cross sections

Magazine for the Structural Engineers Association of New York

2023 VOLUME 28 NO. 2

SPECIAL ISSUE

2023 SEE Awards

STRUCTURAL ENGINEERS ASSOCIATION SEA NEW YORK

cross sections

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ON THE COVER
Arizona State University, Rob and Melani Walton Center for Planetary Health
Submitted by Buro Happold

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RENOVATION / RETROFIT / REHABILITATION

WINNER

PHOTO COURTESY OF SEVERUD ASSOCIATES

PROJECT

TSX BROADWAY & PALACE THEATER REDEVELOPMENT

DESIGN FIRM

SEVERUD ASSOCIATES

TSX Broadway was created by shifting and reassembling portions of an existing structure—including the historic Palace Theater—and combining them with new elements to produce a revitalized entertainment, retail, and hotel complex at the center of Times Square in New York City.

The landmarked theater, built in 1910, was lifted an astonishing 31 feet into the air to allow street-level commercial space to be added and a second cellar excavated.

The 16-story podium is topped by massive post-tensioned concrete girders that transfer a 32-story hotel tower over the theater. TSX Broadway's multiple LED screens brighten its Times Square location.

2023 SEE AWARDS

RENOVATION / RETROFIT / REHABILITATION

HONORABLE MENTION

PHOTO COURTESY OF DESIMONE

With a total cost of $1.5 billion, this massive renovation project ranks as the largest office-to-condominium conversion in New York City history. Five new floors were constructed on top of the southern half of the building and 25 new elevator shafts were threaded through the structure. The project features a Whole Foods, a fitness center, and various other retail venues at the lower levels, and 566 residential units in the towers above.

The project includes the adaptive reuse, conversion, and expansion of a historic structure and utilizes a structural system that negotiates between existing steel structure and new concrete construction.

PROJECT: **ONE WALL STREET CONVERSION**

DESIGN FIRM: **DESIMONE**

2023 SEE AWARDS

RENOVATION / RETROFIT / REHABILITATION

HONORABLE MENTION

PHOTO COURTESY OF SILMAN

Originally known as the Municipal Ferry Building, the Battery Maritime Building first opened in 1909 and has been listed on the National Register of Historic Places since 1976.

While the ground floor still has active ferry slips, the upper levels have been redeveloped. Silman provided structural engineering services for the renovation and reinforcement of the existing building and a glass-clad vertical expansion containing a numerous hospitality spaces.

The building's original structure is unique, a reflection of its uses and location over multiple active subway lines. The steel framing is supported by a substructure of concrete-capped wood piles that reach down to bedrock.

PROJECT: **BATTERY MARITIME BUILDING**

DESIGN FIRM: **SILMAN**

2023 SEE AWARDS

OTHER STRUCTURES

WINNER

PHOTO COURTESY OF SCHLAICH BERGERMANN PARTNER WITH ENTUITIVE

This family of three bridge types (each paired for six total) are key infrastructure components of Toronto's waterfront revitalization. The aesthetically unified bridges provide the new Port Lands neighborhood with light rail, vehicular, cycle and pedestrian connections, creating a critical link. Designed as hybrid shell-arch bridge structures, they are essentially curved tied arches with a planar deck connected by hangers. Innovative fabrication techniques combined with state-of-the-art engineering allowed for maximized material efficiency and reduction of costs. With four of the six now in place, the bridges have become emblematic of Toronto's evolution, with unique and compelling structural forms.

