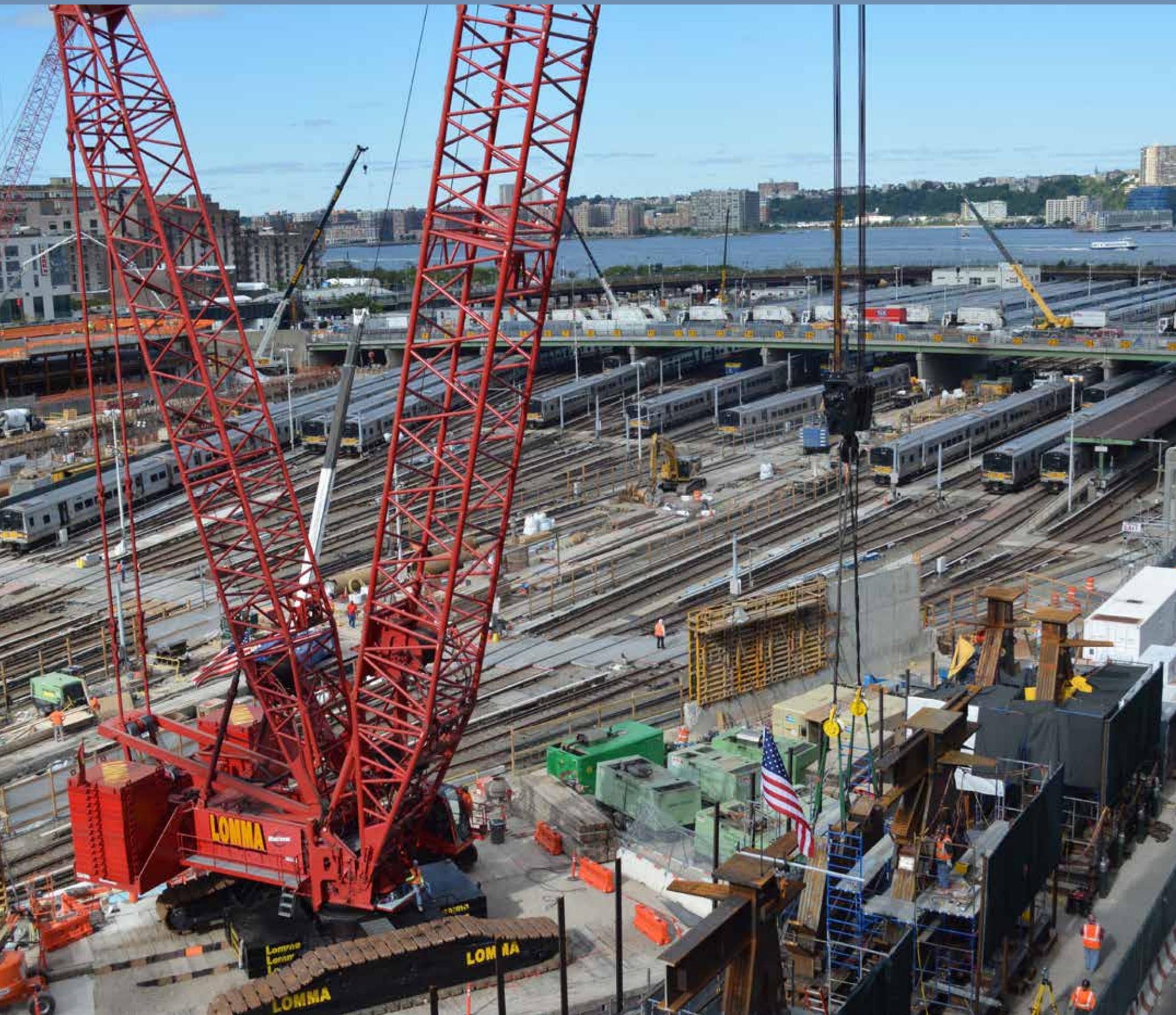


CONSTRUCTIONER



Tutor Perini

Ahead of Schedule on Tower Platform for \$20B Hudson Yards

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Tutor Perini Builds 10 Acre Railroad Tracks for \$20B H



A massive concrete and steel platform designed to support several skyscrapers at a 17 million square foot real estate development in west Manhattan will be finished ahead of schedule, thanks to an aggressive work pace by the contractor, Tutor Perini Corporation.

