasant space. The auxiliary building is cleverly situated beneath the main structure's steel framework and conceals a professional winemaking facility. Visitors can directly access the wine sanctuary from the square.

Upon entering the main edifice, a centrally positioned eye-catching staircase and accessible pathways on both sides facilitate easy movement for visitors. The ground floor chronicles Asheville's winemaking history and features an indoor grapevine slope, allowing individuals to experience and learn the enchantment of wine production.

The second floor is an artistic realm, combining a glassblowing experience with wine aroma tasting. Parents can guide their children here to craft exclusive containers for their wine. Additionally, a welcoming terrace garden graces this level. From the riverside avenue, guests can opt to ascend via the staircase or enjoy a fun slide descent. Further enhancing this space, the architectural design incorporates a vertical wind power generator, underscoring a staunch commitment to renewable energy.

The third floor is an airy, expansive lounge and wine-tasting space. Here, visitors can savor wines and immerse themselves in the winemaking process. A specially designed adjustable rooftop can ventilate, collect rainwater, and modulate indoor natural lighting as required, manifesting the building's eco-friendly pledge and design philosophy.

Winemaking is akin to penning a diary, with time serving as its guide. Years later, as children mature and visit Ampelos Winery with friends, they can proudly retrieve a bottle of wine from the cellar and share that it was crafted years ago when visiting with their parents. ■

This month's New Products section features an updated version of a construction helmet, Bluetooth earmuffs, and comfortable knee pads.

Studson SHK1 Full-Brim Helmet

Construction helmet manufacturer Studson's latest evolution of its SHK-1 is the SHK-1 Full-Brim. The company says it is the first full-brim helmet that is compliant with the American National Standards Institute (ANSI) Z89.1 Type I and II safety standards. The helmet contains Koroyd-welded tube polymer to help absorb impact. Koroyd aids heat dissipation and venting with cellular-structure design instead of traditional EPS foam. It also features embedded twICEme technology, which stores emergency contacts and vital health information that's accessible to first responders. The chin strap, made by FIDLOCK, is a four-point system with a magnetic buckle enclosure, which allows for maximum adjustability and easy one-handed use with gloves. For more information, visit **studson.com/products**.

Klein Tools Bluetooth Earmuffs

Klein Tools' Situational Awareness Bluetooth earmuffs have Smart Sense, which allows users to listen to their surrounding environment safely and clearly communicate with co-workers. They boast premium audio quality with rich bass, clear mids and crisp treble through the latest Bluetooth 5.1 technology. The battery is USB-C rechargeable and has up to 25 hours of runtime on a single charge. The headphones have a 23 Noise Reduction Rating (NRR) and a dual-knob design with unique grooves that enable independent control of Smart Sense and Bluetooth volume. Their vented headband provides cool comfort in the hot summer months, and they have memory-foam ear cushions designed for all-day use. The earmuffs' noise-canceling microphones eliminate background for crystal clear calls in loud environments, and they have drop protection up to 6½ ft. To learn more, visit **kleintools.com/new-products**.

DeWalt gelled knee pads

Protect your knees during strenuous, repetitive tasks with DeWalt Stabilizing Knee Pads with Gel. Engineered for slip protection and a secure fit, these knee pads provide all-day comfort in tough conditions. Features include semi-rigid TPE flat caps designed for slip prevention on unbalanced surfaces, molded foam for a sturdy and durable structure for the knee, a protective gel zone, multiple layers of support, and a swiveling buckle for comfort on long days. The pads also have an extra wide single strap and an additional quick-release elastic strap. They're designed with 1680 denier fabric that provides strength and abrasion resistance. Grasp pull tabs allow wearers to adjust fit while wearing gloves. Visit **dewalt.com/products** for more information.

LEADERSHIP CHANGES

AISC Elects New Board of Directors Chair, Vice Chair

The AISC Board of Directors chose new leadership at its September meeting.

Hugh McCaffrey of Southern New Jersey Steel in Vineland, N.J. was elected board chair Sept. 9 at AISC's annual business meeting, and Glenn Tabolt of STS Steel in Schenectady, N.Y. was elected vice chair.

"Hugh and Glenn both have a long track record of volunteering their knowledge, expertise, and leadership skills to the steel industry," said Steve Knitter, the board's immediate past chair. "Their wealth of knowledge in the fabrication industry and their varied regional experience will undoubtedly benefit the Institute. I have full confidence in their ability to provide strong leadership and continue AISC's mission of advancing the steel construction industry."

McCaffrey has been the owner of Southern New Jersey Steel since 2005. Before that, he was the company's principal for more than a decade. He has worked for Southern New Jersey Steel since 1984, joining after a four-year stint as a Mid-Atlantic Regional steel joist and metal deck sales representative for Nicholas J. Bouras/United Steel Deck. McCaffrey is also the owner of North Carolina-based Atlantic Architectural Metalworks, which he started in 2009.

McCaffrey was initially elected to the AISC Board of Directors in January 2017. He earned a dual bachelor's degree in business and psychology from La Salle University. He has served on several corporate boards, including a stint as president of the Mid-Atlantic Steel Fabricators Association.

As chair, McCaffrey says he will emphasize strengthening key AISC programs, including a national public relations campaign promoting the value and benefits of domestically fabricated structural steel, determining how to integrate AI into steel design and construction, revitalizing AISC's marketing efforts, and further strengthening AISC's already invaluable university relations activities. McCaffrey also is a strong proponent of arming all AISC members with the information they need to successfully advocate for steel and connecting AISC members and regional steel fabricator associations with AISC and its activities.

