The Stamford Review®

Winter 2009

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holland cabinet
ROMAN THOMAS
New York 2006

WALNUT, PINE, MERCURY GLASS,
BRASS, LEATHER,
H 33.5 W 43 D 15.5

chichester
CAROL MANGAN
New York 2002

GOUACHE ON PANEL
H 59 W 96

cartella sconce
FERRAN
Spain 1974

FORGED IRON, HAND STITCHED
PAPER PARCHMENT
H 8 W 8 D 5

vase
EDWARD HALD
Sweden 1925

HAND BLOWN & ENGRAVED
SLIPGRAAL VASE
H 8 D 5.75

to the trade

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Introduction

One of the few benefits of the present economic crisis is a greater willingness to fund infrastructure improvements. These have been sadly neglected over a number of years, and the risk of negative consequences has grown. Infrastructure lacks glamour, and therefore the attention it deserves, yet it is critical to our economy and to our day-to-day lives.

In this issue, five experts have written about various components of our public infrastructure. Their backgrounds and expertise are summarized on the opposite page.

Their articles make important proposals for maintaining, governing and funding New York's traffic, electrical, water and sewage systems. Yet these problems are nationwide.

We dedicate this issue to a new president and administration, and to legislators and voters who seem finally willing to address them.

Larry Sicular
Editor

Photo: Melissa Gorman

Can New York Keep the Lights On?

Max Schulz

IT has been more than five years since the plug was pulled on New York City. Shortly after four o'clock on the afternoon of August 14, 2003, electricity vanished in an instant. Most businesses were operating without backup generators; operations ceased, and computer systems crashed. Restaurant freezers failed, and traffic lights went dark. Excepting the honking of car horns, the hum of the city gave way to silence.

Once more, stranded New Yorkers crossed the city's major bridges by foot to get home. Flights were grounded at LaGuardia and JFK. Cell phones failed to work. A general sense that nobody "knew what was going on" enveloped a metropolitan area of roughly 20 million. New Yorkers could be forgiven for thinking they were targets of yet another terrorist attack.

The 2003 blackout affected not only New York City, but also large portions of the Northeast and Midwest, as well as Ontario, Canada. But as the nation's media and financial capital—before Wall Street's implosion and with the wounds from 9/11 still raw, it seemed to most deeply affect New York.

The lights went out again in July 2006. Tens of thousands of New Yorkers, mostly in Queens, were without power for over one week.

The causes in each case were wildly different, yet the practical effect was exactly the same: The juice that powered people's lives and livelihoods was cut off, and everything stopped. Unfortunately, there is every reason to think it will happen again.

A WARNING

The New York Independent System Operator (NYISO), the nonprofit corporation responsible for operating the state's bulk electricity grid, has issued grave warnings about New York's electricity system in recent years. According to the NYISO's last two annual Power Trends reports, the condition of the grid is adequate to meet near-term reliability requirements for the state, but only through 2011. The NYISO analysis predicted "a change for the worse" in the next several years unless significant infrastructure additions are made. NYISO insists that the state must build power plants to add electricity generating capacity. Otherwise, with too much demand chasing too little power, the lights will go out once more. A recession might slow the growth of electricity demand and give New Yorkers a little breathing room, but probably not much. Electricity demand has increased inexorably for decades, despite occasional economic downturns. The bottom line, according to NYISO, is that New York needs more power.

The group has identified particular vulnerability in the city and close-in Westchester and Rockland counties. An additional 500 megawatts (MW) of resources are needed in New York City, and fully 750 MW in the Hudson Valley, in order to meet reliability needs in 2012.

To meet statewide energy requirements by 2017, according to the NYISO, the Empire State will need the equivalent of 2,750 MW added to the bulk electricity grid, some portion of which must be located in New York City and Long Island. This includes replacement of 1,300 MW due to the planned retirement of several generating plants by 2010.

How much is 2,750 MW? Consider that the Indian Point nuclear power plant north of New York City has two operating reactors, each with an operating capacity of about 1,000 MW. These are huge power generators, capable of supplying gargantuan amounts of electricity. There are only about 70 generators in the entire country capable of supplying 1,000 MW of power. What the NYISO is saying is that New York needs about three more, and pronto.

Avoiding disaster is in the hands of New York state and city officials who should make sure new power plants get sited and built. But other aspects of mitigating the danger of blackouts are largely out of their hands. The 2003 blackout didn't start in New York, though its waves swept over the state like a tidal surge. It had to do with the peculiar fragmented nature of the nation's electricity grid.

THE TRIUMPH OF THE GRID

In 2003, the National Academy of Engineering, a division of the National Academy of Sciences, ranked electrification as the single greatest engineering achievement of the 20th century. By "electrification," it meant the development of the system of generation, transmission, and distribution of electric power to virtually every corner of the United States. In effect, the National Academy cited the grid as the supreme achievement of the century.

It speaks to the importance of our electricity system that the nation's premier group of engineers considers its development more significant than the automobile (ranked second), the telephone (ninth), or computers and the internet (eighth and thirteenth, respectively).

Yet the average American is oblivious to the centrality of electricity to daily life. We expect the lights to turn on when we flip the switch, with virtually no thought to the coal mined from deep underground, or its shipment by rail or barge to a distant power plant.

There it is pulverized and burned to provide steam to spin the turbines that generate electricity, which is ramped up and transmitted hundreds or even thousands of miles along high-voltage transmission lines. Only then is it handed off at a substation, where the power is stepped down for distribution to home meters, making its way through home wires to the lights and computers and appliances.[1] Whereas we routinely marvel at many other technological achievements, we scarcely think about the electricity system until it fails us.

Our electricity generating and delivery system is a complicated marvel. It is comprised of nearly 17,000 big and little power generators nationwide, with a total generating capacity of about 1,000 gigawatts (GW). Most of these are tiny, but there are behemoths, too. There are more than 800 electric generators capable of producing more than 250 MW of power each. Half of those can generate 500 MW or more.

These plants are owned and operated by more than 3,100 electric utilities; more than 200 of these are investor-owned and provide nearly three-quarters of the nation's power. Additionally there are more than 2,100 non-utility power producers feeding electricity into a system marked by several hundred thousand miles of high voltage transmission lines, over 100,000 substations, and an additional 2.5 million miles of local distribution wires.

The Electric Power Research Institute (EPRI) put the value of North America's transmission and delivery system at $358 billion, and says that "with its millions of transformers, circuit breakers, and other components, it is the most complex machine ever invented." And perhaps the biggest as well; it is the second largest physical structure in the United States, after the nation's system of highways and roads.

This amazing system serves the needs of more than 130 million customers, representing nearly every business and household in America. Colloquially referred to as "the grid," it is as interesting for what it isn't as for what it is. It is not a system that was engineered or designed by a single governmental authority, the way the Interstate Highway System was developed top-down by the Eisenhower Administration. It was not created or designed by any of the men we recognize as giants in the field of electricity, like Edison or Tesla or Insull or Westinghouse. It is not a singular, defined, completed structure like Hoover Dam or the Golden Gate Bridge.

Strictly speaking, in fact, it is not even a single

grid. It is a powerful, efficient, massively sprawling and ever-growing network of technology that has developed organically over the full course of the 20th century. It is not one system, but several. There are three distinct major independent power networks, or grids, that have evolved in the United States. One is east of the Rocky Mountains, one west, and one handles most of Texas (Hawaii and Alaska are not included). These interconnections are largely independent from each other.

Within these three grids are many smaller, regional ones that emanate from power plants built to serve nearby urban load centers. Throughout the better part of the 20th century, each power plant served its own localized grid. The focus was on distribution systems designed to move power in one direction—from power plant to end user. Over time, as power plants grew larger and more efficient, they were located further away from the load centers. Electricity generators relied upon improved high-voltage lines to transmit their electricity to increasingly distant markets.

While operators stretched out these grids, they also realized that the reliability of their systems could be enhanced by linking with nearby systems. Thus independent and localized grids stretched out and linked to each other. In time these morphed from independent and localized systems to multi-state ones that linked entire regions.

Restructuring and deregulation efforts in the 1990s encouraged the sale of power across state lines, further stretching the grid and facilitating interstate commerce. Utilities split themselves into transmission companies (whose rates were still regulated) and generation companies (whose rates no longer were). With rates strictly regulated (a prerogative jealously guarded by authorities at the state level), transmission companies lacked the incentive to invest in the maintenance and upkeep of their wires. All of these developments conspired to develop the electricity generation and transmission and distribution system we name today the grid. All conspired to plunge a huge portion of North America into darkness one quiet August day.

INHERENT VULNERABILITIES

A structure as large and spread out as the grid is vulnerable on various fronts. Its high-voltage transmission lines convey as much power as is produced by the engines of a 747, and very nearly at the speed of light. A number of circumstances can instantly send a massive, destructive surge of power up or down these lines—peak loads on a hot summer day, a major weather event, or even human error. These can send huge amounts of power surging up and down the system, much like waves sloshing in a bathtub. The system depends on its circuit-breakers, switches and transformers to route power by handling and flattening it out. These are designed to protect the system from any calamitous surges.

While the grid has become more efficient and more powerful, in order to meet the demands of the increasingly electrified and digital economy, it still relies on technology developed in the 1950s. Most of the grid's key switches, for instance, are spring-loaded, electromechanical devices, not solid-state, ultra-high-power silicon switches that could control grid power flows much faster and more reliably.

The grid's switches are controlled by regional transmission authorities and utility control centers that rely upon "supervisory control and data acquisition" (SCADA) networks for information about the state of the grid. But the software systems needed to monitor and process this information weren't fully in place in August 2003.

What kicked off the greatest blackout in human history wasn't a power overload. As summer days go, August 14, 2003, wasn't particularly hot, and consumers weren't taxing the grid by cranking their air conditioners. But power lines expand and sag when transmitting electricity, and one sagged a little too much. It was later determined that a tree in northeast Ohio interfered with a power line, causing a series of power outages near Cleveland and sending waves of power surging over the lines. This happened quickly, but not instantaneously. There was still time to send warning to other grid operators, but no warning ever came. A joint U.S.-Canadian investigation found that a computer was switched off while a technician was out to lunch. With no one to sound the alarm, and the system unable to protect or police itself, utilities across the northeast United States were not notified of the massive surge of power about to overwhelm their networks. The ancient electromechanical switches were no match against the cascades of power that plunged 50 million people into darkness.

The blackout that shut down power in Queens in

2006 was a more conventional outage. A heat wave hit the city that week, and electricity demand spiked. The city's aging electricity infrastructure could not handle the load. Feeder cables serving portions of Queens—some more than half a century old—failed, putting greater stress on others. They too failed. It took Consolidated Edison 10 days to restore power to some parts of Queens. More than 150,000 people were affected, and the extent of losses suffered by businesses is still unclear.

CAN WE STOP IT FROM HAPPENING AGAIN?

The tragedy of the 2003 blackout is that the technology and know-how exist to prevent it. In the future, the question is whether the regulatory and legal regime will provide incentives for their deployment.

Congress took some important steps in a comprehensive energy bill in 2005. It established mandatory reliability standards for utilities, and made subject to punishment the sort of human error that helped cause the 2003 blackout. But the technologies that could be used are not yet successfully deployed. As Peter Huber and Mark Mills wrote in their 2005 book *The Bottomless Well:*

"With advanced control software, interconnected data networks, and high-speed, high-power switches at key locations, the grid could readily be made as smart as it is powerful. Power suppliers know where to put the software and switches. What regulators entirely failed to give them, however, was any economic incentive to deploy them—the prices suppliers could charge were set too low, with no premium for maintaining a more reliable grid or penalty for failing to do so. However unwittingly, regulators contrived to channel investment capital away from the wires that needed it most."

The challenge for policymakers is encouraging the investment that will make the grid as smart as it is powerful.

Each year, the problems grow more threatening. Demand for electricity is increasing steadily. Government efforts to promote conservation and efficiency are unlikely to do anything but slow the growth of energy demand. New power plants are needed, as are more transmission wires, as part of the build-out of a backbone high-voltage national electricity grid. Also needed are upgrades to smarter equipment that use silicon switches and computing technology instead of the old electromechanical devices. The energy infrastructure that worked reasonably well in the 20th century is overmatched by the demands of the 21st century.

Building new power plants in New York is easier said than done, ever since the expiration of Article X of the Public Service Law nearly six years ago. Article X was a power plant siting law that provided a one-stop permitting process, cutting the amount of time it took proposed projects to win approval. It also consolidated the process for considering local objections to proposed plants. Once a project was approved, it couldn't be tied up in courts by localities' NIMBY objections.

The law expired at the end of 2002, and the state legislature has consistently failed to extend it. The permit process for getting a proposed power plant is now onerous and prohibitive. The numbers tell the tale: The late 1990s saw the initiation of six new large power plants with a combined generating capacity of 3,400 MW. Since Article X expired, only one large-scale power plant has been initiated—the 350-MW Caithness Long Island Energy Center, a combined natural-gas and oil-fired facility, due to go online in 2009.

Siting transmission lines in New York is hardly easier, largely because of environmental and NIMBY opposition. The Energy Association of New York notes that it has been two decades since the last major transmission line was approved and sited.

In addition to increasing the likelihood of blackout, inadequate transmission capacity leads to congestion charges that drive up the price of power. The U.S. Department of Energy (DOE) estimates that congestion charges in 2008 will cost customers on the eastern grid $8 billion, or about $40 per person. But those costs are not evenly spread out. DOE figures that New York City area residents paid $90 per person in congestion charges in 2005.

Of course, those numbers are piddling compared to the full-blown economic losses from a serious blackout. ICF Consulting estimated that the 2003 blackout accounted for between $7 billion and $10 billion worth of damage.

A key component to whether New York and the Northeast U.S. can avoid another blackout is whether policymakers will help foster development of a far more robust transmission network than currently serves

us. That largely means construction of a high-voltage transmission backbone overlaid on the existing system, reinforcing electricity delivery and minimizing the chance of breakdowns. A national high-voltage electricity backbone will enhance efficiency, lower retail electricity prices, and facilitate the use of renewable energy sources.

CHANGE IS POSSIBLE

As with siting power plants, that's no simple feat. Two critical issues must be resolved. First, how can high-voltage, multistate lines get sited, especially given the parochial concerns of local regulators with the power to approve or reject proposals? Second, who should pay for them?