Tutor Perini was retained in January 2012 by developer Related Companies and Oxford Properties Group to be contractor for the Hudson Yards development, which will rise above the Eastern and Western Rail Yards of west Manhattan. Hudson Yards is a working rail yard that is divided by 11th Avenue into the eastern and western portions. This 26 acre complex will offer more than 6 million square feet of commercial spaces, approximately 5,000 residences, a new public school, and a luxury hotel. Related/Oxford is developing the Eastern Rail Yard portion of Hudson Yards as the first of two phases, with a tentative completion date of 2024 for the entire project.

Platforms Span Railroad and Support Skyscrapers

The 10 acre platform now under construction by Tutor Perini is one of two such structures that have to be built to bridge over 30 active Long Island Rail Road train tracks, several 100 year old railroad tunnels used by Amtrak and New Jersey Transit, and a new concrete casing (Amtrak box tunnel) nearing completion. Designed by structural engineers Thornton Tomasetti together with geotechnical and environmental engineers Langan Engineering & Environmental Services, the platforms cover about three-quarters of the Eastern and Western Rail Yards, creating a supporting surface for six towers rising from 50 to more than 90 stories, while also serving as a roof over the train tracks. Platforms built by placing precast concrete slabs on steel framework transfer the enormous weight of buildings to concrete-filled steel caissons drilled as deep as 80 feet in bedrock. More than 250 of the 4 to 5 foot

Mammoth columns support platforms that Tutor Perini is building to span up to 30 sets of train tracks at the Related Companies/Oxford Properties development.

1 Acre Platform Spanning Hudson Yards Development

By Paul Fournier

diameter caissons are needed to support the Eastern Rail Yard platform.

Platform and Tunnel Progressing Well

Crews began drilling the caissons last March under an accelerated work pace. By November, platform construction was well ahead of schedule, according to Tutor Perini's Chairman and CEO Ronald Tutor. In a transcript of Tutor's third-quarter earnings results provided by the Seeking Alpha website, the CEO speaks of some of their larger projects including the platform, and the box tunnel being built beneath the development under a separate contract.

"Our civil projects, namely the Amtrak tunnel and the platform over the Eastern Yard, are both progressing well. We are very close to completion of the initial scope of work for the Amtrak tunnel project, with tunnel work completed inside the Eastern Yard and in the final stages of backfill and utility work with a limited amount of track work to follow.

"We are working seven days a week on a platform project and have completed the installation of 155 out of a total of 253 caissons to bedrock, and steel erection

work has commenced and is currently 15 percent complete. This platform is scheduled to complete in June of 2016, but we believe a significant portion of it will complete by the end of 2015. With portions of that platform nearing completion, our building group is now commencing the start of the maintenance of equipment building on the platform."

Construction of the Eastern Rail Yard platform requires an estimated 25,000 tons of steel, 14,000 cubic yards of concrete, with the completed structure weighing more than 35,000 tons.

The platform is supported by a number of gigantic steel A-frame columns. Consisting of two, 45 ton sections, the columns are so large that the welding equipment of the steel fabrication facility had to be updated to produce them.

Special Crane and Rigging for Colossal Columns

Special equipment was also needed to lift the outsized column sections. Tutor Perini used J.F. Lomma's 750-ton-capacity Manitowoc 18000 Crane to lift and place the 45 ton sections of A-frame columns. The support sections were

brought in on trailers in a horizontal position and offloaded by the Manitowoc, which was equipped with I&I Sling Slingmax Twin-Path slings and a 125 metric ton Equalizer Block. This combination facilitated the lifting of column sections into a vertical position so they could be welded together, and also the lifting of the 90 ton assembled columns into place between the railroad tracks.

Trusses Transfer Loads

Locating places among the 30 tightly spaced railroad tracks to drill caissons was a challenge for the builders, since less than 40 percent of the land was actually available for drilling. More problematic was the area of the "throat," where 30 tracks converge into just four near the entrance to Penn Station, the busiest rail station in the country. One of the office towers – 30 Hudson, the tallest tower at 92 stories – was to be built over the throat. In this location, the existence of buried utilities and other factors related to train operations precluded the drilling of caissons. In order to provide support for the platform in this area, the contractor had to build 16 bridges, or trusses, to serve

as transfer girders. The trusses span the throat, transferring the loads of the tower to deep-drilled caissons at the ends.

Intervening Amtrak Tunnel

Before the platform could be completed, Tutor Perini had to construct an underground concrete casing (box tunnel) beneath the Eastern Rail Yard under a separate contract with the National Railroad Passenger Corporation ("Amtrak"). The box tunnel is a key element of Amtrak's Gateway Program and is intended to preserve an underground right-of-way for possible future expansion of rail service via two new rail tunnels underneath the Hudson River between New Jersey and Penn Station. The new Hudson River tunnels have been designed to withstand flooding such as occurred in the existing tunnels during Super Storm Sandy, and will double the capacity of the Northeast Corridor. Both Hudson River tunnels were flooded with 3.25 million gallons of brackish water, which halted all Amtrak Northeast Corridor and New Jersey Transit service into Manhattan for five days, impacting nearly 600,000 daily riders, according to Amtrak. The box tunnel



Manitowoc crane equipped with I&I slings and Equalizer Blocks uprights a 45 ton section of A-frame column for platform designed to support skyscrapers at Hudson Yards in Manhattan.