Tabolt founded STS Steel in 1984 with colleague Jim Stori. He began his career with Pittsburgh-Des Moines Steel in 1978 and has been STS Steel's president and CEO since 2009. He was named to the AISC Board of Directors in June 2017 and has served on multiple AISC task forces. He was part of the the AISC Certification Hydraulic Task Group to create language for the Hydraulic Steel Structures Chapter in the Certification Standard for Steel Fabrication and Erection, and Metal Components. He also served on the AISC/SSPC Joint Task Committee to create a joint certification standard for shop application of complex protective coating systems. He chairs the planning committee for NASCC: The Steel Conference.

Tabolt is a member of the Education Foundation Board of Directors and is the organization's treasurer. He graduated from Clarkson University with a bachelor's degree in civil engineering and has an MBA from the University of Pittsburgh. He is a licensed professional engineer in New York and Connecticut and a certified welding inspector.

People & Companies

SmithGroup, an integrated design firm and the oldest continuously operating architecture and engineering firm in the U.S., has announced a transition within its leadership team. **Roxanne Malek, AIA**, has been named as a managing partner, joining **Russ Sykes, PE**, and **Troy Thompson, AIA**, to form the three-person team leading the firm. Malek succeeds **Mike Medici, AIA**, who has served as a managing partner with Sykes and Thompson since 2015. Medici, a 42-year veteran of SmithGroup, will support several initiatives for the firm through November.

The **American Iron and Steel Institute (AISI)** welcomed **Dustin Young** as the director of business development for the construction program. Dustin is responsible for managing the optimization of the AISI construction programs by providing strategic leadership to direct multiple construction committees and implement program business plans. He succeeds Dan Snyder, who was recently promoted to AISI vice president, construction program.

The **Charles Pankow Foundation** announced the appointment of **Col. Stuart Harrison, USA (Ret.), PE,** as the organization's new executive director. The foundation leads industry collaborations, funds research and projects, and delivers solutions that enable the AEC industry to advance innovation in the design and construction of buildings.

STV Group, Inc., a professional services firm that plans, designs, and manages infrastructure projects across North America, has acquired **American Engineers, Inc.**, a full-service civil engineering firm with a staff of more than 120 professionals in Kentucky and Georgia servicing clients throughout the southeast U.S. American Engineers will now be known as AEI, an STV Company.

MILEK FELLOWSHIP

Large-Format 3D Printing Researcher Earns 2023 AISC Milek Fellowship

Any recent Amsterdam visitor might have strolled across a noteworthy steel landmark: the first 3D-printed bridge. The nearly 40-ft bridge—opened in 2021—is for pedestrians only and spans a canal in the city's Red Light District.

It prompts an intriguing follow-up question: Can 3D printing be an attractive, economically viable option for large-scale structural steel projects?

Ryan Sherman, PE, PhD, of the Georgia Institute of Technology is working to answer that question—and that research has garnered him the American Institute of Steel Construction's 2023 Milek Fellowship.

"Additive manufacturing (sometimes called 3D printing) could be a game-changer," said AISC Director of Research Devin Huber, PE, PhD. "Dr. Sherman is exploring whether combining commercial robotic welding hardware with readily available wire feedstock could achieve a high-throughput and favorable economics compared to other metallic additive manufacturing techniques, which would make that a practical solution for the structural steel industry."

Specifically, Sherman will examine material factors (including non-destructive and destructive evaluation), mechanical and small-scale component testing of various connection types, computational analyses, and large-scale testing to demonstrate structural steel applications.

Sherman is an assistant professor at Georgia Tech in the School of Civil and Environmental Engineering, where he has worked since 2019. He was previously an Assistant Professor at the University of Nevada, Las Vegas in the Department of Civil and Environmental Engineering and Construction.

He earned both his PhD and Master of Science in Civil Engineering at Purdue University, where he was advised by Rob Connor, PhD. Sherman's primary interests include the behavior and performance of steel buildings, bridges, and ancillary highway structures, including large-scale structural testing, field monitoring, material characterization, and Finite Element Analysis (FEA) simulation. His research has specifically focused on fatigue and fracture, large-format metallic additive manufacturing, and high-toughness steel.

He received an AISC Terry Peshia Early Career Faculty Award in 2022 and serves on the Institute's Partners in Education committee, which focuses on curriculum development, faculty development, student activities, and industry interaction.

IN MEMORIAM

Schuff Steel Founder David Shuff Dies At 92

David Schuff, founder of Schuff Steel Company, died on August 25 at age 92.

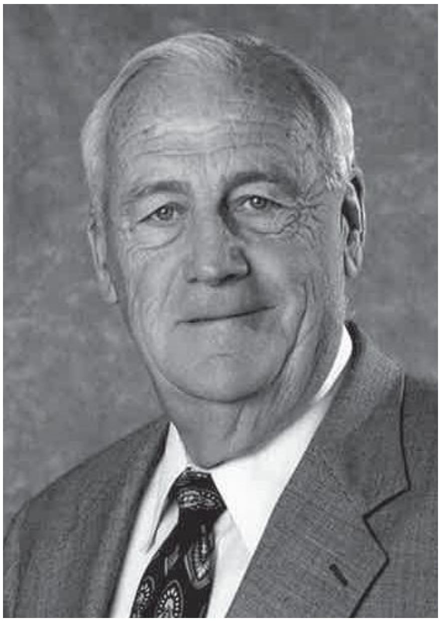
Schuff founded the Arizona-based steel fabrication and construction company in 1976 with his son, Scott. It started in the family's home garage and grew into one of the nation's largest fabricators and erectors. Operating out of seven fabrication shops and eight offices, it counts the 2023 AISC IDEAS^2 Award-winning SoFi Stadium in Los Angeles and Apple's corporate headquarters in Cupertino, Calif. among its recent major projects.