The first crucial step requires us to rethink the way we view transmission. Though originally local, electricity transmission has become increasingly regional and encompasses many states. We need to consider this sort of transmission—the moving of electrons across state lines—as interstate commerce, giving regulatory authority to the federal government. Siting multistate transmission lines with regional or national benefits should be the purview of the Federal Energy Regulatory Commission, not local or state regulatory authorities (though they should certainly keep jurisdiction over wires wholly within their areas). Utilities and investors need to know that they can get rights of way end-to-end. Otherwise, they won't sink money into needed projects.

A precedent for this sort of regulatory system exists. One obvious example is the interstate highway system, administered by the federal government and funded by federal gasoline taxes. Another is natural gas pipelines. At a recent Manhattan Institute forum on the need for a national electricity grid, Philip Moeller of the Federal Energy Regulatory Commission said, "If you take a look at what FERC's authority is in terms of siting interstate natural gas pipelines, they get built. And if you look at what happens with trying to site interstate transmission lines, you know, not a whole lot of them have been built in the last 20 years. Now, there are a number of reasons for that, but siting is probably, by far, the top one."

A federal regulatory presence is also necessary to allocate the costs of large-scale transmission projects. Transmission rates are customarily determined at the state level by public service commissions and similar entities. But who should pay for lines that cross numerous states? Ultimately, of course, it's ratepayers. Figuring out which ratepayers to bill and how to bill them is a political challenge far more complicated than the engineering challenge of laying wires and shipping power over long distances.

That's why FERC is probably best suited to step in, determining the rules by which transmission projects of national interest can get sited and the mechanisms by which investors can recover their costs. Until Congress moves to shore up the federal government's oversight of long-distance transmission wires, various regions of the country will be susceptible to avoidable blackouts and power outages.

The New York economy has taken a lot of hits over the last decade. And in addition to the 9/11 attacks and the 2003 and 2006 blackouts, it is facing a financial crisis.

But it still needs electricity. Will it face other blackouts? The odds suggest that it will, unless policymakers in Washington and Albany take appropriate steps.

Electricity is very often described as the lifeblood of an economy. A better, slightly different, analogy is life-support; pull the plug, and if you wait long enough, your patient dies.

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Notes

1. Coal provides half of America's electricity, while natural gas and nuclear power provide about 20 percent each. Large hydropower provides about another 7 percent, while renewables like wind and solar provide less than one half of one percent of the power American's use. Oil accounts for a similarly negligible percentage of America's electricity generation. In the case of New York City, the numbers are a little different. The law requires that 80 percent of the city's power be generated within the city. Residents therefore rely much less on coal than on power from in-city power plants that burn natural gas and oil. Much of the rest of NYC's power comes from nuclear power (like Indian Point) and hydropower.

Congestion Pricing

What Went Wrong and What Can Be Done

C. Kenneth Orski

THE proposal to charge motorists a fee to enter Manhattan, south of 60th street during daytime hours, was popularly known as "congestion pricing." It died in April 2008 after a year-long debate and intense lobbying by Mayor Bloomberg and a coalition of business, civic and environmental organizations. The plan failed when Assembly Speaker Sheldon Silver concluded he did not have enough votes to pass the enabling legislation. But the underlying reasons for the plan's failure were a far more complex set of factors—that had to do as much with political chemistry and personalities as with the substantive merits of the pricing proposal.

The demise of the congestion pricing plan was publicly mourned by many but quietly celebrated by probably an equal number. Transportation Secretary Mary Peters issued a terse announcement calling the decision "deeply disappointing" while preparing to distribute the money, originally intended for New York City, to other aspiring congestion-fighting cities. Mayor Bloomberg blasted the state legislature for its "cowardice" in not being willing to stand up and be counted. "It takes true leadership and courage," he said, "to embrace new concepts and ideas and to be willing to try something.... Unfortunately, both are lacking in the Assembly today."

The New York press corps was largely on the side of Mayor Bloomberg and against Speaker Silver whom they singled out as responsible for the collapse of the congestion pricing plan. "Rarely does one man have a chance to do so much harm to so many," editorialized The *New York Times*. But the truth was far more complicated than the editorial writers would have us believe.

WHY CONGESTION PRICING FAILED TO WIN APPROVAL

From conversations with opponents as well as advocates of the plan, including several state legislators from both parties, emerged a complicated tale. It was of a bungled strategy to steer a complex and politically vulnerable proposal, in an election year, through an alienated state legislature, predisposed to treat the mayor's initiative with skepticism.

To be sure, the plan was strongly opposed by the residents of the boroughs of Queens, Brooklyn, and the Bronx on the grounds that the congestion fee would pose a hardship to low-income commuters who had no option but to drive. The elected officials from these boroughs viewed the proposed congestion fee as a regressive measure enacted on the backs of low-income constituents and small businesses to benefit affluent Manhattanites. "The word 'elitist' came up a number of times," noted Queens Assemblyman Mark Weprin, a longtime critic of the proposal, describing discussions among his fellow Assembly Democrats. He estimated that opinion among them ran four-to-one against the plan.

But to the extent that the debate veered from the issues of traffic mitigation and environmental benefits

to transit financing, the proposal generated additional objections. Suburban officials from New Jersey, Long Island and Westchester County, whose constituents would have borne much of the cost, saw little benefit from Manhattan-centric transit improvements such as the Second Avenue subway and little reason to support the cordon fee.

The more congestion pricing became publicly associated with the need for a steady stream of revenue to support the financially strapped MTA, the more it appeared simply as a commuter tax in disguise. The issue of interregional equity came to a boil when New Jersey Governor Jon Corzine threatened to take legal action if the city went ahead with the council proposal to charge New Jersey commuters an extra $3 on top of the $8 toll they already pay to cross the Hudson. The governor's warning was followed by a letter from New Jersey Senator Robert Menendez asking the federal government to deny New York City the promised $354 million grant, on the grounds that the proposal created an unconstitutional burden on interstate commerce.

Issues of fairness and equity, however, were not the only factors that made the plan vulnerable and undermined its credibility. Many of the operational problems raised during the year-long debate remained unresolved or were treated only in the most superficial manner. Among them were the problems of dealing with commuter parking at subway stops on the periphery of the congestion zone; the provision of adequate transit access to subway stops in the outlying areas of Queens and Brooklyn; the challenge of absorbing the diverted commuters by a transit system that is already overburdened and running at peak capacity; the mechanics of providing the proposed tax credit to low-income commuters; and the question of how to ensure that the collected congestion fees would remain fully dedicated, as promised, to mass transit improvements. An additional unresolved problem arose, late in the game, when the City Council demanded that the Port Authority pay an extra $1 billion per year for the city's mass transit, or collect an additional $3 congestion fee from New Jersey commuters.

Many legislators felt that the proposed legislation needed to be amended to address these outstanding issues and to restore the plan's original intent to conduct a three-year pilot project (the project morphed into a permanent program without a sunset provision so as to enable long-term bond financing for capital projects). However, the mayor appeared to reject the idea of any further negotiations. "The time for changes has long come and passed," said Mayor Bloomberg. Such a display of inflexibility was not the way to gain allies and influence the legislative process in Albany.

Moreover, many critics felt that the traffic mitigation benefits of the plan were oversold. Assuming that the congestion fee would result in measurable reductions in the number of vehicles entering Manhattan, many of the underlying conditions causing its traffic congestion would have remained. These include double parked vehicles, truck deliveries, lane-blocking utility repairs, taxicabs discharging and picking up passengers, rampant violations of the block-the-box prohibition, and pedestrian-vehicle conflicts at street intersections.

Decisively, Albany lawmakers were offended by what they felt were heavy-handedness and strong-arm tactics on the part of Mayor Bloomberg. An example was the mayor's behind-the-scenes support of a political action committee whose objective was to defeat lawmakers who did not support the plan. "All politics is relationships and... the mayor just does not know how to approach the Legislature," said Manhattan Assemblyman Michael Kellner (quoted in The *New York Times* article, "Bloomberg Tactics Were High-handed, Lawmakers Say," April 8, 2008). Making a bad situation worse were the high pressure tactics of persuasion and intimidation used by the mayor's surrogates. "If you are against [the plan] you're going to have a lot of explaining to do," one senior aide was quoted as threatening legislators in Albany. What may have been tolerated coming from the boss was resented and considered arrogant and offensive coming from the mayor's minions.

THE WIDER IMPLICATIONS

The defeat of the congestion pricing plan has been a severe blow to Mayor Bloomberg's political legacy. But how much of a setback has it been to the concept of congestion pricing and its future application in other jurisdictions? Probably not much. Numerous other candidates for the $354 million in grants that New York City has forfeited eagerly lined up for the money. (Eventually, the city of Los Angeles and King County, Wash. were named as alternate beneficiaries with grants of $213.6 million and $154.5 million, respectively, to support "innovative

approaches to reducing congestion.")

It should be pointed out that the New York City proposal did not involve congestion pricing, strictly speaking. The fee lacked the element of variability that is thought to be essential to effectively control the level of congestion. The proposed NYC "congestion charge" was more akin to a conventional toll charged at the point of entry into the cordon area—not unlike the tolls already in existence at the trans-Hudson bridge and tunnel crossings. (The only distinction being that the NYC plan would have allowed multiple daily crossings of the cordon boundary at no extra charge for delivery trucks making multiple daily trips into and out of the charge zone).

Conventional road tolls are already well accepted by the public and state legislatures, as evidenced by the substantial number of jurisdictions planning to introduce tolling on newly-built lanes, roads and bridges. It is doubtful that the New York City experience will throw a damper on other states' decisions to move forward with these projects. The lesson of the New York experience is not that tolling and pricing are politically unacceptable, but that they require a convincing showing of benefits to those who are being asked to pay.

WHITHER TRAFFIC MITIGATION?

Kathryn Wylde, President of the Partnership for New York City, who lobbied tirelessly for the mayor's plan, is taking the long view. Commenting after the collapse of the congestion pricing plan, she opined that congestion pricing will ultimately prevail because it is the only long run answer to New York's twin challenges of reducing traffic congestion and raising new revenues for mass transit. She may well prove to be right, but the reintroduction of congestion pricing in Manhattan will have to await another mayor and possibly a more receptive state legislature. In the meantime, congestion in central and downtown Manhattan continues unabated. What is to be done?

Some people suggest letting soaring gas prices do their work. Indeed, in May, with gasoline at more than $4 a gallon, traffic at the Metropolitan Transportation Authority's bridges and tunnels dropped 4.6 percent compared with the same month the previous year. The Port Authority of New York and New Jersey recorded a similar decline in travel across its bridges and tunnels. Some experts believe that if gas prices had stayed high, the result could have been close to the goal set by Bloomberg's congestion pricing plan, whose goal was a reduction in traffic by 6.3 percent.

But counting on rising gasoline prices was an uncertain strategy. One reason is that the effect of reduced travel is spread over the entire region rather than focused narrowly on the congestion in midtown and downtown. There was no noticeable reduction in traffic congestion in Manhattan during the recent spike in the price of fuel.

A more promising approach would be to identify the probable key causes of persistent congestion and then devise targeted strategies to alleviate those conditions. An informal poll conducted by this author among his friends and colleagues who reside in Manhattan produced a long list of probable causes. Chief among them were:

- Double parked delivery trucks, especially on cross-town streets in midtown Manhattan
- Cruising taxicabs in search of fares
- Construction sites and street repairs blocking one or more lanes, especially in daytime
- Widespread violation and inadequate enforcement of the "Block-the-Box" prohibition
- Abuse of the placard system
- Lax enforcement of on-street parking regulations
- Pedestrian-vehicle conflict at intersections

It is beyond the scope of this article to propose a comprehensive strategy to deal with this array of factors. An attempt to develop such a strategy was made by the Keep NYC Congestion Tax Free coalition in a report entitled "Alternative Approaches to Traffic Congestion Mitigation in the Manhattan Central Business District." The report, which was meant to serve as an alternative to Mayor Bloomberg's congestion pricing plan, proposed a number of traffic mitigation measures and examined their impact on congestion and traffic.

A MODEST PROPOSAL

Our objective is more modest. It is to focus on what we believe is one of the key causes of excessive traffic in Manhattan—the cruising taxicab—and propose some practical remedies.

Studies have shown that cruising taxicabs, in search of fares, are a major contribution to traffic congestion in Manhattan. According to data prepared for the Traffic Congestion Mitigation Commission, taxis account for approximately 33 percent of all vehicle-miles of travel (VMTs) in mid- and lower Manhattan. Empty taxicabs cruising in search of passengers account for about 39 percent of that total. The "Alternative Approaches" report cited above estimated that cruising taxis thus account for approximately 13 percent of total vehicle-miles traveled (VMT) in the congestion pricing zone. To put this figure in perspective, eliminating cruising taxis would achieve a reduction in VMTs that is double the VMT reduction that the city claimed it could achieve through congestion pricing (6.3 percent).

Prohibitions against cruising already exist in some communities (e.g.: "It is unlawful for any person to cruise, drive or operate an unhired taxicab." Article 5.80.280 of the municipal code of the City of Longview, Wash.). These prohibitions are also quite common in European cities. In Paris, for example, taxi stands are located at or near most metro stations. They are equipped with telephone lines so that taxi drivers can respond to telephoned requests for service as well as accept passengers emerging from the metro stations. No doubt the high cost of gasoline in Europe serves as an effective deterrent to cruising. The recent escalation in the price of gas in this country might begin to have had a similar effect on taxi behavior in New York City, but in the absence of designated stands, city cabdrivers have no option but to be constantly on the move.

What exactly can be done? As a starting point, imagine creating a dense network of taxi stations throughout midtown Manhattan—possibly on every cross-town block. Each taxi stand would be equipped with a heated shelter, a telephone and a GPS-enabled display showing availability of cabs at neighboring taxi stands within a radius of several blocks. Customers arriving at an empty stand would be able to summon a cab by telephone from a neighboring stand. The city would discourage or prohibit taxis from cruising in search of passengers, and the high cost of gasoline would serve as an added deterrent. As growing numbers of New Yorkers adopted the habit of picking up cabs at taxi stations, cabdrivers would find it increasingly costly and impractical to cruise in search of a fare.

Could New Yorkers be weaned from the present system of hailing cabs at street corners in sufficient numbers to make the system practical? De facto taxi stands in front of major hotels and railroad stations already exist, so people already understand the convenience of finding cabs waiting for them at designated places. The certainty

of always finding a cab at a taxi station or being able to summon it should compensate for the inconvenience of having to walk half a block to reach the nearest taxi stand. Residents of a score of European cities find the system of taxi stations convenient and practical.

