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East Side Access

COST: \$7.2 BILLION

The MTA's \$7.2 billion East Side Access project will bring Long Island Rail Road trains into Manhattan's Grand Central Terminal.

"This project will relieve overcrowding at Penn Station and save 27 minutes on average off the commutes of Long Islanders who work uptown," says Ken Lewaine, director of procurement and administration for the MTA Capital Construction Co. The MTA expects the trains to begin running in 2014 and to carry 160,000 people daily.

Dragados/Judlau, a 70/30 joint venture between Dragados USA of Spain and Judlau Contracting of New York began boring at 63rd Street in fall 2007 with its first 200-ton, computer-guided machine. By the end of last year, two hard-rock tunnel-boring machines were going full tilt on the \$428 million tunnel-boring contract.

The work began with a massive excavation in Queens, through which pieces of the tunnel-boring machines were lowered. Crews then hauled the pieces through the existing 63rd Street tunnel under the East River to an assembly chamber on the Manhattan side, where the machines were put together and tested. They will ream out 22-ft-diameter tunnels through which the trains will roll. Muck and rock left in the machines' wakes are moved out using a conveyor system.

Once the two machines complete tunnels under Grand Central and on to a storage area at 38th Street, crews will partially disassemble them, take them back to 63rd Street and start additional tunnels. Altogether, the machines will bore four tunnels under Manhattan until they approach Grand Central.



Then the equipment will branch off again to bore eight tunnels coming into the terminal. Past Grand Central to the storage area, the number of tunnels decreases again to four.

Dragados/Judlau also received the \$734 million contract to blast out two caverns 140 ft below Grand Central to create the three-level Long Island Rail Station. When finished, the below-grade Long Island Rail Station will house four platforms with eight tracks and a mezzanine. Escalators will carry passengers to a new concourse 90 ft above the tracks.

The East Side Access project also requires work in Queens, including soft-earth tunneling at Sunnyside Yard and reconfiguring Harold Interlocking and the tracks leading to Sunnyside. Pile Foundation Construction Co. of Hicksville, N.Y., continues excavating a \$122 million, 60-ft-deep, open-cut hole through which the

soft-earth boring equipment will begin tunneling underneath Sunnyside.

The MTA anticipates awarding the soft-ground tunneling contract in third quarter 2008. The first \$139 million phase of construction for the Harold Interlocking reconfiguration began in March.

Key Players

Owner: Metropolitan Transportation Authority, New York

Program Manager: URS Corp, New York

General Engineering Consultant: A joint venture of PB Americas, STV and Parsons Transportation Group, New York.

Tunnel and Station Contractor: Dragados/Judlau, a joint venture between Dragados USA, Spain, and Judlau Contracting, New York

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Croton Water Filtration Plant

COST: \$2.2 BILLION

After weathering community opposition, lawsuits and fines from the federal government, the long-delayed \$2.2 billion Croton Water Filtration Plant in the Bronx is finally under construction.

When completed in 2011, the 400,000-sq-ft plant will be one of the largest water filtration facilities in the U.S., with a capacity to treat 290 million gallons a day from the Croton reservoir system.

The city's Department of Environmental Protection is constructing the plant to comply with state and federal law mandating the filtration and disinfection of all surface water systems unless granted a waiver. Years of battling between the city and the federal governments over construction of the plant resulted in a consent decree, issued in 1998, obligating the city to complete the facility by 2006. That deadline was later extended to 2012.

Community opposition and lawsuits fighting the city's plans to site the plant beneath the Mosholu Golf Course driving range in Van Cortlandt Park resulted in further delays. The issue was resolved in 2004 when the state permitted the city to use land under the park and the city committed \$220 million to park improvements in the Bronx.

The federal government started imposing daily fines on the city in February 2007 for failure to meet a court-mandated deadline to hire a contractor to build the facility. Frustrations mounted when the low bidder on the project, a joint venture led by Perini Corp. of Framingham, Mass.,



pulled out of negotiations in April.

DEP finalized a \$1.3 billion contract to build the plant in May 2007 with the only other bidder on the project, a joint venture of Skanska USA Civil of Whitestone, N.Y., and Tully Construction of Flushing, N.Y.

Site preparations for the facility began in September 2004 with the excavation of over 1 million cu yds of rock and soil to create a 300,000-sq-ft, 90-ft-deep pit to house the plant. Boring is under way for two water tunnels. One tunnel will house a 9-ft pipe carrying untreated water from the Croton Aqueduct to the facility. The second tunnel will hold two 8-ft pipes transporting treated water from the plant to the distribution system near Jerome Park reservoir.

The four-story plant will be built completely underground. Work began in August 2007 to lay the reinforced concrete foundation. Construction will start shortly

on the concrete plant. Work will also include the installation of all equipment, piping, valves, instrumentation and site utilities.

The project is expected to use over 250,000 cu yds of concrete, 21,000 tons of reinforcing steel and 160,000 ft of piping.

