

cross sections

Magazine for the Structural Engineers Association of New York

2021 VOLUME 26 NO. 2



SPECIAL ISSUE

2021 EISE Awards

cross sections

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GREENPOINT LANDING - SITE D

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PRESIDENT'S MESSAGE



BRADFORD T. KIEFER, PE

Please enjoy the Excellence in Structural Engineering Awards issue of Cross Sections. This year we had 31 total entries from 15 unique firms. We will be highlighting the winners and the finalists for their creativity, complexity, use of innovative materials, and sustainability. Submissions for the awards are always outstanding, and this year is no exception with entries including Moynihan Train Hall, One Vanderbilt, Greenpoint Landing, and One Wall Street. Not many cities can boast of so many exceptional projects, let alone in one year.

In addition to the 5 major building category awards, this year we award our inaugural Young Member Group Award to Yun Luo of LERA. This award is for an engineer younger than 36 years old that has given back to the industry and the community. Yun's commitment to SEAoNY and the industry are inspiring. Leading SEAoNY's SEER committee and founding LERA's SE 2050 Carbon Reduction Commitment Committee are just a few examples. It was an honor to judge the awards this year, and I would like to thank my fellow judges: Past SEAoNY President Jonathan Hernandez of Gilsanz Murray and Steficek; Len Woods - Vice-President at Ramboll; Diana Zakem - Director of Construction at Brookfield Properties; Sarah Khan - Principal Engineer at Agencie Group; and a special thanks to Past SEAoNY President and SEAoNY Honorary Member Robert Murray.

I would also like to thank our sponsors for the awards: LERA Consulting Structural Engineers, Geiger Engineers, Severud Associates Consulting Engineers, AISC, and Old Structures Engineering. SEAoNY is always appreciative of such wonderful, continued support from so many.

Congratulations to all the winners and finalists! Please enjoy their accomplishments; if you are interested to see more, you will soon be able to find the EISE Award videos on the SEAoNY website. Good luck to everyone next year!

While reading through this issue and enjoying the accomplishments of our profession, I ask that you discuss at least one of the projects with someone outside of our industry and impart to them the importance of what we do. As an industry, we are always asking for structural engineers to be seen as the important part of society that we know we are. Let's all do our part to educate others. The best examples of what we do are illustrated in this Cross Sections edition. Show someone how the beauty of Moynihan Station is the structure itself, how Greenpoint Landing defies gravity, or how a 170-year-old landmark, the Cathedral of Saint Sava, was saved so that future generations can see the past. Our work is interwoven into society. Let people know.



PHILLIP BELLIS, PE

EDITOR'S MESSAGE

The SEAoNY Excellence in Structural Engineering Awards do not receive the same recognition as the Academy Awards. Major TV networks do not fight over the right to broadcast the awards ceremony. There is no red carpet. Critics may speak on the architectural aspects of the projects entered for consideration, but rarely do their words touch upon what it is SEAoNY judges; structural engineering creativity and innovation.

If you are reading this magazine, you know all of this. You didn't become a structural engineer for the glitz and the glamour. If you did, I apologize on behalf of whoever misled you. That doesn't mean, however, that we shouldn't recognize the incredible work that structural engineers contribute to society. It isn't work that necessarily entertains. It doesn't produce memorable quotes that your friend group will repeat with decreasing accuracy as time progresses. It isn't typically experienced while eating popcorn. That being said, but without the ticket sales figures to prove it, I am confident that more people have seen the projects featured in this magazine than have seen *Nomadland*.

To the extraordinary engineers who contributed to these projects, thank you for your hard work. You should be very proud of your accomplishments. Take time to enjoy them, but not more than 5 minutes. There is a sketch that needs to be distributed by EOD and a submittal that is two days overdue.

2021 EISE AWARDS

RENOVATION / RETROFIT / REHABILITATION

WINNER



Lucas Blair Simpson & Aaron Fedor © Empire State Development | SOM

Moynihan Train Hall expands New York City's Penn Station across Eighth Avenue and into the landmarked James A. Farley Post Office, designed by McKim, Mead and White in 1912 as a sister to their original Pennsylvania Station.

Five decades after demolition of Penn Station and almost 30 years after the plan's conception, Moynihan Train Hall once again provides visitors with a grand entrance to New York City.

