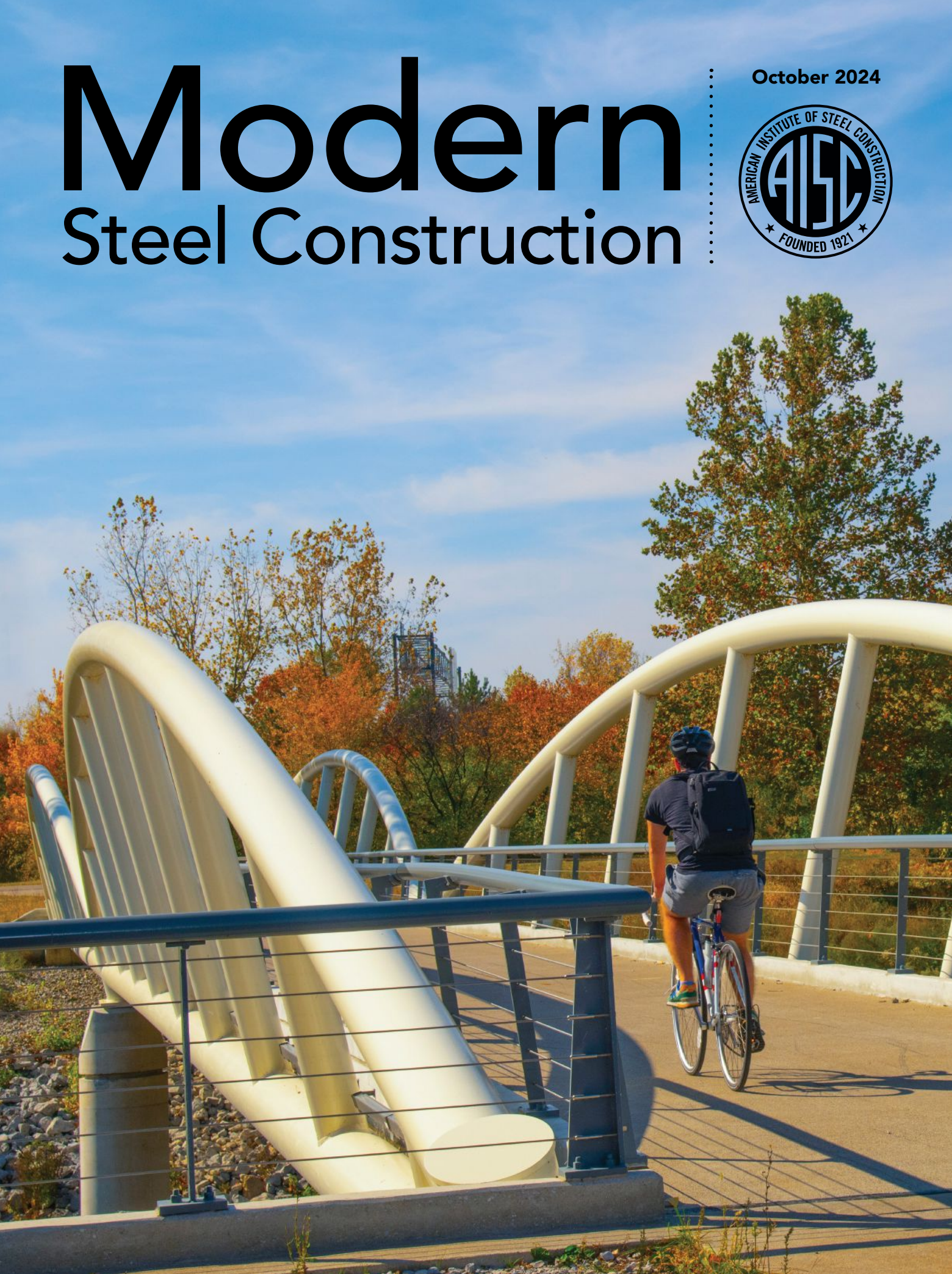
Modern Steel Construction

October 2024



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Modern Steel Construction

October 2024

in every issue

columns

features

ON THE COVER: A new bridge gives bikers another connection to downtown Columbus, Ohio, p. 32. (Photo: Randall Lee Schieber Photography)

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editor's note

Look at me, I'm sitting in first class!

OK, spoiler alert: It's a train, not a plane.

The picture is from my family's summer trip to the UK, which I mused about last month. I won't turn this page into an ongoing travel diary, but I do want to share a couple more quick observations from that trip.

For one thing, I think it's a fairly common habit—though certainly not the worst one—to feel obligated to eat dishes that are a place's known speciality. Admittedly, I cringe a bit when people visiting Chicago fixate on hot dogs and deep-dish pizza when we have so much amazing food from around the globe here. You can basically find at least one well-executed version of anything you want. And yet, we do hot dogs and deep dish better than anyone, so why *wouldn't* you fixate on those items?

That's a long-winded way of saying that I had fish and chips and Scotch eggs in the UK, but only twice each. All four instances were excellent in their own ways—and all made me feel like a nap. But we also had fantastic, interesting wood-fired pizza. And London's "best sandwich." And strawberries with chocolate sauce. And a croissant that looked like the evil puzzle box in *Hellraiser*. And halloumi fries (probably not what you think). And Cullen skink. And a pannuozo. And some of the best Thai curry I've ever had.

I could go on and on about what I ate on vacation, but let's switch to steel. You know what features massive amounts of exposed, soaring, and grandiose steel? British train stations, particularly the train sheds. Oh, and also bridges. Like, *lots* of attractive steel bridges of all types.

Speaking of steel bridges, this issue features multiple examples, including an Interstate exit in Connecticut that relieved a longstanding traffic bottleneck, a tub girder replacement bridge in a small Illinois town, and a cool connector in Columbus providing pedestrians and cyclists safe passage over the Olentangy River near the city's Arena District. October also highlights the annual Bridges to Prosperity initiative and the resulting bridge in Rwanda (page 50) and a handful of practical bridge resources in our monthly SteelWise section (page 16).

Back to travel for a minute. Maybe all of you have done this most of your lives, but, as a non-engineer, it wasn't until I started working at AISC that I started taking photos of interesting, gorgeous steel structures everywhere I go. And as I mentioned, those were in abundance on my trip. I was constantly the guy standing in the middle of a crowded train station, gawking upwards while locals pushed past me in droves, fixated on their phones, instinctively knowing where to go, and oblivious to every element of their surroundings—least relevant of all the exposed, artistic steel trusses supporting the translucent roofs of each terminal, each its own main character in an elevated steel wonderland. What can I say? Working here has given me even one more reason to enjoy travel.

Back here in the U.S., later this month (October 14-18 to be precise), we'll be celebrating AISC's annual SteelDays. Now in its 16th iteration, it offers AEC professionals, faculty, students, and the general public an inside look at the U.S. structural steel industry. Every year, the event features fabrication shop tours, jobsite visits, and hands-on opportunities at venues such as ironworker training facilities. Turn to page 28 to learn more about this year's edition, and visit **aisc.org/steeldays** to see a list of events and find one near you. If you're not able to get out of the office, consider our virtual option, the Flash Steel Conference, which includes 20 half-hour webinars with topics ranging from connections to seismic design to adaptive reuse and more.

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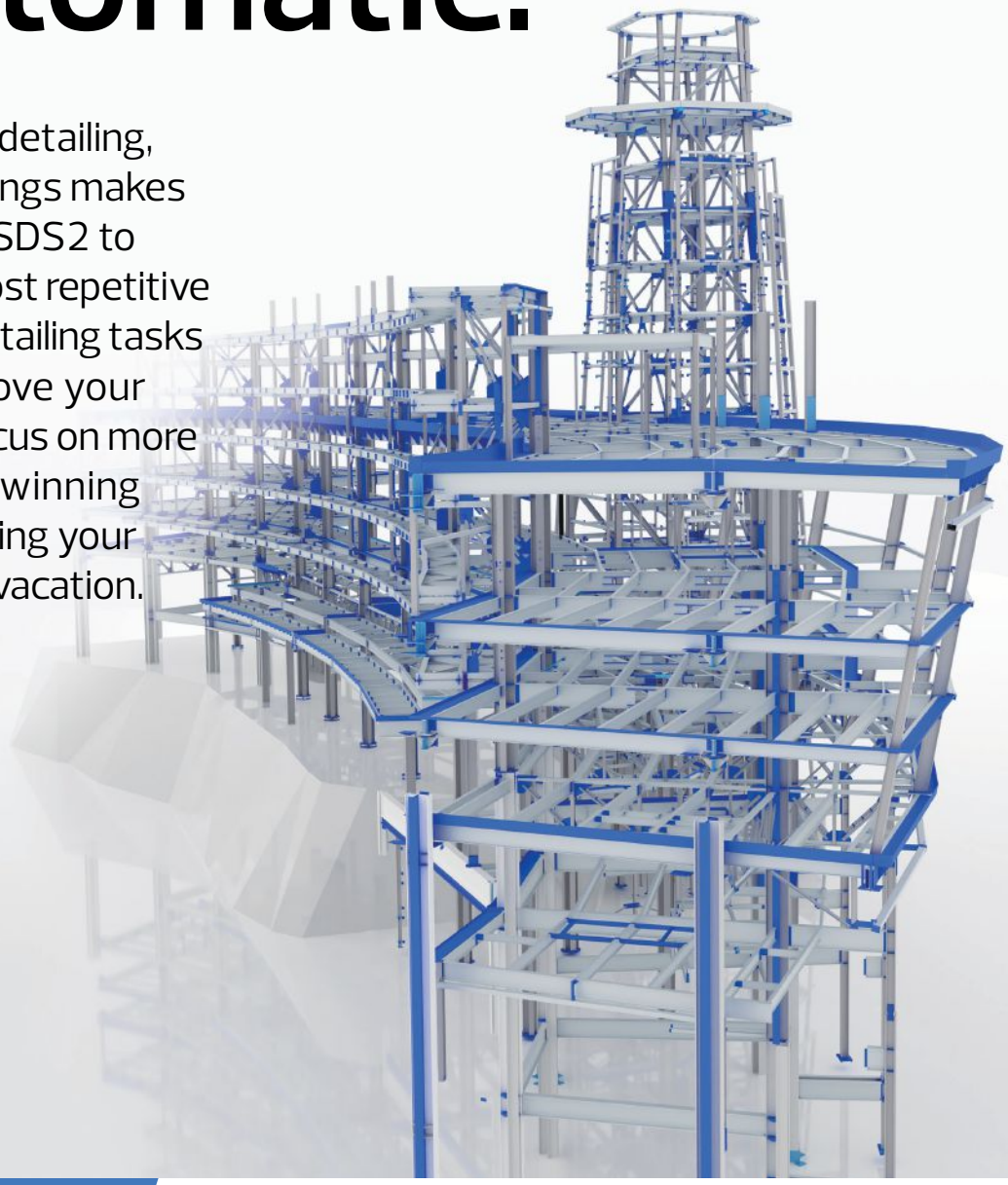

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If you've ever asked yourself "Why?" about something related to structural steel design or construction, *Modern Steel*'s monthly Steel Interchange is for you! Send your questions or comments to **solutions@aisc.org**.

Effective Moment of Inertia for Composite Steel Floor Vibrations

In Example 4.2 of Design Guide 11: *Vibrations of Steel-Framed Structural Systems Due to Human Activity*, Second Edition, the calculated location of the composite neutral axis is 15.4 in. above the center of gravity of the joist, as seen in Figure 1. This places the neutral axis ½ in. above the top of the 1½-in.-deep steel deck, which is ½ in. into the 3½ in. concrete slab. When the composite moment of inertia is calculated, the contribution of the slab includes the entire 3½ in. thickness of the concrete section, not just the part above the neutral axis. When comparing this approach with reinforced concrete design for flexure, the procedure in Design Guide 11 seems odd. Can you explain why the concrete below the neutral axis is considered to be effective in these cases?

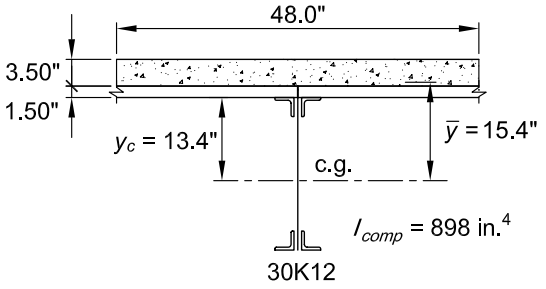

Fig. 1. Composite joist cross section for Example 4.2.

Brad Davis, one of the co-authors of Design Guide 11 (a free download for members at **aisc.org/dg**), provided some information regarding this question. He said the research indicates the gross section of concrete can be used for typical steel systems like those shown in the Design Guide 11 examples. Cracking might have an effect; however, there is significant scatter in the data, so that effect is smaller than the scatter caused by other effects.

Human-induced vibrations cause extremely small stress amplitudes. These analyses are much different from traditional concrete design methodologies that are concerned with much higher stresses.

The practice in reinforced concrete design being referred to concerns the use of the moment of inertia of the cracked section transformed to concrete (I_{cr}). The moment of inertia used to assess serviceability criteria of reinforced concrete elements can vary depending on the member and expected level of cracking, as discussed in Chapter 24 of ACI 318-19.

Section 3.2 of Design Guide 11 discusses composite action as it relates to the vibration of steel floor systems and suggests assuming an uncracked concrete section. Section 3.2 states: "In calculating the fundamental natural frequency using the relationships in Section 3.1, the transformed moment of inertia is to be used if the slab (or deck) is attached to the supporting member."

The section later says, "If the concrete side of the member is in compression, the concrete can be assumed to be solid and uncracked. Based on limited experimental data, it is recommended that the concrete be assumed to be uncracked for cantilever members as well."

Consistent with Section 3.2, Example 4.2 uses the transformed effective moment of inertia of the uncracked section, and the stiffness of the concrete below the neutral axis is considered.

Heather Gathman

Beam Flange to End-Plate Moment Connection Weld Requirements

I am designing an end-plate moment connection. Can the beam flange to end-plate connection be made using fillet welds? Or is a CJP weld always required?

The beam flange to end-plate weld is typically CJP, but in some cases can be a PJP or fillet weld. Design Guide 39: *End-Plate Moment Connections* (a free download for members at **aisc.org/dg**) provides guidance. Section 3.7.5 discusses beam and stiffener welds to the end plate. The section states:

> "The appropriate design and detailing of the welds is critical for an end-plate moment connection to realize its full flexural strength. Welds in a seismic resisting connection can be subjected to inelastic strain demands and thus must be designed to develop the full strength of the connecting part with filler metal and detailing that promote ductility. There are more options for welds in end-plate connections designed for gravity, wind, and low-seismic-ductility applications. Regardless of whether the connection is designed for high-seismic-ductility or not, the design of welds must be based on configurations that have been tested in full-scale experimental programs."

The subsection on *Welds for Gravity, Wind, and Low-Seismic-Ductility Applications* then continues and states:

> "Normally, the beam flange to end-plate weld is designed to develop the yield strength of the connected beam flange. This is typically done with CJP groove welds, but alternatively, PJP groove welds or fillet welds may be used for thin flanges.

All mentioned AISC publications, unless noted otherwise, refer to the current version and are available at **aisc.org/publications**. *Modern Steel* articles can be found at **www.modernsteel.com**.

Heather Gathman (gathman@aisc.org) is a staff engineer in AISC's Steel Solutions Center. **Larry Muir** is a consultant to AISC.

However, when the applied moment is less than the design flexural strength of the beam, the beam flange to end-plate weld can be designed for the required flexural strength, but not less than 60% (LRFD) or 40% (ASD) of the specified minimum yield strength of the connected beam flange."

The subsection then continues and discusses limit states for welds for gravity, wind, and low-seismic-ductility applications. The subsection on *Welds for High-Seismic-Ductility Applications* states:

"The beam flange to end-plate weld must be a CJP groove weld made from the outside of the flanges except directly over the beam web. Weld access holes and backing bars are not permitted. The root along the inside of the flanges must be back gouged, except at the web where access makes this impossible, and then a $\frac{5}{16}$ in. reinforcing fillet weld must be added on the inside of the beam flanges. At the web locations, the weld is not considered a CJP groove weld because it does not satisfy the prequalified CJP groove weld requirements, but instead is considered a full-depth PJP groove weld."

Heather Gathman

Verification of Anchor Rod Tightening

When anchor bolts are tightened with a spud wrench by an ironworker, what is the best way for an inspector to verify they have been tightened correctly if they were not present for the tightening?

AISC Design Guide 1: *Base Connection Design for Steel Structures*, Third Edition (a free download for members at aisc.org/dg) states, "It is important in all methods that the erector tightens all the anchor rods before removing the erection load line so that the nut and washer are tight against the base plate. This is not intended to induce any level of pretension, but rather to ensure that the anchor rod assembly is firm enough to prevent column base movement during erection." An inspector need not be present for the tightening to see that the nut and washer are tight against the base plate.

It is generally not required to induce any level of pretension in anchor rods. Appendix A of Design Guide 1 discusses conditions where pretension may be required.

Larry Muir, PE

Steel Interchange is a forum to exchange useful and practical professional ideas and information on all phases of steel building and bridge construction. Contact Steel Interchange with questions or responses via AISC's Steel Solutions Center: 866.ASK.AISC | solutions@aisc.org. The complete collection of Steel Interchange questions and answers is available online at www.modernsteel.com. The opinions expressed in Steel Interchange do not necessarily represent an official position of the American Institute of Steel Construction and have not been reviewed. It is recognized that the design of structures is within the scope and expertise of a competent licensed structural engineer, architect or other licensed professional for the application of principles to a particular structure.


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steel quiz

This month's steel quiz is all about the recently released AISC Design Guide 1, *Base Connection Design for Steel Structures*, Third Edition. AISC members can download a free copy and find the bonus material at **aisc.org/dg1**.

1 **True or False:** ASTM A36 is the preferred base plate material specification.

2 **True or False:** When large moments and forces must be resisted, embedded base connections can reduce the need for heavy anchorage in the base plate assembly.

3 Which of the following describes how flexure is typically resisted in an embedded base connection:
- **a.** Horizontal bearing of the concrete against the column flange
- **b.** Vertical bearing of the base plate against the footing
- **c.** Through the anchor rods
- **d.** (a) and (b)

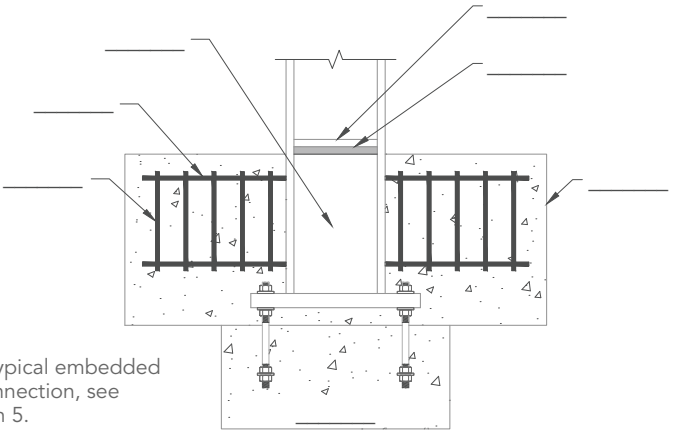

Fig. 1. Typical embedded base connection, see Question 5.

4 **True or False:** A brace that connects to the base of a column can also be embedded along with the base connection if needed to help transfer the applied loads.

5 Name the components of a typical embedded base connection by filling in the blanks in Figure 1 above.

6 **True or False:** The objective of weak-base connection design for seismic loading is to ensure the base connection remains elastic under design-level shaking.

7 **True or False:** The overall flexibility of a base connection only considers the column-to-footing connection.

8 The recommended widths of plate washers are intended to cover the entire hole in the base plate when the anchor rod is in which of the following positions?
- **a.** When the anchor rod is in the center of the hole.
- **b.** When the anchor rod is at the edge of the hole.

TURN TO PAGE 14 FOR ANSWERS

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Answers reference the newly published AISC Design Guide 1, *Base Connection Design for Steel Structures*, Third Edition (a free download for members at **aisc.org/dg1**).

1 **False.** The preferred base plate material is ASTM A572/A572M Grade 50 for plate thicknesses up to 4 in. The availability of alternative material should be confirmed prior to its specification. Because ASTM A572/A572M Grade 50 plate is readily available, the plates can often be cut from stock material (Chapter 2).