From the public standpoint, the concept scores high on two important criteria. The plan requires a minimum of capital investment and it is relatively easy to implement. The cost of erecting and maintaining shelters could be covered in part at least through advertising. The loss of revenue from curb parking meters that would be eliminated to make room for the taxi stations would be more than compensated in terms of reduced traffic, congestion and the attendant air pollution.

THE NEXT STEPS

Implementation could begin where taxi density is the greatest: in the midtown section of Manhattan, bounded, say, by 59th Street in the north, 42nd Street in the south, between First and Eighth Avenues. In this area of roughly 150 blocks, taxi stations/shelters would be erected on each block. At a conservative estimate of $50,000 per shelter (including wireless communication equipment and radiant heater) the totals cost would amount to $7.5 million. The venture could be undertaken as a public-private partnership, with the private partner obtaining exclusive rights to use the shelters for advertising. Renting advertising space at bus shelters is not uncommon and has been done in a number of U.S. cities. It is conceivable that most of the capital cost could be borne by private entrepreneurs. The program could be progressively expanded to lower Manhattan, with the shelter advertising franchise offered to the highest bidder.

With the possibility of congestion pricing now only a distant vision, the concept of a network of taxi stands, coupled with a prohibition on taxi cruising, offers an attractive, though admittedly only a partial solution, to the problem of excessive traffic congestion in midtown and lower Manhattan.

Gilboa Dam: Siphons and a notch cut into the spillway are features of ongoing interim repairs.

Bringing Water to the City

New York City's Upstate Water Supply

Gail Shaffer

NEW YORK CITY'S RENOWNED LIQUID ASSETS

MOST New Yorkers turn on the tap without a thought to the superior quality of their water, or to the incredible infrastructure that delivers it. New York City consistently wins nationwide quality and taste competitions among municipal water systems, and remains the largest unfiltered surface water system in the world, one of only five major American cities exempted from federal filtration mandates.

Reaching as far as 125 miles away, New York City taps a vast network of reservoirs and mammoth aqueducts to capture the purest mountain water, from a watershed spanning 2,000 square miles, and delivers it efficiently through a gravity system, using virtually no pumping mechanisms. New York supplies over a billion gallons daily to eight million New Yorkers plus an additional one million neighbors in four suburban counties.

That we take all this for granted is the ultimate measure of this remarkable municipal system. Complacency, however, is a luxury we can no longer afford. New York's position as the premiere urban center of our country cannot endure unless the city addresses serious looming challenges and invests, prudently and proactively, in its water infrastructure.

A CITY OF TWO TALES

The history of New York's water supply system could be titled a City of Two Tales.

Initially, over the span of more than a century, it was a tale of visionary municipal leaders and innovative feats of engineering. The expanding metropolis created, incrementally, a far-flung infrastructure to provide the water essential to the city's growth and preeminence.

However, it is also a tale, in our more recent era, of woeful shortsightedness, breathtaking neglect, bureaucratic corner-cutting, and the dismal failure to maintain the very system that sustains the life of the city.

Furthermore, throughout both the farsighted era of the system's creation and the shortsighted era of its neglect, there is a legacy of heartbreaking sacrifices on the part of watershed communities whose resources have been tapped, and of the arrogance of power the city has historically displayed toward them.

During the century of construction, the city's feudalistic attitude toward the Catskill region was manifest in the heavy-handed use of eminent domain, without fair compensation, for land and water rights seized (indeed, the Board of Water Supply's annual reports during the construction of Gilboa Dam in the 1920's boasted of their conservative expenditures to compensate landowners). The cultural trauma resulting from obliteration of entire communities, loss of farms and businesses, displacement of thousands of residents, and ecological impacts on stream flow, agriculture and fisheries, left a bitter legacy of resentment.

In our own era, a cavalier attitude persists regarding flood safety. Decades of deferred maintenance have made this once awesome infrastructure a liability waiting

to happen. With global climate change exacerbating the frequency of major weather events, the need to reengineer for these new patterns presents further challenges. As the risk of flooding has intensified, New York City has been obtuse in its resistance to reasonable steps to minimize the risks.

At the very time that the city must invest in this aging infrastructure, it also confronts challenges to the purity of the water itself. New York has been facing an ultimatum from the federal government to meet stringent standards or undertake mandatory construction of a costly filtration system. These timely challenges converge into a perfect storm of fiscal and policy headaches; yet there is also a genuine opportunity to restore and even enhance a remarkable water system.

HISTORY OF NEW YORK'S WATER SYSTEM

Manhattan originally had about 300 natural springs; the population grew, and the first public drinking well was dug in 1667 near Bowling Green. At the onset of the American Revolution, with over 22,000 inhabitants, Manhattan's water system had a Collect Pond, feeding water into a network of hollow logs which delivered to a reservoir. By 1800, with a population of 60,000 and serious water quality problems, the Manhattan Company (precursor to today's Chase Bank), founded by Aaron Burr, created a deep well at the corner of Reade and Centre Streets, delivering water to private subscribers.

With Manhattan's population burgeoning, the State Legislature in 1834 authorized the city to venture upstate for its water. New York's modern water supply system was born when the city voted to dam the Croton River, 45 miles north of Manhattan. The Old Croton Reservoir, completed in 1842, supplied water to reservoirs in Central Park and present-day Bryant Park.

With the consolidation of the five boroughs of New York City in 1898, into a single metropolis of 3.5 million residents, the limits of existing water systems had been reached. In 1905, the State Legislature created the Board of Water Supply of the City of New York, which targeted the upstate Catskill Mountain region as the prime source to expand the water supply. In short order, the city embarked upon an ambitious engineering project, constructing masonry dams and over 160 miles of aqueducts. The Ashokan Reservoir delivered water through an aqueduct by 1916, followed in 1926 by the Gilboa Dam at Schoharie Reservoir, and a huge 18-mile tunnel through the mountains.

Even before Gilboa's completion, the board in 1921 broadened its reach to further sources of water, resulting in the Delaware Aqueduct System, tapping into the tributaries of the Delaware River and the Rondout Creek to meet growing demand.

These three components now constitute the water supply for New York City. The Croton system, completed in 1842, supplies 10 percent of New York's water; the Catskills system, completed in 1927, supplies 40 percent; and the Delaware system, completed in 1965, supplies 50 percent (see map on p.25). This vast network comprises 19 reservoirs and three controlled lakes, connecting to nearly 300 miles of aqueduct, and two massive subterranean tunnels which distribute the water to the city. The final component, a 60-mile Third Tunnel, under construction since 1970, is slated for completion in 2021. The system sprawls across a watershed encompassing nearly 2,000 square miles, and delivers over a billion gallons a day of high quality water to nine million residents of the metropolitan region and its millions of commuters and visitors.

A DAM SHAME: NEW YORK'S CASE STUDY OF DEFERRED MAINTENANCE

Haunting images of our crumbling national infrastructure have riveted our attention in the last few years: levees collapsing on the Mississippi, an interstate bridge in Minneapolis crashing into the river, a dam in Kauai in fatal collapse. Our nation has neglected basic maintenance of the infrastructure so critical to America's safety and economic strength.

New Yorkers may be unaware of how close to home these disasters lurk. A crisis emerged in the case of the aging Gilboa Dam at Schoharie Reservoir, the northernmost part of the city's vast water supply system. This dam was allowed to deteriorate for half a century, its vulnerability exposed in October 2005 with an emergency declaration. The adhesion between the concrete dam and the bedrock was seriously compromised, presenting the danger, in a worst case scenario of severe weather, of the dam sliding forward and collapsing. Such an event would send a tsunami-like wall of water 20 feet high hurtling through the valley, carrying with it 25 billion gallons of water, destroying whole communi-

Gilboa Dam: Visible deterioration

ties, historic sites, prime farmland, major highways and bridges—and countless lives—along the way.

The downstream communities have pressed New York City's Department of Environmental Protection (DEP) to reinforce the dam to appropriate standards. Since the crisis, the city has implemented interim repairs to stabilize the dam, including 80 post-tension steel cable anchors, driven into the bedrock. The next step will be a major long-term renovation of the aging dam, projected to cost $683 million over the next six years. Furthermore, the city claims to have developed a comprehensive long-term rehabilitation plan for the entire reservoir system.

How did this crisis evolve? One vulnerability from the outset was the fragile bedrock, a highly fractured mix of mudstone, siltstone and sandstone. Furthermore, when the dam was built, the city neglected to incorporate iron reinforcement bars, a technology available at the time; instead, huge columns of concrete "monoliths" were simply poured sequentially. Most lamentably, the city deferred maintenance for the past five decades, except for a few minor band-aid procedures. After eight decades of wear and tear, the concrete spillway had visibly eroded.

Gilboa is the poster child of an infrastructure in crisis. Not only has the City of New York, with all its resources, failed to maintain a major asset in its water system; but the State of New York, responsible by law for oversight of dam safety, failed (with a woefully understaffed program) to ensure that safety standards were met.

Deferred maintenance, sadly, is not a rarity. Nationwide, critical infrastructure maintenance is shockingly undercapitalized, and oversight inadequate. The American Society of Civil Engineers issued a Report Card for America's Infrastructure in 2005, examining roads, bridges, railways, and other critical infrastructure. Dams received a "D", the worst grade of all categories (even our ailing bridges received a "C"). Our country has 82,642 dams, of which over 11,881 have high hazard potential; more than 33 percent are deemed "unsafe." It is estimated that $40 billion would be required to repair America's dams.

The specific incident at Gilboa is a canary in the

coalmine, alerting us that we can ill afford to ignore the condition of our major infrastructure. Were the city to allow any dam in its system to collapse, the loss of water supply—and the liability for loss of life and property—would exponentially exceed the cost of investing preemptively in ongoing maintenance.

WATER QUALITY CHALLENGES

Beyond the challenge of its ailing infrastructure, the city must also safeguard water quality. Federal legislation mandates filtration of surface water. Because of its enviable water quality, since 1993, New York has earned a rare exemption from this mandate, a "filtration avoidance determination" granted by the federal Environmental Protection Agency (EPA) to only five major cities.

However, that exemption became precarious, as threats to New York's vaunted water quality arose. The major culprit is turbidity, increased by changing weather patterns and runoff pollution from land development in the watershed. The city thus far has added an average 16 tons of chemicals daily to meet federal standards; however, a long-term solution is needed to avert building a mammoth filtration plant, which would cost over $8 billion for construction and over $100 million a year for operation.

Although the EPA in 2007 granted New York a ten-year extension of this exemption, several conditions apply, including construction of the world's largest ultraviolet-light purification plant in Westchester County (projected to be completed in 2010, at a cost of $1.8 billion), continuing investment in watershed land acquisition, and other programs to combat erosion and pollution.

THE WATERSHED MOMENT

The ultimatum from the federal government, to upgrade water quality or invest in filtration, provided impetus for an historic Watershed Agreement with upstate donor communities. This memorandum of understanding—executed in 1997 by New York City, New York State, the federal EPA and over 90 stakeholders, including the Clean Water Coalition of non-profit environmental organizations and myriad local governments in the watershed—commits New York City both to stewardship of environmental resources and to the economic viability of the watershed region. It funds robust acquisition of sensitive lands from willing sellers, eschewing the confiscatory reach of eminent domain. It commits the city to reasonable payments in lieu of taxes for lost tax base in donor communities and provides resources to upgrade watershed sewer systems.

The Watershed Agreement was a promising milestone, a partnership with donor communities to address the water quality issues of direct concern to the city. However, when the direct concerns of donor communities are at issue—flood mitigation, public safety and ecological restoration—they are often met with insensitivity on the part of the city.

Again, the crisis at Gilboa Dam puts these issues in stark relief. With the long-term rehabilitation of this dam about to commence, downstream residents have urged the city to incorporate some reasonable design features to benefit the region. Common sense, practical, low-cost enhancements to incorporate flood mitigation and minimal restoration of stream flow would represent a good faith effort on the part of the city to be a more responsible neighbor to its donor communities.

From the outset of the Gilboa crisis, the DEP bureaucracy adamantly denied any responsibility for flood mitigation, claiming that their charter was strictly

limited to water supply. It took the intervention of Mayor Bloomberg in 2006 to change this position, with then deputy mayor Doctoroff conceding that "obviously, the city also has a responsibility to assist, to the extent possible, with flood control. We have been a bad neighbor, and we want to turn over a new leaf and be a cooperative partner" with donor communities. The final design of the dam will test whether that commitment is genuine.

A proactive approach to infrastructure design and maintenance is even more imperative given the impacts of new phenomena, such as global climate change. According to a report by International Rivers, a global NGO, "Today, the biggest dam-safety challenge is climate change. The world's more than 45,000 existing large dams have not been built to allow for a rapidly intensifying hydrological cycle. In this sense, all dams should be considered unsafe."

At Gilboa, four of the 10 most severe floods on record have occurred in the past three years alone.

FUNDING AND FAIRNESS: NEW REVENUE SOURCES

Facing fiscal, geological, meteorological and engineering challenges, New York City must reconfigure the system for the next generation with visionary, innovative solutions. After decades of deferred maintenance, substantial fiscal resources are needed to rehabilitate this critical infrastructure.

The public policy challenge, beyond the funding itself, is to establish a more equitable funding base. As demonstrated in Harold Shultz's article herein, the current system is unfair, placing the entire burden for funding basic infrastructure costs on ratepayers, and it is disproportionately onerous to lower-income households. The obvious alternative—shifting these capital costs from ratepayers to the general fund—would likely prove to be politically unpalatable, particularly in the current, constrained fiscal climate.

REVENUES FROM BOTTLED WATER COULD FUND OUR TAP WATER

The city has an opportunity to avert new taxes by creating a new revenue stream clearly linked to the overarching objective of reliable drinking water. New York State enacted a bottle bill in 1982, imposing a refundable nickel deposit on certain beverage containers (primarily carbonated beverages and beer). In its quarter century history, the bottle bill has demonstrated measurable progress toward its objectives of fostering recycling and reducing litter and landfill waste. The bottle bill has produced a substantial rate of returned containers (currently 66 percent, nearly 75 percent at its peak).

The city should advocate for expanding the bottle bill to capture non-carbonated beverages, with a provision that the unclaimed deposits would go into a dedicated revenue fund for water quality projects. For the deposits collected within the New York City water supply usage area, these could be specifically targeted to the maintenance of the water supply system; deposits on beverages sold upstate (where many communities do not have municipal systems) could be dedicated to similar purposes; Long Island's share could be designated for aquifer protection.