The redevelopment, led by a public-private partnership between New York State, transportation authorities, and a design-build joint venture, is a 21st century transportation hub that greatly improves access and interconnectivity and offers many amenities to improve each visitor's experience.

**MOYNIHAN
TRAIN HALL**

PROJECT

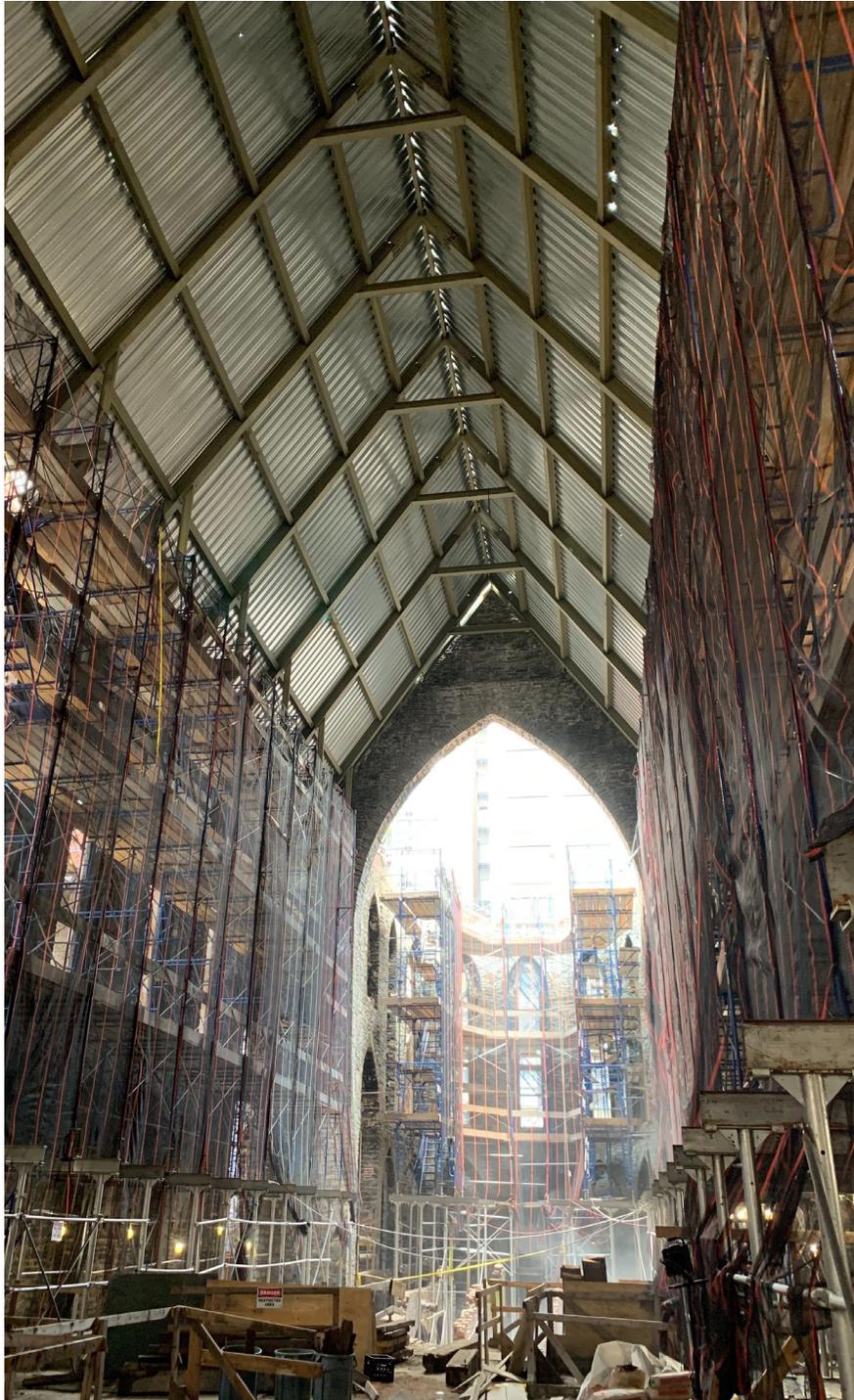
**SEVERUD ASSOCIATES
CONSULTING ENGINEERS, PC**

DESIGN
FIRM

2021 EISE AWARDS

RENOVATION / RETROFIT / REHABILITATION

FINALIST



**SERBIAN
ORTHODOX
CATHEDRAL OF
SAINT SAVA**

PROJECT

DESIGN
FIRM

**OLD STRUCTURES
ENGINEERING PC**

The Serbian Orthodox Cathedral of St. Sava, is a New York City Landmark in the heart of Manhattan.

