

**NEW ISSUE**

In the opinion of Bond Counsel, assuming continuing compliance by the Authority and the Board with their respective covenants relating to certain requirements contained in the Internal Revenue Code of 1986 (the "Code"), interest on the Series A Bonds is not includable in the gross income of the owners thereof for Federal income tax purposes under existing statutes and court decisions. Interest on the Series A Bonds is exempt from personal income taxes imposed by the State of New York or any political subdivision thereof, including The City of New York. See "TAX EXEMPTION" herein for a discussion of certain Federal taxes applicable to corporate Bondholders.

**\$285,000,004.50**  
**New York City**  
**Municipal Water Finance Authority**  
**Water and Sewer System Revenue Bonds**  
**Fiscal 1991 Series A**

Dated: Date of Delivery

Due: June 15, as shown below

The Series A Bonds will be issued as registered bonds and, when issued, will be registered in the name of Cede & Co., as nominee of The Depository Trust Company, New York, New York, which will act as securities depository for the Series A Bonds. Purchasers will not receive certificates representing their ownership interest in the Series A Bonds purchased. See "THE SERIES A BONDS—Book-Entry Form Only". Interest on the Series A Bonds (other than the Capital Appreciation Bonds) will accrue from their date of delivery and will be payable semi-annually on each December 15 and June 15, commencing December 15, 1990. The Capital Appreciation Bonds bear interest from their date of delivery compounded semi-annually on each December 15 and June 15 commencing December 15, 1990, and paid only at maturity or earlier redemption. The Series A Bonds are subject to redemption prior to maturity as described herein.

The proceeds of the Series A Bonds are expected to be used to finance a portion of the cost of the Capital Improvement Program of the System, fund certain reserves, and pay costs of issuance.

The Series A Bonds are special obligations of the Authority, payable solely from and secured by a pledge of and first lien on the gross revenues of the System. The Authority has no taxing power. The Series A Bonds are not a debt of the State of New York, The City of New York or the New York City Water Board and neither the State of New York, The City of New York, nor the New York City Water Board is liable on the Series A Bonds.

**\$44,520,000 Serial Bonds**

Maturity	Amount	Rate	Price or Yield	Maturity	Amount	Rate	Price or Yield
1991	\$4,095,000	6.20%	100%	1999	\$2,585,000	7.10%	100%
1992	5,420,000	6.30	6.35	2000	2,790,000	7.20	100
1993	1,760,000	6.50	100	2001	2,965,000	7.25	100
1994	1,870,000	6.60	100	2002	3,185,000	7.30	100
1995	1,990,000	6.70	100	2003	3,420,000	7.40	100
1996	2,120,000	6.80	100	2004	3,670,000	7.40	7.45
1997	2,275,000	6.90	100	2005	3,950,000	7.50	100
1998	2,425,000	7.00	100				

**\$5,990,004.50 Capital Appreciation Serial Bonds\***

Maturity	Amount	Approximate Yield	Maturity	Amount	Approximate Yield
2006	\$1,373,208.80	7.25%	2009	\$1,109,056.80	7.25%
2007	1,278,826.40	7.25	2010	1,035,215.00	7.25
2008	1,193,697.50	7.25			

**\$76,875,000 7.25% Term Bonds Due June 15, 2015, Yield 7.40%\***

**\$98,630,000 7.50% Term Bonds Due June 15, 2019, Yield 7.70%**

**\$58,985,000 6.00% Term Bonds Due June 15, 2020, Yield 7.60%**

The Series A Bonds are offered when, as and if issued by the Authority and received by the Underwriters and subject to the approval of legality by Willkie Farr & Gallagher, New York, New York, Bond Counsel. Certain legal matters will be passed upon for the Underwriters by Brown & Wood, New York, New York. It is anticipated that the Series A Bonds will be available for delivery in New York, New York, on or about August 16, 1990.

**Smith Barney, Harris Upham & Co.**  
Incorporated

**Pryor, McClendon, Counts & Co., Inc.**

**Morgan Stanley & Co.**  
Incorporated

**PaineWebber Incorporated**

**Dillon, Read & Co. Inc.**

**First American Municipals, Inc.**

**Goldman, Sachs & Co.**

**Kidder, Peabody & Co., Incorporated**

**Lebenthal & Co., Inc.**

**J.P. Morgan Securities Inc.**

**Roosevelt & Cross, Incorporated**

August 9, 1990

\* Insured by Municipal Bond Investors Assurance Corporation.

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Philip R. Michael, <i>ex officio</i> .....	<i>Member</i>
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Thomas C. Jorling, <i>ex officio</i> .....	<i>Member</i>
Arthur B. Hill .....	<i>Member</i>
Kenneth Kopelson .....	<i>Member</i>
Donald C. Platten .....	<i>Member</i>

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Mark Page .....	<i>Executive Director</i>
Alexandra Altman .....	<i>Secretary</i>

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Leroy Carmichael .....	<i>Member</i>
Barbara Fife .....	<i>Member</i>
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Sally B. Hernandez-Pinero .....	<i>Member</i>

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Richard G. Mendes .....	<i>Executive Director</i>
William Kusterbeck .....	<i>Treasurer</i>
Michael Burke .....	<i>Secretary</i>

**Authority Consultants**

Bond Counsel .....	<i>Willkie Farr &amp; Gallagher</i>
Consulting Engineer .....	<i>Metcalf &amp; Eddy of New York, Inc.</i>
Financial Advisor .....	<i>WR Lazard &amp; Co., Incorporated</i>
Rate Consultant .....	<i>Ernst &amp; Young</i>

This Official Statement does not constitute an offer to sell or the solicitation of an offer to buy the Series A Bonds in any jurisdiction to any person to whom it is unlawful to make such offer in such jurisdiction. No dealer, salesperson or any other person has been authorized to give any information or make any representation, other than those contained herein, in connection with the offering of the Series A Bonds, and if given or made, such information or representation must not be relied upon. Neither the delivery of this Official Statement nor the sale of any of the Series A Bonds implies that there has been no change in the affairs of the Authority, the Board or the City or the other matters described herein since the date hereof. The information set forth herein has been provided by the Authority, the Board and the City, but it is not guaranteed as to its accuracy or completeness and is not to be construed as a representation by the Underwriters.

IN CONNECTION WITH THIS OFFERING, THE UNDERWRITERS MAY OVERALLOT OR EFFECT TRANSACTIONS WHICH STABILIZE OR MAINTAIN THE MARKET PRICE OF THE SERIES A BONDS AT A LEVEL ABOVE THAT WHICH MIGHT OTHERWISE PREVAIL IN THE OPEN MARKET. SUCH STABILIZING, IF COMMENCED, MAY BE DISCONTINUED AT ANY TIME.

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## SUMMARY STATEMENT

The following is subject in all respects to the additional information contained in this Official Statement, including the appendices attached hereto. Defined terms have the same meaning herein as elsewhere in the text.

- Use of Proceeds:..... The Series A Bonds are being issued to finance a portion of the Capital Improvement Program of the System, to fund certain reserves, and to pay costs of issuance.
- The System: ..... The Water System provides an average of 1,492 million gallons per day (mgd) of water to approximately 800,000 accounts. It supplies water to approximately 300 square miles in the City and consists of 5,700 miles of pipe, 88,000 mainline valves, 96,000 fire hydrants, 18 reservoirs and three controlled lakes. The Sewer System is primarily a combined system designed to carry both storm and sanitary flows. It is comprised of an extensive network of approximately 6,300 miles of sewer lines, 90,000 catch basins, 5,000 seepage basins and 14 treatment plants. The sewage treatment facilities include 14 operating treatment plants, one storm-overflow retention plant, 88 pump stations, five wastewater laboratories, three inner-harbor vessels and four ocean-going barges for sludge disposal. The sewage treatment facilities treat approximately 1,650 mgd of dry-weather sewage. Under the Act, the Lease and the Agreement, the Board is obligated to pay the operating expenses of the System. The City is obligated to operate and maintain the System.
- Capital Improvement Program: ..... The Capital Improvement Program developed in April, 1988 covers the period through Fiscal Year 1998 and is designed to maintain a satisfactory level of service, to improve operating efficiencies of the System and to address future System requirements. The anticipated cost is \$8.535 billion, of which more than 95% is expected to be provided from System funds. Since April, 1988, DEP identified an additional \$1.7 billion in required capital improvements. It is anticipated that System funds will be used to pay for such costs. Current forecasts of the capital program for Fiscal Years 1991-1994 are more fully described herein. It is anticipated that proceeds derived from the sale of Bonds will be used to fund the System's portion of this program. The City is obligated to carry out capital improvements to the System.
- Security for the Series A Bonds:
- Revenue Pledge:..... The Series A Bonds are special obligations of the Authority, payable solely from and secured by a pledge of the gross revenues of the System prior to the payment of operation and maintenance costs or any other expenses.
- Debt Service Reserve Fund: ..... A Debt Service Reserve Fund, equal to the maximum Adjusted Aggregate Debt Service on the Bonds, will be fully funded at the delivery of the Series A Bonds.

**Security for the Series A Bonds  
(continued):**

<b>Rate Covenant:</b> .....	The Board has covenanted to establish and collect rates, fees and charges sufficient in each Fiscal Year so that Revenues collected in such Fiscal Year will be at least equal to the sum of (i) 115% of Aggregate Debt Service on all Bonds Outstanding and on any Projected Series of Bonds payable in such Fiscal Year, and (ii) the Operating Expenses and Required Deposits for such Fiscal Year.
<b>Rates:</b> .....	Rates, fees and charges are imposed by the Board and are not subject to regulatory approval except for those rates charged to a limited class of upstate users representing less than 1% of Revenues and as provided under certain Federal grants.
<b>Additional Bonds:</b> .....	Additional Bonds, secured on a parity with the Series A Bonds and the Outstanding Bonds, may be issued to pay for capital improvements to the System and to refund any and all outstanding Bonds and general obligation bonds of the City issued for water or sewer purposes. Additional Bonds may be issued subject to financial tests specified in the Resolution.
<b>The Authority:</b> .....	The Authority, a separate legal entity established in 1984, has the power to issue Bonds for financing the renovation and improvement of the System, to require the Board to fix rates sufficient to pay the costs of operating and financing the System and to require the City to adequately maintain the System. The Authority has no taxing power.
<b>The Board:</b> .....	The Board, a separate legal entity established in 1984, has leased the System from the City. It is authorized to fix and collect rates, fees and charges adequate to pay the cost of operating and financing the System.
<b>The Financing Agreement:</b> .....	Pursuant to the Financing Agreement, the Authority has agreed to finance all or a portion of the Capital Improvement Program through the issuance of Bonds or other indebtedness secured by revenues of the System.
<b>The Lease:</b> .....	Pursuant to the Lease, the Board has acquired the System from the City for a term equal to the longer of 40 years or until provision has been made for the repayment of all outstanding Bonds or other indebtedness of the Authority.

# **OFFICIAL STATEMENT**

**\$285,000,004.50**

## **New York City Municipal Water Finance Authority**

### **Water and Sewer System Revenue Bonds, Fiscal 1991 Series A**

#### **INTRODUCTORY STATEMENT**

The purpose of this Official Statement, which includes the cover page, summary statement and the appendices hereto, is to set forth certain information pertaining to the New York City Municipal Water Finance Authority (the "Authority"), a public benefit corporation duly created and existing under the New York City Municipal Water Finance Authority Act, as amended (the "Act"); the New York City Water Board (the "Board"), a public benefit corporation created by Chapter 515 of the Laws of 1984, both of which laws were enacted by the Legislature of the State of New York (the "State"); and the Authority's \$285,000,004.50 Water and Sewer System Revenue Bonds, Fiscal 1991 Series A (the "Series A Bonds").

Pursuant to a lease agreement (the "Lease") between the Board and The City of New York (the "City"), dated as of July 1, 1985, as amended, the Board has leased from the City its facilities for the collection, transmission and distribution of water (the "Water System") and its facilities for the collection, treatment and disposal of sewage (the "Sewer System") (collectively, the "System"). Pursuant to the Lease, the System is operated and maintained by the Department of Environmental Protection of the City ("DEP"). The Board has also entered into a financing agreement, dated as of July 1, 1985, as amended (the "Agreement"), with the Authority and the City for the financing of capital improvements to the System through the issuance of bonds (the "Bonds") or other obligations of the Authority.

Pursuant to the Lease and the Agreement the Board has agreed to cause rates, fees and charges to be collected and, in April 1988, the City developed a ten-year \$8.535 billion capital improvement program (the "CIP") for the System. The Authority estimates that more than 95% of the cost of the CIP will be provided from System funds. It is anticipated that the System's portion of this program will be funded from proceeds derived from the sale of Bonds, including the Series A Bonds. Since April, 1988, DEP identified an additional \$1.7 billion in required capital improvements. It is anticipated that System funds will be used to pay for such costs. Current forecasts of the capital program for Fiscal Years 1991-1994 are more fully described herein. See "CAPITAL IMPROVEMENT PROGRAM". The Series A Bonds will be issued by the Authority pursuant to its Water and Sewer System General Revenue Bond Resolution adopted on November 14, 1985, as amended (the "General Resolution"), and its Eleventh Supplemental Resolution adopted on August 9, 1990 (the "Supplemental Resolution"). The General Resolution and the Supplemental Resolution are collectively referred to herein as the "Resolution". The Authority has appointed Citibank, N.A. to act as trustee (the "Trustee") under the Resolution.

The Bonds are special obligations of the Authority, payable solely from and secured by a pledge of the gross revenues of the System (the "Revenues"), all moneys or securities in any of the funds and accounts established under the Resolution, including the Debt Service Reserve Fund, and all other moneys and securities to be received, held or set aside pursuant to the Resolution, subject only to provisions of the Resolution and the Agreement relating to the use and application thereof. The Board has covenanted in the Agreement to maintain rates, fees and charges at sufficient levels to produce in each Fiscal Year an amount equal to 115% of the principal and interest coming due and projected to become due in such Fiscal Year on Bonds, plus 100% of the operation and maintenance expenses of the System certified by the City and of Required Deposits. The Agreement requires a Consulting Engineer to review the operation and maintenance of the System, and further requires the City to operate and maintain the System in accordance with the advice and recommendations of the Consulting Engineer. See "SECURITY FOR THE BONDS".

Rates, fees and charges are imposed by the Board and are not subject to regulatory approval nor are they subject to other regulations under current law except for the rates charged to a limited class of upstate users, representing less than 1% of Revenues, or as required by certain Federal grants. See "GOVERNMENTAL REGULATION" and "RATES AND BILLINGS".

The estimates and projections contained in this Official Statement are based on, among other factors, evaluations of historical revenue and expenditure data, analyses of economic trends and current and anticipated Federal and State legislation affecting the Authority's finances. The financial projections contained herein are subject to certain contingencies which cannot be quantified and are subject to the uncertainties inherent in any attempt to predict the results of future operations, accordingly, such projections are subject to periodic revision which may involve substantial change. Consequently, the Authority makes no representation or warranty that these estimates and projections will be realized.

There follow in this Official Statement brief descriptions of the Series A Bonds, the Authority, the Board, the System and the CIP, together with other information including summaries of the terms of the Bonds, the Resolution, the Agreement and the Lease. All references herein to the Resolution, the Agreement and the Lease are qualified by reference to such documents in their entirety, copies of which are available from the Authority. All references to the Bonds are qualified in their entirety by reference to the definitive Bond form and the terms and provisions thereof contained in the Resolution.

