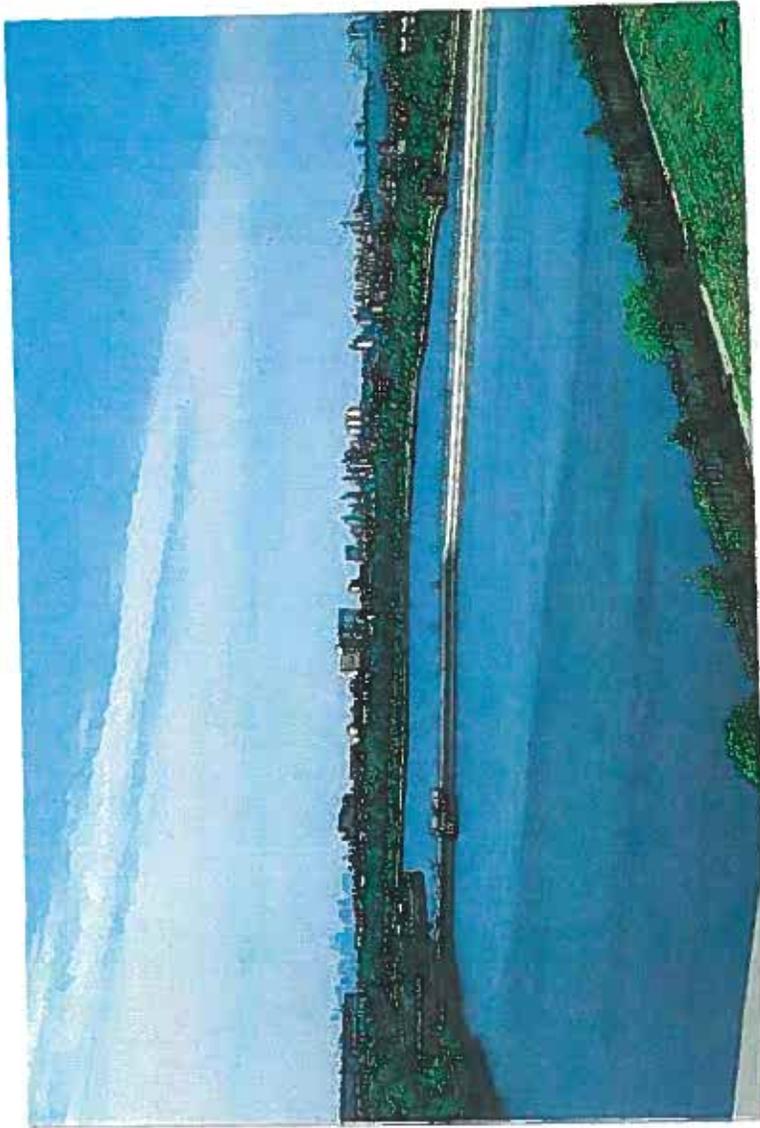
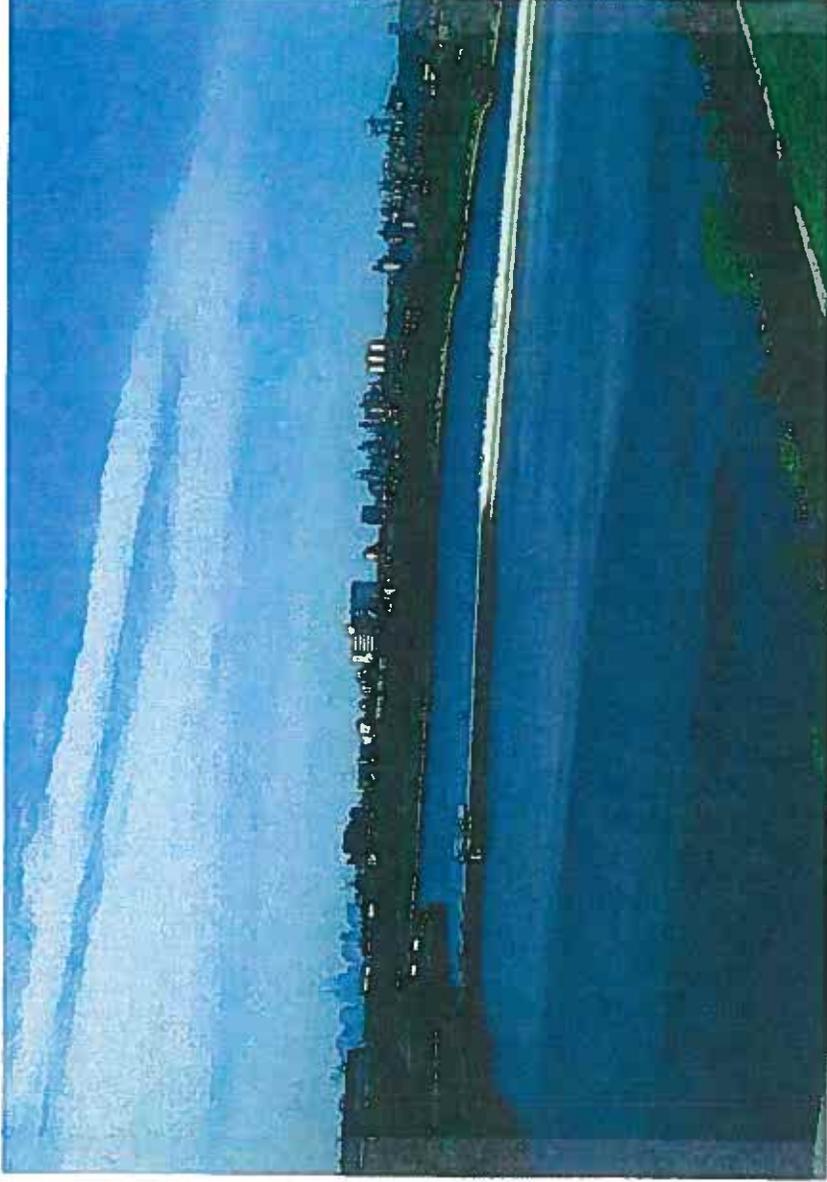


Attachment 6



DESIGN FOR A NEW URBAN PARK



AT JEROME PARK RESERVOIR
Bronx, New York

The Jerome Park Conservancy • Gail E. Wittwer, ASLA

DESIGN FOR A NEW URBAN PARK

Key elements of the design for the park are to *preserve* its historic essence, to *reveal* its potential as a public space, to *link* the places and events within the park to the surrounding community and to *frame* the beauty of the reservoir with a new layer of landscape and purpose.



Existing path at the water's edge along Reservoir Avenue



Proposed plaza at Gate House 6 at Reservoir and Goulden Avenues

Preserve

- open space
- scenic vistas
- historic brick and stone structures
- water supply infrastructure

Reveal

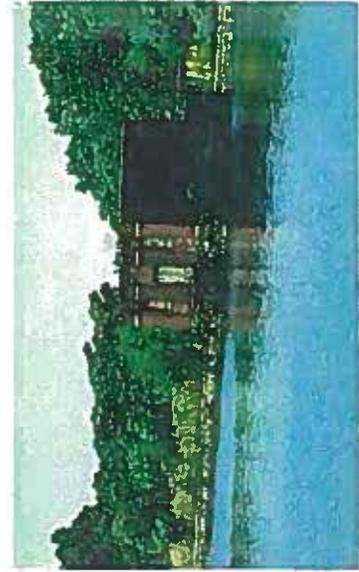
- its essential park like nature by removing all unpark like elements such as the outer chain link fence and temporary structures
- its historic character by exposing the architecture, topography, stonework and water

Link

- park paths, plazas and programs to:
- surrounding communities and adjoining schools
 - adjacent public parks and playing fields
 - New York City and Bronx Greenways
 - the landmarked Old Croton Aqueduct

Frame

- the site with new trees, paths and plazas
- the function of the reservoir with new programs and activities designed to encourage recreational and educational uses



Gate House 3 and stone reservoir basin walls above Sedgwick Avenue

Robert Korteck, Jr.

Carl Wilson

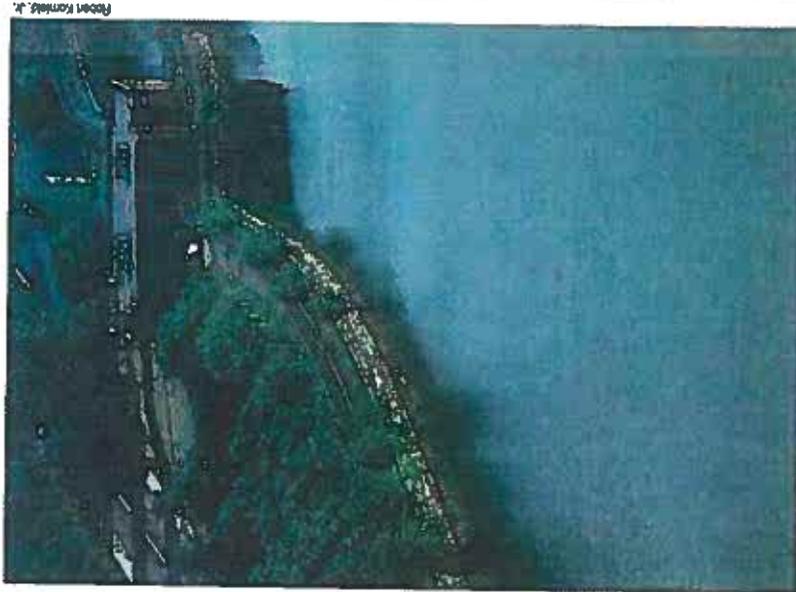
INTEGRATING PRESERVATION, EDUCATION AND RECREATION

The New York State Office of Parks, Recreation and Historic Preservation recently found the entire reservoir eligible for inclusion in the National Register of Historic Places. Most of the Croton system has already been landmarked, from the gatehouses at Croton Lake to the Central Park Reservoir.

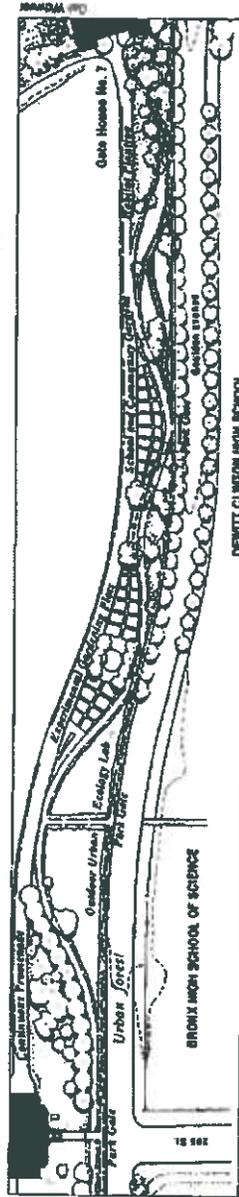
Jerome Park Reservoir is the missing link in this 30-mile long chain of recognized historic structures. Its stonework, gatehouses, infrastructure, and scenic vistas should be preserved.



Detail of an existing dry-stacked stone wall that holds the levee below Reservoir Avenue



Gate House 5 at Goulden Avenue and 205th Street showing stone masonry walls at the water's edge



Detail of park plan along Goulden Avenue showing the Outdoor Urban Ecology Lab which includes school and community gardens

Robert Komelz, Jr.

DAVID WICKHAM

ARCHITECTS

CHANGE IS COMING

Jerome Park Reservoir is one of two distribution reservoirs for the Croton water system. Until recently it shared this function with the Central Park Reservoir. Because state and federal governments have mandated that Croton water be filtered, the use of both these reservoirs has been changing. The Central Park Reservoir is being removed from the water supply system and it is possible that all or part of Jerome Park Reservoir will no longer be needed for supplying water.

The Jerome Park Conservancy is proposing to create a 125-acre park based on the following preliminary design guidelines:

Remove the outer fence and replace the one by the water with an attractive wrought-iron safety fence.

Create walking, jogging, skating and/or bicycling trails around the reservoir.

Develop the dividing wall as a promenade.

Plant ornamental trees and shrubs, ground-covers and grass. Provide park furnishings, such as benches, lights, and garbage cans.

Remove any features or structures that don't fit into this new park setting, such as the Lehman parking lot and building and the Department of Environmental Protection's temporary pilot water treatment plant. Develop plans for alternative parking.

Develop areas for community gardens, public gatherings and performance spaces.



Proposed waterside promenade below Reservoir Avenue showing jogging and cycling paths

Restore the historic features around Jerome Park Reservoir, including the stone walls, the gate houses, the Jerome Avenue Pumping Station and the geological mounds. Preserve and enhance the scenic vistas.

Develop new uses for the gate houses, such as a water-side cafe and an ecology center.

Develop a plan for using the reservoir as an educational resource for the 25,000 local students.

Promote the presence of birds and other wildlife.

Develop a maintenance and security plan which addresses the complementary needs of the DEP and the community.

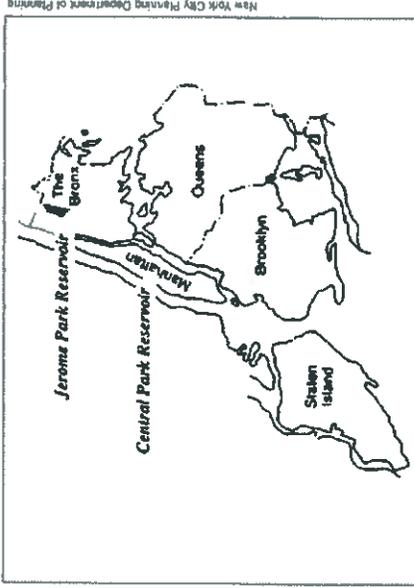
Integrate the reservoir with adjacent parks, the neighborhood and the network of New York City and Bronx Greenways.

Develop ecologically sound methods of avoiding water eutrophication.

The Jerome Park Conservancy has concluded that its plans for a park are fundamentally incompatible with a water treatment plant.

JEROME PARK RESERVOIR

New Yorkers love the Central Park Reservoir because it's beautiful, accessible and in the midst of a park. Half-hidden behind fences on a ridge in the northwest Bronx is New York's other reservoir - Jerome Park. It too is beautiful and the Jerome Park Conservancy has developed a plan to make it equally accessible. Once created, this new urban park would serve tens of thousands of people.



