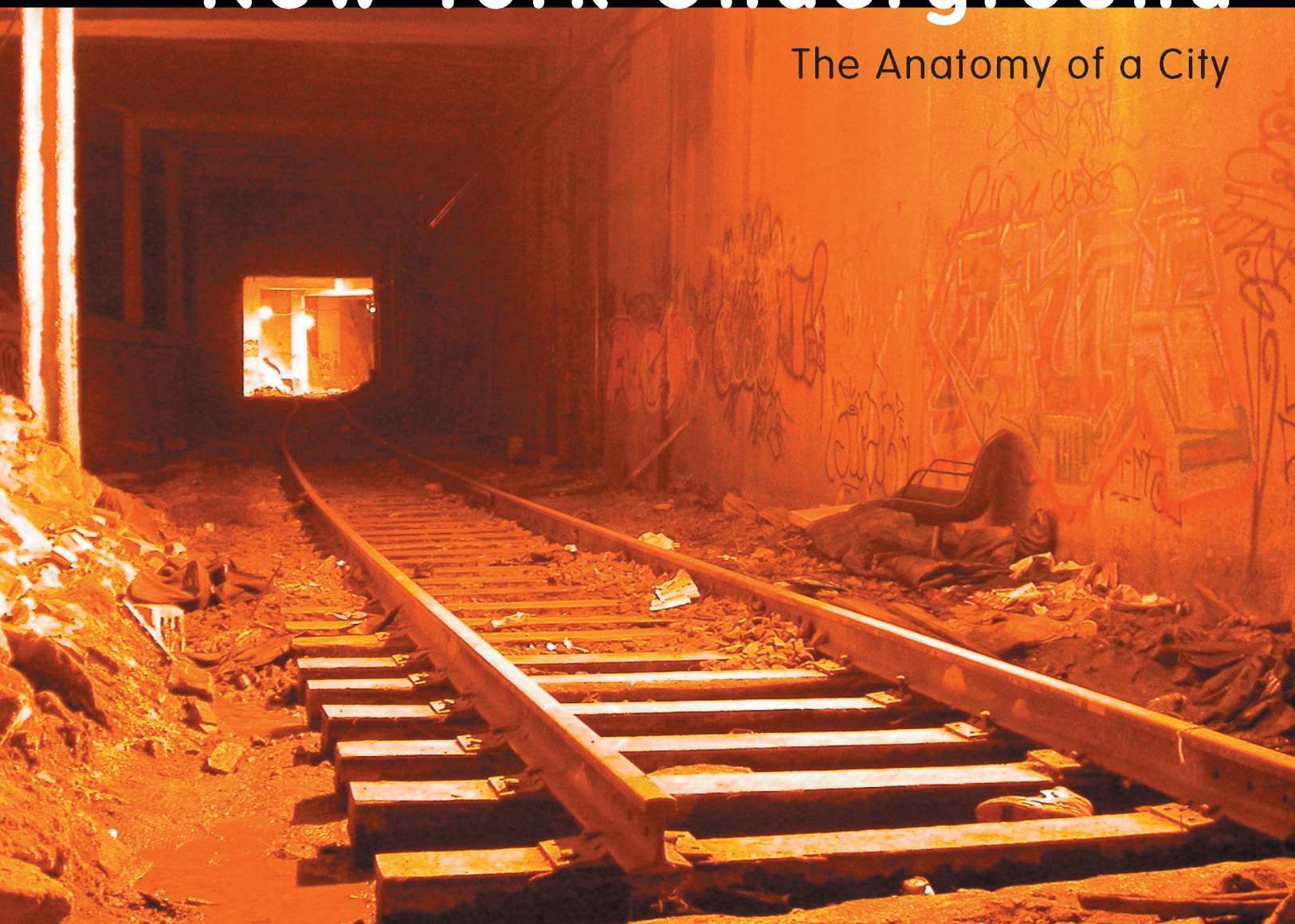
Julia Solis

New York Underground

The Anatomy of a City



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The Anatomy of a City

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This book is dedicated to the Croton Maid