## THE SERIES A BONDS

### General

The Series A Bonds initially delivered to the Underwriters will be dated their date of delivery, which is expected to be on or about August 16, 1990. The Series A Bonds will mature on the dates and will bear interest at the annual rates shown on the cover of this Official Statement. The Series A Bonds will bear interest from their respective dates until paid or redeemed. Interest on the Series A Bonds, other than the Series A Capital Appreciation Bonds maturing on June 15, 2006 through June 15, 2010, inclusive (the "Capital Appreciation Bonds"), will be payable semi-annually on each December 15 and June 15, commencing December 15, 1990. The interest on the Capital Appreciation Bonds will be compounded semi-annually on each December 15 and June 15 commencing December 15, 1990 and paid only at maturity or earlier redemption. Principal of, redemption premium, if any, and interest on the Series A Bonds will be payable in lawful money of the United States of America. The Series A Bonds will be issued only as fully registered bonds without coupons in the denomination (or maturity payment amounts in the case of the Capital Appreciation Bonds) of \$5,000 or any integral multiple thereof. Series A Bonds issued in denominations or maturity payment amounts of more than the applicable minimum amount may be redeemed by the Authority in part from time to time in one or more units of such minimum amount as more fully provided in the Supplemental Resolution.

### Book-Entry Form Only

When issued, the Series A Bonds will be registered in the name of Cede & Co., as nominee of The Depository Trust Company, New York, New York ("DTC"), which will act as securities depository for the Series A Bonds. DTC is a limited-purpose trust company organized under the laws of the State of New York, a member of the Federal Reserve System, a "clearing corporation" within the meaning of the New York Uniform Commercial Code and a "clearing agency" registered pursuant to the provisions of Section 17A of the Securities Exchange Act of 1934, as amended.

DTC holds securities and facilitates the clearance and settlement of securities transactions through electronic book-entry changes in accounts of its participants (the "DTC Participants"), thereby eliminating the need for physical movement of certificates. DTC Participants include securities brokers and dealers, banks, trust companies, clearing corporations and certain other organizations, some of which (and/or their representatives) own DTC. Access to the DTC system is also available to other entities such as banks, brokers, dealers and trust companies that clear through or maintain a custodial relationship with a DTC Participant, either directly or indirectly.



DTC Participants will be credited in the records of DTC with the amount of such Participants' interest in the Series A Bonds. Beneficial ownership interests in the Series A Bonds in the denomination (or maturity payment amount in the case of the Capital Appreciation Bonds) of \$5,000 or any integral multiple thereof may be purchased by or through DTC Participants. A purchaser of such an interest (a "Beneficial Owner") will not receive a certificate representing his beneficial ownership interest. The ownership interest of each Beneficial Owner will be recorded through the records of the DTC Participant from which he purchased his Series A Bonds. Transfers of ownership interests in the Series A Bonds will be accomplished by book-entries made by DTC and, in turn, by DTC Participants acting on behalf of Beneficial Owners. It is anticipated that each Beneficial Owner will receive a written confirmation of the ownership interests acquired by him in the Series A Bonds.

So long as Cede & Co. is the registered owner of the Series A Bonds, as nominee of DTC, references in the Resolution to the owners of Series A Bonds shall mean Cede & Co. and shall not mean the Beneficial Owners of the Series A Bonds. Beneficial Owners may desire to make arrangements with a DTC Participant so that all notices of redemption or other communications to DTC, which affect such Beneficial Owners, and notification of all interest payments will be forwarded in writing by the DTC Participant.

Payments of principal, interest and redemption premium, if any, on the Series A Bonds will be paid by the Authority or by the Trustee directly to DTC or its nominee, Cede & Co. DTC will remit such payments to DTC Participants and such payments will thereafter be paid by DTC Participants to the Beneficial Owners. No assurance can be given by the Authority that DTC and DTC Participants will make prompt transfer of payments to Beneficial Owners. The Authority is not responsible or liable for payment by DTC or DTC Participants or for sending transaction statements or for maintaining, supervising or reviewing records maintained by DTC or DTC Participants.

For every transfer and exchange of the Series A Bonds, the Beneficial Owner may be charged a sum sufficient to cover any tax, fee or other charge that may be imposed in relation thereto.

DTC may discontinue providing its services with respect to the Series A Bonds at any time by giving notice to the Authority and discharging its responsibilities with respect thereto under applicable law, or the Authority may terminate its participation in the system of book-entry transfers through DTC at any time. In the event that the Authority does not continue its participation in a system of book-entry only transfers, it will execute and make available for delivery replacement Series A Bonds in the form of fully registered bond certificates.

In the event that the book-entry form is discontinued, the following provisions would apply: the Series A Bonds will be registered in the names of the Beneficial Owners and principal of the Series A Bonds (principal and interest, in the case of the Capital Appreciation Bonds) will be paid at the principal corporate trust office of the Trustee or such other office as may be designated by the Authority. Interest on the Series A Bonds (other than the Capital Appreciation Bonds) will be payable by check mailed to the respective addresses of the registered owners thereof as shown on the registration books of the Authority maintained by the Trustee as of the close of business on the first day of the calendar month in which there occurs an interest payment date. Series A Bonds will be transferable at the principal corporate trust office of the Trustee upon the payment of any taxes or other governmental charges required to be paid with respect to such transfer.

**Redemption Provisions**

*Sinking Fund Redemption.* The Series A Bonds due June 15 in each of the years 2015 and 2019 will be subject to mandatory redemption prior to maturity in part, by lot in such manner as the Trustee may reasonably determine, at a redemption price of 100% of the principal amount thereof plus accrued interest to the redemption date, on June 15 in each of the years and in the respective principal amounts, as follows:

<u>Year</u>	<u>Series A Bonds due 2015</u>	<u>Amount</u>
2011 .....		\$ 4,240,000
2012 .....		4,550,000
2013 .....		21,125,000
2014 .....		22,655,000
2015* .....		24,305,000

<u>Year</u>	<u>Series A Bonds due 2019</u>	<u>Amount</u>
2016 .....		\$26,055,000
2017 .....		28,005,000
2018 .....		35,105,000
2019* .....		9,465,000

\* Maturity

*Optional Redemption.* The Series A Bonds maturing on or before June 15, 2000 will not be subject to optional redemption prior to their respective maturity dates. The Series A Bonds maturing on or after June 15, 2001 (other than the Capital Appreciation Bonds) may be redeemed prior to their respective maturity dates at the option of the Authority from any moneys available therefor on and after June 15, 2000, in whole at any time or in part on any interest payment date by lot within a maturity, at the redemption prices (expressed as percentages of the principal amount of such Series A Bonds to be redeemed) set forth below, plus accrued interest to the redemption date:

<u>Redemption Period (both dates inclusive)</u>	<u>Series A Bonds due 2001 through 2005, inclusive, 2015 and 2019</u>	<u>Optional Redemption Prices</u>
June 15, 2000 through June 14, 2001 .....		101½%
June 15, 2001 through June 14, 2002 .....		100¾
June 15, 2002 and thereafter .....		100

<u>Redemption Period (both dates inclusive)</u>	<u>Series A Bonds due 2020</u>	<u>Optional Redemption Prices</u>
June 15, 2000 and thereafter .....		100%

The Capital Appreciation Bonds will not be subject to optional redemption.

*Notice of Redemption.* Notice of redemption is to be given by first class mail, postage prepaid, at least 30 days prior to the date fixed for redemption, to the registered holders of such Bonds to be redeemed at their addresses shown on the books of registry. No assurance can be given by the Authority that DTC and DTC Participants will promptly transmit notices of redemption to Beneficial Owners.

**BOND INSURANCE**

Set forth below is a brief summary of certain information concerning Municipal Bond Investors Assurance Corporation ("MBIA") and the terms of its municipal bond insurance policy. Information with respect to MBIA has been supplied by MBIA. The Authority makes no representation as to the accuracy or adequacy of such information or as to the absence of material adverse changes in such information subsequent to the dates indicated. Summaries of or references to the insurance policy to be issued by MBIA are made

subject to all the detailed provisions thereof to which reference is hereby made and do not purport to be complete statements of any or all of such provisions.

The Series A Bonds maturing on June 15 in each of the years 2006 through 2010, inclusive, and 2015 are insured by MBIA (the "MBIA Insured Bonds"). The following information has been furnished by MBIA for use in this Official Statement and is applicable only to the MBIA Insured Bonds. The information refers to certain matters contained in the MBIA policy, such as acceleration of principal and tenders by bondholders, which do not apply to the MBIA Insured Bonds. These provisions should be read in conjunction with this Official Statement as a whole. Reference is made to Appendix G for a specimen of the MBIA policy. The description below reflects the terms of the MBIA policy.

The MBIA policy unconditionally and irrevocably guarantees the full and complete payment required to be made by or on behalf of the Authority to the Trustee or its successor of an amount equal to (i) the principal of (either at the stated maturity or by an advancement of maturity pursuant to a mandatory sinking fund payment) and interest on the MBIA Insured Bonds as such payments shall become due but shall not be so paid (except that in the event of any acceleration of the due date of such principal by reason of mandatory or optional redemption or acceleration resulting from default or otherwise, other than any advancement of maturity pursuant to a mandatory sinking fund payment, the payments guaranteed by the MBIA policy shall be made in such amounts and at such times as such payments of principal would have been due had there not been any such acceleration); and (ii) the reimbursement of any such payment which is subsequently recovered from any owner of the MBIA Insured Bonds pursuant to a final judgment by a court of competent jurisdiction that such payment constitutes an avoidable preference to such owner within the meaning of any applicable bankruptcy law (a "Preference").

The MBIA policy does not insure against loss of any prepayment premium which may at any time be payable with respect to any MBIA Insured Bond. The MBIA policy does not, under any circumstance, insure against loss relating to: (i) optional or mandatory redemptions (other than mandatory sinking fund redemptions); (ii) any payments to be made on an accelerated basis; (iii) payments of the purchase price of Bonds upon tender by an owner thereof; or (iv) any Preference relating to (i) through (iii) above. The MBIA policy also does not insure against nonpayment of principal of or interest on the MBIA Insured Bonds resulting from the insolvency, negligence or any other act or omission of the Trustee or any other paying agent for the MBIA Insured Bonds.

Upon receipt of telephonic or telegraphic notice, such notice subsequently confirmed in writing by registered or certified mail, or upon receipt of written notice by registered or certified mail, by MBIA or its designee from the Trustee or any owner of an MBIA Insured Bond the payment of an insured amount for which is then due, that such required payment has not been made, MBIA on the due date of such payment or within one business day after receipt of notice of such nonpayment, whichever is later, will make a deposit of funds, in an account with Citibank, N.A., in New York, New York, or its successor, sufficient for the payment of any such insured amounts which are then due. Upon presentment and surrender of such MBIA Insured Bonds or presentment of such other proof of ownership of the MBIA Insured Bonds, together with any appropriate instruments of assignment to evidence the assignment of the insured amounts due on the MBIA Insured Bonds as are paid by MBIA, and appropriate instruments to effect the appointment of MBIA as agent for such owners of the MBIA Insured Bonds in any legal proceeding related to payment of insured amounts on such MBIA Insured Bonds, such instruments being in a form satisfactory to Citibank, N.A., Citibank, N.A. shall disburse to such owners or the Trustee payment of the insured amounts due on such MBIA Insured Bonds, less any amount held by the Trustee for the payment of such insured amounts and legally available therefor.

MBIA is the principal operating subsidiary of MBIA Inc. The principal shareholders of MBIA Inc. are Aetna Life and Casualty Company, Fireman's Fund Insurance Company, subsidiaries of CIGNA Corporation, The Continental Insurance Company and one of its affiliates, and Credit Local de France, CAECL S.A., and they own approximately 85% of the outstanding common stock of MBIA Inc. Neither MBIA Inc. nor its shareholders are obligated to pay the debts of or claims against MBIA. MBIA is a limited liability corporation rather than a several liability association. MBIA is domiciled in the State of New York and licensed to do business in all fifty states, the District of Columbia and the Commonwealth of Puerto Rico. As of December 31, 1988, MBIA had admitted assets of \$1.146 billion (audited), total liabilities of \$770

million (audited), and total capital and surplus of \$376 million (audited) prepared in accordance with statutory accounting practices prescribed or permitted by insurance regulatory authorities. As of December 31, 1989, MBIA had admitted assets of \$1.299 billion (audited), total liabilities of \$907 million (audited), and total capital and surplus of \$392 million (audited) prepared in accordance with statutory accounting practices prescribed or permitted by insurance regulatory authorities. Copies of MBIA's financial statements prepared in accordance with statutory accounting practices are available from MBIA. The address of MBIA is 113 King Street, Armonk, New York 10504.

On January 5, 1990, MBIA acquired all of the outstanding stock of Bond Investors Group, Inc., the parent of Bond Investors Guaranty Insurance Company ("BIG"). Through a reinsurance agreement, BIG has ceded all of its net insured risks, as well as its unearned premium and contingency reserves, to MBIA and MBIA has reinsured BIG's net outstanding exposure.

Moody's rates all bond issues insured by MBIA and BIG "Aaa" and short term loans "MIG 1", both designated to be of the highest quality.

Standard & Poor's rates all new issues insured by MBIA and BIG "AAA" Prime Grade.

The Moody's rating of MBIA should be evaluated independently of the Standard & Poor's rating of MBIA. No application has been made to any other rating agency in order to obtain additional ratings on the MBIA Insured Bonds. The ratings reflect the respective rating agency's current assessment of the creditworthiness of MBIA and its ability to pay claims on its policies of insurance. Any further explanation as to the significance of the above ratings may be obtained only from the applicable rating agency.

The above ratings are not recommendations to buy, sell or hold the MBIA Insured Bonds, and such ratings may be subject to revision or withdrawal at any time by the rating agencies. Any downward revision or withdrawal of either or both ratings may have an adverse effect on the market price of the MBIA Insured Bonds.

#### USE OF PROCEEDS

The Series A Bonds are being issued to pay part of the cost of the CIP, to fund certain reserves and to pay costs of issuance. It is anticipated that the Series A Bond proceeds will be applied in the following manner:

Deposit to the Construction Fund .....	\$234,787,526.52
Deposit to the Debt Service Reserve Fund .....	13,391,131.34
Deposit to the Operation & Maintenance Reserve Fund .....	19,586,000.00
Underwriters' Discount .....	2,527,950.04
Original Issue Discount .....	14,707,396.60
Principal Amount of the Series A Bonds .....	<u>\$285,000,004.50</u>

Deposit to the Construction Fund as shown above includes approximately \$150,000 to be used to pay costs of issuance and \$2,296,000 to be used to pay the insurance premium.

#### SECURITY FOR THE BONDS

##### Revenues

The Act empowers the Board to establish and collect rates, fees and charges for the use of service provided by the System in order to receive Revenues sufficient to place the System on a self-sustaining basis. All Revenues of the System will be deposited by the Board in the Local Water Fund held by the Board. The Authority holds a statutory first lien on the Revenues for the payment of all amounts due to the Authority under the Agreement. In the event that the Board fails to make any required payment to the Authority, the Authority or the Trustee may petition for the appointment, by any court having jurisdiction, of a receiver to administer the affairs of the Board, and, with court approval, establish rates and charges to provide Revenues sufficient to make required payments. The statutory lien, however, does not give any holder or owner of any Bond issued by the Authority, or any receiver of the System, power to compel the sale of any part of the System.

