ON THE COVER: A cubic take on retail space, p. 42. (Photo: Courtesy of MdeAS Architects)

MODERN STEEL CONSTRUCTION (Volume 56, Number 9) ISSN (print) 0026-8445: ISSN (online) 1945-0737. Published monthly by the American Institute of Steel Construction (AISC), 130 E. Randolph Street, Suite 2000, Chicago, IL 60601. Subscriptions: Within the U.S.—single issues $4.00; 1 year, $44. Outside the U.S. (Canada and Mexico)—single issues $7.00; 1 year $88. Periodicals postage paid at Chicago, IL and at additional mailing offices. Postmaster: Please send address changes to MODERN STEEL CONSTRUCTION, 130 E. Randolph Street, Suite 2000, Chicago, IL 60601.

Disclaimer: AISC does not approve, disapprove, or guarantee the validity or accuracy of any data, claim, or opinion appearing under a byline or obtained or quoted from an acknowledged source. Opinions are those of the writers and AISC is not responsible for any statement made or opinions expressed in MODERN STEEL CONSTRUCTION. All rights reserved. Materials may not be reproduced without written permission, except for noncommercial educational purposes where fewer than 25 photocopies are being reproduced. The AISC and Modern Steel logos are registered trademarks of AISC.

features

32 Hidden Marvel
BY CHRISTIAN WIEDERHOLZ, PE
A historic concrete bridge near New York City was replicated—in steel. And most people will never know.

36 Smooth Operator
BY SEAN FEENEY
L.A. Metro’s innovative new operations and maintenance facility is the latest addition to the area’s growing transit network.

42 Thinking Outside the Cube
BY JOE MUGFORD, PE, AND PHILIP MURRAY, PE
A new retail project near Times Square demonstrates the hipness of being square.

48 Rapid Rise
BY MATT BARRON, PE, AARON DAVIS AND MARK SEABOLD
Designed and built nearly simultaneously, a new office building enhances a Cedar Rapids growth corridor, turning a vacant lot into premium office space and facilitating expansion.

54 Built to Last
BY GEOFF WEISENBERGER
AISC full member steel fabricators that have reached the century mark share some of their secrets to success.

58 Living (Comfortably) with Vibration
BY THOMAS M. MURRAY, PE, PhD
Vibration due to human activity is a major design consideration. But it doesn’t have to be a problem.

columns

steelwise

17 Addressing Anchors
BY ERIC BOLIN
A look at some field-fix options for column anchor rods.

steelwise

22 Strength and Engagement
BY JAMES LABELLE, PE, DocE
Notes on thread strength and partial engagement of anchor rod nuts.

business issues

27 SteelDay is Coming!
BY JOHN CROSS, PE
This year’s SteelDay continues the spirit of SteelDays past, while also introducing a couple of new elements.

in every issue

departments

6 EDITOR’S NOTE
9 STEEL INTERCHANGE
12 STEEL QUIZ
61 NEW PRODUCTS
62 NEWS
66 STRUCTURALLY SOUND

resources

65 MARKETPLACE & EMPLOYMENT

Printed on paper made from a minimum of 10% recycled content.
A NEW SCULPTURAL pavilion is undergoing a metamorphosis in Merriweather Park at Symphony Woods in Columbia, Md. Initially conceived as a pure compression shell of shingled steel or aluminum plate, the project stayed true to its name—the Chrysalis—as its design was transformed to include a ribcage of structural steel.

On behalf of the Inner Arbor Trust, Michael McCall, president of developer Strategic Leisure, tasked designer Marc Fornes/TheVeryMany with creating this one-of-a-kind park pavilion; Living Design Lab functioned as the architect of record for the project. The steel frame, designed by Arup in Washington D.C., is doubly curved, like the skin it supports, and follows the pleats of the distinctive ridged cladding (the steel was curved by AISC member Kubes Steel, Inc.). Each warped arch is tied together by secondary members to help redistribute loads and increase the stability of the overall frame. The largest arch frames the main performance stage and has an approximate span of 65 ft, with a corresponding max height of 50 ft. The arches are composed of 1,000 linear ft of 10-in.-diameter hollow structural sections (HSS), with 675 ft of straight 8-in.-diameter HSS being used for the secondary framing.

The frame will ultimately be clad in 12,000 sq. ft of anodized aluminum shingles made and installed by Zahner. The cladding system uses an additional layer of framing to help achieve the peaks and valleys of the skin. This frame is composed of ribbed purlins, arrayed at 30-in. centers, that attach directly to the primary steel frame. Due to the structure's complex form, BMT Fluid Mechanics performed a wind tunnel test to attain the appropriate design loads on both the structure and cladding.

In addition, robust analysis was performed to validate the overall stability of the frame, with flanged, bolted moment connections providing continuity across the whole system. The arches were spliced to both aid in erection and help achieve the required curvature of the sculpture. A tertiary layer of steel sits below the primary frame to provide a grid of strong points that can support up to 20 tons of theater equipment. In total, the structure shelters a footprint of 5,000 sq. ft, providing ample amount of stage space for a variety of performance events, as well as an open-air pavilion for public gatherings.

■

structurally sound TUBULAR TRANSFORMATION