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New York Underground

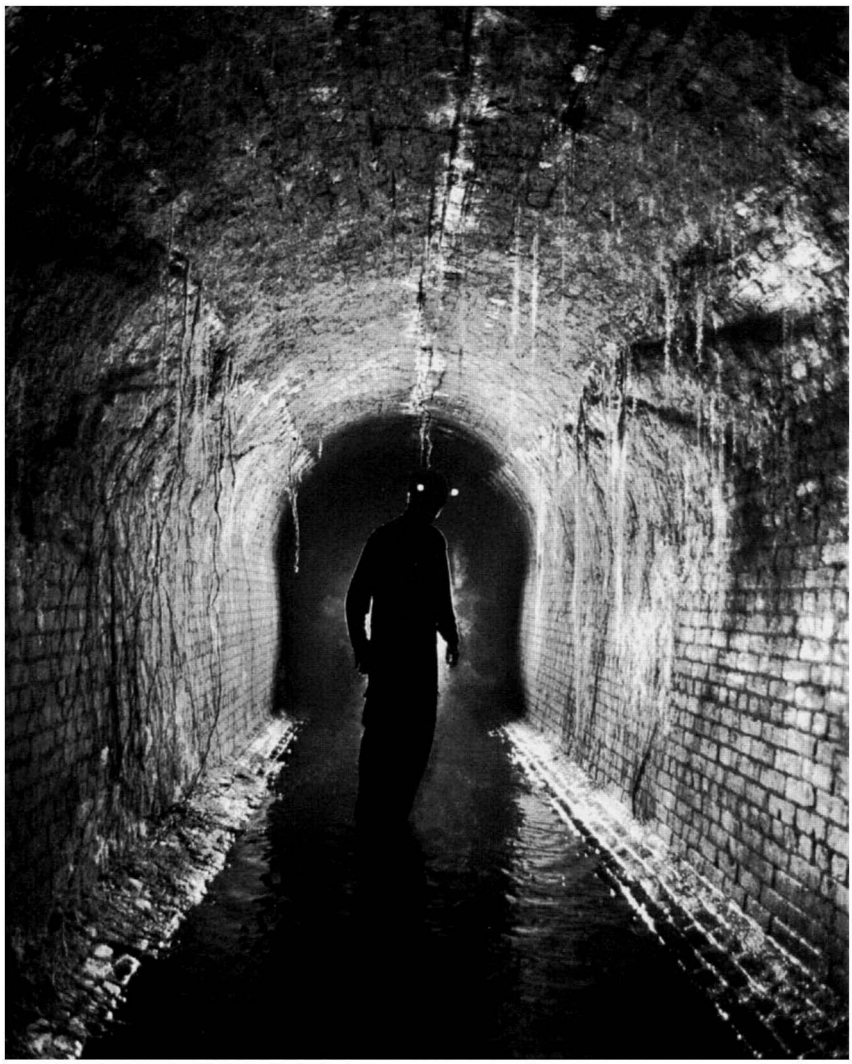

Figure 1.1 Inside the Croton Aqueduct

CHAPTER ONE

Introduction

New Yorkers have long been fascinated by the underground. Even a century ago, New York was described as a city of cave dwellers, whose cellars had many levels and whose communal Main Street had been superseded by the subway, with stations serving as new market squares. From labyrinthine diagrams, urban legends, and reports from the trenches, it would seem that if New York's underground were uncovered, a maze of canyons and chasms, riddled with a dense network of conduits and tunnels, would meet our eyes. The city's history is filled with attempts to harness the world below its streets. Possessing the world's most formidable collection of skyscrapers nicely shows how well New York stands up to engineering challenges. But at least a few New Yorkers know that the real adventure is far below, down the elevator shaft with the sandhogs, where you can feel and smell what New York is really made of and where the very fabric of the city vibrates with life.

Exploring New York's underground brings many surprises. One is that the hidden areas beneath the streets can be strangely peaceful and welcoming. It is specifically in its subterranean realms that this often chaotic metropolis becomes approachable; the secret spaces of the underground, desolate and beautiful, are the intimate surfaces of this gargantuan city. Above ground, New York treats its abandoned structures like seeds stuck between its teeth; well-meaning forces jab at them, hoping to reintegrate them into usefulness, yet eventually they are crushed or absorbed. In losing its ruins, the city is giving up a part of its soul. Only beneath its streets do the dark places linger; here are remnants from past centuries that haven't been renovated or modernized, structures that have been left to age alone in the dark.

My first forays into the New York underground were not to document tunnels, seek out the homeless, or write graffiti, but simply to venture into a world that would throw me for a loop. The subterranean environment was wild, unpredictable, not subject to the societal rules that reigned topside. It seemed incredibly desolate

Figure 1.2 A disused control tower beneath the City Hall area

Figure 1.3 Obsolete freight tracks below mid-Manhattan

and yet alive. Obviously people were passing through, but rarely would they show themselves as I wandered around.

But they left traces, including peculiar objects that remained, collecting dust, and coming across these was like entering a kind of fantasy realm, where the unexpected lay behind every turn. Walking a brightly lit but abandoned subway track beneath Brooklyn, finding a plastic toy train that someone had balanced perfectly on one of the rails left me puzzled. Not far from there I saw laundry hanging on a clothesline above a train spur, the clothes swaying like ghosts in the blue tunnel light. Who had left these things behind?

What was the story behind the carton of doll furniture, still sealed in cellophane, that had been placed like a present at the foot of an emergency exit's decrepit stairs? Why was there a room next to an abandoned tunnel containing nothing but a large hook near the ceiling, a ladder, and a rope? Clearly, there were interesting things going on down here, and in the solitude and expanse of these underground spaces, every detail was magnified; there was space and time for them to make an impression.

Some of the mysteries developed into narratives. It was striking to discover, in the late 1990s, a page by the graffiti writer Revs—a large section of a tunnel wall painted pale yellow and covered with what looked like a journal entry describing a childhood episode in Brooklyn. Out of context, this bright narrative seemed completely insane so deep underground. Only later did I find out that he had written more than 200 of these autobiographical pages all across the city's subway tunnels. Obviously there was a lot more going on here than met the eye.