The City has covenanted in the Agreement to operate and maintain the System in accordance with the advice and recommendations of the Consulting Engineer. Such obligation to operate and maintain the System may be enforced by the Authority in accordance with the provisions of the Act and the terms of the Agreement and the Lease. The amounts required to operate and maintain the System are certified to the Board by the City and reviewed by the Consulting Engineer.

Beginning on the first day of each month the Board is required to pay to the Trustee the Revenues in the Local Water Fund, for deposit in the Revenue Fund until the amount on deposit equals the Minimum Monthly Balance and the Required Deposits for such month. The Minimum Monthly Balance is the amount required to provide for timely payment of all debt service on Outstanding Bonds. See "CERTAIN DOCUMENTS—Summary of the Agreement—Minimum Monthly Balance". Thereafter in such month from the balance remaining in the Local Water Fund, the Board is required, after paying monthly Board Expenses, to pay to the City  $\frac{1}{12}$ th of the operating expenses for such Fiscal Year. After making such payments, any amounts remaining in the Local Water Fund in each month are paid proportionately, (a) to the Trustee for deposit in the Revenue Fund until the total of all amounts deposited in the Revenue Fund equals the Cash Flow Requirement for such Fiscal Year and (b) to the City until all amounts required to be paid to the City for Operating Expenses for such Fiscal Year have been paid. For a more complete description of the required payments from the Local Water Fund, see "CERTAIN DOCUMENTS—Summary of the Agreement—Establishment of Certain Funds and Application of Revenues in the Local Water Fund".

Under the Resolution, all Revenues received by the Authority from the Board will be deposited promptly in the Revenue Fund. As soon as practicable in each month after the deposit of Revenues, the Trustee will, from the amounts in the Revenue Fund, make the deposits in the Funds and Accounts established under the Resolution. See "CERTAIN DOCUMENTS—Summary of the Resolution—Payments Into Certain Funds".

The Series A Bonds will be on a parity with the Bonds currently Outstanding and with Bonds hereafter issued pursuant to the Resolution and are payable from and secured by a pledge of (i) all Revenues, (ii) all moneys or securities in any of the Funds and Accounts established under the Resolution, and (iii) all other moneys and securities to be received, held or set aside pursuant to the Resolution, subject only to the provisions of the Resolution and the Agreement permitting the application thereof for the purposes and on the terms and conditions set forth therein, including the making of any required payments to the United States with respect to arbitrage earnings. See "CERTAIN DOCUMENTS—Summary of the Resolution" and "CERTAIN DOCUMENTS—Summary of the Agreement".

#### **Debt Service Reserve Fund**

The Resolution establishes a Debt Service Reserve Fund and requires that from the proceeds of the sale of each Series of Bonds there shall be deposited into the Debt Service Reserve Fund an amount necessary to make the amount on deposit equal to the Debt Service Reserve Requirement, after giving effect to the issuance of such Bonds. The Debt Service Reserve Requirement is an amount equal to maximum Adjusted Aggregate Debt Service in the then current or any future Fiscal Year on all Bonds Outstanding. Amounts on deposit in the Debt Service Reserve Fund will be applied, to the extent Revenues are not available, to pay Principal Installments and interest on the Bonds. See "CERTAIN DOCUMENTS—Summary of the Resolution—Debt Service Reserve Fund".

As of June 30, 1990, the market value of the securities in the Debt Service Reserve Fund was \$202,363,224.66. The Authority will deposit from the proceeds of the Series A Bonds an amount sufficient to increase the amount on deposit to the Debt Service Reserve Requirement.

In lieu of making cash deposits to the Debt Service Reserve Fund, the Authority may satisfy the Debt Service Reserve Requirement by depositing Financial Guaranties into the Debt Service Reserve Fund. See "CERTAIN DOCUMENTS—Summary of the Resolution—Debt Service Reserve Fund."

### **Rate Covenant**

The Board has covenanted in the Agreement to establish, fix, revise and collect rates, fees and charges for the use of, or the services furnished by the System to provide for (i) the timely payment of debt service on the Bonds and the principal of and interest on any other indebtedness of the Authority payable from Revenues, (ii) the proper operation and maintenance of the System, (iii) all other payments required for the System not otherwise provided for, and (iv) all other payments required pursuant to the Agreement and the Lease.

Without limiting the generality of the foregoing, the Board has covenanted to establish and collect rates, fees and charges sufficient in each Fiscal Year so that Revenues collected in such Fiscal Year will be at least equal to the sum of (i) 115% of Aggregate Debt Service payable in such Fiscal Year on all Bonds Outstanding and on any Projected Series of Bonds, and (ii) 100% of the Operating Expenses and Required Deposits for such Fiscal Year. A failure to generate Revenues as set forth in this paragraph shall not constitute an "event of default" under the Agreement if the Board takes timely action to correct any such deficiency as described in the following paragraph.

The Board has covenanted in the Agreement to review the adequacy of rates, fees and charges at least annually. If such annual review, or the report of the Rate Consultant required pursuant to the Agreement, indicates that the rates, fees and charges are or will be insufficient to meet the requirements of the rate covenant described in the preceding paragraph, the Board will promptly take the necessary action to cure or avoid any such deficiency. In addition, under the Agreement the City, which is responsible for billing, collecting and enforcing collections of rates and charges established by the Board, has agreed that it will diligently pursue all actions necessary to cure or avoid any such deficiency.

The Board has covenanted in the Agreement that it will not furnish or supply or cause to be furnished or supplied any product, use or service of the System free of charge or at a nominal charge, and will enforce (or cause the City to enforce) the payment of any and all amounts owing to the Board for use of the System, except to the extent required (i) by the Act, as in effect on July 24, 1984, or (ii) by existing agreements (including any successor agreements) with the privately-owned Jamaica Water Supply Company ("Jamaica") designed to minimize the disparity between the cost of water paid by users of the System and the cost of water paid by those City residents served by Jamaica. See "RATES AND BILLINGS".

### **Additional Bonds**

The Authority may issue additional Bonds under the Resolution on a parity with all Bonds Outstanding only upon satisfaction of certain requirements including receipt by the Trustee of:

(a) a certificate by an Authorized Representative of the Authority to the effect that the Revenues for either of the last two Fiscal Years immediately preceding the Fiscal Year in which such Bonds are to be issued were at least equal to the sum of (i) 115% of the Aggregate Debt Service during such Fiscal Year (excluding from Aggregate Debt Service any Principal Installments, or portion thereof, paid from a source other than Revenues), and (ii) 100% of the sum of the Operating Expenses of the System certified by the City and the Required Deposits for such Fiscal Year, and

(b) a certificate of the Rate Consultant to the effect that the estimated Revenues for each of the five Fiscal Years following the issuance of such Series of Bonds (plus the Fiscal Year in which such Bonds are issued) after giving effect to any increases or decreases in rates, fees and charges projected for such Fiscal Years will be at least equal to the sum of (i) 115% of the maximum estimated Adjusted Aggregate Debt Service on all Bonds then Outstanding including the Bonds to be issued, and (ii) 100% of the sum of the projected Operating Expenses and Required Deposits for such Fiscal Years.

Alternatively, the Authority may issue additional Bonds for the purpose of refunding Outstanding Bonds upon satisfaction of the following requirements, among others:

(a) the average annual debt service on the refunding Bonds does not exceed the average annual debt service on the Bonds to be refunded, and

(b) the maximum debt service in any Fiscal Year on the refunding Bonds does not exceed the maximum debt service in any Fiscal Year on the Bonds to be refunded.

See "CERTAIN DOCUMENTS—Summary of the Resolution".

## THE AUTHORITY

### Purpose and Powers

The New York City Municipal Water Finance Authority is a public benefit corporation created pursuant to the Act. Among its powers under the Act, the Authority may borrow money, issue debt and enter into the Agreement. Additionally, the Authority has the power to require that the Board charge and collect sufficient rates to pay the costs of operating and financing the System and to enforce the obligation of the City to adequately operate and maintain the System.

Pursuant to the Act, there is a statutory first lien upon the Revenues in favor of the payment of all amounts due to the Authority under the Agreement. The Revenues remain subject to this lien until provision for payment of all indebtedness issued by the Authority has been made.

### Membership

The Authority is administered by a seven-member Board of Directors. Four of the members of the Board of Directors are designated in the Act as *ex officio* members: the Commissioner of Environmental Protection of the City, the Director of Management and Budget of the City, the Commissioner of Finance of the City and the Commissioner of Environmental Conservation of the State. Of the three remaining public members, two are appointed by the Mayor and one is appointed by the Governor. The initial public members appointed by the Mayor have terms of one and two years and the initial public member appointed by the Governor has a term of two years. Subsequently appointed public members will serve for two-year terms. Pursuant to the Act, all members continue to hold office until their successors are appointed and qualified.

The current members of the Board of Directors are:

<u>Member</u>	<u>Occupation</u>	<u>Term Expires</u>
Albert F. Appleton .....	Commissioner of Environmental Protection of the City	<i>ex officio</i>
Philip R. Michael .....	Director of Management and Budget of the City	<i>ex officio</i>
Carol O'Cleireacain .....	Commissioner of Finance of the City	<i>ex officio</i>
Thomas C. Jorling .....	Commissioner of Environmental Conservation of the State	<i>ex officio</i>
Arthur B. Hill** .....	Vice President, United Parcel Service	December, 1988
Kenneth Kopelson* .....	Attorney	December, 1987
Donald C. Platten** .....	Chairman, Executive Committee, Chemical Bank	December, 1987

\* Appointed by the Governor.

\*\* Appointed by the Mayor.

The following is a brief description of the staff members of the Authority:

#### Mark Page, Executive Director

Mr. Page was appointed Acting Executive Director in December, 1984 and Executive Director in October, 1985. Mr. Page also serves as the Deputy Director and General Counsel of the Office of Management and Budget of the City. Mr. Page has worked for the City since 1978 and has served as Assistant General Counsel and General Counsel of the Office of Management and Budget. Mr. Page is a graduate of Harvard College and New York University School of Law.

#### Alexandra Altman, Secretary

Ms. Altman was appointed Acting Secretary in December, 1984 and Secretary in October, 1985. Ms. Altman also serves as Senior Assistant Corporation Counsel of the City. Ms. Altman has worked for the City since 1973 and has served as General Counsel and Director of Finance of the Office of Management and Budget and Counsel to the Deputy Mayor for Finance. Ms. Altman is a graduate of Radcliffe College and The Yale Law School.

## THE BOARD

### Purpose and Powers

The Board is a public benefit corporation of the State created by Chapter 515 of the Laws of 1984. The primary responsibility of the Board is to fix, revise, charge, collect and enforce rates and other charges for the System.

The Board is required under the Act to establish rates that will provide adequate funds to pay the debt service on outstanding Authority indebtedness and the City's cost of operating and maintaining the System. In each Fiscal Year, any amounts remaining in the Local Water Fund, after making the required payments under the Financing Agreement, shall be deposited in the General Account in the Operation and Maintenance Reserve Fund and will be available either as a source of funding for System expenditures or upon certification of the City for deposit to the Authority's Construction Fund to pay for the costs of System capital projects. See, "APPENDIX D—GLOSSARY AND SUMMARY OF CERTAIN DOCUMENTS—SUMMARY OF CERTAIN DOCUMENTS—Summary of the Agreement—Application of Moneys in the Operation and Maintenance Reserve Fund."

Pursuant to the Lease, the Board has a leasehold interest in the System with a term of 40 years or until all Bonds or other obligations issued by the Authority are paid in full or provision for payment has been made, whichever is later. Under the Lease, the City will provide billing, collection, enforcement and legal services to the Board. The Board is required to compensate the City for the cost of these services.

### Membership

The Board consists of seven members who are appointed by the Mayor. The Act provides that the terms of the members of the Board will be two years except that four of the initial members will have terms of one year. The Act also provides that at least one member will have experience in the science of water resource development and that no member of the Board will be a member of the Authority. The Chairman is appointed by the Mayor. There are currently two vacancies on the Board. Pursuant to the Act, all members continue to hold office until their successors are appointed and qualified.

The current members of the Board are:

<u>Member</u>	<u>Occupation</u>	<u>Term Expires</u>
Robert Tierney, Chairman .....	Director of Public Affairs, American Telephone and Telegraph Company	June, 1989
Leroy Carmichael .....	Regional Director of the State Office of Minority Affairs	June, 1986
Barbara Fife .....	Deputy Mayor for Planning and Development of the City	June, 1990
Gaspar V. Garcia .....	President, Atlantic Associates	June, 1986
Sally B. Hernandez-Pinero .....	Deputy Mayor for Finance and Economic Development of the City	June, 1990



The following is a brief description of the staff members of the Board:

**Richard Mendes, Executive Director**

Mr. Mendes was appointed Acting Executive Director in June, 1985 and Executive Director in November, 1985. Mr. Mendes also serves as Deputy Commissioner for Finance and Revenue of DEP. He also served with the Federal government as Director of Management Analysis in the Department of Health and Human Services from 1978 to 1982. Mr. Mendes is a graduate of Wabash College and received his M.A. and Ph.D. from Michigan State University.

**William Kusterbeck, Treasurer**

Mr. Kusterbeck was appointed Acting Treasurer in June, 1985 and Treasurer in November, 1985. Mr. Kusterbeck also serves as the Director of the Office of Financial Management of DEP. He has worked for DEP since 1979 and has served in various positions including Assistant to the Deputy Commissioner for Planning. Additionally, he served as a staff assistant to the Chairman of the City Council Finance Committee. Mr. Kusterbeck is a graduate of Hunter College of the City University of New York and Columbia University Graduate School of Business.

**Michael Burke, Secretary**

Mr. Burke was appointed Secretary in April, 1988. Mr. Burke also serves as Chief of the Municipal Finance Division of the New York City Law Department. Mr. Burke has worked for the Law Department since 1981. Mr. Burke is a graduate of Pace University and the Georgetown University Law Center.

## THE SYSTEM

### History

The Water System. Early Manhattan settlers obtained water for domestic purposes from shallow privately owned wells. In 1677 the first public well was dug in front of the old fort at Bowling Green. In 1776, when the population reached approximately 22,000, a reservoir was constructed on the east side of Broadway between Pearl and White Streets. Water pumped from wells sunk near the Collect Pond, east of the reservoir, and from the pond itself, was distributed through hollow logs laid in the principal streets. In 1800 the Manhattan Company (now The Chase Manhattan Bank, N.A.) sank a well at Reade and Centre Streets, pumped water into a reservoir on Chambers Street and distributed it through wooden mains to a portion of the community. In 1830 a tank for fire protection was constructed by the City at 13th Street and Broadway and was filled from a well. The water was distributed through two 12-inch cast iron pipes. As the population of the City increased, the well water became polluted and supply was insufficient. The supply was supplemented by cisterns and water drawn from a few springs in upper Manhattan.

After exploring alternatives for increasing supply, the City decided to impound water from the Croton River, in what is now Westchester County, and to build an aqueduct to carry water from the Croton River to the City. This aqueduct, known today as the Old Croton Aqueduct, had a capacity of about 90 million gallons per day (mgd) and was placed in service in 1842. The distribution reservoirs were located in Manhattan at 42nd Street (discontinued in 1890) and in Central Park south of 86th Street (discontinued in 1925). New reservoirs were constructed to increase supply: Boyds Corner in 1873 and Middle Branch in 1878. In 1883 a commission was formed to build a second aqueduct from the Croton watershed as well as additional storage reservoirs. This aqueduct, known as the New Croton Aqueduct, was under construction from 1885 to 1893 and was placed in service in 1890, while still under construction. The present Water System was consolidated from the various water systems in communities now consisting of the Boroughs of Manhattan, The Bronx, Brooklyn, Queens and Staten Island.

