



# Friends of the Old Croton Aqueduct

Newsletter

No. 35, Spring 2010

## Thoughts on the Distributing Reservoir

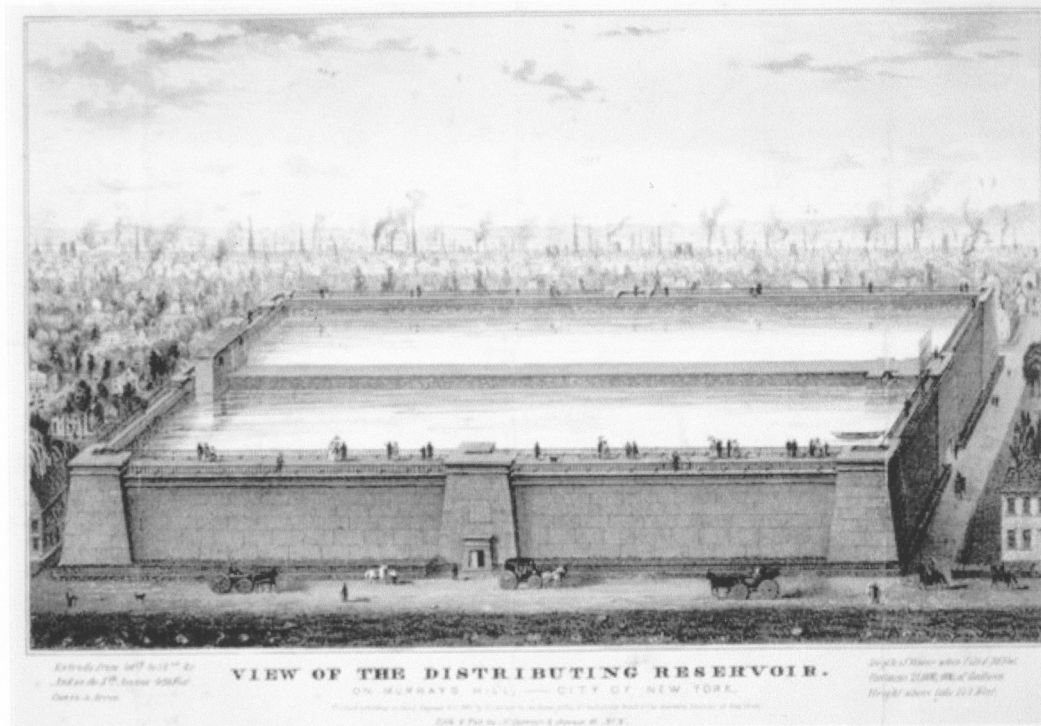
From "Murray Hill Reservoir, November 25, 1849" by Walt Whitman

"It is a delightful little jaunt to go out (if on foot, so much the better) and see the sunset, from the broad walk on top of this reservoir. A hundred years hence, I often imagine, what an appearance that walk will present, on a fine summer afternoon! You and I, reader, and quite all the people who are now alive, won't be much thought of then; but the world will be just as jolly, and the sun will

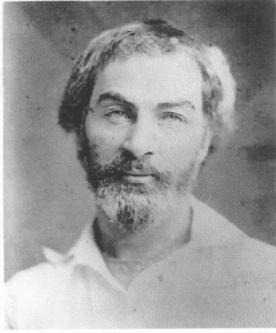
shine as bright, and the rivers off there—the Hudson on one side and the East on the other—will slap along their green waves, precisely as now; and other eyes will look upon them about the same as we do.

"The walks on the battlements of the Croton Reservoir, a hundred years hence! *Then* these immense stretches of vacant ground below, will be covered with

houses; the paved streets will clatter with innumerable carts and resound to deafening cries; and the promenaders here will look down upon them, perhaps, and away 'up town,' toward the quieter and more fashionable quarters, and see great changes—but off to the rivers and shores their eyes will go oftenest, and see not much difference from what we see now. *Then* New York will be more populous than London or Paris, and, it is to be hoped, as *great* a city as either of them—great in treasures of art and



Courtesy of the Library of Congress



Courtesy of the Library of Congress

Walt Whitman

science, I mean, and in educational and charitable establishments. Even *now*, however, as one sweeps his glance from the top of the Reservoir, he can see some seven or eight splendid charities, wholly or partially under the umbrage of the State.....