There were also architectural oddities, and again, the deeper I delved, the more questions surfaced. Places such as the track areas of Grand Central Terminal, with their seemingly inexplicable stairways and crawlspaces, became just as intriguing as the derelict remnants of the city's first aqueduct. How astonishing to discover the sheer scope and intricacies of these man-made burrows.

Getting to the bottom of these mysteries, however, has become virtually impossible in recent years, as the shadow of the terror attacks on 9/11 has spread into all manner of subterranean spaces. The creative anarchy of earlier times has largely dissipated as security has tightened. The attacks have had a profound effect on New York's underworld, an area that now seems rife with threats. Here, in an uninhabited realm, dark and unfamiliar to most New Yorkers, the city appears particularly vulnerable.

In response, the underground is being policed like never before. Hatches have been sealed, subaquatic tunnels are guarded, and cameras have been installed. Information is disappearing off Web sites, archives are closing to the public, and photographers of infrastructure are increasingly met with suspicion. I was lucky to have discovered nearly all of the spaces in this book before the terror attacks and to have found a few kindred

Figure 1.4 A subway tunnel beneath Chinatown

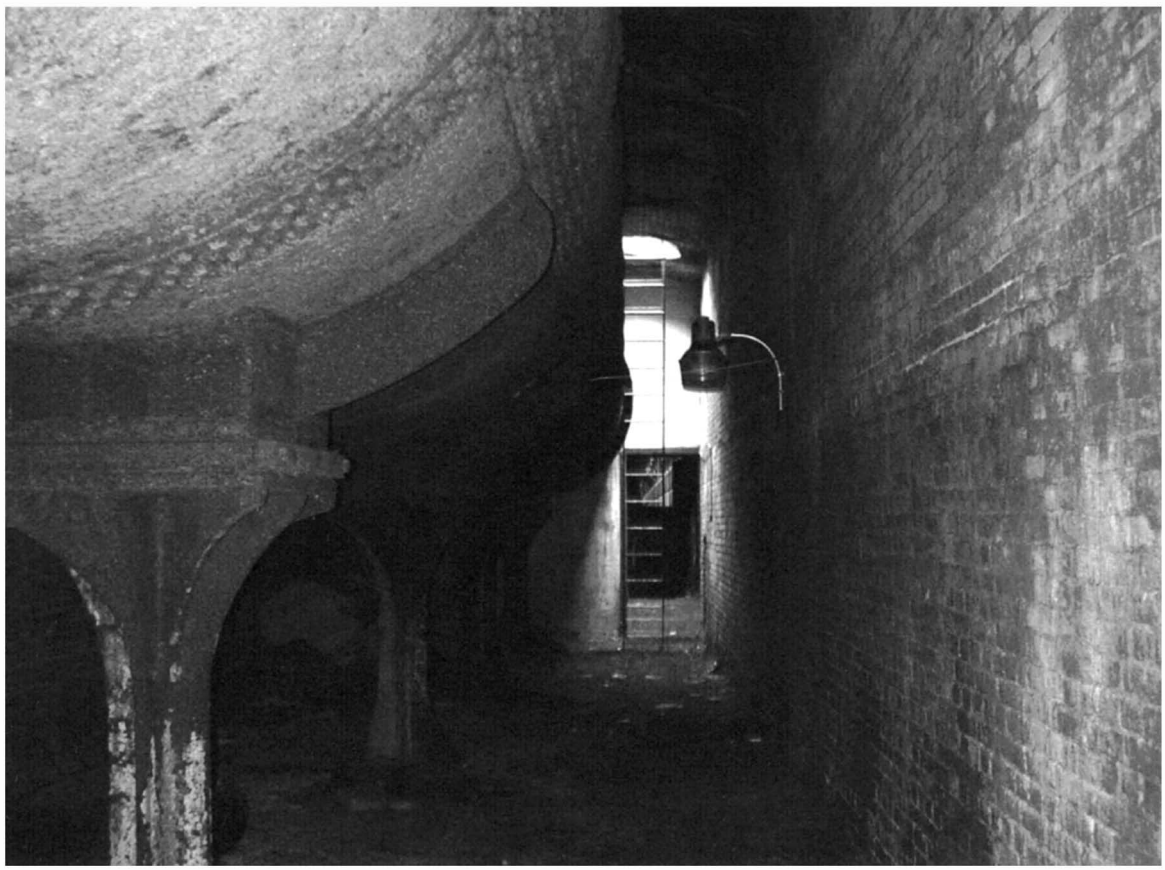

Figure 1.5 The abandoned water pipe inside the High Bridge

spirits among those who work below the streets, since it is now a bad idea to venture into the city's tunnels. Yet, my desire to transform a few of these areas into playgrounds for the imagination has not left.

A friend and I first began organizing scavenger hunts and other games in underground and ruined locations under the name Dark Passage in 1999. Three years later, I founded the preservation society Ars Subterranea, with the goal of introducing the public to more unusual underground spaces. And when we curated an art exhibition on subterranean New York inside the Atlantic Avenue Tunnel in 2002, the overwhelming amount of visitors demonstrated the public interest in this subject. Many spaces that would have been accessible to us only a few years ago are now closed to cultural events, but we will continue trying.

