



## Engineers Design

A Town+Gown Symposium Event

Thursday, May 15, 2014, 4:00 p.m. to 7:00 p.m.

The RAB Lighting Showroom

@ 535 West 24<sup>th</sup> Street, 6<sup>th</sup> floor, New York, NY

### Agenda

**4:00 p.m.—4:15 p.m.**

Registration and Viewing of Engineering Students Poster Exhibit

**4:15 p.m.—6:00 p.m.**

Case Studies of Engineering Design Collaborations

#### *TIMES SQUARE PEDESTRIAN PLAZAS*

James Quinn, P.E., LEED AP

Principal, Weidlinger Associates

Claire Fellman, RLA, ASLA

Director, Snøhetta

#### *PURPLE LINE, SILVER SPRING MARYLAND LIBRARY PROJECT*

Gregory Benz, AICP, RA

Senior Vice President and Principal Professional Associate, Parsons Brinckerhoff, Inc.,

#### *CORNELL UNIVERSITY/ROOSEVELT ISLAND – THE FIRST ACADEMIC BUILDING*

Tom Rice

Associate Principal and Structural Engineer, Arup

#### *NEW NY BRIDGE (The Tappan Zee Bridge Replacement)*

Mark Roche, P.E.

Americas Highways Business Leader, Arup

#### *HUDSON YARDS*

Eli Gottlieb, P.E.

Principal, Thornton Tomasetti

*Moderator:* Samuel I. Schwartz, P.E.

President + CEO, Sam Schwartz Engineering, D.P.C.

**6:00 p.m.—7:00 p.m.**

Reception (on rooftop, if weather permits)



**Introduction.** A common description of engineers, by themselves and by others, is that they “solve problems”. And, it is true that when engineers apply scientific principles to various situations they *are* solving problems. But when civil, structural, mechanical, electrical and environmental engineers solve problems in the built environment, they are also designing. Using five projects as case studies, this event explores how the work of engineers solving problems related to buildings and infrastructure becomes revealed design. It was initially inspired by *Design: Just What the Heck Is It?*, an Archtober 2012 collaboration between AIANY/Center for Architecture and Town+Gown that explored the many meanings of design. One panel focused on design within the broader civic context, in particular discussing what makes people think of New York City as a “design” city? The panelists described a “design” city as one that consciously strives for better design, using missed opportunities and interventions that did not work as hoped or planned as grist for the mill for the next iteration of changes to the urban fabric. In the civic design conversation, design is about *becoming*—it is not a finished product. By expressing physical aspects of the urban landscape in aesthetic terms,

**When I think about the word/concept "design", I think about . . . “ways to creatively solve problems”**

**When I think about the word/concept "design", I think about . . . “intent and solving problems”**

design critics articulate missed opportunities and failures, generating buzz and, possibly, controversy. But it turns out that they are also talking about engineering, without necessarily understanding what is possible and what is necessary. The results of a survey undertaken in conjunction with that event, asked the question “*When I think about the word/concept "design", I think . . .*” and several of the responses revealed aspects of engineering. During NYCxDesign 2013, at an event entitled *Looking*

*Ahead to NYCxDesign 2014*, jointly sponsored by AIANY/Center for Architecture, American Council of Engineering Companies of New York and Town+Gown, a panel of practicing professional engineers and academics at engineering schools brought the engineering sub-disciplines into the City’s design conversation.

**Engineers Design Case Studies.**

Maryland Purple Line/Silver Spring Library

*Purple Line*

*Owner: Maryland Transit Administration*

*Engineer: Maryland Transit Partners (AECOM/RKK JV w/Parsons Brinckerhoff)*

*Architect: KGP Design Studio, Inc.*

### *Silver Spring Library*

*Owner: Montgomery County (Maryland) Department of General Services*

*Engineer: Columbia Engineering*

*Architect: The Lukmire Partnership Architects*

The Purple Line is a 16-mile light rail transit project planned for an inside-the-Washington-Beltway corridor between Bethesda and New Carrollton, Maryland. In trying to find a viable surface alignment through the east side of downtown Silver Spring, the project was able to overcome challenging grade and geometric conditions by develop a track alignment that cuts through a block from one street to another on the site of planned public library. By working with Montgomery County in the early programming and planning of the library, not only was the alignment accommodated and a place for light rail transit station incorporated into the site, but the library building form and structure was also strongly shaped, creating a landmark for the gateway to the Silver Spring Central Business District. The library is under construction, and the Purple Line is advancing toward implementation. A residential tower is being developed on the remainder of the site.