"...Ages after ages, these Croton works will last, for they are more substantial than the

old Roman aqueducts, which were mostly built on the surface of the ground. And crowds of busy feet will patter over this flagging, years hence, and here will be melancholy musings, and popping the question, and perhaps bargains and sales, long long after we of the present time are under the sod."

### Editor's Note

The Murray Hill or Distributing Reservoir, seen in the picture, was part of the Croton Aqueduct water system. Water flowed across the High Bridge and down the west side of Manhattan into the Receiving Reservoir between 79<sup>th</sup> and 86<sup>th</sup> Streets and Sixth and Seventh Avenues. From there it traveled to the Distributing Reservoir between 40<sup>th</sup> and 42<sup>nd</sup> Streets. The Distributing Reservoir was taken out of service in 1890 when the New Croton Aqueduct was completed and was dismantled after a decision was made in 1897 to locate the New York Public Library on the site. The Receiving Reservoir survived until 1940 when it was drained and filled in by Robert Moses to make the Great Lawn in Central Park.

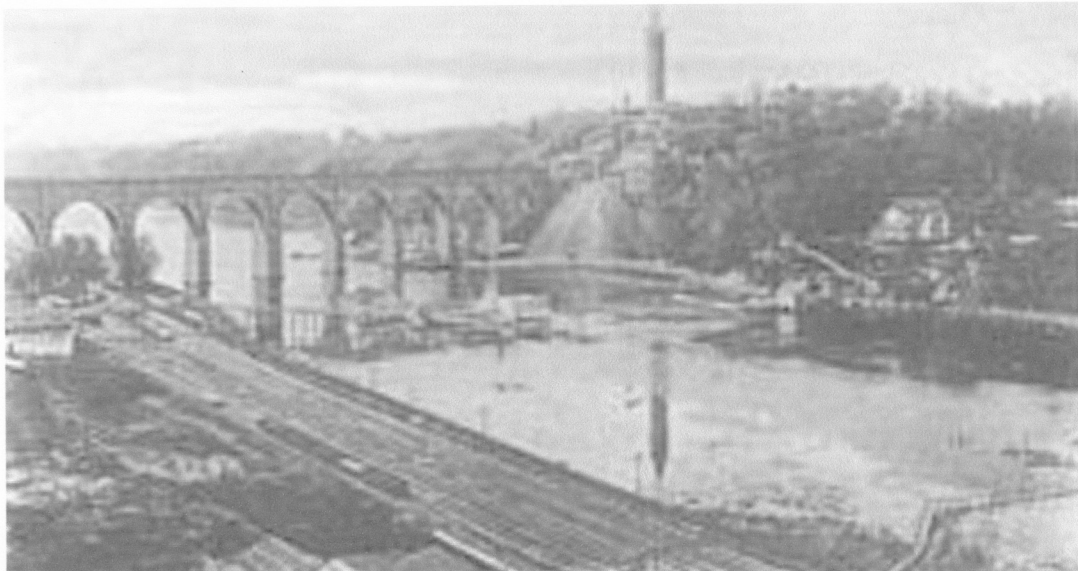
## High Bridge Design Process Starts

An important turning point has been reached in New York City's plan to restore and reopen the High Bridge to the public. The city Parks Department has announced selection of the team that will design the many elements involved in restoring the landmark pedestrian bridge. The process begins this spring.

Lichtenstein Consulting Engineers, a bridge engineering firm, leads the team, which also includes firms specializing in architecture and historic preservation, landscape architecture, and public outreach and planning. The consultants are charged with producing designs for structural improvements, wheelchair- and bike-friendly ramp access, and protective fencing, as well as restoration of the walkway and historic railing, new lighting, and stabilization of the 90-inch water main beneath the deck. The public will have opportunities to weigh in on priorities and concerns early in the process, on schematic plans at a later point, and at various times throughout the design period.