New York City Planning Department of Planning

New York City location map



View of the southern basin from Reservoir Avenue

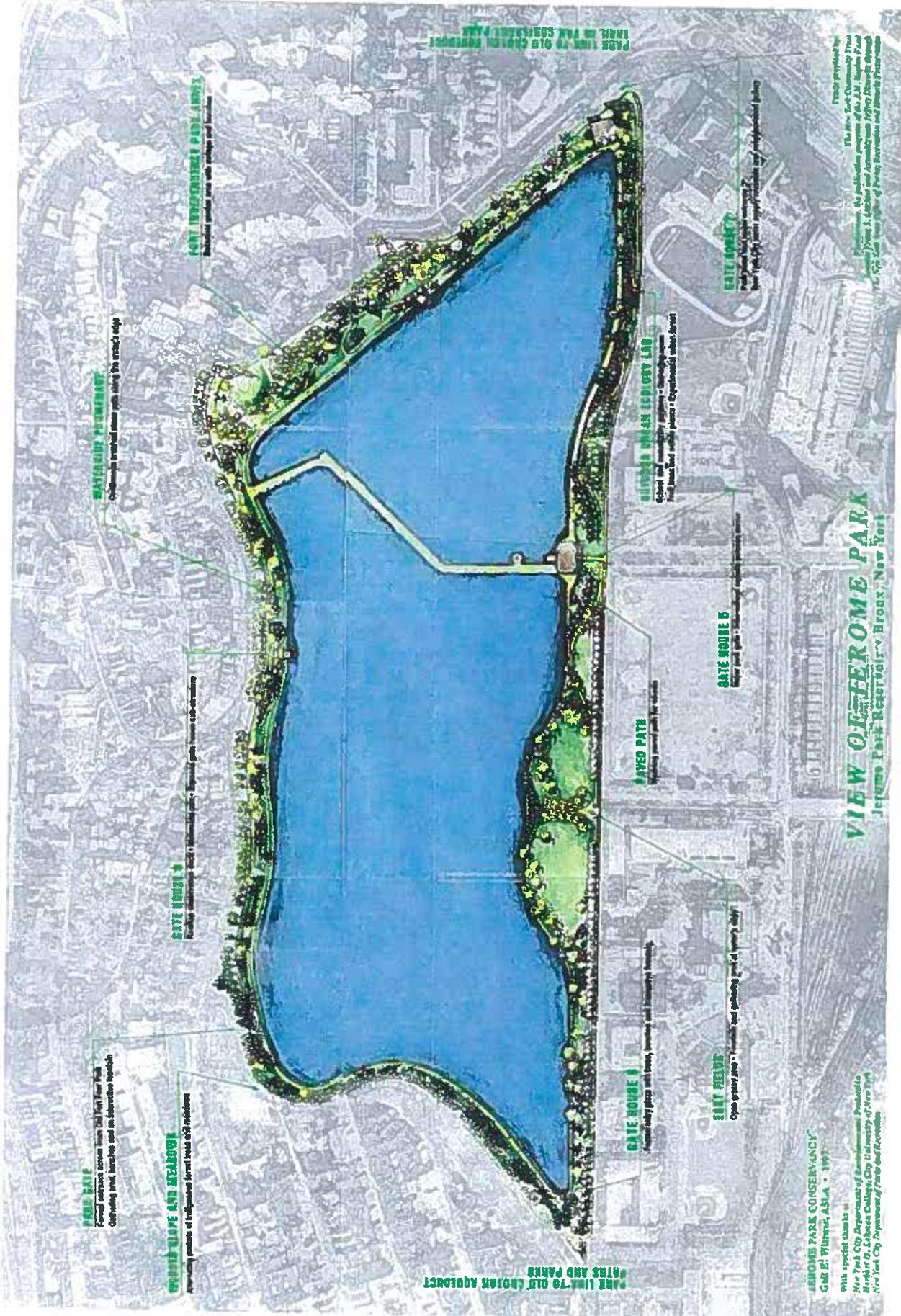
Construction of the Jerome Park Reservoir began one hundred years ago. The 94-acre body of water has a circumference of two miles and is bordered by a series of carefully crafted stone walls.

All reservoirs, except those small enough to be covered, have, in addition to their essential quality of storing water, an element of landscape effect; namely, that of an expanse of clear sparkling water. This same element forms the chief feature of many landscapes in public parks, where it is created at a large cost, and it is clearly a thing of great value to the public when it can be made available. In itself, regardless of its outline or setting, a body of water is beautiful and refreshing, and its value to the public is so well recognized that provision is very often made for giving public access to the enclosure about a reservoir, whence its surface may be seen.

On the Relation of Reservoirs to Parks, 1899
Frederic Law Olmsted, Jr.



View through the fences from Reservoir Avenue



PARK GATE
 Formal entrance across from 125th Street Park
 Featuring art, benches and an interactive fountain

WOODSLOPE AND HEADROCK
 Attracting points of indigenous forest birds and residents

GATE HOUSE A
 Family gathering deck, playground, seasonal gate house and structure

WATERLOO PLAZA
 Children's outdoor play area along the water's edge

PARTICIPANT PARK JONES
 Interactive garden with water play and fountain

PARK LIGHT TO OLD CLOVER ROAD

GATE HOUSE I
 Home daily place and food, beverage and temporary structure

SOFT FIELD
 Open grassy area for family and gathering with a water's edge

PAVED PATH
 Multiple paved paths for exercise

GATE HOUSE B
 Water play area featuring water fountain

WATERLOO PLAZA
 Children's outdoor play area along the water's edge

GATE HOUSE C
 Home daily place and food, beverage and temporary structure

HEROME PARK CONSERVANCY
 GAB E. WILSON, A.S.I.A. • 1997

With special thanks to:
 New York City Department of Environmental Protection
 Mayor M. Lohman, Chicago City University of New York
 New York City Department of Parks and Recreation

VIEW OF HEROME PARK
 Jerome Park Reservoir • Bronx, New York

Project provided by:
 The New York Community Trust
 The participation program of the J.J. Hughes Fund
 Project 2, Lohman and Administration of the District, Bronx
 The City University of New York
 The City University of New York

PARK LIGHT TO OLD CLOVER ROAD

Jerome Park Conservancy Reports

NO. 2

FALL 2001

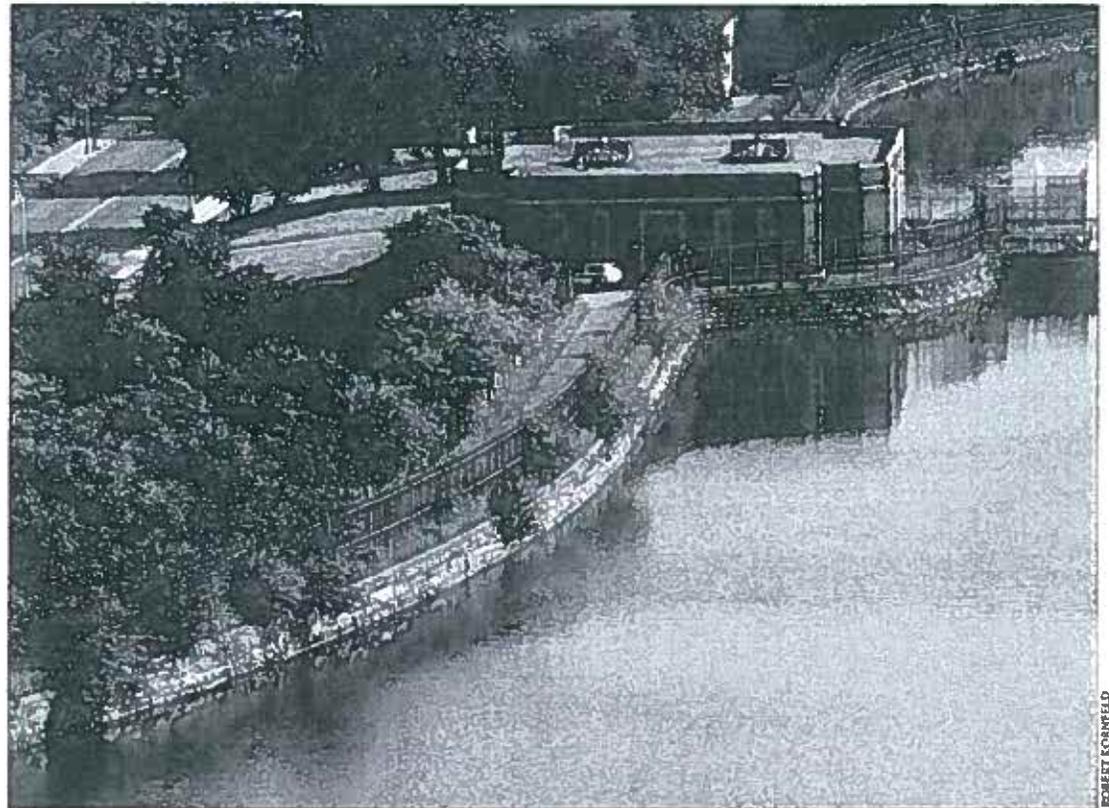
Celebrate on September 22nd

The Jerome Park Conservancy will hold an event at Fort Independence Park (entrances on Sedgwick Avenue at Giles Place and Hillman Avenue) on Saturday, September 22 at 11 a.m. State Parks Commissioner Bernadette Castro will be the guest of honor. A model of a bronze plaque, which commemorates the reservoir's history, will be unveiled.



Commissioner Castro

Ms. Castro was named head of the New York State Office of Parks, Recreation and Historic Preservation in 1994, a year after selling the family's furniture business. She now runs an agency with 1,600 employees maintaining 161 state parks, 36 historic sites, and 17 heritage areas, attracting 65 million visitors annually. ♦



A partial view of the 30-foot high, two-mile long stone wall that encircles Jerome Park Reservoir. The Old Croton Aqueduct, a national historic landmark, runs through it.

Jerome Park Honored by State and Nation

Jerome Park won listing on the State and National Registers of Historic Places last year. On September 22nd, the Jerome Park Conservancy will celebrate this honor and thank New York State Parks Commissioner Bernadette Castro for her leadership in obtaining this recognition.

The newly honored district includes the reservoir and all of its structures, Harris Park (west of Goulden), the Lehman College parking lot, Fort Four Park, and Fort Independence Park.

The reservoir was built between 1895 and 1906 by Italian stonemasons. It was the culmination of the magnificent Croton waterworks, which has been called the eighth wonder of the world. The Croton water supply system includes more than a dozen dams in Westchester and Putnam Counties, two 40-mile long brick aqueducts, and two distributing reservoirs—one in Jerome Park and the other in Central Park. The Croton system is probably the largest

masonry structure ever built by man.

The Jerome Park Reservoir played a critical role in the development of the Bronx and New York City. The streets surrounding it were designed by Frederick Law Olmsted, who also designed Central and Prospect Parks. The Old Croton Aqueduct, which is a National Historic Landmark, runs through two of the gatehouses and along its entire eastern edge.

Outstanding among those who helped us gain this recognition is Robert Kornfeld, Jr., chair of the Conservancy's Preservation Committee, who spent years researching the reservoir's history, our local community boards, elected officials, and city-wide preservation organizations. But without the work of Commissioner Bernadette Castro and her staff, Jerome Park would not have achieved this honor.

The Conservancy will soon begin educating the community, schools, and city officials about the significance of Jerome Park, laying the foundation for its full preservation and restoration. ♦

GreenStreets Opens 'Croton Aqueduct Triangle'

A concrete island in the street at the southern tip of the Jerome Park Reservoir has been transformed. Officially named the "Croton Aqueduct Triangle," it's now part of the GreenStreets Program of the New York City Department of Parks. A ribbon-cutting ceremony with Parks Commissioner Henry Stern was held on May 8.

The Jerome Park Conservancy officially requested the new GreenStreet site in 1999. Among those instrumental in its creation were Commissioner Henry Stern, Bronx Parks Commissioner Bill Castro, City Council member Adolfo Carrion, and GreenStreets Program Director Gail Wittwer-Laird, who designed the site as well as the Conservancy's 1994 plan for Jerome Park. The "Croton Aqueduct Triangle" has been adopted by Mark Stern, an active member of the Conservancy's Education Committee and a science teacher at Walton High School. Students from Walton High School and the Kingsbridge Heights Neighborhood Improvement Association will provide for its maintenance.

The new GreenStreet is located directly above the Old Croton Aqueduct where it emerges from the reservoir at Goulden Avenue, across from Lehman College and Walton High School. The site includes a brick cross-section of the Aqueduct, filled with blue flowers. Other plantings include river birches, inkberry bushes, Virginia sweet spire, and a ring of ginkgo trees. Conservancy Board member Karen Argenti suggested naming the site.

The beautification project received some press. Photos of the ceremony appeared in Bronx papers and in the Friends of the Old Croton Aqueduct newsletter. Walton teachers Mark Stern and Judith Rock appeared on the cable TV program Bronx Talk (Channel 67, Lehman College) with horticulture student Luz Vasquez. They talked about the GreenStreet site and the unique history of the Old Croton Aqueduct.

Another group of students, from John F. Kennedy High School, got into the neighborhood beautification spirit on Earth Day 2001. They cleaned a portion of the edge of the reservoir and planted flowers near Fort Independence Park. ♦



At the GreenStreets ribbon-cutting ceremony: (l-r) Dart Westphal of the Jerome Park Conservancy, Conservancy Chairman Ricardo R. Fernández, NYC Parks Commissioner Henry Stern, Walton High School teacher Mark Stern, designer and GreenStreets Director Gail Wittwer-Laird, Conservancy secretary Karen Argenti, and Bronx Parks Commissioner William Castro.

A Brief History of the Old Croton Aqueduct

New York City had contaminated its fresh water streams and wells by the mid-1830s when it decided to dam the Croton River in Westchester County and build a brick aqueduct from Yorktown to a reservoir at Fifth Avenue and 42nd Street in Manhattan. In the Bronx, the aqueduct passes through what is now Van Cortlandt Park, along the eastern edge of Jerome Park Reservoir, under the Croton Aqueduct GreenStreet, and down Aqueduct Avenue, before crossing into Manhattan over the High Bridge.

