# Smooth TRANSITION

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A major television network expands its operations by connecting to a nearly identical building next door.

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**FROM HUMBLE BEGINNINGS** in the mid-1980s, the A&E Television Network, or AETN, has grown into an international media juggernaut.

Due to its continuing growth, AETN's leadership group decided to expand and renovate the company's existing headquarters in Midtown Manhattan. Wishing to stay in their offices at 235 East 45th Street (or Building 235), an 18-story, steel-framed building dating back to the 1920s, AETN executives decided to simply expand into the adjacent property at 227 East 45th Street (or Building 227)—which was also 18 stories, steel-framed and originally built in the 1920s. The move would increase the total square footage of AETN's headquarters to 330,000 sq. ft. To allow its employees to freely circulate about its expanded home base, the leadership team decided on a plan to structurally connect the two buildings. Unfinished space on the ground floor of the newly incorporated property now hosts a monumental lobby complete with stadium seating, 108-in. LCD TVs and a dramatic mezzanine level. Both structures also underwent comprehensive infrastructure upgrades.

## Going Back in Time

For structural engineer Shmerykowsky Consulting Engineers (SCE), the first challenge involved obtaining the building's original structural drawings. Unfortunately, as is often the case with buildings of this vintage, the original drawings were nowhere to be found. After some searching, SCE principal Marco Shmerykowsky discovered that several of the original architectural drawings for Building 235 had actually been pinned to a board and set out for show. (Architectural and mechanical drawings, especially those produced before the advent of computer drafting, can be of great service to structural engineers, as they typically contain a good amount of useful information about the building.) The drawings Shmerykowsky recovered helped SCE's engineers determine column locations and other basic information about the building. From these materials, the structural team was able to draft and model a preliminary set of floor plans for Building 235. As no drawings were available for Building 227, the floor plans were developed by a reverse engineering process of sorts. Seeing as Buildings 227 and 235 were both designed around the same time and with the same materials, the team supposed that they would rely on similar structural systems.

Several weeks of on-site probing and investigation followed, and the contractors opened up the concrete encasement around the existing columns and beams, permitting engineers from SCE to properly identify their types and sizes. Probing confirmed the structural team's supposition about the structural similarities between Buildings 227 and 235 and allowed them to flesh out the floor plans and models they had developed with more accurate beam and column sizes. As both buildings had setbacks at the 8th, 10th, 12th, 14th and 16th floors, the structural investigation was also crucial in identifying the location of the perimeter column transfers. Having established a working knowledge of each building's layout, the architects at Mancini*Duffy began to develop the interconnection system.

## Synching Up

Designing the building interconnections was complicated by the fact that floor elevations were different at each building. At Building 235, floors 3 through 13 were approximately 3 ft higher than the floors at Building 227. The architectural design team decided to address this issue by creating "transition zones" in Building 227. These zones allowed access to Building 235 via a short staircase and an ADA-compliant lift, both of which connected to a new raised platform.

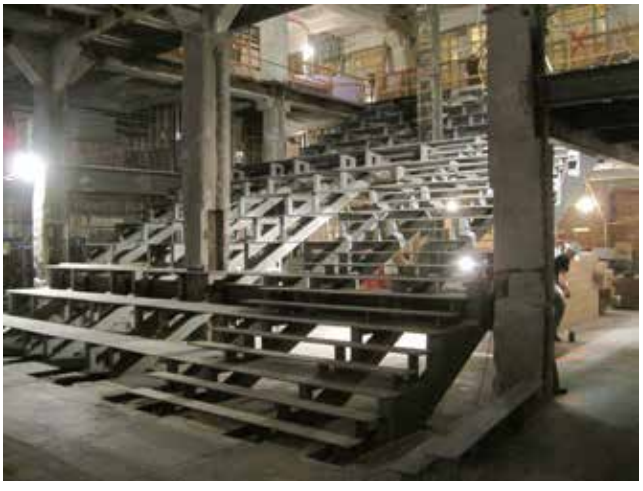
To maximize headroom between these raised platforms and the ceilings above, SCE engineered a shallower structural floor system around the transition zones. They opted to replace the existing structural floor systems, composed of concrete-encased steel beams and a gritcrete slab, with HSS8×8 floor beams upset into the lightweight concrete slab. This shallower construction was also designed to include a 3-in. slab depression within the footprint of the new ADA lifts.