The High Bridge opened in 1848. The most renowned feature of the original Croton Aqueduct, it carried precious Croton water in pipes from the mainland (now the Bronx) to Manhattan, across the Harlem River, on 15 Roman-style arches. Early on the bridge became a hugely popular destination and public promenade, spawning restaurants and a thriving tourist district on both sides of the river. Today it is the city's oldest bridge. Closed to the public for decades, its rehabilitation and reopening are eagerly awaited. The Friends have been active members of the High Bridge Coalition steering committee, a leader in the bridge campaign, since its start eight years ago.

Anyone wishing to be kept informed about dates of public meetings or details for submitting comments should send their contact information to [czfahn@yahoo.com](mailto:czfahn@yahoo.com) or call 914-478-3961. Information will also be posted on the Friends' website, [www.aqueduct.org](http://www.aqueduct.org).  
—C. Fahn



The High Bridge; view toward Manhattan. Antique postcard courtesy of R. Kornfeld.





## Aqueduct Profile— No. 2

*Robert Kornfeld, Jr.*

### J. James R. Croes

As history would have it, some designers are broadly associated with their works, like John B. Jervis with the Croton Aqueduct or Fredrick Law Olmsted with Central Park. John James Robertson Croes was not one of those, and yet most of us live in a more beautiful environment because of his talents as a civil engineer. When he died in 1906 he was a leading civil engineer, and the Croes Medal, awarded by American Society of Civil Engineers (ASCE) to this day, was named to commemorate his remarkable candor and integrity involving the corrupt practices of the Tweed gang when they took over construction of the Boyd's Corners dam.

Croes was born in 1834 in Richmond, Va., son of a clergyman, and grandson of an Episcopal Bishop who was a Revolutionary War veteran. His ancestry was Dutch and Scottish. He attended the College of St. James in Hagerstown, Md. and studied civil engineering, graduating in 1853. Upon graduating he worked on surveys for the construction of two railroads in New Jersey. Because of his intellect and quality he was soon invited to join as an assistant in the construction of the first waterworks of Brooklyn, NY.

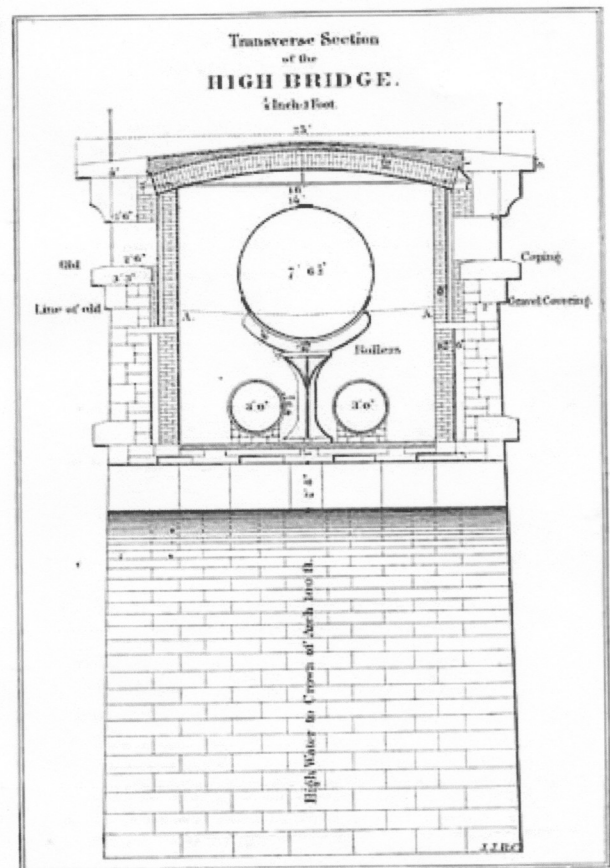
In 1860 Alfred W. Craven, Chief Engineer of the Croton Aqueduct, made Croes Principal Assistant to General George S. Greene, who was the engineer in charge of the design of the New Central Park Reservoir, the installation of the large pipe on the High Bridge, and other parts of the Croton Waterworks Extension. When General Greene joined the Union Army in the Civil War, Croes took over as Resident Engineer for these projects.