This book is rooted in the same motives — a passion for tunnels and a love for New York's underground. While it is intended as a fairly comprehensive overview of what lies below our streets, my attention has leaned toward the stories of people who have creatively broken new ground, such as the inventor Alfred Ely Beach, the sandhog Dick Creedon, the caver Chris Beauchamp, and the writer Revs. It is meant as an armchair guide to the city's nether worlds, not as an invitation for exploration, and that is why no private entry locations will be revealed.

The abundance of myths and legends that have sprung up about New York's underground is not surprising — about sewer inspectors who arm themselves with rifles and go on subterranean alligator hunts; about a forgotten subway station with chandeliers and fountains, where an old woman plays piano at night; about cathedral-like spaces hewn out of the granite far below ground. Most of these myths have their origins in historic events covered in this book.

As this world becomes increasingly shut to New York's public, I expect the legends will only grow in scope and embellishment. In the underground, at least, New York will always retain its mysteries.

Figure 2.1 Roots inside the long-abandoned Croton Aqueduct in the Bronx

CHAPTER TWO

A City Built on Treacherous Rock

"New York is a city that eats its history," Gerard Koeppel, author of *Water for Gotham*, wrote in 2002. As the finance capital of the world, the city has a long-standing reputation for being driven primarily by its quest for profits. Archaeologists and historians whose research depends on access to specific sites have traditionally had a difficult time in New York. Until the terror attacks on the World Trade Center slowed down developments in lower Manhattan, property values, not historic merit, set the standard for the use of many particular locations. Any archaeological excavation in downtown Manhattan, which could stifle the cash flow or obstruct rent collection, would have to fall by the wayside. Each hole in the ground needed to be covered as quickly as possible, each construction site transformed into rentable property.

In their book *Unearthing Gotham*, the archaeologists Anne-Marie Cantwell and Diana diZerega Wall address the reluctance of New Yorkers to integrate New York's historical background into the collective identity of the city. To many of its residents, New York is the emblem of progress; digging in the past is something best left to other, more sluggish towns. That the city's history is nonetheless being rediscovered and preserved is a relatively new phenomenon. As recently as 1963, barely anyone turned out to protest the demolition of the original Pennsylvania Station, and only when the monumental concourse had disappeared, to be replaced by the infinitely less attractive Madison Square Garden, did New Yorkers wake up. In 1965 the New York City Landmarks Commission was created partially in response to the ensuing public furor, just in time to save Grand Central Terminal from a similar destruction. In recent decades, New York developed a greater awareness of its historic relics and is paying closer attention to discoveries that anchor the city in its past.

A large part of these discoveries are made in the underground. The city's oldest colonial artifact, a coin from the year 1590, was found by an archaeologist

at a construction site in 1983. In the course of those excavations on Broad Street, the foundation wall of a tavern and a cistern from the seventeenth century also appeared, and, as part of the Stadt Huys project, are now being displayed below glass next to the finished building. The restoration of City Hall Park in the late 1990s yielded a staggering amount of artifacts and human remains just below the lawn, which have helped shed light on life in the colonial era.

Yet the recently awakened historic interest still has to compete with New York's self-image as the world's economic capital. Even as the public increasingly respects the underground as a potential treasure chest of artifacts, the rent needs to be collected, and fast. But New York's conflicted connection to its own underground goes even deeper. For centuries the city has carried on a well-documented love-hate relationship with its geological foundation, the rock bottom that allows a skyscraper's verticality in both the upward and downward directions. The solidity of the rock has permitted structural engineers to achieve record-breaking heights, yet the engineering feats that had to be accomplished just in trying to reach that rock have been no less pioneering. The geology of New York can always be counted on for a surprise: solid granite borders on decayed rock and quicksand in ways that are unpredictable and often dangerous.

The city primarily rests on a hard rock called Manhattan schist. Although its consistency is very tough, it is prone to decay, making tunnel construction especially perilous. Not all of Manhattan is well suited to support heavy buildings, and the idiosyncrasies of the rock foundation can be spotted from the surface by what might seem like a haphazard distribution of skyscrapers. Constructing a high-rise