"You don't grow from a family-home start-up into one of the largest fabrication and erection companies in the country without vision, ability, and drive," said American Institute of Steel Construction President Charles J. Carter, SE, PE, PhD. "Dave exemplified the entrepreneurial spirit of our industry."

Schuff's legacy includes a generation of delighted children who have scrambled up the steel beams and columns that make up the 37-ft-tall Schuff-Perini Climber at the Children's Museum of Phoenix. In a 2010 interview for Modern Steel Construction, Nancy Stice (then the museum's director of exhibits and facilities) credited him as "the impetus to move forward on such a colossal undertaking." Schuff donated 50 tons of structural steel and its professional services for the whimsical yet technically complex climbing structure that remains a beloved part of the museum today.

"His pioneering spirit and love for the steel business was evident in all that Dave touched," current Schuff Steel CEO Rustin Roach said. "There will never be anyone else like him."

Current and former employees shared remembrances on social media. Controller Shawna Willis called him "one of my favorite people" and fondly recalled how shocked she was that he took the time to greet her on her first day as a staff accountant in 1999. "The nicest, most humble man you could ever hope to meet," Willis wrote on LinkedIn. "He was truly one in a million and will be missed by all who were lucky enough to meet and know him."



IN MEMORIAM

AISC Remembers Former Chief Engineer Bob Disque

Robert O. Disque, PE, AISC's retired chief engineer, died in late summer at age 97.

"Early in my career, Bob was instrumental in teaching me about steel," said AISC President Charles J. Carter, SE, PE, PhD. "When I first started at AISC, Bob had just retired. He continued with us as a volunteer, and I was lucky to get assigned to many things he was still involved in. I wasn't alone—a whole crew of us as staff and volunteers grew up in those years and were better for having Bob to help us. We dedicated the 15th-edition AISC *Steel Construction Manual* to him, and that dedication was a reflection of how much it meant to all of us."

Disque was born in 1926 and grew up in Swarthmore, Penn. Following service in the U.S. Navy during World War II, he earned a bachelor's of science in civil engineering from Northwestern University and a master's of science in civil engineering from Drexel University.

After working as a structural engineer for firms in Philadelphia and New York, he joined AISC as the Pittsburgh District Engineer in 1959. He was promoted to assistant chief engineer in 1963, and in this capacity, he supervised 32 engineers throughout the country. "Bob was one of two mentors for me, a great friend and confidant, and with his help, I became a stronger advocate for AISC and steel construction," explained Emile Troup, a former AISC regional engineer who later became the director of the Steel Fabricators Association of New England.

In 1964, Disque was responsible for launching AISC's renowned lecture series on steel design. He briefly left AISC in 1979 to teach at the University of Maine but soon returned as assistant director of engineering, where he led the development of the ninth-edition *Manual of Steel Construction* and the first two editions of the *Load and Resistance Factor Design Manual*.

"Bob was one of my heroes in the industry," said Mark Holland, chief engineer at AISC member Paxton and Vierling Steel and current chair of the AISC Committee on Manuals. "I'll always remember how, during manual committee meetings, he'd sometimes get very quiet listening to the discussion. Finally, in his booming voice, he'd explain where we had gone wrong. And he was always right. With Bob, you may not have gotten what you wanted to hear, but you always got what you needed to hear. We all learned from him, and AISC's *Manual* and specifications were better for it."

Disque retired from AISC in 1991 and consulted for Gibble, Norden, Champion and Brown in Old Saybrook, Conn.

Among his achievements was the development of the "snug tight" connection concept. As Carter and Tom Schlafly, AISC's senior director of engineering, explained in a 2016 *Modern Steel Construction* article: "There was a time before snug-tightening existed and all bolts required pretensioned installation. When bolts were introduced, rivet manufacturers succeeded in forcing the most conservative installation requirements to be applied across the board. In the early 1980s, Disque and Ted Winneberger of W&W Steel collaborated to lead an effort to free most bolts from decades of conservatism. The snug-tight concept was born and included in the 1985 *RCSC Specification*."

In 1971, Disque authored the well-regarded textbook *Applied Plastic Design of Steel*. In 1994, he published *Load and Resistance Design of Steel Structures*. with Louis F. Geschwinder, PE, PhD, a professor emeritus at Penn State and AISC's former vice president of engineering and research, and Reidar Bjorhovde, PE, PhD, a well-known consulting engineer, professor, and former AISC regional engineer.

"Bob had a major impact on me throughout my professional career, even before we became co-authors on a steel textbook," Geschwindner said. "I believe that any engineer currently in the practice of structural design in steel has been significantly influenced by him, although they may not actually know it. He was not called 'Mr. Steel' by accident."