PROJECT

PORT LANDS BRIDGES

DESIGN FIRM

SCHLAICH BERGERMANN PARTNER WITH ENTUITIVE

2023 SEE AWARDS

OTHER STRUCTURES

HONORABLE MENTION

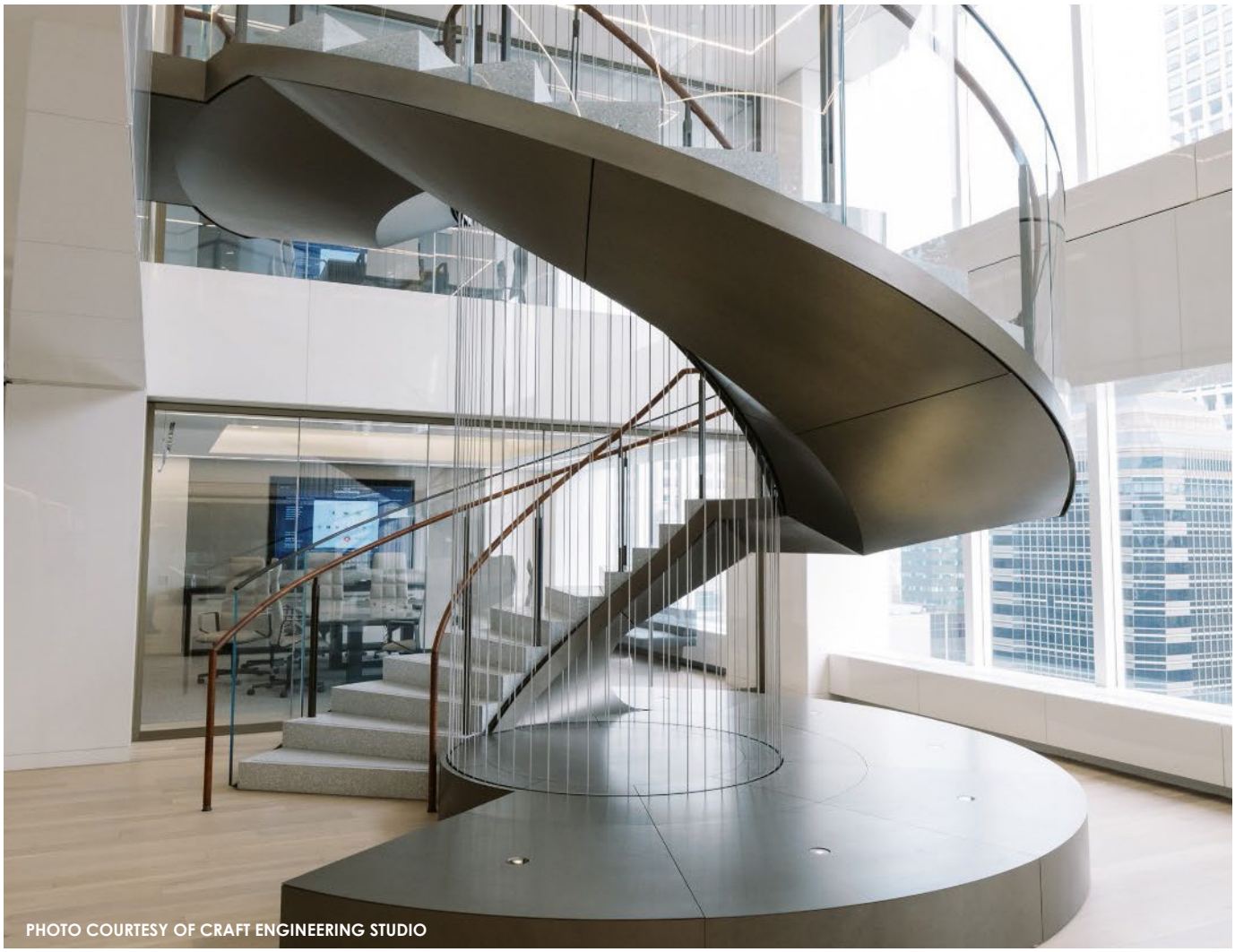

PHOTO COURTESY OF CRAFT ENGINEERING STUDIO

Our firm developed a structurally superior curved stair design alternative without requiring specialty fabrication equipment. We used a planar mesh of triangular flat plates to create a curved surface, maximizing the staircase's cross-sectional properties. Each plate was laser cut from sheet steel and assembled in a single shop, minimizing errors.