In 1866 Croes worked on the first project of an ambitious plan of Craven's to build a series of storage dams and reservoirs along the course of the three branches of the Croton River in northern Westchester and Putnam Counties. Starting in 1866, Croes assisted with the design of the Boyd's Corners Dam, which was a pioneering high masonry dam design. Soon Chief Engineer Craven retired and General Greene took his place. Croes took over construction of the dam as

Resident Engineer and saw it through until it was nearly complete in 1870, the year that the Tweed Gang took over the Croton Aqueduct Department by incorporating it into the infamous Department of Public Works. The quality and integrity of Croes and General Greene made them unable to fit in with the Tweed personnel, and both were soon pushed out.

Croes presented an outstanding paper to the ASCE which was published in their Transactions in 1872, entitled, "Memoir of the Construction of a Masonry Dam," which detailed how the dam was built, including the ways that quality was compromised when the DPW took over. The society was so impressed that a new gold medal was awarded to him and the society decided to permanently name the medal for him.

After Croes resigned from the dam project in 1870, he worked on the design of roadways, water supply and sewers for northern Manhattan and portions of Westchester County. This led to his being appointed Topographical Engineer for the Department of Public Parks. In this role he worked with Landscape Architect



*Cross-section of the High Bridge showing large pipe, set on a cradle, between and above the two original small pipes. This is a signed drawing by Croes. From the 1861 Annual Report of the Croton Aqueduct Department.*

Frederick Law Olmsted to design the streets, parks and grading for the 23<sup>rd</sup> and 24<sup>th</sup> Wards of New York City. This new district was annexed from Westchester County in the 1870's, ranging from the Hudson to Bronx Rivers, including the section of the Aqueduct that passes through what is now the Bronx Borough.

Olmsted was propelled by the great success of his design for Central Park, which was just being completed at this time. Still, the city plan for the 23<sup>rd</sup> and 24<sup>th</sup> Wards ran into trouble with local interests that fought and undermined it, corrupt officials and crooked contractors, and ultimately was remembered mainly for muddy unfinished roads. Croes and Olmsted complained in correspondence to each other about the motives and interference of their "political masters" and before long Olmsted fled to Brookline, Ma. Portions of the Olmsted and Croes city plan can be seen in reflected in the current roads of the Kingsbridge Heights, Fieldston and Riverdale sections of the Bronx.

Croes was engaged in a number of water supply, railroad and bridge design projects around the nation for the rest of his career, and formed the company Croes,

Church and Van Winkle. The New York City water supply continued to consult him as an expert for the design of the New Croton Dam and plans for future water supply.

Croes was also one of the first Palisades Interstate Park Commissioners, and he offered abundant advice and assisted tirelessly with technical issues involved in creation and development of the park. During the final years of his life he was a professor at Princeton University.

Croes did not produce one particular work that gave him fame of the sort that the Croton Aqueduct gave to John Jervis, but he was a brilliant and cultured engineer who contributed to the beauty and greatness of many of the roads, parks, and civil engineering works that we admire on a daily basis. When you look across the Hudson River at the Palisades; or explore the beautiful landscape of Riverdale, Fieldston and northern Manhattan; or admire the beauty of the Central Park Reservoir and High Bridge, remember that without the work of J. James R. Croes it would all be different.

### Smack in the middle of the trail in Dobbs Ferry . . .



### . . . But soon, a duck-your-head passage!



The two massive storms caused major damage to trees along the Aqueduct, but spared the Park's structures, including the Keepers House and iconic ventilators. Several large trees were downed, with perhaps the largest being an uprooted four-foot diameter mulberry near Flower Avenue, just north of the Dobbs Ferry/Hastings line, completely blocking the trail. But thanks to the ingenuity of our trail manager, Steven Oakes, walkers can now get through. This is temporary, of course.

Several other large trees partially obstruct the Aqueduct, chiefly from Hastings to Sleepy Hollow, with scattered additional damage through Croton to the Cornell Dam. Thankfully, the trees and branches that fell seem to have avoided damaging the property of trail neighbors, always a concern with storms of this magnitude.