Designed in the Gothic Revival style by Richard Upjohn in the early 1850s, a catastrophic fire in 2016 destroyed everything but the exterior walls.

Old Structures Engineering PC worked closely with the Eastern Diocese of the Serbian Orthodox Church in North America, Zivcovic Connolly Architects, and an extensive design & construction team to bring the building back to life.

We designed a new steel-truss roof, a new concrete-slab and steel-girder sanctuary floor, and stabilized all of the remaining masonry.

The building is now secure and waiting for the full restoration to its former glory.

2021 EISE AWARDS

RENOVATION / RETROFIT / REHABILITATION

FINALIST



The Carrier Dome at Syracuse University, a 50,000-seat multipurpose, domed stadium, opened in 1980.

The stadium's new roof, designed by Geiger Engineers, is a first-of-its-kind cable truss, employing both tensioned membrane and rigid panels to cover 250,000 sqft. It is an ingenious and innovative design that uniquely addresses the challenges of replacing the original air-supported roof.

One of the structure's most effective and iconic features is the shape of the upper ring, which was found by optimization techniques to most efficiently withstand the significant snow loads of the region while minimizing the demand on the existing structure.

**SYRACUSE UNIVERSITY
STADIUM - NEW ROOF**

PROJECT

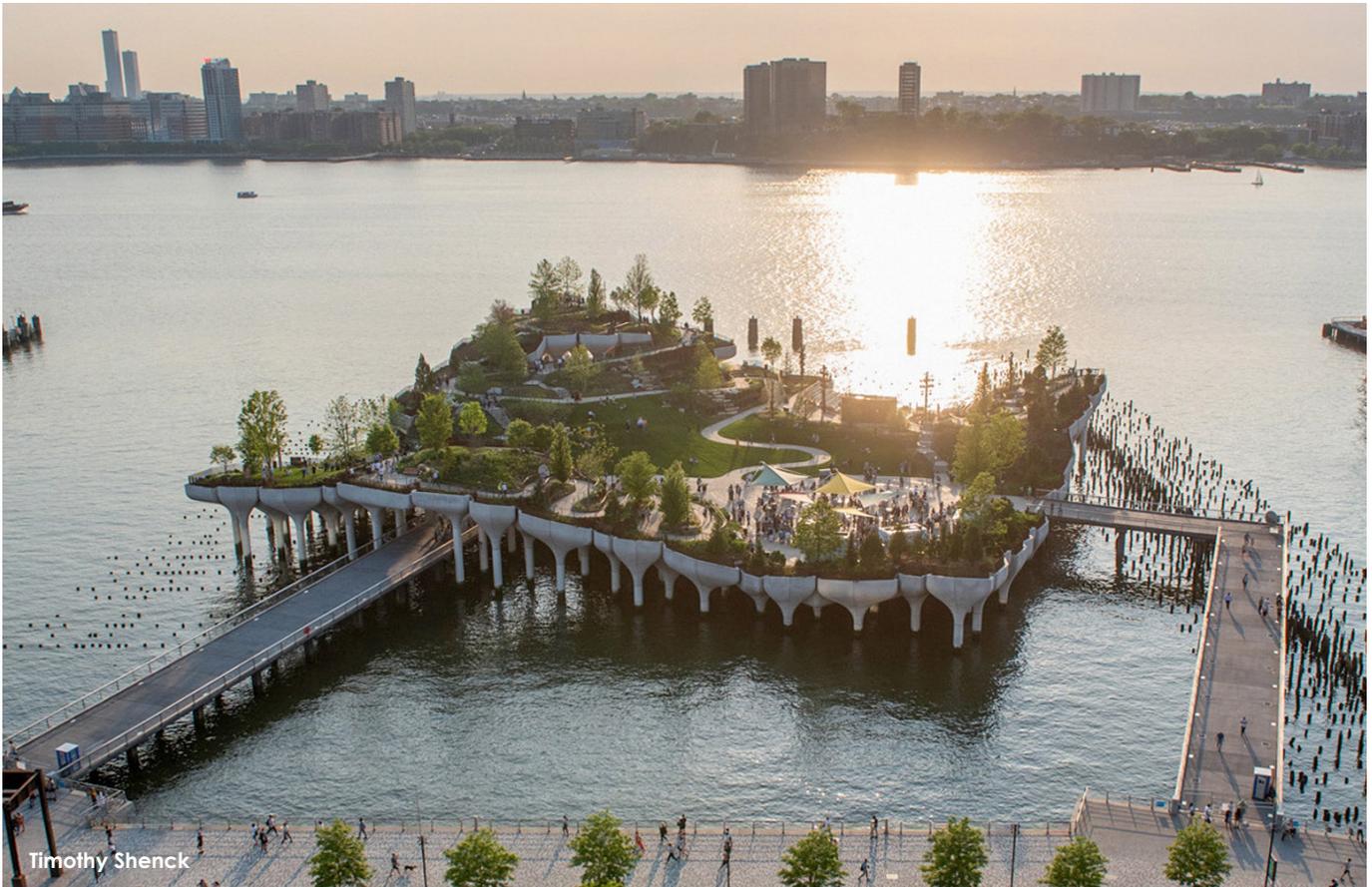
DESIGN
FIRM

**GEIGER
ENGINEERS**

2021 EISE AWARDS

OTHER STRUCTURES

WINNER



Timothy Shenck

The 2.4-acre urban oasis is part park, part performance venue sitting atop 132 precast concrete "pots" soaring high above the Hudson River. Utilization of parametric modeling, electronic information transfer, digital fabrication and offsite construction was critical to the project's realization.

Complex geometries were developed by the architect using parametric scripts and further refined by Arup to make them structural. 3D geometry files were sent to the fabricator for CNC-milled foam formwork, automatic rebar bending, and virtual fit-up with 3D scan.