Customized stair sections were fabricated as welded assembly modules, providing flexibility in module sizes based on delivery and site access. The stair's underside was clad with precisely fitted fiberglass elements that were mechanically connected on site to the structure's geometry. Our innovative approach improved efficiency and accuracy in staircase fabrication.

PROJECT

BLUE OWL SIGNATURE STAIR

DESIGN FIRM

CRAFT ENGINEERING STUDIO

2023 SEE AWARDS

NEW BUILDINGS

WINNER

PHOTO COURTESY OF BURO HAPPOLD

PROJECT

ARIZONA STATE UNIVERSITY, ROB AND MELANI WALTON CENTER FOR PLANETARY HEALTH

DESIGN FIRM

BURO HAPPOLD

The new interdisciplinary science and technology research center, the Rob and Melani Walton Center for Planetary Health, was opened at Arizona State University in April 2022. The building wraps around a central open-air courtyard and features several beautifully exposed structures including three cantilever concrete staircases and a floating steel canopy.

Central to the structural design was an ambition to reduce its embodied carbon footprint. The building was the first in Arizona to use a voided slab system (also known as 'BubbleDeck') and also implemented a performance specification for a 40% reduction in portland cement using locally sourced fly ash.

2023 SEE AWARDS

NEW BUILDINGS

WINNER

PHOTO COURTESY OF MURRAY ENGINEERING

283 Greene Avenue (Frame 283) in Brooklyn, New York, is a pioneering example of sustainable urban living. As the first cross laminated timber (CLT) building in New York City, it showcases innovation and sustainability in residential design. The five-story mixed-use building utilizes CLT for its structure with Nudura ICF exterior walls. Overcoming challenges such as fire safety regulations, the project team employed cutting-edge engineering techniques.

Frame 283 embraces CLT for its environmental benefits, including carbon sequestration and improved indoor air quality. The building is Passive House certified and features eco-friendly technologies. Its efficient constructability and seamless integration into the urban environment further highlight its excellence in design and sustainability.

PROJECT: **283 GREENE AVENUE**

DESIGN FIRM: **MURRAY ENGINEERING**

2023 SEE AWARDS

NEW BUILDINGS

WINNER

PHOTO COURTESY OF SEVERUD ASSOCIATES

NYU's John A. Paulson Center combines performing arts spaces, housing, and athletic facilities within one building. The five-story, steel-framed podium features a 350-seat proscenium theater and other venues acoustically isolated from noise and vibration.

Steel trusses span over two below-grade levels and provide space for basketball courts and a swimming pool. The cellars were designed as a waterproofed "bathtub" and are supported by drilled caissons. An 18-story faculty housing tower and 13-story dormitory block are framed with steel and the Girder-Slab system, which reduced erection time, dead load, and structural depth. The building is expected to achieve LEED Gold certification.

PROJECT

JOHN A. PAULSON CENTER, NEW YORK UNIVERSITY

DESIGN FIRM

SEVERUD ASSOCIATES

2023 SEE AWARDS

NEW BUILDINGS

HONORABLE MENTION

PHOTO COURTESY OF GMS

This new 85,000 sf facility includes a 3,500 seat multi-use space for basketball, volleyball or university events and concerts. The seating can be reconfigured to allow two practice courts or infilled to create an event or dining space.

The venue includes a state-of-the-art broadcast and media center, as well as spaces devoted to the student athletes. The steel trusses span almost 200 feet in one direction and almost 150 feet in the other. The Center opened in November 2022 and had a total project cost of approximately $50M.

PROJECT

FAIRFIELD UNIVERSITY CONVOCATION CENTER

DESIGN FIRM

GILSANZ MURRAY STEFICEK (GMS)

2023 SEE AWARDS

NEW BUILDINGS

HONORABLE MENTION

PHOTO COURTESY OF O'DONNEL

The 5-story, 405,000 SF Honorable Frank J. Guarini Justice Complex is a state-of-the art replacement of the existing Hudson County Administration Building constructed in 1957. The design-build complex features space for 24 courtrooms: 10 Criminal Courtrooms and 12 Family Courtrooms, Judges Chambers, Sheriff Operations and Offices, Courts Administration, the Surrogate, and the Prosecutor's Office.