### *Cornell NYC Tech - First Academic Building*

*Owner: Cornell University*

*Architect: Morphosis Architects*

*Engineer: Arup*

Cornell University is developing a new technology campus on Roosevelt Island in NYC. The First Academic Building (FAB) is being designed by a team led by Morphosis Architects with Arup providing multi-disciplinary engineering and specialist consultancy. Sustainable practices are at the core of the design principles for the new campus, and the owner and design team are pursuing leading edge building performance including net zero energy operation. Energy generation at FAB will include a solar PV canopy and a ground source well field for heating/cooling. The design is being developed

around an academic model to foster innovation for the 21<sup>st</sup> century and to enable FAB to adapt to future developments in use and program.



© Kilograph



© Kilograph

### Times Square Pedestrian Plazas

*Owner: New York City Department of Transportation*

*Engineer: Weidlinger Associates*

*Architect: Snøhetta*

While Times Square has long been an icon for entertainment, culture and urban life, the physical and operational conditions of the streets and sidewalks had deteriorated over time, detracting from the functionality and safety of this critical crossroads. Following the hugely successful pedestrian-only public spaces that the New York City Department of Transportation (DOT) piloted in 2009, DOT and its project manager, the New York City Department of Design and Construction, selected Snøhetta, as prime consultant, and Weidlinger Associates to lead the design of the permanent public spaces in Times Square with a three-fold purpose: to upgrade crucial utility infrastructure; provide event infrastructure for new and expanded public events; and to create an iconic multi-functional public space that reflects the best of Times Square and New York City. The project site, known as the 'Bowtie', is bounded by Broadway and 7th Avenue between 42nd and 47th Streets.

As the civil engineer, Weidlinger was responsible for the extensive mapping of the project, specifically all underground and above ground facilities. Subway tunnels, with shallow depths to the subway roof,

lay beneath the extensive utility systems under both Broadway and Seventh Avenue, thus complicating rehabilitation and/or relocation of these old and undersized facilities. With the emergence over the past decade of Times Square as a destination for both tourists and locals, the infrastructure was either inadequate or substandard in meeting the current and projected demands. The reconstruction includes new water mains, sewers, catch basins, street lights and traffic signals, all coordinated by Weidlinger and Snøhetta to meet the diverse programmatic demands for the new plazas and to provide improved pedestrian and vehicular circulation. Weidlinger also prepared the design of an innovative underground event infrastructure which will provide power and broadcast wiring to streamline the hundreds of events that occur each year. In response to directives from the New York City Police Department, Weidlinger designed perimeter security elements, which will offer protection to pedestrians from errant vehicles as well as potential terrorist attacks. Construction began in the Spring of 2013 and project duration is estimated at three years, with virtual round-the-clock activities to minimize impacts to the users, both pedestrians and vehicles.<sup>1</sup>



#### NewNYBridge (Tappan Zee Bridge Replacement)

*Owner: New York State Thruway Authority*

*Engineer: HDR, Buckland & Taylor*

*Architect: Wilkinson Eyre Associates*

Though only constructed in the 1950's, the Tappan Zee Bridge began to deteriorate rapidly in the 1980's leading to major maintenance costs and potential future safety concerns. As a result, in 2011, after 10 years of studies, the New York State Thruway Authority (NYSTA) decided to replace the existing bridge in a manner that would "maximize the public return on investment in a new Hudson River crossing". The resulting bridge design competition challenged the engineering designers to accommodate future bus rapid transit, future commuter rail and have a "strong visual identity that will

---

<sup>1</sup> For link to other images, see

<http://imagearchive.snohetta.com/Page/Download?code=055a67f5ed948edeb39b5a5ccd55a0cd>

positively reflect the local community context and distinguish the Project internationally". The project, with a total cost of \$3.9b, is the largest of its kind in the nation, but is the "tip of the iceberg" when considering the potential implications for transit and human connections that will be introduced locally and across the region. Tappan Zee Constructors, LLC (TZC), a consortium of design, engineering and construction firms, including Fluor, American Bridge, Granite, and Traylor Bros., along with key design firms HDR, Buckland & Taylor, URS, and GZA, is working closely on the project with a team of NYSTA and State Department of Transportation employees. While construction is due to finish in 2018, the NYSTA, working in partnership with TZC, is approaching the end of the design phase and is moving forward with a design that not only meets the goals of the project but is fully endorsed by local stakeholders and maybe sets a new standard for what can be achieved in the ongoing battle that is the replacement of aging infrastructure. Extensive measures will be in place throughout the duration of the project to protect the environment and to monitor the impact of construction on surrounding communities. The design-build contract with TZC for the bridge will help keep the project on-budget and on-time, because financial risk associated with most cost overruns or schedule delays will lay with TZC, rather than toll or tax payers.