Key Players

Owner: New York City Department of Environmental Protection

General contractor: Joint venture of Skanska USA Civil, Whitestone, N.Y., and Tully Construction, Flushing, N.Y.

Construction Management: Joint venture of URS Corp., San Francisco, and Malcolm Pirnie, White Plains, N.Y.

Design/Engineering: Metcalf & Eddy, New York, and Hazen and Sawyer, New York

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7 Subway Line Extension

COST: \$2.1 BILLION

Construction started in February on the \$2.1 billion extension of the Number 7 Flushing Subway line, an important catalyst to the redevelopment of the west side of Midtown Manhattan.

The extension will run west beneath 41st Street from the No. 7's terminus at Times Square and Seventh Avenue to 11th Avenue, then turn south under 11th Avenue to a new station at 34th Street and end at 25th Street. The track segments between 25th and 34th streets will be used for train storage.

The Metropolitan Transportation Authority awarded a \$1.145 billion contract in October to S3 Tunnel Construction to excavate and build 7,000 ft of double-tube tunnels, the shell for the 34th Street station and the connection to the Times Square Station. S3 is a joint venture of Skanska USA Civil, Whitestone, N.Y.; J.F. Shea Construction, Walnut, Calif.; and Schiavone Construction, Secaucus, N.J.

A \$450 million option to build the shell for a second station at 41st Street and 10th Avenue must be acted on by the city within nine months if it is to be part of the initial work.

Shafts sunk at 25th and 26th streets provide access to the starting point for the tunnel. S3 is using drill and blast methods to excavate the first 1,000 ft of tunnel, creating a staging area where components of two tunnel boring machines can be lowered into the tunnel and assembled.

Working side-by-side, the TBMs will ex-



cavate the remaining 6,000 ft of tunnel. A precast segmental tunnel liner will be bolted together in the tails of the TBMs and installed as the machines advance through the tunnel. A muck conveyance system will transport excavated materials from the TBMs to a vertical belt.

Ground freezing will stabilize 350 ft of bad ground conditions under 11th Avenue, permitting the TBMs to mine through the area.

Two shafts will provide access to the site of the 34th Street station. Drill and blast methods will excavate a 54-ft-high by 66-ft-wide by 1,100-ft-long cavern for the station, which will be lined with a concrete shell.

Over 620,000 cu yds of rock will be excavated and 100,000 cu yds of concrete poured or used to create the precast concrete tunnel liners.

The city-funded project is slated for completion in 2013.

Key Players

Owner: Metropolitan Transportation Authority, New York

General contractor: S3 Tunnel Construction, a joint venture of Skanska USA Civil, Whitestone, N.Y.; J.F. Shea Construction, Walnut, Calif.; and Schiavone Construction, Secaucus, N.J.

Design, Structural, Mechanical, Civil and Geotechnical Engineering: Parsons Brinckerhoff, New York

Systems Engineering: STV Inc., New York

Architecture: Dattner Architects, New York

Consultant Construction Manager: Joint venture of Hill International, New York; Lero Engineers and Construction Manager, Bronx; and HDR/Daniel Frankfort, New York

4

Revel Hotel & Casino

COST: \$2 BILLION

Revel Entertainment aims to elevate Atlantic City, N.J., to the next level as a gambling and entertainment Mecca with its new \$2 billion Revel Resort & Casino at the north end of the famed Boardwalk.

Arquitectonica of New York serves as the design architect; BLT Architects of Philadelphia, the executive architect and architect of record; and SOSH Architects of Atlantic City, the associate architect.

Construction manager Tishman Construction Corp. of New Jersey in Newark began construction in November on the 5.8 million-sq-ft project, which includes about 1,900 rooms in the first 66-story tower; a 150,000-sq-ft casino; 5,500-seat event center; two smaller theaters; nightclubs; 18 restaurants; 75,000 sq ft of retail; 22,000-sq-ft spa; and an indoor-outdoor pool.

The project began with demolition of the existing residential structures and the removal of concrete foundations, 31 heating oil tanks and contaminated soil. The 20-acre beachfront site required extensive dewatering.

Crews have poured the 7,597 auger-pressure grouted pile and 17-ft-thick mat foundation, which will consume 35,000 cu yds of concrete. Edward Cettina, executive vice president and regional manager for Tishman of New Jersey and Pennsylvania, says auger-cast piles were used due to the sandy soil conditions.

Cettina says the building started going vertical in early April. The first of two filigree concrete towers will rise through a



steel-frame podium, which will be 169.5 ft tall and house the public areas. Crews will erect approximately 22,000 tons of steel in the podium. Tishman purchased the steel early, in June 2007, allowing it to obtain a better price and to ensure delivery this spring. The company also bought the precast concrete for the 7,600-car parking deck ahead of time, for delivery in the third quarter of this year.

The filigree cast-plank system is commonly used in Atlantic City for high-rise construction, Cettina says. The system requires no formwork. It combines prestressed panels with poured-in-place decks.

A glass wall system and EFIS will clad the exterior of the podium and a glass curtain wall system the towers. Tishman will build the first tower in its entirety and the second tower to the roof of the podium.