Around 1900, the City recognized the need for additional sources of water and in 1905 the Board of Water Supply was created by the State Legislature. After careful study, the City decided to develop the Catskill region as an additional source. The Board of Water Supply proceeded to plan and construct facilities to impound the waters of the Esopus Creek, one of the four watersheds in the Catskills, and to deliver the water throughout the City. This project, to develop what is known as the Catskill System, included the Ashokan Reservoir and the Catskill Aqueduct, and was completed in 1915 by the Board of Water Supply. It was subsequently turned over to the City's Department of Water Supply, Gas and Electricity for operation and maintenance. Further development of the Catskill System involving the construction of the Schoharie Reservoir and Shandaken Tunnel was completed in 1928.

In 1927 the Board of Water Supply submitted a plan to the Board of Estimate and Apportionment for the development of the upper portion of the Rondout watershed and tributaries of the Delaware River within the State of New York. This project was approved in 1928. Work was subsequently delayed by an action brought by the State of New Jersey in the Supreme Court of the United States to enjoin the City and State of New York from using the waters of any Delaware River tributary. In May, 1931 the Supreme Court of the United States upheld the right of the City to augment its water supply from the headwaters of the Delaware River. Construction of the Delaware System was begun in March, 1937. The Delaware System was placed in service in stages: Delaware Aqueduct was completed in 1944, Neversink Reservoir in 1950, Rondout Reservoir in 1951, Pepacton Reservoir in 1954 and Cannonsville Reservoir in 1965.

The Sewer System. Systematic collection of sewage and building of sewers began in the City as early as 1696. Major portions of the Sewer System in lower and central Manhattan were begun in the early 1830's and completed by 1870. The oldest sewer now in service was built in 1851. The oldest components of the Sewer System, located in Manhattan and Brooklyn, are constructed mostly of brick, clay and cement. The other Boroughs have newer sewers made primarily of vitreous clay and concrete. Historically, waste collection and disposal were a matter of local jurisdiction. Upon consolidation of the City in 1898 the Presidents of the five Boroughs were given responsibility for sewage collection and disposal in their respective Boroughs. A Commissioner of Borough Works was established in each Borough for planning, constructing and administering its sewer system. This local responsibility for sewage collection existed until the mid-1960's.

Although water pollution control did not become a major issue until recent years, it has been a concern of local conservationists and public officials for almost a century. The first sewage treatment facility in the City was opened in 1886, when a small plant was constructed on Coney Island to protect the bathing beaches. In 1904 a Sanitary Commission was established and charged with developing a master plan for sewage treatment in the City. Although the Sanitary Commission completed its task in 1910, sewage treatment plant construction did not receive serious attention until 1929, when the City established a department to construct sewage treatment facilities under the jurisdiction of the Department of Sanitation. In the 1930's this function was transferred to the Department of Public Works. In 1931 a plant construction program was begun to construct a system of sewage treatment plants and associated facilities to control and treat all sewage produced within the City. The first of these plants, Coney Island, opened in 1935 and three more large plants, Wards Island, Tallmans Island and Bowery Bay, were placed in operation before the end of the 1930's. During the 1940's two additional plants, Jamaica and 26th Ward, were opened. The post-war years witnessed an intensified construction effort and, by 1967, 12 major treatment plants were in operation treating about 1,000 mgd at an average removal efficiency of about 65%. At that time most other urban areas were providing only about 35% removal efficiency.

The City Charter of 1963 consolidated the Borough sewer organizations into a City-wide department under the Department of Public Works. In 1968 various municipal services were consolidated into a single agency known as the Environmental Protection Administration ("EPA"), which included responsibility for sanitation and water and air quality resources. The Department of Water Resources, within EPA, had jurisdiction over the Bureaus of Water Supply and Water Pollution Control. These Bureaus were responsible for water supply and sewage collection and treatment. In 1977, water supply, sewage collection and treatment and air quality monitoring responsibilities were combined into DEP.

**Department of Environmental Protection**

**Organization.** The following table sets forth the seven DEP bureaus relating to the System, their projected staffing levels for Fiscal Year 1991 and major responsibilities.

<b>Organization of DEP</b>		
<u>Bureau</u>	<u>System Staff</u>	<u>Major Responsibilities</u>
Chief Engineer .....	143	Coordination of capital program and preconstruction review
Water Supply and Wastewater Collection .....	2,121	Water supply and sewage collection system planning, design, construction supervision, operation, maintenance and repair
Heavy Construction .....	443	Design, construction supervision of large capital projects, i.e., water tunnel, sewage treatment upgrades
Wastewater Treatment .....	1,936	Wastewater treatment plant planning, design, construction supervision, operation, maintenance and repair
Finance & Revenue .....	393	Determination of water and sewer service charges, data processing services and departmental planning
Administration .....	180	Administration of personnel and fiscal services
Executive .....	312	Executive management, vehicle fleet and building maintenance, management analysis, public affairs and intergovernmental relations, labor relations, engineering audit, and legal counsel
Total .....	<u>5,528</u>	

The System staff represents personnel dedicated to the provision of water and sewer services. Approximately 1,040 people within the System staff are assigned to the design and construction of projects within the CIP and 547 provide administrative and support services to both System and non-System staff. There are an additional 585 employees within the DEP staff whose duties are not related to water and sewer service and whose cost is not included as a System cost.

DEP is managed by a Commissioner who is appointed by the Mayor. Each of the three operating Bureaus (the Bureaus of Water Supply and Wastewater Collection, Heavy Construction, and Wastewater Treatment) reports to the Commissioner through the First Deputy Commissioner and is directly supervised by an Assistant Commissioner.

The following are brief descriptions of certain management personnel responsible for the operation of the System.

**Albert F. Appleton—Commissioner**

Mr. Appleton was appointed Commissioner of Environmental Protection in January 1990. Prior to his appointment, Mr. Appleton served as Executive Assistant and Special Assistant Attorney General in the New York State Medicaid Fraud Control Unit, as an attorney in private practice, and as a Senior Project Planner in the New York City Mayor's Office. Mr. Appleton has also served in a volunteer capacity as an officer or director of numerous local, regional, and national conservation organizations. He received his B.A. in political science and mathematics from Gonzaga University in Spokane, Washington and his law degree from Yale University in New Haven, Connecticut.

**Jeffrey L. Sommer—First Deputy Commissioner**

Mr. Sommer was appointed First Deputy Commissioner in 1982. Prior to this appointment, he served as Deputy Commissioner of Intergovernmental Relations and Public Affairs and as Deputy General Counsel of DEP. Prior to joining DEP in 1978, Mr. Sommer served as Assistant to the Deputy Mayor for Intergovernmental Affairs of the City. Mr. Sommer is a graduate of the State University of New York at Plattsburg and the State University of New York Law School at Buffalo.

**Joseph T. Miller, P.E.—Chief Engineer**

Mr. Miller served as Assistant Commissioner and Director of the Bureau of Water Pollution Control from 1974 until 1986 and currently serves as Chief Engineer. Mr. Miller has over 35 years of experience with the System and has served as Deputy Chief and Chief of the Division of Plant Design, Bureau of Water Pollution Control. Mr. Miller is a graduate of the College of the City of New York and is a Professional Engineer.

**John L. DiMartino, P.E.—Deputy Chief Engineer**

Mr. DiMartino served as Assistant Commissioner and Director of the Bureau of Sewers from 1978 until 1986 and currently serves as Deputy Chief Engineer. Mr. DiMartino has served the City since 1953 and has held a number of positions at DEP, including Deputy Director of the Bureau of Water Pollution Control and Chief of the Division of Sewer Maintenance. Mr. DiMartino is a graduate of New York University and is a Professional Engineer.

**Joseph P. Conway, P.E.—Assistant Commissioner**

Mr. Conway served as Assistant Commissioner and Director of the Bureau of Water Supply from 1980 until 1986 and currently serves as Assistant Commissioner and Director of the Bureau of Water Supply and Wastewater Collection. Mr. Conway also served in various capacities in the Office of the Mayor including Assistant to the Director of Construction and Assistant Director of the Office of Management and Budget. Mr. Conway is a graduate of the College of the City of New York and is a Professional Engineer.

**Nicholas S. Ilijic, P.E.—Assistant Commissioner**

Mr. Ilijic was appointed Assistant Commissioner, Director of the Bureau of Heavy Construction on December 18, 1989. Mr. Ilijic has served in a number of capacities in his 30 years with DEP, including Deputy Chief and Chief of the Division of Plant Design for the Bureau of Water Pollution Control and Deputy Director for the Bureau of Heavy Construction. Mr. Ilijic is a graduate of Brooklyn Polytechnic Institute and is a Professional Engineer.

**Edward O. Wagner, P.E.—Assistant Commissioner**

Mr. Wagner was appointed Director of the Bureau of Wastewater Treatment in 1986. He has served with DEP in numerous capacities for over 25 years, including Director of Plant Operations and Deputy Director of the Bureau of Water Pollution Control. Mr. Wagner is a graduate of the College of the City of New York and New York University and is a Professional Engineer.

**Service Area.** DEP supplies water and sewer service to the Boroughs of Manhattan, the Bronx, Brooklyn, Queens, and Staten Island, an area of over 300 square miles, and serves over 7,300,000 people. Water and sewer service is provided to approximately 800,000 accounts. See "Appendix C—CERTAIN INFORMATION CONCERNING THE CITY OF NEW YORK". In addition to supplying the needs of its residents and businesses, the City is required by State law to sell water in counties where its water supply facilities are located.

The vast majority of System accounts receive both water and sewer service. The remaining customers either receive water from Jamaica or are in the few areas of the City, primarily in Staten Island, where water or sewer service is not yet established and, thus, accounts may be water only or sewer only.

Approximately 88% of the System's water and sewer customers are residential. The remainder are primarily commercial and industrial users. Industrial customers, however, account for only a small portion of water and sewer usage.

Customers are billed on either a flat-rate or metered basis. There are approximately 480,000 flat-rate accounts and 320,000 metered accounts. The classification of customer accounts is set forth in the table below.

**Customer Classifications (1)**

<u>Type of Account</u>	<u>Percentage of Total Accounts</u>	<u>Percentage of Total Billings(2)</u>
One-Family Dwellings .....	37.5%	9.6%
Two-Family Dwellings .....	27.3	10.3
Walk-up Apartments(3) .....	15.9	19.0
Elevator Apartments(3) .....	2.7	25.7
Factories and Industrial .....	1.9	5.2
Stores .....	6.3	8.3
Office Buildings .....	0.9	5.6
Utility Properties .....	0.2	2.8
Lofts .....	0.9	2.6
Hospitals and Health Facilities .....	0.2	1.5
Hotels .....	0.2	2.3
Other .....	6.0	7.1
Total .....	<u>100.0%</u>	<u>100.0%</u>

- (1) This information is based upon an analysis conducted in Fiscal Year 1987 by Ernst & Young. Billing percentages by customer class reflect total billings for each customer class less average cancellations and adjustments for metered customers.
- (2) Approximately 63% of billings in Fiscal Year 1987 were for water service and the remaining 37% were for sewer service.
- (3) Certain accounts and billings under this type of account relate to commercial establishments located in apartment buildings.

Daily consumption from the Water System averages approximately 1,492 mgd, of which approximately 1,379 mgd is consumed in the City and 113 mgd is consumed in upstate counties (Westchester, Putnam, Orange and Ulster). Water consumption varies by season with the summer months having the largest demand. Peak flows in the Water System can exceed a rate of 2,000 mgd. The following table shows the average daily water consumption from the Water System from 1980 through 1989.

### Average Daily Water Consumption

Calendar Year	Total (mgd)	Upstate Counties (mgd)	New York City	
			Total (mgd)	Per Capita* (gals/day)
1980.....	1,554	110	1,444	213
1981.....	1,347	100	1,247	185
1982.....	1,419	105	1,314	194
1983.....	1,480	113	1,367	199
1984.....	1,527	114	1,413	204
1985.....	1,390	107	1,283	184
1986.....	1,433	116	1,317	187
1987.....	1,543	120	1,423	200
1988.....	1,582	125	1,457	204
1989.....	1,492	113	1,379	192

\* Population source: U.S. Department of Commerce, Bureau of the Census.

In the drought year of 1981 total consumption declined 13.3% as a result of conservation measures established by DEP. Although consumption levels have been generally higher since the 1981 drought year, strict enforcement of drought measures during the 1985 and 1989 droughts resulted in decreases in consumption in 1985, 1986 and 1989.

Sewer service is provided to virtually the entire City. Sewer service is also provided to certain upstate communities in System watershed areas. Daily sewage flow from these upstate communities is approximately 2.1 mgd. Daily flows of sewage to the City treatment plants average approximately 1,650 mgd.

For a discussion of the proposed addition to the System service area, see "RATES AND BILLINGS—Jamaica Water Supply Company."

Expenditures. The System's forecasted Fiscal Year 1991 expenditures for operation and maintenance are approximately \$504.2 million. This amount represents the cost of DEP services dedicated to operating the System. The costs associated with DEP staff whose responsibilities include the design and management of the CIP are included in the CIP and therefore are not reflected in the following table.

#### Fiscal Year 1991 System Forecasted Operation and Maintenance Expenses (thousands)

	<u>Total Expenses(1)</u>
<b>Water</b>	
Personal Service (2) .....	\$ 73,229
Other Than Personal Service (3) .....	<u>108,474</u>
Total .....	181,703
<b>Sewer</b>	
Personal Service (2) .....	137,599
Other Than Personal Service (3) .....	<u>184,894</u>
Total .....	<u>322,493</u>
<b>Total System .....</b>	<u><u>\$504,196</u></u>

- (1) Amounts shown are consistent with the forecasted cash flows in Appendix B.
- (2) Personal Service costs include salaries, fringe benefits and pension costs.
- (3) Other Than Personal Service costs include real estate taxes on upstate watershed properties, electricity, costs for protection and replacement of gas mains affected by water and sewer replacements, fees for ocean disposal of sludge, chemicals and supplies.

**The Water System**

Water for the System is impounded at three upstate reservoir systems which include 18 reservoirs and three controlled lakes with a storage capacity of approximately 550 billion gallons. The three water collection systems were designed and built with various interconnections to increase flexibility by permitting exchange of water from one system to another. This feature mitigates localized droughts and takes advantage of excess water in any of the three watersheds.

Water is conveyed to the City from the reservoirs in the Croton, Catskill and Delaware Systems by gravity through large aqueducts and balancing reservoirs. Within the City, water is distributed through two major tunnels and four distribution facilities. A third tunnel is now under construction and will supplement the two City tunnels currently in use.

In comparison to other public water systems, the Water System is both economical and flexible. Approximately 95% of the total water supply is delivered to the consumer by gravity. Only about 5% of the water is regularly pumped to maintain the desired pressure. As a result, operating costs are relatively insensitive to fluctuations in the cost of power. When drought conditions exist, additional pumping is required.

Water Collection. The three main reservoir systems are the Croton, Catskill and Delaware. (See "New York City Water Supply System" map between Appendices A and B for the location of the reservoir systems.) The following is a brief description of the City's water collection system.

The amount of water that can be safely drawn from a watershed during the worst period in the drought of record is the "Dependable Yield". DEP has determined that the System could have furnished an average of 1,290 mgd during the drought of record in the mid-1960's. During periods of normal rainfall, watersheds supply more than the Dependable Yield.