Expansion of the bottle bill deposits to include non-carbonated, non-alcoholic drinks would capture an additional 21 percent of the beverage market. Various proposals for expanding the bottle bill have been advanced, but without specifically linking it to water quality objectives; most bills propose to funnel the unclaimed deposits into the state's existing multi-purpose environmental fund. The New York State Public Interest Research Group, quantifying current unclaimed deposits at $153 million annually statewide, projects an increase to $232 million annually if expanded to non-carbonated beverages. Targeting this additional $79 million (largely for bottled water) to specific water quality purposes would be a huge boost in maintenance of water systems.

A salient flaw in the current statute should be avoided in any expansion bill: the law must clarify that unclaimed deposits for non-carbonated beverages shall not be the property of the beverage companies. This money, collected by the bottlers, should be designated as an escrow fund, to be released annually to the state, after a specified amount of time, to be utilized for water quality projects. It is not acceptable to allow these deposits to be pocketed by the beverage industry as an unearned windfall profit (as is currently the case). The author, an original sponsor of the 1982 legislation in the Assembly, is well aware of the obstacles that the well-financed beverage industry lobby may present to any new bill. However, specifically targeting these revenues to safeguarding our future water supply could galvanize

a broad-based coalition of consumers and environmentalists to provide momentum for legislation.

WHY WAIT FOR ALBANY?

New York City should enact its own municipal bottle bill on non-carbonated beverages, absent sufficient political will to pass an expansion of the statewide bottle bill. Rather than wait for the lethargic process of a bipartisan state legislature, where it could take years to overcome the influence of industry lobbyists, the City Council, in the more eco-friendly five boroughs, could presumably fast-track its own nickel deposit with broad public support, dedicating the revenue (over $40 million annually, presuming conservatively that half the statewide total of deposits would be collected in the city) to maintaining the water supply system.

Millions of New York City residents, commuters and visitors purchase bottled water, although the water from the tap is of the finest quality anywhere. This irony can be leveraged in a positive way, with consumers' nickels building a fund to ensure potable municipal water. Linking of bottled water deposits to an infrastructure which, properly maintained, would obviate the need for that same product, is compelling public policy.

If the unclaimed deposits were marshaled toward water-quality needs, there would be a total win-win outcome, regardless of whether the return rate increased or declined: the deposits claimed through returns would contribute to worthy recycling, and the unclaimed deposits would contribute to worthy water quality projects.

HARNESSING HYDROPOWER

Another potential source of revenue is to harness hydroelectric power at four of the city's dams: Gilboa, Pepacton, Cannonsville and Neversink. The Delaware County Electric Cooperative, a Catskill region nonprofit, has filed an application with the Federal Energy Regulatory Commission (FERC) to harness the energy potential of the waters currently spilling over these dams during seasonal peaks.

Initial estimates project an annual output of 91,000 megawatt hours, enough to power over 20,000 rural homes in the Catskill region. Leasing this resource for hydropower could generate another dedicated revenue fund for ongoing maintenance of the system. Without disruption of the city's water supply, this would create clean energy, benefiting the environment and the local economy. The synergy of such multiple usage of these dams—simultaneously and efficiently meeting societal needs for water supply, hydroelectric power, flood mitigation and agriculture—exemplifies sound public policy.

CHARTING A SECURE COURSE FOR THE FUTURE

Maintaining and enhancing its water system is not a choice for New York City but an imperative. Using nickels from bottled water and dollars from hydropower, to maintain the world's largest unfiltered water system, would help fund an enormous cost, and without burdensome taxes. The water supply system is a remarkable asset to New York. By ensuring responsible stewardship of this resource such initiatives, not incidentally, could also foster a more symbiotic relationship with the communities at the source of our water. With bold leadership and enlightened citizens, we can muster the will and the vision for sound, farsighted planning and policy—including the necessary commitment of resources—to maintain New York's national stature as a model for municipal water systems.

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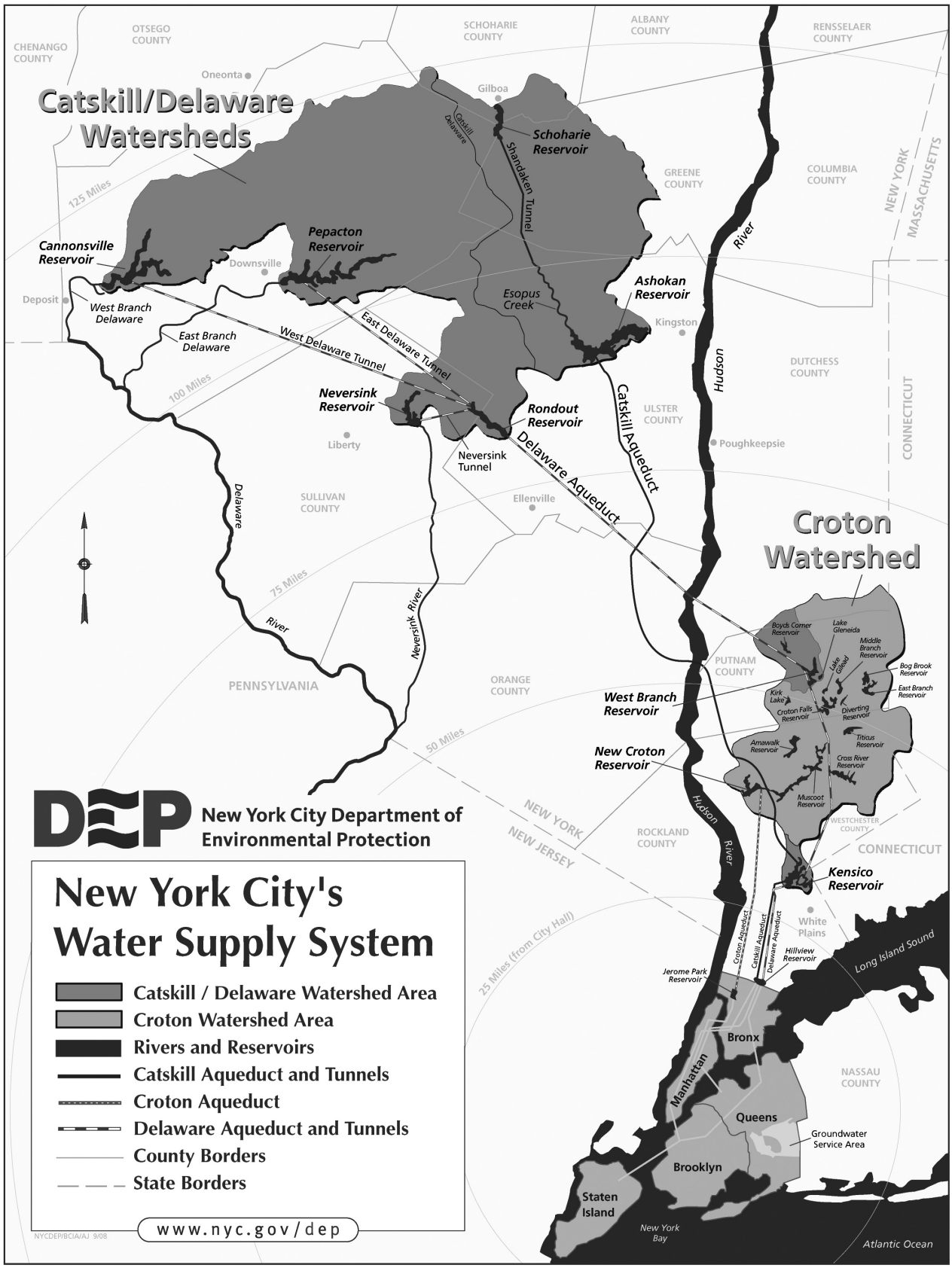
Catskill/Delaware Watersheds
Croton Watershed
OTSEGO COUNTY
CHENANGO COUNTY
SCHOHARIE COUNTY
ALBANY COUNTY
RENSSELAER COUNTY
Oneonta
Gilboa
Schoharie Reservoir
Shandaken Tunnel
Catskill
Delaware
GREENE COUNTY
COLUMBIA COUNTY
NEW YORK
MASSACHUSETTS
125 Miles
Cannonsville Reservoir
Pepacton Reservoir
Downsville
Deposit
West Branch Delaware
East Branch Delaware
West Delaware Tunnel
East Delaware Tunnel
Esopus Creek
Ashokan Reservoir
Kingston
Hudson River
DUTCHESS COUNTY
CONNECTICUT
100 Miles
Neversink Reservoir
Rondout Reservoir
ULSTER COUNTY
Catskill Aqueduct
Liberty
Neversink Tunnel
Delaware Aqueduct
Poughkeepsie
Delaware
SULLIVAN COUNTY
Ellenville
75 Miles
River
Neversink River
PENNSYLVANIA
ORANGE COUNTY
PUTNAM COUNTY
Boyds Corner Reservoir
Lake Gleneida
Middle Branch Reservoir
Lake Gilead
Bog Brook Reservoir
East Branch Reservoir
Kirk Lake
Croton Falls Reservoir
Diverting Reservoir
West Branch Reservoir
Titicus Reservoir
Amawalk Reservoir
Cross River Reservoir
New Croton Reservoir
Muscoot Reservoir
50 Miles
NEW YORK
NEW JERSEY
ROCKLAND COUNTY
WESTCHESTER COUNTY
CONNECTICUT
Hudson River
Kensico Reservoir
White Plains
Croton Aqueduct
Catskill Aqueduct
Delaware Aqueduct
Hillview Reservoir
Long Island Sound
25 Miles (from City Hall)
Jerome Park Reservoir
Bronx
Manhattan
NASSAU COUNTY
Queens
Groundwater Service Area
Brooklyn
Staten Island
New York Bay
Atlantic Ocean
DEP
New York City Department of Environmental Protection
New York City's Water Supply System
Catskill / Delaware Watershed Area
Croton Watershed Area
Rivers and Reservoirs
Catskill Aqueduct and Tunnels
Croton Aqueduct
Delaware Aqueduct and Tunnels
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Photo: Melissa Gorman

Getting Rid of It

Sewers, Waste, and Rainwater

Richard Herschlag

HORIZONS

IN the late 1960s, you could smell the noxious odors of raw sewage as you drove over the Queensboro Bridge. As it had been for generations, the East River was the final destination for billions of gallons of raw sewage, every month. The River was the butt of everyday jokes to the effect that it was unfit for anything remotely connected with health, hygiene, or even life itself. It was accepted that virtually every waterway within and around the five boroughs of New York City was unsanitary.

In 1972, the United States Congress passed a landmark piece of legislation known as the Clean Water Act. The city's public waterways had come a long way from their polluted state of decades earlier. Yet the capture and treatment of sewage had further to go before our waterways could be declared safe for fishing, bathing, and, in some places, even the incidental human contact involved in boating.

NECESSITIES AND GROWTH

Manhattan in the early 1800s was an island of open lots with small townhouses, modest farms, streams, and ponds. Human and animal wastes were spilled onto cobblestone pavements, buried, or brought to the nearest stream or pond and dumped. In some cases, open troughs were excavated in the street. More ambitious plans were realized sporadically for rudimentary pipes, often consisting of hollowed out logs, just under the roadways.

While minor improvements were better than none at all, they were not keeping pace with the steady increase in population, and particularly the increase in population density. The endpoints of this makeshift sewage system—the ponds and streams—were becoming highly unsanitary and foul smelling and were the source of often life-threatening disease.

During the mid-1800s, New York began to construct brick, vitrified clay, and cast iron pipes underground to carry both sewage and surface runoff from rain. A fair number of these pipes are still in service today. A longstanding effect of this effort is not the sewers that managed to survive the following century-and-a-half, but the pattern established by their configuration. Because the capture and conveyance of both sanitary sewage and storm runoff was combined, they would remain combined and pose an enormous conundrum many decades later.

In the meantime, constructing a viable sewage system was critical for a rapidly growing city. The general parameters for that system were straightforward. A series of smaller sewer lines, each serving an individual block, were connected to larger branch lines. Branch lines connected, in turn, to larger branch lines, and then finally to a trunk main. A trunk main typically followed a major avenue, such as Canal Street, and ultimately served an entire neighborhood or—as it would ultimately be called—a drainage basin.

The typical trunk main was too far below grade to serve nearby buildings and houses directly. Its purpose was to convey an entire drainage basin's worth of sewage and storm water to an open waterway or a tributary. For the west side of the island, that waterway was the Hudson River. For the east side, it was the East River and the Harlem River. For downtown, it was the Upper New York Bay.

Generally, a 2-to-3-foot-per-second minimum sewage flow rate in the pipes was the design goal. "Spur" pipes—from a building house main to the sewer in the street—were typically in the 4-to-6-inch diameter range. Connections between storm water catch basins and branch lines were typically 8-to-16-inches in diameter, taking into account the sizeable peak flows from significant storms. Branch lines and trunk mains measured anywhere from 12 inches in diameter, along the limited confines of Barrow Street, to as much as 48 inches along the north-to-south thoroughfare known as Washington Street.

Throughout the remainder of the 19th century and into the early 20th century, environmental improvements brought about by this massive, ongoing undertaking were dramatic. Typhoid and dysentery declined by more than 90 percent. Interiors, yards, and streets were freed of the human wastes and the accompanying odors that had long plagued them. The streams and ponds were mostly gone, long since filled in for the development which the sewers themselves made possible.

THE NEXT LOGICAL STEP: TREATMENT

The constant stream of human waste had been largely relocated from inland to the Hudson River, East River and New York Bay. However, with noticeable and sometimes overwhelming increases in pollution along these shores, there came an increasing public demand for treatment of raw sewage, prior to outfall into the waterways.

Sewage treatment as a science or engineering discipline was in its infancy in the 1930s. Yet there was an ironic upside to the Great Depression. It not only provided federal funding for a variety of large public works, but also made available the otherwise idle hands of skilled and unskilled laborers and the minds of engineers and architects.

The first two major sewage treatment plants, the Coney Island Sewage Treatment Works and the Wards Island Sewage Treatment Works, were placed into operation in 1935. The Coney Island plant served the southern part of Brooklyn known as the Paerdegat Basin. Among other benefits, it protected bathers at the Coney Island beaches from exposure to raw sewage. The Wards Island plant served both the east side of Manhattan and the south portion of the Bronx.

The next plant in was the Tallman Island Sewage Treatment Works. Tallman Island, located in the Upper East River between the Bronx and Queens, was also ideally situated to treat sewage from two boroughs, and it also protected Flushing Bay. With the New York City's World's Fair in Flushing scheduled to close out the decade, 1939 was the ideal target date for completion of the Tallman Island plant, and happily that target was met.