BRIDGES

SSSBA, WVDOT Publish Standard Plans for Short-Span Bridges

The Short Span Steel Bridge Alliance (SSSBA) and West Virginia Department of Transportation (WVDOT) teamed up to develop and publish standard bridge plans for composite rolled beam girders and composite plate girders. The plans will allow owners and engineers to cut project costs and save time since they will not need to design the steel girders. They include cross sections, span configuration, loadings, state-specific practices for West Virginia, and various details. They are for bridges with spans under 140 ft.

"The standard plans, developed by the Short Span Steel Bridge Alliance, will greatly enhance our ability to specify steel bridges for future short span projects," said Joseph Neeley, district one design section head at the West Virginia Department of Transportation. "With over 7,000 bridges to maintain in West Virginia, we anticipate that these plans will help to create a more cost-effective and efficient infrastructure system within our state."

The plans were developed by Karl Barth, PhD, co-director of the SSSBA Bridge Technology Center and associate professor at West Virginia University, and Gregory Michaelson, PE, PhD, co-director of the SSSBA Bridge Technology Center and associate dean and professor at Marshall University, in a collaborative effort with the West Virginia Department of Transportation.

SCHOLARSHIPS

Annual AISC Scholarship Recipients Announced

AISC has announced the recipients of its 2023–2024 scholarships.

These 90 undergraduate and master's level students share a total of $360,250 in funding for the 2023–2024 academic year.

About $80,000 went to the AISC David B. Ratterman Fast Start Scholarships program, which awarded 10 scholarships this year. This program supports the immediate family members of AISC full-member company employees who will be freshmen and sophomores during the upcoming academic year—or the employees themselves, in some cases. The students may attend two- or four-year programs and may choose any area of study.

Seven students in Wyoming are turning up the heat with Rex I. Lewis Fast Start Scholarships they won at last fall's annual Puma Steel welding competition in Cheyenne, Wyo. They competed against other high schoolers to win scholarships to local welding programs. The AISC Education Foundation administered $13,000 to these seven recipients. AISC also awarded a total of $13,000 in funds to the top-scoring teams in the Student Steel Bridge Competition, as well as three team awards for spirit, ingenuity, and engagement.

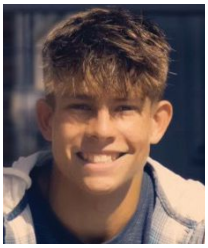
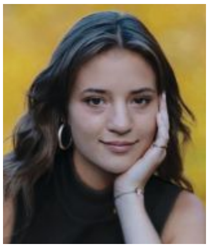
The AISC Education Foundation, in partnership with several other structural steel industry associations, awarded the remaining $254,250 to 65 additional students. AISC is deeply thankful for the growing support of our industry partners as well as all the individual contributors who help us support the next generation of great thinkers.

The following students will receive AISC scholarships for the 2023–2024 academic year:

David B. Ratterman Fast Start Scholarships





- Kendrick Ables, Weber State University
- Hailee Buehler, Lindenwood University
- Lydia Burrows, University of Wisconsin–La Crosse
- Julia Huls, Montana State University
- Brennen Jelinek, University of Nebraska–Omaha
- Ayden Shook, University of Nebraska–Lincoln
- Zola Spence, Auburn University
- Anna Swinney, University of Arkansas at Little Rock
- Mallie Zielinski, University of Mississippi

not pictured: Osihel Leos, University of Texas at Arlington

AISC would like to thank this year's David B. Ratterman scholarship jurors for their time and dedication:

- Greg Borchardt, Infra-Metals Co.
- Babette Freund, Dave Steel Company, Inc.
- Hollie Noveletsky, Novel Iron Works, Inc.
- Philip Stupp, Stupp Bros., Inc.
- Jacob Thomas, Thomas Steel, Inc.
- Duff Zimmerman, Cooper Steel