Amenities include a 75-seat public cafeteria, a self-help law library, a children's play area, and training spaces for staff. A six-story parking garage with space for 459 vehicles, located on the east end of the courthouse building, provides parking for Judges, County Employees, and Jurors.

PROJECT

HONORABLE FRANK J. GUARINI JUSTICE COMPLEX

DESIGN FIRM

O'DONNEL & NACCARATO

2023 SEE AWARDS

NEW BUILDINGS

HONORABLE MENTION

PHOTO COURTESY OF SOM

The new terminal at Kansas City International Airport is the largest single infrastructure project in the history of Kansas City.

At 1.1 million square feet, the 39-gate terminal brings all airport operations under one roof, with the capacity to serve more than 16 million travelers annually. The I-shaped building encompasses two levels: the upper for departing passengers and the lower for arrivals. The departures curb and check-in hall together form the building's signature space, and the structure is a significant part of its experience—with beautiful exposed structural steel details that transition from the outside deep into the interiors.

PROJECT

KANSAS CITY INTERNATIONAL AIRPORT NEW TERMINAL

DESIGN FIRM

SOM

2023 SEE AWARDS

NEW BUILDINGS

FINALIST

PHOTO COURTESY OF ARUP

The Buffalo AKG Art Museum is the re-branded name of the transformative project at the AlbrightKnox Art Gallery in Buffalo, NY. The expansion and renovation project introduces 30,000 square feet of additional gallery space in addition to back-of-house spaces, an expansive public lawn above a parking garage, and a new enclosed Town Square.

Our team determined a steel structure was the ideal solution for the new building. The translucent façade brings a fresh look to the traditional art museum and creates an openness between interior and exterior. The multi-story steel building connects directly into the original 1905 building through a transparent pedestrian bridge snaking around a grove of historic oak trees.

PROJECT: **BUFFALO AKG ART MUSEUM**

DESIGN FIRM: **ARUP**

2023 SEE AWARDS

NEW BUILDINGS

FINALIST

PHOTO COURTESY OF BURO HAPPOLD

Harvard University's Science and Engineering Complex (SEC) is the cornerstone building of the school's growing Allston Campus and their most significant new building in a generation. Its forward-looking design is designed to inspire learning and scientific discovery while showcasing sustainability. Constructed above an existing 250,000 square foot basement, the structural design for this world-leading research and teaching facility faced a number of unique challenges.

The building's adaptable, innovative environments support the school's commitment to cutting-edge academic collaboration, create vibrant public spaces at a variety of scales, and set a distinctive architectural tone for the Allston campus.

PROJECT

SCIENCE AND ENGINEERING COMPLEX, HARVARD UNIVERSITY

DESIGN FIRM

BURO HAPPOLD

2023 SEE AWARDS

NEW BUILDINGS

FINALIST

PHOTO COURTESY OF DESIMONE

Eagle + West consists of three 8-, 30-, and 40-story residential buildings connected by a mixed-use podium. The complex includes two complementary towers stacked like a ziggurat and its inverse surrounded by public open space along the Brooklyn waterfront. One tower steps back as it rises while another steps forward toward its partner.

The critical structural assemblies that allow for these unique geometries are distributed throughout the height of the buildings, but are most pronounced within the western tower, where cantilevered stepping occurs. Here, sloped concrete columns meet hanging vertical posts and post-tensioned floors to create intricate assemblies that support the slanted, stepping geometries of the tower.

PROJECT: **EAGLE + WEST**

DESIGN FIRM: **DESIMONE**

2023 SEE AWARDS

NEW BUILDINGS

FINALIST

PHOTO COURTESY OF SILMAN

This new campus hub for design-based learning features classrooms, studios, collaboration spaces, and fabrication facilities. A central atrium and a sloping walkway facilitate circulation. The main level is defined by an open gallery that spans between the east and west entrances.