2 **True.** When large moments and forces need to be resisted by the base connection, it is not feasible to rely only on anchor rods to transfer the moments and forces because relying on anchor rods results in other expenses, such as thicker or stiffened base plates, larger or additional anchor rods, or deeper anchorage depths. In these situations, the column may be embedded in the foundation. A new Chapter 5 on embedded base connections is included in the new edition of Design Guide 1, reflecting findings from multiple research studies summarized in Section 1.2.

3 **d.** Embedded base connections consist of the bottom portion of a column embedded within the concrete footing. Flexure is typically resisted through a combination of two mechanisms: (1) horizontal bearing of the concrete against the column flange in conjunction with development of a shear panel, and (2) vertical bearing of the embedded base plate against the footing (Chapter 3 and 5).

4 **True.** Large base forces may be resisted by embedded base plate connections when the anchor rods alone are incapable of handling the forces. Chapter 3 of the design guide discusses base connections with and without braces—and in both cases, the magnitude of the forces to be resisted impacts the use of either exposed or embedded based plates.

5 The correct answers are shown in the figure below. For more information, see Section 5.2 of the design guide.

6 **False.** As explained in Section 6.4, weak-base design for seismic loading implies that the base connection will accommodate plastic rotations, while the column will remain elastic. The objective of strong-base design, on the other hand, is to ensure that the base connection remains elastic under design level seismic shaking.

7 **False.** It is important to note that the overall flexibility of a base connection includes the flexibility of the column-to-footing connection and the flexibility of the footing and the foundation itself, including its interaction with the soil. The new Appendix C provides guidance for simulating column base connections in structural analysis, including estimation methods for rotation stiffness for different cases.

8 **b.** The AISC-recommended washer widths in Table 4-3 of Design Guide 1 (also Table 14-1 in the 16th Edition *Steel Construction Manual*) are sized to cover the entire hole when the anchor rod is placed at the edge of the hole. Plate washers are usually custom-fabricated by thermally cutting the shape and holes from plate or bar stock. Washers can be round, square, or rectangular if the thickness is adequate to prevent pulling through the hole (Chapter 4).

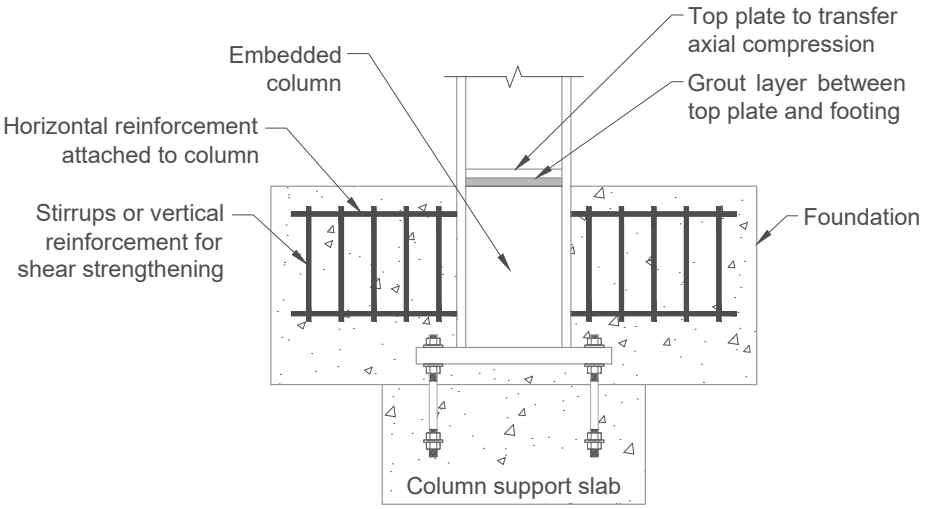

Fig. 1. Components of a typical embedded base connection, see Question 5.

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**.

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Bridge Resource Central

BY BRANDON CHAVEL, PE, PHD

Creating efficient and economical steel bridges is easy with NSBA's extensive collection of free online resources.

CREATING EFFICIENT and economical steel bridges is easy with National Steel Bridge Alliance's extensive collection of industry resources.

These resources include guidelines, design tools, and specifications that are developed through research or in a collaborative environment. And the best part? They're all available for free at **aisc.org/nsba**. This robust collection runs the gamut of bridge design and construction topics, but here's an overview of a few central ones and an explanation of recent updates to publications.

Guidelines for the Design of Steel Railroad Bridges for Constructability and Fabrication

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Steel Railroad Bridges

One of NSBA's most recent publications is *Guidelines for the Design of Steel Railroad Bridges for Constructability and Fabrication*, developed through a collaboration between the American Railway Engineering and Maintenance-of-way Association (AREMA), AREMA Technical Committee 15 (Steel Structures) members, and NSBA.

The *Guidelines* represent the most up-to-date steel industry best practices for efficient and economical rail bridge design, fabrication, construction, and future maintenance. This new publication is intended to be used in conjunction with the recommendations given in the AREMA *Manual for Railway Engineering*, Chapter 15—Steel Structures, but should not supersede any AREMA-recommended practices.

The document starts with an overview of special considerations for railroad bridges, including the key differences between railroad and highway bridges, discussion of design philosophy, and typical loadings. It then provides recommendations and design considerations regarding structure type selection, with attention given to the track's vertical and horizontal clearances. It points to flange and web sizing choices to maximize the efficiency of steel plate usage, including minimum thicknesses and sizing requirements for various components.

The *Guidelines* also provide a list of commonly available shapes (found in Appendix A) so designers may choose members that are more easily sourced for constructability.

Recommendations for various design decisions and details in deck girder bridges, through girder bridges, trusses, and floor and deck systems are also provided. A section on construction provides details

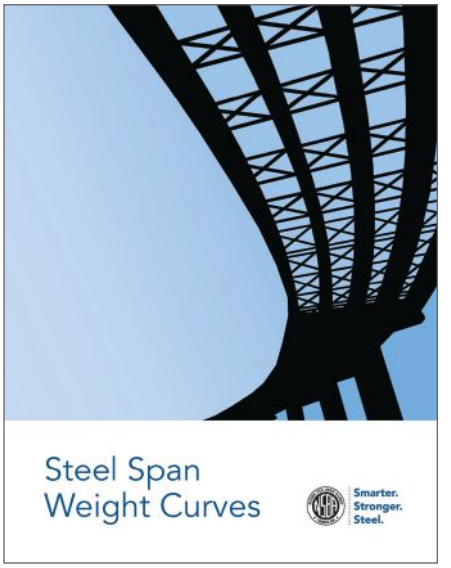
on the most common types of contract delivery methods and their applicability to the railroad industry and addresses construction engineering considerations that are unique to railroad bridges. Ultimately, the new *Guidelines for the Design of Steel Railroad Bridges for Constructability and Fabrication* is a go-to resource for everyone involved in steel railroad bridge design and construction.

TS&L Kickstarter Resources

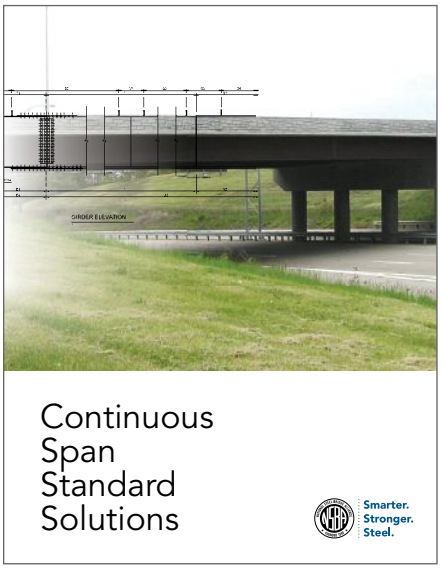
NSBA has a suite of resources to help bridge designers and owners quickly make effective decisions during preliminary type, size, and location (TS&L) design that will result in an efficient steel bridge. When used in combination, these resources allow engineers to compare various span arrangements, girder spacings, and girder sizes in a matter of hours. These tools include Steel Span to Weight Curves, Continuous Span Standards, LRFD Simon, and NSBA Splice.

Steel Span to Weight Curves are the quickest way to determine the weight of steel per square foot of bridge deck for straight, low skew plate girder bridges. They are ideal for comparing various span arrangements and girder spacings. If designers know the span lengths and girder spacings, they can easily find an average weight of steel superstructure per square foot of concrete deck using the curves.

Designers can also easily see how span lengths and girder spacing can affect the overall weight of the bridge and make appropriate early design decisions regarding the steel superstructure. Combined with local cost information from similar projects and regional steel bridge fabricators, superstructure weight from the curves can easily be converted to a high-order estimate for the cost of the steel superstructure.



Continuous Span Standards serve as a guide to all bridge designers, owners, and contractors in the development of suitable



and economical steel bridge superstructures. Included are 88 unique solutions for three-span bridges with center spans between 150 ft and 300 ft, girder spacings between 7½ ft and 12 ft, and plate girder designs using homogenous and hybrid steel options.

Each conceptual solution includes tables presenting girder plate sizes, diaphragm spacings, intermediate stiffener sizes and locations, shear connector spacings, camber, and girder weights. Designers can use them at the TS&L stage to approximate girder depth, flange sizes, and other design details that may influence preliminary deflection choices.

An update of the information in Continuous Span Standards is nearing completion, and it will include new steel bridge design standards for one-, two-, three-, and four-span bridges, with span lengths ranging from 150 ft to 300 ft, along with girder spacings of 8 ft, 10 ft, 12 ft, and 14 ft. All the design details, such as flange and web plate sizes, stiffeners, cross-frame sizes, shear studs, and deck designs are included—plus several design examples to guide engineers when their bridge may not fall exactly into the span lengths or girder spacings used.

In some TS&L stages, designers may need to review options outside the range in Continuous Span Standards—for example, when state or project live loadings are more than the standard AASHTO LRFD loadings, or when the bridge has horizontal curvature and distribution factors need to be adjusted for preliminary design. In these cases, NSBA's LRFD Simon can be quickly used to obtain an appropriate girder.

LRFD Simon is a powerful line-girder analysis and design program for steel I-shaped plate girders and multiple single-cell box girders. It allows users to quickly produce complete steel superstructure designs in accordance with the AASHTO LRFD *Bridge Design Specifications*. Users can start with their own base girder design in LRFD Simon based on past projects or experience, or simply use one from Continuous Span Standards, which have LRFD Simon analysis and design files.

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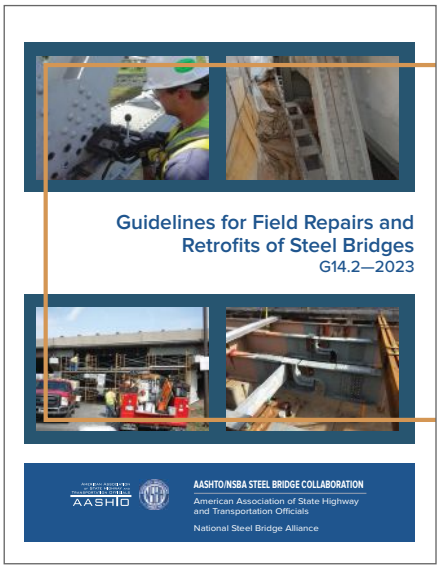


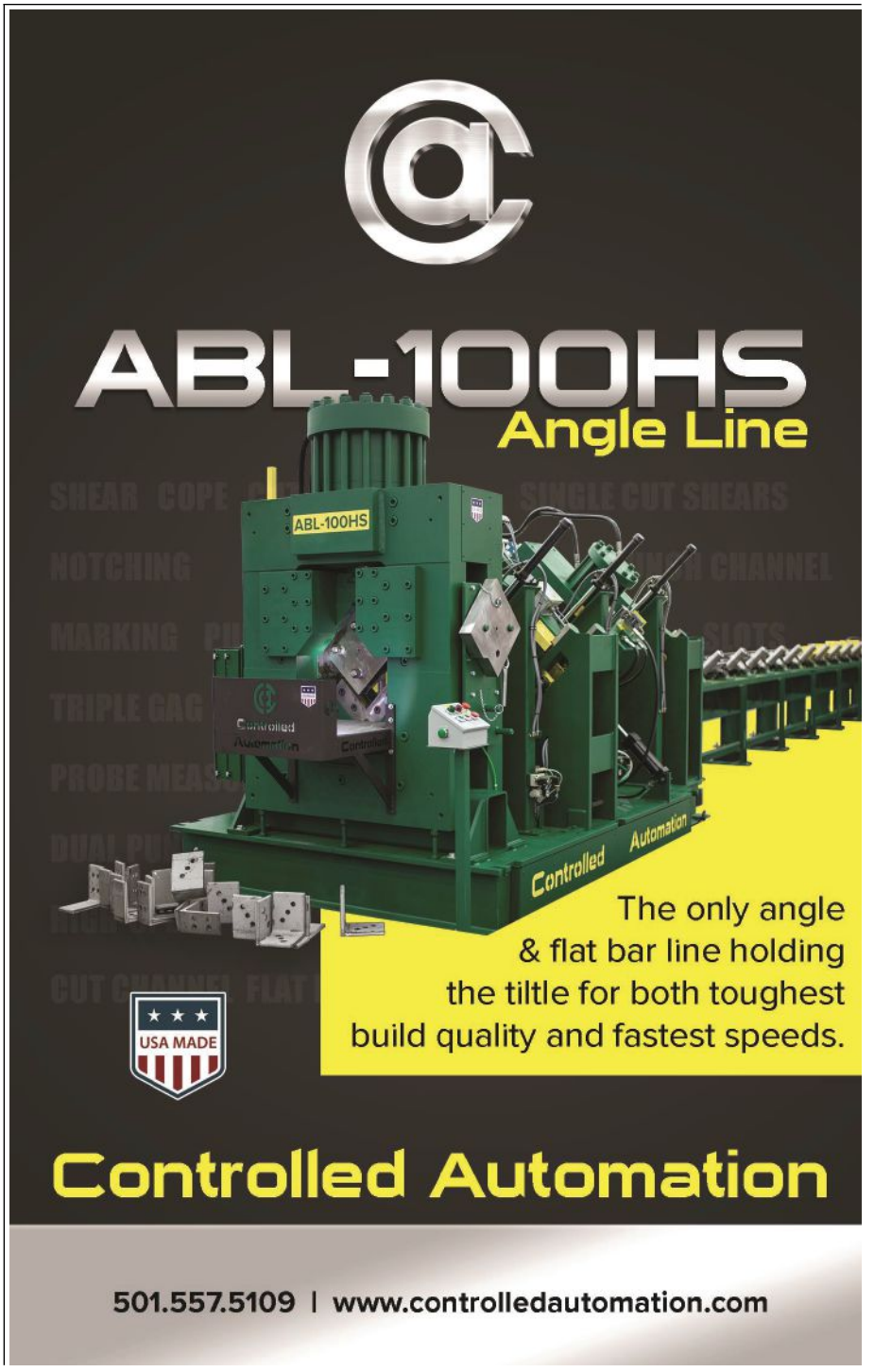
If designers wish to go one step further and design the girder field splices as part of their preliminary design estimate, they can use NSBA Splice. NSBA Splice takes the time-consuming task of designing and checking a bolted splice connection and rewrites the process with a simple input page and output form. NSBA Splice can be incorporated as a design tool on plate girder bridges, allowing a designer to quickly analyze various bolted splice connections to determine the most efficient bolt quantity and configuration.

Guideline for Field Repairs and Retrofits of Steel Bridges

A recent publication by the AASHTO/NSBA Steel Bridge Collaboration is *Guidelines for Field Repairs and Retrofits of Steel Bridges*, published in 2023. It provides guidance related to the most common forms of steel bridges damage and options for repair. It includes detailed repair procedures, detailing techniques, maintenance recommendations, inspection recommendations, and preservation actions to repair and retrofit damaged bridges. Details and repair procedures are provided for various types of repairs related to section loss, strengthening to increase load carrying capacity, over-height vehicular impacts, and repairs that may be required for damage during construction. This resource is a must-have for bridge designers looking to rehabilitate a steel bridge and extend its service life.

All NSBA technical resources are available for free at **aisc.org/nsba**, along with contact information for all NSBA staff. ■

Brandon Chavel (**chavel@aisc.org**) is the vice president of bridges at the National Steel Bridge Alliance.



Fluent in Bridges

INTERVIEW BY GEOFF WEISENBERGER

Heather Gilmer studied linguistics before finding her way to her original engineering passion: bridges. Combining them has led to 20-plus years in fabrication quality management and specification writing.

Heather Gilmer (center) with AISC President Charles J. Carter (left) and AISC Board of Directors chair Hugh McCaffrey.

STEEL BRIDGES first intrigued **Heather Gilmer** as a grade school student.

Her college coursework and early career took her in a different direction, though. Gilmer earned an undergraduate degree in linguistics from Cornell University and pursued a PhD in the same field before pivoting to civil engineering with a focus on buildings. But her first engineering job landed her at a state department of transportation, bringing her full circle back to bridges.

Gilmer's bridge focus began at the Texas Department of Transportation (TxDOT) and continues at Pennoni, where she has been a senior engineer since 2022. She has worked for multiple firms and fabricators since leaving TxDOT and through it all, has served on many committees and helped develop several industry codes and specifications. In March, she was honored with an AISC Lifetime Achievement Award, which recognizes individuals who have helped AISC and the structural steel industry succeed.

Gilmer spoke with *Modern Steel Construction* about her career path, the importance of committee work, and more.

Where are you from and where did you grow up?

The short answer is three places: Long Island, Israel, and New Jersey.

My grandfather moved to Israel. Later, my mother moved to Israel from Long Island and took me with her. I lived there from the first to third grades, which were formative years. It shaped me a lot.

What is your origin story as an engineer?

In a way, it goes back to fourth grade. I had a project in science class where we made these structures with straight pins

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**.

and soda straws. Mine could hang the most washers on it. Then we had to start cutting straws, and I remember thinking I would have designed it differently if I had known we were cutting straws. If I knew redundancy was a consideration, I would have done something completely different. So, it kind of goes back to that.

In fourth grade, I also built a suspension bridge out of straws, straight pins, and thread. I always loved bridges, but I didn't go that direction in college. I focused on engineering school because I didn't have a better idea when I was applying. I put mechanical engineering as my intended major in my college applications. The first major I declared was computer science, and then I switched from that to linguistics.

I didn't understand the subfields of civil engineering—I was afraid that if I aimed for bridges, I would get sewers. But I wanted bridges, and I didn't think I would get to work on them because all I was thinking about was big signature projects. I pursued a PhD in linguistics, but dropped out and had some time to think about where I wanted to go. I found a *Reader's Digest* condensed book about skyscraper engineering and thought I might not do bridges, but I could do skyscrapers.

I went back to civil engineering and enrolled at the University of Texas. I got into the music scene there and wanted to stay in Austin after I graduated. The most interesting civil engineering job was with TxDOT, so that made me put the skyscraper idea aside. I got into overpasses on the material side, not the design side, and it took me a while to realize that this wasn't a compromise. This was Plan A; I found my way to my bridge interest and didn't even realize that for a couple years.

Before I left TxDOT, I worked on a signature bridge: the Margaret Hunt Hill Bridge in Dallas. It's a Santiago Calatrava bridge design, and workers were in the process of erecting it when I left in 2010.

It's great that you got you work on a signature bridge before leaving TxDOT. In addition to actual bridge projects, how would you describe your contributions to the industry?

My fingerprints are on most steel bridge-related specifications, and an important part of what I've done is serve on a lot of committees. All that committee work created an intersectionality I could bring to each individual committee.

Right now, I'm an unofficial liaison between AISC and AMPP. Having a foot in a lot of camps lets me help each one of them not be in a silo and work with the others. I feel that's the best part of it, more so than writing all the specifications and doing all kinds of other stuff. There's volume, but there's also a broad spread that helps me contribute.

I appreciate that I was allowed to be on all those committees. I became involved with many committees back when TxDOT financially supported it. When the funding for that dried up, they still supported me in allowing me to have the time, and I would self-fund.

In the private sector, my employers know me as an established committee person, and I've had no problem getting them to support me in that. But for those people, I was already established. So how do we make the next person with enough breadth to bring that bigger picture?

It's harder to find the resources to send someone to a three-day meeting and cover for a committee person who's out of the office. Everybody's running leaner and leaner. Our industry needs to put thought into enabling employers to support their people to do more committee work. It's important and worth the investment.