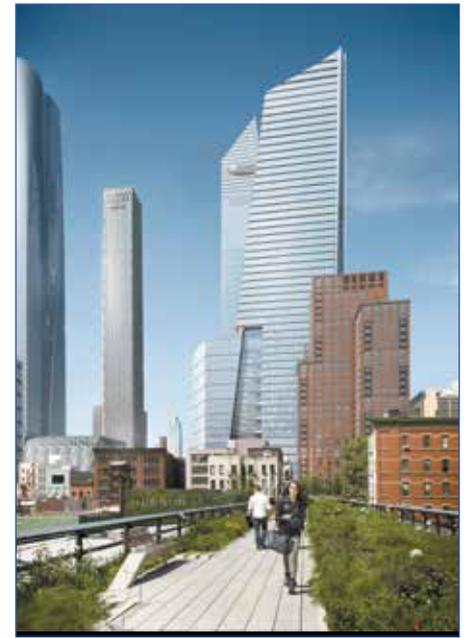


The 750 ton crane slowly raises and swings the column to the Eastern Rail Yard platform, one of two platforms that will support three high-rise offices and residences.

By the end of 2014, more than 7 million square feet of development was underway on Phase One, the Eastern Rail Yard portion of Hudson Yards.



Eastern Rail Yard platform consists of precast concrete slabs on steel framework supported by massive columns that in turn bear on concrete-filled caissons drilled to bedrock.



Architect's rendering of completed Hudson Yards skyscrapers as seen from neighboring High Line, a popular park built on an abandoned elevated rail line.



Earlier construction photo shows 10 Hudson office tower rising at site, which is scheduled for occupancy in 2015 by Related/Oxford.

measures approximately 800 feet long, 50 feet wide, and 35 feet tall. Construction began in mid-2013 and was essentially completed by November 2014.

Office and Residential Towers Underway

Construction of three towers are now underway at the Eastern Rail Yard – 10 Hudson, 30 Hudson and 15 Hudson, with starting schedules in that order.

The first to break ground, in December 4, 2012 ceremonies, was 10 Hudson, a 52 story, 895 foot tall office tower offering 1.7 million square feet of space. Foundation work was able to get underway immediately because there was ample ground space available for drilling caissons at its location in the southeastern corner of Eastern Rail Yard, and therefore no need to wait for platform construction. This is the only tower in Phase One that is not on the platform.

Foundation work continued through the first half of 2013, with superstructure work beginning in August. During excavation work, an estimated 70,000 cubic yards of soil were removed, while some 11,000 cubic yards of concrete was placed for the foundation. Tower con-

struction was awarded in March 2013 to Tutor Perini subsidiary, Tutor Perini Building Company. This is the only New York City Class A office building to have a direct connection to the High Line, a popular elevated park that attracts tourists and native New Yorkers alike. The southern façade of the tower bridges over the 30th Street spur of the park to create a 60 foot public passageway through the building. Related/Oxford anticipates a 2015 occupancy for 10 Hudson.

The developer's flagship office tower, 30 Hudson, got underway in 2014. Ranked as the fourth tallest building in New York, the 1287 foot, 92 story skyscraper will provide 2.6 million square feet of space. When it is opened for occupancy in 2018, the tower is expected to offer a public observation deck that will be the highest open-air lookout in the city.

Construction of the first residential tower, 15 Hudson, began in December. This building will be 910 feet tall and

will offer about 385 for-sale and rental residences in its 70 stories. The 960,000 square foot LEED Gold-designed building will be next to the High Line and directly connected to the Culture Shed, a multipurpose venue offering art, design and special events. The tower is expected to be completed in 2018.

Building Momentum

By the end of 2014, more than 7 million square feet of development was underway on Phase One, the Eastern Rail Yard portion of Hudson Yards. It has been slightly over two years since the groundbreaking ceremony on December 4, 2012 and a little more than four years since the rail yard owners, Metropolitan Transportation Authority, leased the site to Related Companies and Oxford Properties Group for 99 years for a reported fee of \$1 billion. 🏗️



Architect's rendering of office and residential towers (lighted at center-right) from across the Hudson River in New Jersey.