Full assembly was completed offsite and pots were delivered to the site for erection onto the precast cylinder piles.

| | |
|----------------|----------------------|
| DESIGN FIRM | PROJECT |
| | LITTLE ISLAND |
| | ARUP |

2021 EISE AWARDS

OTHER STRUCTURES

FINALIST



The East End Gateway - Entrance Canopy is designed to bring the grandeur of Moynihan Train Hall to the eastern side of Penn Station, the busiest train station in the Western Hemisphere and a hub for the Metropolitan Transportation Authority's Long Island Railroad (LIRR) and New York City Transit's subway lines, New Jersey Transit, and Amtrak.

The monumental glass and steel canopy marks the entrance to the LIRR concourses and establishes a sense of place. The canopy aligns directly with the Empire State Building to give views of the iconic landmark. The structure, designed and engineered by SOM in collaboration with AECOM, rises 40 feet and gently curves to the ground. Pre-tensioned steel cables, spanning two ways, support the smoothly curved, high-performance glass enclosure. Skanska and Seele were part of the design-build team of the canopy.

EAST END GATEWAY ENTRANCE CANOPY

PROJECT

DESIGN
FIRM

SKIDMORE, OWINGS
& MERRILL

2021 EISE AWARDS

OTHER STRUCTURES

FINALIST



Nicholas Knight © Empire State Development

Located across the street from and connected below ground to New York City's Penn Station in the landmarked James A. Farley Post Office Building, the Moynihan Train Hall is transformed with a monumental series of four gridshell skylights in the building's Train Hall and an additional gridshell skylight in the Midblock space.

These new lightweight skylights are designed to rest minimally on the building and on its historic steel trusses.

The design of the gridshells was optimized to create an inviting visitor experience by arranging larger panels with decreasing steel member depth toward the middle of the shells to enhance the sense of lightness and grandeur.

MOYNIHAN TRAIN HALL SKYLIGHTS

PROJECT

SCHLAICH BERGERMANN
PARTNER

DESIGN
FIRM

2021 EISE AWARDS

NEW BUILDINGS UNDER 180,000 SQ. FT.