The City celebrated completion of the project in 1842 when Croton water started flowing. Because the population was expanding so rapidly, the City almost immediately needed more water and started building more dams and the New Croton Aqueduct. The Old and New Croton Aqueducts intersect at Jerome Park Reservoir, which opened in 1906 as a reservoir park. The Old Croton Aqueduct is a National Historic Landmark. ♦

DEP Cleanup Around Reservoir

Thanks to efforts by the Membership Committee of the Jerome Park Conservancy, Community Boards 7 and 8, City Councilwoman June Eisland, and Bronx Borough President Fernando Ferrer, the New York City Department of Environmental Protection has let a contract for a weekly cleanup around the perimeter of the Jerome Park Reservoir. The Conservancy appreciates the assistance and encourages the DEP to make sure the cleanups are taking place every week.

Kudos to Common Cents Kids

Neighborhood school children have been raising money for the Jerome Park Conservancy through Common Cents, a national organization that encourages philanthropy in children. Students at PS/MS 95 raised \$550 and students at PS 340 raised \$250. (For more information, visit www.commoncents.org.)

The Jerome Park Conservancy Preservation Report and the National Register nomination are available at www.lehman.cuny.edu/preservationreport

Jerome Park Conservancy Members and Contributors

Many thanks to the people who joined the Conservancy, and to those who contributed to our cleanup fund:

Ruth K. Abrahams	Charlotte & Stanley Fahn	Rose & Bill Kerr	Marjory & Joseph Piscitello
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Margaret Drago	Abraham & Evelyn Katz	Anne Perryman	Dart Westphal
Friends of June Eisland	Martin & Renee Katz	Fred & Jane Phelps	Deborah Wolfe
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			Ed Yaker

J E R O M E P A R K C O N S E R V A N C Y M E M B E R S H I P F O R M



PLEASE BE AS GENEROUS AS YOU CAN BE. *Your contribution is tax deductible.*

MEMBERSHIP DUES: _____ \$10 minimum per household _____ \$25 minimum per small business or association

ADDITIONAL CONTRIBUTION \$ _____

I/we would like to join the Jerome Park Conservancy. My check for \$_____ is enclosed.

Name _____

Address _____

City _____ **State** _____ **Zip** _____

Phone _____ **E-mail** _____

Please complete the membership form and return it with your check to:

Jerome Park Conservancy
3965 Sedgwick Avenue, #1C
Bronx, NY 10463
Phone/Fax 718-884-7864

OUR PURPOSE

The Jerome Park Conservancy was formed to preserve the beauty and heritage of Jerome Park Reservoir and its surrounding communities by the creation of a 125-acre park comprised of the water and the land around it.

The Conservancy advocates the designation of the Jerome Park Reservoir as a scenic and historic landmark and the use of the reservoir as an educational resource for the more than 25,000 students who attend schools by the water's edge.

*Jerome Park
Conservancy Reports
Editor: Anne Petryman*

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 Bronx, New York 10468

Public Access at the Jerome Park Reservoir

Anne Marie Garti, President

Jerome Park Conservancy

Croton Filtration Monitoring Committee Meeting

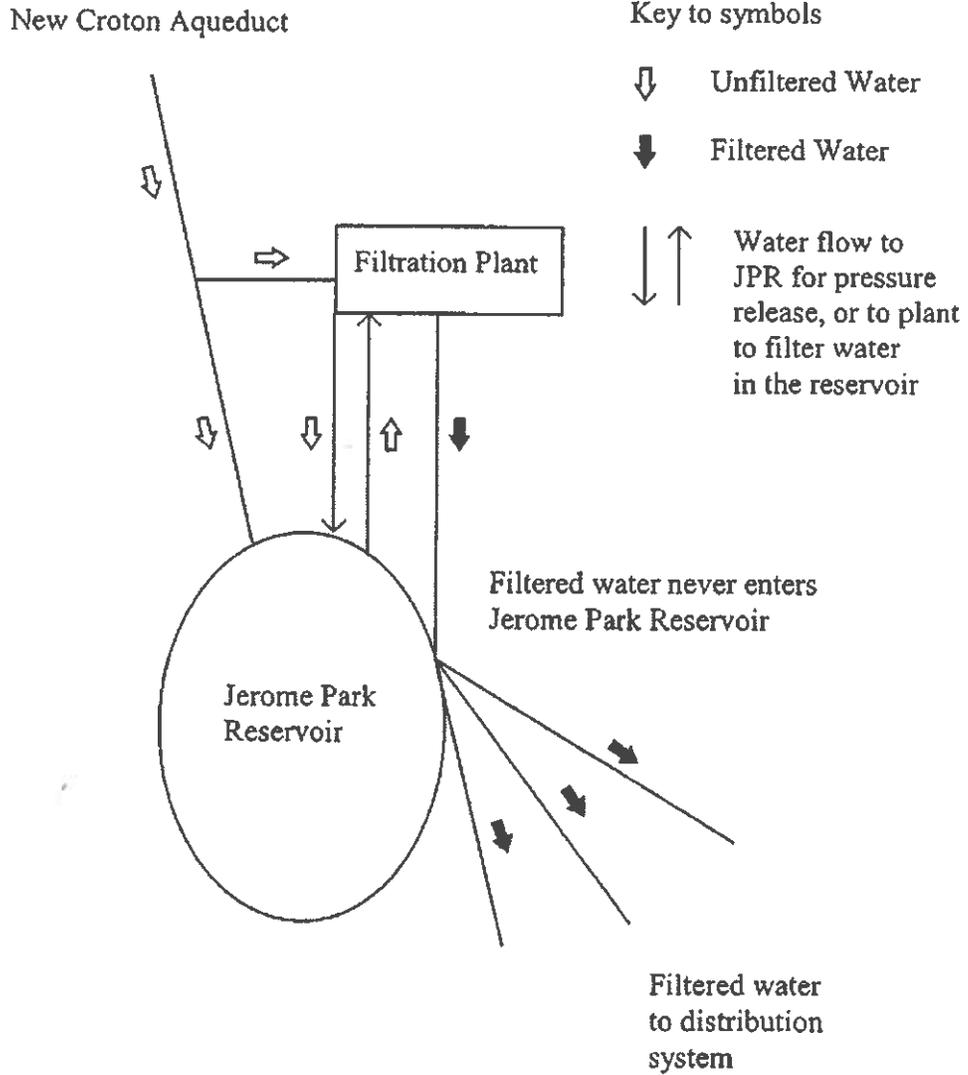
June 19, 2008

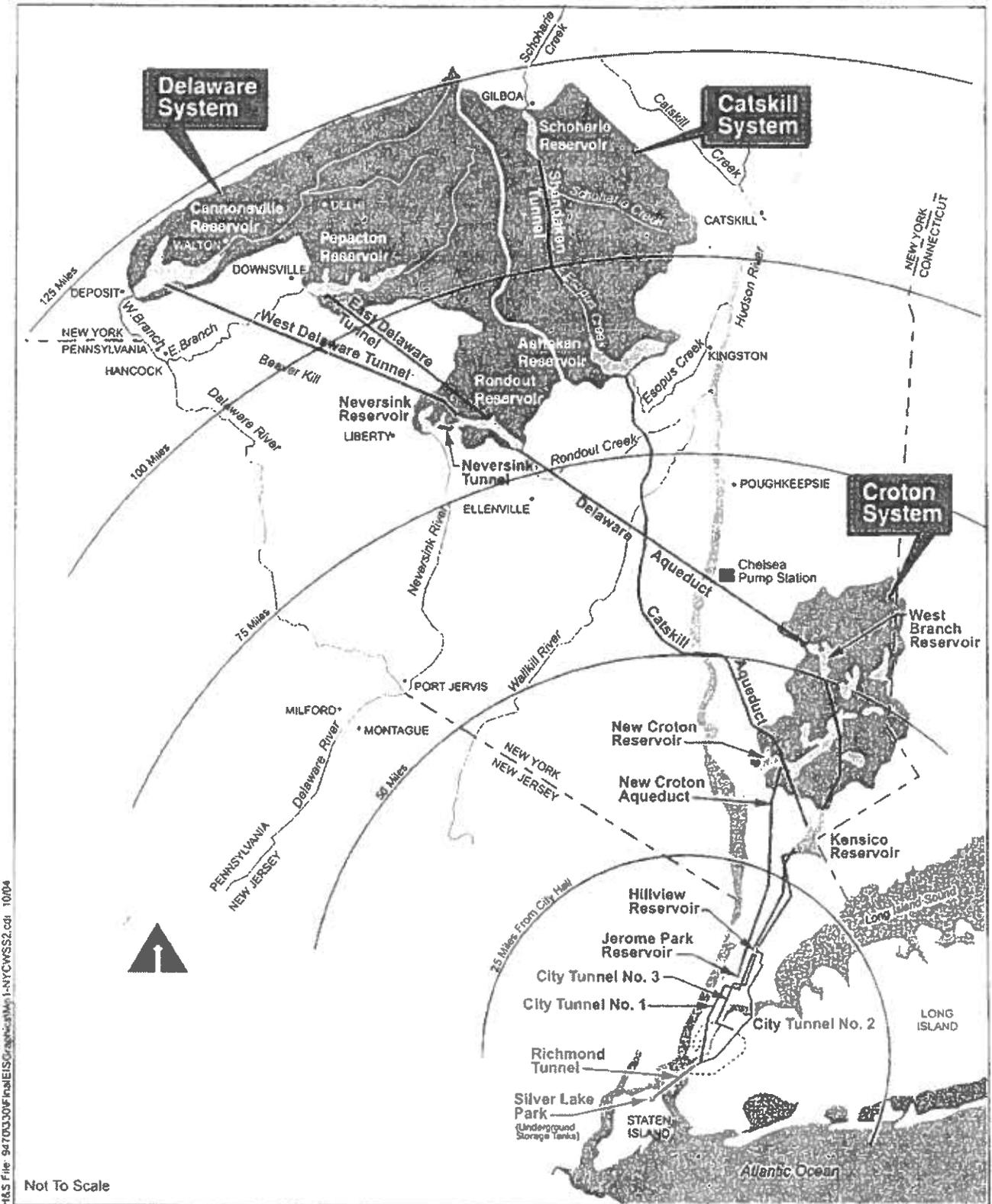
- I. History of Jerome Park Reservoir
 - A. Designed as a reservoir park in the late 19th century
Surrounding streets were designed by Frederick Law Olmsted
Original design for reservoir may have also been by Olmsted
 - B. Integrated with community until WWII
 - C. Aesthetics: water, hand crafted stone walls, and elegant wrought iron fences
 - D. 125-acres of reservoir and surrounding land listed on the State and National Registers of Historic Places in 2000
 - E. Would cost billions of dollars to build now

- II. Jerome Park Conservancy
 - A. Formed in 1994
 - B. Mission - to preserve and enhance the Jerome Park Reservoir
 - C. Raised over \$100,000 to create consensus on park plan
 - D. Unifying design guideline is the waterside path
 - E. Prior DEP Commissioners were committed to public access

- III. Operational and Security Issues and Solutions
 - A. Use of reservoir is changing
Only unfiltered (raw) water will be stored at Jerome Park.
It will mainly be used as a back-up supply and to relieve water pressure.
 - B. If the water stored in the Jerome Park Reservoir is used at all, it will have to go through the filtration plant first. This will take many hours, not minutes.
The DEP allows people to walk and fish at the Kensico Reservoir, which is closer to people's faucets than Jerome Park.
 - C. To ensure security with public access:
 - * Keep the outer security fence with guard(s)
 - * Require DEP permits and photo ID
 - * Check bags
 - * Test for poisons at the filtration plant
 - D. For operational concerns:
 - * No hazardous chemicals will be used or stored at the reservoir, so the DEP should be able to perform any required operations with public access.
 - * For over 100 years the DEP maintained the Central Park Reservoir while 1000s of people ran around it every day.
 - * Temporarily deny public access if major repairs are needed.

Flow of Water to Jerome Park Reservoir With the Croton Water Treatment Plant





H&S File: 94703306\Final\GIS\Graphics\Map1-NYCWSS2.cdr 10/04

Not To Scale

Catskill/Delaware UV Facility

New York City Water Supply System

Figure 1-1



NEW YORK STATE
OFFICE OF PARKS, RECREATION
AND HISTORIC PRESERVATION

This is to certify that

*Jerome Park Reservoir
Bronx, Bronx County, New York*

*in recognition of its significance in American history
and culture was listed on the*