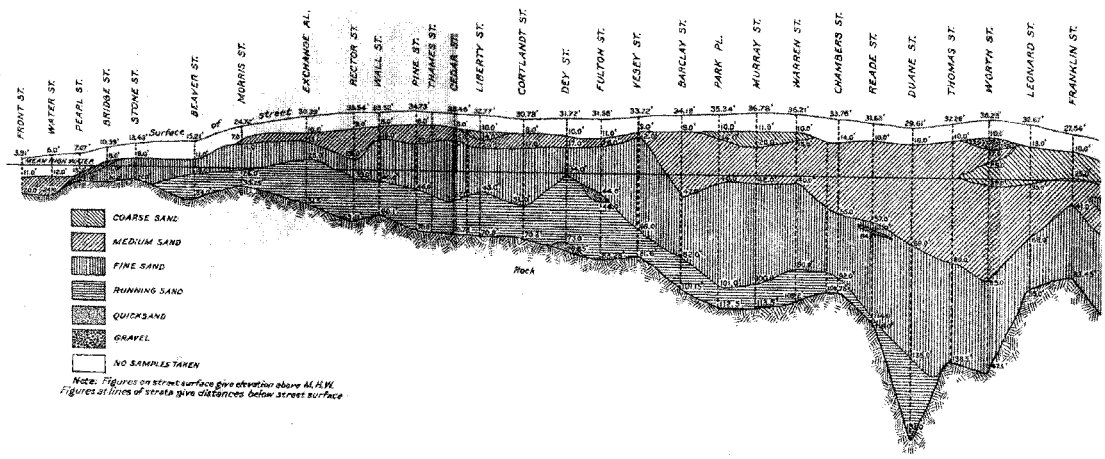

Figure 2.2 The varying depths of bedrock in lower Manhattan

above Houston Street in the East Village, for instance, would mean that engineers would have to dig more than 100 feet down in order to find the gneiss to support the structure. At Rockefeller Center, in contrast, the schist is so close to the street surface that it had to be blasted to make room for garages and basements.

Manhattan, an island of roughly 23 square miles, has several distinct topographic areas. The small hills that once speckled lower Manhattan were evened out in the course of city development — during the filling in of the old Collect Pond, for example. Toward upper Manhattan, the rock formations and hills become more apparent; north of Central Park the city is home to large ridges and fault lines. The highest point in Manhattan is at 185th Street, about 270 feet above sea level. Conversely — since the subway runs at a fairly level grade, even as the street altitude rises — the 191st Street station is the deepest in the New York subway system, lying 180 feet below ground.

Among the five boroughs comprising New York City, Manhattan is the one whose physical shape has changed the most in the last few centuries. Since the first settlers moved here in the sixteenth century, downtown Manhattan has grown

Figure 2.3 These building supports on West 123rd Street rest on bedrock above street level

by one third of its original area, mainly through deposits of soil and waste products. During the construction of the World Trade Center alone, about 1.2 million cubic yards of soil were excavated and deposited into the Hudson, creating an entire new neighborhood, Battery Park City. For foundation engineers, it can be a nightmare having to process these accumulated deposits before finding solid rock.

Subterranean construction is further complicated by underground rivers. That the city is riddled with streams buried deep beneath the pavement may conjure up images of romantic, cavernous grottoes straight out of Jules Verne. Unfortunately, these do not exist. But the waterways that have carved their beds into Manhattan's soil are still affected by tidal changes and continue to drive contractors to despair. Because they have been obstructed by building foundations does not mean they have lost their vitality.

These waterways used to run largely above ground before gradually being forced beneath the surface during the urban development of Manhattan. The water of what the early settlers called Turtle Creek, for example, contributes to a lake in Central Park, dips below 59th Street and the Metro-North train tracks under Park

Figure 2.4 The Viele map traces subterranean streams in New York

Avenue, until emerging in the East River in an area once called Turtle Bay, presently the site of the United Nations. Maiden Lane in lower Manhattan was named after the young women washing their laundry in the brook running along that street, while Cedar Creek flowed from a duck pond at Madison Square through Gramercy Park to the East River. The Stuyvesant Meadows and their various streams occupied a marshland area from Avenue A to the East River between Houston and 12th streets, where the water table still needs to be kept in check during any new construction. In Harlem, there were so many small streams that in the seventeenth and eighteenth centuries it was possible to travel from the Hudson to the East River by canoe.

Until the early nineteenth century, Minetta Brook flowed into the Hudson near Greenwich Village. The residents lucky enough to live beside this idyllic creek were able to catch the best trout in all of Manhattan here. Less pleasant was a large area of marshland surrounding the brook, which had been turned into a mass grave for slaves and yellow fever victims in the 1790s. When it was transformed into Washington Square Park in the 1820s, the swamp yielded more than 10,000 human remains. To dry out the soil during the park construction, the riverbed was diverted and forced underground. Today, a small street called Minetta Lane in the heart of Greenwich Village follows the course of the stream flowing beneath the pavement. The volatile creek — once referred to as "Devil's Water" — still occasionally floods the basements along its route.

Since subterranean streams in New York continue to dictate the plans of construction engineers, a topographical atlas by Egbert L. Viele from 1865 remains one of the most essential reference tools. Viele, a civil engineer, began tracing the city's watercourses in 1860, as many of the creek beds were already disappearing beneath buildings, often with dire results. "It is seriously to be regretted that the engineers who laid out this city did not know that the streams then observable on the island were fed by perennial springs," he mentioned to a newspaper in 1892. "They made the fatal mistake of not providing a system of drains to carry off this living water that is constantly bubbling out of the rocks on which the city is built, and which will find an outlet somehow."

Viele's concern was that the streams for which no proper drainage had been provided were spreading diseases, and as the sanitary engineer of Central Park, he helped design an elaborate drainage system 18 miles long, which prevented the buildup of contaminated groundwater. But his astonishingly precise topographical map is valued by structural engineers to this day for the simple reason that it prevents their excavations from ending in disaster. When the chief engineer for the Chase Manhattan Plaza decided to forego Viele's map during the plaza's

construction in 1957, his crew was unprepared for the fact that the building site lay directly over a stream, which had caused an accumulation of quicksand. To salvage the site and keep the water out of the foundations, a barrier of silicic gel had to be injected into the mud for the first time in the construction history of New York.