WINNER



**1245
BROADWAY**

PROJECT

DESIGN
FIRM

**GACE CONSULTING
ENGINEERS DPC**

1245 Broadway is a new concrete commercial tower in Midtown, Manhattan located blocks away from Greeley Square Park, and close to both Penn Station and major subway lines making it an ideal and convenient location for its tenants.

The building includes boutique office space throughout its 22-stories of retail space at cellar and ground levels.

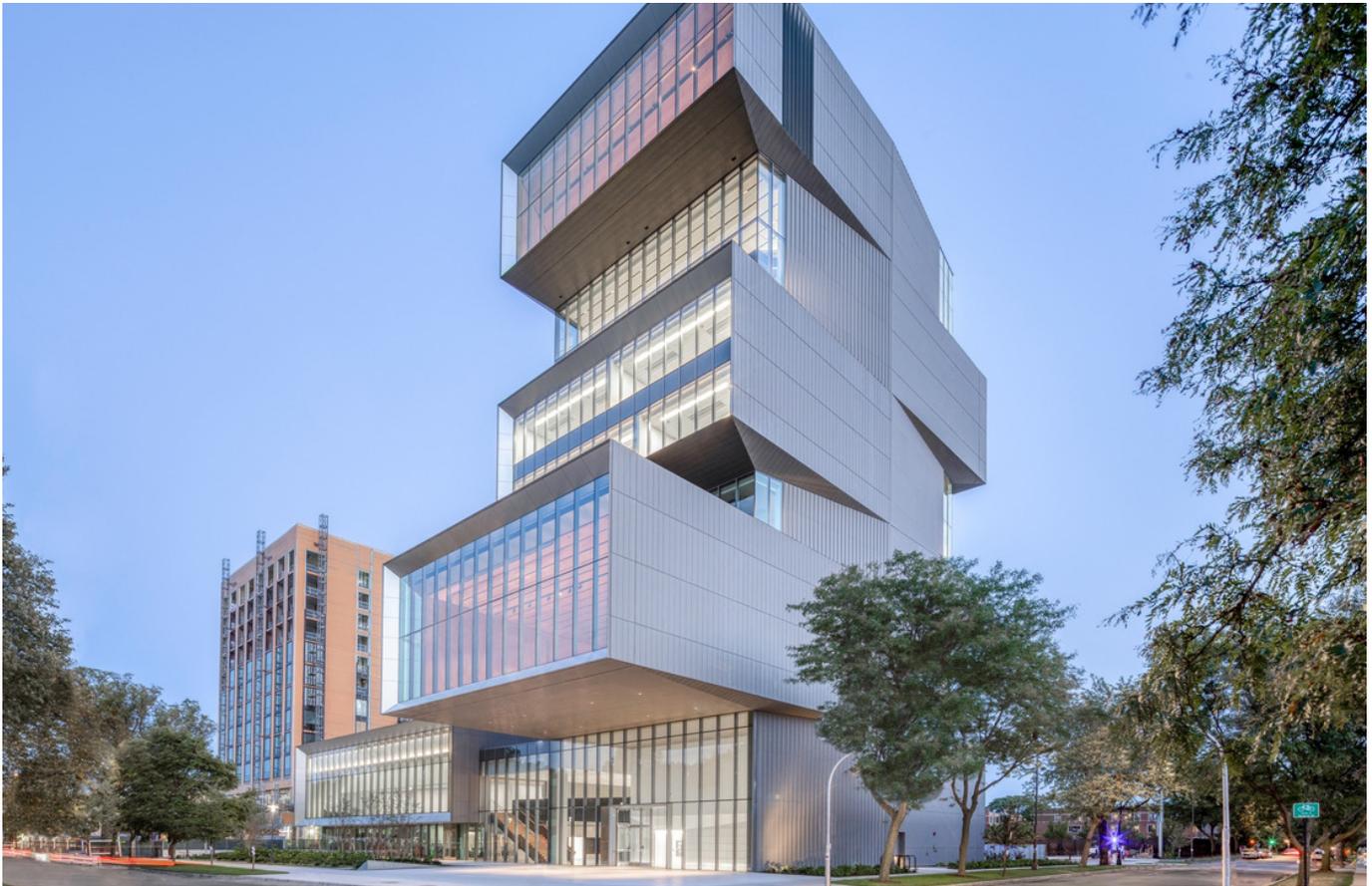
A system of transfer slabs and beams made it possible to have 4 setback outdoor terraces at the 6th, 10th, 13th, and 20th floors of the building.