They're all volunteer committees and employer supported. But the degree to which I and a couple other people are involved in multiple committees ties it all together. I think it's going to get harder and harder to build that. I don't have the answer, but we need to discuss it as an industry.

Do you have a most memorable or favorite project you have worked on during your career?

Early in my TxDOT tenure, I worked on the fabrication side for a set of arch bridges over U.S. 59 in Houston that won a NSBA/AISC Prize Bridge Award in 2003. I was neck deep in that and was pals with the TxDOT designer. It was a really great thing to work on a couple of years after I started.

My role was in inspection, quality control, and quality management. I think of it as the designer is the biological parent who contributes the genetic material, and we're like the midwife who helps it come into existence.

I also worked at fabrication shops for several years. I'm in the inspection consulting business now, and I miss a lot of the hands-on work and seeing the steel go out the door. As a fabricator, if you go out into the field, it's usually because something went wrong. Even so, it's fun to go out in the field.

You've basically worked on every side of the steel bridge industry. Are you intrigued by becoming a professor and sharing everything you've accumulated?

I love teaching. I have two master's degrees and zero PhDs, and there's a reason for that: I found that I hit a wall after three or four semesters, and that becomes the end of me. When I was in the linguistics PhD program, I taught a lot. I built my own courses and loved every minute of it. But I don't know if I'm equipped for other parts, like generating a thesis. I can write a specification, but not a thesis.

People who gravitate to linguistics seem to know more than one language. What else did you study?

I didn't need to study any languages there because I came in having satisfied all the requirements for linguists. I placed into the top level of French and Hebrew at the time but took German for fun.

But later, I learned some Italian for the Calatrava job. I took a vacation to Spanish-speaking countries in December, so I did a couple of months of Duolingo. Two months of it and a lot of hand gestures will get you through a construction site.

My specialty was semantics, which is the relationship between the words in the sentence and the meaning you convey. It's kind of like formal logic applied to natural language. You say something in a sentence, and there are certain things implied by it from which you can draw accurate conclusions and inaccurate conclusions. Specification writing is all about that. We want to write a sentence that excludes all the cases we don't want and includes all the cases we do. That same mindset transfers from computer science and linguistics into engineering specifications.

I know you play the violin too, or did at one point. Do you still?

These days, I play the fiddle—basically the same instrument. One thing that kept me in Austin beyond grad school was playing in a few Irish bands, medieval ensembles, and an Irish/French music group. I really liked it and wasn't ready to walk out of it when I finished my master's. It only went so far, but it was a lot of fun. I'm still doing some of it and played on St. Patrick's Day.

Who would you consider to be mentors and influences in your career?

I have a few. One is Ronnie Medlock, now at High Steel Structures. He was my first boss at TxDOT and oversaw a research project I did as part of my master's. He hired me at TxDOT and he got me addicted to committees. He was on a lot of committees back then. He has a Lifetime Achievement Award for founding the AASHTO/NSBA Steel Bridge Collaboration, among other things. He got me involved in all that stuff and is a great example of how to be a good people person, most of which I have not succeeded in adopting for myself.

Karl Frank was my graduate advisor at the University of Texas. He has been coming to a lot of committee meetings since he became an emeritus professor, and he's an amazing combination of academic and practical experience. He did so much in the field before coming into academia, and the industry will lose a lot when he finally decides to retire the rest of the way.

The third would be Duane Miller, who just recently retired from Lincoln Electric. He taught me so much about how to be a committee person, run a meeting, and make sense and present things in ways that people will understand and want to do. I'm not sure I'd be where I am without those three.

What do you enjoy about Pittsburgh, which I understand is where you've lived since 2016?

Diverse topography and geography are a change from living in Texas and Florida for 20 years. Austin had Hill Country nearby, but it's not as hilly as western Pennsylvania. And everywhere you look, there's a nice steel bridge. I feel like I don't get out much, but when I really think about it, I do. There are music events. A friend of mine has a French dance party once a month where I play music. ■

This interview was excerpted from my conversation with Heather. To hear more from her, listen to the October Field Notes podcast at ***modernsteel.com/podcasts****, Apple Podcasts, or Spotify.*

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

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Attesting to AI

BY DANIEL KAMAU, PEng, AND GRAYSON INGRAM, PhD

Fabricators discuss how implementing AI has improved productivity and share their experiences working with steel-specific AI.

STEEL FABRICATORS can empathize with the hurdle put in front of Justin Airhart last year.

Airhart, the COO of AISC-member fabricator SSE in St. Bernard, La., lost one of his senior estimators in 2023. The experience level needed in that role and today's hiring challenges make filling the job and others like it an arduous and lengthy process. As limited manpower reduced his bid capacity and slowed revenue potential, Airhart jumped back into estimating, redirecting his focus from working on the business to working in the business.

Airhart filling the void was a temporary fix, though. Soon after, he turned to software automation technology to fill SSE's capacity gap and discovered how AI-powered innovations support the steel industry. SSE is among a growing number of fabrication companies to implement it in recent years.

As detailed in "AI Arrival" in the June 2024 issue of *Modern Steel Construction*, AI aims to train computers to think, learn, and solve problems like humans or, in some cases, better than humans. Modern algorithms still have a long way to go—most are known as "narrow" AI that specialize in a handful of functions. ChatGPT's ability to answer questions and write essays or Midjourney's ability to turn text into images using natural language processing falls into that category.

Those programs are trained on generalized data and aren't built for the risk-laden, safety-conscious, visual-data-heavy steel industry. Early applications of AI in steel largely revolve around computer vision—the "eyes" of the AI world that can identify, interpret, and manipulate images and videos. Some contractors and sub-contractors are using computer vision to collect data and report potential safety concerns, monitor machinery for predictive maintenance, examine products for defects, and manage inventory and logistical needs.

Limited-use cases have shown AI can increase efficiency, decrease financial bleeds, and fill gaps hollowed by labor shortages. Most AI programs weren't designed just for steel; they were co-opted from other industries. AI's true potential unfolds when AI developers and domain experts in steel businesses come together to create technologies that understand the steel business' needs and language.

One of the first major AI and steel collaborations began in 2021 when a group of AISC-certified and member fabricators joined AI startup Sketchdeck.ai to build LIFT, an automated material take-off software that can read 2D engineering drawings. LIFT partnered with fabricators to ease the burden on estimation teams by identifying structural steel elements in bidding plans and exporting information into integrated software/BOMs.

As an early application of AI in steel, the journey of building and discovery was fraught with trial, error, and iteration—and has started yielding meaningful success. Early case studies have proven that teams using AI technologies like LIFT can evaluate and bid more work, increase speed without compromising quality, and alleviate the strain on human estimators, resulting in healthier revenues.

Increasing Bid Capacity Through Automation

Estimator teams can only complete bids so fast. The prohibitively time-consuming evaluation process presents significant barriers to growing revenue; companies inundated with requests are often limited by their actual bid capacity, with last-minute bids and double-stacked deadlines pinching the revenue bottleneck even tighter.

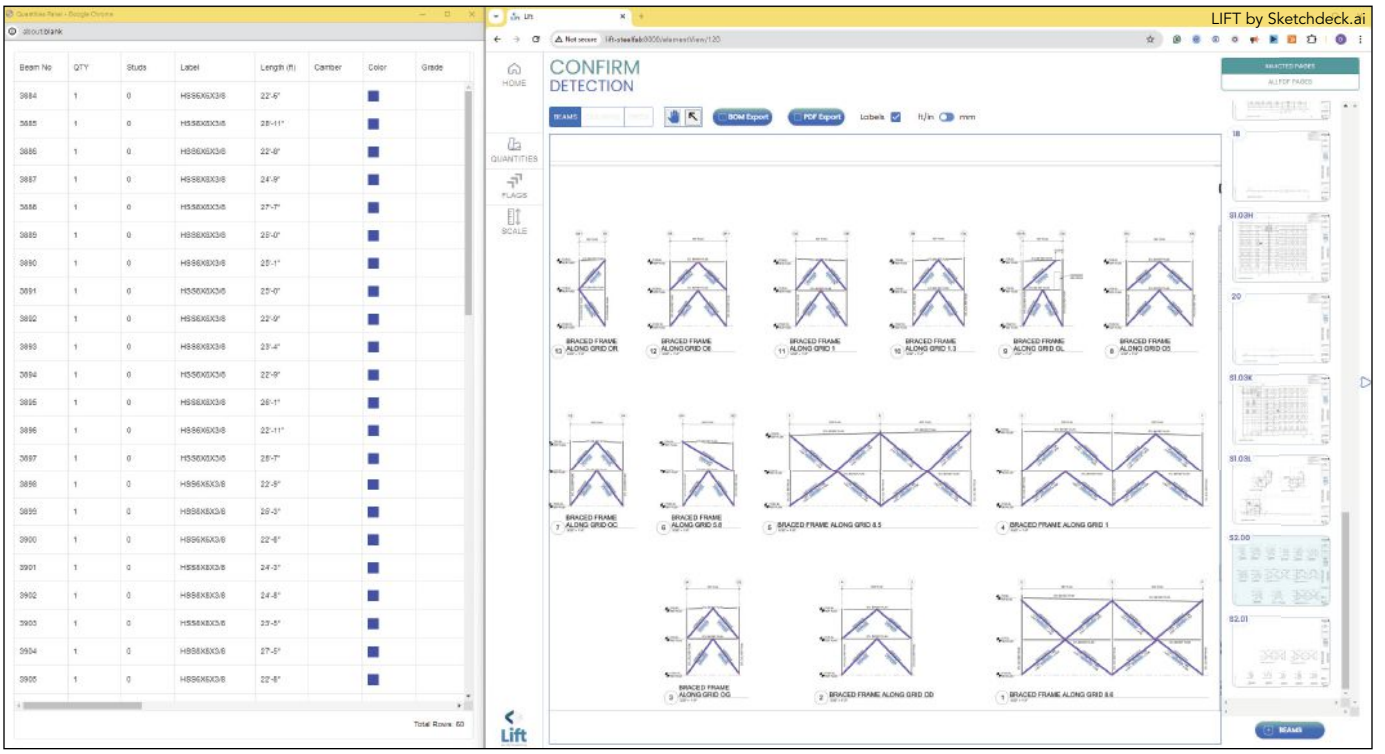
In fall 2023, Todd Weaver, CEO of the Metals Fabrication Company and an AISC Board of Directors member, encountered a shop slowdown right as two experienced estimators left the business. The increased workload and decreased capacity quickly overwhelmed MetalsFab's estimation team with many tedious tasks, and accuracy faced potential compromises as the team pushed faster bids with fewer members.

MetalsFab tapped AI to help alleviate the burden and noticed what Joe Sage, MetalsFab's IT manager, described as an "immediate impact" on productivity. Integrating the new technology into the team's workflow reduced take-off times by up to 50%, allowing estimators to spend more time on high-value tasks like reviewing bid details and scope documents. When the estimation bottleneck uncorked, turnaround times on bids contracted, bid capacity increased, and MetalsFab built a healthy backlog of awarded jobs in the following months.

Alleviating Talent Shortages

When Airhart's senior estimator left, he witnessed firsthand how hard the steel industry's labor shortages have hit estimation teams, whether they're ramping up growth or replacing lost talent. The time-consuming process required the stretched-thin fabricator to split precious hours between working on the shop floor and managing his business, limiting bid capacity and expansion potential. Even after onboarding, estimators often stagger under hefty workloads and tight deadlines that contribute to burnout and future talent losses.

"I've had problems finding competent, capable estimators who I didn't have to train," Airhart said. "I want to have the estimators I have, not worry about adding new talent, and still be able to grow."



Like MetalsFab, SSE integrated LIFT into their workflow to automate portions of the estimation process. Airhart's team immediately reported reduced estimation times up to 75%, with complex bid times dropping from six to eight hours to just 1.5. The extra support eased the pressure on SSE's estimators, who could tackle their workload with renewed focus. Airhart even found more time to focus on exploring new client opportunities.

Bridging the Gap Between Speed and Quality

Troy Ernst, chief estimator at King Steel, Inc., is no stranger to the tightrope fabricators walk: increase speed and decrease accuracy, potentially landing more jobs that need more corrections, or decrease speed and increase accuracy, limiting bid capacity.

"You have human eyes looking at drawings, doing take-offs one piece at a time, and quantifying that. There are limits to human speed," Ernst said. "There's only so fast you can work to stay accurate."

Ernst's estimation team frequently faced manual take-offs that were time-consuming and prone to imprecision under tight deadlines. Adding more work to grow the business exacerbated their stress. Often, his estimators found themselves choosing between focusing on details, speed, or client engagement, leading to perceptions of disorganization.

Ernst implemented LIFT into King Steel's workflow to give his team a new tool to address the capacity-quality bid gap. The estimation team leveraged LIFT's ability to identify steel on plans and automate material take-offs to halve estimation times, freeing up room to focus on quality. The increased accuracy and reliability allowed King Steel to hone its competitive edge in a tight market, and soon, estimators were tackling new, exciting projects that hit the ideal balance of challenging and accomplishable.

Software that "Speaks Steel"

Estimators spend substantial chunks of time fiddling with software not designed for their needs.

"We automate a lot of things in our shop—fabrication processes, different things for the erectors—so we really wanted to integrate [automation] into the estimating department," said Mason Callagher, an estimator at MSE Inc. "The problem we found over 10 to 15 years was that it's hard to find estimators to do monotonous jobs like simple beams and columns data entry."

Those are tedious, time-intensive, and detail-heavy tasks that often lead to mental strain, eye strain, and, in some cases, low morale. Software that should, in theory, speed up the inefficient, error-prone process merely shifts it into another computer program and frustrates teams.

"We [looked at] other software that allows you to perform the take-off on the PDF, [but] you still have to perform your take-off manually," Callagher said. "In at least one of those cases, it really slowed things down. It didn't reduce the workload; it was just a different way of collecting the information."

MSE initially adopted LIFT to streamline take-offs from PDF drawings, but the estimation team soon found benefits beyond reducing take-off times by 95%. Having software fluent in steel-specific activities as part of the workflow allowed estimators to focus on less tedious tasks, interface with clients, and even enjoy the occasional caffeine break away from their workstations.

"We were just kind of doing it in an archaic way before," Callagher said. "[Now], we're finally doing things more efficiently with the right tools. It just makes it more fun, and you can't help but be a little happier."

Implementing AI Solutions

These four cases reflect just how much more fabricators, erectors, and other stakeholders in the industry can accomplish with less stress when they have the right tools in their arsenal. However, integrating AI isn't as simple as downloading traditional software. The differences boil down to three crucial facts:

AI learns on its own: AI can learn from corrected mistakes and new data, improving its accuracy and capabilities with continued use. Unlike traditional software that requires human intervention to correct mistakes and add new features, AI specializes in real-time adjusting.

Expert-AI interaction should be collaborative: AI tools are probabilistic, not deterministic, meaning they do amazing things but make surprising mistakes. Current AI is only as good as its training, and even advanced algorithms can hallucinate or fabricate outputs unsupported by data. (LIFT, for example, occasionally misidentifies building elements found in bid plans.)

For these reasons, it's helpful to think of AI as a digital collaborator capable of making errors but valuable for speeding up data-intensive tasks. It's common for companies to adopt a human-in-the-loop approach, where a human monitor partners with an AI algorithm to complete tasks and correct mistakes.

AI-empowered software can enhance ROI: AI software integrates into existing processes and digital tools to enhance current functions or add new levels of scope and sophistication. Though businesses can benefit from free tools like ChatGPT, purpose-built algorithms offer enhanced features and rewards so businesses can collaboratively automate more of their workflows with better results. Advanced AI requires more upfront time and resource investment than general AI, but its increased learning and output capacity delivers more impactful results to users' well-being and business' revenues.

Challenges and Future Outlook

As still-developing technologies, it's unsurprising that AI is unevenly implemented across industries. Steel has been slower to adopt AI than many traditionally creative fields for many reasons, among them:

- A lack of AI technologies that know how to work specifically with steel and integrate easily into existing workflows.
- The prevalence of on-the-job training in construction industries, which may spook fabricators, GCs, and estimators away from more technical systems they perceive as requiring more advanced training or knowledge.
- A lack of available upskilling programs to train existing workers to use more advanced systems.
- Concerns about the impact of AI hallucinations on business' output and bottom lines.
- The time and money expense required to acquire new systems—some fabricators prefer what they have over integrating what they don't.

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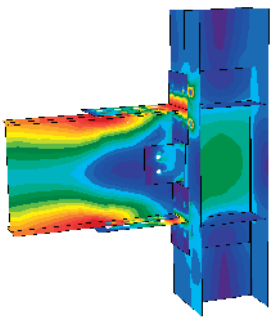

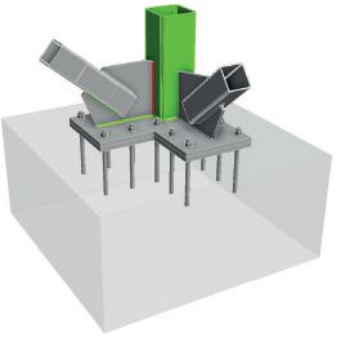

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Despite these challenges, businesses that implement steel-specific AI software can see substantial benefits in just weeks. MetalsFab's estimation team, for instance, enjoyed a 40% reduction in setup time per bid after adopting AI into its workflow. MSE estimates that its team saved a whole work week per month in its first year of use. In both cases, supporting their estimation teams with custom-built AI resulted in more comprehensive bids, faster turnarounds, and increased flexibility.

Strategic partnerships and deployments have already revolutionized the steel industry, making companies faster, more efficient, and more profitable.

"I went from $8 million two years ago to $12 million to $30 million—and we're going to possibly hit $40 million this year," Airhart said.

Contrary to many fears, adopting AI isn't about outsourcing human labor. It's about capitalizing on human labor, building collaborative partnerships where humans delegate menial, data-driven labor to machine learning so they can focus on high-value tasks.

"Everybody's resistant to change; that's just human nature," Ernst said. "We've seen the value of innovation in this industry, and to stay ahead of the curve, you have to keep investing."

As AI grows, learns, and integrates deeper into life and industry, its transformative potential will ease labor shortages and inefficiencies, bridge gaps between speed and quality, and uncork workflow and financial bottlenecks. But it won't happen overnight or on its own. Businesses must prepare their teams by investing in technological education and selecting technologies that balance benefits, real-world uses, and growth potential. While there are challenges that need to be addressed, AI's integration has already shaped a more efficient, cost-effective future for the steel industry.

"We were just kind of scratching the surface before," Callagher said. "We realized that if you're not growing, you're dying."

Daniel Kamau (Daniel@sketchdeck.ai) is the founder and CEO, and **Grayson Ingram** (Grayson@sketchdeck.ai) is a product manager, both at Sketchdeck.ai.

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Stoked for Steel

BY PATRICK ENGEL

AISC's 15th annual SteelDays offers enticing options for exploring the dynamic U.S. structural steel industry.

Students learn welding basics at a 2023 SteelDays event hosted by an Iron Workers Local training facility in New York.

AISC'S WEEK FULL OF FUN and educational steel-related events across the country is almost here—and it's not too late to be part of it.

SteelDays is back for its 15th year providing AEC professionals, faculty, students, and the public a look at the U.S. structural steel industry. The annual celebration sponsored by AISC and its partners is Oct. 14–18, with events across the country (and on computers, in some cases) that can enhance your work or knowledge. Participants can learn about new technologies in steel, explore new steel structures, step into ironworkers' boots for a day, see a fabrication shop in action, and much more.

A computer will suffice for participation in one event. The fully virtual Flash Steel Conference is Oct. 15–17, and it's comprised of 20 half-hour webinars that will cover connections, seismic design, adaptive reuse, and more. Virtual conference attendees can earn up to 10 PDHs.

SteelDays' soft launch was Sept. 13 in Bowling Green, Ky., when Stupp Bridge Company hosted a 25th anniversary celebration of its Bowling Green shop. It featured an open house, networking opportunities, guided tours of the fabrication shop, a presentation from AISC on current resources available to the industry, and a presentation on Stupp's use of BIM and 3D fabrication models.

Here's a look at some in-person October SteelDays events happening across the country. For a complete list of events and registration instructions, visit **aisc.org/steelday**.