Processes at these plants ranged from rudimentary to sublime. These included screens, grit chambers, and clarification tanks—to remove most solids from the sewage—as well as chlorination and other chemical treatments to disinfect. Screens, usually located at the head of the plant, removed the largest objects from the flow, dubbed "floatables." These were cans, bottles, scraps and other objects which, while not necessarily among the most polluting, were certainly the most obvious to the naked eye. Grit chambers either sifted or spun the sewage so that the heavier, lumpier particles were forced to the outside, where they could be stripped from the flow.

Clarification tanks, also known as sedimentation tanks, primarily used gravity to remove medium to finer solids from the sewage. These tanks consumed the largest area within a treatment plant, as the process was effective but slow. Sewage sat in an open tank for one-to-two hours, as heavier particles gradually settled and lighter particles, grease, and oil rose, forming a film along the surface.

A second set of tanks—aeration tanks—was employed at some treatment plants to further reduce the waste content of the final effluent. Air was forced through the bottom of the tanks so that aerobic—that is oxygen producing—bacteria became activated. Doing the job nature intended, the aerobic bacteria destroyed microscopic pathogens. This more sophisticated round of clarification was referred to as "secondary" treatment, distinct from the initial or "primary" treatment.

Large intercepting sewers were designed and built in concert with the treatment plants. An intercepting

sewer, or interceptor, connected all the trunk mains in a drainage basin to a sewage treatment plant. As with the sewers, flow through interceptors was via gravity, although pumping— through force mains—was employed in various locations where the natural terrain did not provide the required grade.

A total of fourteen drainage basins and new or potential treatment-plant sites were identified across New York City, which now included a fifth borough, Staten Island. The Department of Public Works set an ambitious goal of treating one hundred percent of the city's sewage—about 1.5 billion gallons a day—by the year 1950. However, treatment plants were expensive and increasingly difficult to site in or near residential neighborhoods, and this goal was not substantially met until the opening of Manhattan's North River plant in 1986.

THE LINGERING PROBLEM OF COMBINED SEWER OVERFLOW

As improvements in open water quality leveled off, the not-so-new problem of combined sanitary sewage and storm runoff was identified and labeled "combined sewer overflow," or CSO. Treatment plants, where they existed, were designed to handle typical flow, or perhaps even peak flow, but only during dry weather. The design capacity of each plant was limited by the weakest link in the chain: the pumps at the front, or "headworks," the grit chambers, the clarification tanks, or any other process. And since the clarification tanks—essentially large steel reinforced concrete holding pens for standing sewage—consumed by far the most land and the greatest amount of materials, they were typically the critical, limiting factor.

With dry-weather sewage flow largely treated, the problem of CSO—created by the original construction of the sewer system—was now more noticeable. While minor storms might produce a twenty or thirty percent increase in flow to a treatment facility, severe storms could double, or even triple dry weather flow on a rainy day. The result was treatment facility breakdown and dumping of effluent into waterways, before it was fully and properly treated.

There had been attempts to manage CSO since the first few treatment plants. The trunk main outfalls had long been equipped with tide gates. The purpose of the tide gate was to protect the local sewer system from the effects of high tide. During high tide, river or bay water was blocked from entering the system, where it would combine with sanitary sewage and back up into streets and buildings. However, closing the tide gates—typically triggered by a float in an underground wet well—also limited flow in the reverse direction—from buildings and streets out to the river or bay. A closed tide gate could be ineffective or even counterproductive in the event of a major storm during high tide.

To address this issue, or any potential overflow condition, the existing tide gates were incorporated into a new plan. At the intersection of each trunk main with the interceptor, a regulator chamber was constructed. Each chamber contained a valve that triggered the opening of the corresponding tide gate during high water levels in the intercepting sewer, sending sewage—specifically, CSO—directly to the open waterway rather than to the treatment facility.

It was understood that this arrangement was only a partial solution. The treatment plant was protected from being overwhelmed at the cost of dumping large amounts of diluted raw sewage into an open waterway or tributary. In a typical year, total CSO for the five boroughs exceeded 100 billion gallons. Diluted or not, this was a tremendous amount of raw sewage, especially for those who worked or played near one of the many sewer outfalls.

THE CLEAN WATER ACT AND A NEW ERA

The federal Clean Water Act of 1972 ushered in a new mandate for open tributaries and waterways in urban areas. With it came specific targets for removal of solids and billions of dollars in available federal matching funds. One of the first priorities for New York City was construction of a facility to treat the sewage generated on the West Side of Manhattan. The project also required the better part of a decade for construction of an intercepting sewer as much as 60 feet below the street.

Until 1986, when the North River Water Pollution Control Plant went into operation, virtually all of the West Side's sewage was dumped untreated into the Hudson River. The plant stretched north from 135th Street, for several blocks along the Hudson, and was surrounded by political controversy from the first line drawn on a drafting table. Location, potential odor problems, and delays in the park planned above the facility plagued

North River. As with the older facilities, the question of CSO loomed large.

Not just in West Harlem, but around the city, CSO was becoming a watchword for the environmentally plugged-in. As a microcosm of the condition, the North River drainage basin—essentially the West Side of Manhattan—served well. The North River plant's dry weather limit was set at 170 million gallons per day (MGD). This limit was tied to the capacity of pumps, settling tanks, sludge treatment tanks, and various other components of the facility.

It was recognized that wet-weather flows at North River vastly exceeded the 170 MGD capacity by an amount on the order of hundreds of MGD. During severe storms, the dozen-and-a-half regulators along the Hudson did exactly what they were designed to do—allowing overflow to pass directly into the river. However, these incidents were now being documented not only by the regulatory agencies but also by concerned citizens. The citizens demanded solutions, and the regulatory agencies, if perhaps at their own pace, were responsive.

There was an irony to the new environmental political paradigm. Decades earlier, combined sewer overflows were barely distinguishable from daily discharge of dry weather sewage into waterways, particularly where treatment plants did not yet exist. As treatment plants went on-line and gradually but substantially improved water quality, the marginal effect of CSO became significantly greater. Success of the treatment plants created rising expectations.

VALUE ENGINEERING AND PRACTICAL LIMITS

In 1992, the State of New York Department of Environmental Conservation, charged with enforcing the federal Clean Water Act and other mandated water quality standards, entered into an Order of Consent with the New York City Department of Environmental Protection. The agreement set forth a wide range of programs to improve overall open water quality and to reduce CSO. The programs were projected to cost $1.4 billion.

At the time, untreated CSO was estimated at 32.4 billion gallons per year, with about 70 percent of total wet-weather flow captured. By 2004, projected costs for mandated and related CSO capital programs had increased to almost $2.2 billion, with a projected wet-weather capture of over 75 percent. At first glance, this goal might seem less than ambitious as it allows CSO of over 27 billion gallons each year. However, two realities have dominated this massive government effort.

The first reality involves bottom line results. Since 1974, the agencies have been developing and refining mathematical models of water quality and related conditions. Perhaps the single most important finding has been that CSO has only a minor negative impact on primary open waterways such as the East River and Hudson River, but a significant negative impact upon the confined tributary waters. These include Flushing Bay, Paerdegat Basin, Jamaica Bay, Newtown Creek, and Coney Island Creek. These results have led to more refined modeling using two major measurable criteria for water quality—dissolved oxygen and pathogen concentrations.

The second reality involves cost. As can be gleaned from the city's reports, the cost per gallon of captured and treated CSO tends to rise exponentially and becomes increasingly difficult to justify against other necessary capital expenditures. A brief discussion of a few of the numerous proposals evaluated demonstrates how such decisions have been made to date.

Perhaps the most straightforward proposal has been to maximize treatment capacity at existing water pollution control plants. This is being accomplished through a variety of improvements including upgrading the aeration tanks at the Newtown Creek facility, rehabilitating the six main sewage pumps at the Wards Island facility, and an overall headworks upgrade at the Hunts Point plant. Rather than expanding facilities by sheer size, planning and design have focused on the weakest links in the sewage processing chain in an effort to free up previously unused capacity.

Sewer separation refers to the proposal to construct a separate sanitary sewer on a street-to-street basis. This would allow complete separation between sanitary and storm flows. One way to think about the proposal is as an attempt to turn back the hands of time and build the sewers according to what we know now. Unfortunately, the hands of time cannot genuinely be turned back. A hundred-plus years later, the city streets are now crowded beneath the surface with subways, electrical conduits, gas lines, and various other services.

Storage of CSO is an attempt to retain combined sewage that would otherwise be discharged untreated until such time—typically only hours later—as a nearby treatment facility "catches up" and regains sufficient available capacity. Storage is divided into two types, in-line and off-line storage. In-line storage utilizes tunnels, typically an existing interceptor, to retain sewage. Off-line storage requires construction of a new holding tank.

Both of these options are problematic. Depending upon existing tunnel elevations and gradients, in-line storage may cause extensive sewage backups into buildings. Construction of a new tunnel for the dedicated purpose of in-line storage tends to be cost-prohibitive. Construction of off-line, or tank storage, is cost-prohibitive and requires large land areas not often available in a dense urban environment.

One exception to this evaluation has been the Paerdegat Basin, where a capital program for both in-line and off-line storage is underway. Evaluation of the existing sewer lines in the area indicated the unlikelihood of basement flooding. In addition, all three of its outfalls are located in close proximity to each other as well as to a pumping station, so that a single centralized storage basin is relatively economical.

A GLASS 98 PERCENT FULL?

In April 2007, as part of his PlaNYC, Mayor Michael Bloomberg set forth goals and means for dramatic improvements in the city's ecological health by the year 2030. Among other targets, the plan calls for 98 percent of New York City's waters—including 90 percent of its tributaries—to be open for recreation. However, at most locations recreation would include only "secondary contact" such as boating and fishing, as opposed to "primary contact," less formally known as swimming.

As discussed in the Summer 2007 issue of City Limits ("Deep Trouble: New York City's Silent Sewage Crisis"), these commendable but limited goals reflect inherent constraints in the sewer system itself, dating back to the mid-1800s, as well as the economic limitations on reaching for the stars—or in this case, the sea. For those who are satisfied by a stroll or an afternoon of boating, a renaissance has already arrived. But those who dream of pleasant swims in the East River may have to dream on for decades to come.

Paying for It

Water and Sewer Rates

Harold Shultz

IN 1988, New York City changed its method for collecting water and sewer charges from a system based on building frontage to one based on actual water usage, as determined by metered charges. It is fair to presume that this change distributed the cost of using water equitably and encouraged conservation. In reality, the cost of water now has less to do with the amount consumed than with the enormous cost of the infrastructure required to deliver it. By 2009 approximately 46 percent of the average water and sewer bill will reflect actual usage costs, while 45 percent will represent the cost of infrastructure maintenance and construction.[1] In two years infrastructure costs will exceed operating costs and will continue to grow through 2020. Even if water use declines, the cost to rate payers will rise due to infrastructure costs.

There is little understanding of the regressive nature of the water and sewer tax and its potential impact on the financial viability of the city's existing, rent-regulated, multiple-dwelling housing stock. All rate payers are property owners, and 79 percent of the costs of water and sewer charges are borne solely by residential property owners. 73 percent of residential housing units are in multiple dwellings, and varying market conditions or regulatory restrictions limit the ability of landlords to pass on the increased costs to tenants.[2]

Since only property owners pay for water and sewer, the broader-based tax system (income tax, sales tax, hotel taxes, real estate tax, and others) is not contributing . The "tax" base for water and sewer is artificially restricted and includes a disproportionate number of properties owned by or rented to lower income households (51.8 percent of New York City households were below 80 percent of median income as of 2004).

Further, water and sewer infrastructure costs are increasing dramatically and there is little incentive to control them. Following on 11.5 percent and 14.5 percent increases in water and sewer charges over the past two years, double-digit annual rate increases can be expected for the rest of this decade and possibly longer. Even if the city meets its stated goal of reducing consumption by 60 million gallons per day, rate payers can expect additional rate increases to make up the lost revenue.

To avoid a deleterious impact on the city's residential property owners, it is time to reconsider who pays for the water system and how its infrastructure planning and costs are managed.

HOW THE SYSTEM IS FINANCED

What's driving these double digit increases? Quite simply, the huge capital cost of new facilities for the water and sewer system.

For a decade, following New York City's financial crisis of the '70s, capital was unavailable, and the water and sewer systems' huge capital needs, maintenance and upkeep were grossly delayed. Those needs then included the construction of a third water tunnel, vital to protect the city's water supply, and a new system of sewage

treatment plants, required by new Federal mandates, to protect the quality of the city's drinking water and to limit dumping of untreated sewage into its surrounding waters.

In 1984, to ensure reliable financing, the city created a funding process outside of the normal system, which depended on general tax revenues to pay for general obligation municipal bonds. The new process was designed to shift, over time, the entire capital and operational cost of the water and sewer system to rate payers.

Money was now borrowed by the Municipal Water Finance Authority (MWFA), which was given the ability to issue its own bonds. This change removed a large burden from the city. For example the city's general obligation bonding for the period 2008-2012 is projected at $28.55 billion. MWFA bonding for the same period is projected to be $10.76 billion, more than one-third of the cost of all other city financed construction.

The New York City Water Board was created at the same time to set water and sewer rates and to ensure payment of the new bonds and operation of the system. The Water Board leases the water and sewer system from the city's Department of Environmental Protection (DEP) and then pays DEP to operate the system and construct new facilities.

In 1988, rate payers paid for 48 percent of the capital needs of the water and sewer system. The balance was paid for by city and Federal subsidies. Currently rate payers are responsible for about 95 percent of total system costs, a number that will increase. The city and federal government have effectively ended their subsidies.

This new system of financing freed spending on water and sewer infrastructure from political oversight. Decision making was transferred out of the political realm and into the hands of the New York City Water Board and DEP. Revenue was insulated from the ups and downs of tax collections, thus ensuring that future budget cuts would almost never effect the water and sewer system's capital program. These were innovative decisions that were designed to protect the system's funding. Over time, however, they have led to an insular process, far removed from the public scrutiny associated with most municipal capital spending, and with little incentive for cost controls. Public oversight is further discouraged because most water and sewer construction takes place upstate, underground, or at the periphery of the city. Unlike the rebuilding of the World Trade Center, most New Yorkers never see what their water and sewer charge is building.

