

Multiuse Structure Tops Massachusetts Turnpike

By T.R. Witcher

A Boston developer is planning a multiuse structure on a deck to be built above a sunken portion of the Massachusetts Turnpike, not far from Fenway Park.

September 17, 2013—Built alongside the old Boston and Albany Railroad, the Massachusetts Turnpike has sliced through the heart of Boston for well over 40 years. While developers have since chipped away at the idea of building structures on decks above the sunken highway, not much progress has been made, and the busy turnpike is still something of an open wound. Now, Meredith Management Corporation, of Newton, Massachusetts, is planning a \$500-million air-rights project that would place four buildings alongside of, and on top of, a decked-over stretch of the turnpike. Fenway Center, slated to be in construction by the end of the year, will feature a mix of residential, retail, parking, and office space, including a 27-story tower that will rest atop the deck over the freeway.

The genesis of Fenway Center stretches back more than 20 years. In 1992, Meredith's president, John Rosenthal, bought a 340-space parking garage on Lansdowne Street, just behind the famous Green Monster at Fenway Park, and close to the Kenmore Square Green Line station operated by the Massachusetts Bay Transit Authority (MBTA). In 2002, he bid on and was awarded the air rights over the highway, enabling him to move forward with a project that would link the ballpark, south of the turnpike, with Kenmore Square, just to the north. But he ran into opposition from local institutions, including the Boston Red Sox, which didn't want towering buildings looming over the ballpark.

A deal was worked out in 2007 that would move the project to a neighboring parcel (as well as granting the Red Sox a small stake in the center), and in 2009, the project was fully approved. It is, Rosenthal says, the first major air-rights development in Boston in decades. "It's complicated and requires dense development, and there's an enormous economic burden associated with building over an operating highway and track," Rosenthal says.



A \$500-million air-rights project will place four buildings alongside of, and on top of, a decked-over stretch of the Massachusetts Turnpike.

Courtesy of The Architectural Team



The 1.3 million sq ft development will include residential, retail, parking, and office spaces—as well as a 27-story tower.

Courtesy of The Architectural Team

structure in a way so you're hitting the landing points that are only along, essentially, the jersey barriers [along the turnpike]. You can't bring a column down in the middle of the turnpike or the tracks," he explains. "You have to organize the structure in a way that by the time you get above the deck, the loads have all been transferred, so they're coming directly down on the bearing points."

After the foundations are placed, columns will be placed starting on the north edge of the turnpike, then the south, then down the median. Adjacent to the rail lines, however, columns won't be sufficient to satisfy federal regulations for "crash walls."

"Anytime you build next to the train, you can't have an element that, if there were a derailment, [wouldn't] take a significant amount of the impact," he says. So, instead of columns, workers will construct individual walls 10 to 12 ft long that will sit on the top of the foundation elements.

On air-rights projects, Cheever says, it's not too hard to determine vertical bearing points, but it's often very difficult to deal with the lateral loads. "You've created this table," he says, "and tables that don't have any sort of diagonal bracing tend to be wobbly." He says the portion of the structure that will be located on the ground will anchor the lateral loads.

One of the structures to be built as part of the development is a parking garage, and for that structure the engineers couldn't bring any diagonals down, Cheever says, so they will use a moment frame with fairly heavy plate-girder sections, "in order to be rigid enough to carry seismic and wind loads on the parking garage and deliver them to the foundation."

The 1.3 million sq ft development will occupy 4.5 acres, two of those acres above eight lanes of highway and train tracks, and the rest on terra firma. Locating part of the project on land was a requirement for approval of the project.

Pete Cheever, P.E., M.ASCE, the president of Boston-based LeMessurier Consultants, which is overseeing the structural work on the project, notes that the vehicular travel lanes on the turnpike are 60 ft wide in each direction, and to the south of these lanes are the 45 ft wide commuter and freight train lines. The street level is located 22 ft higher than the travel lanes, and Cheever says that the deck that will be built for the structure will measure roughly 600 ft in length and 165 ft in width, and will be placed on columns that extend to the turnpike level. He likens the arrangement to a table.

Cheever notes that once you get it in place, the superstructure is fairly conventional, "other than the fact that you have to organize the

For the remaining structures that are part of the project, the engineers found that they couldn't make all of the load transfers from the internal columns of the buildings at the deck level. If they had, the columns would have been required to be spaced 60 ft apart. "No one can afford to build with 60-foot bay sizes," Cheever explains. Residential buildings typically have columns spaced between 25 and 30 feet apart to facilitate divisions for living quarters.

Another option might have been to use very deep girders at the deck level, but the engineers found they were restricted to using girders that match the depth of the girders used on a vehicular bridge that abuts the development. That wouldn't be enough depth to fully transfer all of the column loads, Cheever says. The solution was to increase the floor-to-floor heights on the first two floors of the buildings, to buy enough space to add deep transfer structures at the second floor, rather than at the deck level.

Before the deck and new buildings can get under way, Meredith is also overseeing completion of a \$15-million upgraded commuter rail station, the MBTA's Yawkey Station, at the site. "I wanted to do that in order to make sure it was built on time and on budget, because we couldn't build Fenway Center without Yawkey Station being completed first," says Rosenthal.