The structure is comprised of flat plate construction with a lateral system of shear walls, covered by an exposed concrete façade and supported on a mat foundation.

2021 EISE AWARDS

NEW BUILDINGS UNDER 180,000 SQ. FT.

FINALIST



The David Rubenstein Forum at the University of Chicago is a new center for intellectual exchange, scholarly collaboration and special events. The 97,000-sf facility consists of a 2-story podium and a 10-story tower of stacked “neighborhoods” with a zinc-and-glass exterior.

The stacked neighborhoods of the tower are staggered to varying degrees, posing a complex structural challenge, with cantilevers up to 40 ft. The structural system is composed of a series of simple individual structural elements that are stacked in a harmonious form to efficiently create the desired open spaces.

Incorporating post-tensioned concrete into the structural design proved crucial to achieving the long spans, cantilevers, and column-free spaces that the architectural team envisioned.

**RUBENSTEIN FORUM,
UNIVERSITY OF CHICAGO**

PROJECT

DESIGN
FIRM

**LERA CONSULTING
STRUCTURAL ENGINEERS**

2021 EISE AWARDS

NEW BUILDINGS UNDER 180,000 SQ. FT.

FINALIST



The Nancy and Rich Kinder Building - Museum of Fine Arts, Houston is the centerpiece of the 14-acre campus expansion and adds 164,000sf of exhibition space.

The structure consists of exposed concrete walls, and steel floor and roof framing. Notable features include the 23ft deep double basement providing 190,000sf of parking freeing campus of at-grade parking, and the roof "canopy" providing natural light to the top floor and full-height central atrium.

The canopy consists of twenty-five distinct, doubly-curved surfaces and is framed by a two-way steel grillage that follows the architectural envelope with thin, tapered edges at the clerestories between the surfaces.

NANCY & RICH KINDER BUILDING - MUSEUM OF FINE ARTS, HOUSTON

PROJECT

GUY NORDENSON AND
ASSOCIATES W/ IMEG CORP.

DESIGN
FIRM

2021 EISE AWARDS

NEW BUILDINGS - 180,000 TO 900,000 SQ. FT.

WINNER



We have designed several creative structural solutions to support the ambitious architecture of the 2 buildings, delivering a highly integrated design that exceeds the university's desire to craft an environment that fosters connection and interaction between students and faculty staff.

Special steel framing solutions are provided at the perimeters to create the layered and textured shapes of the buildings, for example the story-deep 'skip trusses'.

Students and staff can meet on spiraling, slender feature stairs with panoramic views over the square.

On the ground floors, very transparent auditorium spaces connect the buildings with the campus and the city.

**COLUMBIA
BUSINESS SCHOOL**

PROJECT

DESIGN
FIRM

ARUP

2021 EISE AWARDS

NEW BUILDINGS - 180,000 TO 900,000 SQ. FT.

FINALIST



ENGINEER'S CHOICE AWARD

OMA

Greenpoint Landing – Site D measures 850,000 sf and consists of two residential buildings connected by a mixed-use podium and surrounded by an acre of public open space along the Brooklyn waterfront.

The most innovative aspect of the structural design for Greenpoint Landing – Site D involved its inverse ziggurat tower, which resembles a set of precariously stacked boxes—seven floors each—which grow outward from bottom to top.

In 2017, the Waterfront Alliance certified this first phase of Greenpoint Landing into its award-winning Waterfront Edge Design Guidelines (WEDG) program for excellence in waterfront design and resiliency.

**GREENPOINT LANDING
SITE D**

PROJECT

DESIGN
FIRM

**DESIMONE CONSULTING
ENGINEERS**

2021 EISE AWARDS

NEW BUILDINGS - 180,000 TO 900,000 SQ. FT.

FINALIST



The National Museum of the United States Army in Fort Belvoir, Virginia will be the first national museum to tell the story of America's oldest military branch. It will walk visitors through every generation of the Army.

The layout and program of the museum are informed by the topology of the site to reduce cut and fill.