STATE REGISTER OF HISTORIC PLACES

on

July 11, 2000

under provisions of the

State Historic Preservation Act of 1980

and on the

NATIONAL REGISTER OF HISTORIC PLACES

on

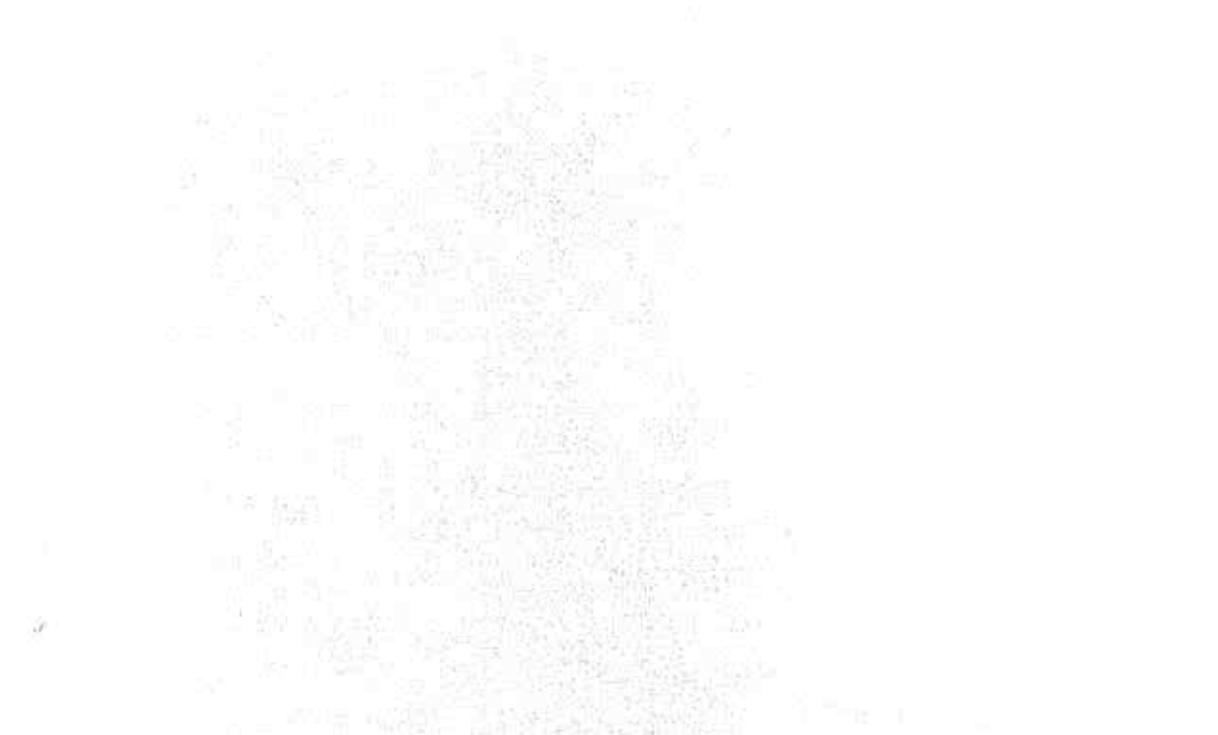
September 7, 2000

under the provisions of the

National Historic Preservation Act of 1966

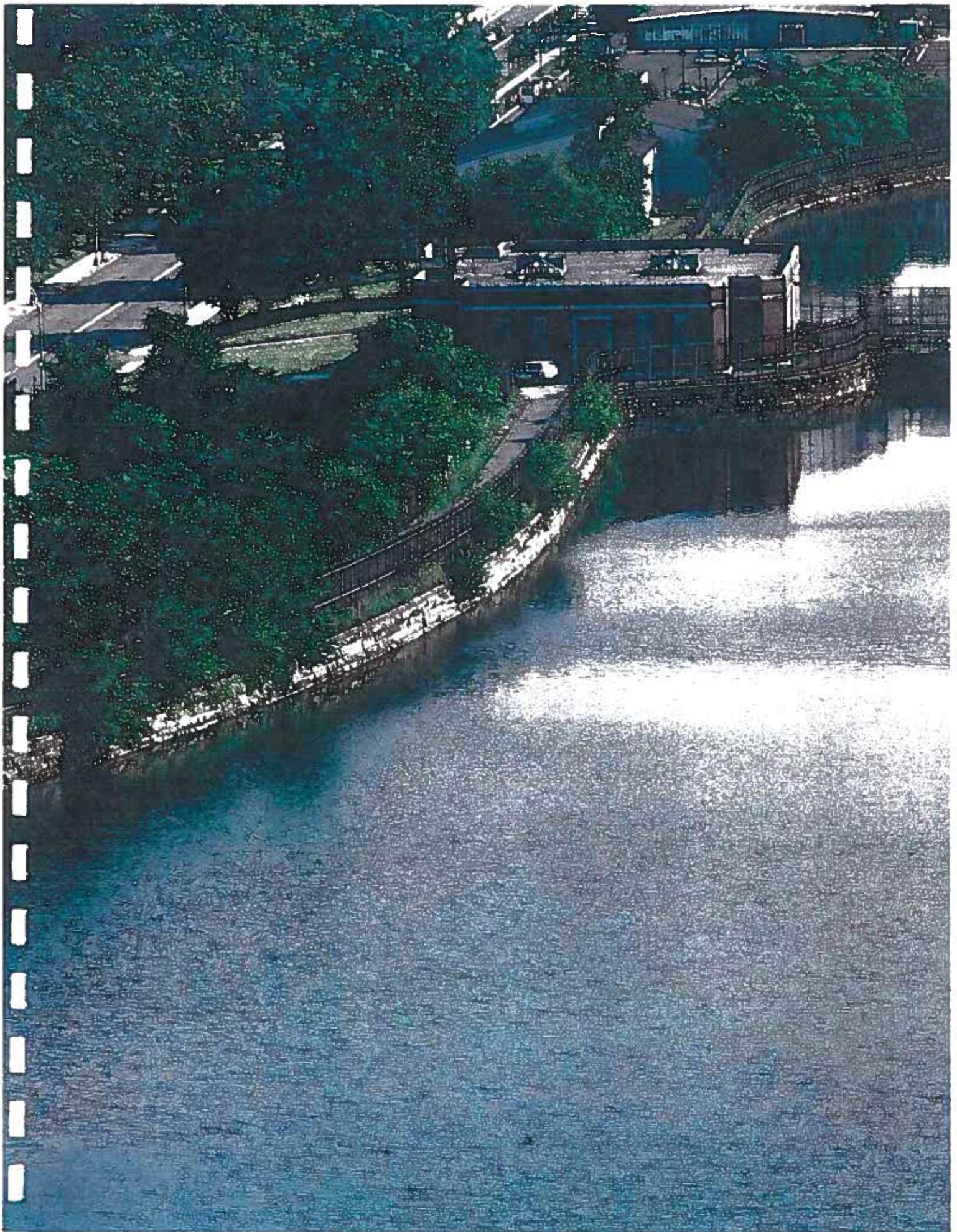
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10/11/00



JEROME PARK CONSERVANCY
PRESERVATION REPORT

HISTORY AND EVALUATION OF THE
JEROME PARK RESERVOIR



JEROME PARK CONSERVANCY PRESERVATION REPORT

HISTORY AND EVALUATION OF THE JEROME PARK RESERVOIR

Prepared for:

Board of Directors
Jerome Park Conservancy
Ricardo Fernandez, Chairman
Anne Marie Garti, President

Prepared by:

Robert J. Kornfeld, Jr. AIA
Chairman, Preservation Committee

DRAFT REPORT - AUGUST, 1998

ABOUT THE AUTHOR

Robert J. Kornfeld, Jr. AIA, an architect, is a Senior Project Director with LZA Technology. In addition to serving as Chairman of the Preservation Committee of the Jerome Park Conservancy, he is a member of the AIA Historic Buildings Committee, the National Trust for Historic Preservation, and the Friends of the Old Croton Aqueduct. He is Acting Chairman of the Bronx Landmarks Task Force, Office of the Bronx Borough President. Mr. Kornfeld is a resident of Hastings-on-Hudson, New York.

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Thanks to Daniel J. Donovan of Bronx Borough President Fernando Ferrer's Office for reawakening interest in Frederick Law Olmsted's design of the Bronx, and for his assistance in comparing it with the as-built condition.

Thanks also to Department of Environmental Protection Commissioner Joel Miele for his cooperation, and to Douglas Greeley, Eric Axelson, Joe Hadden, Joe McGuire and Rocco Mastronardi for their assistance in accessing the reservoir.

An immense debt of gratitude is owed to Charles E. Beveridge, Editor of the Frederick Law Olmsted Papers, for his seminal research on Olmsted's design of the Bronx, and his discovery of the drawings fourteen years ago.

PREFACE

This draft report is intended to raise awareness of the beauty, significance and history of the Jerome Park Reservoir, and to support the Jerome Park Conservancy's call for the reservoir to be landmarked and preserved. While the reservoir is well known and has received much publicity in recent years, its history is relatively obscure. A considerable amount of primary research was necessary. Documentation included a survey of the basin, when the reservoir was drained for maintenance, in order to photograph the magnificent stone structures that are normally submerged, and whose images have never been published. While much additional research remains to be performed, I believe that this report provides a new perspective on the history of the Croton system and its relation to the development of New York City.

When I was selected to be the Chairman of the Preservation Committee of the Jerome Park Conservancy, I was generally familiar with the Croton Aqueduct System, but knew little about the Jerome Park Reservoir. I thought of the reservoir as somewhat historic, not terribly significant, and not that old -- probably a common view. What sparked my interest was a bus tour, on a rainy day in 1995, led by Gail Wittwer and Anne Marie Garti. The world that I saw from the bus window looked like a forgotten Frederick Law Olmsted landscape, and I vowed to myself that I would discover what I was looking at, why it was there, and who designed it.

What I subsequently learned, in my search for the history of the Jerome Park Reservoir, was nothing short of a revelation about the reservoir, the Croton Waterworks, and the history of New York City itself. The historic and architectural significance of the Jerome Park Reservoir has been grossly underestimated, and its prominence in the history of the Croton Aqueduct system has not been acknowledged. Originally planned in 1875, and designed and constructed over the following thirty years, it was one of the major works of the Croton Aqueduct system, located at the confluence of the Old and New Croton Aqueducts. It is the largest and most significant body of water in the Borough of the Bronx.

There was a longstanding reluctance on the part of the city to build the Jerome Park Reservoir, and a residual hostility whose vestiges are still reflected in the proposal for converting the reservoir into an industrial water treatment plant. Remarkably, this hostility appears to have had its roots in the friction between the engineers of the Croton Aqueduct Department and the Tweed Ring that took it over in 1870. In fact, the Aqueduct Commissioners, who designed the reservoir, were formed in the 1880's largely to take control of the design and construction of the New Croton Aqueduct away from the corrupt Department of Public Works.

I also learned that Frederick Law Olmsted designed a comprehensive city plan for the west Bronx, that most of the streets surrounding the Jerome Park Reservoir were constructed exactly as designed by Olmsted, and that he may well have had a role in the design of the reservoir itself. Olmsted fought with corrupt city officials who he felt were undermining his plan for the annexed territory that was to become the Bronx. He was dismissed in 1878.

The title for a local history might be *The Bronx at 100: a Century of Broken Dreams*. The

west Bronx, with the finest natural landscape in the city, and a street plan and park system founded by Olmsted, remains beautiful despite its legacy of misrule and misuse. An alternate title might be *Olmsted's Bronx: Forgotten but not Gone*.

The plan to convert Jerome Park Reservoir into a water treatment plant is a direct product of the mid-twentieth century planning mentality that led to the Cross Bronx Expressway and other destructive mega-projects. In the mid-1980's, the low point of Bronx history, the Department of Environmental Protection began construction of a new dividing wall for the now-defunct filtration plant scheme in the north basin. Part of this project was the needless demolition of an 1890's-vintage arched stone bridge in the reservoir. Plans also called for demolishing all of the stone gate houses and portions of the Old Croton Aqueduct, a National Historic Landmark. It is ironic in an era when we are witnessing a masterful restoration of Grand Central Station and the rebirth of Central Park, that attitudes towards Jerome Park remain in the mind-set that led to the destruction of Penn Station.

The historical, architectural and cultural significance of the Jerome Park Reservoir and the surrounding parks and communities is indisputable. No form of mitigation could offset the devastating impact of the proposed water treatment plant on the historic resources of the reservoir and the surrounding community. In this centennial of the city's consolidation, New Yorkers should finally recognize this neglected masterpiece: designate the Jerome Park Reservoir a landmark, and drop it from consideration as the site for a water treatment plant. I hope that future generations will be able to enjoy the Jerome Park Reservoir along with the High Bridge and the New Croton Dam, the other great landmarks of the Croton Waterworks system along Old Croton Aqueduct Trailway.

Robert J. Kornfeld, Jr. AIA
Chairman, Preservation Committee
Jerome Park Conservancy

EXECUTIVE SUMMARY

This report from the Preservation Committee of the Jerome Park Conservancy describes the role of the Jerome Park Reservoir in the Croton water supply and its place in the history of New York City. The City's expanding need for water and the endless controversies over how to supply it are covered in the report, as is the dedication of the men who designed the Croton system.

The Old Croton Aqueduct was built between 1837 and 1842. It was a unique stone and brick structure that stretched 40 miles, from a dam on the Croton River to a reservoir on 42nd Street. But within a few years of its completion, it could not adequately supply water to the exploding population of the City.

The City's campaign to increase the water supply included the construction of the Central Park Reservoir, the High Bridge Tower and Reservoir, and many storage reservoirs and dams in Westchester and Putnam Counties. It was called the Croton Waterworks Extension.

In 1874 New York City annexed a large portion of southern Westchester, from the Bronx River west to the Hudson. (It became part of the Borough of the Bronx in 1898.) The NYC Department of Public Parks selected Frederick Law Olmsted, landscape architect, and J.J.R. Croes, civil and topographical engineer, to prepare a comprehensive design for the new area. Their plan, completed in 1878, was adopted by the city and was largely constructed as designed.

In 1875, in response to the renewed threat of water shortages, plus the need for a water supply system for the new district, the Croton Waterworks Extension was expanded to include plans for an additional aqueduct and a new distributing reservoir: the New Croton Aqueduct and Jerome Park Reservoir. They were to be interconnected with the Old Croton Aqueduct in the newly acquired territory, for which Olmsted was developing a master plan.

In 1895 Italian immigrant stonemasons began building the Jerome Park Reservoir. They positioned the two aqueducts within the thirty-foot thick stone retaining wall that runs down the eastern edge of the reservoir, and constructed a number of thirty-foot-high stone gatehouses that are reminiscent of ancient Roman structures. Their work was completed in 1906.

In its original design, Jerome Park Reservoir was to be over twice as large as it is today and was to include two islands and a peninsula. It was to serve as a final settling-basin for Croton water, and, according to the Chief Engineer, "will add greatly to the attractiveness of the surrounding grounds." There is even reason to believe that Olmsted had a hand in Jerome Park's design.

However, the reservoir's construction was beset by friction between the Aqueduct Commissioners and the Bureau of Water Supply, Gas and Electricity. While the Commissioners were gearing up to complete Jerome Park Reservoir as the final masterpiece of

the Croton system, the Bureau, in 1907, requested permission to install slow sand filters in the east basin. In the end, plans for the east basin, the sand filters, and the magnificent gatehouse superstructures were set aside.

When the Jerome Park Reservoir opened, it was a reservoir-park and, to complete the overall landscaping, city parks were established around it. Old Fort Four Park and Fort Independence Park were created on the sites of Revolutionary War forts and have retained their picturesque natural topography and spectacular views across the water. Harris Park and Harris Park Annex provided a green border for the eastern edge of the water.

Jerome Park Reservoir was designed and built amidst controversy and is the focus of a bitter one today. The Department of Environmental Protection (DEP), like the Bureau of Water Supply, Gas and Electricity that preceded it, is proposing to build a filtration plant in the reservoir. However, unlike the natural sand filters that were under consideration earlier in this century, the current filtration plant would be filled with gigantic machines and hazardous chemicals.

The surrounding community unanimously opposes the DEP's plan. And the Conservancy not only joins in this opposition but also advocates the designation of Jerome Park Reservoir, with all of its architectural and landscape features, as a New York City Landmark. The reservoir should also be listed on the State and National Register of Historic Places. The entire Croton system has been deemed eligible for landmarking, and Jerome Park Reservoir is the only major element of the system, within the City's boundaries, that has not yet been designated a city landmark.