The LEED Gold certified building's structural system is designed to complement its pavilion-like vision. Silman used long spans and exposed structural steel framing throughout. Deep roof overhangs, including twin 30-foot cantilevered steel canopies that highlight the main entrances, suffuse the interior with natural light while mitigating solar heat gain.

PROJECT

CHAMPAIGN SIEBEL CENTER FOR DESIGN, UNIVERSITY OF ILLINOIS URBANA

DESIGN FIRM

SILMAN

2023 SEE AWARDS

NEW BUILDINGS

FINALIST

PHOTO COURTESY OF DESIMONE

30 Front Street, also known as Olympia Dumbo, is a 26-story mixed-use residential building developed by Fortis Property Group and designed by Hill West Architects with Workstead handling interiors.

The 270-foot tall structure will yield 76 condominium units as well as a collection of indoor-outdoor mixed-use spaces totaling over 38,000 square feet.

PROJECT: **30 FRONT STREET (OLYMPIA DUMBO)**

DESIGN FIRM: **DESIMONE**

2023 SEE AWARDS

NEW BUILDINGS

FINALIST

PHOTO COURTESY OF STV

The new Terminal A at Newark Liberty International Airport is a three-level, 1-million-square-foot, 33-gate domestic terminal. It replaces the existing facility with a light, modern, steel and glass building with vast openness and abundant natural light. Its brand-new arrivals and departures hall features soaring floor-to-ceiling windows.

The building structure consists of a steel superstructure with a combination of braced frames and shear walls. In addition to the terminal building, the project includes 1,000 feet of new road bridge structures, a 660-foot-long pedestrian bridge, and 1.5 million square feet of new concrete airfield paving.

PROJECT

NEWARK LIBERTY INTERNATIONAL AIRPORT NEW TERMINAL

DESIGN FIRM

STV

2023 SEE AWARDS

ENGINEER'S CHOICE

WINNER

PHOTO COURTESY OF SILMAN

Commissioned by Meta Open Arts, Sacred Footprint by artist Timur Si-Qin is suspended in the four-story main atrium of Meta's New York City headquarters. The two-ton, 50-foot-tall arboreal assembly of cast stainless steel and aluminum is a reference to the mythical Tree of Life.

Hung from two main cables, the seemingly levitating sculpture is composed of 86 unique 3D printed castings. The individual castings are connected through 30 double helix links that freely rotate, forming a free-form chain. Since each piece moves, finding the natural resting location of the Tree was not an easy task.

PROJECT

SACRED FOOTPRINT BY TIMUR SI-QIN

DESIGN FIRM

SILMAN

2023 SEE AWARDS

YOUNG ENGINEER OF THE YEAR AWARD

WINNER

CANDICE OGANDO

Candice Ogando is a professional engineer who is inspiring other structural engineers to embrace sustainability in their designs. As the Founding Co-Chair of the Sustainable Design Committee, she believes in their mission to target the reduction of embodied carbon to ultimately achieve net zero emissions within the structural engineering industry. Over the past 3 years she has hosted several webinars surrounding the increasing importance and urgency of sustainability in the built environment, and providing tools and strategies to help firms implement change now through specification recommendations and free life cycle assessment and embodied carbon tools.

Deeply intertwined with her commitment to sustainability, Candice is a passionate advocate for diversity, equity, and inclusion within the industry. Understanding the profound impact that structural engineers can have on empowering marginalized communities, she actively works to foster an inclusive and equitable environment.

Candice holds a Bachelor of Science degree in Civil Engineering from Cornell University and a Master of Science degree from Columbia University. She is a licensed Professional Engineer, working at Schlaich Bergermann Partner, where she continues to make a meaningful impact through her engineering work.