NEW PROJECTS

Following an initial capital investment in the 1980s, debt payments were steady from 1991 to 2005, however, the capital needs of the water and sewer system are on the rise. Between 2007 and 2018, capital investment in the system is expected to total $23 billion. The high point is occurring during the three year period, 2007-2010, with spending at over $3 billion per year. It is this increase in capital spending that is largely responsible for the double-digit increases in rates. And projected increases may underestimate the future costs of the investment. For example, in 1998, the estimated cost of the Croton Reservoir filtration project was $861 million. DEP's current estimate has more than doubled to $1.9 billion. The recent discovery of ground water problems at the site suggests further increases.

Major projects include:	*2007-18 Cost*
Filtration of water from the Croton Reservoir	$1.9 billion
Water Quality Preservation	$2.7 billion
Various Water Pollution Control Projects	$9.4 billion
Third Water Tunnel ($5.4 billion already spent)	$.68 billion

Figure 1 Source: MWFA Prospectus, October 2007

WHY RATES RISE

Figure 2 shows the two main cost components of the water and sewer system. First is Total Operating Expense, which covers all of the costs of actually operating the system. Second is Total Debt Service, which must be paid each year to amortize the bonds that have been issued. These add up to the Total System Expenditures, which must be covered by the Total Revenues.

Water and Sewer
Selected Revenue and Expenditure Trends 1997-2011

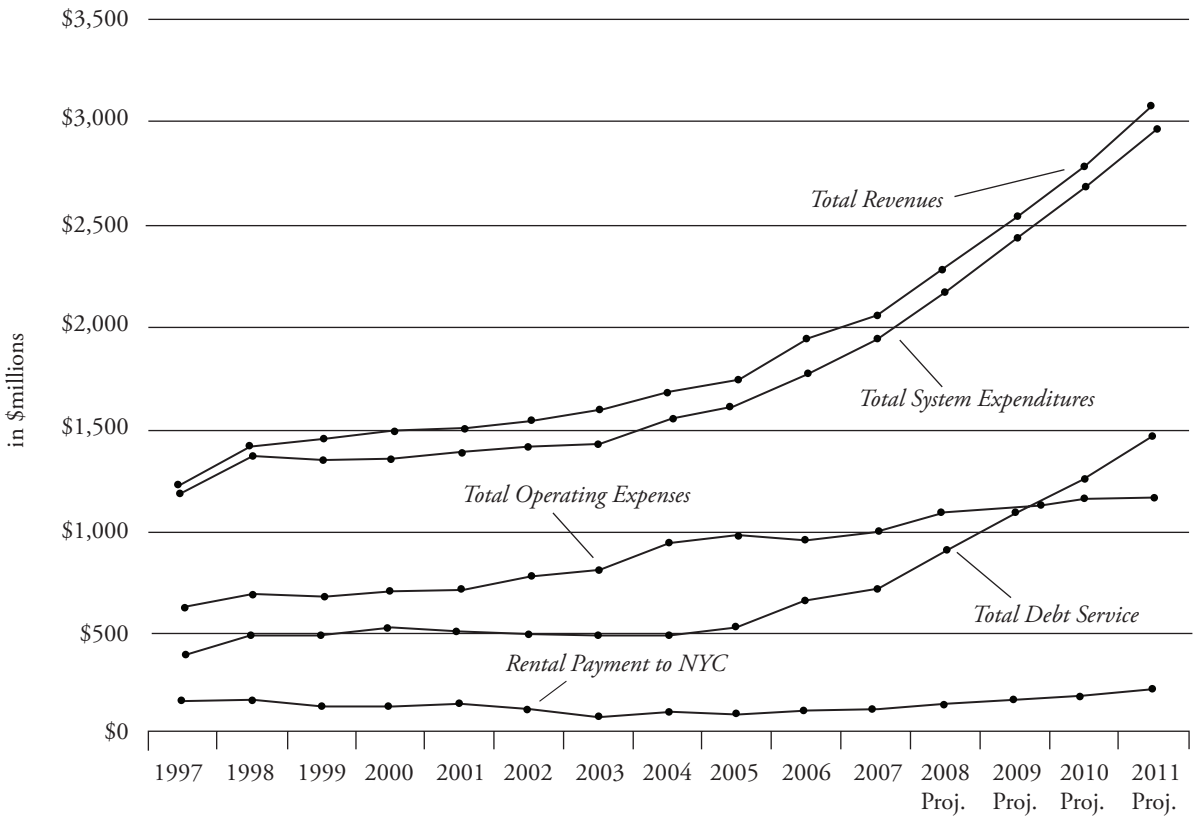

Figure 2 Source: NYC Water Board Blue Books 1992-2007 and MWFA Prospectus October 2007

As the chart makes clear, Total Operating Expense is increasing at a moderate rate, but Total Debt Service is increasing at a very high rate. It is the sharp upward trend in the capital program that is driving the increases in the Total System Expenditures. Total Revenues must be increased to cover them.

THE RENTAL PAYMENT

Another component of the increase in Total Operating Expense is the rental payment made by the Water Board to the City of New York. The payment is a charge for leasing the water infrastructure that was built by the city prior to 1984. Prior to 2005 the Water Board paid the city annually whatever the city was paying on debt service for constructing the pre-1984 infrastructure. In 2004, that payment totaled $115 million.

After 2005, however, the city invoked a provision of the lease agreement requiring the Water Board to pay an amount equal to 15 percent of the interest and principal paid by the Water Board on the total outstanding MWFA bonds. The lease payment to the city now bears no relation to the cost of the leased infrastructure, and it is increasing as the amount of outstanding MWFA bonds increases. In 2006 the payment increased to $124

million. By 2011, it is projected to reach $235 million, even though debt service for the original water and sewer infrastructure will be less than half what it was in 1984. The difference between the cost of the pre-1984 bonds (the prior rental payment) and the new rental payment is the "excess rent payment." Excess rent is growing and will continue to grow.

According to the MWFA, this extra rental payment is protecting the rating for its bonds, by providing an additional margin of safety for holders of the MWFA bonds, and compensating the city for police and other costs of the system (similar to a payment in lieu of taxes). However, ever increasing capital needs and the corresponding increase in the amount of outstanding MWFA bonds ensures that this payment will only continue to go up—and not necessarily in proportion to the services or risks that the city has undertaken. Figure 3 shows the projected increase in this excess rental payment.

USE LESS, PAY MORE

While a core guiding principle of the rate structure is that users should fully pay for the water and sewer system (a principle known as "full cost pricing"), another goal is to promote water conservation and decrease the need for future capital investment.[3] With the city's population projected to increase by one million by 2030, the latter goal is clearly critical. One of the primary arguments for metering water has been that users would decrease usage and thus reduce the need for expensive new facilities.

To a large extent, that has happened. Water usage in New York City has decreased from 1.512 billion gallons per day in 1979 to 1.086 billion gallons per day in 2006. Despite the addition of about one million residents since the 1970s, no new reservoirs or other water sources have been required. Many observers believe that these savings have largely been the result of fixture improvements, building code requirements, and rebate programs that have increased the use of low flow toilets and shower heads.

However, for rate payers, reducing water usage has not decreased costs. This is a serious flaw in the effort to conserve water. DEP is about to commission a study to reconsider the rate structure. In order to achieve actual savings, any new rate structure should reward

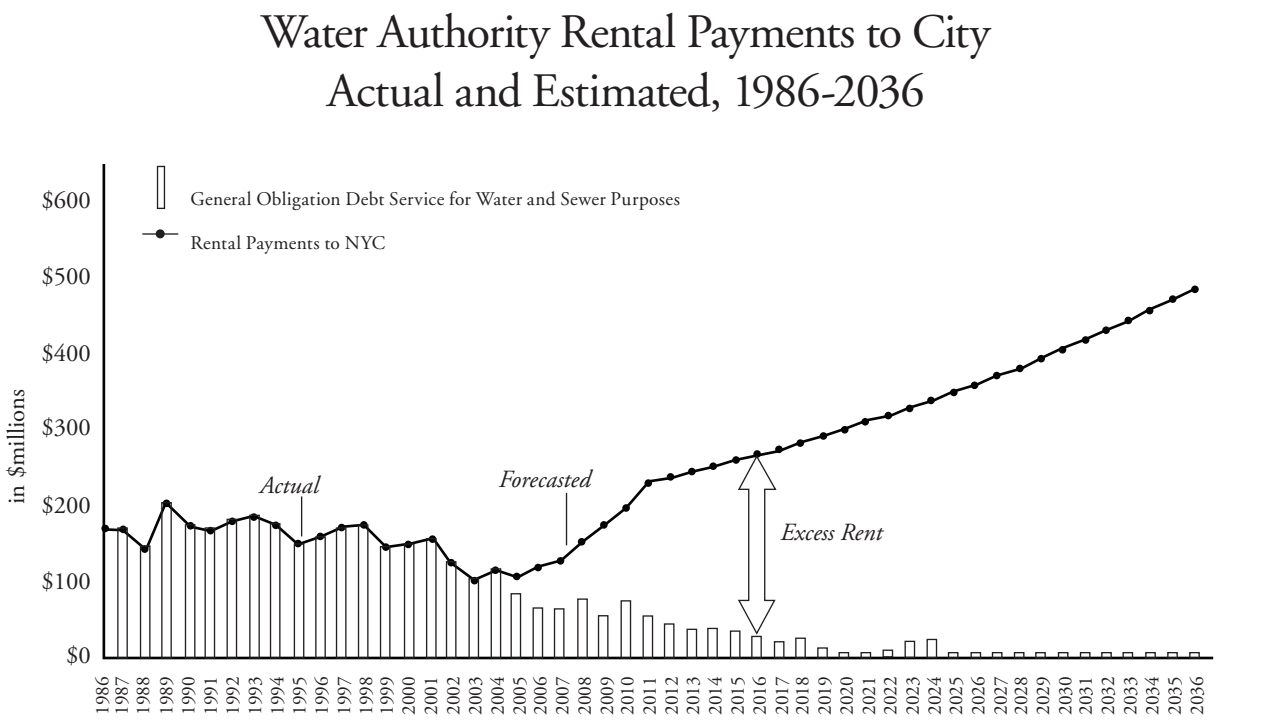

Figure 3 Courtesy Office of the Comptroller, City of New York—Based on 2007 projection

Percent Difference from Citywide Average in Annual Water Rates

By Apartment for Pre-1947 Rent Stabilized Buildings Larger than 10 Units

2006 Data

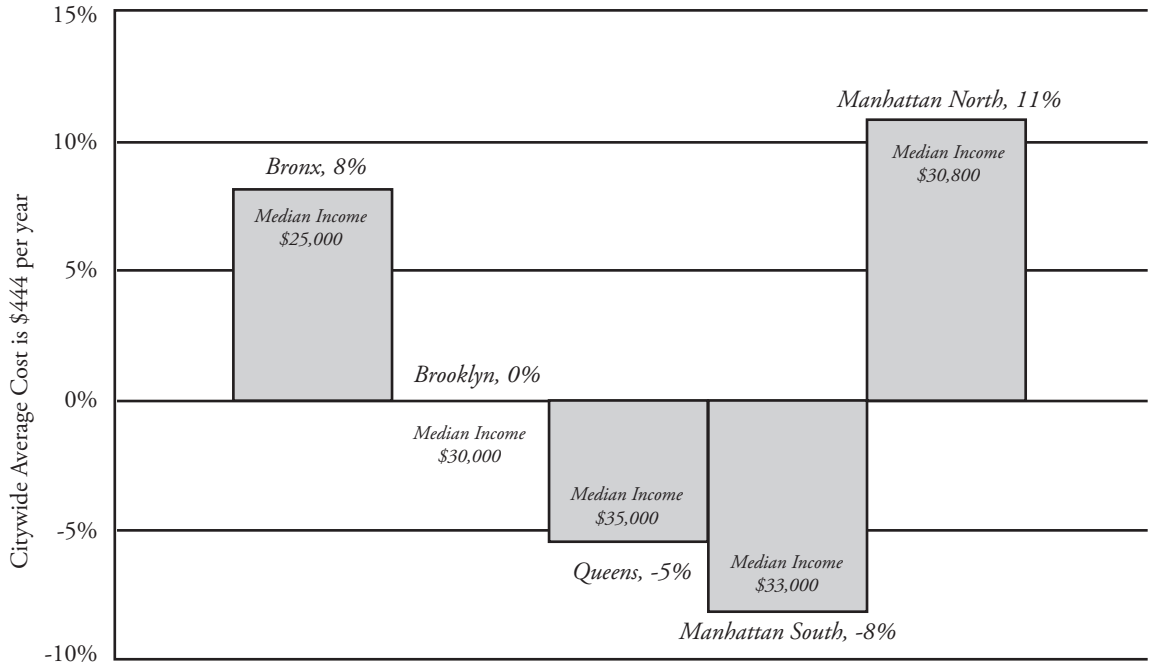

Figure 4

Source: Rent Guidelines Board RPIE Data, 2006

conservation with a real cost savings. This will require a rate structure that removes part of the capital cost from the rates so that lower usage is not offset by higher debt service payments.

REGRESSIVE TAXATION

The water and sewer charge is one of the more regressive taxes in New York City. Using data filed with the New York City Department of Finance, the Rent Guidelines Board reports a surprising variation in the costs of water and sewer, in pre-1947 rent stabilized buildings of ten units or more (Figure 4).

Low-income neighborhoods pay more. In these pre-war buildings in 2006, the citywide average cost for water was $444 per housing unit. But in Manhattan South (below West 110th and East 96th Streets) water cost only $408 per unit. In Manhattan North it cost $492 per unit, and in the Bronx it cost $480 per unit.

One reason for this disparity is that lower income households have a higher occupancy rate, and thus, a higher need for water. Another is that lower income households vacation less frequently than higher income households. Lower water and sewer use in Manhattan South correlates with lower occupancy. According to the 2005 New York City Housing Vacancy Survey, apartments in Manhattan south of West 106th St., and south of East 96th St., have an average occupancy of 1.57 persons per apartment, well below the citywide average of 2.26 persons per apartment.

This is bad news for affordable housing in New York City. One funder of tax-credit housing, for very low income households, reports its water costs at an average of $633 per unit per year, almost $200 above the average reported by the Rent Guidelines Board.

For owners and developers of affordable housing, including privately owned, non-subsidized affordable

housing, this means a disproportionate burden of building the water and sewer system. And it is a cost that is rapidly rising.

RATE SETTING AND CAPITAL PROJECTIONS

In its listing of important objectives, the Water Board states that the rate structure should provide a reasonably stable and predictable flow of revenue.[4] Similarly building owners need reasonably predictable rate increases. These should be moderate and smoothly spread out over time, enabling them to adjust to changes without sharp and unexpected rent increases.