#### Hudson Yards Mixed-Use Project

*Owner: The Related Companies L.P. and Oxford Properties Group Inc.*

*Engineer: Thornton Tomasetti*

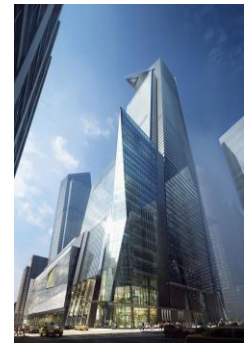
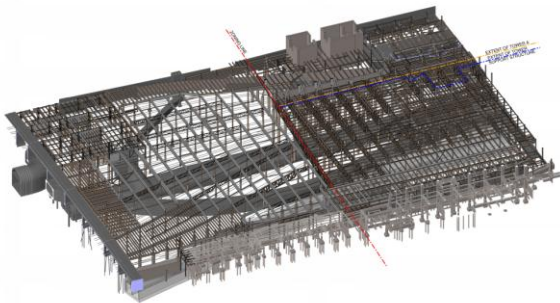
*Architect: Kohn Pedersen Fox Associates*

Hudson Yards is one of the largest private development projects in New York City history. The mixed-use development will provide more than 17 million square feet of commercial, retail and residential spaces with five Class-A office towers, a retail center with two levels of restaurants and markets, a 150-room hotel, a school, a performing arts center and approximately 5,000 residences.

The site spans the rezoned West Side Rail Yard on the far west side of Manhattan. Buildable areas were limited to only 38 percent of the 26-acre site in order to keep Penn Station's rail lines in operation during construction. A structural steel platform with a reinforced concrete deck was

designed to bridge the 30 railroad tracks to allow for phased construction of the development. The new platform transfers the weight of the proposed towers to an expansive system of large-span trusses and strategically placed columns between the rail lines and alongside the existing infrastructure. Caissons drilled 60 to 80 feet into the bedrock support the platform and allow the towers to rise above. The 37,000-ton platform will be built in two phases, Phase I: Eastern Yard and Phase II: Western Yard.

Construction began in March 2014 for the podium base structure for Phase 1, and for the first two towers to be constructed on the Eastern Yard: 10 Hudson Yards and 30 Hudson Yards. Thornton Tomasetti utilized a 3D building information model to detail and specify all the steel members and connections to ensure accurate fabrication of all the components. The model enabled better project team collaboration and helped reduce the risks for project delays due to design changes.



**Engineering Students Design Exhibit.** The discussion about how engineers collaborate with other designers on projects and the roles they play in the design of the built environment supported the creation of an “engineering button” on the NYCxDDesign 2014 website, which has given rise to this

**When I think about the word/concept "design", I think about . . .** “a process in which a professional evaluates the need to make improvement and subsequently develops a solution”

event and an accompanying exhibit—*Engineering Students Design*. This is the first exhibit of posters visualizing completed engineering student projects from among five engineering schools in New York City—Columbia University/The Fu Foundation School of Engineering and Applied Sciences; The Cooper Union for the Advancement of Science and Art/Albert Nerken School of Engineering; New York Institute of Technology; New York University/Polytechnic School of Engineering; and Manhattan College/School of Engineering. These engineering student posters

provide visual evidence of the assertion that, from the elements of their professional training, when engineers solve problems in the built environment, they are also designers, designing revealed elements of the civic space. At *Policy, Meet Design*, the second Archtober collaboration between Town+Gown, AIANY/Center for Architecture and Public Policy Lab, on October 10, 2013, panelists explored the divides between the design disciplines and public policy fields. Engineers operating on public and private projects have specialized knowledge with implications for public policy and they desire their work inform public policy debates about the built environment. Some of the divides between designers and public policy analysts explored last fall could be operative between engineers whose work can have direct application in public policy analysis and discussions and public policy analysts who, unlike urban planners, are rarely trained for the built environment setting and its issues. For more on the divides between design and public policy, see

**When I think about the word/concept "design", I think about . . .** “creative melding of functionality and form”

[http://www.nyc.gov/html/ddc/downloads/pdf/town\\_and\\_gown/Symposia/10\\_10\\_13\\_Precis.pdf](http://www.nyc.gov/html/ddc/downloads/pdf/town_and_gown/Symposia/10_10_13_Precis.pdf) and [http://www.nyc.gov/html/ddc/downloads/pdf/town\\_and\\_gown/events/policy\\_meet\\_design.pdf](http://www.nyc.gov/html/ddc/downloads/pdf/town_and_gown/events/policy_meet_design.pdf).

*Town+Gown is a systemic action research platform that links academic and practitioner resources to increase applied built environment research across disciplines and sectors, using the city’s inter-related physical and social setting as a laboratory. Now in its 5<sup>th</sup> year of operation, Town+Gown has hosted 77 completed projects with 24 practitioner partners and 23 academic programs—for more information, please go to the program’s website at: <http://www.nyc.gov/html/ddc/html/design/tg.shtml>.*