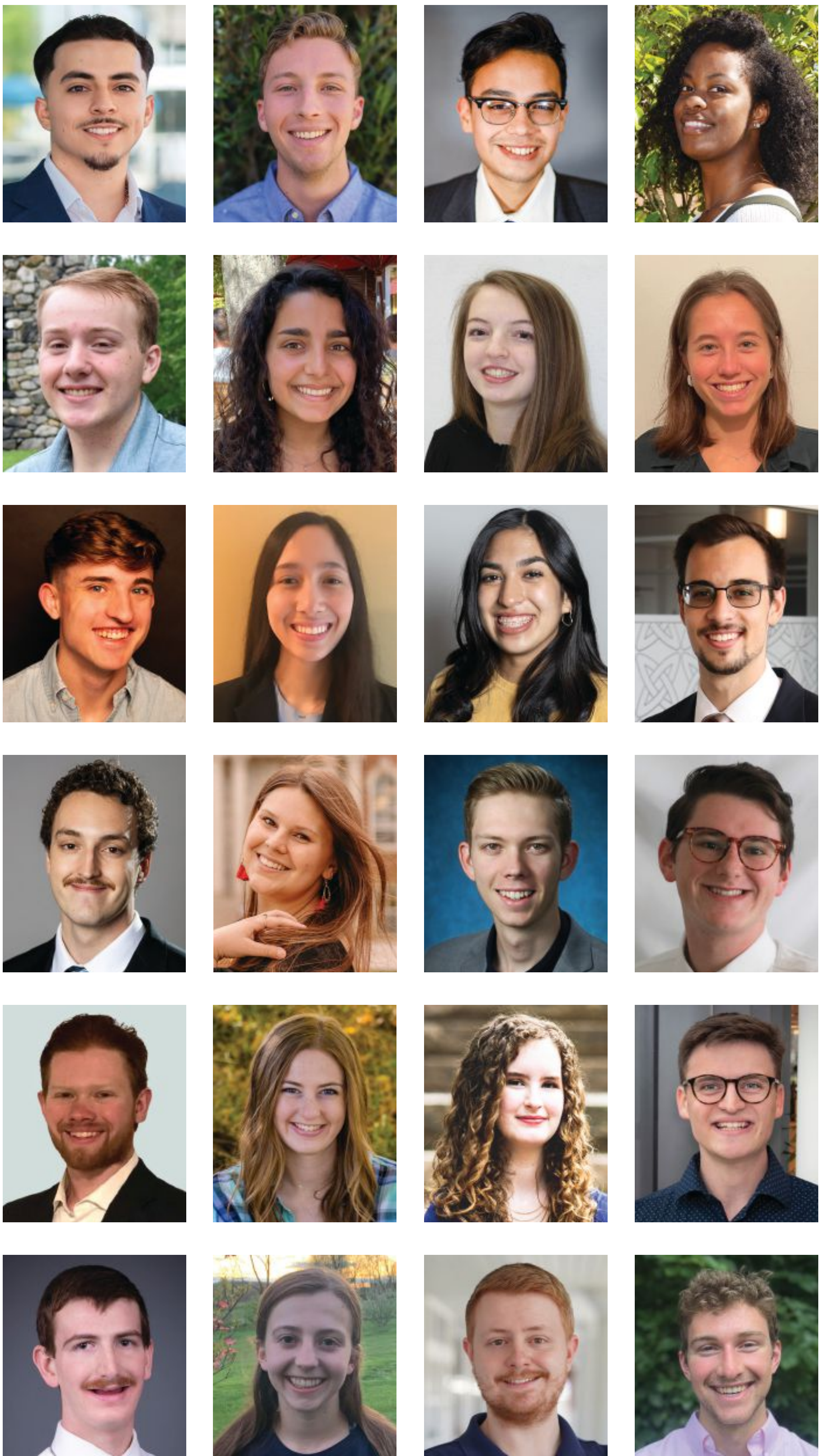
Rex I. Lewis Fast Start Scholarships


- Braxton Green, Eastern Wyoming College
- Landen Morrill, Western Wyoming Community College

not pictured:

- Cameron Cox, Eastern Wyoming College
- Devon Louderback, Laramie County Community College
- Colton Mclaury, Laramie County Community College
- Aidan Peters, Laramie County Community College
- Mason Richards, Laramie County Community College

AISC Scholarships for Juniors, Seniors, and Master's Students



- Ivan Alvarez, University of California, Berkeley
- Logan Arrasmith, University of Arizona
- Rafael Avila (Steven J. Fenves Scholarship), Georgia Tech
- Brianna Banks-McLean, University of California, Berkeley
- Adam Bartlett, Worcester Polytechnic Institute
- Rebecca Bauman, University of California, San Diego
- Isabella Bernard, The Catholic University of America
- Colette Burd, California Polytechnic State University San Luis Obispo
- Mariano Casciotti, Marywood University
- Emma Conroy, Stanford University
- Ana Contreras, Georgia Tech
- Andrew DeLuca, Cornell University
- Nicholas Divilbiss (Fred R. Havens Scholarship), Kansas State University
- Bailey Downing, University of Arkansas
- Ryan Hamman, University of Arizona
- Noah Kartagener, University of Florida
- Tracy Kinzer, Penn State–Harrisburg
- Elizabeth Lacey, Georgia Tech
- Sydney Lough, University of Kentucky
- Tyler McFarren, Case Western Reserve University
- Paul Quinn, University of Michigan
- Emma Robert, Villanova University
- Ian Self, Penn State
- Alec Spano, North Carolina State University

AISC Scholarships continued on page 62 >>

not pictured:

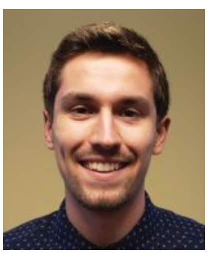
- Tyler Kleinsasser, South Dakota School of Mines and Technology
- Thomas Pastell (Cohen Seglias Scholarship), Michigan Technological University
- Mark Redden, Penn State
- George Saphir (Cohen Seglias Scholarship), University of Arizona

AISC Scholarships for Juniors, Seniors, and Master's Students



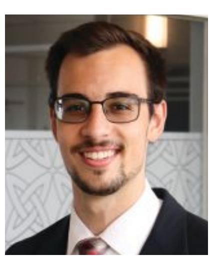

- Noah Struck, University of Minnesota–Twin Cities
- Margaret Tolan, Manhattan College
- Joshua Trimm (W&W|AFCO Steel Scholarship), Texas A&M University Kingsville
- Macy Vincent, Oregon State University

AISC/Southern Association of Steel Fabricators Scholarships




- Josh Gargan, Georgia Tech
- Cheyenne Wimsatt, University of Louisville

AISC/Indiana Fabricators Association Scholarships

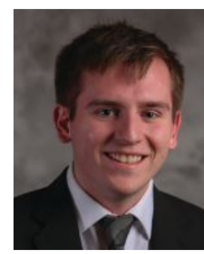



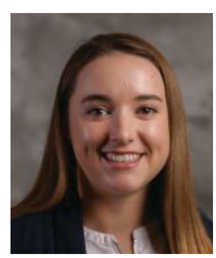
- Rachel Becker, Rose-Hulman Institute of Technology
- Andrew DeLuca, University of Notre Dame
- Joely Overstreet, Valparaiso University
- Justin Schwartz, Purdue University

not pictured:

