



Divers Complete Installation of Critical Mechanical Plug In Delaware Aqueduct Shaft to Ensure Stability Ahead of Repair

\$2.1 Billion Water for the Future Program Will Ensure Clean, Reliable and Safe Drinking Water for New Yorkers for Decades

Environmental Protection Commissioner Carter Strickland today announced the completion of work to strengthen a critical shaft of the Delaware Aqueduct, helping to lay the groundwork for repair of the aqueduct leaks. The work is part of DEP's Water for the Future program, a \$2.1 billion initiative that will ensure clean, reliable and safe drinking water for nine million New Yorkers for decades to come. The program has two main elements: repairing leaks in the Delaware Aqueduct—which supplies roughly half of the city's daily drinking water needs—and supplementing the city's water supply during construction work on the tunnel. Beginning February 28, a team of divers from Global Diving of Seattle worked 24 hours a day in rotating shifts to install a crucial mechanical plug at the bottom of a 700 foot tunnel shaft located in the Town of Wappinger in Dutchess County. The plug, which is capable of withstanding millions of pounds of force from the water within the Delaware Aqueduct, will allow an access shaft to the tunnel to be drained. Once empty, the shaft will be outfitted with nine new submersible pumps that will be able to drain the Delaware Aqueduct at a rate of 80 million gallons per day when the aqueduct must be dewatered during the Water for the Future program.

“The repair of one New York City's most critical pieces of infrastructure—the Delaware Aqueduct—is DEP's top capital priority and securing this shaft is a key step in that decade-long process,” said Commissioner Strickland. “The undertaking of the installation of this plug is an extremely complicated operation that required the technical skills and courage of these highly specialized divers. The project also required thousands of hours of meticulous planning and preparation by engineers at DEP. This represents one step in a series of many over a long period of time that get us that much closer to the ultimate goal—improved reliability of New York City's water supply.”

The new plug and pumps will be critical pieces to minimize the amount of time the aqueduct is out of service and, therefore, to facilitate the connection of a new stretch of tunnel that will bypass the leaking section. When they were not actively installing the plug underwater at the bottom of the shaft, the divers lived in a specially-designed, pressurized chamber, outfitted with sleeping accommodations. They remained under pressure while they moved from the habitat chamber to their diving bell, which was lowered to the bottom of the shaft so the divers could exit and perform their work. The underwater work was observed and monitored using closed circuit cameras and audio attached to the divers' helmets and the diving bell.

The Earth's surface atmosphere is approximately 78% Nitrogen and 21% Oxygen, but because of the immense pressure at 700 feet beneath the surface of the shaft (nearly 300 pounds per square inch), the divers are required to live in an environment composed of 97% helium and 3% oxygen for the duration of the work. Even after their work was complete, the diving team remained in the confinement of the saturation chamber for an additional seven days so they could gradually and safely return to standard atmospheric pressure.

The construction of the bypass tunnel and the repair of the lining will ensure that DEP can continue to deliver high quality drinking water every day. In November 2010, DEP outlined a design and timeline to address leaks in the Delaware Aqueduct by building a two-and-a-half mile bypass tunnel around a portion of the aqueduct that is leaking in the Roseton area of the Town of Newburgh, and repairing leaks in the Town of Wawarsing from inside the existing tunnel. Under the plan, DEP will break ground on the bypass tunnel in 2013, and complete the connection to the Delaware Aqueduct in 2021. The tunnel repair and associated projects are expected to create between 1,000 and 1,500 jobs. Preparation for the repair work is currently underway, including installation of pumping system and site improvements to support construction, purchasing equipment for the repair, planning and design of the bypass tunnel, geotechnical investigations, discussions with local stakeholders, and investigating augmentation projects.

Milestones reached over the last year include the following:

- In July, DEP announced that the first geotechnical test borings were underway for the construction of an access shaft in the Town of Newburgh and in the Town of Wappinger. Construction of shafts in Newburgh and Wappinger will enable the construction of a new tunnel to bypass a leaking section of the Delaware Aqueduct near Roseton. These were the first of several planned borings to obtain geophysical data for the design and construction of the bypass tunnel. DEP will break ground on

the shafts for the bypass tunnel in 2013, and will begin the bypass connection in 2020. Geotechnical test borings are used to obtain geophysical data for the design and construction of the bypass tunnel, including basic underground rock formations and other conditions that will dictate the design of the tunnel, the selection of equipment, and construction techniques.

- In June, DEP started the second phase of a ground-breaking study to evaluate the effectiveness of mitigating leaks in the Wawarsing areas by adding lime to water in order to seal the cracks from within the tunnel. The \$4 million project, which entails building a small-scale water system that replicates full-scale water supply conditions, will help the city better determine if full-scale application of lime will be successful.

The 85-mile Delaware Aqueduct, completed in 1944, conveys approximately half of the city's drinking water from four upstate reservoirs to more than eight million people in New York City, and one million people in Ulster, Orange, Putnam and Westchester counties who also rely on the City's high quality drinking water. The aqueduct is a concrete-lined tunnel that varies in diameter from 13.5 to 19.5 feet and runs as deep as 2,000 feet beneath the ground. It was constructed by drilling and blasting through rock, and, in most areas, lined with unreinforced concrete.

DEP manages the city's water supply, providing more than one billion gallons of water each day to more than nine million residents, including eight million in New York City, and residents of Ulster, Orange, Putnam and Westchester counties. This water comes from the Catskill, Delaware, and Croton watersheds that extend more than 125 miles from the City, and the system comprises 19 reservoirs, three controlled lakes, and numerous tunnels and aqueducts. DEP employs nearly 6,000 employees, including almost 1,000 scientists, engineers, surveyors, watershed maintainers and others professionals in the upstate watershed. In addition to its \$49 million payroll in upstate counties and \$132 million in annual taxes paid in upstate counties, DEP has invested more than \$1.5 billion in watershed protection programs—including partnership organizations such as the Catskill Watershed Corporation and the Watershed Agricultural Council—that support sustainable farming practices, environmentally sensitive economic development, and local economic opportunity. In addition, DEP has a robust capital program with a planned \$13.2 billion in investments over the next 10 years that creates up to 3,000 construction-related jobs per year. For more information, visit www.nyc.gov/dep, like us on Facebook at www.facebook.com/nycwater, or follow us on Twitter at www.twitter.com/nycwater.