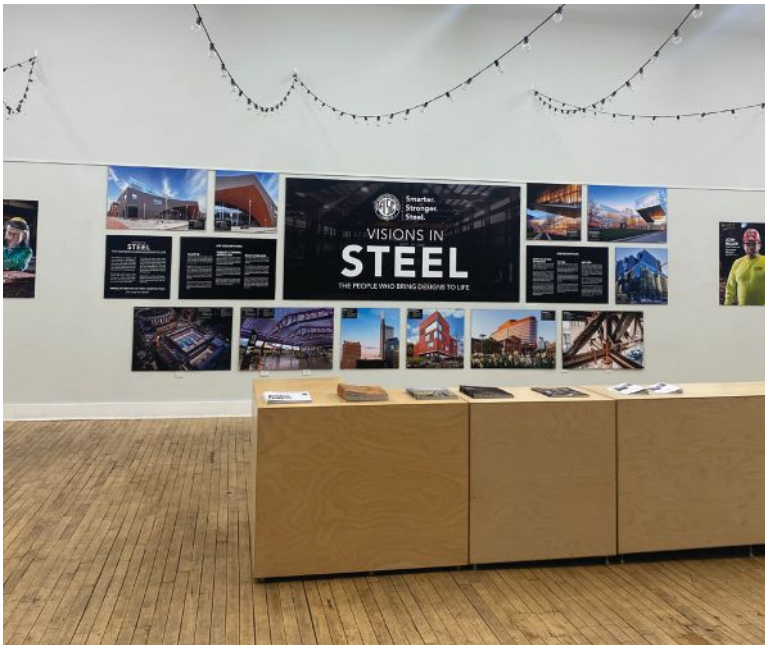
Charlotte (Oct. 14). Join Cory Byrd of SidePlate and Jonathan Mertz of SteelFab for a two-part event: a presentation on using SidePlate Connection Design and a project site tour at Atrium Health New Bed Tower. Participants will be required to provide their own PPE (hard hat, safety glasses, vest, and steel-toed boots).

This event is free for Structural Engineers Association of North Carolina (SEAoNC) members or applicants with membership

forms and dues, and $25 for nonmembers. Reservations must be made by 5:00 p.m. Oct. 14. Nonmembers can pay by card online, or click "bypass payment" during the registration process and bring a check made out to "SEA Charlotte."

Brooklyn, N.Y. (Oct. 18). Up to 30 attendees can go behind the scenes at Barone Steel Fabricators in Brooklyn for a shop tour and lunch. Closed-toed shoes, long sleeves, pants, and safety glasses are required for all attendees. Registration is required.

Tampa, Fla. (Oct. 15). The Tampa Visions in Steel photography gallery is on display at the Center for Architecture and Design through mid-November, and the exhibit will open with a ceremony on Oct. 15 from 6:00 p.m. to 9:00 p.m. Visions in Steel highlights



above and below: Visions in Steel was in Philadelphia earlier in 2024.

left: A student climbs a girder at an Iron Workers Local training facility in Phoenix.

left, below: Students learn how to prepare steel members for a crane pick at an Iron Workers Local training facility in Houston.

the people who work in local AISC member shops and recent steel buildings in the area, and Tampa is its latest stop. Attendees can learn about steel structures and read profiles on some of the fabricators who played a part in bringing them to life. Registration for the opening ceremony is required, and dinner and drinks are included.

Cheyenne, Wyo. (Oct. 18): Puma Steel is hosting its annual student welding competition. This year, $25,000 in Rex I. Lewis Scholarships will be awarded to the top 20 finishers to help further their education at any Wyoming community college. High school juniors and seniors from as far as 500 miles away will participate in a multi-day skill and knowledge competition. The top 20 finalists will return to Puma Steel on Oct. 20 for a final round that will challenge their skills even more. Wyoming Gov. Mark Gordon will attend and award students their scholarships.

Multiple locations (Oct. 14–18): Iron Workers Local chapters across the country are hosting high school and college student visitors at their training centers to give them an up-close look at a day on a jobsite. Attendees at each center can go through hands-on training stations where they will learn to weld, flame-cut, bolt, and climb a column—all while learning how to make the most of Ironworker Management Progressive Action Cooperative Trust (IMPACT) and AISC resources. Each event lasts about two hours.

Training facilities in Pittsburgh; Philadelphia; Austin; St. Paul, Minn.; Astoria, N.Y.; and La Palma, Calif., are hosting students this year. Attendees can earn 1.0 PDH. ■

Patrick Engel (engel@aisc.org) is the associate editor of *Modern Steel Construction*.

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City Center Connector

BY TRAVIS BUTZ, PE, AND JOHN SHANKS, PE

An affordable, efficient, and minimally disruptive steel bridge is a new link between a downtown area with three stadiums and a busy bike trail.

COLUMBUS, OHIO'S ARENA DISTRICT has become one of the city's busiest neighborhoods and a year-round destination. Its three stadiums host hundreds of special events each year that routinely total more than 6.3 million annual attendees and visitors.

But until recently, one missing piece was convenient access to the Olentangy Greenway Trail—Central Ohio's busiest bike path—on the opposite side of the Olentangy River. A survey in the 2014 Columbus Recreation and Parks Master Plan revealed increased non-motorized access to and from regional bike trails was Columbus residents' number one recreation-related priority.

With that need as a primary motivator and priority, the city launched a project to build the Olentangy Trail-Arena District Connector over the river. This new bridge links the arenas, the Olentangy Greenway Trail, and the Lower Olentangy Boat Ramp to the bike trail, serving as an arterial access point to the Central Ohio Greenway network. It offers an alternative transportation option to jobs, special events, housing, retail, and entertainment.

The city and design team viewed structural steel as the sole material option for the pedestrian and bike bridge because it met aesthetic requirements, mitigated river impacts, and could be rapidly and easily constructed.

One of the design goals was to create a modern nod to the historic steel truss structures that once occupied the site, namely a two-span interurban railway truss bridge and an adjacent single-span vehicular truss bridge. The city preferred a custom truss design rather than a typical prefabricated structure to give the bridge a distinct appearance that fit well with the site and surrounding structures. An inclined


Randall Lee Schieber Photography

The Olentangy Trail-Arena District Connector links a popular biking and walking trail to a vibrant section of downtown Columbus, Ohio.

Vierendeel truss constructed with ASTM A500 Grade C round HSS members provides a slender shape at a comfortable scale that gives the 233-ft-long bridge a pleasant, open appearance for pedestrians and cyclists and evokes the feeling of a gateway. The trusses have three HSS member types: 16.000×0.625 (lower chord), 14.000×0.625 (upper chord), and 10.000×0.500 (vertical).

Minimizing impacts to the waterway was crucial. The steel truss design allowed for assembly in a staging area followed by lifting each span into place, preventing extended impacts on the river. Most importantly, the river's 100-year floodplain elevation was within a few feet of the bikeway elevation, meaning that the structure depth below the bridge deck needed to be minimal to avoid a hydraulic impact. The steel truss structure was ideally suited to this purpose, because its below-deck depth was limited to the depth of the transverse floor beam members.

Steel members facilitated flexibility in detailing the structure components. The round HSS truss members are aesthetically pleasing and take advantage of the inherent structural efficiency of circular cross-sections subject to axial loads. The trusses were fully shop-welded and transported to the site as a single unit.

Connection plates were shop-welded to the lower chord truss members, and I-shaped transverse floor beams were field-bolted to the trusses in a staging area on-site. Using I-shaped ASTM A708 Grade 50 members for the floor beams allowed for conventional stay-in-place deck forms to be used and permitted the use of web perforations to allow utility conduits carried by the bridge to be discreetly positioned under the deck.

Trusses were shop-welded and transported to the jobsite as a single unit.

Tom McNally

Alex Bruner

The Vierendeel structure eliminates the need for bracing members in the truss openings, giving the bridge a more open and modern appearance.

Alex Bruner

The bridge was assembled in a nearby staging area, and each span was then lifted into place.

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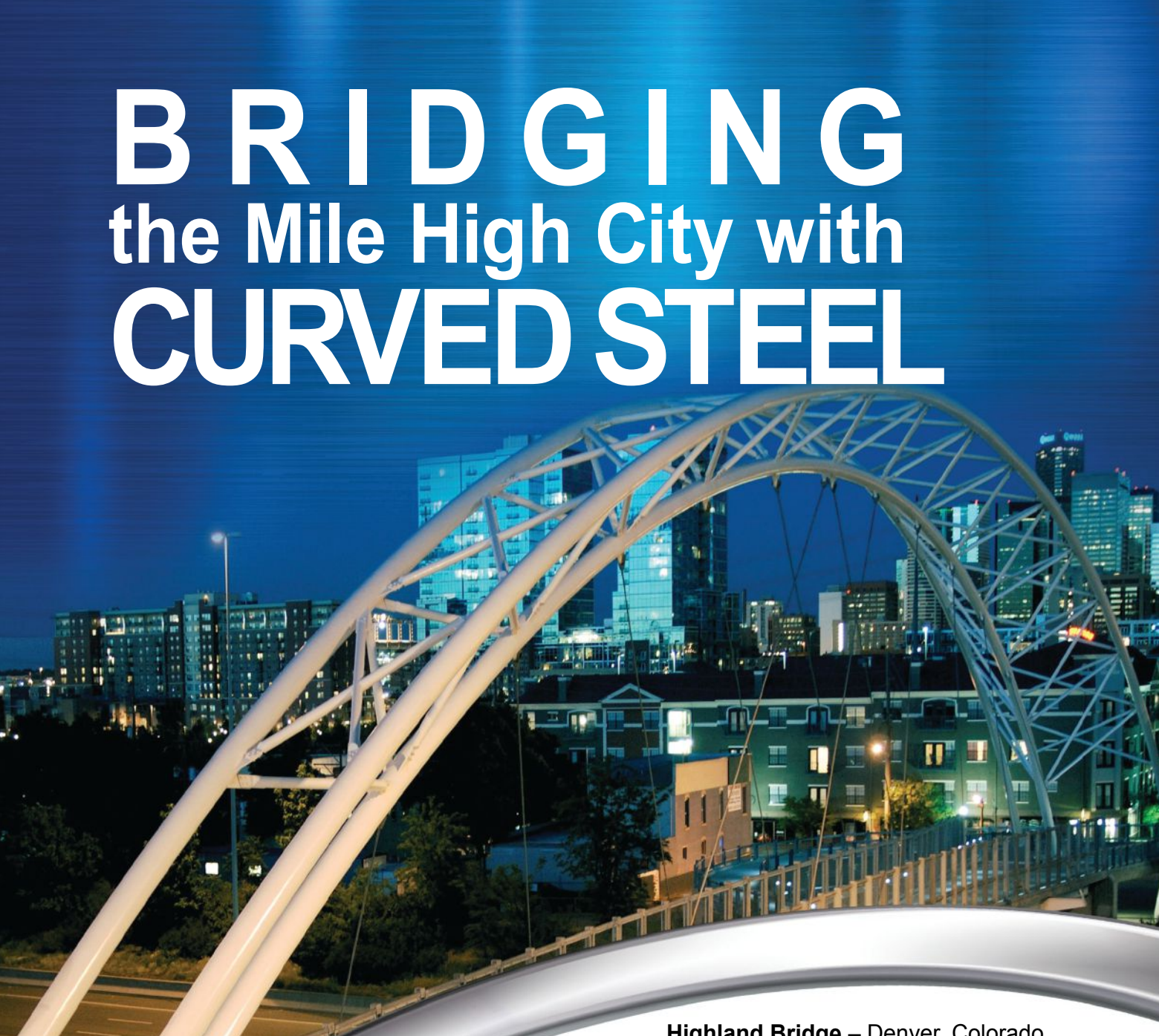

Highland Bridge – Denver, Colorado
This award-winning bridge is both dramatic and economical. Chicago Metal Rolled Products' Kansas facility was able to curve 153 tons of 18" outside diameter tubing up to 100' long, which reduced splicing costs.

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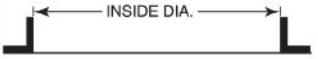
1 Angle Leg Out



10" x 10" x 1" Angle

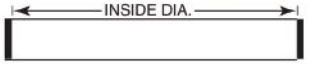
2 Angle Leg In

10" x 10" x 1" Angle

3 Flat Bar The Hard Way

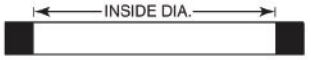
24" x 12" Flat

4 Flat Bar The Easy Way



36" x 12" Flat

5 Square Bar

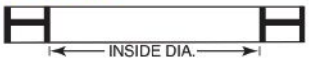


18" Square

6 Beam The Easy Way (Y-Y Axis)

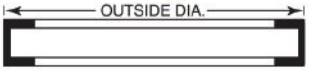
44" x 335#,
36" x 925#

7 Beam The Hard Way (X-X Axis)



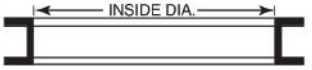
44" x 285#

8 Channel Flanges In



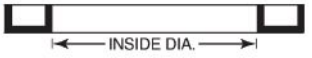
All Sizes

9 Channel Flanges Out



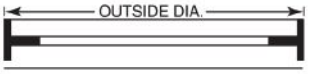
All Sizes

10 Channel The Hard Way (X-X Axis)



All Sizes

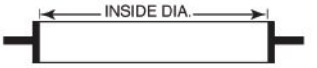
11 Tee Stem In



22" x 142½# Tee

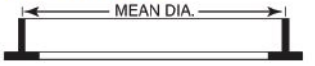
We bend ALL sizes up to:

12 Tee Stem Out



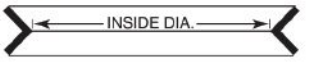
22" x 142½# Tee

13 Tee Stem Up



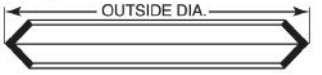
22" x 142½# Tee

14 Angle Heel In



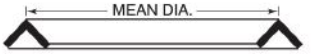
8" x 8" x 1" Angle

15 Angle Heel Out



8" x 8" x 1" Angle

16 Angle Heel Up

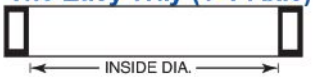


8" x 8"x1" Angle

17 Square Tube

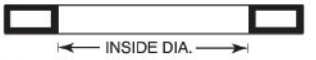
24" x ½" Tube

18 Rectangular Tube The Easy Way (Y-Y Axis)



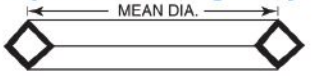
20" x 12" x ⅝" Tube

19 Rectangular Tube The Hard Way (X-X Axis)



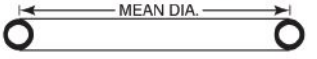
20" x 12" x ⅝" Tube

20 Square Tube Diagonally



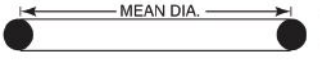
12" x ⅝" Square Tube

21 Round Tube & Pipe



24" Sched. 80 Pipe

22 Round Bar



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Mathew Aldridge

The bridge creates easy access from Lower.com Field (upper left) to the other side of the river and the trail.

Waterway Wariness

To assess the waterway impact, the designers performed a hydraulic analysis of the structure's effect on the Olentangy River with the goal of no rise in flood elevations. The original scope prescribed a single-span pedestrian bridge across the Olentangy River, but structural engineer Burgess & Niple (B&N) advised that design and construction costs could be significantly reduced with a two-span bridge and therein create funds to cover unique desired aesthetics and architectural lighting.

However, an additional pier in the middle of a floodway would typically cause an increase in the 100-year flood elevation, requiring the preparation of a Conditional Letter of Map Revision (CLOMR) and more involved coordination with FEMA. Those would add to the project schedule and cost.

In exploring workarounds, B&N considered the hydraulic effects of an abandoned interurban railway bridge pier at the crossing that collapsed on the riverbed at the onset of the project, along with existing minor remnants of a previously removed dam. Through hydraulic modeling, B&N demonstrated that removing these elements sufficiently offset the effects of a new pier in the river, avoiding a rise in flood elevation and need for a CLOMR. The discovery paved the way for a more cost effective two-span bridge.

The city also had a long-standing desire to remove the few small dam remnants. B&N determined that the contractor's temporary river causeway for constructing the new bridge could be used for access to remove the remnants at a much-reduced cost while the bridge contractor was mobilized on site and could perform the work. Folding this ancillary work into the bridge project saved the city from an additional cost and from undergoing additional environmental coordination for it through a separate standalone project.

In addition, the arches in the bridge design needed to be above the bridge deck to avoid the flood plain. Steel created slender arches that met the placement requirement and aesthetically aligned with the design.

B&N performed a preliminary engineering study to identify a preferred alignment to optimize the bridge length, locate the bridge abutments outside the floodway, and minimize impacts to the existing utilities. Those utilities included two old 36-in. cast iron water mains supplying downtown Columbus, an abandoned pump house structure, and existing boat ramp access to the Olentangy Water Trail.

The preferred crossing location coordinated the east landing with proposed Nationwide Boulevard and Confluence Village improvements—among them a new adjoining riverside park (Confluence Park, renamed Astor Park) and proposed repurposing of the abutting abandoned water intake pump house building planned to become a restaurant and bar.

Placing the bridge at that spot meant tightly fitting it against the intake structure, avoiding impact on the old cast iron water mains immediately north of the alignment, and providing adequate vertical clearance over the boat ramp. Using steel helped maintain a small footprint and slender under-bridge depth to overcome these constraints.

The 233-ft-long bridge spans the Olentangy River Water Trail and a boat launch ramp.

Bikers on the Olentangy Greenway Trail can now easily access the Arena District and its offerings.

Randall Lee Schieber Photography

Open Trusses

The bridge trusses have an arched upper chord and radially oriented verticals, forming a Vierendeel truss with trapezoidal openings—as opposed to a typical truss with triangular ones. The design is more complex than a traditional truss because joints between the members are required to resist moments in addition to axial forces.

The Vierendeel structure eliminates the need for bracing members in the truss openings, giving the bridge a more open and modern appearance. The truss lines were designed to have a 12° outward incline to provide a more open and inviting experience for pedestrians crossing the bridge, and to offer enhanced visual impact and appeal from all surrounding vantage points.

The arched trusses were kept to a modest height, varying from approximately 1 ft to 10 ft above the deck surface, fostering a pedestrian-scale visual experience. Fully shop-welded joints and white colored paint enhance the structure's clean appearance. The round tube members provide a modern artistic expression that complements the look of Lower.com Field, the newest of the three stadiums and home to Major League Soccer's Columbus Crew, and progressive surrounding development. It also provides trail access to fans coming from the other two venues, Nationwide Arena and Huntington Park.

The bridge railing, which consists of a gray-painted steel handrail and stainless-steel cables, was designed to be largely transparent when the bridge is viewed from a distance, to avoid visual distraction from the distinct character


Mathew Aldridge

and shape of the Vierendeel truss. For pedestrians on the bridge, the railing design affords unobstructed views of the river.

The design was performed using a multi-phase, three-dimensional analysis model that examined member and connection demands during construction and under service loading. Linear and non-linear buckling analysis was performed to verify stability during erection and construction operations. A local finite element model of the truss end panels, where the upper and lower chords meet the end post, was used to evaluate the connection behavior and stresses.

The end product is a seamless, visible connection between the Olentangy Trail and the Arena District that is responsive and exciting to the area's context. The city sought a structure that adds value to the public and private developments in the Arena District and downtown Columbus in a way that was distinctive, practical, simple, elegant, and affordable.

The bridge's aesthetic lighting system consists of energy-saving linear LED up-lighting that highlights the truss members and LED pod lights in the handrails that illuminate the bridge deck surface for pedestrian safety and sense of comfort. It's an iconic wayfinding gateway for pedestrians and cyclists entering the Confluence Village/Arena District.

Hundreds of fans use the bridge every Crew game day, which has led to a formal bike-check program staged off the east end of the bridge during home games. As Columbus continues economic development efforts, the connector will provide non-motorized access to downtown and the riverfront for years to come. ■

Owner
City of Columbus, Recreation and Parks Department

Architect
Lisle Architecture & Design, Inc.
Bridgescape, LLC

Structural Engineer
Burgess & Niple, Inc.