Yet there has been a wide variation in projected and actual expenditures on the capital program. For instance, projected 2008 capital expenditures, as indicated in the Water Board's 2006 and 2007 Blue Books, varied by about $2 billion. ($1.6 billion was projected for 2008 expenditures in the 2006 Blue Book versus $3.5 billion in the 2007 Blue Book.) Actual expenditures for 2008 are about $3.77 billion.

This wide variation does not induce confidence in the oversight of the capital program or in the predictability of rates. Unlike the city's other capital proposals, there does not seem to a process of weighing alternatives and making choices based on limited resources.

GOVERNANCE

One reason is the system's unusual governance. For all other agencies the city's Office of Management and Budget (OMB) reviews capital expenditures and budgets capital and operating expenses. When there is a need to decrease spending, it directs agencies how much to cut and may recommend ways to do so. With overall responsibility for the city budget, OMB has a direct interest in ensuring that funds are used wisely and frugally.

Although chaired by the Director of the Office of Management and Budget, the Municipal Water Finance Authority has little incentive to control costs since its revenue is, essentially, off the books. With OMB acting both as a key player and the main oversight agency, there is less independent supervision of the process. With virtually no staff, and dependent on the technical expertise of the agencies, the Water Board generally approves whatever rate increases are dictated by expected expenditures. Although the system labors under a series of court orders, mandating between 50 and 75 percent of its capital program, there is less than the normal incentive to cut costs.

WHAT TO DO

There is broad agreement that New York City has a shortage of affordable housing. Indeed, the city funds affordable housing and provides a wide variety of tax benefits to keep it affordable. A policy of overtaxing housing for water and sewer use is contrary to this policy. Our objectives for water and sewer pricing should be:

- End the excess rental payment to New York City.
- Improve capital spending projections and oversight to insure predictability in rate expectations.
- Spread out the costs of infrastructure investments so as to reduce the burden on home and multiple dwelling owners.
- Increase conservation by providing real cost reductions for those who conserve.

END THE EXCESS RENTAL PAYMENT

Comptroller Thompson has proposed that the excess rental payment (the difference between the cost of amortizing the pre-1985 bonds and the current payment based on the outstanding MWFA bonds) be returned to the water and sewer system for capital and operating expenses. It is a recommendation that would help to reduce the burden on the rate payers, and it should be adopted by the Water Board.

The rental payment though is only a small portion of the cost problem. (In 2008's 14.5% increase, the increasing rental payment accounted for only 1 percentage point. Eliminating the excess rental payment entirely would reduce the average customer's bill by about 7%.) The bigger question is what to do about increasing capital costs. As with many other nationwide infrastructure needs, (e.g. roads, bridges, railroads, airports, education, etc.) the federal government should provide more assistance, although it is doubtful that it will be able to do so.

IMPROVE CAPITAL MANAGEMENT

Another solution would be to transfer the construction part of the water and sewer system to the NYC Department of Design and Construction (DDC). This

is the city's prime construction agency, and it has been remarkably effective since its creation under the Giuliani administration. The DDC already has a portion of the construction work to the extent that it overlaps with its street construction responsibility.

Another part of the solution would be to ensure that final fiscal approvals rely on independent technical expertise. That would mean giving the Water Board a permanent technical and fiscal staff, to make it a true overseer of the system.

SHARE INFRASTRUCTURE COSTS EQUITABLY

The capital costs of the water and sewer infrastructure system should be borne equitably through New York City's larger tax base. This can be done by having the city borrow and pay for a portion of new capital infrastructure or by making a direct payment to the MWFA for debt service.

This argument is compelling for several reasons. Capital expenditures represent what it costs to have a water system. The marginal cost of delivering another gallon of water is trivial compared to the cost of laying the pipe that delivers the first gallon. The cost of filtering the water from the Croton Reservoir is mostly represented by the cost of building the plant—not the operating cost of filtering each gallon. As with other major infrastructure—roads, bridges, fire stations, etc. —the water system is a basic requirement of having a city. Its burden should not fall solely on property owners.

ENCOURAGE CONSERVATION

If the users were only paying the operational costs, then continued reduction in water usage would be rewarded with lower rates for those who conserve water. We should have a system that rewards conservation. While PlaNYC states that conservation is an objective for 2030, there is no real strategy to achieve it. Without a change in the rate structure, users will pay more even as they conserve. Removing part of the capital costs from rate payers would reduce bills when water usage decreases. Under the current system, reduction in use will lead to inadequate revenue to pay the construction bonds. Thus rates must be increased to offset the lost revenue.

The existing MWFA/Water Board structure insulates the water and sewer system from political and economic swings, ensuring a source of funds for capital projects and encouraging long term capital planning. However it is now time to rethink how we plan, borrow, build and pay for this system in order to protect our housing stock, achieve equitable distribution of costs, plan and build an efficient and cost effective infrastructure, and support conservation of a critical natural resource.

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Special Thanks to: NYC Independent Budget Office, Office of the NYC Comptroller, NYC Office of Management and Budget, and for assistance from John McCarthy, Jim Buckley, and Jerilyn Perine.

Notes:

1. Of the remainder 7% is the rental payment to NYC, and 2% is miscellaneous.
2. Water and sewer costs are a component for the determination of rent increases for rent stabilized tenants. However in many poorer areas of the city, the owner is not able to fully pass along rent increases since local market rents are not as high as the permissible rent stabilized rent. As a result in poorer neighborhoods the cost of the increase is usually shared to varying extents by tenants and owners. In the strongest market areas cost increases also encourage owners to take steps to increase revenue by aggressively seeking to remove lower income tenants in favor of higher income tenants.
3. See 2008 Blue Book, page 26. Available at www.nyc.gov/html/nycwaterboard/pdf/blue_book/bluebook_2009.pdf.
4. See 2008 Blue Book, page 26. Available at www.nyc.gov/html/nycwaterboard/pdf/blue_book/bluebook_2009.pdf

New York City Housing Development

Suffers the Effects of the Credit Crisis

Following is an abbreviated and edited transcript of a panel discussion on October 2, 2008 at Massey Knakal's Madison Avenue offices

Panelists, Clockwise from left:
Kenneth S. Horn, President, Alchemy Properties
Andy Gerringer, Managing Director, Development Marketing Group, Prudential Douglas Elliman
Paul Massey, CEO, Massey Knakal Realty Services
Matthew Gottsegen, Partner, Franke, Gottsegen, Cox Architects
Matt Albano, GCP Capital Group (not pictured)

Moderator
Larry Sicular, Editor, *The Stamford Review* (not pictured)




Sicular: I'm the editor of *The Stamford Review,* and we're here for a panel discussion this morning on residential development. With us are our host, Paul Massey, of Massey Knakal, a building brokerage firm; Andy Gerringer of Douglas Elliman development marketing; Matt Albano of the GCP Capital Group, a real estate financing company; Matthew Gottsegen of Franke, Gottsegen, Cox, Architects; and Kenneth Horn of Alchemy Properties, a housing developer. It's hard not to start without talking about what's happening in the present uncertain environment, so I thought we'd perhaps ask Matt first to talk about the availability of money.

Albano: The real transition that we have seen in the finance market is the uncertainty of actual closing. Getting a term sheet used to mean a lot more that it does in these days.

Sicular: What is a term sheet?

Albano: A letter of intent. Initially, I draft a financial brochure, with the developer's materials; we meet on site, negotiate with lenders and pick a lender to proceed with. At that stage, the bank has done a lot of underwriting, it likes the economics of the deal and wants to go forward, so they issue a letter of intent. That letter of intent is not a commitment. Then we do a formal appraisal, a project cost review; we pretty much go through all third parties to make sure budgets work and the individuals' economics for guarantees work.

Sicular: What's changing that now?

Albano: It's very hard to get commitments. In the past I would get someone a letter of intent to go through that process, get them to a comfort level, and the bank would close—almost 99.9 percent of the time they would close. I've never seen it put on cruise control but the obstacles were far less.

Sicular: We're talking about construction loans?

Albano: Absolutely, ground-up construction loans. I just had two particular deals and a letter of intent and

both of them got bounced. One was from a Hong Kong bank, which had a recent bank run or attempted bank run, so that affected all commitments. Another one is a Puerto Rican-based bank, which I'm still waiting on, but it looks like it's going south.

Sicular: What kind of time frame are we talking about?

Albano: I'm talking the last two months. And the basic terms of financing have changed too. They're doing longer terms. Initially, the typical deal was a prime plus one, 18 months with a six month extension. A lot of developers haven't met those deadlines, so now its 24 months which means more reserve, more oversight, more underwriting, less loan to cost. We used to do 80 percent, and sometimes up to 95 percent with mezzanine financing, but that has really dried up. We're now doing 65, 70 percent loans. Your average developer of the last five years is an attorney, like me, architect, or other professional, who understands the business but has not done the amount of ground-up work that some other seasoned veterans have done. Loans for them are pretty much non-existent right now.

Sicular: What are the rates?

Albano: Rates are going up as well. They're doing floor rates now, previously they were at prime plus one-and-a-half, or plus two, but the floors are really going up to seven-and-a-half or eight percent. I'm doing a couple at seven which are still being honored, through a few committees that will still allow condo releases; some of them won't now. Everything has to be rentals.

Sicular: Ken, what are you finding?

Horn: Well, we've closed on two construction loans this year, one in June and one in August. The first loan we closed, the bank did not negotiate. They held the rate at 1.65 above LIBOR, which was really remarkable.

Albano: That's fantastic.

Horn: The second loan we closed on in August. The original spread of the loan was LIBOR-based, and we were offered 70 percent of cost. It did close, but it was a

mild torture. From the term sheet—we didn't actually get a commitment letter—we went right to documents. The spread went up about 30 basis points and we were very fortunate. We were told by the lender that ours was the last construction loan that they were going to do in Manhattan this year. So financing is difficult, to say the least.

Sicular: And can you tell the readers what kind of projects we're talking about for these two loans?

Horn: Both are ground-up buildings; one is a 75,000 square foot building; 18 stories, two units per floor, on the Upper East Side and the other is about 160,000 square feet on Tenth Avenue in the West 50s. I should point out that even though they're condominiums, they make sense as downside rentals. The lenders will only look at lending now based on downside rental scenarios, knowing that in the event the market doesn't hold, they would be in a position to rent the units out, with their debt service covered. I'd imagine that 18 months ago, that was not a great concern.

Massey: Can I ask you to rough out construction costs for those two projects?

Horn: We build our own buildings so we act as our own contract manager, so it's a little bit lower in terms of cost. For the building on East 77th Street, we're coming in probably around $370 per square foot. Our building that's on Tenth Avenue is only an 8-story building, and spread out over 37,000 feet, so it's a huge site. We budgeted around $375-$380 a foot.

Gerringer: Paul, are the owners of the land getting more realistic on the pricing?

Massey: Sellers would prefer not to sell because real value is unknown, and buyers are, to some degree, in that same mindset so it's hard to answer.

Overall, we were selling roughly 50 buildings a month during the sunny days in the first half of 2007, and 15 months ago, 14 months ago we immediately and dramatically dropped to 25-30 buildings a month, so velocity went off depending on the sub market anywhere from 35-50 percent.

So in 2005, 2006 and the first half of 2007, the velocity of New York City properties sales was four-and-a-half percent, so four-and-a-half out of every hundred buildings would roll over.

Horn: But that is not necessarily for development sites; that's for income producing ....

Massey: All property types were now at two-and-a-half percent. The velocity in development sites went from four-and-a-half percent, in that range, to less than one percent now. In a lot of our sub markets there's no velocity of land or property that would be significantly redeveloped.

Gerringer: And the transaction prices, have they gotten lower or remained steady?

Massey: On sales that are actually happening, which mostly happened in the earlier part of 2008, the prices have held.

Sicular: Are the land deals that have closed clustered in any particular geographic area?

Massey: Manhattan and pockets of high-end Brooklyn.

Albano: With the money out there, I have guys they can write checks for anything. But what they want is to take product over.

Sicular: What do you mean by that?

Albano: Traditional mezzanine financing has now morphed into a JV [joint venture] equity piece. But the guy developing his project doesn't want to give it up. Rather than bringing in a partner, probably surviving, he would rather say no and just take debt. I think the bigger guys are going to come in and be able to pick off a lot of nice pieces. But I don't think we're there yet. But we're coming there in a couple of months.

Horn: In any given week we're approached by probably four guys—not exaggerating—over the last 90 to 120 days. They're saying, "I'm developing a property, I'm out of money, I can't get a construction loan; will you come in a joint venture with me?"

Sicular: Matthew, do you have any comments you want to make about construction costs?

Gottsegen: They are always going up. It seems that even if the purchase price is down, the velocity is slow, and the market is a bit frozen, construction costs are operating on different parameters—you know, they're global.

Gerringer: Until Dubai and China slow down.

Gottsegen: Concrete's up, steel's up. Construction costs, at least at the moment, don't seem like they're flattening out. They may.

Horn: I think on certain of the trades people are getting a little hungry.

Gottsegen: Yes, it seems we have gotten more calls from vendors and contractors looking for work in the last month, dramatically more. For the last two years no one needed to make those kinds of calls.

Sicular: Andy, why don't you give us some kind of overview of the new development pipeline, if any are coming on at all?

Gerringer: As far as projects coming on, a lot of things are on hold. Those guys that did get their financing are at "should I do it as a rental, should I do it as a condo?" We have been recommending to our developers, for as much as a year, that they consider taking deals that are within reason, as they may have to take a lot off later. As a broker you can tell them that 'til they're blue in the face sometimes.

Sicular: We're talking about the end unit sales.

Gerringer: I'm talking about the end unit sales, you know where people come in and make decent offers but the developer wants to hold the price.

Sicular: You saying a reasonable deal, what kind... can you talk in percentage terms?

Gerringer: It really varies. The Manhattan market has slowed up a little bit more than Long Island City, where we have a lot of product out, and three jobs open, and we've been doing sales. A couple of weeks ago, on the worst day on Wall Street before this past week, we did three sales at our jobs out there. I think part of it has to do with people getting good deals; and they're coming from rentals as opposed to having a house to sell.

Horn: The developer mentality is almost to push the market and our mentality, which Andy recommends and we adhere to, is not necessarily to push the market, but to sell your product, sell it at a relatively fast pace, pay off your debt, return your equity, hit your profit and move on, but because some of the land went for such high prices and because construction costs have gone up, coupled with the minimum release prices from the lenders, it's hard for some developers to be in a position where they say: I'm going to cut my price from $1,500 to $1,300 a foot.