- Linh Green, Purdue University Fort Wayne
- Nicholas Gushrowski, University of Evansville
- John Nash, Trine University

AISC/Associated Steel Erectors of Chicago Scholarships




- Mohammed Inani, University of Illinois at Chicago
- Caleb Metcalf, Purdue University
- Michelle Mo, University of Illinois at Urbana-Champaign
- Eliza Mount, Purdue University
- Lauren Schissler, University of Illinois at Urbana-Champaign
- Joseph Shamaon, Illinois Institute of Technology
- Frank Ziccardi, University of Notre Dame

not pictured:

- Mitch Hutmacher, Purdue University
- Elizabeth Sirkman, Illinois Institute of Technology

AISC would like to thank this year's scholarship jurors for their time and dedication:

- Benjamin Baer, Sheffee Lulkin & Associates, Inc.
- Ezra Arif Edwin, Simpson Gumpertz & Heger
- Jeanne Homer, AISC
- Luke Johnson, Nucor
- Matt Streid, Magnusson Klemencic Associates
- Jacquelyn Wong, California Department of Transportation

AISC/Ohio Steel Association Scholarship

- Hailey DeGeorge, Case Western Reserve University

AISC/UIUC Architecture Scholarship

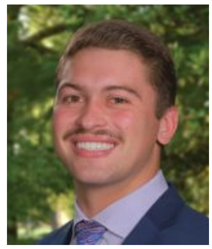
- Pat Dillon, University of Illinois at Urbana-Champaign

AISC/Virginia Carolinas Structural Steel Fabricators Association Scholarships

- Thomas Morrison, The Citadel

- Rick Wohlrab, Virginia Tech

AISC/W&W|AFCO Steel/ Oklahoma State University Scholarships









Seniors

- Koda Oller, Civil Engineering Technology
- Raphael Wall, Civil Engineering
- Skylar Waters, Architectural Engineering

Juniors

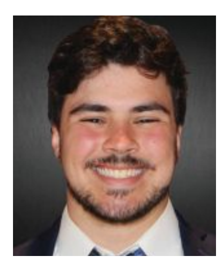
- Georgia Giddens, Civil Engineering
- Elyssa Gowriluk, Architectural Engineering
- Weston Light, Civil Engineering Technology

Sophomores

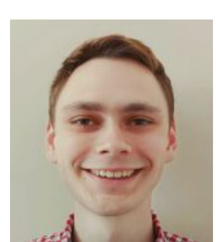
- Joseph Black, Civil Engineering Technology
- Caitlyn Lutrell, Architectural Engineering
- Griffin Moore, Civil Engineering

Student Steel Bridge Competition Scholarships





- Ben Cardamone, University at Buffalo
- Caleb Napper, University of Tennessee, Knoxville

- Zachary Nieves, University of Tennessee, Knoxville
- Ruth Potter, South Dakota School of Mines and Technology
- Joseph Brock Sullivan, University of Florida

not pictured:

- Isaiah Amir-Townes, University at Buffalo
- Nathan Chalus, Youngstown State University
- Zachary Glavic, Youngstown State University
- Marshall Sarisky, Youngstown State University

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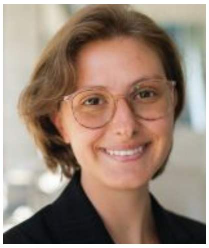
AISC/Rocky Mountain Steel Construction Association Scholarships

- Derrick Poss, Colorado School of Mines

- Jeremiah Vaille, Colorado School of Mines



Undergraduate Research Fellowships

The AISC Education Foundation continued its Undergraduate Research Fellowships program, awarding two undergraduate students each with a $2,500 grant to conduct research projects during the fall 2023 term.

Congratulations to Rebecca Bauman and faculty sponsor Machel Morrison, SE, PhD, from the University of California, San Diego. Bauman will study Electroslag welding-narrow gap (ESW-NG) to further the use of Electroslag welding in steel fabrication.

Meanwhile, Shirin Raschid Farrokhi (and faculty sponsor Ryan Sherman, PE, PhD) from Georgia Tech will study the fatigue behavior of wire arc additive manufactured (WAAM) steel to enhance the current material database for WAAM of carbon steel.

Learn more about the selected proposals and the new fellowship program at **aisc.org/research**.

The AISC Education Foundation makes a difference in the world—and you can help us do just that! This fall, we have the opportunity to establish a permanent, annual $5,000 scholarship in honor of Steven J. Fenves, a long-time educator, passionate engineer, and influential AISC committee member and volunteer. Visit **aisc.org/giving** to learn more about Steven, his impact, and how you can help us honor him.

INFRASTRUCTURE SPENDING

USDOT Launches Program Focused on Improved Infrastructure Project Speed

The U.S. Department of Transportation has launched the Project Delivery Center of Excellence to help recipients of federal infrastructure funds deliver projects more efficiently and effectively, from concept to completion. The center will serve as a central resource for innovative practices and will bring project managers together to enable knowledge sharing and peer-to-peer learning.

"This USDOT Project Delivery Center of Excellence that we are launching is important because it is so important to deliver good projects well—on time, on task, on budget," U.S. Transportation Secretary Pete Buttigieg said. "I know that in the months ahead, the Center of Excellence at Volpe will only continue to grow and evolve in this purpose of better supporting project delivery staff, project sponsors, and everyone working on this both inside and outside the department."