The Jerome Park Reservoir is a century-old component of the Croton Aqueduct system, one of America's oldest and greatest engineering masterpieces. The reservoir is remarkable for its stone structures, its Olmsted-inspired landscaping, its place in the history of the Croton System, and its role in the development of the Bronx. It should not be desecrated by a filtration plant, but preserved as an historic treasure.

Anne Marie Garti
President
Jerome Park Conservancy

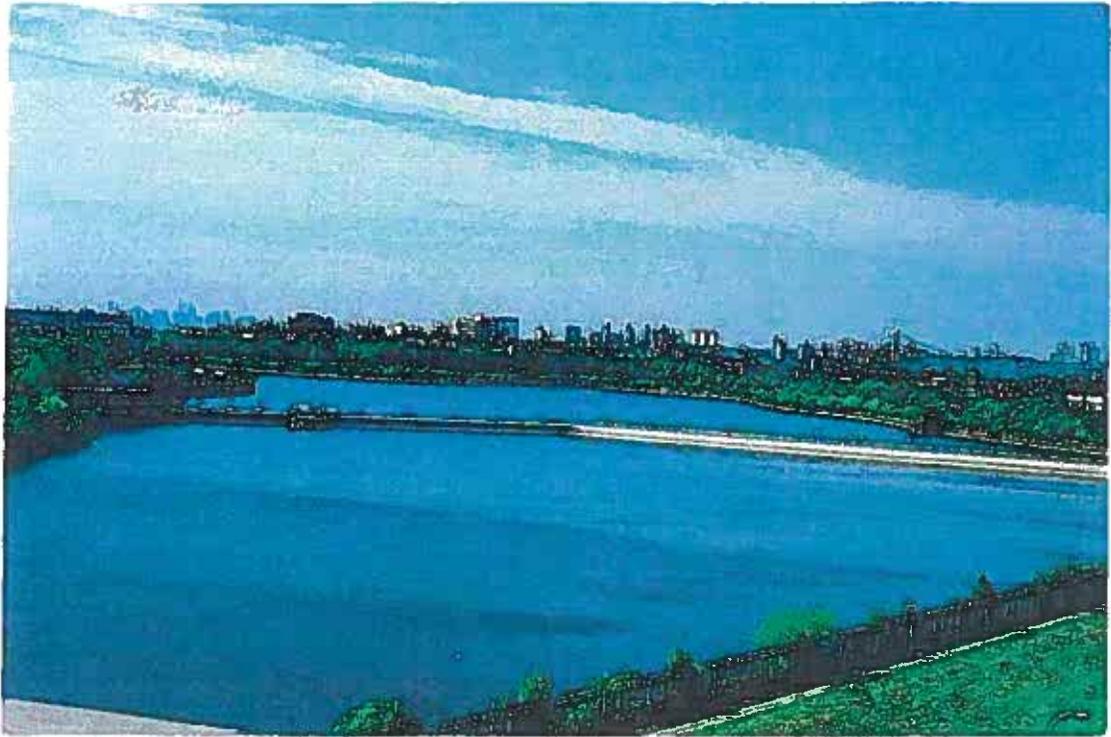


Illustration 1: Jerome Park Reservoir viewed from a neighboring apartment building. (Photo by Sandra Sider)

Illustration 2: Pipe Vault Portal, an arched stone structure at the northwest corner of the Jerome Park Reservoir, leads to a passage through the reservoir embankment to Gate House No. 2.



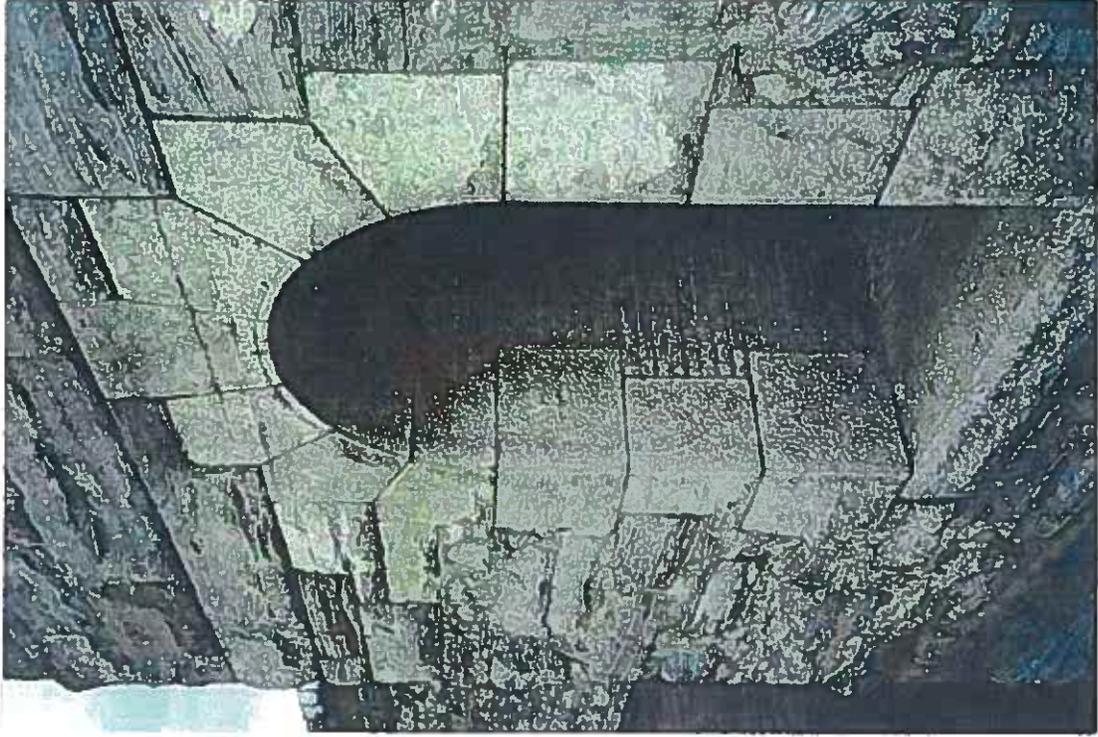


Illustration 4: Gate House No. 2, Jerome Park Reservoir, inlet with voussoir arch .

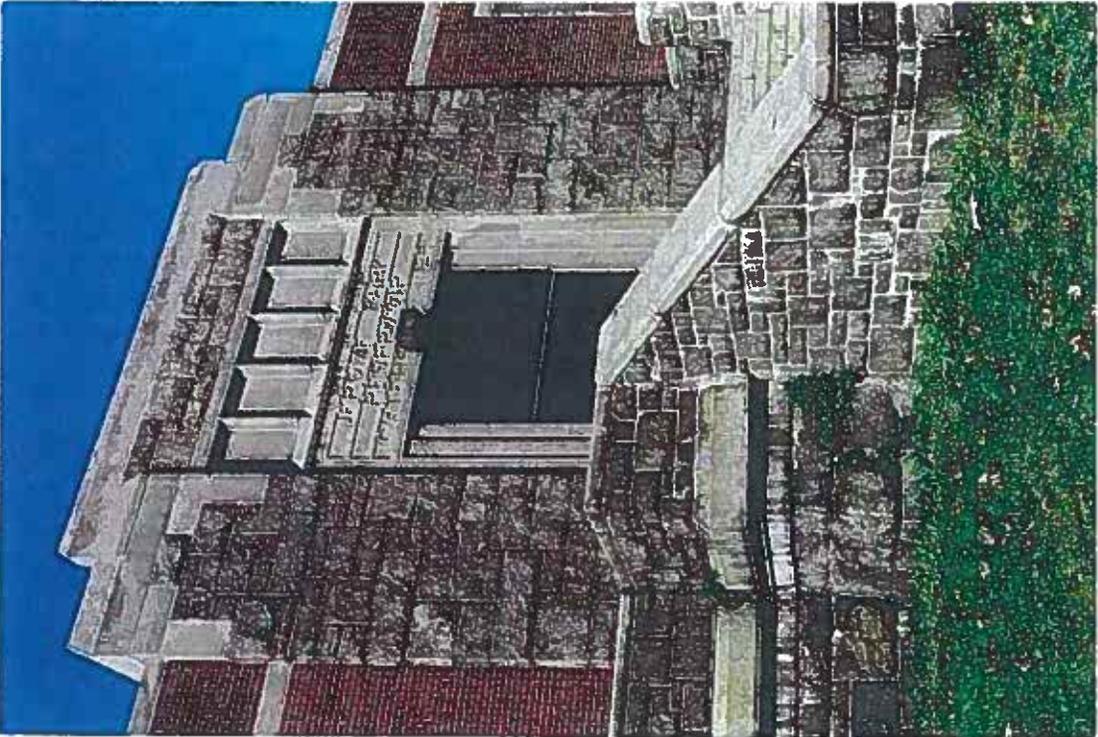


Illustration 3: Gate House No. 5, Jerome Park Reservoir, main entry portal.

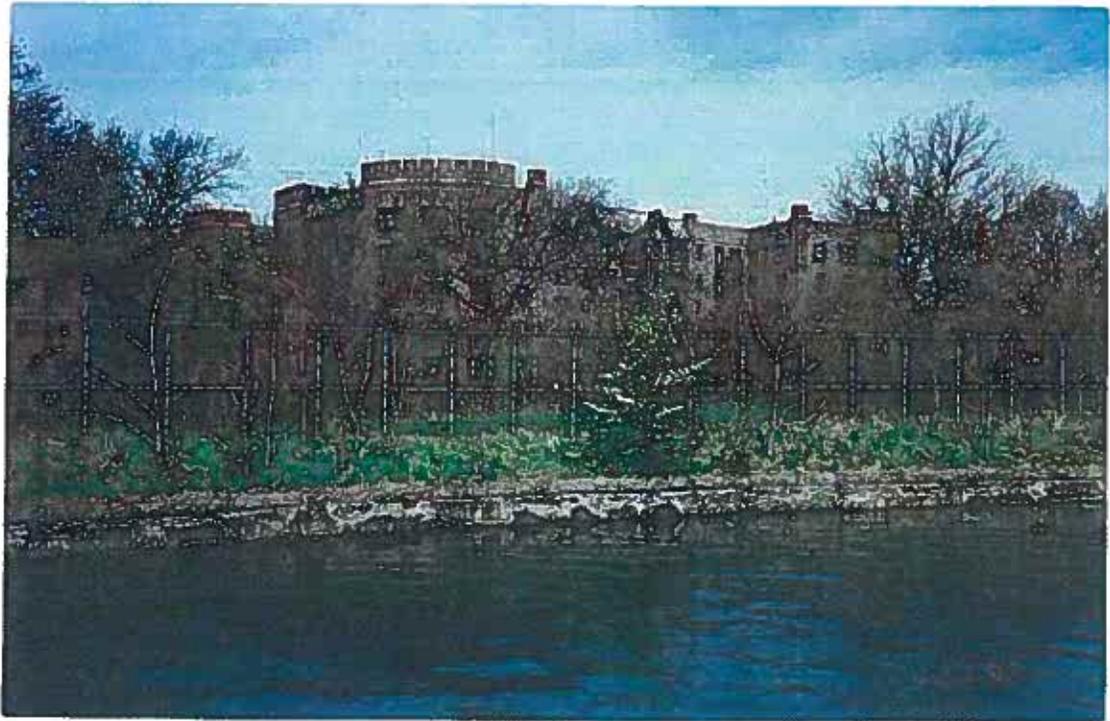
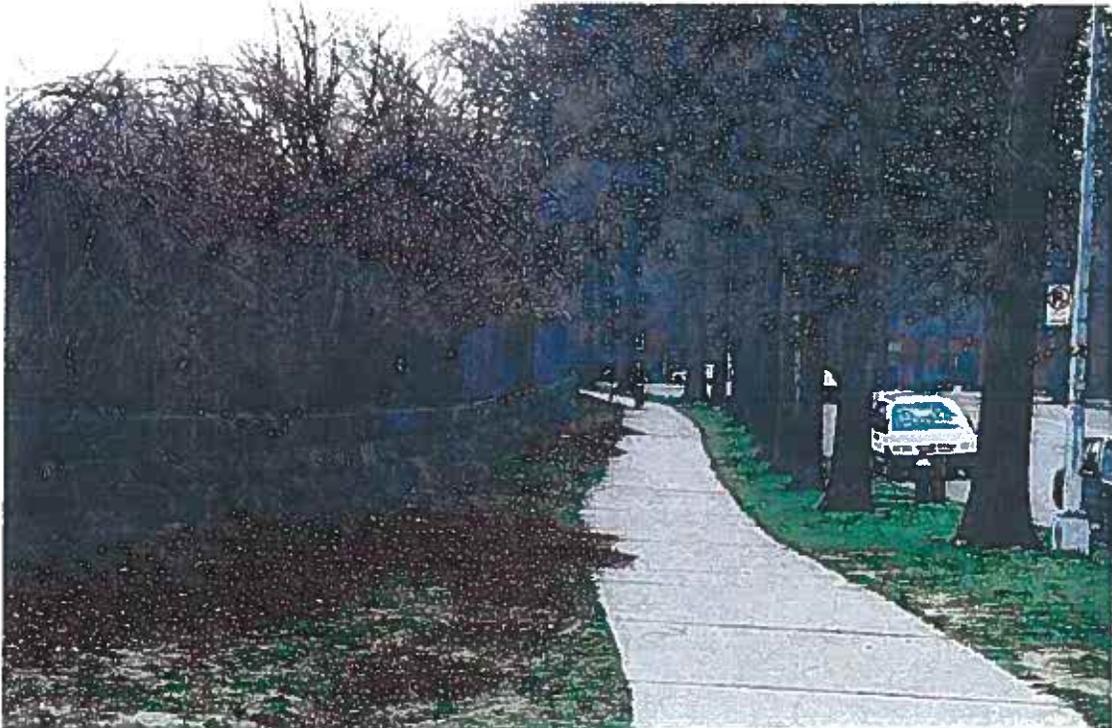


Illustration 5: Sholem Aleichem Houses, an historic apartment building overlooking the Jerome Park Reservoir.

Illustration 6: Sedgwick Avenue, designed by Frederick Law Olmsted, landscape architect, borders the western edge of the Jerome Park Reservoir.