The pavilioned main building features a long span grand lobby supporting a rooftop memorial garden and banquet spaces with strict acoustic and vibration criteria.

The exhibit wing accommodates large exhibits in column-free spaces and hanging exhibits.

Nonlinear dynamic analyses were performed for progressive collapse avoidance to achieve more efficient design.

NATIONAL MUSEUM OF THE UNITED STATES ARMY

PROJECT

DESIGN
FIRM

SKIDMORE, OWINGS
& MERRILL

2021 EISE AWARDS

NEW BUILDINGS - ABOVE 900,000 SQ. FT.

WINNER



Max Touhey

ONE VANDERBILT

PROJECT

DESIGN
FIRM

**SEVERUD ASSOCIATES
CONSULTING
ENGINEERS, PC**

At a height of 1,401 feet, One Vanderbilt is Midtown Manhattan's tallest office tower, and one of the most graceful architecturally.

Severud Associates engineered an efficient structural steel building frame that was erected ahead of a core of high-strength concrete shear walls.

Outrigger trusses and a tuned mass damper control lateral drift and accelerations.

The foundation, transit, and open space improvements were tightly coordinated with mechanical systems and adjacent infrastructure to avoid interference and improve interconnectivity.

2021 EISE AWARDS

NEW BUILDINGS - ABOVE 900,000 SQ. FT.

FINALIST



Circa Resort and Casino is the first ground-up casino in downtown Las Vegas since the 1980s.

The property utilizes an entire city block, comprising a 38-story tower with 777 guest rooms, and a two-level casino, restaurants, a six-tiered pool amphitheater, and a stadium-style three-story sportsbook which has the largest television screen in sportsbook history.

The carbon footprint of the structure per square foot is 23% lower than the average concrete building in the United States, as estimated by a study by the Carbon Leadership Forum.

Efficient structural design enabled low concrete strengths and high utilization of post-tensioned concrete, reducing material use.

**CIRCA RESORT
AND CASINO**

PROJECT

DESIGN
FIRM

**DESIMONE CONSULTING
ENGINEERS**

2021 EISE AWARDS

NEW BUILDINGS - ABOVE 900,000 SQ. FT.

FINALIST



Seth Powers

SHENZHEN RURAL COMMERCIAL BANK HEADQUARTERS

PROJECT

DESIGN
FIRM

SKIDMORE, OWINGS
& MERRILL

The Shenzhen Rural Commercial Bank Headquarters is a 150-meter tower located prominently on a public park that fronts the Pacific Ocean.

The tower will be an owner-occupied headquarters, with the flagship public bank at the ground floor.

SOM envisaged this project as an opportunity to develop several next generation sustainability technologies, and an update to one of SOM's core structural design legacies - the external diagrid.

The structure is an external steel diagrid that is pulled off from the façade to create flexible, dramatic, column-free interior office space. The external diagrid doubles as a solar shading structure.

COUNSEL'S CORNER

INHERENT RISKS FOR DESIGN PROFESSIONALS IN CONTRACTOR-LED DESIGN-BUILD

Over the last several years, there has been a material increase in contractor claims against designers for cost-overruns and delay damages on large Design-Build (“D/B”) projects. The significant losses caused AIG/Lexington, a long-time leader in the project-specific professional liability market, to exit the space. This article provides a concise description of the current legality of D/B in NY, summarizes the major risks of contractor-led D/B, and provides practical risk management techniques.

While there is no law expressly prohibiting D/B, laws have traditionally restricted its use: Wicks Law¹ and the General Municipal Law² require government agencies to engage four separate prime contractors (general construction, electrical, HVAC, and plumbing). Additionally, whether a project is public or private, the Education Law, and regulations promulgated thereunder, prohibit an unlicensed entity from contracting for professional services³ and place professional conduct limitations⁴ on design professionals that may be more easily violated in D/B.⁵ Despite these laws, use of D/B has increased over the last few decades. In fact, without repealing any laws, the 2011 NYS Infrastructure Investment Act authorized a series of state agencies⁶ to use D/B, and on the last day of 2019, NY enacted the NYC Public Works Investment Act granting similar authority to some city agencies.⁷ As such, it appears we can expect increased utilization of the D/B delivery method in NY.