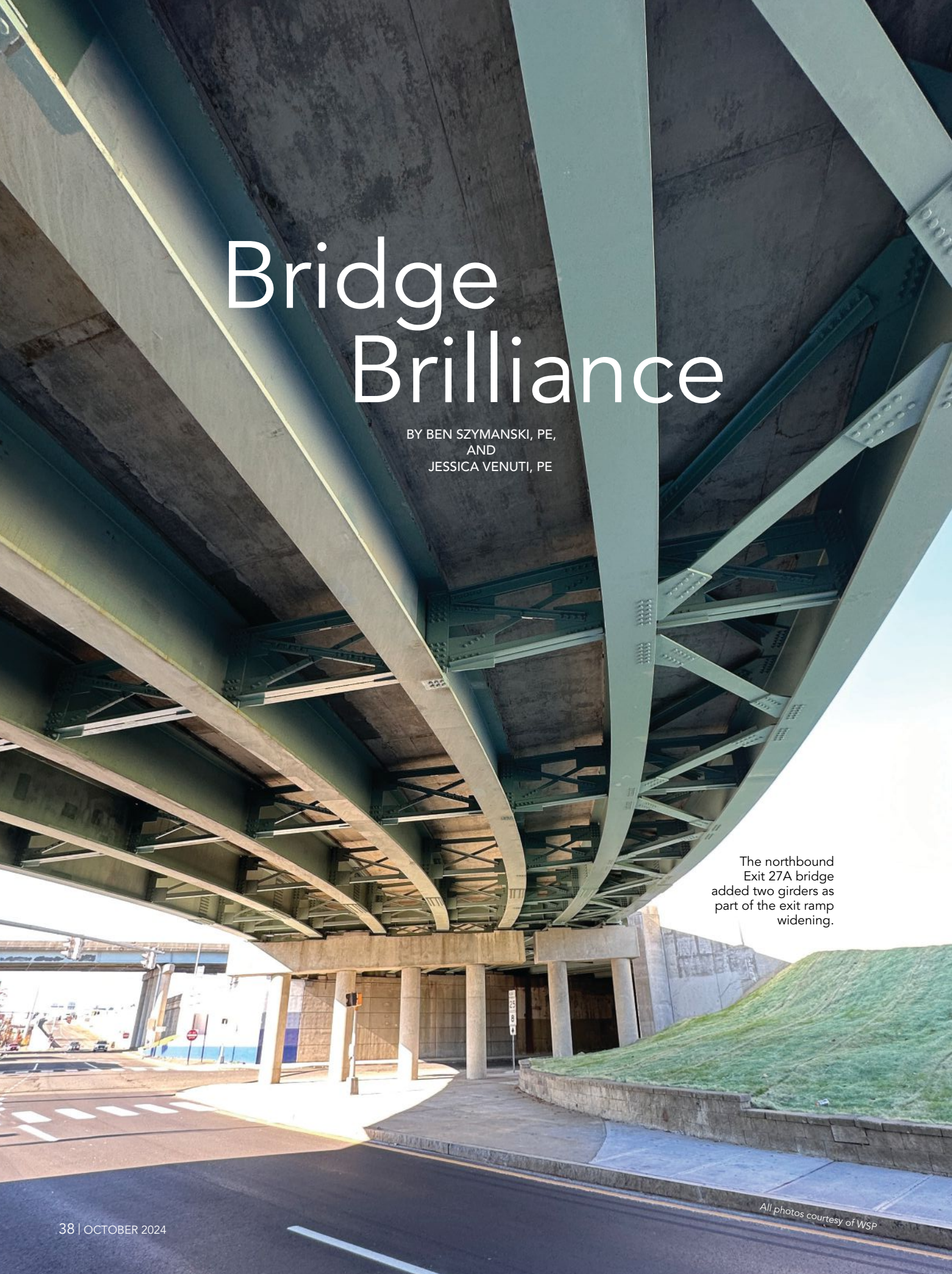
General Contractor and Erector
Kokosing Construction Company

Steel Fabricator
Ohio Structures, Inc. AISC CERTIFIED FABRICATOR

Travis Butz (**travis.butz@burgessniple.com**) is a senior bridge engineer and **John Shanks** (**john.shanks@burgessniple.com**), is the director of bridge design, both at Burgess & Niple, Inc.

Bridge Brilliance

BY BEN SZYMANSKI, PE, AND JESSICA VENUTI, PE



The northbound Exit 27A bridge added two girders as part of the exit ramp widening.

All photos courtesy of WSP

An interstate exit bridge widening project showed off fit-up creativity and included a clever geometry control system.

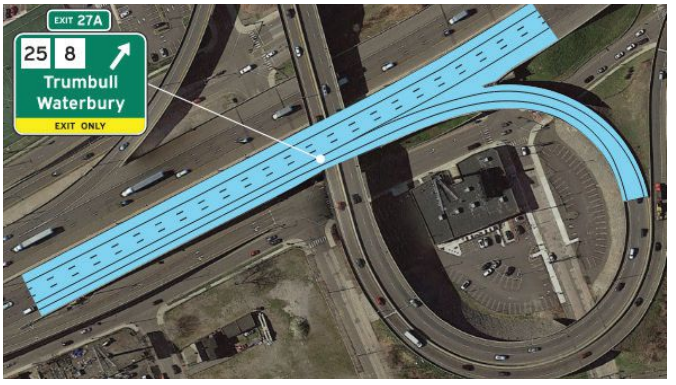
AN EXIT ON INTERSTATE 95 in Bridgeport, Conn., developed a wretched case of bottleneck that turned dangerous.

Exit 27A on northbound I-95 carries 24,000 vehicles every day. As its usage increased over the years, its one lane off-ramp carrying traffic to State Route 8 resulted in frequent backups on I-95 and, in turn, numerous accidents. Side swipe accidents from cars attempting to cut into the queuing ramp were a frequent occurrence at the exit.

A 2019 strategic implementation plan by the Connecticut Department of Transportation (CTDOT) identified the need for a "short-range, cost-effective, targeted" improvement to "reduce congestion, improve travel reliability, and improve safety" at Exit 27A. The existing condition included a single exit lane from northbound I-95 to Exit 27A to northbound Route 8, transitioning to two lanes immediately after the exit bridge over Warren Street. CTDOT retained WSP to design the two reconfigured bridges.

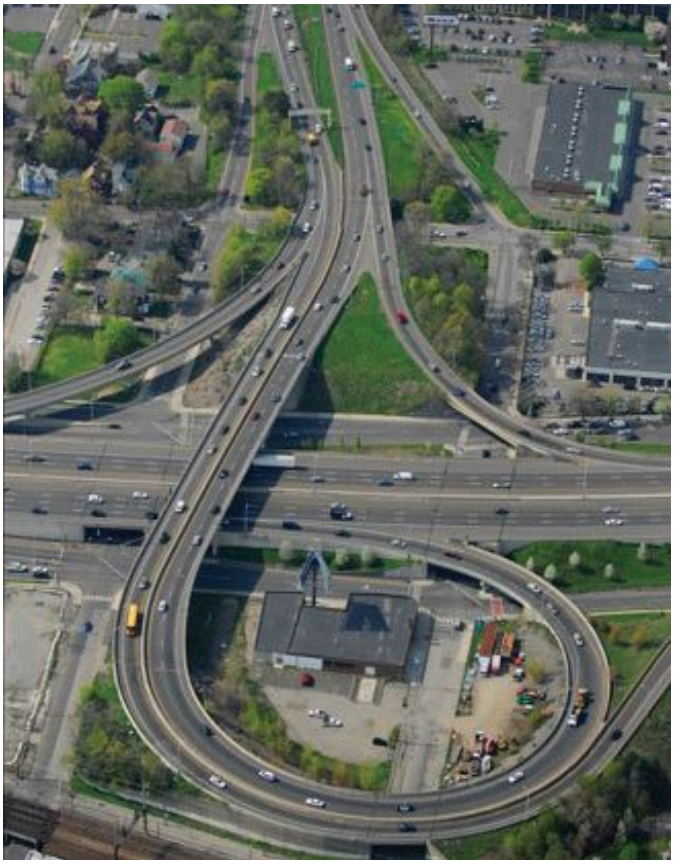
The solution was to reconfigure the exit lanes to allow for a dedicated off ramp lane and an optional right lane, carrying two lanes over the off-ramp bridge. Introducing a second lane meant modifications to a pair of existing bridges over Warren Street: widening of the curved girder bridge carrying Exit 27A and revising the splayed framing of the bridge carrying I-95.

The existing Warren Street bridges were previously separated only by a longitudinal joint, which posed geometric challenges to the reconfiguration of the off-ramp. Along with fitting the new ramp geometry into the footprint of the existing structures, other design challenges included deck geometry, orientation of the impact attenuation system, splayed and partial length girder

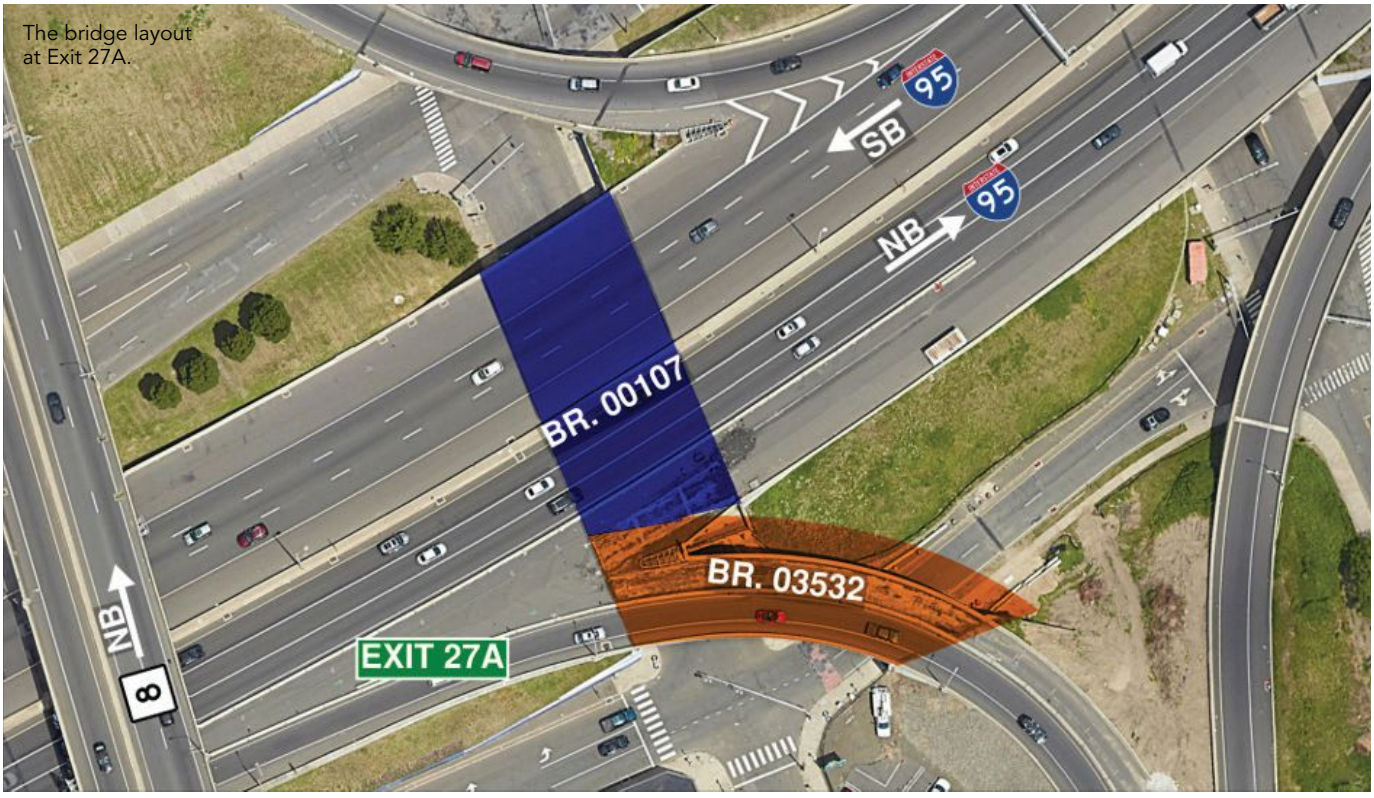


The prior lane configuration at northbound Exit 27A.

The new lane configuration.



The full view of Exit 27A pre-reconfiguration.



The bridge layout at Exit 27A.

framing on the bridge carrying I-95, tight curvature and high skew of the existing bridge carrying Exit 27A, and widening of the existing substructures at Bridge 03532 (as seen in the diagram above).

Bridge 03532 carrying northbound Exit 27A to northbound Route 8 was originally built in 1968 and reconstructed in 1998. The bridge consisted of a two-span continuous welded steel curved plate girders. The superstructure consisted of five continuous welded steel curved plate girders with a reinforced concrete deck with a total length of 164 ft along the baseline and a total curb-to-curb width of 36 ft, 10 in. The existing substructures consisted of reinforced concrete cantilever abutments and a post-tensioned center pier cap supported by reinforced concrete columns and a spread footing. Due to the relatively recent bridge rehabilitation and good condition of the structure, another rehabilitation and a widening made more sense than full replacement.

Bridge 00107 carrying northbound I-95 was originally built in 1959 and reconstructed in 1998, along with Bridge 03532. The superstructure consisted of simply supported rolled steel girders with cast-in-place reinforced concrete decks with a 10° skew at abutments. The northbound portion of the bridge had a 72-ft, 7-in. span with nine full-length rolled steel girders with bottom flange cover plates, a single partial-length girder at the first interior bay, and a curb-to-curb width of 77 ft. The existing substructures consisted of reinforced concrete abutments on spread footings.

The framing immediately adjacent to the curved girder Bridge 03532 included partial length girders and splayed framing to make up the roadway geometry. It needed to be partially removed and reconstructed to allow space for the new curved girders in the widened ramp.

Fine Line for Fit-Up

Widening Bridge 03532 carrying Exit 27A allowed for standard shoulders and the additional exit lane. To create those, existing girders were removed from Bridge 00107 carrying I-95 to make room for two new curved girders on the ramp bridge to the outside of the curve. Fortunately, the wide existing shoulder and gore provided ample space to stage traffic while the structures were reconfigured.

The reconfiguration was performed in two stages. The first stage shifted ramp traffic to the right, while the existing deck was partially demolished and the new framing and deck on Bridge 00107 and new curved girders and deck on Bridge 03532 were installed. The second stage shifted traffic to the left onto the new widened structure and repaired the existing deck. The geometry at the interface of the two bridges was carefully detailed to orient the impact attenuator at the gore at the proper angle to function as intended and to provide reasonable deck overhangs at each bridge. That resulted in a new splayed and partial length framing on Bridge 00107.

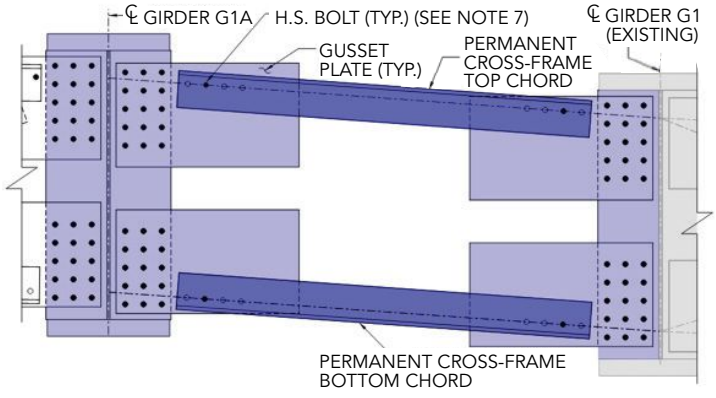
The challenge of fit-up between existing and new girders is inherent to curved girder bridge widening. Curved girder bridges, as well as bridges that include high skews, need to resist torsional forces that are generated by these conditions. The higher the skew or the tighter the curvature, the higher the torsion. Bridge 03532 included both conditions, with an approximately 36° skew at Abutment 2 and a radii as low as 197 ft at the existing inside girder. These two aspects combined to create significant torsion in the structural system, which needed to be transferred through the cross frames between girders.

While designing the new cross frames between the two new curved girders was not a significant challenge, the additional forces imposed on the existing cross frames needed to be minimized. The design team also included lateral bracing between the two new girders to resist torsion and minimize the influence on the existing structure. Ultimately, the team's targeted approach to strengthening select cross frames included bolted connections using additional angles and plates to supplement the existing single-angle members.

Both bridges were reconstructed in 1998, making a full rebuild an undesirable solution.

To ensure proper fit-up between the existing and new curved girders, the design team developed an approach to partially install new cross frames that would keep the new girders plumb during installation. Curved girders, particularly curved girders with tight radii, are prone to rolling over due to their shape and torsion that develops under load. To eliminate the potential for rolling over that would hinder cross frame fit-up, the design plans included a scheme where the top and bottom chords of the new cross frames would be installed first with only one bolt in each connection, allowing for the new girder to deflect plumb relative to the adjacent existing fascia girder, essentially acting as a hinge.

This temporary condition was verified by calculation, with forces determined through finite element analysis stage construction and confirmed through independent modeling. While fit-up between existing and new steel was a major concern for the design team, ultimately total dead load fit-up (TDLF) was chosen for fabrication as a means of minimizing locked-in forces on the structure.



The temporary configuration where the new cross frames' top and bottom chords were installed with only one bolt in each connection.

Another aspect that helped facilitate the fit-up of the new steel was the location of the construction joint in the existing bridge.

The construction joint was located inboard of the existing fascia girder, which facilitated removal of the existing overhang and parapet deck reinforcement. The construction joint's location led to a gradual unloading condition of the existing girders, with the first interior girder being partially unloaded and the existing fascia girder being almost totally unloaded, eliminating the potential for an abrupt change in the deflected condition between existing and new steel.

The high skew at Bridge 03532 Abutment 2, tight curvature of the superstructure, widening to the outside of the curve, and relative proportion of span 2 to span 1 created another hurdle: the transfer of torsion in the existing structure. These factors led to a slight uplift in the existing inside bearing at Abutment 2.

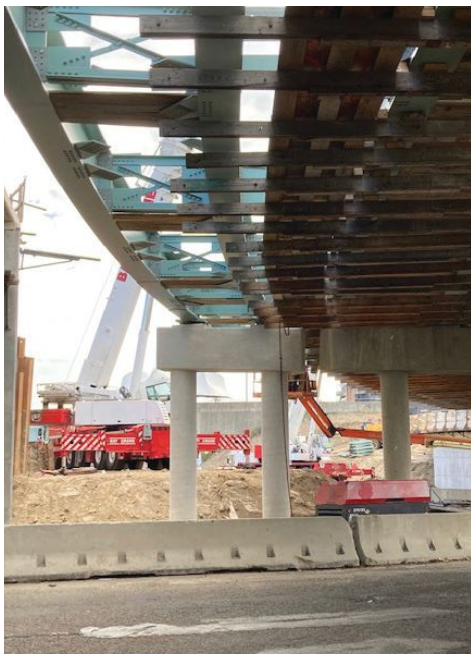
above: Erecting new girders for the Exit 27A bridge.

below: Targeted strengthening of cross frames was an important part of the bridge widening.

The construction joint was located inboard of the existing fascia girder.

below: The new girders on the outside of the curve.

right: Total dead load fit-up (TDLF) was chosen for fabrication to minimize locked-in forces.



Concrete counterweights solved an uplift problem.

above: The new exit ramp post-construction.

below: A post-construction look at the new exit ramp girders.

To eliminate the uplift potential under live load, a concrete counterweight was placed in the first interior bay at Abutment 2. The existing end diaphragm was modified to plate over the inspection opening and a new steel diaphragm was placed 6 ft away. The existing end and new intermediate diaphragms had new welded shear studs installed, and the void between the two was filled with concrete, a low-maintenance fix for the uplift issue.