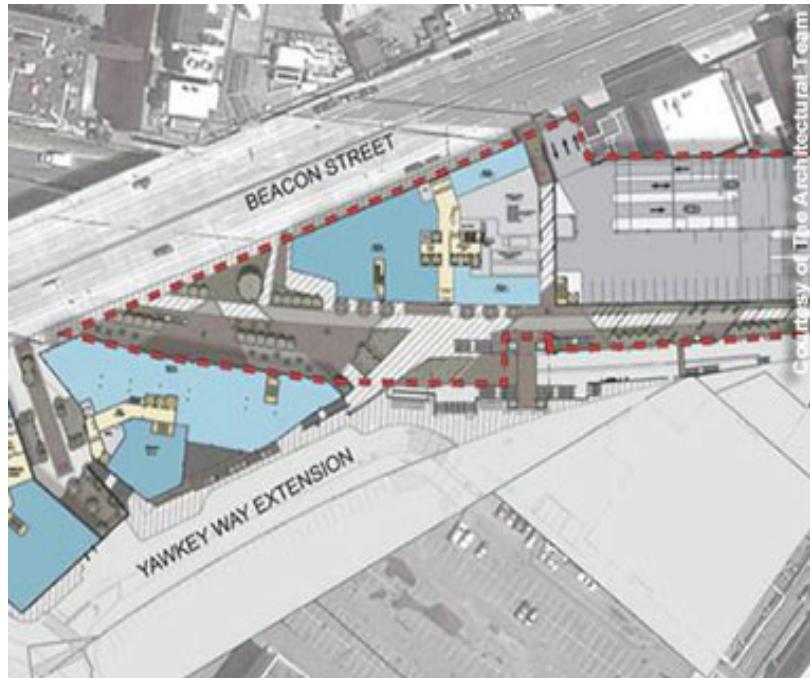
The station sits next to the ballpark, Massachusetts's top tourist draw, as well as one of the Commonwealth's chief economic engines—the Longwood Medical and Academic area. This is a dense campus of medical institutions that employs 60,000 people, serves 15,000 students, and sees 2 million patients visit each year.

Even though 40 trains pass through the Yawkey station each day, only 17 of them stop, because the station has but one platform. The new station will have two new platforms, each more than 680 ft long, as well as a new head house with four elevators, a 150 ft shed roof, and a mezzanine level connecting to Beacon Street and, eventually, to Fenway Center.

Structural and geotechnical design on the station was performed by the Boston office of Weidlinger Associates, Inc. According to principal Peter Quigley, P.E., M.ASCE, the platform level will be made of precast-concrete double tees and cast-in-place concrete slab, with concrete shear walls around the elevator cores. Steel framing supports the crossover level between the outbound and inbound tracks, as well as the head-house roof structure. Steel-framed canopies along the inbound and outbound platforms provide shelter for passengers.

The support system for the cast-in-place concrete pier caps, designed by Michael Oakland, Ph.D., P.E., L.S., M.ASCE, a geotechnical engineer with Weidlinger, will use pressure-injected footings and minipiles. The minipiles were specified for low headroom areas beneath the existing bridges.

The Yawkey Station will be fitted with a south-facing solar array that can generate more than 200,000 kW/h of electricity a year, more than the station needs—making the station a net-zero energy producer.



The project will be constructed in phases, the first completed in 2017 and the final phase, shown here, completed in 2018.

Fenway Center will be a gateway to Boston, one of the first major structures drivers will see when they enter Boston from the west. The project design is being overseen by The Architectural Team, of Chelsea, Massachusetts. According to Jay Szymanski, AIA, LEED-AP, an associate with the firm, the project evolved from the original master plan to include a variety among the buildings' architecture. "Boston tends to be more traditional when it comes to architecture," he says. "But due to the iconic nature of the project and the fact that it is not located in any one particular neighborhood, we have flexibility to introduce a more modern vocabulary." The design will have a lighter, more transparent feel than one expects in the historic city of red brick structures.

Air-rights projects may continue to be a viable direction in a compact, built-out city such as Boston. "In many ways, now we're creating land," says Rosenthal. "I feel a little bit like a pioneer, when our forefathers filled in Boston Harbor, which was an engineering feat in and of itself. Now we're taking air rights over the highway in order to create land." In doing so, however, it is important to ensure that the projects can justify the costs. "You certainly need uses that can help pay for that premium," Rosenthal says.

Building this project over the sunken highway rather than over land will run at least \$34 million more than a traditional development of this size, he says. Getting buy-in—convincing community groups that higher density is the only way to make it fly—is tough, especially in a neighborhood where buildings typically extend just four to seven stories.

"Boston, in particular outside the financial district, has been opposed to height, density, and parking," Rosenthal says, "all of which the community groups had to accept in order to see the highway, this ugly scar, covered up."

The project could usher in a new era of development in the compact city. "If we're successful it will absolutely lead to new air-rights development," Rosenthal says.

Fenway Center is expected to break ground around the end of the year, after the Yawkey Station project is completed. The development will be completed in two phases. Phase one comprises the construction of 70,000 sq ft of the highway deck, 420 apartments across three buildings, 50,000 sq ft of retail, and about 1,000 parking spaces in two different garages. That phase should be complete in 2017. Phase two, which will likely begin before the first phase is entirely wrapped up, will add an additional 30,000 sq ft of highway deck along with a 27-story, 305 ft tall building with retail, office, and residential spaces. That should be completed by 2018.