Sicular: I want to talk about end-loan financing for the buyers of individual condos and what you're seeing.

Gerringer: Sure, the buyers have to be a little more qualified today than they were. Developers were building and projecting a year, but their developments may have taken a little longer than they thought to complete. For some people who had 90 percent financing the rate lock expired and there's no longer 90 percent financing in the market. So there are some issues with that, and the buyer generally has to be more qualified today. You have to have a job. [laughter] No income verification, no doc loans have gone the way of the dodo bird really, and it's really a different lending environment.

Sicular: Other than in the immediate crisis, in your existing projects, how does your absorption rate this year compared to absorption rates last year?

Gerringer: It's much slower; even in a market that has had very high absorption and visitor traffic like Long Island City, the traffic is at the same level, but the purchasing has slowed down.

Sicular: Can you quantify that at all?

Gerringer: I'd say maybe it's down 20, 25 percent.

Sicular: Ken, what types of projects are you looking for now? You say you're still a buyer.

Horn: Anywhere between 60 and 100 units is perfect for us. And we're looking to buy either rehabs or ground-up opportunities that make sense at not-inflated sales prices, not-inflated rents. The good news is that we've got equity partners who are willing to take the deals with us all cash. We go through the development process, the architectural, engineering, the demolition, probably the excavation and foundation, which will probably end up taking 15 months, to get us rolling with all the permits and DOB approvals, etc. At the end of the 15 month period, we'll make a determination whether or not we'll continue the deal all cash or, hopefully, borrow if the financing markets open up.

Sicular: What do you find the developers are looking for Paul? I understand things are on hold right now, so let's talk about the current cycle.

Massey: We're talking to a whole bunch of our clients about the possibility of middle income, lower income housing. There are three million housing units in the city and the creation of housing has been just one little element of that, the luxury condo market, for two reasons. One, it was highly profitable business, the other was that construction costs and land values got so high, that it was really difficult to contemplate anything else.

Gerringer: That's right.

Massey: For low and middle income, there hasn't been any creation of stock. The last big surge in housing creation was in the 1960s. So our housing is aging; we need rehabilitation of that property. The Bloomberg administration is projecting a million people added to the census over the next 7-10 years, and if you do the math on 2.4 people for every unit, a typical family size, that need alone is 400,000 units.

Sicular: So where do you believe that it's feasible to create low and middle income housing? You must be offering sites to developers.

Massey: The lowest price on a square-foot basis for land has been consistently in the Bronx, which is something people should consider because it's a fundamentally good place. There is infrastructure; there are communities; there is transportation; and it abuts Manhattan. So I don't know why that schism in land values still exists for the Bronx. I don't think it will continue to exist.

Sicular: Are there projects that are coming on-line up there, or is this just an opportunity that you perceive?

Massey: I think the developers that have been active up there are probably in a little bit of a squeeze, so that's taking a rest, but when the sun starts to come out again, that's an area that people might want to consider for bread-and-butter housing creation.

Sicular: Is this rental housing creation?

Massey: Ideally yes.

Horn: A lot of the Bronx developers have always had 421a certificates to sell, and those certificates buttressed their returns. Now that they don't have them to sell, it'll be interesting to see….

Masssey: For our readers, the 421a program has been modified by the city. In order for a development to qualify, affordable housing now has to be created on-site, so creating housing in the Bronx and selling the certificates for market rate housing in other, more expensive locations isn't going to be happening any more. I think the city is going to be sorry.

Horn: I agree, the concept was that we shouldn't sell certificates to wealthy people who are just going to have a reduced tax base, however there was a certain cycle to it, in the sense that those certificates helped generate low-income housing.

Massey: The modification of the 421a directly conflicts with the mayor's stated desire to create 165,000 new units in the next few years. So that will have to be addressed.

Sicular: Matthew, let's talk about the design of new buildings, and the designs of unit interiors.

Gottsegen: I think design awareness, as something that's value added to a project, has been gaining a lot of credence. And it's marketed to the point where a specific architect or designer is hyped, like at the Richard Meier Towers, a groundbreaking iconic building in the West Village. And it's been a great opportunity for architects to show that there is a reason for design as value added, not only its stylish aspects, like custom hardware and elegant bathrooms and kitchens but also quality bones, really good layouts, good light, good views, good things that people really desire. The architect's role has ratcheted up somewhat on the high-end projects. What a good designer can bring to the table is looked upon as extremely important and it's marketed to the hilt.

Gerringer: I think Related has done a good job of branding with [Robert] Stern. I think that's an instance where there's some value. Most of the time I don't think it makes that much difference. What people really want in the market today is good value; they want a great layout, they want nice finishes. All these amenities, the wine coolers, and home theaters are all marketing hype. I'd rather not see that kind of thing put into these projects because it all comes down to the bottom line.

Sicular: Because you feel buyers are becoming more conservative?

Gerringer: No, it's about the absolute dollar. We can talk dollars per square foot until we're all blue in the face, but it's meaningless. It's about how much somebody can afford to spend, given today's financing guidelines. At the end of the day you want a great product that somebody can sell at a reasonable price. You know, another thing coming into play that we haven't mentioned is this whole green….

Gottsegen: A lot of condominium developers have stayed away from that.

Gerringer: Ours have for the most part….

Gottsegen: If you're doing high quality, high efficiency boilers for instance, or other kinds of energy saving devices, these are the least sexy parts, because you don't see them. Over the life cycle of the building if you're an owner and operator, it makes a lot of sense to buy a boiler that will save you oil or gas, but if you're a condominium developer, you're in and out so it's not saving you any money, it's costing you money.

Horn: Back to Andy's point about making units that are theoretically affordable, that is 100 percent accurate. On Tenth Avenue, we've made our one-bedroom apartments a little smaller; we've made them in the high 700s maybe 800 square feet, and what we have also done is to create one-bedroom units with dens, which are about 950 square feet with two baths. So they're like junior twos.

Gerringer: That's a good product.

Horn: And they can be priced well below your standard two-bedroom unit. You could probably sell those for below a million dollars. And you're selling them at $1,000, $1,100 a square foot, which is pretty good. There's a cap on what people will pay for a unit.

Sicular: No matter how big it is.

Horn: It doesn't matter, same thing with two-bedroom units. The price per square foot is deceiving although, unfortunately, developers and banks use it as a method.

Sicular: Are the comments you were making about more affordable prices and lower frilled layouts different from a year or two ago?

Gerringer: I think probably two years ago, but you really have to look at who your target market is. What you build in the East Village is not necessarily what you build on the Upper West Side; you really have to know your market intimately.

Sicular: Please explain to the readers what you build in the East Village and how that contrasts with what you build in the Upper West Side.

Gerringer: Generally, in the East Village you would build small one-bedroom and smaller two-bedroom units. You wouldn't build family-sized apartments. They'd be much tighter than what you would build in a more prime location. So a 650-to-700 square-foot, one-

bedroom apartment in the East Village could be 750 to 800 square feet on the Upper West Side. And you do some larger units on the Upper West Side.

Gottsegen: We're doing a project on the Upper East Side that has six 4,500 square foot units. On the Upper East Side it makes sense.

Horn: As a developer I would never do that; it's risky. In the building we're doing on Tenth Ave., we have 95 units. I think I've got four or five three-bedroom apartments.

Gerringer: That's all you need.

Horn: Especially ones, ones with dens, small twos, twos with dens. On the Upper East Side—we have no ones, no studios. They're all twos, twos with dens, threes, and we can combine them and make them fours or fives.

Gerringer: That's the right way. When we work with architects, we recommend that they plan and pre-plan combination units out in advance, wet walls backing wet walls and so on, so if the market so dictates you can change directions.

Sicular: Andy, please explain for the reader how you get involved in a project and where you begin.

Gerringer: The earlier that we get involved the better. We're kind of the developer's outsource marketing department, and we're there through the whole process, from concept to closing. We do the market analysis; we work with the architect and make recommendations on the product design, pricing, reviewing the offering plans, working with the mortgage broker on financing. We're kind of the glue that tries to hold everything together.

Sicular: Essentially the developer is coming to you in part for your knowledge on previous projects.

Gerringer: Yes, and we have also opened up a lot of new markets.

Sicular: What's the most recent new neighborhood for condos?

Gerringer: I'm a big believer in Long Island City. I keep saying this so it sounds like an ad for the Long Island City BID [Business Improvement District], but the reality is you can get from the Jackson Square Station to Grand Central literally in three minutes.

Sicular: All right Matthew, why don't we talk about when developers come to you.

Gottsegen: Smart developers come to us before they buy the property. They maximize profit by building as many square feet as possible. And development properties are sold based on the potential square footage. So we are constantly doing zoning studies for potential clients, showing them how much they can build. That's the first part of the service that we provide.

Sicular: Ken, do you farm out that service? Or do you have it in-house?

Horn: I try it myself at first, and then I give it to our architect and our legal counsel. A lot of times there are discrepancies between the lawyer and the architect.

Gottsegen: Yes, the zoning ordinance is a difficult document to read.

Horn: Special districts, special height restrictions, absolutely. Matt is right; it doesn't matter what the permitted FAR [floor-to-area ratio] is; it doesn't matter how big the site is. You may be in a landmark district, a restricted district. A lot of times when brokers give you the set up, and Paul's guys happen to be very good about this, they will say, gee, you've a 10 FAR, a 10,000 square-foot site, you can build 100,000, but there are hundreds of different variations, and you need your architect and legal counsel to review it.

Massey: Most developers are very bright and have their experts, so they know what they're getting, and they check. And Ken's point is right; there are iterations under the zoning calculation that can surprise people, so….

Horn: In fact, Paul, do you remember years ago we were about to do a transaction, a phenomenal site, and we thought we could build a certain amount, and then our legal counsel remembered something, that didn't appear in the title report, didn't appear anywhere? No one knew it: the seller didn't know it, we didn't know it….

Sicular: What did she remember?

Horn: She remembered that there was some kind of swap of air rights on that site. She said, "I'm going to go to City Planning and double check it," and she was right, we couldn't build anything. So the site was about 5,000, 6,000 feet and we thought we could build 80,000 feet.

Sicular: Wasn't it recorded?

Horn: It was not recorded. It would have been a morass….

Andy: I hope you gave her a good bonus.

Horn: She caught it. Now we've sainted her; whenever she calls, we say St. Melanie. [Melanie Meyers]

Sicular: She really saved your neck.

Horn: Yeah, we had a big group hug in the office… that would have been very bad….

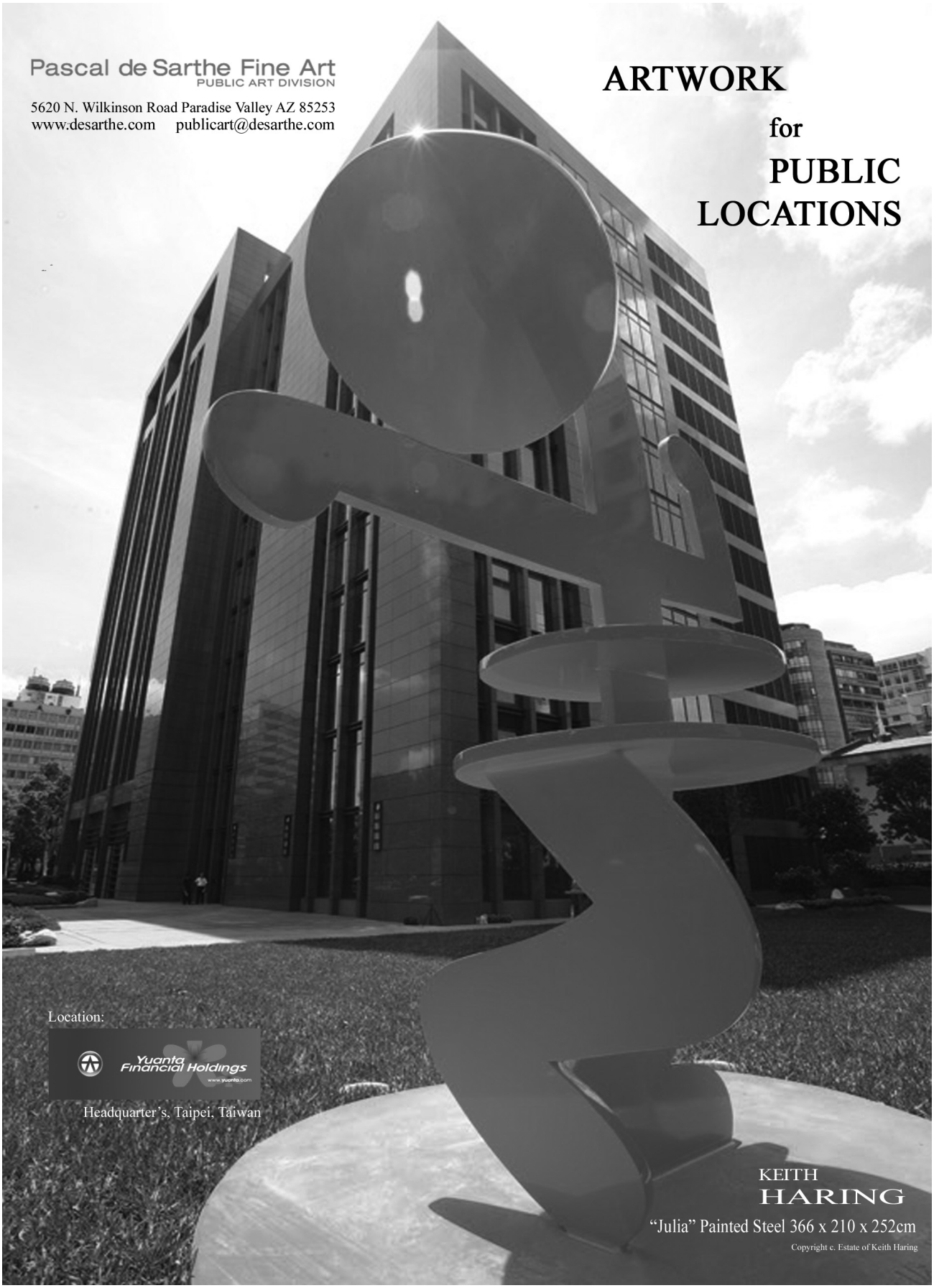
Sicular: I think that's a good place to end, on a positive note. Thanks a lot.

Prima

The Renwick

Georgica

Chelsea Stratus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