Since President Joe Biden signed the Bipartisan Infrastructure Law in 2021, USDOT and the entire Biden-Harris Administration have hit the ground running to take advantage of this once-in-a-generation opportunity to rebuild our nation's infrastructure—and it is already delivering major progress.

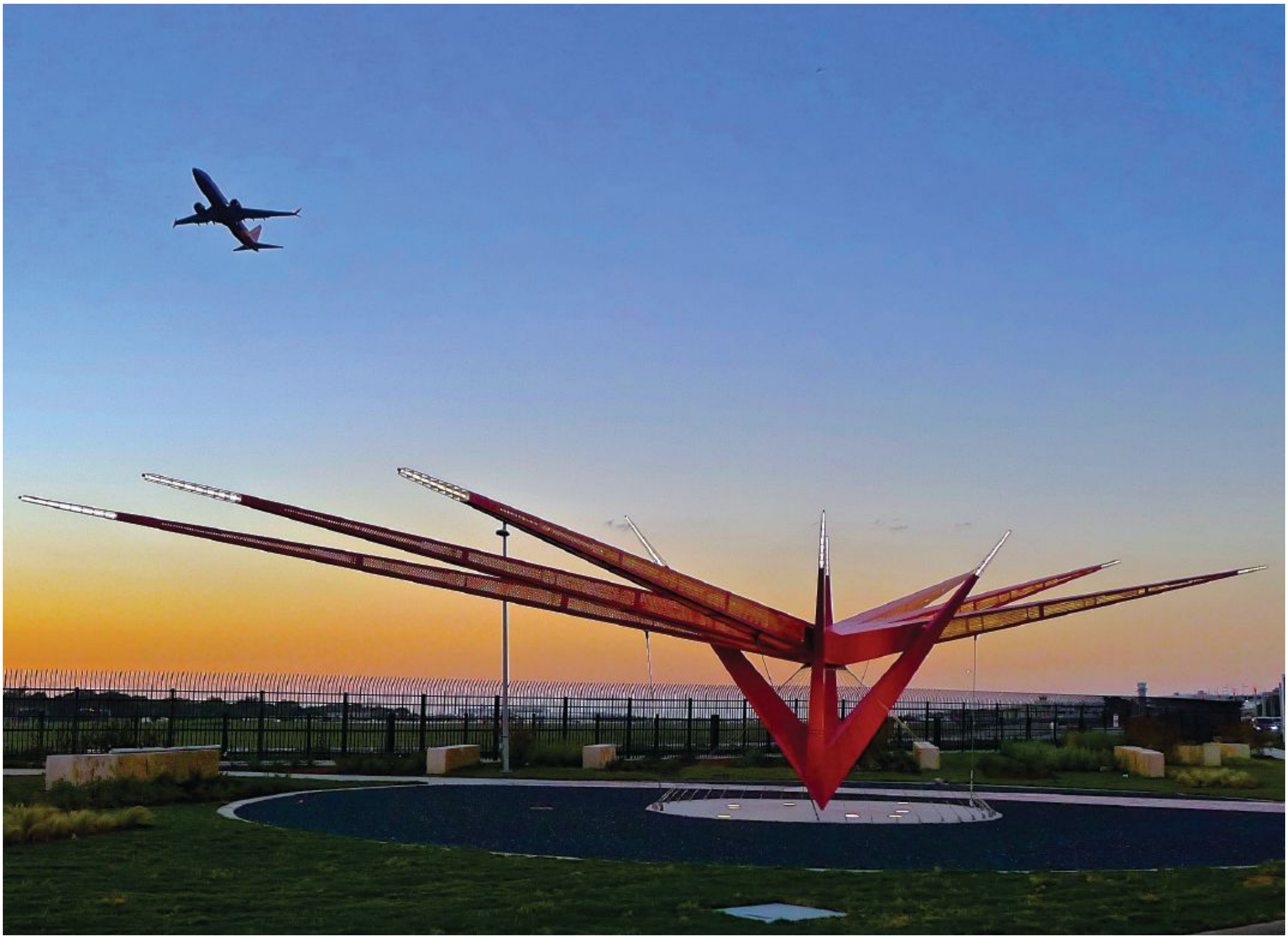
"President Biden's Investing in America agenda is delivering tens of thousands of new transportation projects across the country, and this announcement will help us deliver on time, on task, and on budget," said Mitch Landrieu, Senior Advisor to President Biden and White House Infrastructure Coordinator. "The Department of Transportation's Project Delivery Center of Excellence will be a key nexus for exchanging ideas, knowledge, and best practices to continue to improve and make our transportation system better for all."

"We're honored to host the Project Delivery Center of Excellence at the USDOT Volpe Center and look forward to continued collaboration with the Department's Operating Administrations, because we believe that the most effective project delivery happens before your project even begins," U.S. DOT Volpe Center Director Anne Aylward said. "We want this resource to be useful, so we will partner with federal, Tribal, state, and local Bipartisan Infrastructure Law project sponsors to grow the Center of Excellence to ensure good projects are delivered well."