## Inspection of the Double Arch Bridge

The Croton Aqueduct bridge over the Sing Sing Kill in Ossining, sometimes called the Double Arch Bridge, is one of the major valley crossings along the 41-mile length of the Aqueduct. Observant visitors to the area will have noticed serious deterioration of the bridge's exterior stonework over the years. As a result, engineering consultants engaged by State Parks last year surveyed the bridge's condition to determine what work is needed and prepare technical documents so that work can start as soon as funding becomes available.

In a related effort, on Dec. 2, 2009, a team of State Parks archeologists, headed by Michael Roets, inspected soil conditions between the underside of the deck and the upper surface of the Aqueduct through a 7- by 2-foot opening in the deck. Friends member Jean Horkans was present during the inspection, which was aided by the 1913 image shown here. The photo dramatically illustrates the location of the Old Croton Aqueduct in relation to the bridge's walking surface. The roof of the

water tunnel appears just below the deck. The distance is, in fact, about 30 inches, as measured by the archeologists.

The inspection showed the soils above the Aqueduct to be highly saturated with water from seepage through gaps in the deck. A concrete surface was encountered beneath the soil layers. It is not clear if this surface is a coating over the original brickwork of the water tunnel or a replacement of it. Neither the soils beneath the deck nor the concrete surface, which is in good condition, are judged to date from the time of the Aqueduct's construction. The bridge surface itself was not originally paved.

The December 2009 inspection will inform the engineering plans being prepared to improve drainage and halt damage to the bridge. I thank Michael Roets and Steven Oakes of State Parks and Jean Horkans for their assistance. *C. Fahn*



*"Ossining arch, view south showing arch of Old Croton Aqueduct uncovered and partly excavated, June 10, 1913."  
Photo by J. A. Rundlett. Copyright New York City Department of Environmental Protection Archives.*

Trailside, Spring 2010



## Notes from the Underground

Ed Perratore

I've a little ritual I've followed since the first time I hiked the Aqueduct Trail. Whenever I reach one of the 21 ventilators that line the trail more than 160 years after the tunnel's completion, I lay a hand upon the stone column and pause. At first I considered it a subconscious nod to those who came before—those who installed the necessary ductwork for air intake, along with others who laid the stone and troweled the mortar. But more recently I came to understand the deeper meaning of this chill, which runs through my fingers no matter how warm the open air. It's rather the question of how it felt down below, in the Aqueduct itself, for those who needed to keep the water flowing for a more than century after the Aqueduct began its service.

I got part of my answer last summer, when I finally took a tour inside and down the steps of Ossining's weir. Although the temperature dips immediately inside the brick weir, it felt chillier than the dankest basement by the time tour guide Jean Horkans of the Friends led our group down to the Aqueduct itself. A trickle of water ran beneath a metal walkway that ran several feet in both directions along the Aqueduct's tunnel. To the south, beneath the promenade of the bridge, the ceiling of the tunnel was hydraulic cement; to the north was a ceiling carved and blasted out of the very rock of a hill, the one you descend behind the weir on the steps toward Ann Street.

Before the tour finished, the rest of the group on their way back up to daylight, I stopped to take a long, hard look northward past the shadows. I thought about the bats Jean said needed chasing away every spring, after months without human intrusion, and wondered what else might be there, creatures that didn't announce their presence so cooperatively. And I felt a new appreciation for the dedication of not only those who dug and blasted their way through the rock but also the inspectors who occasionally needed to enter the tunnel, the underground stream slowed to a trickle, to inspect for weakness in the masonry and make repairs. What manner of man could enter the icy blackness and not feel fear?

Consider the 1877 *Scribner's Monthly* account of Benjamin S. Church, a resident engineer of the Aqueduct, who had just completed some repairs within the tunnel and sent a messenger with word to turn the

water back on. Then came news: Some distance down, a keeper had seized the opportunity while the water was low to make some unauthorized repairs. And he was still in the tunnel. It was too late to stop the messenger—but a man on a fast horse could get to the keeper in time. Church made the trip and, once there, sent down several laborers to finish the job in a hurry. From above, he could hear the hammers and trowels of workers growing increasingly anxious. The work soon over, the crew clambered up to skylight, moments before another sound took over...the rushing torrent of city-bound water.