The exit overhaul was successfully completed in November 2023 after two years of construction. Fit-up went smoothly, with only minor modifications to the erection scheme the contractor implemented. Exit 27A is open with traffic flowing freely. ■

Owner
Connecticut Department of Transportation

Engineer of Record
WSP

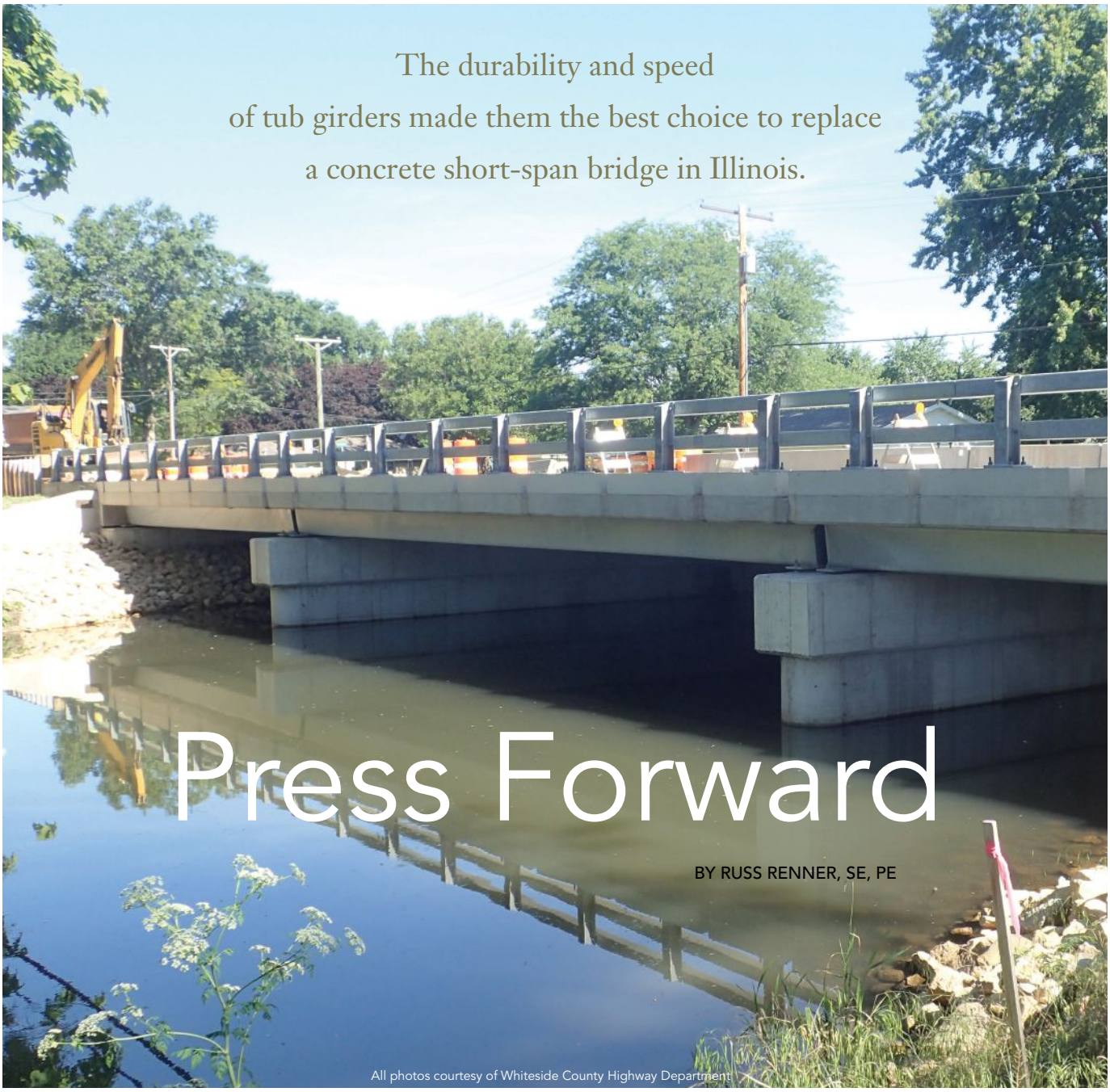
Consultant Liaison Engineer
CHA Consulting

Steel Team

Fabricator
High Steel Structures

Erector
Rotha Contracting

Ben Szymanski (**Benjamin.Szymanski@wsp.com**) is an assistant vice president and technical principal, and **Jessica Venuti** (**Jessica.Venuti@wsp.com**) is a senior structural engineer, both at WSP.



The durability and speed of tub girders made them the best choice to replace a concrete short-span bridge in Illinois.

Press Forward

BY RUSS RENNER, SE, PE

All photos courtesy of Whiteside County Highway Department

A BRIDGE PROJECT in small-town Illinois picked an emerging steel solution to replace a concrete bridge—and discovered its time-saving benefits along the way.

The choice to replace a four-lane bridge structure in Rock Falls, Ill., carrying Dixon Avenue (County Highway 5) over Howland Creek was press-break-formed tub girders (also known as press-brake tub girders or PBTG), a relatively new structure type that uses steel as the primary load-carrying component. They lent themselves to minimized superstructure installation while also providing an ideal choice for longevity.

The original bridge structure—located in Whiteside County, Ill.—over Howland Creek was built in 1954 and consisted of a three-span, 15-in.-thick reinforced concrete deck slab carrying two lanes of traffic. In 1967, the existing structure was widened to accommodate four lanes. In 1983, the structure was rehabilitated with isolated patch repairs on the deck surface followed by deck scarification and the installation of a latex concrete overlay.

In the early 2000s, the concrete curbs and rail showed significant deterioration, and spalling was observed on the deck underside with exposure of reinforcement bars. The construction joint between the original structure and the widening structure had also deteriorated significantly. The substructure consisted of precast concrete piles, which aren't historically driven deep, and its flaws led to a recommendation to replace the bridge rather than reuse the substructure.

Several important considerations for the county arose when analyzing replacement options. Dixon Avenue is an arterial county road consisting of four lanes and carrying approximately 3,000 vehicles per day. It's one of the primary roads into and out of Rock Falls, so minimizing the amount of traffic disruption was important. Secondly, the county uses salt or a combination of salt and

opposite page: The bridge carries County Highway 5 Howland Creek.

above: Galvanized PBTGs can withstand the elements well.

below: The precast deck required a curb on the outer beams.

chips as the primary material for ice control in the winter, so the new structure needed to withstand exposure to both.

Another concern was the minimal amount of depth available for the superstructure. The elevation difference between the existing roadway surface and the streambed was approximately 13 ft and needed to accommodate a flow of approximately 3,600 cfs, meaning a shallow-depth superstructure was required so increases in roadway elevation were negligible. Minimizing an increase in roadway elevation was important due to the presence of a super-elevated curve just east of the existing bridge. A major increase in roadway elevation would have added to the complexity of the approach work to the structure.

When Whiteside County Highway Department officials weighed all considerations, they reduced their options to a precast-prestressed concrete (PPC) deck beam system or galvanized PBTG beams.

Head-to-Head

Precast-prestressed concrete (PPC) deck beams are commonly used for bridges carrying lower-volume local roads in northern Illinois. On higher-volume roads, it is common to provide a 5-in. non-structural concrete wearing surface for additional protection for the deck beams. The depth of the deck beams with the overlay was similar to the depth of the proposed PBTG beams with the precast deck.

The cost of the two systems was essentially equal. The galvanized PBTG beams, though, offer strong protection from the exposure to salt while also providing visibility of the main supporting structure to monitor its condition. The PPC system can be somewhat protected from exposure to salt with a concrete overlay, but its main structural component is pre-stressed strands that are not visible for inspection. PPC systems generally have been shown to last around 50 years—sometimes less—depending upon their

The curb has spaces every 6 ft to accomodate runoff.

exposure to salt. If PBTG beams were to deteriorate over time, there are rehabilitation options that would allow continued use of the steel for many years, even if the deck needed to be replaced. The county chose PBTGs after weighting cost benefits.

The PBTG system can accommodate a cast-in-place concrete deck or a precast deck option. The county chose the precast deck, anticipating a longer life for it. In addition, the elimination of a cast-in-place deck could potentially increase the number of contractors interested in bidding on the project.

The bridge beams, including the precast deck, were purchased from Valmont Structures through a separate bid letting ahead of the construction bid to provide sufficient time for fabrication. Traditionally, the purchase of the materials is included with the construction letting, but the Illinois Department of Transportation allowed for a separate local letting for the beams with the county funding the materials up front. The county was later partially reimbursed with federal funds after the beams were incorporated into the project.

The PBTG system has been used in some other states, notably Michigan (see "Save a Bundle with Tub Girders" in the October 2023 issue, **www.modernsteel.com**). The Dixon Avenue bridge, though, was just the third of its kind built in Illinois, following bridges in Peoria County and Champaign County, and was the first multi-span PBTG bridge. The structure consists of three simple spans (as opposed to continuous beams) of nine beams each, for a total of 27 beams, weighing a total of 189 tons including the precast deck. Because Dixon Avenue is four lanes, the county completed the work in two stages to keep the road open for traffic, using single-lane temporary signals at the ends of the project.

Finishing Fast

The new substructure consisted of commonly used concrete-filled round metal shell piles with cast-in-place abutments and pier caps. The piles of the piers were encased in concrete to form pier walls. No special considerations or designs were required for the substructure that were related to the PBTG system, although the necessary capacities of the piles were lower, as the PBTG system weighs less when compared to the PPC deck beam system. The PBTG system was about 120 lb per sq. ft, while a 17-in.-deep PPC deck beam with a 5-in. overlay is about 220 lb per sq. ft.

The precast deck on the outer beams required the incorporation of a concrete curb to fit with the curb and gutter approaches on each side and end of the bridge. The bridge rail was mounted to the top of the precast curb, and openings were left in the curb every 6 ft to accommodate runoff from the bridge deck. The ends of the beams supported at the abutments included a precast backwall. Steel channels were installed in the field as diaphragms at the piers.

above and below: Work was completed in two stages to keep the road open for traffic at all times.

above and below: The bridge design team chose a precast concrete deck.

below: The precast deck allowed the bridge to open faster.

above and below: PBTGs can be exposed and allow for easy monitoring of their condition.

One of the differences between the installation of the PBTG system and PPC deck beams is the bearing plate is narrower than the beam width, and with the shallow depth of the tub girder, there was not enough clearance to drill the anchor bolts with the beam in place. The contractor lifted the beam into the proper position, marked the hole locations, lifted the beam back up while holes were drilled into the substructure and anchors dropped into the holes, and set the beam back down while guiding the anchors through the holes. Grout was then installed into the holes.

That process was completed for each beam and required a short-term road closure, but the impact to traffic was minimal, with the closure only lasting five to ten minutes for each beam. Traffic returned to a regular pattern by the time the contractor was ready to set the next beam.

After setting all the beams, the 8-in. joints between the beams were filled with a high-strength (7,000 psi in 24 hours) non-shrink grout material after forms were installed to the bottom of the joints. To eliminate the need to work from underneath, the forms for the bottom of the joints were tied to the exposed reinforcement at the edge of the deck while the beams were being installed. The forms were then tightened to the bottom of the deck after beams on both sides of the joint were in place.

Using the precast concrete deck option allows for a short traffic opening timeline. While other factors not related to the bridge structure itself came into play, the bridge realistically could have been open to traffic within a week based on the amount of time for setting beams, placing the closure joint material, and installing the diaphragm. The county had a waterproof membrane system installed to the deck surface to provide a well-protected and uniform riding surface. ■

Owner
Whiteside County, Ill.

Engineer
Chastain & Associates

General Contractor and Erector
Martin & Company Excavating

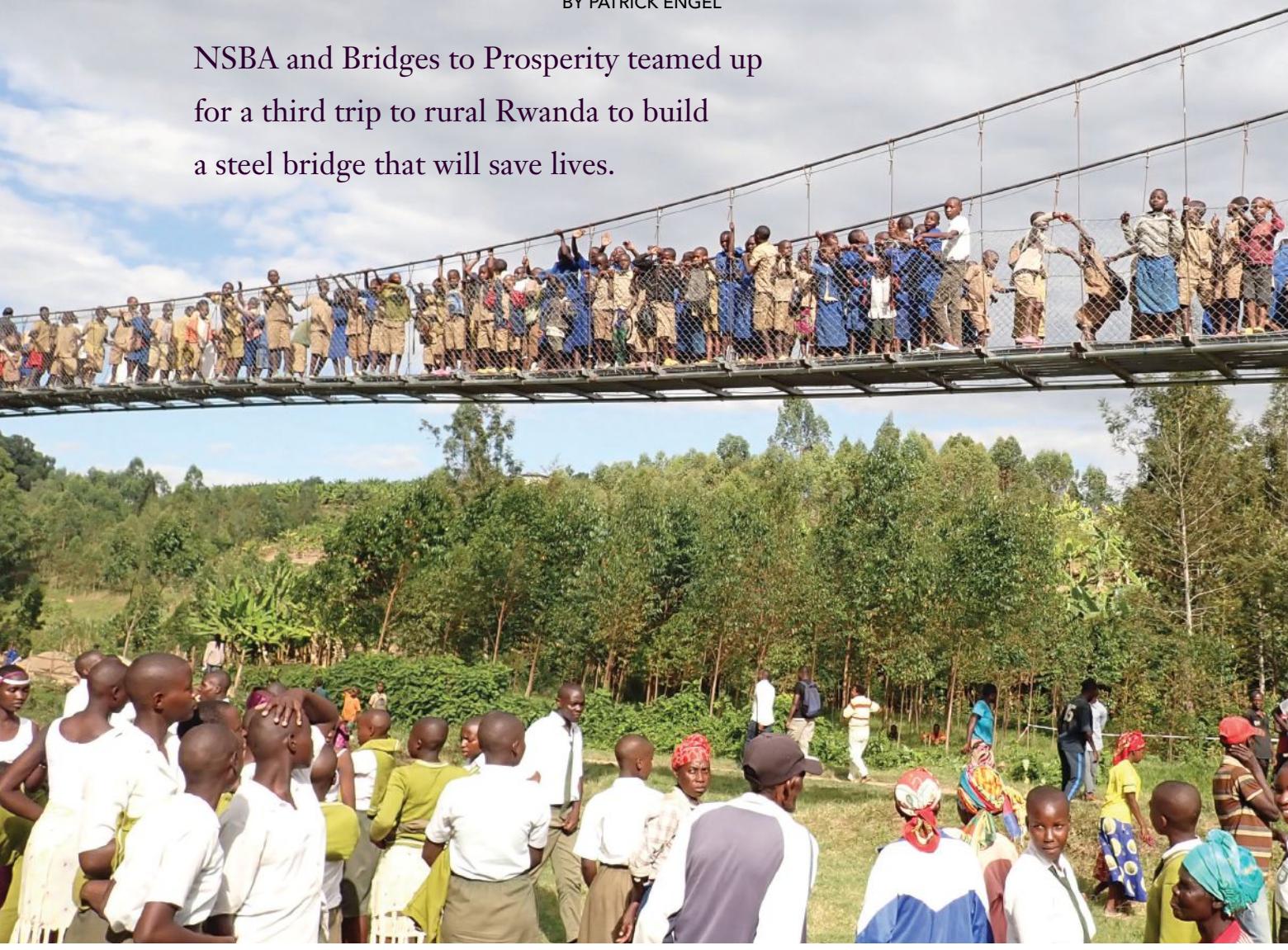
Fabricator
Valmont Structures

Russ Renner (**rrenner@whiteside.org**) is the county engineer for Whiteside County, Ill.

Critical Crossing

BY PATRICK ENGEL

NSBA and Bridges to Prosperity teamed up for a third trip to rural Rwanda to build a steel bridge that will save lives.



CROSSING A 120-FT-WIDE RIVER that only reaches that width when it floods is an effortless, routine task for most Americans. The nearest major road with a bridge over a river is typically blocks away in a city or a short drive away in a small town, and the prevalence of sidewalks and cars is an afterthought.

These bridges have short spans and might even lack piers or towers. They often blend into the roadway and feature a change in roadside terrain as abbreviated as the awareness of crossing them.

In a section of rural Rwanda, though, going from one side of a similarly sized river to the other can mean endangering lives.

For residents of small towns and villages on either side of the Rurumanza River, the shortest way to cross was to walk right through it. Paved walkways and cars are rare. In some months, crossing the river presents a low risk, but during the rainy season, it's perilous. Attempting to cross the flooded river during that time has resulted in at least one death and several injuries per year, residents say. A safe crossing meant adding hours to the journey.

"We have had things for so long that we've gotten used to being able to take a car just to get wherever we want to go," said Bob Cisneros, the chief engineer at AISC-member fabricator High Steel Structures, LLC. "But people (here) are working every bit as hard as we do to build things, and they have to walk two hours to get something."

Until now.

left: Residents and volunteers cross the bridge and celebrate at its inaguration.

below: Preparing the bridge for inaguration.


Erin O'Malley


Erin O'Malley

Cisneros was among 11 American steel bridge industry volunteers who traveled to southern Rwanda in May to build a 279-ft span steel pedestrian bridge over the Rurumanza River that connects the Rwandan districts of Ruhango and Muhanga in a remote area. The two-week project was a National Steel Bridge Alliance (NSBA) and Bridges to Prosperity (B2P) collaboration, their sixth overall and third in Rwanda.

"This was the smoothest build we've had," said NSBA senior director of bridge initiatives Jeff Carlson, who has led the last two Rwandan projects.

B2P is a nonprofit that builds pedestrian bridges in isolated international communities. Each year since 2022, NSBA has led a B2P project in Rwanda that delivered a steel bridge built without heavy machinery. Volunteers and area residents have erected each one in about two weeks.

The bridge is more than just a safer river crossing. It's a lifeline for residents who must cross back and forth to access essential activities like doctors, markets, and schools. Their trek no longer takes extra hours to reach the nearest bridge or presents hazardous conditions. Bridges like this one help break the isolation that contributes to rural poverty and aren't possible for a community without easily obtainable building materials, bridge engineering expertise, and tools to build on its own.


Moise Kwizera


Erin O'Malley

above: Three months of substructure work preceded the volunteers' arrival.

right: Tower construction takes nearly a week.

below: Volunteer Erin O'Malley of HDR works atop one of the towers.


Erin O'Malley

"People all over the world should have the same freedom to get to where they want to go," Cisneros said. "No person shouldn't be able to get to a clinic, to a school, to the store, or a market to sell something they worked so hard to build."

Many local families' financial success is rooted in selling goods at markets, and the journey to them while carrying those goods is less laborious with a reliable river crossing. But perhaps the bridge's most important impact is giving 870 more students safe access to their school. Before it was built, routes to school were treacherous. The community built a temporary bridge each year that spans the river during the dry season, when the water is merely a stream, but annual floods wash it away. Without it, students crossed the river during flood season or didn't go to school. Children put their lives at risk to learn, and parents knew their children were at risk of serious harm on their journey to and from school.

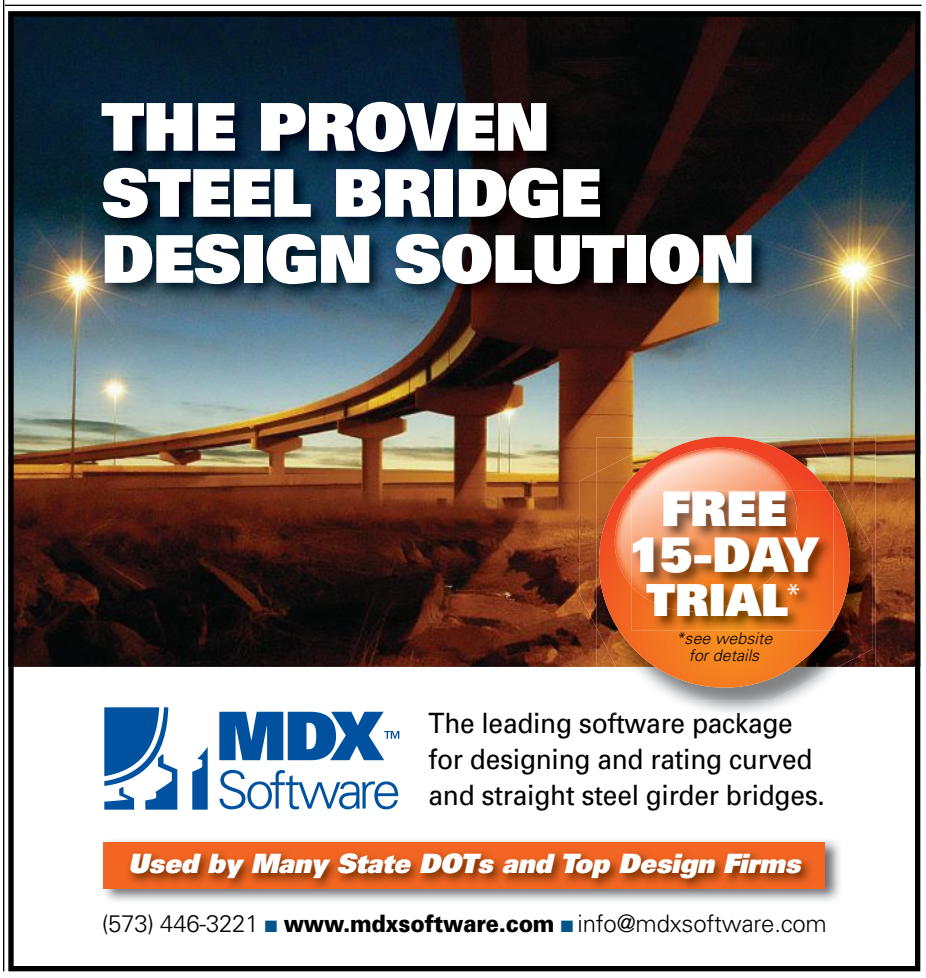
With the new bridge, their previously unfathomable reality gave way to peace of mind. The gratitude the students displayed reflected the significance of that shift.