2023 SEE AWARDS

YOUNG ENGINEER OF THE YEAR AWARD

WINNER

KATHERINE RIVERA

Katherine, a project engineer at DeSimone Consulting Engineers, holds Bachelor's and Master's degrees in structural engineering and forensics from Columbia University. As a passionate and lifelong learner, she embraces new challenges which shape her into a well-rounded engineer. Her experience spans across every project phase, from feasibility to construction, and encompasses a diverse range of structures, from unconventional mid- and high-rises to pedestrian bridges and even dinosaurs! Katherine's focus lies in leveraging technology to advance structural design, employing tools such as parametric and algorithm-driven design, 3D scanning, machine learning, automation, and optimization.

Beyond her professional endeavors, Katherine finds joy in engaging with students and sharing her love for structural engineering both in and out of the classroom. Her commitment to education will see her teaching a graduate-level course on BIM and parametric design at Cooper Union in Fall 2023. Since 2015, she has actively participated in SEAoNY's Student Outreach Committee, assuming the role of co-chair from 2020 to 2022. Additionally, Katherine contributes her skills and enthusiasm to SEAoNY's Young Member and Communications efforts. She also remains engaged with NCSEA, serving as a member of the Communications Committee and co-chairing their Public Awareness and Outreach group since 2021.

Katherine's enthusiasm knows no bounds, and she even loves sharing structural fun facts with tourists who admire our extraordinary skyline. Her dedication to her work and unwavering passion make her an asset in our structural engineering community.

2023 SEE AWARDS

YOUNG ENGINEER OF THE YEAR AWARD

FINALIST

MARK BELTRAMELLO

Mark Beltramello is an Associate with Gilsanz Murray Steficek. He is a Professional Engineer in California and is a certified Special Inspector.

He has worked on many projects in different sectors including healthcare, retail, residential, and office fit-outs. Some noteworthy projects include the addition of five stories onto an existing six-story building at 515 West 29th Street, the renovation of approximately 240,000 sf for a global financial firm's offices at 225 Liberty Street, the renovation of approximately 330,000 sf for a global financial firm's office at 2 Bryant Park, a roll-out of new Citibank branches in the Northeast and Mid-Atlantic, and a national roll-out of new Yves Saint Laurent stores, including flagship locations in New York and Los Angeles.

Mark received his Bachelors in Civil Engineering from Bucknell University and his Masters in Structural Engineering from Lehigh University.

FINALIST

MAY THU NWE NWE

May Thu Nwe Nwe is a Senior Engineer with Gilsanz Murray Steficek. Throughout her time in GMS, May Thu has worked on a variety of projects, including the conversion of a 24-story office tower into 588 market rate rental apartments at 160 Water Street, a renovation of an existing four-story building at 255 Butler Street, and the redevelopment of the East Plaza of 1221 Avenue of the Americas.

She is also helping develop an in-house optimization software program that can be used to find efficient beam and column sizes for steel and concrete building structures.

May Thu has also co-authored an article in STRUCTURE magazine about the benefits of using visual aids such as MOLA Structural Kits to teach teens about structural engineering. May Thu is a member of ASCE, SEAoNY, and the ACE Mentoring Program. She received her undergraduate in Civil Engineering from Bucknell University and her Masters of Science and Doctorate of Philosophy in Civil Engineering from Johns Hopkins University.

EXAMINING EXECUTIVE ORDERS 22 AND 23

BY KIMBERLY AVELAR
EIT, ARUP

BY LEAH PEKER
PE

Two executive orders were introduced last fall that are worth examining for relevance to the New York structural engineering community. In September 2022, New York State Governor Kathy Hochul issued Executive Order 22 (EO22) "Leading By Example: Directing State Agencies to Adopt a Sustainability and Decarbonization Program." In the same month, Mayor Eric Adams issued New York City Executive Order 23 (EO23) "Clean Construction," set to take effect immediately.

NYS EO22 follows the 2019 enactment of the Climate Leadership and Community Protection Act, noted by the executive order as "the most ambitious climate legislation in the United States", and which established a Climate Action Council charged with developing a plan to reduce greenhouse gas emissions in every sector of the State's economy.