The following table sets forth the Dependable Yield and storage capacity for each of the water supply systems.

**Water System Yield and Capacity**

<u>System</u>	<u>Dependable Yield (mgd)</u>	<u>Storage Capacity (1) (billion gallons)</u>
Croton .....	240	86.6
Catskill .....	470	140.5
Delaware .....	580	320.4
Total .....	<u>1,290</u>	<u>547.5</u>

(1) Capacity above minimum operating level.

*The Croton System:* The Croton System normally provides approximately 10% of the City's daily water supply. The Croton System consists of 12 reservoirs and three controlled lakes on the Croton River, its three branches and three other tributaries. The water flows from upstream reservoirs through natural streams to downstream reservoirs, terminating at the New Croton Reservoir. The watershed drained by the Croton System is now extensively developed and the density of the population is eroding the original quality of this water source. See "THE SYSTEM—The Water System—Water Quality".

The Croton System is divided into three subsystems: the West Branch, Croton Falls, and Muscoot. The watershed which supplies the Croton System has an area of 375 square miles. It lies almost entirely within the State, approximately 45 miles north of lower Manhattan, with a small portion in the State of Connecticut.

*The Catskill System:* The Catskill System watersheds occupy sparsely populated areas in the central and eastern portions of the Catskill Mountains and normally provide approximately 40% of the City's daily water supply. Water in the Catskill System comes from the Esopus and Schoharie Creek watersheds, located approximately 100 miles north of lower Manhattan and 35 miles west of the Hudson River. The

Esopus Creek flows naturally into the Hudson River and drains an area of about 257 square miles. The Schoharie Creek drains into the Mohawk River from an area of 314 square miles. The greater part of the water from these two watershed areas is stored in the Ashokan Reservoir and the balance in the Schoharie Reservoir.

The Ashokan Reservoir is formed by Ashokan Dam across the Esopus Creek. The Schoharie Reservoir is formed by the Gilboa Dam across Schoharie Creek at Gilboa in Greene County, north of the Esopus Creek. The tributaries of the Schoharie Creek have their source at elevations of nearly 2,200 feet in the vicinities of Hunter, Windham, Prattsville and Grand Gorge in Greene, Delaware and Schoharie Counties.

Water from Schoharie Reservoir is conveyed via the Esopus Creek and Shandaken Tunnel to Ashokan Reservoir where the Catskill Aqueduct begins. It is possible to divert water from the Catskill Aqueduct into the New Croton Reservoir to maximize the use of storage capacity.

*The Delaware System:* The Delaware System, located approximately 100 miles north of lower Manhattan, normally provides approximately 50% of the City's daily water supply. Three Delaware System reservoirs collect water from a sparsely populated region on the branches of the Delaware River: Cannonsville Reservoir (formed by a dam on the West Branch of the Delaware River); Pepacton Reservoir (formed by the Downsview Dam across the East Branch of the Delaware River); and Neversink Reservoir (formed by the Neversink Dam across the Neversink River, a tributary to the Delaware River). These reservoirs feed eastward through separate rock tunnels, West Delaware, East Delaware and Neversink, to Rondout Reservoir where the Delaware Aqueduct begins. Rondout Reservoir is formed by the Merriman Dam across Rondout Creek. Although much of the water in Rondout Reservoir is Delaware River water drawn from the other three reservoirs, Rondout Reservoir is not in the Delaware River watershed since Rondout Creek flows into the Hudson River.

Water may be pumped into the Delaware Aqueduct from the standby pump station at Chelsea, New York (the "Chelsea Pump Station") which draws from the Hudson River. The Chelsea Pump Station has a capacity of 100 mgd and pumped approximately 82 mgd of water from the river for almost five months during the 1985 drought. The Chelsea Pump Station also pumped approximately 90 mgd between May 1, 1989 and May 15, 1989. The second facility of its type to be situated at this location, the Chelsea Pump Station was reconstructed in 1965-66 under drought emergency circumstances and operated for approximately ten months during that period. It was placed on standby status until 1981. In that year, again under drought conditions, the station was rehabilitated to full operating capacity. Tests made of the Hudson River water, which serves as the sole source of supply to a number of population centers, indicate that the untreated water meets virtually all Federal and State standards for treated water and that it compares favorably to the supplies available to major population centers outside the Hudson River Basin.

Water Transmission. The System's water supply is transported through an extensive system of tunnels and aqueducts. (See "New York City Water Tunnels" map between Appendices A and B for the location of the major water transmission facilities.) Croton System water is delivered from the New Croton Reservoir by the New Croton Aqueduct to the Jerome Park Reservoir in The Bronx and Central Park Reservoir in Manhattan. From Jerome Park and Central Park Reservoirs and from direct connections to the New Croton Aqueduct, trunk mains carry water to the service area. The Catskill and Delaware Aqueducts convey water from Ashokan Reservoir and Rondout Reservoir to Kensico Reservoir and then to Hillview Reservoir in Yonkers. Both Kensico and Hillview Reservoirs serve as balancing reservoirs. Water from the Catskill and Delaware Systems is mixed in the Kensico Reservoir, and is conveyed to Hillview Reservoir where water enters Tunnels 1 and 2. Trunk mains carry water from tunnel shafts and from the distribution facilities (Jerome Park, Central Park and Ridgewood Reservoirs and Silver Lake Tanks) (the "Distribution Facilities") to the service area. These trunk mains are usually more than 20 inches in diameter.



### Water System Tunnels and Aqueducts

Tunnels and Aqueducts	Connections	Length (miles)	Diameter (feet)	Transmission Capacity (mgd)	In-service Date
<b><u>Tunnels-Upstate</u></b>					
Shandaken . . . . .	Schoharie to Ashokan	18.1	11.5 x 10.25	650	1924
West Delaware . . .	Cannonsville to Rondout	44.0	11.33	500	1964
East Delaware . . .	Pepacton to Rondout	25.0	11.33	700	1955
Neversink . . . . .	Neversink to Rondout	6.0	10	500	1954
<b><u>Aqueducts</u></b>					
New Croton . . . . .	New Croton to Jerome Park	24.0	13.5 x 13.6	300	1893
	Jerome Park to the 135th St. Gatehouse	9.0	12.25 - 10.5	250	1893
Catskill . . . . .	Ashokan to Kensico	75.0	17 x 17.5	610	1915
	Kensico to Hillview	17.0	17.5 x 18	800	1915
Delaware . . . . .	Rondout to West Branch	44.2	13.5	890	1944
	West Branch to Kensico	27.2	15	1,045	1943
	Kensico to Hillview	13.6	19.5	1,450	1942
<b><u>Tunnels-Downstate</u></b>					
Tunnel 1 . . . . .	Hillview to distribution system	18.0	15 - 11	1,000	1917
Tunnel 2 . . . . .	Hillview to distribution system	20.0	17 - 15	1,000	1936
Richmond Tunnel	Tunnel 2 to Staten Island Uptake Shaft	5.0	10	350	1970

*The New Croton Aqueduct:* The New Croton Aqueduct transmits water by gravity from New Croton Reservoir to Jerome Park Reservoir in The Bronx and via aqueducts and conduits to Central Park Reservoir in Manhattan. Water is also drawn from the New Croton Aqueduct directly into distribution mains in the City. It is a grade tunnel about 33 miles long with a delivery capacity of about 300 mgd. The New Croton Aqueduct is located three to 300 feet underground and is composed of two sections. One section is a bricklined rock tunnel located near the Old Croton Dam, three miles north of the New Croton Dam, and extends to Gatehouse No. 1 in Van Cortlandt Park, a distance of about 24 miles. The other section is a pressurized masonry conduit extending from Gatehouse No. 1 to a gatehouse at 135th Street and Convent Avenue in Manhattan, a distance of about nine miles. In addition, a branch of the New Croton Aqueduct transmits water from Gatehouse No. 1 to the Jerome Park Reservoir.

*The Catskill Aqueduct:* The Catskill Aqueduct, which also transmits water by gravity, is 92 miles long and extends from the Ashokan Reservoir to Kensico and Hillview Reservoirs. Four distinct types of aqueduct construction were required due to the terrain between the Catskill Mountains and the City. The Catskill Aqueduct is for the most part a 17 feet high by 17.5 feet wide horseshoe-shaped cut-and-cover conduit. The Catskill Aqueduct is also composed of a number of steel pipe siphons and grade and pressure tunnels where topography requires. A deep rock tunnel siphon 14 feet in diameter and 1,114 feet below mean sea level crosses beneath the Hudson River near Cornwall. The delivery capacity of the Catskill Aqueduct from the Ashokan Reservoir to the Kensico Reservoir is about 610 mgd and about 800 mgd from the Kensico Reservoir to the Hillview Reservoir. The Catskill Aqueduct passes under the New Croton Reservoir. At this point it is possible to transfer water from Ashokan Reservoir to New Croton Reservoir.

*The Delaware Aqueduct:* The Delaware Aqueduct similarly transmits water by gravity from Rondout Reservoir to West Branch Reservoir, in the Croton System, and from West Branch Reservoir to Kensico Reservoir and to Hillview Reservoir. The Delaware Aqueduct is a circular, cement-lined, pressurized, bed-rock tunnel 85 miles long located 300 to 1,000 feet underground, passing beneath the Hudson River at a depth of about 600 feet below sea level. Water in this aqueduct is directed by uptake and downtake shafts to the Kensico and West Branch Reservoirs. The Delaware Aqueduct has a diameter of 13.5 feet to 19.5 feet. The capacity of the section from Rondout Reservoir to West Branch Reservoir is about 890 mgd and delivers water from the Rondout, Neversink, Pepacton and Cannonsville Reservoirs. Interconnection with the Catskill System is possible at both the Kensico and Hillview Reservoirs. The delivery capacity of the Dela-

ware Aqueduct from West Branch to Kensico Reservoirs is about 1,045 mgd and about 1,450 mgd from Kensico to the Hillview Reservoirs.

***Tunnel 1:*** From Hillview Reservoir, water from the Catskill and Delaware Systems is delivered into the City by a circular, cement-lined, pressurized, bedrock tunnel narrowing in diameter from 15 to 11 feet. Tunnel 1 is 18 miles in length and extends south from Hillview Reservoir through the West Bronx to Manhattan and Brooklyn. From two terminal shafts in Brooklyn, steel and standby cast iron pipelines extend into Queens and Staten Island, respectively. Tunnel 1 is 200 to 750 feet underground and thus avoids interference with streets, buildings, subways, sewers, pipes and other underground infrastructure. These depths are necessary to ensure substantial rock covering necessary to withstand the bursting pressure of the water inside and to ensure watertightness. Tunnel 1 has a capacity of approximately 1,000 mgd. Shafts placed along the tunnel connect with surface mains which deliver water to the distribution system.

***Tunnel 2:*** The second tunnel also delivers Catskill and Delaware System water from Hillview Reservoir. It is a circular, cement-lined, pressurized, bedrock tunnel 200 to 800 feet below the street surface and 15 to 17 feet in diameter. Tunnel 2 extends south from Hillview Reservoir, east of Tunnel 1, through the Bronx, under the East River at Rikers Island, through Queens and Brooklyn, and connects with Tunnel 1 at Fort Greene Park as well as at State and Nevins Streets in Brooklyn. Tunnel 2 has a capacity of approximately 1,000 mgd and is 20 miles in length. Shafts, connected with surface mains, deliver water to the distribution system.

***Richmond Tunnel:*** Connecting to Tunnel 2 in Brooklyn is the 10-foot diameter, five-mile long Richmond Tunnel, which was completed in 1970 and carries water 900 feet beneath Upper New York Bay to Staten Island. The Richmond Tunnel, the Richmond Distribution Chamber, the Richmond Aqueduct and the underground Silver Lake Tanks were designed to improve the water supply facilities of Staten Island. The underground storage tanks (among the world's largest) have a combined capacity of 100 million gallons and replace the Silver Lake Reservoir (now Silver Lake).

***Tunnel 3:*** A new water tunnel connecting the reservoir system to the City is presently under construction to enhance the adequacy and reliability of water transmission to the City in the future. The primary reasons for constructing Tunnel 3 are to:

- increase capacity to meet a growing demand in the eastern and southern areas of the City;
- permit inspection and rehabilitation of Tunnels 1 and 2;
- provide water delivery alternatives to the City in the event of disruption in Tunnel 1 or 2; and
- provide capacity for peak demand which Tunnels 1 and 2 occasionally cannot supply.

Tunnel 3 is a circular, cement-lined, pressurized, bedrock tunnel which will be built in four stages which include:

**STAGE I**, currently under construction and expected to be completed in 1991, has a 13-mile route which extends south from Hillview Reservoir in Yonkers under Central Park Reservoir in Manhattan, and east under the East River and Roosevelt Island to Long Island City in Queens. Stage I parallels Tunnel 1 along most of this route.

**STAGE II** will consist of two sections expected to be completed in 2004. The Brooklyn/Queens section will extend from the end of Stage I to supply Queens, Brooklyn and the Richmond Tunnel. The second section will extend south from the valve chamber at Central Park into lower Manhattan. Completion of Stage II will further enhance the System's water distribution capability. Upon completion of this stage, Tunnel 1 or 2 can be closed for inspection.

**STAGE III** will extend from the Kensico Reservoir to the interconnecting chamber of Stage I, south of Hillview Reservoir. Completion of this stage will supplement the delivery capability of both the Catskill and Delaware Aqueducts between Kensico and Hillview Reservoirs. Tunnel 3 will deliver water from Kensico Reservoir under greater pressure than is available in Tunnels 1 and 2. This increased pressure is a result of the higher elevation of Kensico Reservoir than that of Hillview Reservoir where Tunnels 1 and 2 originate.

**STAGE IV, as now contemplated, would deliver additional water to the eastern parts of The Bronx and Queens. It would extend southeast from the northern terminus of Stage I in The Bronx to Queens and then southwest to interconnect with the Queens portion of Stage II.**

**Water Distribution.** The water distribution system consists of a grid network of water mains ranging in size from six to 84 inches in diameter. It contains approximately 5,700 miles of pipe, 88,000 mainline valves and 96,000 fire hydrants.

Slightly over half of the mains in the System are unlined cast iron, the primary construction material used before 1930. Between 1930 and 1970, cement-lined, cast iron pipe was used and comprises about 39% of the water main mileage. Since 1970, the installed pipe material has been cement-lined, ductile iron and comprises about 9% of the water main mileage. The CIP provides for the programmatic replacement of water mains in accordance with certain established criteria. The water distribution system also has an excellent record with regard to the frequency of water main breaks per mile of distribution network. See "Appendix A—REPORT ON THE ENGINEERING FEASIBILITY OF THE WATER AND SEWER SYSTEM SERVING THE CITY OF NEW YORK".

Water pressure is regulated within a range of 35 to 60 pounds per square inch ("psi") at street level. Generally, 40 psi is sufficient to supply water to the top of a five or six-story building. About 95% of the total consumption is normally delivered by gravity. It is necessary to pump only the remaining 5% to areas of higher elevation to keep the pressure within this desired range.

The distribution system in each Borough is divided into three or more zones in accordance with pressure requirements. These zones are determined chiefly by the local topography. The ground elevation in the City varies from a few feet above sea level, along the waterfront, to 403 feet at Todt Hill in Staten Island. The highest ground elevations in the other Boroughs are: Manhattan, 267 feet; The Bronx, 284 feet; Brooklyn, 210 feet; and Queens, 266 feet. Various facilities provide storage to meet the hourly fluctuations in demand for water throughout the City, as well as any sudden increase in draft that might arise from fire or other emergencies. With the exception of some communities in the outlying areas of the City which may experience low pressure service in peak hours during summer months, the water distribution system provides generally excellent service.