Not only live streams but even entire ships have been found in New York's underground. During the excavations for the Cortlandt Street subway station in 1916, the workers suddenly came across the remains of an old vessel. James Kelly, their foreman, happened to be a history buff, and he was excited by the find. Nearby Greenwich Street had originally been right on the Hudson's shore, and Kelly was convinced that the ship lying before him in the underground belonged to a group of vessels that had arrived here from the Netherlands in 1613. One of their number, a ship called Tijger, had burned down just off the coast of West Manhattan. Although the archaeologists he contacted did not seem to share his enthusiasm, he had the prow sawed off and removed to a large aquarium. A subsequent analysis of the wood, now displayed by the Museum of the City of New York, revealed that it did in fact stem from the years between 1450 and 1610.

But only the part of the ship obstructing the subway dig was salvaged. The remainder, along with all the other old artifacts (a cannon ball, tools, pipes, shards) were reburied. Although archaeologists were assigned to look for the vessel when the area was excavated again during the construction of the World Trade Center, they were unable to locate the rest of the ship.

Today it is not as easy to rebury artifacts of historic value. Since the introduction of the National Historic Preservation Act in 1966, every construction site in New York that is at least partially funded by the government has to be examined by an archaeologist, and each unearthed artifact needs to be documented. Of course it is still possible for construction companies to hire archaeologists whose loyalty doesn't necessarily lie on the side of historic discovery and who might try to obscure any finds that could potentially shut down the building site and incur momentous financial losses.

The regulation of 1966 does, however, give the city a unique opportunity to find out more about its past. One significant find was made in 1991 at a construction site on the corner of Duane Street and Broadway, at what has since been known as the African Burial Ground, where the General Services Administration was planning to build an office tower. Archaeologists unearthed hundreds of human remains from the eighteenth century at this forgotten cemetery, which is believed to have contained up to 20,000 bodies beneath a 20-foot layer of landfill. The skeletons, many of which turned out to be those of slaves, were numbered and photographed

Figure 2.5 Rebuilding the foundation of 7 World Trade Center in 2003

before temporarily being transferred into boxes, until, over a year later, the property owners put an end to an exhumation that had cost more than 20 million dollars.

As a result of the preservation efforts of several African American groups, the GSA set aside an area for the reburial of the human remains, which, in the meantime, were stored in the basement of 6 World Trade Center, with artifacts and documentation, until they were beset by an unexpected turn of events. Fortunately, despite the structural devastation in the area, this project did not become another casualty of the terrorist attacks on 9/11. New crypts were constructed to receive the coffins, and in October 2003, the remains were finally returned to their resting place.