I. JEROME PARK RESERVOIR AND THE HISTORY OF THE CROTON WATERWORKS

A. The Early Water Supply of New York City

Because the lower Hudson River is an estuary, the water is salty all around Manhattan Island and for many miles upstream, and is not suitable for drinking. The early European settlers found adequate supplies of potable water from other sources. Public wells and pumps existed in New York City from the 17th century, and a major source of water was a pond called the Collect, where Foley Square is today. The Collect, along with many of the wells, was hopelessly polluted by the end of the 18th century.¹ The accelerating growth of the city's population combined with the failing water supply and the engineering difficulty of providing an adequate public water supply system, caused decades of debate. The profession of civil engineering was in its infancy in the United States, and there were no precedents in North America for the type or scale of construction that would be required to divert a river of pure water to the city.

In 1798 the city adopted a plan for a municipal water supply system, an ingenious scheme by Dr. Joseph Browne to divert the water of the Bronx River from a dam, near where the Bronx Zoo is today, through a canal to the Harlem River, where a water wheel would pump the water through a cast iron pipe to a reservoir on Manhattan Island.² (This plan was never executed.)

The enabling legislation of 1799 created the Manhattan Water Company, which was led by Aaron Burr. Using this as a maneuver to obtain a bank charter, Burr spent as little effort as possible providing water. The company (which eventually became the Chase Manhattan Bank) abandoned the Bronx River plan in favor of creating a well and small reservoir, holding only a fraction of the city's daily need. The system was deficient in many ways: it used hollow logs rather than iron pipes, served only the areas where service was profitable, and did not provide water for street cleaning or fire fighting.³

¹ T. Schramke, *Description of the New York Croton Aqueduct*, 1846, p.8

² Edward Wegmann, *The Water Supply of the City of New York 1658 - 1895*, John Wiley & Sons, 1896, p.7

³ Jeffrey A. Kroessler, "Water for the City", *The Old Croton Aqueduct: Rural Resources Meet Urban Needs*, The Hudson River Museum of Westchester, 1992, pp.13, 14.

The city continued to be plagued by fires that consumed whole blocks, and epidemics of yellow fever and other diseases that fed on poor sanitation. A terrible cholera epidemic in 1832 spurred the city to take immediate steps to create a true municipal water system.⁴ There was disagreement on whether to use the Croton River, the Bronx River, or another source for the city's water. At the urging of Alderman Myndert Van Shaick, a proponent of the Croton River, the Common Council commissioned a study by civil engineer Colonel DeWitt Clinton, Jr., the son of Governor Clinton, who concluded that the Croton would be the best source, and developed a comprehensive plan.⁵

B. The Old Croton Aqueduct

In 1833, a Board of Water Commissioners was appointed to plan a water supply system. One of their engineers, Major David Bates Douglass, a hero of the War of 1812 and a West Point engineering professor, sided with Colonel Clinton in favor of using the Croton River. Douglass became the chief engineer of the project, overseeing the planning and design of the Old Croton Aqueduct.⁶ The Commissioners replaced Douglass in 1836 with John B. Jervis, an engineer with experience in canal and railroad construction. Jervis revised and completed the design, and oversaw the construction of the aqueduct. He, more than anyone else, is credited with the final design of the Croton Aqueduct.⁷ Also involved as "...an engineer and supervising architect,"⁸ in design and production of drawings was the young James Renwick, Jr., later the architect of St. Patrick's Cathedral in Manhattan, and the Riverdale Presbyterian Church and the Greyston villa in the Bronx.

The great fire of 1835 created pressure to complete the work. Construction of the Old Croton Aqueduct began in 1837, and it was ready to go into service within five years, an unprecedented feat of organization. When it was complete, the masonry

⁴ F. Daniel Larkin, "Preliminary Plans for the Old Croton Aqueduct and the Structure of its Engineering Department", *The Old Croton Aqueduct: Rural Resources Meet Urban Needs*, The Hudson River Museum of Westchester, 1992: p. 18.

⁵ Charles H. Weidner, *Water for a City*, Rutgers University Press, 1974, p. 28 - 31

⁶ D. B. Douglass, Engineer's Report, *Report of the Commissioners... Relative to Supplying the City of New York with Pure and Wholesome Water*, 1833, pp. 381-408

⁷ Larkin, pp. 18-20.

⁸ James Richards, *Who's Who in Architecture*, Holt Reinhardt & Winston, 1977, p. 267

aqueduct wound its way for more than 40 miles through forests, villages and cities from a dam on the Croton River to two high-walled, rectangular reservoirs in Manhattan, the Receiving Reservoir at Yorkhill (where the Great Lawn now is in Central Park) and the Distributing Reservoir on Murray Hill (where the 42nd Street Public Library is today).

Like the aqueducts of ancient Rome, the Old Croton Aqueduct was designed to rely on gravity, and was built with a constant slope, which it maintains while the terrain around it undulates. Because it was designed to be constructed by the cut and cover method wherever possible, the aqueduct follows a course where the natural contours are the closest to its gradient. Typically, the aqueduct is partially buried, borne on a stone foundation, with a telltale mound running over it. With an earthen top and banked stone-faced or sod-covered walls, this mound is the characteristic aqueduct berm (Illustrations 7 and 8). The conduit itself is a horseshoe-arch-shaped stone and brick tunnel. The aqueduct was built mostly by Irish immigrant laborers. The Croton Aqueduct Trailway runs on top of the tunnel for most of its length, and is used today for recreation and as a pedestrian facility.

Where the aqueduct crosses valleys it is carried on massive stone and earth embankments. Streams and roads penetrate the embankment through vaulted culverts (Illustration 9); larger rivers were spanned by dramatic arched bridges. The most famous, the High Bridge over the Harlem River was completed in 1848, six years after the aqueduct itself (Illustration 10). Other above-ground stone structures include picturesque tapered ventilator shafts (Illustration 11), intended to keep the water fresh, and weir buildings (Illustration 12), structures that allowed water to waste and enabled the aqueduct to be drained.^{9 10 11}

Although a triumph of engineering and architecture, and a blessing for the city, the construction of the new water system had a human toll as well. On January 8, 1841, a heavy snow storm followed by days of torrential rain made the waters of the Croton swell, setting off a collapse of the incomplete Croton Dam and sending a wall of water and masses of ice crashing through the Croton Valley for three miles to the Hudson River. The disaster took three lives, and destroyed numerous houses, mills, factories, roads and bridges. The engineers reconstructed the dam with a larger spillway, but did not restore the economic life of the Croton River below the

⁹ John B. Jervis, Chief Engineer, *Description of the Croton Aqueduct*, Slamm and Guion, 1842, pp. 12 - 14

¹⁰ Edward Wegmann, *The Water Supply of the City of New York 1658 - 1895*, John Wiley & Sons, 1896

¹¹ F. B. Tower, *Illustrations of the Croton Aqueduct*, 1843

dam. which, due to flood damage, was no longer deep enough to be navigable by commercial vessels.^{12 13}

The pure, abundant water from the Croton Reservoir finally flowed into the mains of New York City on the Fourth of July, 1842. A great celebration was mounted, with jubilant throngs, the ringing of church bells, firing of cannon, and a five-mile-long parade. "Standing in front of the City Hall, with the fountain sending plumes of Croton water fifty feet into the air, Governor Seward and Mayor Morris addressed the crowd. Members of the New York Sacred Music Society stood by the fountain and sang an ode written for the occasion."¹⁴ The Croton system was hailed around the world as an engineering masterpiece and the promenade along the parapet of the Murray Hill Distributing Reservoir became a major tourist attraction, especially when the Crystal Palace was located next door on the site of the present Bryant Park. With a world-class water system at last in place, the city was equipped to become a modern metropolis.

C. Croton Waterworks Extension

New York's population grew persistently faster than expected in the second half of the 19th century, and the flow of Croton water that seemed so abundant in 1842 appeared insufficient only a few years later. The problem was twofold: one issue was the capacity of the aqueduct conduit; the other issue was the quantity and quality of water available from the Croton River itself, particularly in years of drought.

In 1849, the year after the High Bridge went into service, the Croton Aqueduct Department was created. Its broad responsibilities extended to the building of sewers and paving of streets, but its central purpose was to operate and maintain the waterworks. To solve the first part of the water supply problem, they could accommodate increased demand for quite a few years simply by increasing the flow of water in the aqueduct, which had been designed with substantial overcapacity. The other part of the problem, controlling the volume and quality of the river water itself, required a strategy to increase storage capacity throughout the system. All of the changes required to improve the system, and to allow it to evolve to meet new demands and to incorporate improvements and new components, came to be categorized as the Croton Waterworks Extension.

¹² Jervis, pp.15, 16

¹³ Roger Panetta, "The Croton Aqueduct and Suburbanization of Westchester", *The Old Croton Aqueduct: Rural Resources Meet Urban Needs*, The Hudson River Museum of Westchester, 1992: pp. 44-46

¹⁴ Weidner, p. 47

In 1857 and 1858 a topographical survey of Croton Valley in northern Westchester and Putnam Counties was performed to identify suitable points for storage reservoirs along the three branches of the Croton River. This watershed covered an area ranging nearly from the Hudson River to the Connecticut border, and upstream from the Old Croton Dam for close to fifty miles¹⁵.

The storage reservoirs were to be artificial lakes formed by damming the Croton River and its tributaries at strategic locations. This technique had been used to create the Old Croton Reservoir. The 1850's plan, which envisioned fourteen storage reservoirs, designated A through O, was carried out nearly as planned between 1866 and 1911. This system, with its picturesque highland lake landscapes, and majestic stone and earth dams, is still operating today.

This plan was a marriage of engineering and ecology. It eventually created a controlled water chain along the Croton's three main branches and principal tributaries, with storage reservoirs controlling the flow of water through spillways in the dams back into the river to maximize storage capacity and supplement the volume in drought conditions. There were also several natural lakes whose water could be drawn if needed. At the Croton Reservoir, the final lake in the upstate system, water would enter the aqueduct to the city. The Croton Aqueduct Department and successor agencies took great pride in maintaining the cleanliness and ecological health of the Croton Watershed, and were roundly criticized when critics felt that they were neglecting this task.

The New Central Park Receiving Reservoir at Yorkhill, built from 1858 to 1863, was the first major project of the Croton Waterworks Extension. Unlike the original Receiving Reservoir, it was planned with the knowledge that the park was being developed:

“Its curvilinear shape is largely due to the persuasiveness of the man who was then the engineer of the new Park, Anton Viele. Viele argued that the new reservoir should not be rectangular like the old one but should have a more graceful and natural form. In spite of this aesthetic gesture, the Reservoir posed problems for the designers Olmsted and Vaux. It filled so much of the Park from side to side that it was a virtual barrier to north-south traffic.”¹⁶

¹⁵ *Annual Report of the Croton Aqueduct Department Made to the Common Council of the City of New York for the Year 1858*, January 3, 1859

¹⁶ Elizabeth Barlow Rogers, *Rebuilding Central Park*, the Central Park Conservancy, MIT Press, 1987, p. 106

The naturalistic form of the New Central Park Reservoir is reminiscent of artificial lakes such as the original Croton Reservoir and the new storage reservoirs that were being planned in the Croton Valley. Begun only fifteen years after the completion of the earlier reservoirs, it represented a change in design philosophy. Unlike the earlier rectangular reservoirs that had been intended to fill city blocks, new urban reservoirs could be integrated into park landscaping, and be enjoyed for scenic views and recreation:

“According to the contemporary historian Clarence Cook, the pedestrian walkway around the Reservoir provided an ‘admirable constitutional’ in the early days of the Park. It afforded a fine breeze, dancing waves and a setting for beautiful sunsets. Three cast iron bridges...were built to carry pedestrians over the Bridle Trail to the walkway.”¹⁷

The second major project of the Croton Waterworks Extension, starting in 1861, was the addition of a large wrought iron main to the High Bridge to upgrade its capacity. The height of the walls and cornice was increased, and the bridge was roofed with a brick vault for its entire length. This work was completed in 1863.

The following year iron railings were installed on the bridge and Bronx High Bridge park was terraced and landscaped.¹⁸ From the start the system had been viewed as a scenic attraction by the public, and the High Bridge continued to rank among the city’s top tourist attractions.

Plans for commencing other major new projects were delayed by the Civil War. The High Bridge Reservoir and Tower (Illustration 13) were constructed from 1866 to 1873 to serve the growing population of upper Manhattan’s heights, known as Carmansville, and nearby areas that were above the head of the existing aqueduct and reservoirs.¹⁹ The steam-powered pumping engines of that day were not reliable and the reservoir and tower were required to make service continuous.²⁰ The tower had essentially the same function as the reservoir, but served a higher elevation. The High Bridge Reservoir was the last of the rectangular reservoirs of the Croton System.

¹⁷ Rogers, pp. 106, 107

¹⁸ Wegmann, pp. 71 - 73

¹⁹ F.S. Cook, and George Taber, “The Water Supply of the City of New York, Exhibits at the Louisiana Purchase Exposition”, 1904, p.11

²⁰ *Annual Report of the Croton Aqueduct Department Made to the Common Council of the City of New York for the Year 1866*, January 7, 1867, pp. 15, 16

The Croton Aqueduct Department was taken over by the Department of Public Works in 1870. The significance of the water supply system, along with the road-paving and sewer operations, was immediately recognized by the first Commissioner of Public Works, William Marcy Tweed, who harnessed it for his bold schemes of malfeasance and racketeering.

In the Department of Public Works Annual Report of 1870/71 Commissioner Tweed wrote that, "The very large amount of labor which has fallen to the charge of the Chief Engineer of the Croton Aqueduct is apparent upon reference to his voluminous report."²¹ In fact, the "voluminous report" written by Chief Engineer Edward H. Tracey had only about ten pages that vaguely described the works currently underway along with twenty-nine pages of filler, which consisted of a thirty-year-old description of the system written by Jervis. This filler was inserted abruptly and awkwardly in Tracey's text, most likely at the insistence of Tweed. While the Annual Report looks like a normal, orderly bureaucratic document, it glosses over a binge of spending that drew the city to the verge of insolvency.