I read recently how New York City was sending teams of divers 700 feet down into the Delaware Aqueduct, where it crosses beneath the Hudson, to scope out decades-old leaks. Working underwater for weeks at a time, the inspectors slept in a sealed, pressurized compartment outfitted with closed-circuit cameras and audio connections on their helmets. Compared with today, the sounds of workmen with their clinking hammers and trowels seem almost quaint. But the next time you pass a ventilator, take a breather. Lay a hand on the cold stone and lean in close—you may hear them still.

## Map Orders

The Friends' color map-and-guides of the Aqueduct in Westchester (Old Croton Aqueduct State Historic Park), and of its route in New York City, are available by mail. The maps are \$5 each (members, \$4). Add 75 cents shipping and handling for the first map, 50 cents for each additional map. Please specify which map(s) you want.

Send a check for the total to the Friends at 15 Walnut St., Dobbs Ferry, NY 10522. Or order from our website: [www.aqueduct.org](http://www.aqueduct.org). Questions? Call 914-693-0529.



## ANNUAL MEETING

Sunday, April 25, 2pm to 5pm

**Captain Scott Craven will talk about how the Aqueduct changed the course of the Croton River — and history. There will be music, food and good company. Irvington Library at the bottom of Main Street. Call 914-693-0529 for more information.**



## Walks, Talks and Tours

**Friends Walk Schedule, Spring 2010:** All walks will be led by a member of Friends of the Old Croton Aqueduct.

**April 3 – Ossining Weir tour.** See video at the Community Center to learn about the Old Croton Aqueduct, then descend into the original brick pre-Civil War water tunnel. Meet at 10:00 AM at the Ossining Community Center at 95 Broadway adjacent to the Aqueduct, just west of Highland Ave./Rt. 9. Information: 914-762-4082

**April 17 – Celebrate Earth Day in Irvington** with a walk on the Old Croton Aqueduct to Lyndhurst estate. Learn about local architectural landmarks and Aqueduct history. Meet in Irvington on Main St. 2 blocks west of Broadway /Rt. 9 at 11:00 AM. Information: 914-591-7399

**April 24 – Aqueduct walk from Irvington to Lyndhurst estate.** (See above). Meet at 11:00 AM on Dows Lane at the Aqueduct, one block west of S. Broadway/Rt.9. Optional tour of Lyndhurst — fee. Approx 2 hours round trip. Information: 914-591-7399

**May 8 – Ossining Weir tour.** \* Meet at 11:00AM \* (see further details from April 3 schedule above). Info: 914-862-4207 or tom.tarnowsky@gmail.com

**May 16 – Croton Dam to Crotonville on the Old Aqueduct.** Tour the 105 year old stone dam, then step back in time to walk on the Aqueduct along rustic Croton Gorge. Meet 10:00 AM in parking lot of Croton Gorge Park on Rt. 129, 1/2 mile north of village of Croton-on-Hudson. Approx 4 miles round trip. Information: 914-862-4207 or tom.tarnowsky@gmail.com

**May 23 – Guided walk around 94-acre Jerome Park Reservoir in the Bronx** where the Old and New Croton Aqueducts meet. Because of filtration plant work, the basin is currently waterless, permitting full view of the gatehouses. Learn about the Croton water supply, local Revolutionary War history and surrounding National Register district. Bring lunch and water. Meet at 11:00 AM at Bedford Park Blvd and Goulden Ave. About 2 miles. Information: 718-430-4613 or spdevillo@earthlink.net

**May 30 – The Old Croton Aqueduct in the Bronx.** Guided walk follows the path of the Old Croton Aqueduct to (but not on) the High Bridge. Learn about Aqueduct history, engineering and nearby historic sites. Optional extension across Washington Bridge to view Manhattan end of High Bridge. Meet at 9:30 AM at Bedford Park Blvd. and Goulden Ave. Bring lunch and water. About 4-5 miles. Information: 914-478-3961 or czfahn@yahoo.com

**June 12 – Ossining Fair Day.** Weir and aqueduct tunnel tours from 10 AM to 3 PM. From Main St. one block west of Rt. 9/Highland Ave. walk north across Aqueduct bridge to weir.