"One day during the build, we got to the assembly area and 1,500 students erupted in applause," Carlson said. "Every one of us had tears in our eyes because of how powerful it was. They asked us questions about where we were from, sang us songs, and we gave them gifts we brought with us. That was the most powerful thing I've seen in any one of these builds."

Work started on the bridge long before the volunteers arrived in May. Community members—led by a B2P employee serving as the foreman—did three months of substructure work and site preparation. They cleared the site, excavated the substructure, mixed and poured the concrete for the cable anchors, and put together rebar cages for the substructure—all by hand.

Next, the residents and volunteers erected the steel towers, bridge deck, and cables with hand tools and manual labor. Tower assembly and cable hanging took up the first week, while most of the second week was spent hanging the 85 suspenders and laying the deck and fences. The towers are made of 8-in. Extra Strong tubes and required no welding on site.

The community didn't just gain a new bridge. Residents learned how to build and maintain a community asset to ensure it stays in sturdy condition for decades. And some are compelled to share that expertise.



The completed bridge before its inaguration.

Steve Lawton

Bridge deck assembly was the final piece of construction.

Erin O'Malley

"I wish to continue providing my energy and skills to other communities around the country," resident and worker Iragena Fraterne said.

The teamwork-oriented building process reflects the B2P volunteer experience. The volunteers do not parachute into the community each morning from cities hours away. They stay in a house nearby. They traveled in vans and on foot to and from the jobsite daily. Meals and downtime activities—like the group wiffle ball game—are communal, not individual. The volunteers also spent a weekend at Lake Kivu, which sits on the Rwanda-Democratic Republic of the Congo border. Every piece of the trip is befitting of the project motto: One Team, One Goal.

Like the prior two Rwandan B2P-NSBA projects, construction ended with a euphoric inauguration ceremony that drew the curtains on two weeks of bonding. Residents and volunteers crossed the bridge amid applause and dancing from everyone else.

"It felt like you were going into a stadium where everybody's cheering for you," said volunteer Steve Lawton, the director of quality at Rosewich Engineering.

This year's volunteers were from NSBA, American engineering firms, steel fabricators, state departments of transportation, and other bridge industry sectors. Most heard of the opportunity by word of mouth from colleagues who went on prior trips or NSBA videos that detail the experience. Prior attendees described it to them as a pivotal moment in their lives.

Eleven more people learned why and now say the same.

"If you have the opportunity to do it," volunteer Jim Costigan said, "it's a life-changing experience."

*Bridges to Prosperity and NSBA are leading another build in Rwanda in 2025, tentatively set for May 10–24. Contact Jeff Carlson at **carlson@aisc.org** to learn more. Visit **aisc.org/b2p** for videos about the 2024 trip and prior years' trips.*

2024 NBSA-Bridges to Prosperity Volunteers

- Austin Behrends, a volunteer from the Iowa DOT
- Bob Cisneros, High Steel Structures
- Erin O'Malley, HDR
- Jeff Carlson, NSBA
- Jim Costigan, Modjeski and Masters
- Jonathan Stratton, Eastern Steel Works
- Mohab Hussein, a volunteer from the New Jersey DOT
- Pierre Paquette, Nucor
- Ron Berry, BNSF Railway
- Steve Lawton, Rosewich Engineering
- Bill Saffian, a volunteer from the New Hampshire DOT

Patrick Engel (**engel@aisc.org**) is the associate editor of *Modern Steel Construction*.

Workforce Development Win

BY PATRICK ENGEL

The Fabricator Education Training Program is AISC's most ambitious and thorough effort yet toward improving talent recruitment and retention.

A NEW PROGRAM for AISC member fabricators is designed to shorten the time needed to make new employees productive and immediately show them a promising career path in the industry.

The Fabricator Education Training Program is a self-paced online class to help new hires quickly acclimate to working in steel fabrication. The key to its success, though, is how it was developed. AISC staff worked closely with an industry leader in adult learning and a group of experienced fabricators to ensure the training modules were relevant, correct, and engaging.

The program's collaborators come from a diverse collection of fabrication shops, from small to large, from low-volume to high-volume, and from bridge-focused to building-focused to all-purpose. All of them have seen the boost that effective training creates and wanted to give shops of all sizes an opportunity to benefit from it.

"I think it's going to be a boon to fabricators, small and large," Cooper Steel Fabricators president Duff Zimmerman said.

The Fabricator Education Training Program's first curriculum, Fabricator Fundamentals, launched in August. Modules on layout and fit-up of beams and columns will be released later in 2024. The program is only available to AISC member fabricators, and membership dues cover the cost. To access the training, email **fabtraining@aisc.org** or submit the form at **aisc.org/fabricatortraining**.

"We're going from zero to a junior fitter, in essence," said Mark Trimble, AISC senior vice president and a former vice president at Huntington Steel in Huntington, W. Va.

The high-quality training program improves the onboarding process, but just as importantly, it aims to retain more employees by showing them a path to improvement and success.

"It's one thing to get workers, but if we can get the workers jump-started and have them become productive as quickly as possible, we'll have a workforce a lot faster," Trimble said.

Most of all, the program's collaborators hope it gives new hires a sense of pride, ownership of the work, and a vision of a successful career in fabrication—increasing the chances they stay in the industry. Seeing their progress quantified brings a sense of accomplishment that the sink-or-swim, learn-by-osmosis training programs commonly found in fabrication shops can't provide.

"People can get discouraged if they feel like they're failing at the job," said Glenn Tabolt, CEO of STS Steel and AISC Board of Directors vice chair. "You have to make sure you bring them along in a way that builds confidence."

Fabricators compete for workers with major equipment manufacturers, automobile plants, and other trades. Some of those competitors are large corporations that had ample money and time to invest in formal training programs long ago. Many steel fabricators, though, don't have the schedule freedom or resources to commit to developing a thorough, trackable program.

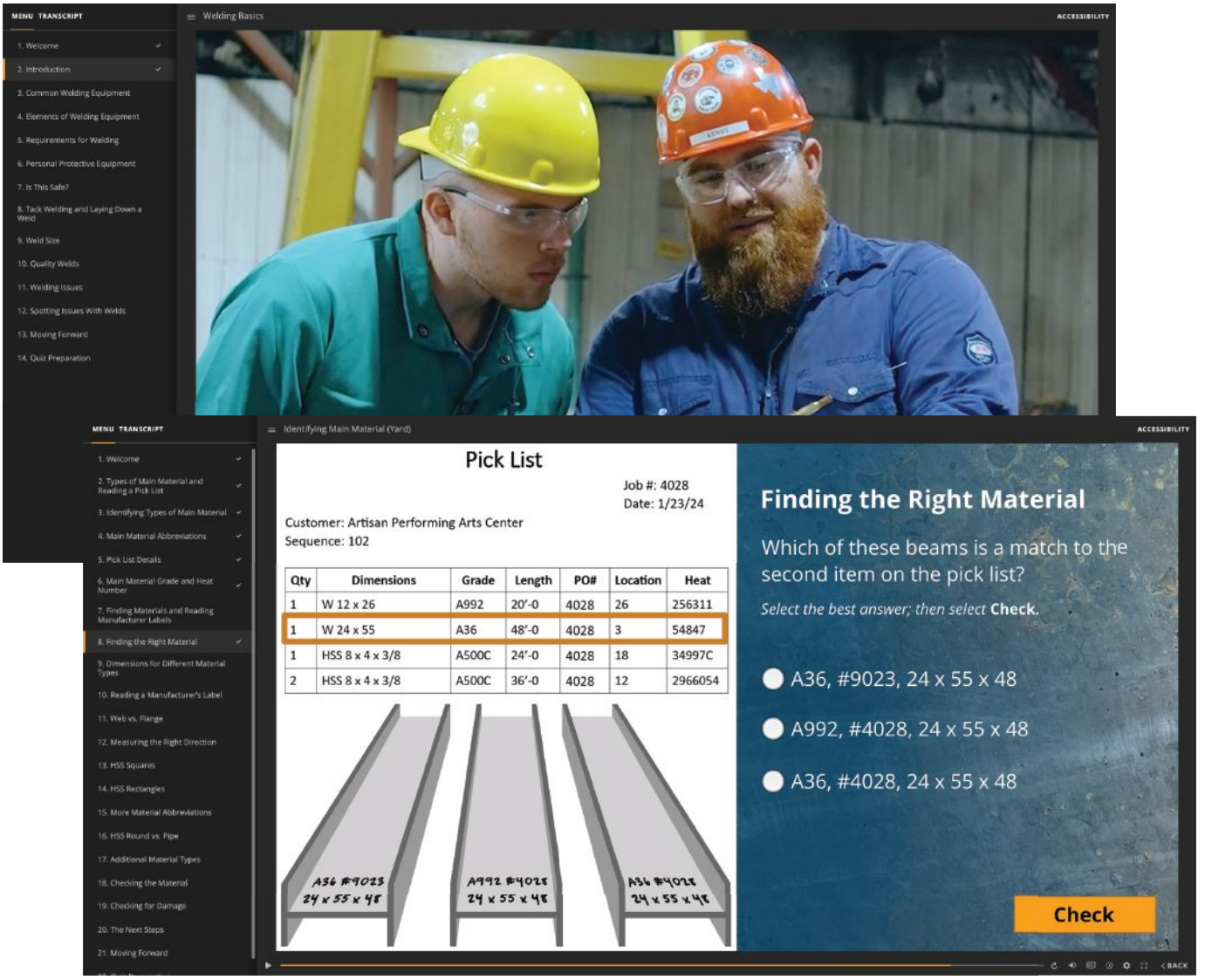
"If you're up against Nissan or Honda, they have unlimited resources for training and employee development compared to a 100-person fabricator shop that mostly uses internal knowledge and trains one person at a time," said Joel Landsverk, AISC's Fabricator Education Training Program manager.

Individual fabrication companies, including some of the nation's largest, have tried to create, implement, and maintain a formal, digestible, and trackable training program for their new shop employees. Refining the message and the lessons into easily understandable classes for a beginner takes time and agreement on what to teach. Picking an appropriate online education vendor can be time-intensive and expensive. Those factors, in addition to the commitment to maintaining the training library, are often a large enough roadblock to prevent the work from getting done at all.

Cooper Steel was an outlier, though. In the early 2000s, it developed an in-person training program modeled after the Steel Erectors Association of America's method, which Zimmerman helped create. The program included a twice-weekly, six-week in-person class for employees and non-employees at a local technical college. Employees who completed it were offered a $1 per hour raise. Non-employees were offered a job at the end.

The program created ownership and built a workforce pipeline for Cooper Steel, a large fabricator based in Shelbyville, Tenn. It was proof of concept that thorough training matters and a lack thereof was a reason behind fabricators' shared workforce development issues.

"I shared our training program with the AISC board, and they agreed there was an unmet need for training like this," Zimmerman said. "We need to do it, but we need to train with videos and computers because that's how young people learn. It enables them to have some control over the pace and not feel embarrassed if they have to go over a concept more than once."



AISC had the resources, expertise, and a strong desire to develop a widely accessible training program for their member fabricators that expands on Cooper's original design and helps many fabrication shops compete for workers at a level above what their resources would otherwise allow. Still, there were several hurdles to clear: defining and understanding the audience, finding an e-learning content creation company that could understand fabrication, partnering with a successful industry insider and fabricator trainer, and gathering a diverse group of subject matter experts to guide and review the content.

"AISC decided that if it was going to invest in training," Zimmerman said, "it needed to be as modern and up-to-date as possible."

Content Crafting

Trimble and Tabolt formed a committee of subject matter experts—most of them fabricators—to help develop the program. They needed a team to produce it and people to appear in the videos, but the early priority was finding a veteran trainer. They found their instrumental member at 2022 NASCC: The Steel Conference in Denver.

Kenny Hicks, a training specialist at Able Steel Fabricators in Arizona, held a session at the conference and spoke about the training program he started from scratch in 2018. Four years after its inception, his program had sparked a steady stream of applications for Able Steel's open positions.

AISC board members and staffers were in the audience for his session. Several spoke with Hicks afterward and visited Able, which offered its shop as a studio for the training videos. Cooper Steel Fabricators, TrueNorth Steel, Dave Steel Company, and Thomas Steel, Inc. also opened their shops for program material production.

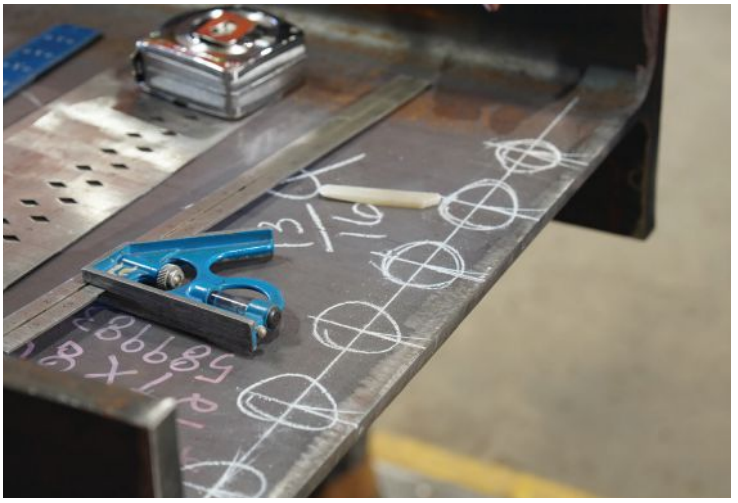
"Kenny has been a trainer, fitter, and quality assurance person," Tabolt said. "He's enthusiastic about training people."

Among Hicks' first pieces of guidance was knowing where to start with each topic and, more importantly, where to stop.

"You can go deep into each category and talk about different experiences or methods," Hicks said. "One of the things when I'm training at Able is that I'll show you a way to do it. It's not the only way to do it. There are several ways to fit structural steel. But the main thing is we're clear on the fundamentals, and we include in each module that you have to follow your shop's procedures and guidelines."

The committee of subject matter experts came from several shops with different methods. No matter the method they chose for a course, it had to answer a guiding question: What do you want new hires to accomplish?

"When you think about drawing reading, you don't want them to just learn how to read a drawing without a purpose," Tabolt said. "You want them to read a drawing so they can correctly and accurately layout and fit those parts."



The Fabricator Fundamentals curriculum has 13 modules covering tasks that focus on a new hire's first 90 days:

- Introduction to Steel Fabrication—What is it? How does it work?
- Career Success: Your First 90 Days—Tips for success and learning what to expect
- Read and Use a Tape Measure 1: Fractions
- Read and Use a Tape Measure 2: Measuring
- Grinding Basics
- Bolts and Bolting Basics
- Handtool Fundamentals: Clamps
- Handtool Fundamentals: Squares
- Identifying Main Material
- Identifying Detail Pieces
- Crane and Rigging Basics
- Welding Basics
- Career Success: Beyond 90 Days—There are many opportunities in steel fabrication!

All 13 apply equally to a small one-shop company or a large fabricator with multiple locations.

"For so many of our members, it's such a big leap from what they've traditionally done for training," Landsverk said. "Most of their training is passed down. You have a guy who's been in the shop for 40 years and done the thing a new hire is trying to do. Spending a few hours with that mentor and learning is a long way from a developed, intentional training method and plan."

Kenny Hicks (right) has extensive fabricator training experience and is prominently featured in the program material.

Educational and Entertaining

Creating the Fabricator Education Training Program meant fabrication experts without teaching skills had to mesh with teaching experts without fabrication skills. The training program committee interviewed three online learning content developers and liked Artisan Learning's approach most because of its experience creating online learning content for adults.

Around the same time, AISC hired Landsverk to manage the curriculum developers, e-learning content development experts, video producers, and fabricator subject matter experts. He had spent more than 20 years working on corporate training and technical content development. His company, Landsverk Media, was a subcontractor in another bid for the fabricator training program, and he had worked closely with AISC's project team for months before the bid was awarded to Artisan.

Upon earning the bid, Artisan had to take the fabrication material the committee developed and turn it into an online course module, which meant it first had to become fluent in the art of fabrication.

"We know how we would train people, but we learned we weren't doing it very well because Artisan shined a light on how people learn and why we can't teach at the pace we think someone should learn," Trimble said. "We take for granted all the things we already know about fabrication that people don't inherently know."

Hicks trained the Artisan team as if they were new fabricators. Artisan traveled to fabrication shops nationwide, consulted with subject matter experts to develop standardized terminology, and immersed its team in the fab shop environment.

"It's not somebody who doesn't know how to fabricate who created these lessons," Tabolt said. "It's professional educators drawing the information from subject matter experts who really know how to do this stuff."

Subject Matter Expert Committee

The following people were subject matter experts who helped develop the Fabricator Education Training Program:

- Larry Martof, AISC
- Russell Barngrover, SteelFab Inc.
- Christian Crosby, Schuff Steel
- Jason Lansford, Delongs Inc.
- Adam MacDonald, AGT Robotics
- Linda Hale, QMC Auditing
- Dennis Haught, AISC
- Jeremy Michalsky, TrueNorth Steel
- Rodney Harden, Cooper Steel
- Scott Vesper, Southern New Jersey Steel
- Viji Kuruvilla, Lexicon Inc.
- Willard Deemer, East Valley Institute of Technology
- Kenny Hicks, Able Steel Fabricators, Inc.
- Mark Trimble, AISC
- Glenn Tabolt, STS Steel, Inc.
- Matthew Haaksma, Orange County Ironworks, LLC
- Ben Spaeth, TrueNorth Steel

The training video format is Hicks, and other mentors like him, on camera coaching an actor who plays a new fab shop employee. The actors knew as little about fabrication as most new hires do. The questions they asked were sparked by real-time curiosity and processing of instructions—just like a new hire—rather than a script. They were truly learning in the moment.

"We're watching organic development happen on screen," Landsverk said. "We have some great mentors and actors who are learning in front of the viewer. It's almost like reality TV."

The subject matter experts knew they had to develop the lessons in a way that was appropriate for their learners. That meant a precise understanding of the audience and how it learns. The committee developed several fictional characters with racial, socioeconomic, educational, and geographic backgrounds commonly found in new fabrication shop hires. Among those personas were a high school graduate looking for a career direction and a person recently discharged from the military.

"We built content around those people," Trimble said. "All of us subject matter experts had to back off and let it flow the way Artisan guided us. They would use us as experts but craft the courses in a way that would truly benefit the learner."

The finished product is a first for AISC's educational efforts. AISC has published 16 editions of its *Steel Construction Manual* and more than 40 design guides, created countless webinars, and started a Night School program—all intended to help engineers continue to grow and learn. The Fabricator Training Program, though, is one of its first educational programs for the shop employees who have their hands on the steel every day.

"It took me years to gain all this knowledge," said Hicks, a four-decade industry veteran. "Now, we put it in a training curriculum that will slingshot these new students into their careers in structural steel." ■

Patrick Engel (engel@aisc.org)
is the associate editor of
Modern Steel Construction.

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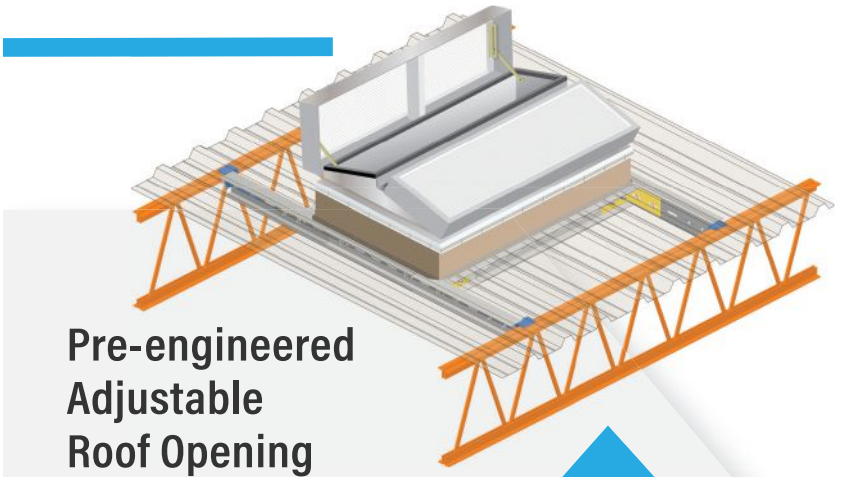

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new products

This month's New Products section includes several pieces of safety equipment, an anti-overload device for forklifts, and the latest version of a forklift.