**Water Quality.** The System is known for the high quality of its water. Because of its inherent quality and the long periods of retention in the reservoirs, it has not been necessary to filter water from the System to reduce the bacterial content and the turbidity. The only treatment procedures routinely employed by DEP are screening, detention, addition of caustic soda for pH control, chlorination for disinfection, and fluoridation. Additions of copper sulfate for algae control and alum for turbidity control are made only when needed.

Until recently, this level of treatment had proven to be more than sufficient to maintain water quality standards throughout the entire Water System. Population growth and commercial and industrial development within the Croton System, the Water System's oldest, have caused some deterioration of its water quality. The City is operating a demonstration treatment facility for Croton System water at Jerome Park Reservoir. Funding for a full-scale treatment facility, the Croton Filter Project, is included in the CIP. This project is expected to be completed in the late 1990's.

The System has five laboratories that monitor water quality employing approximately 60 bacteriologists, engineers, and chemists. Over 80,000 samples per year are collected and 1,000,000 analyses are performed annually. Routine checks are made for 60 different substances, including heavy metals and trace organics. As part of a long range water quality and watershed protection program, DEP is increasing its staff in order to expand water quality monitoring within watershed and distribution areas and to improve its sample collection force. The monitoring program meets or exceeds Federal and State requirements and has the capability to meet potentially more stringent requirements.

DEP has historically monitored key locations representative of its distribution system for over 40 individual water quality parameters. These special monthly analyses include analyses for lead. Current DEP

data indicate that lead is absent from both the water supply and distribution systems. Federal guidelines are being developed as to how water purveyors should address the issue of lead in building plumbing.

In addition to the monitoring program, DEP watershed inspectors continually run sanitary surveys and maintain constant surveillance of the watersheds. To further ensure high water quality, the System includes real estate adjacent to its reservoirs acquired to prevent potential water contamination from sewage that would be produced if these areas were developed and to control access to the reservoirs. To enhance these efforts, DEP continues to work in conjunction with State programs to better protect watershed wetlands which act as a filter to general land use pollution which would otherwise be deposited in the reservoirs. DEP's wetlands projects include: data collection and communication with the State to effect watershed classification upgrading; review of and comment on wetlands protection regulations; and wetlands studies.

The System includes several upstate sewage treatment plants to prevent untreated sewage from being released into the watersheds. To enhance watershed protection, the CIP includes funds for upgrading these facilities and, DEP, through the City's law department, is taking legal action pursuant to the Federal Clean Water Act to compel the owners and operators of non-City owned sewage treatment plants in the watersheds to comply with State Pollution Discharge Elimination Systems ("SPDES") permits.

DEP is undertaking a new initiative to develop a computerized watershed modelling system which will enable DEP to evaluate better the effects of land development on water quality.

**Drought Response Measures.** From time to time the System experiences drought conditions caused by significantly below-normal precipitation in the watershed areas. Since the Water System relies upon a surface water supply it is sensitive to major fluctuations in precipitation. An extremely dry winter and spring, during which reservoir levels dropped considerably, led to the declaration of a "Drought Watch" on January 17, 1989, a "Drought Emergency—Stage II" (bypassing "Drought Emergency—Stage I") on March 22, 1989 (when reservoirs dropped to 55% of capacity), and a "Drought Emergency—Stage III" on May 1, 1989. Following a two week period of record-breaking rain, the City was able to declare the drought emergency officially over and lift drought restrictions on May 15, 1989. As of July 1, 1990 reservoir storage levels were at 95.5% of capacity compared to normal levels of 96.1% at that time of year. Historically, drought conditions in the Water System have occurred in 14 to 20 year cycles. Throughout even the worst droughts, the Water System has continued to supply sufficient amounts of water to the City.

To ensure adequate water supply during drought conditions DEP, in conjunction with other City, State and interstate agencies, maintains a Drought Contingency Plan. The Drought Contingency Plan defines various drought phases that trigger specific management and operational action. Three defined phases are: "Drought Watch," "Drought Warning," and "Drought Emergency." A Drought Emergency is further subdivided into four stages based on the projected severity of the drought and provides increasingly stringent and restrictive measures.

A Drought Watch is declared when there is more than a 50% probability, based on the existing 60 years of record, that either the Catskill or Delaware reservoir system will not be filled by the following June 1. This phase initiates the pumping of water from the Croton System. In addition, a public awareness program is begun and all users, including upstate communities taking water from the System, are requested to initiate conservation measures. Discussions with the New York State Departments of Health ("NYSDOH") and Environmental Conservation ("NYSDEC"), the Delaware River Basin Commission (the "DRBC") and City agencies are held concerning their prospective participation in the event of a declaration of a "Drought Warning."

A Drought Warning is declared when there is more than a 66% probability that either the Catskill or Delaware reservoir system will not fill by June 1. Limited restrictions on water usage are mandated. All previous efforts are continued or expanded and additional programs are initiated, including City conservation programs, expanded leak detection and the placing of the Chelsea Pump Station on a standby alert status.

A Drought Emergency is declared when it becomes necessary to reduce consumption by imposing even more stringent measures. A Drought Emergency is usually subdivided into four stages and imposes manda-

tory water use restrictions on all users of the Water System. Major components of the Drought Emergency phase of the Drought Contingency Plan are set forth below.

**STAGE I MANDATES:**

- 15% reduction in water consumption based on prior year usage for non-residential users;
- restriction on watering of lawns, gardens and golf courses to a maximum of four hours on alternate days during specific hours; and
- \$500 fine for unauthorized use of a fire hydrant.

**STAGE II MANDATES:**

- a ban on lawn watering;
- a ban on the filling of private swimming pools;
- restricted use of water-cooled air conditioners, requiring a two-hour shut-down between 8 AM and 10 AM or 4 PM and 6 PM; and
- an additional 5% reduction in water consumption for non-residential users.

**STAGE III MANDATES:**

- additional restrictions on the use of water-cooled air conditioning systems, prohibiting temperatures below 78°F; and
- an additional 5% reduction in water consumption for non-residential users.

**STAGE IV MANDATES:**

- installation of flow restricting devices on plumbing fixtures; and
- an additional 5% reduction in water consumption for non-residential users.

In addition to the imposition of restrictions, DEP may enhance existing System management and public awareness programs, expand its inspection force and perform additional leak and waste surveys in public and private buildings. DEP may also require communities outside of the City that are served by the System to adopt similar conservation measures. The Chelsea Pump Station may also be brought into service in order to draw Hudson River water into the System.

Long-Term Water Supply Planning. After the mid-1960's drought, the U.S. Army Corps of Engineers commissioned the Northeast Water Supply Study to address regional water supply needs. The study considered, among other sources, further use of Hudson River water. In July, 1985, the City formed an intergovernmental task force to study New York's water supply needs. It issued its first interim report in February, 1986, entitled "Increasing Supply, Controlling Demand." The report recommended that consumption studies be performed to refine water use projections and that every reasonable effort be made to control water demand through increased metering, rate setting, leak detection and conservation. As a result of the work of the task force, a study of system water demand was approved by the City's Board of Estimate in December, 1986. This study is being undertaken as an amendment to an existing State Water Resource Management Strategy contract. In addition, a universal metering program was adopted by the Board and the City in 1986 and began in Fiscal Year 1988. Full implementation of metering for all customers of the System is expected to be completed by the end of 1997.

The first interim report of the task force concluded that expanded pumping of Hudson River water represents the only large source of supplemental supply which can be realistically developed within the next 10 to 15 years. The current CIP includes expansion of the existing pumping station at Chelsea to a maximum capacity of 300 mgd which is estimated to cost approximately \$445 million. The second interim report

of the task force, which builds upon those recommendations made in the first interim report, was completed in December, 1987. The final task force report is expected to be completed by late 1990.

## **The Sewer System**

The Sewer System is composed of the sewage collection system and the sewage treatment facilities. (See "New York City Drainage Areas and Sewage Treatment Plants" map between Appendices A and B for the location of the sewage treatment facilities.)

Sewage Collection. The sewage collection system is divided into 14 drainage areas and includes approximately 6,300 miles of sewer pipes of varying size which are classified as one of three types: sanitary, storm or combined. Sanitary sewers accommodate household and industrial waste. Storm sewers carry rainwater and surface water runoff. Combined sewers carry both types of waste. Approximately 70% of the City's sewers are of the combined type. In addition to the sewage pipes, 90,000 catch basins and 5,000 seepage basins are maintained to prevent flooding and sewer backups.

The Sewer System is comprised of a number of systems built to varying standards. Different materials and methods of construction were used resulting in different life cycles. Approximately 4,000 miles or two-thirds of the City's sewer pipe is made of vitreous clay. Significant mileage of sewer pipe is composed of other building materials including cement, reinforced concrete, iron and brick.

Approximately 17% of the City's sewers were installed before 1900 and roughly 69% are over 50 years old. Several components of the Sewer System were constructed of very durable materials and methods and have achieved a service life in excess of 100 years. Most notable are the approximately 600 miles of brick sewer in lower Manhattan and Brooklyn where large portions are still structurally sound. Other components of the Sewer System were constructed of less durable materials that have a more limited useful life, primarily cement pipe sewers installed in Brooklyn between 1860 and 1900. Approximately 300 miles of this type of sewer are being replaced.

Sewage Treatment Facilities. The facilities related to the treatment of sewage include 14 currently operating sewage treatment plants, one storm-overflow retention plant, 88 pump stations, five laboratories, three inner-harbor vessels and four ocean-going barges which dispose of digested sludge—a by-product of the sewage treatment process. The 14 plants currently in operation treat about 1,650 mgd of dry-weather sewage, virtually all of the dry-weather sewage generated in the City. Ten of the System's 14 plants have been upgraded to provide for full secondary treatment capability.

The Red Hook plant, which became operational in May, 1987, is designed to treat approximately 60 mgd of sewage. Its total cost is estimated to be \$410 million. Full secondary treatment facilities at Red Hook were completed in 1989. The North River plant, which is designed to treat 170 mgd of sewage became operational in March, 1986. Approximately \$1.1 billion will be spent on the construction of that plant. Full secondary treatment facilities at North River will be completed in early 1991.

In 1983 the City began the upgrading of two older plants, Owls Head and Coney Island in Brooklyn. Upgrading of these plants will be completed in 1995 and 1994, respectively. The total cost of upgrading the Coney Island and Owls Head plants is estimated at \$1.1 billion. The upgrade of the Newtown Creek plant to full secondary treatment and expansion of its capacity is now estimated to cost \$1.2 billion, \$342 million of which is funded in the CIP.

Issues of treatment capacity have been raised elsewhere in the System, particularly in connection with the Wards Island, Newtown Creek, and Coney Island plants. On February 2, 1989, the City signed a consent order which mandates various water conservation measures to reduce flow to the Wards Island plant and which requires expansion of the plant. The estimated cost of the expansion is approximately \$100 million, which is not currently funded in the CIP. Current planning provides for completion of increased capacity and treatment upgrading of the Newtown Creek plant by 1999. Interim conservation measures to reduce flow to the plant are currently the subject of negotiations with NYSDEC. DEP believes that the actual capacity of the Coney Island plant exceeds its current rating and can accommodate expected flow.

DEP is, therefore, seeking an increase to the Coney Island plant's rated capacity from the State. See "GOVERNMENTAL REGULATION—Wastewater Regulation".

Water quality has improved significantly according to the Harbor Surveys conducted by DEP. The final results of the 1987 Harbor Survey and the 1988/89 Harbor Survey indicate that the Hudson River continues to show marked improvements since the North River plant commenced operation. In addition, the Surveys reflect the positive impact the Red Hook plant has had on the lower East River. In general, coliform bacterial counts, indicators of sewage pollution, are down throughout New York Harbor and the dissolved oxygen level, important to sustaining marine life, has increased measurably over the past several years. As a result of this improvement the NYSDEC has reclassified the Hudson River north of Manhattan from a fishing standard to a swimming standard.

Sludge Disposal. Pursuant to the Marine Protection, Research and Sanctuaries Act of 1972 ("MPRSA") as amended by the Ocean Dumping Ban Act of 1988 (the "Ban Act") DEP is permitted to dispose of all of the sludge generated by its sewage treatment plants in the Atlantic Ocean 106 miles offshore (the "106 Mile Site"). The Ban Act prohibits the ocean disposal of sludge after August 14, 1989 without a permit from the United States Environmental Protection Administration ("USEPA"). DEP entered into a Consent Decree And Enforcement Agreement ("Consent Decree") with the United States and the State of New York on August 1, 1989 and was granted a permit to continue to use the 106 Mile Site on condition that the City develop alternative sludge disposal technologies and cease all ocean disposal by June 30, 1992. The Consent Decree provides a timetable with specific milestones to be achieved in order to meet the June 1992 deadline. The Consent Decree, pursuant to the Ban Act, also provides for the imposition of fees and penalties for each dry ton of sewage sludge disposed of in the ocean until such disposal is terminated.

The Consent Decree requires the implementation of interim measures and a long-term program to end ocean disposal. As part of the interim measures, DEP is proceeding with the purchase and installation of facilities to dewater its sludge and reduce its volume. Sludge dewatering is a necessary first step in the process of ending ocean disposal and is consistent with any interim or long-term alternative sludge disposal program. Sludge dewatering facilities will be located at 8 of the 14 sewage treatment plants with capacity to dewater all of the sludge generated by the System. DEP is reviewing proposals from private firms for the disposal of its dewatered sludge to meet the Consent Decree requirement to reduce the quantity of sludge disposed of in the ocean by 20% by December 31, 1991 and to end ocean disposal by June 30, 1992. The Consent Decree also requires DEP to explore long-term solutions (such as land application and incineration technologies) for sludge disposal which may rely on additional DEP facilities or private firms and to implement long-term solutions capable of processing 50% of the City's sludge by December 31, 1995 and 100% by June 30, 1998. The capital cost for dewatering facilities is currently estimated at approximately \$800 million. The ultimate cost of alternatives to ocean disposal of sludge is not now known.

Ocean disposal fees and penalties imposed by the Ban Act and the Consent Decree amounted to approximately \$13.7 million in Fiscal Year 1990. Even with the timely implementation of the sludge disposal alternatives described above, DEP expects such fees and penalties will be approximately \$25.5 million in Fiscal Year 1991, and \$49.6 million in Fiscal Year 1992. After June 30, 1992 it is expected that DEP will cease the ocean disposal of sludge. In the event the anticipated timetable for ending ocean disposal is accelerated, the penalties will be less. If the termination of ocean disposal is delayed, the above mentioned fees and penalties will continue to be imposed as well as substantial stipulated penalties. The Ban Act and the Consent Decree provide that 85% of the fees and penalties payable shall be deposited into a Trust Account and shall be available to reimburse the City for costs incurred in developing alternative sludge management programs. A portion of the balance of the fees and penalties accruing shall be paid to USEPA with the remainder divided equally between the New York State Water Pollution Control Revolving Fund and the New York State Clean Oceans Fund. Amounts paid to the Clean Oceans Fund are also available to reimburse the costs of developing alternative sludge management programs. In addition, the Financial Plan contains an additional \$8.8 million in Fiscal Year 1992, \$92.4 million in Fiscal Year 1993 and \$103.1 million in Fiscal Year 1994. Since entering into the Consent Decree, DEP does not expect that these funds will be paid as fees or penalties. However, they have been retained in the System as a reserve to offset the costs of private disposal of sludge.