part I Utilities

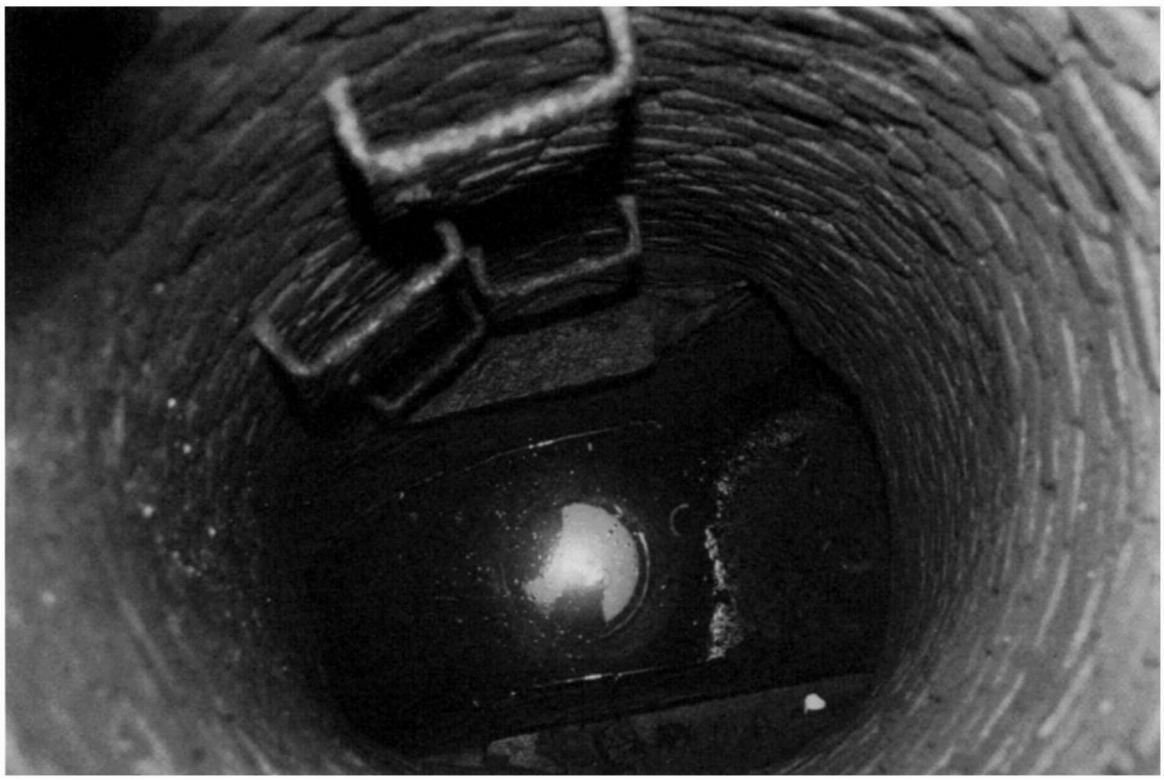

Figure 3.1 A manhole leading to a branch of the former Croton Aqueduct in Soho

CHAPTER THREE

Struggling for Fresh Water

There is a small street in Soho that is barely longer than an alley and, surprisingly, contains no stores. Few people would probably guess that a manhole in the pavement of Jersey Street drops straight into one of the relics of New York City's first aqueduct. The brick-lined conduit below a manhole cover from 1866 is part of a network that stretches from Lower Manhattan all the way to the Croton River in the north.

New York has never had it easy in its procurement of fresh water. The Hudson River, which branches into the East River south of the Bronx, consists of salt water in the city's vicinity, leaving Manhattan with few options. The early settlers built the first public well in 1677 near the fort at Bowling Green, and for the next hundred years, much of the drinking water was distributed by pumps placed at various street corners. The largest direct water supply was the Collect Pond, which once took up a considerable area around what is now Foley Square.

The Collect Pond was the size of several city blocks and so deep that up until the eighteenth century it was believed to contain sea monsters — and patriotic ones at that — as they were said to have captured at least one British soldier trying to swim across during the Revolution. The lake, which even had a small island in its center, was originally surrounded by rolling hills and tranquil meadows. But like Manhattan's creeks, it became hopelessly contaminated, and as sanitary conditions deteriorated toward the end of the eighteenth century, drinking from the Collect Pond became a health risk. Yet the city's residents, desperately thirsty, had no other recourse. A yellow fever epidemic in 1798, spread by foul water, took so many lives among the then 60,000 New Yorkers that the public increasingly began to clamor for a remedy.

Among the many proposals for new water systems received by the city, that of Aaron Burr was among the most highly regarded. It was a somewhat primitive undertaking: the pipes were to be fashioned from hollow tree trunks, running

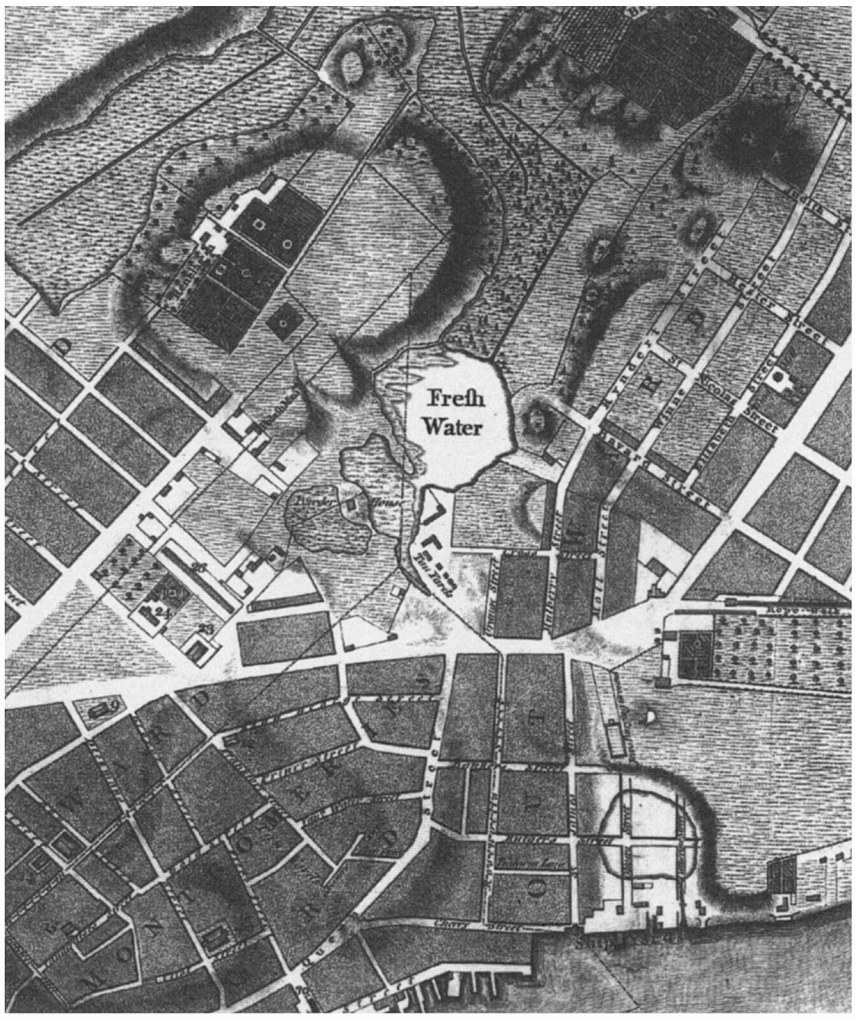

Figure 3.2 Until it was drained in 1803, the Collect (Fresh Water) Pond supplied increasingly contaminated drinking water