Cettina says the job is ahead of sched-

ule, and he anticipates completing the first phase of the project in the fourth quarter of 2010.

Key Players

Owner: Revel Entertainment, Atlantic City

Construction Manager: Tishman Construction Corp. of New Jersey, Newark

Architect: Bower Lewis Thrower Architects, Philadelphia; Arquitectonica, New York; SOSH Architects, Atlantic City

Concrete: Midstate Filigree Systems, Cranbury, N.J.

Dewatering: Moretrench American Corp., Rockaway, N.J.

Environmental Consultant: Excel Environmental Resources, New Brunswick, N.J.

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Catskill and Delaware Ultraviolet Light Disinfection Facility

COST: \$1.4 BILLION

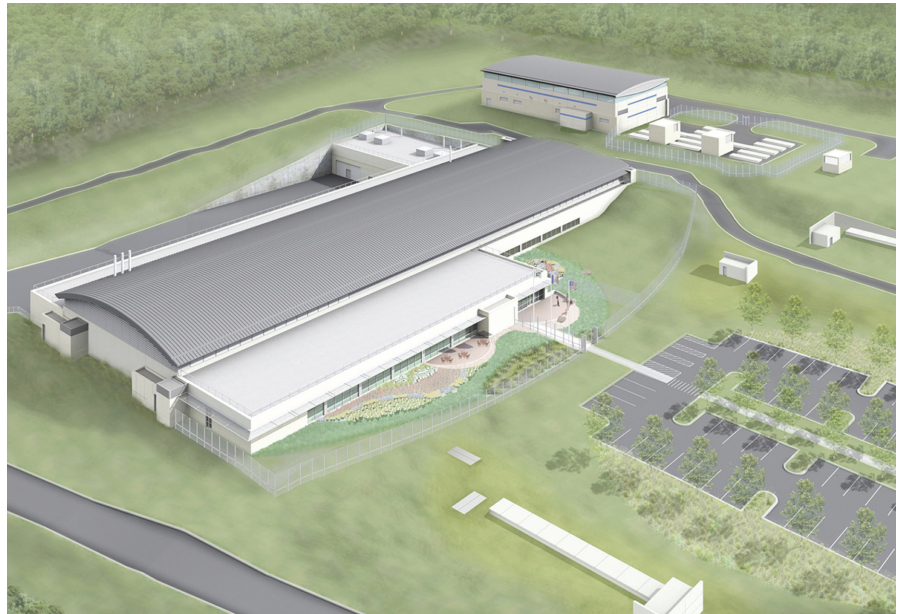
The largest ultraviolet water treatment plant in the U.S. is under construction in Mount Pleasant, N.Y.

When completed in January 2013, the \$1.4 billion Catskill and Delaware Ultraviolet Light Disinfection Facility will treat over 2 billion gallons of water per day from the Catskill and Delaware systems, which supply 90% of New York City's drinking water.

The contract to build the plant was awarded to Skanska USA Civil of Whitestone, N.Y., in February by the city's Department of Environmental Protection. Under the Federal Safe Drinking Water Act, all drinking water taken from surface water sources must be filtered unless the U.S. Environmental Protection Agency grants a waiver or Filtration Avoidance Determination. DEP agreed to build the plant in 2001 to satisfy the requirements of a FAD issued by the EPA that exempted the city from building a water filtration plant. At the time, the cost of a filtration plant was estimated at \$8 billion.

The FAD also required the city to expand its programs to protect the Delaware and Catskill watersheds. To date, the city has invested \$1.5 billion in watershed protection and land acquisitions program. A subsequent agreement with the EPA in July 2007 commits the city to spending an addition \$416 million for land purchases and protection programs over the next decade.

The 161,000-sq-ft facility, which will house the treatment equipment, laborato-



ries and offices, is being constructed on city-owned property within the towns of Mount Pleasant and Greenburgh, in Westchester County. A series of underground structures and waterways will tap into the existing concrete uptake shaft to transfer water from the shaft to large holding tanks in the plant. Valves and sluice gates will control the flow of water from the tanks to 56 UV treatment units, each able to process 40 million gallons of water a day.

The UV units consist of stainless steel disinfection chambers containing an array of quartz-sleeved UV lamps that are immersed in the water flow. UV light alters the DNA of water-based microbes and prevents them from replicating.

Treated water will be transferred via pipelines to the downtake shaft for distribution.

The UV units and valves controlling the

water flow will be the largest ever built.

Gravity, instead of pumps, will convey water in the system. To follow the grade of the existing shafts and use gravity to move the water within the facility, most of the concrete plant will be buried underground.

Key Players

Owner: New York City Department of Environmental Protection

General contractor: Skanska USA Civil, Whitestone, N.Y.

Design and Engineering: Joint venture between Hazen and Sawyer, New York, and Camp, Dresser and McGee, St. Louis.

Construction Manager: Joint venture of Malcolm Pirnie, White Plains, N.Y., and CH2M Hill, Denver.