## GOVERNMENTAL REGULATION

The System is subject to Federal, State, interstate and municipal regulation. At the Federal level regulatory jurisdiction is vested in USEPA; at the State level in the NYSDEC and the New York State Department of Health ("NYSDOH"); at the interstate level in the Delaware River Basin Commission ("DRBC") and in the Interstate Sanitation Commission (the "ISC"); and at the municipal level in DEP, New York City Department of Health ("NYCDOH") and the Department of Buildings ("DOB"), and to a limited degree in municipalities and districts located in eight counties north of the City.

### Water Supply Regulation

**Federal.** All water supply systems in the United States which provide water to at least 15 service connections or 25 individuals are subject to the provisions of, and to regulation by USEPA under, the Safe Drinking Water Act ("SDWA"). USEPA has promulgated nationwide drinking water regulations which specify the maximum level of harmful contaminants allowed in drinking water and which govern the construction, operation, and maintenance of water supply systems as required by SDWA.

Under 1986 amendments to SDWA, the USEPA is directed to promulgate filtration treatment regulations "relevant to the protection of health" which shall be used by the State to identify public water systems supplied by surface water sources which must initiate filtration measures. The regulations, known as the Surface Water Treatment Rule ("SWTR"), prescribe guidelines concerning studies to be performed, programs to be implemented, timetables to be met and any other actions necessary to insure compliance with the regulations' terms. USEPA published regulations in the Fall of 1987, but due to numerous comments received from municipalities nationwide, it revised the regulations and republished them in the Spring of 1988. A final SWTR was published in June, 1989. The City believes that under the SWTR promulgated by the USEPA it will be able to meet criteria for non-filtered supplies. See "THE SYSTEM—The Water System—Water Quality".

**State.** In 1977, enforcement of SDWA and its related regulations was delegated by USEPA to the State. Under the terms of SDWA, a State has primary enforcement responsibility for public water systems if USEPA determines that the State's drinking water regulations are at least as stringent as the Federal drinking water regulations. Consequently, regulation of the Water System is primarily under the jurisdiction of the State. Enforcement of the water quality mandates for the most part has been entrusted to NYSDOH. The State Sanitary Code ("Sanitary Code") sets forth surveillance, quality testing and water treatment requirements. Also set forth in the Sanitary Code are the procedures for planning, facility siting, facility operation and the granting by NYSDOH of variances and exemptions. At times Croton System water does not meet the currently applicable State drinking water standards for turbidity. The City has received variances from the State permitting continued use of the Croton System. These variances are contingent on the City's proceeding with the Croton Filter Project. See "CAPITAL IMPROVEMENT PROGRAM—Water System".

Subsequent to promulgation of SWTR by USEPA, NYSDOH commenced a rulemaking proceeding as a prelude to amending the Sanitary Code through the issuance of new State surface water filtration and disinfection requirements by the end of December 1990. A report, explaining the need for adopting new requirements, the various options available, and the considerations involved with each option, was issued in December 1989, and public hearings were thereafter held in January and February 1990. NYSDOH has recommended, among other measures, that filtration of all surface water supplies, including those of the Catskill and Delaware Systems, be required by the year 2005. The capital cost of compliance by those Systems was estimated by NYSDOH at \$2.5 billion. At the public hearing, held February 7, 1990 in New York City, the City opposed the adoption at this time of a blanket filtration rule, with no exceptions allowed, as being premature, and counterproductive State-wide and especially in the Catskill and Delaware Watersheds. The City also took issue with the Catskill/Delaware capital cost estimate of \$2.5 billion put



forth by NYSDOH, contending that the cost would be in the \$4 to 5 billion range. Further State action is anticipated shortly, after NYSDOH has completed its study of the testimony and other evidence proffered at the January and February hearings. The City expects to continue to resist mandatory filtration of the Catskill and Delaware Systems by 2005.

Pursuant to the Water Supply Act of 1905 (the "1905 Act"), the City was granted permission to develop areas of the Catskill Mountains, located in the Hudson River Basin, for additional sources of pure and wholesome water. Subsequent amendments to the 1905 Act extended the City's development rights to portions of the Delaware River Basin located to the west of the Catskill Mountains, provided that no additional water storage structure or reservoir could be built within the drainage area of the Esopus Creek in Ulster County.

In return for these development rights, the 1905 Act and subsequent amendments require the City to furnish, upon request, supplies of fresh water to municipalities and water districts in eight northern counties in which City water supply facilities and watersheds are located. The City's obligations under the 1905 Act in this respect have now passed to the Board.

The 1905 Act also governs the provision of fresh water to the northern counties and the rates that may be levied for such water. An eligible municipality or district may draw water based on a formula computed as the local population multiplied by the daily per capita consumption in the City. Current water allowances are based on 1980 U.S. census data and will be revised when 1990 U.S. census data are finalized. In the event of disagreement between the upstate users and the System as to appropriate water charges, NYSDEC has the authority to fix the water charges based on the actual total cost of the water to the City, deducting those costs incurred by the City itself for distributing water to City residents.

The Water System historically has furnished and is currently furnishing water to users in only four of the eight eligible northern counties (Westchester, Putnam, Orange and Ulster counties). Economic and demographic conditions and the availability of System water under the currently applicable formula in the remaining four counties have rendered use of System water impractical. However, a recalculation of water allowances under finalized 1990 U.S. census data and recent State legislation authorizing a county water authority in Orange County may result in an increase in the use of System water in that county.

NYSDEC has promulgated regulations which require release of fresh water from most of the Water System's reservoirs into downstream water bodies, to enhance recreational use of rivers and streams in the System's watersheds and drainage areas. The regulations recognize seasonal variations and, with insignificant exceptions, releases for recreational purposes are effectively suspended during periods of drought.

NYSDEC also oversees a dam safety program in connection with the System's dams located east of the Hudson River (Croton System and Kensico Reservoir). The first phase initiated under the National Dam Inspection Act included inspection by the U.S. Army Corps of Engineers of all of the System's dams. That study indicated that the dams in the Delaware and Catskill Systems were in excellent operating condition and that the dams east of the Hudson were safe but in need of some rehabilitation and reconstruction work. The second phase, administered by the City and subject to NYSDEC approval, assessed the measures needed to restore the dams east of the Hudson River to first-class operating condition. The first contract for the reconstruction of Boyds Corner Dam was awarded in the Spring of 1988, and work is expected to be completed in the fall of 1990. DEP is currently selecting consultants to design the balance of the work that will be required under the second phase of the dam safety program.

Interstate. Three major interstate actions have influenced the maintenance and operation of the Delaware System.

The conditions under which the System's Pepacton, Neversink and Cannonsville Reservoirs may be operated are set forth under the terms of a 1954 decree of the Supreme Court of the United States (the "1954 Decree"). It allows the System to divert 800 mgd of water from the Delaware River Basin for use by the Water System. At the same time, the System is required to release, from the three reservoirs into the tributaries of the Delaware River, quantities of water sufficient to maintain flows of 1,750 cubic feet per

second in the main branch of the Delaware River at Montague, New Jersey. In addition, the System must meet the State-mandated conservation releases and flow requirements in various tributaries contained in numerous deeds and condemnation decrees. Enforcement of the 1954 Decree is under the jurisdiction of a River Master appointed by the Supreme Court of the United States. The City and State, and the governments of New Jersey, Pennsylvania and Delaware are named parties to the 1954 Decree.

DRBC was created in 1961 as a result of the Delaware River Basin Compact among the Federal Government, the State, and the states of New Jersey, Pennsylvania and Delaware. It has jurisdiction over water resources and is responsible for development, planning and coordination and protection of the interstate areas served by the Delaware River and its tributaries. Although not a participant in the Delaware River Basin Compact, the City functions as an advisor to the State in DRBC proceedings and assumes a major role both as a party to the 1954 Decree and as the owner and operator of the three largest reservoirs subject to DRBC jurisdiction.

In 1982, as a result of conditions during the drought of record in the mid-1960's, the drought of 1981, and the inability of the System's Pepacton, Neversink and Cannonsville Reservoirs to satisfy all of the requirements of the 1954 Decree during those periods, a set of Interstate Water Management Recommendations (the "Good Faith Agreement") was submitted to DRBC. Executed by all of the parties to the 1954 Decree, the Good Faith Agreement sets forth a series of recommendations, including various levels of diversions and releases necessary during normal hydrological conditions and during periods of drought. The Good Faith Agreement was followed during the 1985 and 1989 droughts.

Municipal. Rates, fees and charges for water supply are the responsibility of the Board. Data compiled from meter readings made by DEP inspectors furnish input for billings and information useful in determining the effectiveness of City-mandated conservation measures. Statistics generated from the metering program are also employed in long-range water supply planning.

Water quality standards are enforced within the watershed areas north of the City through a network of overlapping governmental jurisdictions. Participating in that network, among others, are NYSDEC and NYSDOH inspectors; county, municipal and district police and inspectors; and City personnel from DEP and NYCDOH. The various jurisdictions maintain physical security, take water samples, monitor the use of herbicides, insecticides and fertilizers, and generally oversee the physical condition of, activity on and the operation of water supply lands and facilities. Portions of the overall legislative and regulatory framework governing the watersheds may be found in the City's Administrative Code, Health Code and Water Supply Regulations.

Regulatory enforcement within City limits is almost exclusively accomplished through City personnel. Provisions incorporating and augmenting the substance of SDWA, related regulations and the Sanitary Code, are contained in the Health Code, Water Supply Regulations and the City's Building and Building Construction Codes. These provisions are enforced by personnel from DEP, NYCDOH and DOB.

### **Wastewater Regulation**

Federal. Enforcement of federal law and regulations with respect to wastewater treatment is entrusted by the federal government to USEPA. This body of law includes the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 and by the Water Quality Act of 1987 (the "Clean Water Act"), and MPRSA as amended by the Ban Act.

Under the Clean Water Act, USEPA administers an extensive program of Federal capital construction grants (the "Construction Grants Program") and oversees compliance with regulations and guidelines promulgated by it concerning (i) sewer and sewage treatment plant construction, operation, maintenance, upgrading and rehabilitation, (ii) introduction of toxins and other pollutants into sewer and sewage treatment facilities, and (iii) pollutant discharges from all point sources. Included in that regulatory framework is the National Pollutant Discharge Elimination System ("NPDES") Permit Program and the issuance of

sewage treatment plant operating permits. As authorized by the Clean Water Act, enforcement of the permits program has been delegated to the State.

Funding for a major portion of the capital costs of upgrading and new construction of sewage treatment plants has been received through the Construction Grants Program. Administration of the grants has been delegated to the State by USEPA. Congressional authorization for the Construction Grants Program was renewed in January, 1986. Currently forecasted levels of Clean Water Act grant funding will be reduced as the grants program is phased out and replaced by a revolving loan program to be administered by the State.

The Water Quality Act of 1987 provides for the phasing out of the Construction Grants Program and for the implementation of a water pollution control revolving loan program. Such act requires, as a condition for receipt of federal financial assistance, that each state establish a revolving fund administered by the state or an instrumentality of the state. The purpose of a state revolving fund is to provide a source for loans and other types of financial assistance (other than direct grants) to local entities for the construction of publicly owned wastewater treatment facilities. Initial funding for a revolving fund program is provided from federal capitalization grants and state matching funds.

The State has created a State revolving fund and has designated the Environmental Facilities Corporation (the "Corporation") to be the administrator of such fund. The Corporation will apply federal capitalization grants and State matching funds or other available amounts in the State revolving fund to provide subsidized capital financing to municipalities for eligible sewage treatment projects.

The upgrading of ten of the System's existing plants and the construction of the two new plants are, in part, for the purpose of complying with the mandates of the Clean Water Act. In 1972, the City began a program of upgrading its existing plants to operate in conformance with the requirements of the Clean Water Act; that is, 30 milligrams per liter ("mg/l") or less of suspended solids and BOD<sub>5</sub> in the effluent or at least 85% removal, whichever is more stringent ("Full Secondary Treatment"). Ten of the System's 14 sewage treatment plants have already been upgraded at a construction cost of approximately \$1.4 billion. Two additional existing System plants, Coney Island and Owls Head, are currently in the process of being upgraded with anticipated completion dates of 1994 and 1995, respectively. The Newtown Creek plant will also be upgraded and its capacity increased in order to meet Federal requirements on a consistent basis. The project is expected to be completed in 1999. See "THE SYSTEM—The Sewer System—Sewage Treatment Facilities".

The construction schedules of the new sewage treatment plants, the North River plant on the Hudson River and the Red Hook plant on the East River, are also the subject of a United States District Court Consent Decree, last modified in 1982 (the "Decree"), which directs ending the discharge of approximately 215 mgd of untreated sewage into those rivers. The Decree requires that the North River plant commence advanced preliminary treatment operation by May 1, 1986, which deadline was met, and that Full Secondary Treatment operation be commenced by May 1, 1991. The Red Hook plant began advanced preliminary treatment operation in May, 1987; the Decree deadline for full secondary treatment operation was met on May 1, 1989. The North River plant is expected to achieve full secondary treatment by early 1991.

The Clean Water Act also directs USEPA to address the problem of discharges of toxins and other pollutants into publicly owned treatment works. USEPA has promulgated effluent limits for toxic and other substances that must be met by specific industries ("Categorical Standards") and has directed that publicly owned treatment works establish and enforce industrial pretreatment programs. The System has undertaken such a program. DEP has modified its Sewer Use Regulations to incorporate the Categorical Standards and to assign personnel to monitor and enforce compliance with the Sewer Use Regulations.

Under Federal court order, the Ban Act, MPRSA and USEPA regulations promulgated thereunder, the System is also required to have a permit for dumping into the Atlantic Ocean sludge generated by its sewage treatment plants and to cease ocean disposal by June 30, 1992. See, "THE SYSTEM—The Sewer System — Sludge Disposal".

**State.** Under authority delegated by USEPA the State established SPDES and has assumed jurisdiction over point source discharges and wastewater treatment plant operating permits. The State powers are enforced by NYSDEC, which also administers the Construction Grants Program. NYSDEC, therefore, has regulatory power with respect to the upgrading, construction and operation of the sewage treatment plants by the Sewer System pursuant to some 14 SPDES permits. NYSDEC withheld \$7.4 million of State grants for Fiscal Year 1987 in connection with a dispute over staffing levels. DEP has increased its maintenance staff in an effort to further improve its preventive and corrective maintenance programs. In addition, NYSDEC monitors compliance by the System not only with the conditions of the Construction Grants Program, but also the System's adherence to the terms of the State construction and operations reimbursement grants under the State's Pure Waters Bond Act of 1965 and Environmental Quality Bond Act of 1972.

The terms of the SPDES permit issued by NYSDEC for the Newtown Creek plant require the City to reduce flow to the plant to 310 mgd. The plant is currently operating over capacity. However, by order dated August 6, 1990, the City has negotiated compliance terms with NYSDEC to reduce flow to the plant. The cost of additional and accelerated conservation measures that have been agreed to by the City and NYSDEC and that are not currently funded is estimated to be less than \$10 million.