Tweed relied on the reputation of the Croton Aqueduct Department and its engineering feats. For example, he recalled their 1869 work on the regrading of 5th Avenue in Manhattan, where they lowered two 36-inch iron mains four feet into a rock-cut while water was flowing through them, to avoid interrupting service.²²

The corrupt administration of the Croton Waterworks under Tweed fundamentally shook the faith of the public; this damage has never been fully erased. It ended an era of innocence during which there had been absolute confidence in the motives and honesty of the administrators and engineers of the system, who were entrusted with decisions concerning the vast works and huge outlays of public money that are inherent to the supply of water for great cities. It also began a schism between the engineers of the former Croton Aqueduct Department and their new masters, whose primary interest was in controlling the flow of money rather than water.

Boyd's Corners Reservoir (Reservoir E) was the first of the storage reservoirs to be constructed in the watershed. Located in Putnam County it was built between 1866 and 1874 on the West Branch of the Croton River near Fahnestock State Park. It was in the midst of this project that the Department of Public Works took over the Croton Waterworks.

The distaste for the new regime was often expressed subtly, as in the statement by J.J.R. Croes, the Resident Engineer for the construction of Boyd's Corners Reservoir, criticizing the workmanship of an embankment, "It was built by

²¹ William M. Tweed, *Annual Report of Commission of Public Works of the City of New York for the Year 1870-71*, p. 9

²² Tweed, p. 9

contract, and not rolled or thoroughly rammed, but merely carted over.'...In stating 'it was built by contract,' Croes is alluding to the fact that...the city's engineers had little or no discretionary power over contractors to insure good work. Under Tweed rule, contracts were awarded subject to stipulated kickbacks or commissions; contractors could slight their work with impunity..."²³

The Middle Branch Reservoir (Reservoir G) (Illustration 15), also in Putnam County, was the next to be constructed, from 1874 to 1879. Twenty years after the initial storage reservoir plan, only two of the reservoirs along the Croton River had been completed, and both of those had relatively small watersheds. Still, it was the aqueduct conduit itself that became the critical bottleneck in the system. By the mid-1870's it was clear that the Old Croton Aqueduct could not continue for long to provide a sufficient water supply for the rapidly growing city.

The Old Croton Aqueduct was already operating well beyond its planned capacity. The aqueduct was modified in 1875 to allow a higher water level by the addition of one or more rings of brick over the top arch. Tests of the aqueduct at 103 million gallons per day (mgd) had "disastrous results" and it was decided that 95 mgd was the maximum allowable capacity.²⁴ It was felt that conservation measures to curtail waste, such as metering, would only postpone the inevitable. Additional supply would be required as the aqueduct had finally reached its limit.

Debate over the future of the water supply system was vigorous in the late-1870's and early 1880's. Benjamin S. Church, who had been in charge of the Old Croton Aqueduct since 1861, presented a paper before the American Society of Civil Engineers (ASCE) in 1876. He pointed out design flaws in the Old Croton Aqueduct that were leading to settlement of stone foundations, structural failures and leaking at the embankments (sloping stone-clad earthworks that braced the aqueduct at valley crossings and hillsides) of which there were about five miles total. While he had great admiration for the work of Jervis and Douglass, Church believed that the aqueduct had yet to be perfected, and that, with no other large scale source of water, shutdowns for repair work would inevitably become disastrous interruptions of the city's water supply.²⁵

At the ASCE meeting, one of Jervis's former students questioned Church's structural analysis and staunchly defended the original design, but there was no disputing Church's records and observations. In his many years at the helm,

²³ Weidner, p. 62

²⁴ Wegmann, p. 82, 108

²⁵ Benjamin S. Church, C.E., "Notes and Suggestions on the Croton Water Works and Supply for the Future" with Discussions and Transactions of the American Society of Civil Engineers, 1876

Church had overseen a huge volume of work in maintaining and restoring the Old Croton Aqueduct. Routine, minor leaks were remedied with a mixture of sawdust, sand and clay that was poured into the water upstream of the leak, and flowed down and plugged the leak from the inside. There were also many conditions that required substantial masonry repairs. In 1866 alone, for example, Church supervised the reconstruction of an arched culvert over a roadway north of Tarrytown and the repair of more than 4,800 feet of fissures in stone retaining walls.²⁶

There had also been a nearly catastrophic breach of the aqueduct in Fordham, approximately two miles north of the High Bridge in what was then southern Westchester, and some sections of berm washed out near Ossining in storms.

One of Church's concerns was that every time repairs were necessary, the water supply had to be shut off at the dam at Croton Lake, and the whole length of the aqueduct drained, because the original valve system in the weir buildings did not allow the flow of the aqueduct to be diverted at an individual weir. The weirs as originally built could only drain the water passively through side openings, a design that some critics in the 1870's denounced as short-sighted and even perceived as the Achilles' heel of Jervis's design. The draining and refilling of the whole aqueduct added about 48 hours to the time required for repairs, so that even a small amount of masonry work inside the conduit would impact service. This was especially true because, by the late 1870's, only the top few feet of water in the city's reservoirs had sufficient head to provide adequate pressure to the increasing stock of taller buildings.

Church planned improvements in the design of the Old Croton Aqueduct. One was the provision of cross-valves at each of the waste weirs to divert water so that individual divisions of the aqueduct could be drained for repairs without shutting down and refilling the whole system. Starting in 1881, the waste weirs were modified (it may have surprised the neighbors to realize that the quiet streams in their back yards could be transformed instantly into 95 mgd torrents). The waste weir in Ossining was reconstructed at a new location, rather than being modified like the others, so that the water could drain more directly into the Sing-Sing Kill. The Ossining weir retained the architectural style of the existing weirs of the Old Croton Aqueduct.²⁷

Another issue was providing a water supply for the 23rd and 24th Wards of New York City, territory annexed from Westchester in 1874 that would later become part of the Borough of the Bronx. Under the jurisdiction of the Department of Public

²⁶ *Annual Report of the Croton Aqueduct Department ... for the Year 1866, 1867*, pp. 8,9

²⁷ Wegmann, p. 83

Parks, Frederick Law Olmsted and J. J. R. Croes were retained to create a comprehensive city plan for the new wards.²⁸ While some groups felt that water from the Bronx River should be tapped for the new wards, reserving the Croton water for Manhattan, the Common Council passed an act, in May, 1875, calling for the distribution of Croton water in the areas to be developed in the newly acquired territory. Within a year mains were being laid from the Croton Aqueduct in the new wards.²⁹ This was the same year that it was first decided that a reservoir should be constructed at Jerome Park at the junction of the Old Croton Aqueduct and a new aqueduct. Work on this project was postponed indefinitely due to the condition of the city's finances, which had been weakened by the spending spree of Tweed and his cronies.³⁰

In 1879 work began on a new aqueduct, unrelated to the Croton: the Bronx and Byram water system. In 1884 the Bronx River Pipeline went into service, and the new Williams Bridge Reservoir in the Bronx was completed in 1889.³¹

The Bronx and Byram water system is reported to have been a product of ongoing Tammany Hall influence, constructed by the Department of Public Works under a revived Tweed Act. The project was attacked repeatedly by the Union League Club (of which Church and Olmsted were members). An 1882 report stated that if a new aqueduct was required, "...one from the Croton would doubtless have been selected in lieu of the one from the Bronx. The selection of the latter must now be regarded as an official mistake not likely to have been made by a body of intelligent Commissioners."³²

Construction of the Bronx and Byram system was ordered by Commissioner of Public Works Allan Campbell, whom the Union League Club report called an unqualified "party politician" whose confirmation to office allegedly had been secured by payments from construction interests in anticipation of lucrative city contracts.³³ According to Campbell, his decision was based on estimated costs for the Bronx and Byram system of \$3 million as compared to \$12 million for a new

²⁸ Kenneth Jackson ed., *The Encyclopedia of the City of New York*, Yale University Press, 1995, p. 864

²⁹ George B. Butler, Esq., "Croton-Water Supply for the City of New York", New York Municipal Society, 1876

³⁰ Wegmann, p. 90

³¹ Cook and Taber, p. 11

³² Union League Club, "The Water Supply of New York. The Club Favors a Comprehensive System, and the Construction by a Commission to be Appointed by the Governor and Senate, of such Additional Works as may be needed," January, 1882, p.9

³³ Union League Club, pp. 4,5

aqueduct from the Croton. In the end, the Bronx and Byram project cost about \$5 million³⁴ and contributed a meager 15 mgd.³⁵

The Old Croton Aqueduct, which was originally intended to have a capacity of 72 mgd, was operating at its maximum of 95 mgd. The New Croton Aqueduct, when complete, could operate at a maximum of 300 mgd.

D. Works of the Aqueduct Commissioners

Even before the small contribution of the Bronx River Pipe Line of the Bronx and Byram system was brought on-line, it was obvious that plans for a new aqueduct from the Croton could not be delayed for long. What was less clear was who would design and build it, the Department of Public Works or a new organization, perhaps guided by an old Croton hand such as Benjamin S. Church.

In April, 1881, Isaac Newton, Chief Engineer of Water Works for the Department of Public Works, presented a special report to the Commissioner of Public Works, Hubert O. Thompson, supporting the case for an additional aqueduct from the Croton River.³⁶

Cynicism prevailed among the city's elite, and it was said of the proposed New Croton Aqueduct that, "...such a work would greatly exceed the expense of the one we have, and besides that its construction would not be controlled by the faithful engineers who were on the work originally, and still remain with it, but it would come into modern hands. The present aqueduct was built long before frauds were common in city affairs."³⁷ Groups such as the Union League Club lobbied to limit the authority of the Department of Public Works, and to have the new works planned comprehensively, designed and constructed by a newly formed commission appointed by the Governor.

Several years of severe drought spurred action on a comprehensive plan. Criticism was leveled at the choice of storage reservoirs constructed to date in the Croton Valley, and the pace of the program. More than twenty years after the 1858 plan, only two storage reservoirs had been constructed in the watershed. It was felt that the East Branch and Bog Brook (Double Reservoir I) should be started immediately.

³⁴ Wegmann, pp. 90, 91, 93

³⁵ Aqueduct Commission, *Report to the Aqueduct Commissioners, 1895*
- 1907, 1907, p 7.

³⁶ Wegmann, p. 108

³⁷ Butler

Advocates of an additional aqueduct from the Croton River cited the tremendous volume of water passing over the Croton Dam unused.

In 1883 the Aqueduct Commissioners were appointed, and they immediately undertook the design and construction of the new aqueduct and other additions to the Croton system. Church was appointed as Chief Engineer. With his immense knowledge of the existing system, he was the mastermind of the New Croton Aqueduct. This link partly explains the family resemblance between the structures of the two Croton Aqueducts.

The Aqueduct Commissioners' plan generally called for additional storage reservoirs and dams in the watershed, a new Croton Dam that would raise the water level, increasing the size and capacity of the Croton Reservoir, a new receiving and distributing reservoir located along the Old Croton Aqueduct in northern New York City (Jerome Park), and a new aqueduct conduit from the existing Croton Reservoir more-or-less due south to Jerome Park and then on to Central Park. This differed from Newton's proposed plan: Newton also proposed a new dam, but the proposed new aqueduct would start at the new dam and parallel the route of the Old Croton Aqueduct near the Hudson River. Also, the Newton plan did not include additional new storage reservoirs outside of the enlarged Croton Reservoir.

Department of Public Works Commissioner Thompson, an *ex officio* Aqueduct Commissioner, supported the building of Newton's version, and wrote that the plan, "was submitted for examination to Mr. John B. Jervis, the designer and builder of the Croton Aqueduct...(who) examined the whole subject for himself and approved of the plans proposed by the Department as the best system."³⁸ Thompson was critical of the concepts put forward by reformers, and stated that construction of the East Branch/Bog Brook Reservoir, a rallying point of DPW critics, would be unnecessary if the new Croton Dam were built.

Thompson also claimed that a new design was not necessary for the East Branch dam, because it was almost a facsimile of the Middle Branch dam, and went on to point out that the construction of Reservoir I was recommended by the department many years earlier (this reference to the 1858 survey fails to distinguish that it had been performed prior to the takeover by the Department of Public Works). It is clear that Thompson was not pleased to have control of the work taken away from his department.

³⁸ Hubert O. Thompson, "Report of Commissioner of Public Works to the Aqueduct Commission upon Plans, etc. for New Aqueduct, etc. Aug. 8, 1883", from Aqueduct Commission, *Report to the Aqueduct Commissioners*, 1887, p. 56

Many issues were discussed at public hearings, including whether to follow the Hudson or the inland route, where land acquisition costs would be lower, as Church wanted. Another subject was whether to run the New Croton Aqueduct across the High Bridge, a new bridge or bridges, or through a tunnel. In most matters Church prevailed, and his vision shaped the future of the Croton system, although he apparently compromised his position in respects to achieve consensus. For example, he agreed that the East Branch Reservoir was not necessary immediately if the New Croton Dam was to be built.

After his many years of faithful service as Resident Engineer of the Old Croton Aqueduct, Church's career and renown surged. In 1886, for example, when the offices of the Aqueduct Commissioners were closed, "...in honor of the celebration of the inauguration and unveiling of the Bartholdi Statue of Liberty...the Chief Engineer was directed to extend to the engineers, artists and guests from France attending the inauguration...an invitation to examine the plans and visit the works of the New Croton Aqueduct."³⁹

The New Croton Aqueduct began construction in 1885 and went into service in 1890 (Illustration 16). It is a remarkable structure, a vintage stone and brick masonry aqueduct, still intact, and fully operational today. The New Croton Aqueduct is similar to the old in many respects, and its design can be seen as Church's perfection of the technology of the Old Croton Aqueduct. It is a masonry conduit with a horseshoe-shaped section, although it has about three times the area and capacity of the Old Croton Aqueduct (Illustration 17). It is a gravity tunnel for approximately twenty-four miles from the Croton Lake Gate House, which is adjacent to the Old Croton Dam, to Gate House No. 1 of the Jerome Park Reservoir, which is located a short distance north of the reservoir in Van Cortlandt Park.

Although the Jerome Park Reservoir was indicated as "proposed" on the 1887 map of the system, it was part of the original design and the New Croton Aqueduct was configured to anticipate its construction. South of Gate House No. 1, the New Croton Aqueduct drops beneath the Jerome Park Reservoir and continues as a round masonry tunnel under pressure beneath the Harlem River (Illustration 18) to the Terminal Gate House at 135th Street in Manhattan.