**June 12 - Ossining weir and aqueduct tunnel tour,** followed by round-trip hike to the Croton Dam, about 9 miles total at a vigorous pace. Bring lunch for picnic at Croton Gorge Park. Wear appropriate footwear, bring fluids, and use sun protection. Meet at 10 am at Ossining Community Center, 95 Broadway (see April 3 listing), walkable from Metro-North Hudson Line's Ossining Station. Friends of the Old Croton Aqueduct, joint with Appalachian Mtn. Club and Sierra Club. Information: 917-902-7979 or mgraiff@nyc.rr.com.

### Talks sponsored by Friends of History, Croton-on-Hudson, 7:30 pm at the Croton Free Library

**May 11 – “Tales on Tap: Water Systems of North Westchester,”** by Jan Wines

**June 3 – “A Look at Hudson River Bricks,”** by Pat Gordon, Director of the Haverstraw Brick Museum.

### Parks and Trails New York Awards Elisa Zazzera and Joe Koslowski

Parks and Trails has announced the 2010 New York Greenway and Community trail awards. The Volunteer Service Award goes to two members of the Friends of the Old Croton Aqueduct, Elisa Zazzera and Joe Koslowski, for engaging local community groups in the clean-up and promotion of the Old Croton Aqueduct in Yonkers.

**For inquiries about Old Croton Aqueduct State Historic Park or to report trail conditions, call Park Manager Steven Oakes at 914-693-5259; mailing address: 15 Walnut Street, Dobbs Ferry, NY 10522.**

### MEMBERSHIP COUPON

Your tax-deductible contribution helps to protect and preserve the trail.

- |   |   |
|---|---|
| <input type="checkbox"/> Renewal          | <input type="checkbox"/> New Member               |
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Please make check payable to Friends of the Old Croton Aqueduct. Send it with this coupon to the Friends at Keeper's House, 15 Walnut St., Dobbs Ferry, NY 10522-2109.

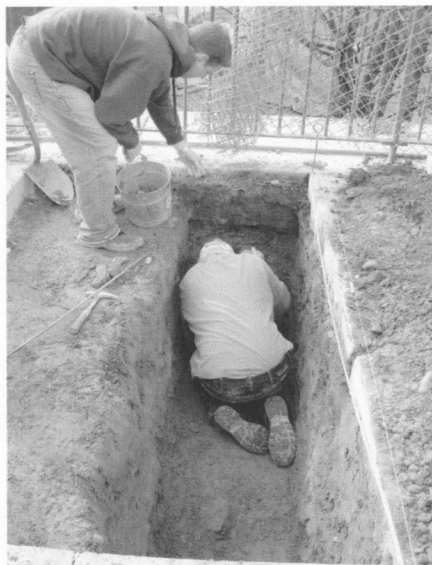
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*Please let us know if you would like to volunteer.*

State Parks  
archeologists  
Michael Roets  
(standing) and  
Joe McEvoy  
inspecting soils  
beneath the deck  
of the Ossining  
bridge. See page 5.  
(Photo by  
J. Horkans)



**Newsletter:** Ruth Gastel, *Editor*. News items, reminiscences, and comments welcome: 914-479-1414 or [ruthg@iii.org](mailto:ruthg@iii.org) or by mail c/o the Friends.

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**Friends of the Old Croton Aqueduct** is a private, non-profit, volunteer organization formed to protect and preserve the Old Croton Aqueduct. The Friends work to raise public awareness of the Aqueduct and trail, and to secure the resources that will enable this historic greenway to remain unspoiled in perpetuity. *Address:* Keeper's House, 15 Walnut St. Dobbs Ferry, NY 10522-2109; *telephone* 914-693-4117, [www.aqueduct.org](http://www.aqueduct.org)

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