Milwaukee BOLT Safety Helmets with IMPACT ARMOR Liner

Milwaukee Tool delivers advanced slip, trip, and fall protection on the jobsite with the new BOLT Safety Helmets with IMPACT ARMOR Liner. Designed with RHEON technology, the IMPACT ARMOR Liner delivers the best oblique impact protection. The safety helmet is a part of the BOLT system that allows users to secure accessories simultaneously for efficiency on the jobsite.

In addition to protection against top and side impacts, the helmets allow wearers to use multiple accessories at once. The construction safety helmets include a Milwaukee BOLT Headlamp Mount that works with most headlamps for easy, secure attachment and a BOLT Marker Clip that allows for easy access to pens and markers.

The helmets have a comfortable padded suspension that includes an adjustable swinging ratchet for better comfort. The climbing style helmet also has a comfortable, adjustable chin strap for better security. These safety helmets are American National Standards Institute (ANSI) type 2 and are customizable with the ability to add a company logo in up to four locations on the helmet.

The IMPACT ARMOR Liner is also available separately, allowing users to retrofit the liner into any Milwaukee safety helmet, increasing protection and performance. Visit **www.milwaukeetool.com/products** to learn more.

Brass Knuckle SmartFlex 400 Series Gloves

Brass Knuckle SmartFlex 400 Series gloves are comfortable, general-purpose work gloves that afford the wearer abrasion resistance and maximum feel. These are gloves workers love to wear, and they inspire compliance and help reduce injury.

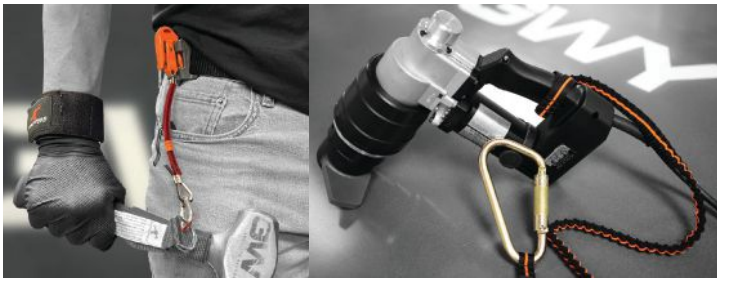
There are three gloves in the 400 Series, each suited for a different style of work. SmartFlex BK401 is black nylon with a gray coating to conceal dirt and grime. SmartFlex BK402 is white-on-white, making it easy to identify foreign particles on the glove—ideal for inspectors and quality control. SmartFlex BK403 is black nylon with a black coating, a tough-looking concealer for grimy projects.

Each glove in the 400 Series is carefully constructed for fit and is cost competitive. The lightweight, 13-gauge nylon shell facilitates dexterity and grip, making an immediate impact on productivity. A polyurethane coating on the palm and fingers makes the glove grippy but not sticky. For more information, visit **www.brassknuckleprotection.com**.

GWY Safety Tools

GWY, LLC offers a safety product line designed to protect workers and safeguard equipment investments. Two of its top safety tools, the quick switch and shock-absorbing tool lanyard, can enhance workplace safety and prolong the lifespan of your equipment.

The quick switch safety solution allows for fast, secure, and hands-free transfers between tools and other users while remaining 100% tied off. Additionally, the tool lanyard provides peace of mind by preventing accidental drops and reduces impact force of your tool and attachment point. These lanyards have been specifically designed and tested for use with TONE tools. Investing in these safety solutions showcases a commitment to prioritizing safety and protecting valuable equipment assets. Trust in GWY's products to deliver the protection you need every step of the way. Visit **www.gwyinc.com/safety** for more information.



Columbia Safety and Supply Custom Workwear

At Columbia Safety and Supply, we know that looking sharp on the job is as important as staying protected. Workers can stand out in a crowd with Columbia Safety and Supply's in-house apparel customization program. Add your company logo to any piece of workwear for a professional and cohesive look on the job.

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Combilift Combi Safe-Lift

Several factors can influence a forklift to become overloaded: load center, load weight, lift height, and the type of load. The load center—the distance from the face of the fork to the center of gravity of the load—plays a crucial part, and its position can also vary depending on the type of load.

Combilift's Combi Safe-Lift is an anti-overload device that helps forklift operators avoid overloading's serious consequences. It incorporates a strain sensor on the mast section and a lift cut-out valve on the hydraulic line to disable lifting if the unit is potentially overloaded. Combi Safe-Lift has an audible alarm that warns the operator of possible overload, and a load moment indicator is fitted to the dashboard in the cab. The system's green, amber, and red lights show the overload risk level and prompt the operator to take appropriate action. Visit **www.combilift.com** to learn more.

JLG Industries SkyTrak 8042 Telehandler

JLG Industries, Inc. has released the latest SkyTrak 8042 telehandler, remastered to maintain the performance and reliability customers expect from the SkyTrak brand. Building on the legacy of its predecessor, this model comes with innovative updates that include a lightweight design, hydrostatic transmission, advanced control system, electric-over-hydraulic joystick, and data at-a-glance.

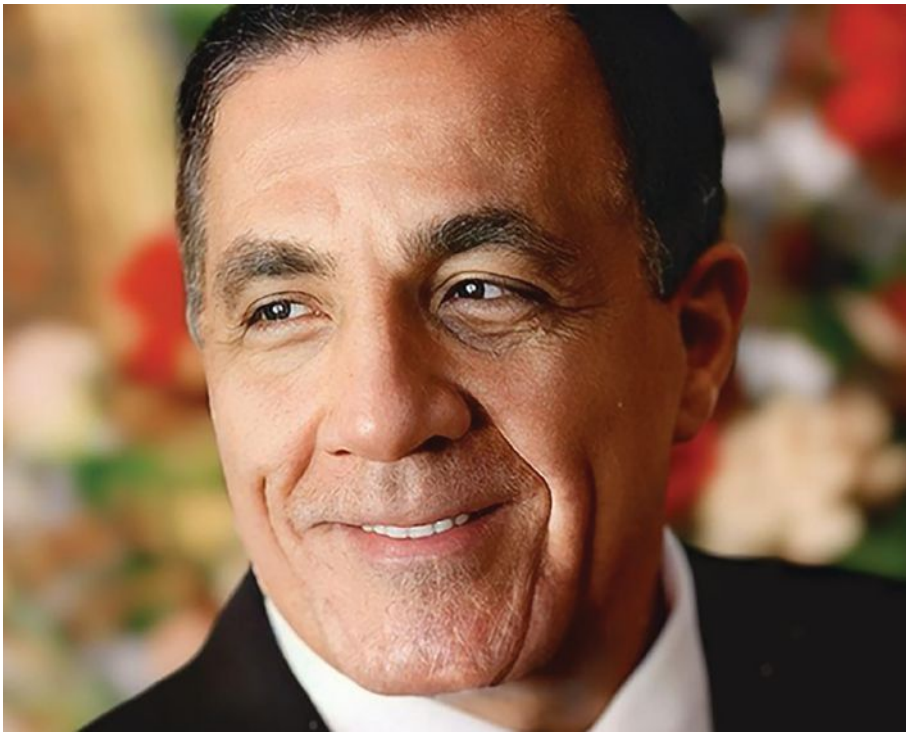
The updated 8042 features a lightweight design with an optimized boom and frame structure to make transportation much easier. Two JLG 8042 telehandlers can fit on a single flatbed trailer. The improved cab styling on the 8042 provides a larger LCD display and single-page load charts.

It has a maximum lift height of 42 ft, 4 in., a maximum reach of 29 ft, 6 in., and a 21,200 lb operating weight. The enclosed cab has optional air conditioning.

The hydrostatic transmission on the newly remodeled 8042 provides operators greater control and ease of operation while allowing for inching—the ability to run the boom at high speeds without shifting into neutral—for faster delivery of materials at height. The new 8042 has a multifunctional, electric-over-hydraulic joystick that includes auxiliary hydraulic functions and attachment tilt capabilities. Improved boom speed is complemented by auxiliary hydraulic connections on the side of the boom head for quick, efficient attachment changes. To learn more, visit **www.jlg.com/equipment/telehandlers**.

IN MEMORIAM

AISC Remembers Seismic Design Expert Nabih Youssef



Nabih Youssef, SE, PE, one of the country's leading experts on seismic design and founder of the eponymous firm Nabih Youssef Associates (NYA), died on July 12 at the age of 80.

Youssef was well known for his groundbreaking work on performance-based design, base isolation, and the use of steel plate shear walls in areas of high seismic risk. In 2010, he earned an AISC Special Achievement Award for his work on the LA Live project, a 52-story structure that used an elegant steel shear wall system rather than bulky concrete shear walls to provide lateral strength. Youssef was a prolific designer and speaker and also earned the 2011 SEAoSC Barnes Award and the 2008 AIA (Los Angeles) Presidential Award for Professional Achievement.

"As a leader in implementing state-of-the-art technologies, NYA's contributions to the development of earthquake engineering codes and standards and performance-based design has made possible numerous elegant, cost-effective and leading-edge structures," wrote Richard G. Weingardt, PE, a well-known author of books about significant structural engineers, in a 2012 profile.

Youssef chaired the Seismic Safety Committee for the Governor's California Building Standards Commission and the City of Los Angeles' Mayor's Blue Ribbon Seismic Hazard Reduction Committee and taught classes at multiple universities. Additionally, he served on the University of California Seismic Advisory Board.

Among his significant projects were the pioneering use of base isolation of Los Angeles City Hall, The Broad Museum in Los Angeles, the Cathedral of Our Lady of the Angels in Los Angeles, LA Live, the Waldorf Astoria Beverly Hills, UCSF New Hospital at Parnassus Heights, Calif., New Stanford Hospital, USC University Village, Long Beach Civic Center, the restorations and expansions of the Harold Examiner building in Los Angeles, the Los Angeles Coliseum, Dodgers Stadium, and the Cleveland Museum of Art.

"Nabih was so accomplished and yet completely unassuming and gentlemanly," said AISC President Charles J. Carter, SE, PE, PhD. "He gave generously of his knowledge and wisdom in his work with several AISC and related committees. We will miss him greatly."

People & Companies

AISC Director of Workforce Development **Jennifer Traut-Todaro**, SE, is now the president of the **Structural Engineers Association of Illinois (SEAOI)**. She has served on the SEAOI's Executive Committee since 2021, first as secretary and then as treasurer, and has also co-chaired the Equity, Diversity, and Inclusion ad-hoc committee. She is the fourth female president of SEAOI in the organization's 59-year history.

Lexicon, Inc., Arkansas Northeastern College (ANC), and Mississippi County, Ark., recognized the state's first graduates from Lexicon's master millwright program in July. The program is part of Lexicon University (Lex U), an initiative launched in 2023 in partnership with ANC that provides employees with the tools to improve in their current jobs, develop skills in another field and build a career path that leads to success for themselves and their families. Lexicon funds the program, which is available to all its employees, companies and divisions.

Zekelman Industries plans to invest more than $6 million to expand steel tube production at its facility in Jefferson County, Ala., creating a combined 91 jobs. The Chicago-based company will use some of the money to upgrade the manufacturing capabilities and production capacity at its existing Atlas Tube facility and, in the process, create 33 jobs over a three-year period. It will invest more money to equip an existing warehouse to a new Wheatland Tube facility in Birmingham, where it will perform finishing processes on torque tubes produced by Atlas. This project will create 58 jobs over the same three-year period. At the Atlas facility, workers will fabricate specialized steel tubing to be used in solar arrays. Those tubes will then go to the Wheatland facility for processing and finishing steps before delivery to customers.

GRANTS

EPA Grant Supports Further Development of Steel Industry EPDs

AISC, in partnership with the University of Massachusetts Amherst and the American Iron and Steel Institute (AISI), has been selected to receive a $6.4 million grant to help automate the development of steel product environmental product declarations (EPDs). The grant is part of a nearly $160 million U.S. Environmental Protection Agency program to reduce climate pollution from the manufacturing of construction materials and products.

"These historic investments will expand market access for a new generation of more climate-friendly construction materials, and further grow American jobs that are paving the way to the clean energy economy," EPA Deputy Administrator Janet McCabe said.

"What can we do in these five years of EPA funding to propel us 50 years in the future? We are trying to transform an industry, not make temporary or incremental change," said Kara Peterman, associate professor of civil and environmental engineering at UMass Amherst and lead researcher on the project.

The AISC/AISI/University of Massachusetts Amherst project will:

- reduce the environmental impacts of domestic construction activity, steel production, and product manufacturing by increasing the quality, transparency, and geographic coverage of life cycle inventories and resultant EPDs representing steel products
- develop life cycle inventory and EPD generator tools that can automate production of steel product EPDs, create an EPD repository, and update the steel PCR
- identify deconstruction processes for existing structures, required tests for recovered materials, and required modifications and fabrication data to increase the use of salvaged steel products

"American structural steel is already the most transparent, sustainable material on the market today--and thanks to a grant from the U.S. Environmental Protection Agency, specifiers and the public will have even more accurate data available to help them choose structural materials that protect the planet both today and tomorrow," said Brian Raff, AISC's vice president of sustainability and government affairs.

AISC already offers third-party vetted industry average EPDs for fabricated hot-rolled structural sections, fabricated steel plate, and fabricated hollow structural sections (HSS). Most domestic structural steel mills also offer mill-specific EPDs.

"It is impossible to make an informed decision without accurate environmental product declarations (EPDs) that show a material's full environmental implications, from production/harvest to what happens to the building material after demolition," Raff said. "American structural steel already leads the field with transparent EPDs that document its impact all the way from the scrapyard to an electric arc furnace to a jobsite and eventually recycled into a new building or bridge.

This project will help a broader range of manufacturers and fabricators (particularly small businesses) generate EPDs that accurately showcase steel's sustainability. Environmentally conscious stakeholders will be able to quickly produce high-quality EPDs to assist them in choosing a green structural material—and everyone wins when informed decisions lead to better environmental outcomes."

That's where AISC and AISI's industry relationships come into play.

"The broad base of support we have cultivated from the wider steel and sustainable construction industry will be the key to our success," Peterman said. "Collecting and curating representative data on the entire steelmaking and steel fabrication process will be a monumental task, but one we have unparalleled access to accomplish. The UMass Amherst team is excited to be working so closely with AISC and AISI to create this picture of the steel industry."

The University of Massachusetts Amherst will also provide educational resources to build a skilled workforce and promote sustainable practices for the next generation.

"We are also training the industry, from students to steelmakers to structural engineers, to leverage these EPDs and the information within to create steel structures with a lower carbon footprint," Peterman said.

FHWA

DOTs Across America Receive $5 Billion in Bridge Grants

U.S. Transportation Secretary Pete Buttigieg announced July 17 more than $5 billion in grant awards to fund the reconstruction, repair, and restoration of 13 nationally significant large bridges. Those grants are part of the FHWA's Bridge Investment Program, which will help advance critical safety and connectivity improvements nationwide.

"For too long America let bridges fall into disrepair, which left people less safe, disrupted our supply chains, and cost people time and money—but now the Biden-Harris Administration is changing that with the biggest investment in our bridges since the Eisenhower era," U.S. Transportation Secretary Pete Buttigieg said. "There are currently about 3,000 fewer bridges in poor condition than when our administration began, and today we are proud to announce funding to repair or replace 13 of America's largest and economically significant bridges."

Those 13 bridges touch 16 states.

"Under the Bipartisan Infrastructure Law's Bridge Investment Program, we are reinvesting in our infrastructure and ensuring vital connections for Americans who need to get to a job, a class, or a doctor," Federal Highway Administrator Shailen Bhatt said. "These grants are helping to advance critical bridge projects across the nation that will improve overall quality of life and ensure this country's infrastructure works for everyone."

news & events

SEAA

AISC Member Erectors Earn SEAA Project of the Year Awards

Three AISC member erectors earned 2024 Steel Erectors Association of America (SEAA) Project of the Year awards, two in the miscellaneous metals class and one in the structural class.

Harrisburg, Penn.-based S&R Enterprises earned recognition in Structural Class IV (steel erection contract over $2.5 million) for its work on the Cape Canaveral Space Force Base, Launch Complex 36. The complex is the first ground-up construction at Kennedy Space Center in more than 50 years, and its erection contract was valued at more than $46 million.

The project included two 633-ft-tall towers as well as a massive hydraulic pit. In all, 15 modules were constructed and stacked on top of each other, and one module was lifted more than 600 ft high. The heaviest module, weighing 1 million lb, had to be crawled about 100 ft into position using a unique crane configuration.

The scale and complexity of this project required coordination of multiple crews, modular construction techniques so that all trades were used as efficiently as possible, and around-the-clock schedules to meet strict launch deadlines.

Porter Steel, Inc., based in Lilburn, Ga., won the award for Miscellaneous Metals Class II (up to $500,000). It delivered materials for an 8,625-lb architecturally exposed structural steel (AESS) staircase to be installed between the 9th and 10th floors of an Atlanta office building—using an elevator that measured just 5 ft by 8 ft.

The staircase started in Porter Steel's Lilburn fabrication shop, where they were fabricated in five sections weighing between 1,366 and 2,140 lb each. The sections were rolled into the building on carts, transported in the freight elevator, and rigged and welded at the jobsite. Porter had to manage the weight, size, and logistics to make installation possible in a restricted space.

All Things Metal, LLC—based in Phoenix—won in Miscellaneous Metals Class II (more than $500,000) for setting structural steel by hand in the basement and upper floors of an office-to-hotel conversion project in downtown Phoenix. The 100-year-old office building was converted into a Moxy hotel, and it was hemmed in on one side by a light rail line.

The project demanded a delicate balance between preserving the building's rich heritage and implementing modern upgrades. Getting steel inside the building and erecting it in the basement and upper floors of the building proved the most challenging aspect of this job, which was compounded by navigating unforeseen structural issues. The building's foundation, materials, and architectural nuances are reflective of a bygone era, requiring a thorough understanding to ensure that any modifications were seamlessly integrated with the original design.

ARCHITECTURE

AISC's Conceptual Design Competition Returns—with $25,000 in Prizes

Do you have a visionary idea that pushes the boundary of what's possible? AISC's Forge Prize challenges architects, educators, and students to create design concepts that embrace innovations in steel as the primary structural material—with $25,000 in prizes.

"The Forge Prize is the Architecture Center's flagship design competition--and it's just one way that the Center sparks creativity to inspire great designers," said AISC Director of Architecture Nima Balasubramanian, AIA, NOMA. "The basic questions are simple: What will the future look like? What will people build with? Where will they live, work, and play? And how could steel make it happen?"

Three finalists will each win $5,000 and work with a steel fabricator to refine their design before presenting it live to the judges and the world. The winner will receive a $10,000 grand prize and a showcase at the 2025 Architecture in Steel Conference (part of NASCC: The Steel Conference, April 2–4, 2025, in Louisville, Ky.).

Learn more about the Forge Prize, past winners, and entry requirements at **aisc.org/forgeprize**.

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From Spiritual Space to City Center Staple

THE WINNING CONCEPT in the main category of last year's Steel Design Student Competition (SDSC) was a gathering place for spiritual expression that stands out on a suburban college campus (illustrated above). The 2024 competition asked students to design something near the opposite end of the spectrum: a structure that will sit in the shadows of one of America's signature urban landmarks.

The main category in the 2024 SDSC was a steel innovation construction center in downtown St. Louis just south of the Gateway Arch, with areas for exhibition, fabrication, training, and community outreach.

Like every iteration of the SDSC, all concepts for this year's competition were required to use steel as the primary structural material. And for students who wanted to think outside the main category, the open category allowed for more flexibility in the building type.

You can see last year's winners in the "Spirited Steel" article in the November 2023 issue (**www.modernsteel.com**), and this year's winning concepts in the main and open categories will be featured in the November 2024 issue. The contest—administered annually by the Association of Collegiate Schools of Architecture and sponsored by AISC—awards $20,000 in cash prizes. ■

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