EO22 does not impact private projects but instead contains a list of "Affected Entities" comprised of state agencies and departments such as the Department of Transportation (DOT), that are obligated to comply with the requirements. According to the executive order, new infrastructure and building projects are "designed and built to account for the climate changes that may occur over their lifespans." EO22 also calls for the establishment of the GreenNY Council made up of directors, presidents, and commissioners from several NYS agencies and departments including the Department of Environmental Conservation (DEC).

The GreenNY Council is required to issue "Operational Directives and guidance for common construction materials to reduce the amount of embodied carbon in such materials." Affected entities must seek to reduce embodied carbon in both new construction and major renovations. To comply, design teams will be required to calculate total embodied carbon resulting from construction of their design. Additionally, contractors will be required to submit environmental product declarations (EPDs) when available that include embodied carbon data calculations for products intended for use on the project.

Affected entities are also required to create waste diversion plans which include waste data reports about recycled materials, compostable and organic materials, material sent to landfill including construction and demolition waste, and special waste including hazardous waste. It may be more important than ever to design projects with the waste produced and potential repurposing or recycling in mind.

On the local level, NYC has committed to carbon neutrality by 2050 and the goals of the Paris Agreement. The driving goal of the NYC EO23 is to reduce construction carbon emissions to help the City meet those goals.

EO23 aims to achieve its greater sustainability goals by introducing criteria for capital project agencies which include the Department of Design and Construction, the Department of Environmental Protection, and the Department of Transportation.

The city's executive order establishes four major elements for capital project agencies: low-carbon concrete specifications, EPDs, low emissions vehicles and equipment, and life-cycle assessments.

Low-Carbon Concrete Specifications: The Order states that capital project agencies shall make their "best efforts to incorporate low-carbon concrete specifications for all batch plant ready-mixed concrete used in capital projects" while complying

with State and Federal regulations.

Environmental Product Declarations (EPDs): All capital projects using concrete or steel must submit product-specific EPDs for all batch plant ready-mixed,precast concrete, and structural steel to the City's Building Transparency database.

Low Emissions Vehicles and Equipment: Capital project agencies must "make their best efforts to include specifications in capital project construction contracts for low-emission vehicles and equipment with a preference for all-electric equipment."

Life Cycle Assessment (LCA): NYC EO23 dictates that for projects that are required to comply with the green building standards outlined in the New York City Charter (NYCC), the capital project agencies must "endeavor to achieve" credits for LCA. In some cases, they are required to submit annual LCA reports.

In addition to these 4 categories, the executive order requires that capital project agencies develop and submit action plans to reduce embodied carbon and submit their proposals by October 1, 2023.

While it is important to distinguish that NYC EO23 pertains only to capital projects, its introduction is likely signaling that similar policy requirements will become more ubiquitous and that we can anticipate such requirements extending to private projects in the future.

The following definitions may be useful to understand the requirements of the executive orders:

EMBODIED CARBON

Embodied carbon refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials. For example, in a steel building, the embodied carbon results from the raw iron used to produce the steel, the energy required in the processing, the fuel consumption for the shipment of fabricated steel to the site, and the fuel used to assemble that steel, in addition to maintenance and disposal.

CAPITAL PROJECTS

Capital projects provide "for the construction, reconstruction, acquisition or installation of a physical public betterment", according to New York City Construction Codes. In layman's terms, they are public projects that are paid for in whole or in part by the city treasury.

ENVIRONMENTAL PRODUCT DECLARATIONS (EPDs)

Environmental Product Declarations (EPDs) are documents that provide information regarding the environmental impact of a particular product over its life cycle. They are best described as nutrition labels for building materials. Declaration standards are specified by the International Organization for Standardization (ISO) 14025.

LIFE CYCLE ASSESSMENT (LCA)

Life Cycle Assessment (LCA) measures the environmental impact of a product over the course of its life cycle. In this context, the product is any piece of infrastructure. The life cycle starts at the production of the materials and ends at the demolition and disposal or recycling of the building elements.

SEAONY 2023 BOAT CRUISE

SEAONY 2023 BOAT CRUISE

2023 IDEAS² Merit Award
Moynihan Train Hall New York
Photo: Severud

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