from a reservoir on Chambers Street directly to those houses in lower Manhattan that were willing to pay for the service. In 1799, Burr's Manhattan Company received city funds to install its pipes below the streets. But providing a new water supply was only of secondary interest to Burr, who sought to profit from the venture. He ignored his pledge to bring in fresh water from an untapped source north of lower Manhattan and instead built new pumps to divert the contaminated water from the Collect Pond to the reservoir on Chambers Street. In the end, although some households did connect to his water system, Burr used the remaining funds to start a financial institution, today's Chase Manhattan Bank.

New Yorkers continued to resort to wells; one shaft that was dug at Broadway and Bleecker Street in 1832 descended more than 400 feet before reaching an underground stream. Not far from there, at Broadway and 13th Street, the groundwater was tapped specifically for the fire companies, who had a hard time

trying to quell the frequent blazes. But in 1835, a devastating fire ripped through the city and destroyed around 700 buildings, including historic houses of the first Dutch settlers. This at last brought some urgency to the search for water, and the city decided to tap the Croton River north of Manhattan by building a long water tunnel that would feed two large new reservoirs.

In 1837, work was begun on the forty-one-mile-long Croton Aqueduct. From the north, the masonry tunnel wound past Ossining through a forest in the Bronx, passing into Manhattan across the High Bridge and then descending toward the Receiving Reservoir in what would become Central Park, and the Distributing Reservoir on Fifth Avenue and 42nd Street. From this reservoir on Murray Hill a network of pipes ran like arteries through the city. The tunnel, which was built on a downward grade across its entire course, is still considered one of the great engineering marvels of the modern world.

The inauguration of this enormous system in 1842 included an unusual journey: a small skiff with four passengers, the "Croton Maid," accompanied the first flow of water through the tunnel. It took two days for the water to make its way to City Hall, where its arrival was greeted with much cheer and excitement in the greatest public celebration the city had ever experienced.

Yet this new resource could not quench New York's thirst for long. Between 1860 and 1912, more than 25 million immigrants passed through the city, and what had seemed like an extravagant water supply soon felt like a mere trickle. Additional

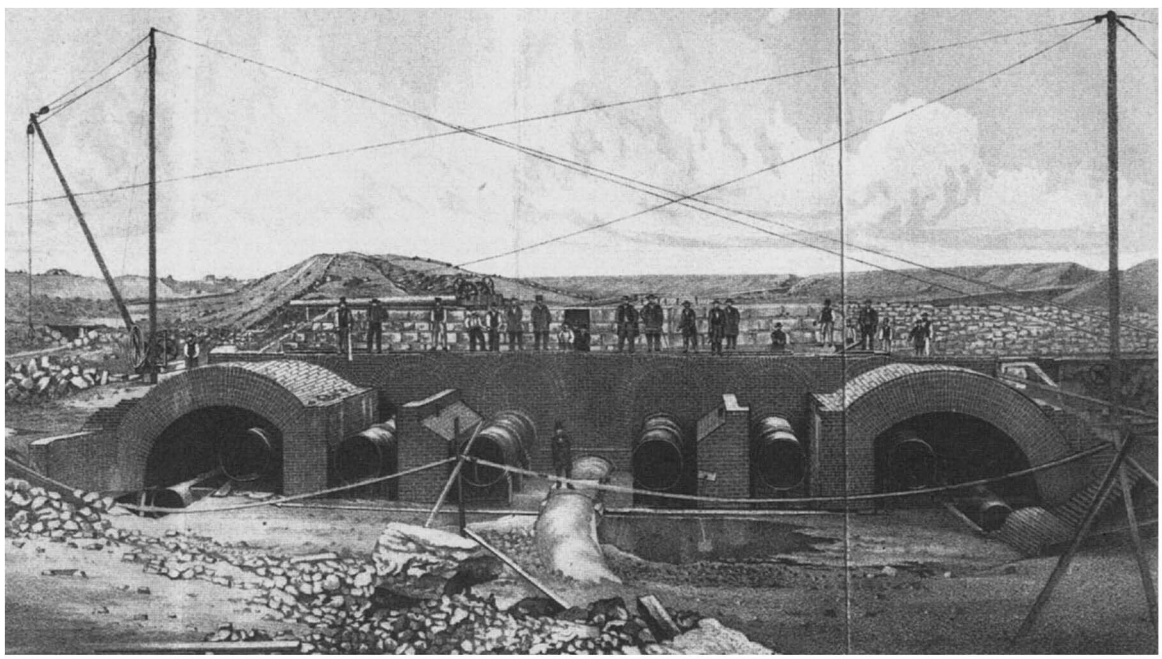

Figure 3.3 Construction of the South Gate House in Central Park