Among the initial plans for the Project Delivery Center of Excellence:

- Simplifying the contracting process by providing newer, less experienced grant recipients with an off-the-shelf, high-quality model that they can use to ensure consistency and quality in design and construction contracts.
- Centralizing project delivery methods, best practices and convening information exchanges.
- Providing a central repository and disseminating national best practices and case studies in successful, innovative project development, project delivery, and cost containment efforts.
- Working in partnership with the American Society of Civil Engineers and the Association of Consulting Engineering Companies to develop and distribute templates and model language for transportation construction contracts.

advertiser index



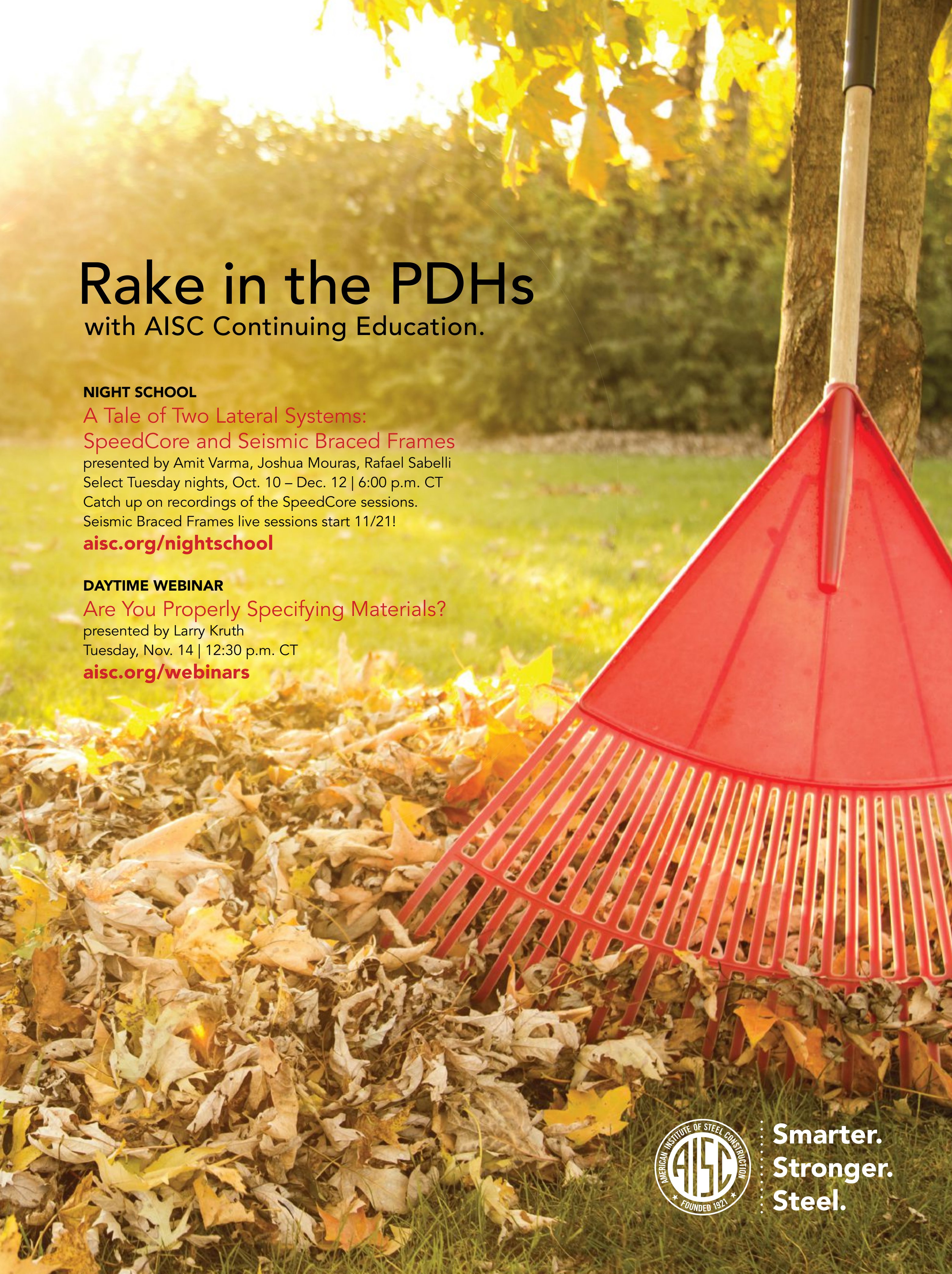
Steel in Flight

STEEL HAS LANDED at Dallas Love Field Airport. But not aboard a plane.

A sculpture called LoveBird graces part of the space between the airport's main roadway entrance and a runway ending. It's a 90-ft-wide by 20-ft-high bright red artwork fabricated from 304 stainless steel. Sculptor Ed Carpenter, who specializes in monumental public art, designed it to look like a mockingbird—Texas' state bird and the name of the street along one side of the airport. It's positioned to look like it's either landing or taking off.

LoveBird greets every Love Field visitor who drives on the airport's main road, Herb Kelleher Way. It will also be featured in next month's issue of *Modern Steel* in the annual What's Cool In Steel section, which will explain how it was fabricated and also how such a wide sculpture could be supported on a 2½-in.-base.

What's Cool In Steel highlights recent steel projects and initiatives around the country and, in rare cases, in other nations. It focuses on smaller and sometimes temporary structures that demonstrate a creative use of steel. This year's list will also feature a striking staircase in the atrium of a medical institute's new building, a children's book that has generated excitement about the trade industry in schools across the country, Wrigley Field's new sportsbook, and much more.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