The design team had to take a different approach at the 14th through 16th floors. The transition zones on lower floors were built in spaces between the face of the building to the south and elevator banks to the north. The previously noted building setbacks progressively narrowed these spaces. At the 14th floor and above, there was no longer enough room to create a viable building interconnection. The designers developed an alternative system that would connect the buildings via a pair of inter-floor fire stairs, one located in the northeast corner of Building 227 and the other located in the northwest corner of Building 235. These upper level transition zones consisted of a stair descending from the floor slab at Building 227 to an intermediate landing on the inter-floor stair at Building 235. This approach was simple in theory, but existing conditions (as they often do) complicated matters.

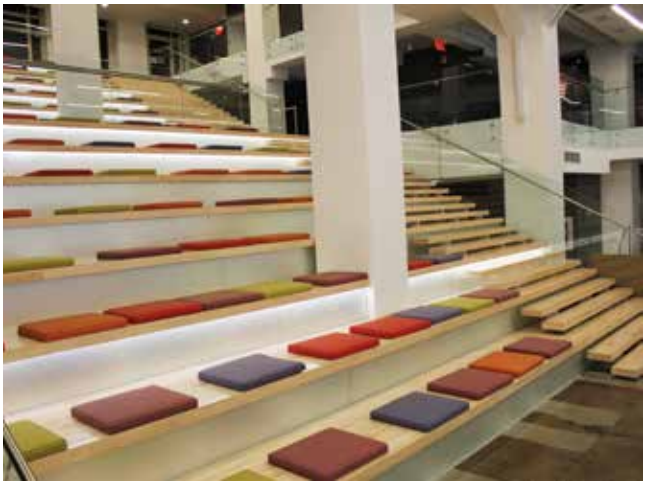
To build the upper level transition zones, spandrel beams in the northwest corner of Building 235 would need to be reframed. Ideally, the team would have installed a new spandrel

◀ The façades of the adjacent buildings at 227 East 45th Street and 235 East 45th Street, respectively.

▼ Structural steel for the lobby's stadium seating. A saw-toothed arrangement of HSS4x4 forms the bleacher's basic tread/riser profile.



▼ Stadium seating after cladding. Colorful pillows and a light wood finish lend the lobby a relaxed ambiance.



▲ The extended slab at the mezzanine level supports two large television screens opposite the stadium seating.

beam at a slightly different elevation from the original beam and called it a day. But in this case, the existing spandrel crossed into an elevator shaft. Initially, the team considered hanging from above or posting down to adjacent floors. Pursuing these design strategies, however, was made difficult by a lack of as-built information and ever-present scheduling concerns. In the end, the team chose a "keep it simple" solution, cutting through three spandrel beams and re-supporting them by posting down to the foundation level. This was considered the most expedient option.

At the 3rd and 7th floors, inter-floor stairs were installed in the transition zones at Building 227's southeast corner. Before new slab openings could be cut to accommodate the new stairs, it was necessary for the engineering team to review the lateral bracing of the façade. The structural team then engineered reinforcement for the spandrel beams to compensate for the removal of the slabs.

## Monumental Change

The interconnecting portion of the AETN project is the sort of no-nonsense work whose value lies in the fact that you don't notice it. It's unlikely that AETN employees will be thinking about aesthetics as they travel from Building 227 to Building 235, then back again. But when they walk into the new lobby in Building 227—well, that's another matter entirely.