Now, shifting to the inherent risks: Contractors and engineers perform their work under different liability and insurance schemes. Engineers are subject to, and insured for, the Standard of Care—which allows for human error and is essentially a legal acknowledgment that design is as much art as science; contractors operate in a universe of warranties where infallibility is assumed. Moreover, design and construction firms have very different financial realities and risk capabilities. These facts create an incongruence in contractual-risk-transfer philosophies that clash when the D/B contractor expects to flow down heavy-handed contractual warranties and terms related to cost, schedule, and quality—including sometimes warranting design performance, something unique to D/B. Such provisions are typically uninsurable and anathema to a design firm’s financial structure and manner of practice.

Moreover, what about alignment of expectations on design requirements? Does the D/B contractor understand the design concept well enough to adequately accommodate the appropriate design development, including value-engineering, into the schedule and price? A common criticism from opponents of D/B project delivery is that some D/B contractors are driven by speed and expense, rather than design quality.



KRITON A. PANTELIDIS, JD

CONSTRUCTION/DESIGN INSURANCE & RISK-MANAGEMENT SPECIALIST
VICE PRESIDENT OF PROFESSIONAL SERVICES, RISK STRATEGIES COMPANY

Other questions include whether the (usually) guaranteed maximum cost is realistic, considering (among other things) subsurface, environmental, and overall site conditions as well as any political hurdles. Are adequate design and construction contingencies built in? Such queries emphasize another common criticism, i.e., D/B contractors often prematurely commit to a guaranteed price—which can easily give rise to cost-overrun and delay claims against engineers to fill the gaps.

Finally, having a contractor as the client is an unusual position for many engineers as they are no longer independent of the construction vertical. Detractors would go further, claiming a loss of independent oversight on matters like overall design quality.

If the claims trend noted above persists, the reduced availability of project-specific insurance will significantly strain engineers’ practice policies, making a series of risk mitigation techniques even more essential. Initially, engineers should seek an honest, continuous dialogue with all relevant stakeholders prior to prime contract execution regarding uninsurable, heavy-handed contractual flow-down provisions, alignment of design requirements, any guaranteed price, and the project’s design and construction contingencies. To the extent that such conversations do not appear productive, engineers should consider increasing their fee. In addition, throughout the project engineers should tactfully and cautiously ingratiate themselves with ownership as this may allow professional opinion to be conveyed more clearly.

Moreover, engineers should document the project record on the referenced issues specifically highlighting any insufficiencies in project contingencies, design and schedule choices made by other stakeholders, means and methods decisions, premature procurement, missing information, program changes, and the effects of all the foregoing. Finally, like on any project, selectivity regarding one’s client, project partners, and project parameters is absolutely critical.

¹ NYS Finance Law § 135. ² NYS General Municipal Law § 101. ³ E.g., Education Law §§ 7202 and 7302. ⁴ E.g., Education Law § 6509(7) (aiding and abetting unlicensed practice) and 8 NYCRR § 29.3(a)(4) (improper fee splitting). ⁵ The NYS Court of Appeals has ruled that a professionally unlicensed contractor may enter into a D/B contract without violating the Education Law as long as all professional services are actually performed by a separate licensed entity, *Charlebois v. Weller Assocs.*, 72 N.Y.2d 587 (1988). However, the New York State Education Department (“NYSED”) maintains—in spite of *Charlebois*—that such a process violates the Education Law. As such, while contractors are not at risk because the NYSED lacks jurisdiction over them, design professionals should take heed to have proper contractual practices in place on D/B projects when working for the contractor—for example, consider adding provisions precisely delineating scope, role, and fee; acknowledging that the engineer’s professional duty runs to the owner; allowing unrestricted access to the owner; and permitting direct payment by the owner or identifying the contractor as agent of the design professional regarding receipt of payment—to avoid disciplinary charges like improper fee-splitting and aiding and abetting illegal practice. For a complete understanding of such issues, design professionals should consult a practicing attorney. ⁶ Among others: New York State Thruway Authority, Department of Transportation, Office of Parks Recreation and Historic Preservation, Department of Environmental Conservation, and New York State Bridge Authority. Some of these agencies are only authorized for Capital Projects above a certain monetary threshold.

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Designed by Eppstein Uhen Architects
Structural Engineer Pierce Engineers
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