To maximize the amount of water available to the system, the designers included weep holes in portions of the horseshoe tunnel to allow ground water to enter the system. The holes, termed "weepers" were 4 inch x 8 inch openings through the

³⁹ James C. Spencer, "Report of the President", from Aqueduct Commission, *Report to the Aqueduct Commissioners*, 1887, p. 20

brick tunnel wall, spaced 20 feet on center. At the time, the "weepers" provided an additional 4 mgd to the water flowing from the Croton Lake Gate House.⁴⁰

Whereas the Old Croton Aqueduct had been built predominantly at grade by the cut and cover method, with tunnels or tall embankments used where necessary to maintain the required gradient, the New Croton Aqueduct was tunneled for most of its length, giving it much greater protection from frost damage and other sources of weathering and damage. At those areas where the hydraulic grade met the surface grade, such as Pocantico, Ardsley, and South Yonkers, the Aqueduct Commissioners designed blow-off and waste weir structures reminiscent of those of the Old Croton Aqueduct (Illustration 19). At the Harlem river an impressive complex was created at Shaft No. 25, on the Manhattan side of the aqueduct tunnel, overlooking the Speedway (now the Harlem River Drive), a few hundred yards north of the High Bridge. Still remaining at Shaft No. 25 is a monumental retaining wall and stair, with a symbolic horseshoe-arched portal (Illustration 20).

Aqueduct Commissioners Reports were issued covering the periods from 1883 to 1887, 1887 to 1895, and 1895 to 1907. The reports were lavishly illustrated by the Draughting Bureau. Under the direction of Frederick S. Cook, C.E., Assistant Engineer, the Drafting Bureau designed and produced working drawings for the New Croton Aqueduct, the storage reservoirs and dams, the New Croton Dam, and the Jerome Park Reservoir. Cook has been attributed as designer of the Terminal Gate House at 135th Street, a New York City Landmark, by the Landmarks Preservation Commission.⁴¹ He was equally the designer of the other works of the Aqueduct Commissioners.

The drawings included in the 1887 and 1895 reports were of exceptional quality (Illustrations 21 and 22), and were signed by the delineators. The finest were by Charles Gustafson, Charles Manning, and Giuseppe Bonanno, draftsmen, and Jean Genthon, topographical draftsman. These draftsmen were also the designers of the system, under the direction of the Chief Engineer, Consulting Engineers and F. S. Cook.

Church, as Chief Engineer, wrote in 1887, "Mr. F. S. Cook, Special Assistant, in charge of the draughting bureau, has not only directed the execution of accurate drawing for the dams and contract plans for the Aqueduct and designs for the Gate

⁴⁰ Wegmann, p 126

⁴¹ Andrew S. Dolkart, *Guide to New York City Landmarks*, New York City Landmarks Preservation Commission, 1992, p.141

House Superstructures, but he supervised the numerous detailed working plans required with marked ability."⁴²

Work from 1883 to 1887 consisted largely of the top priority item, creating the new aqueduct and its ancillary structures. Storage reservoirs in the watershed were designed, but not yet constructed. Two large, complex projects, the New Croton Dam and the Jerome Park Reservoir, were planned at this time, but were not constructed. The dam was bogged down from the start in a myriad of hearings and special commissions, and the reservoir had not yet been funded.

Both the dam and Jerome Park were suited for construction after the New Croton Aqueduct was in service, because they both involved reconstructing and realigning portions of the Old Croton Aqueduct. At the New Croton Dam, the Old Croton Aqueduct would be realigned to pass through Gate House No. 1 of the new dam. At Jerome Park, the Old Croton Aqueduct would be incorporated into the original dividing wall, which is now the east basin wall along Goulden Avenue, and the principal gate houses.

Church's star began to fade during the construction of the New Croton Aqueduct. In 1886 he was charged with improprieties by a construction inspector. A panel acquitted him on all counts.⁴³ It seems that Church was making spontaneous field decisions to expedite the project rather than engaging in corruption. It also appears that he was overwhelmed by the unprecedented scale of the project, and the lack of honest and qualified inspectors. He was also unprepared for the brazen deceptiveness of the contractors, who did such things as concealing giant voids behind false walls before inspectors arrived. In 1888 rumors of extensive defective work proved true and caused major headlines. Church resigned as Chief Engineer.

Church was replaced by Alphonse Fteley, who had been Consulting Engineer. Church assumed the title of Consulting Engineer until 1889, when that position was abolished. Church, by this time had lost the support of reformist critics as well, and a group called the Committee of Twenty-One from the Union League Club railed against him for having signed on to Newton's Quaker Bridge (New Croton Dam) plan at the expense of building the East Branch storage reservoir. They also ridiculed the endorsement of Jervis (then in his late 80's) and others, pointing out that they had no experience with high masonry dams.

⁴² Aqueduct Commission, *Report to the Aqueduct Commissioners, 1883 - 1887*, 1887, p 54

⁴³ *Charges against Chief Engineer 1886 - Report of Examining Engineers John Newton, George S. Greene and Q.A. Gilmore on the Charges Preferred against the Chief Engineer of the Aqueduct Commission, 1886*

The work of the period from 1887 to 1895 included completion of the new aqueduct, which went into service in 1890, and accelerated design and construction of dams and storage reservoirs in the watershed. Construction began on the East Branch dam in 1888 (Illustration 23), followed soon by the Carmel, Amawalk and Titicus (Illustration 24) dams. The Titicus was a precursor of the New Croton Dam. Design work on the New Croton Dam and Jerome Park Reservoir were intensive during this period.

Construction began on the New Croton Dam in the early 1890's. It would be ready to go into service in 1906 (Illustrations 25 and 26), more than thirty years after the initial proposal. The dam was the largest masonry dam in the world when it was built. It had undergone a long design process for both social and technical reasons. An expert panel, consisting of J. J. R. Croes, J. P. Davis and William F. Shunk, was assembled in 1888 to study the size, shape and location of the dam. Local activism challenged the original siting of the dam at Quaker Bridge.

Numerous dam sites were studied (Illustration 27), and the Cornell site further upstream was finally selected in 1891. Technical issues also lengthened the design time for the enormous dam, particularly as the deadly collapse of the first Croton Dam in 1841 was still within living memory. Completed sections of masonry-core earthen dam (the type of construction that had failed in 1841) were removed and replaced with solid masonry, partly to reassure local communities. Sections of porous masonry and improper work, which made local headlines, were also replaced.

The New Croton Dam and the Jerome Park Reservoir were both subject to labor disputes, and work on both projects ground to a halt during a union-led strike in 1900. There had been labor unrest during the construction of both aqueducts, but this strike caused great concern. According to local lore in Croton, Teddy Roosevelt, who was then Governor of New York, led his Rough Riders to Croton. The Cavalry was established at the dam site in "Camp Roosevelt". Fifteen hundred National Guardsman of the 7th Regiment commanded by Major General Charles Roe rode to Croton Station by train and marched to the dam.⁴⁴

In spite of all the delays and struggles, the works of the Aqueduct Commissioners are distinctive in appearance. The dams of the Croton Watershed and the New Croton Dam, along with the the Jerome Park Reservoir and the New Croton Aqueduct, are architectural siblings. In 1846, Schramke had called the Old Croton Aqueduct, "...that noble monument of hydraulic architecture,"⁴⁵ and the works of the Aqueduct Commissioners continued and built on that tradition.

⁴⁴ D'Alvia, pp. 127 - 135

⁴⁵ Schramke, Dedication

E. The Jerome Park Reservoir

The engineers, such as Church, who operated the Old Croton Aqueduct, had always known the topography of the entire route, and when they considered sites for a storage reservoir on the mainland near Manhattan Island, Jerome Park was an obvious choice. When that portion of southern Westchester was annexed to the city and became part of the 24th Ward, Jerome Park was clearly the most suitable site for a large new reservoir along the Old Croton Aqueduct, within the city limits, particularly in light of a second aqueduct conduit.

The Jerome Park Reservoir was first formally recommended in 1875, when Commissioner of Public Works Gen. Fitz John Porter ordered a survey. According to Edward Wegmann, "Two routes... were surveyed, commencing a quarter of a mile below the head of Croton Lake and terminating near Jerome Park, where it was proposed to construct a large receiving reservoir. Nothing more was done towards constructing this work."⁴⁶ (It was after this that the next Commissioner decided that the Bronx and Byram System should be constructed instead.)

The planning of the Jerome Park Reservoir began simultaneously with the comprehensive city plan of the 23rd and 24th Wards designed by Frederick Law Olmsted, Landscape Architect and J. J. R Croes, Civil and Topographical Engineer, who performed this design work for the Department of Public Parks. Their street plans were adopted by the city in 1877 and 1878, and subsequently constructed in large part.⁴⁷

An Olmsted job number has been assigned to Jerome Park by the editors of the Frederick Law Olmsted Papers. There are also numerous sketches and studies of the 23rd and 24th Wards that may be relevant to the design of the reservoir and the surrounding community. The Jerome Park Conservancy is currently researching this data to determine if Olmsted actually created the schematic design of the reservoir in addition to designing the adjacent streets. We do not yet know what role Olmsted or Croes played in the design of the reservoir.

The plans of the reservoir (prepared by the Aqueduct Commissioners in the 1880's and 90's) show the unmistakable influence of Olmsted, and may have been based on a preliminary design by him. Olmsted and Croes were surely aware that a reservoir would eventually be built on the site.

Croes had an extensive engineering career in the Croton Aqueduct Department: he took over preparation of drawings for the New Central Park Receiving Reservoir in

⁴⁶ Wegmann, p. 90

⁴⁷ Refer to Section II.C of this report for a more extensive discussion of the Olmsted and Croes plan.

1860,⁴⁸ was Resident Engineer for the High Bridge improvements starting in 1862,⁴⁹ and was in charge of construction of the Boyd's Corners Reservoir and dam, which was completed in 1874.⁵⁰

Croes had recently overseen the completion of the Boyd's Corners Reservoir when he and Olmsted began the surveys and studies for their comprehensive plan of the 23rd and 24th Wards. The start of their survey work was roughly contemporary with the water supply survey that identified Jerome Park as the intended reservoir location in 1875.

Church was a familiar figure to both Croes and Olmsted because of their work in Central Park. Olmsted and Church were club-mates at the Union League Club. Croes was a colleague and admirer of Church's: the copy of Church's *Notes and Suggestions on the Croton Water Works and Supply for the Future*, from 1876, in the collection of the New York Public Library, was donated by Croes, with a note, "With the compliments of J. James R. Croes, Civil and Topographical Engineer Department of Public Parks, NYC." Croes would also go on to join a committee of experts to review the design issues of the New Croton Aqueduct, particularly with regard to design of the new dam.

The Olmsted and Croes 1877 plan of the Jerome Park Reservoir vicinity shows the race track but does not indicate the reservoir.⁵¹ Being an adopted plan for construction, it could not indicate proposed or future elements. However, the plan essentially blocks out territory for the reservoir, bounded by Sedgwick Avenue to the west, Kingsbridge Road to the south, Jerome Avenue to the East, and what would become Mosholu Parkway and Van Cortlandt Park to the north. They also removed the existing Old Boston Road from across the site. This open area is reflected in the Map of Location and Environs published by the Aqueduct Commissioners in 1895 (Illustration 28). The detailed design of the reservoir was produced by the Aqueduct Commissioners during the years that the Olmsted and Croes street plan was under construction all around it, and it is likely that their guidance was sought.

The Jerome Park Reservoir was not included in the recommendations for a new aqueduct in the report of Isaac Newton, Chief Engineer of the Croton Aqueduct (under the Department of Public Works) in 1882. Its necessity was supported in the

⁴⁸ Wegmann, p. 71

⁴⁹ Wegmann, p. 73

⁵⁰ Wegmann, p. 79

⁵¹ Adopted Map D No. 23, Dept. Of Public Parks, Plan of Streets, Roads and Avenues Lying West of Jerome Avenue and South of the Road from Mosholu to Williams-Bridge, in the Twenty-fourth Ward, 1877

report of W. E. Worthen, C. E., who was subpoenaed by the Aqueduct Commissioners to testify at a public hearing in early 1884. Worthen wrote that, "No provision has been made in the Quaker Bridge plans for additional storage reservoirs within the city limits... This is the fundamental error of the project."⁵²

The decision to build the Jerome Park Reservoir was reached by the Aqueduct Commissioners in early 1884, soon after their appointment. It was not yet known when the site would be obtained or the funding approved.⁵³ The first objective was the completion of the New Croton Aqueduct conduit.

The purpose in constructing the Jerome Park Reservoir was to create a storage and distributing reservoir along both the Old and New Aqueducts. It would provide water to the city if either or both of the Aqueducts had to be shut off for repairs. Also, it would provide local supply in the area of the 23rd and 24th Wards. According to Church, "80 to 100 million gallons were reserved for the Twenty-third and Twenty-fourth Wards,"⁵⁴ a more generous plan than the 15 million delivered by the Bronx River Pipe Line. An examination and surveys for a Receiving and Distributing Reservoir at Jerome Park were performed in 1885.⁵⁵

Church pushed for immediate construction of the Jerome Park Reservoir, believing that the city's water supply was in danger of serious interruption until it was completed. The project was delayed due to the opinion of Newton that it would not be needed for at least ten years.⁵⁶

The schematic representation of the Jerome Park Reservoir shown in the system map of 1887 shows a curvilinear form reminiscent of the New Central Park Reservoir. The location and environs plan published by the Aqueduct Commissioners in the 1895 report (Illustration 28) has a similar but revised form, and is completely integrated with the Olmsted and Croes street plan, including two "Proposed New Avenues", Reservoir Avenue (from Sedgwick Avenue east and south to Kingsbridge Road) and the Sedgwick Avenue North (from Van Cortlandt Avenue West northeast to Goulden Avenue).

⁵² W. E. Worthen, "Report of W. E. Worthen, C. E. on the Projected Reservoir and Aqueduct for 'The Additional Water-Supply of New York City.'", 1884

⁵³ Wegmann, p. 209

⁵⁴ Benjamin S. Church, Report of Chief Engineer, Aqueduct Commission, *Report to the Aqueduct Commissioners*, 1887, p. 43

⁵⁵ Benjamin S. Church, Report of Chief Engineer, Aqueduct Commission, *Report to the Aqueduct Commissioners*, 1887, p. 48, 49

⁵⁶ Aqueduct Commission, *Report to the Aqueduct Commissioners, 1887 - 1895*, 1895, pp. 37, 38