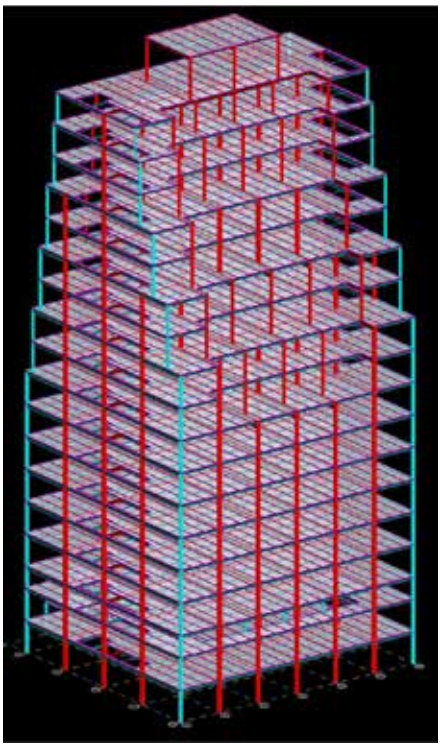
The first thing visitors will notice is the two-story-high, 33-ft-wide stadium seating. The treads of these bleachers are topped with a light wood finish and connect the ground, mezzanine and second-floor levels. The mezzanine level, sleekly framed with glass handrails, serves as a lounge space where AETN employees can now be found playing table tennis in their free time.

The first step in designing this unorthodox lobby space was removing four existing framing bays at the second floor level to create a single large opening. But before this step could be taken, the existing column at the center of the space had to be reinforced to handle the increased unbraced length. Properly reinforcing this column required an exhaustive analysis of the building's lateral system. To engineer this reinforcement system, the structural team employed a combination of field probing and reverse engineering to analyze the existing superimposed loads on the column. Once the reinforcement was installed, the second-floor structure could be removed. Additional framing modifications were also made to support the new bleachers.

The bleachers themselves have a substructure made up of HSS8×8 tube stringers, with one segment spanning from the ground to the mezzanine floor and another segment spanning from the mezzanine to the second floor. Above that, a saw-toothed arrangement of HSS4×4 form the bleacher's basic tread/riser profile, which rises 1.5 ft and runs 2.5 ft. Steel plate treads span between the stringers and the HSS4×4.

At ground level, the HSS8×8 stringers land within the span of the existing gritcrete slab. New wide-flange beams were installed beneath the slab to provide structural reinforcement. Taking advantage of the fact that the stadium seating spans the full width of two framing bays, the design team also installed an intermediate beam to support the ground-to-mezzanine floor segment of the bleacher construction. This support beam spanned east-west and framed into the existing building columns. At the top of each segment, support was provided by heavy wide-flange beams. To maximize clearance at the second floor landing between the underside of the steel and the top of the mezzanine floor slab, the structural team chose a shallower, heavier section over a more structurally efficient but deeper alternative.

On the east side of the bleacher structure, each HSS4×4 tread/riser segment is subdivided by two additional steps. (This is a pedestrian stair, and if you've ever struggled to find your seat at a ballpark, you've probably spent a fair share of your time walking up and down one of these.) This stair is made up of steel plate treads, which bear on vertical support plates. The



Shmerykowsky Consulting Engineers' 3D model of Building 227.

vertical support plates are coordinated with HSS8×8 and HSS4×4 below.

The simple but elegant geometry of the stadium seating is complemented by an extended mezzanine level, which provides a crucial sense of scale and also serves as a space where AETN employees can meet for lunch or share ideas. The extension at Building 227's south façade was created by doubling the width of an 8-ft strip of slab to 16 ft, allowing for new seating and other amenities. Slab extensions at the northeast and northwest corners of the mezzanine level opening improved the flow of the lobby space and provided space for new architectural features. The expanded area was reframed with new wide-flange steel sections, with support distributed between connections to existing framing at the mezzanine level and hangers up to the framing at the second floor. The extended slab also incorporated a support structure for the two television screens mounted opposite the stadium seating. The screens are supported by HSS cantilevering up from the mezzanine floor framing below.

## One Size Doesn't Fit All

New York's vast stock of densely packed, existing buildings means that for corporations like the A&E Television Network, there are no one-size-fits-all solutions. But for the design and construction team, extensive experience in structural steel design unleashes myriad possibilities for overcoming the challenges posed by existing conditions and, ultimately, meeting the client's needs. ■

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