As part of its municipal compliance program, the State took action against the City for those sewage treatment plants that were unable to attain the secondary treatment requirements of the Clean Water Act by July 1, 1988. This court action resulted in the City signing consent decrees (the "State Consent Decrees") for the Owls Head, Coney Island, Newtown Creek and Oakwood Beach plants, all of which include compliance schedules. Three state referees have been assigned to monitor the City's compliance. The State Consent Decree requires that the upgrading of the Newtown Creek plant be completed by 1996. DEP currently anticipates completion in 1999 and expects that the State will agree to an amendment to the Decree to accommodate the change. By phasing construction of the Newtown Creek plant improvements over a longer period, disruption of sewage treatment during construction will be minimized.

The System is also required to develop programs to reduce pollution from combined sewer overflows into New York Harbor and to eliminate excess inflow into the Sewer System from infiltration of ground and storm water. DEP has completed Infiltration/Inflow Studies for 11 of its 14 drainage areas and Sewer System Evaluation Studies ("SSES") for four of the drainage areas. Studies covering the Sewer System's remaining drainage areas and sewage treatment plants are either underway or planned to satisfy SPDES permit requirements. On May 19, 1989, in a proceeding commenced by the ISC and several environmental groups against NYSDEC, the New York State Supreme Court, Queens County ruled that NYSDEC was required to conduct a hearing prior to the renewal of operating permits for the City's fourteen sewage treatment plants. In accordance with that decision, NYSDEC is currently holding hearings which could result in modification of the permits previously issued by NYSDEC.

**Interstate.** In the late 1920's the State and the states of Connecticut and New Jersey recognized the need for interstate cooperation and regulatory overview to abate and control pollution in their tidal and coastal waters. The ISC was formed for those purposes by a tri-state compact approved by Congress in 1935. The ISC was given investigative and regulatory powers which it exercises with respect to floating and settleable solids, oil and grease contamination, color and turbidity, dissolved oxygen and BOD<sub>5</sub>, and various other standards. In large measure, the jurisdiction of ISC has been preempted by the more comprehensive Federal and State legislation and regulations currently in force. Nonetheless, the ISC continues to exercise an investigative and regulatory role which reinforces and supplements those of the Federal, State and municipal governments.

**Municipal.** Rates, fees and charges for sewer service are the responsibility of the Board. Connections to the System's sewers are also regulated by DEP under the Sewer Use Regulations and by DOB under the Building and Building Construction Codes. Also contained in the Sewer Use Regulations are the industrial pretreatment standards mandated by USEPA under the Clean Water Act and the system of sewer surcharges which are a condition of the System's receipt of Federal grants. Compliance monitoring and compilation of necessary data for surcharge billing are functions performed by DEP.

## **RATES AND BILLINGS**

The System has approximately 800,000 water and sewer accounts. The vast majority of these accounts receive both water and sewer service. There are more sewer accounts than water accounts since 90,000 accounts in Queens receive water from Jamaica. In addition, in developing areas such as portions of Staten Island where the System does not yet provide full service, accounts may be for water service only.

The Board's customer accounts are in two categories: approximately 480,000 annual flat-rate accounts and approximately 320,000 metered accounts. Only water service is metered. Charges are established for both flat-rate and metered customers with sewer charges computed as a percentage of water charges. The Board retained the firm of Ernst & Young for the purpose of conducting a detailed review of the structure of water and sewer rates. The Board considers the results of their rate studies in establishing its rates and charges for service.

The System's rates and charges are largely exempt from Federal or State regulation. The Board's water rates, fees and charges are not subject to further approval or regulation except for rates for upstate users. Participation in the Construction Grants Program, however, requires the maintenance of sewer charges sufficient to defray costs of operation, maintenance and replacement, and of surcharges for industrial discharges into the System's sewers levied in conformity with formulas set forth in the Clean Water Act and regulations thereunder. For a discussion of limitations on water service rates, fees and charges, see "GOVERNMENTAL REGULATION—Water Supply Regulation" and "THE SYSTEM—Department of Environmental Protection—Service Area".

### **Flat-Rate Accounts**

At the present time, approximately 480,000 accounts are billed annually through the flat-rate system. These accounts are charged for water through a computation which incorporates, among other factors, the width of the front of the building ("frontage"), the number of stories, the number of dwelling units, and the number of each of the water-using fixtures (such as bathtubs, showers and toilets) in the building. The flat-rate is computed when the building is first constructed, and amended upon notice from DOB of building alterations or when a DEP inspector determines that the basis for charges is incorrect. Flat-rate annual bills are normally sent to customers prior to the start of each Fiscal Year and are due at the beginning of the Fiscal Year but may be sent out to reflect changes in charges adopted by the Water Board as necessary.

### **Metered Accounts**

There are now approximately 320,000 meters in use. Meters installed prior to July 1, 1987 are owned by the property owners, but must meet DEP specifications and be tested for accuracy. All meters installed or replaced by the City as part of the universal metering program are the property of the City.

It is the policy of DEP to read the meters of the 25,000 largest accounts every two months and, to recalibrate or replace such meters when necessary. DEP reads all other meters every six months. Meter readings currently are recorded on optical scanning cards for automated processing. Metered account bills are sent out throughout the year.

Residential properties formerly had the option of metering their water use or being charged a flat annual rate. The Board has amended its regulations to preclude any properties which are currently metered from changing to a flat-rate billing basis. Commercial accounts are required by the Board and the City to have meters installed on all water services. Currently 14.8% of these accounts are not in compliance with this requirement due to their location in multi-use buildings (i.e., containing both residential and commercial units).

### **Universal Metering Program**

The three major goals of universal metering of all water service in the City are water conservation, improved water supply system management and rate equity. Under the program, all flat-rate accounts will

be metered by the end of 1997 at an estimated total installation cost of \$290 million. The City has purchased meters at bulk prices and is issuing contracts for the installation of the meters. At the same time, existing meters are being tested and replaced by DEP where necessary. All new meters will incorporate remote devices which enable meter reading from outside the building. This will enhance meter reading efficiency by eliminating the meter reader's need to gain building access. The installation of meters is being conducted on an area-by-area basis. Six community board districts were chosen for the program's initial phase. These districts are areas in the City where there is low water pressure and/or where water must be pumped. An additional twenty-eight community board districts have been selected Citywide, among them areas requiring conservation to reduce sewage volume. To date, approximately 95,000 meters have been installed under the universal metering program. Upon the initiation of this program, the City assumed responsibility for the maintenance, repair and replacement of all meters. For Fiscal Year 1991, the costs of this program are funded from System revenues and are anticipated to be paid from System revenues in the future as well.

### **Exempt Accounts**

Under the laws of the State, certain institutions may be exempt from the payment of all or a portion of their water and sewer charges depending upon usage. These institutions include religious, certain educational and other charitable institutions as well as homes for the aged, hospitals and other non-profit or charitable corporations. Effective January 1, 1990, flat-rate accounts of these institutions which would be charged less than \$8,256 per year for water service are fully exempt from water and sewer charges with a 50% exemption for those accounts ranging from \$8,256 to \$16,512 in annual water charges. Flat-rate accounts charged in excess of \$16,512 are not exempt. The thresholds for metered accounts of these institutions are \$9,193 and \$18,385. At the beginning of Fiscal Year 1990, there were 2,392 exempt flat-rate accounts of which 2,385 were fully exempt.

### **Jamaica Water Supply Company**

The Jamaica Water Supply Company has benefitted from an agreement with the System to provide virtually free water to Jamaica to help equalize costs for water between the Jamaica water service area and the service area for the System. The current agreement sets the maximum amount of water to be delivered to Jamaica by the System at 50 mgd.

On June 16, 1988, pursuant to State legislation, the City commenced condemnation proceedings against that portion of the Jamaica system which in 1989 delivered approximately 52.5 mgd of water (of which 29.5 mgd was provided from the Water System) to about 518,000 people in southeast Queens, representing approximately 90,000 accounts. The legislation requires the City to condemn the property, provided that the Court fixes compensation therefor by use of a specified valuation method. The trial on valuation has begun. The legislation also specifies that in the event the value established by the court is in excess of the value utilized by the Public Service Commission ("PSC") in setting rates, the proceeding may be discontinued by the City. The City estimates that the value utilized by the PSC for such property in setting rates is approximately \$60 million. The acquisition of the City portion of Jamaica would result in increased operating and maintenance costs for the System as well as the addition of new accounts for water service. This acquisition, although not included in the CIP, could be financed through the issuance of Bonds.

## Rates

The following table sets forth the changes in rates for water and sewer service since 1984.

### History of Water and Sewer Rate Increases

<u>Date</u>	<u>Change in Flat-Rate Water</u>	<u>Change in Metered Water</u>	<u>New Metered Water Rate</u>	<u>Change in Sewer</u>
July 1, 1984	Increased 6.45%	Increased 6.45%	66¢ per ccf	Increased to 60% of water charge.
July 1, 1986	Increased 9.9%	Increased 9.9%	72.5¢ per ccf	Remained at 60% of water charge.
July 1, 1987	Increased 12%	Increased 12%	81¢ per ccf	Increased to 70% of water charge.
July 1, 1988	Increased from \$14.06 to \$26.40 per year for each additional family above the single family assumed in an individual flat-rate account.	No change	No change	Increased to 75% of water charge.
July 1, 1989	Increased from \$26.40 to \$41.86 per year for each additional family above the single family assumed in an individual flat-rate account. Remaining flat rate charges increased by 7.8%.	Increased 7.8%	87¢ per ccf	Increased to 88% of water charge.
Jan. 1, 1990	Increased 9%	Increased 9%	95¢ per ccf	Increased to 112% of water charge.

On May 10, 1990 the Board adopted rates for Fiscal Year 1991 which continue basic rates and charges at current levels through June 30, 1991.

**Basic Sewer Charge.** For all properties connected to the Sewer System, there is a charge imposed equal to a fixed percentage of the property's water charge. As of January 1, 1990, the sewer charge is 112% of the water charge.

**Sewer Allowances.** Certain commercial customers use water in their products and thus return less waste to the Sewer System than their water consumption might indicate. Upon application and approval, these commercial users are entitled to an effective rate reduction which reflects the proportion of water which is retained in their products or evaporated and not returned as sewage.

**Sewer Surcharges.** For those industries which generate sewage of a particularly high strength, as measured by suspended solids and BOD<sub>5</sub> concentrations, an additional charge is imposed. The surcharge is based on the cost of removing the excessive concentrations, and specific charges are determined by a complex formula. Eligible accounts are identified by the Bureau of Wastewater Treatment, and charges are rendered to customers in a supplemental billing.

**Sewer-Only Customer Charges.** In the case of premises which receive water service from alternative sources, a sewer charge is determined by DEP. For the current Fiscal Year, the sewer charge to such premises is equal to 112% of the dollar amount that would be charged for water usage if it were supplied by the Water System.

**Jamaica Sewer Accounts.** There are approximately 90,000 accounts in Queens which are connected to the Sewer System but receive their water from Jamaica. The rate schedule provides that the sewer charge of these accounts shall, as nearly as possible, be adjusted so as to be equivalent to the sewer charge that would have been imposed if the property were served by the Water System. Accordingly, DEP maintains a record of properties served by Jamaica and purchases a computer tape of meter readings billed by Jamaica. A special billing for these accounts is generated annually.

**Comparative Charges.** The following table presents comparative annual water and sewer charges for 24 large cities in 1990 based upon a survey conducted by Ernst & Young. Using a ranking system where 1 represents the lowest rates, the City's ranking relative to these cities is: for Single-Family Residential—7, for Commercial—14, and for Industrial—15.

**Comparative Annual Water and Sewer User Charges(1)**

Single Family Residential		Commercial		Industrial	
City	Annual Charge	City	Annual Charge	City	Annual Charge
Detroit	\$205	Detroit	\$1,718	Detroit	\$136,494
Baltimore	\$226	Baltimore	\$1,737	Baltimore	\$146,753
Cleveland	\$248	Newark	\$1,996	Milwaukee	\$150,261
Newark	\$249	Milwaukee	\$2,016	Philadelphia	\$168,448
Los Angeles	\$264	St. Louis	\$2,136	Newark	\$170,149
St. Louis	\$268	San Antonio	\$2,159	St. Louis	\$170,225
<b>New York</b>	<b>\$269</b>	Dallas	\$2,170	Indianapolis	\$170,706
Milwaukee	\$277	Honolulu	\$2,329	Dallas	\$197,381
Columbus	\$284	Philadelphia	\$2,357	San Antonio	\$202,478
San Antonio	\$304	Indianapolis	\$2,430	Columbus	\$222,556
Indianapolis	\$314	Chicago	\$2,475	Honolulu	\$231,039
Honolulu	\$331	Cleveland	\$2,535	Chicago	\$247,516
San Jose	\$339	Columbus	\$2,566	Cleveland	\$254,138
San Francisco	\$341	<b>New York</b>	<b>\$2,693</b>	Atlanta	\$259,104
Atlanta	\$362	Los Angeles	\$2,817	<b>New York</b>	<b>\$269,251</b>
San Diego	\$376	San Jose	\$2,976	Los Angeles	\$273,928
Dallas	\$377	San Diego	\$3,063	New Orleans	\$277,254
Washington	\$384	New Orleans	\$3,463	San Jose	\$286,499
Philadelphia	\$401	Atlanta	\$3,517	San Diego	\$292,445
New Orleans	\$433	San Francisco	\$3,544	San Francisco	\$345,401
Houston	\$443	Washington	\$3,834	Jacksonville	\$376,915
Boston	\$454	Jacksonville	\$4,108	Washington	\$383,423
Jacksonville	\$455	Boston	\$4,631	Boston	\$481,553
Chicago	N/A	Houston	\$5,444	Houston	\$547,022
<b>Average</b>	<b>\$331</b>	<b>Average</b>	<b>\$2,863</b>	<b>Average</b>	<b>\$260,872</b>

(1) User charges are based upon information provided by the identified cities and standardized assumptions regarding water consumption, wastewater discharge and other factors. Actual charges in each city will vary in accordance with local usage patterns. Charges for all cities reflect rate schedules in effect in early 1990. The New York City charges reflect the current (July 1, 1990) metered rates of the Board.

N/A = Not Available



## **Billing and Collection**

The Board has contracted with the City for billing and collection services. The Bureau of Water Register of DEP collects the data used to generate bills to customers. Through its field offices in each Borough of the City and its central offices in Manhattan, it is responsible for the reading of meters and checking of meter accuracy as well as the maintenance of current information for those customers on the flat-rate system of billing. Data files for flat-rate customers are updated through inspections by Bureau of Water Register personnel. The Bureau of Water Register also collects certain over-the-counter payments for water and sewer services.

The Bureau of Water Register organizes metered consumption and flat-rate data and forwards all such data to the City's Department of Finance ("DOF") which prepares and mails bills to customers for water and sewer services. Each customer's account is identified by a unique Borough/block/lot number developed through the City's property tax records. DOF bills customer accounts, records these billings and is primarily responsible for the collection process, including procedures for handling delinquent accounts. DOF also administers billing adjustments and works with the Bureau of Water Register to handle customer inquiries. Although shutoffs are infrequent, DOF advises the Bureau of Water Register when a shutoff of services is required for nonpayment of bills.

Payment of bills is made to the Board's account at Chemical Bank, which records payments and forwards the recorded data and receipts to the Board. Customer payments are received either directly by Chemical Bank or through hand-delivered payments to Borough offices of DOF, which are deposited to the Board's account at Chemical Bank. Acting on behalf of the Board, the Office of the City Comptroller records the cash receipts from the System.

If an account is delinquent for 60 days, DOF sends a delinquency bill and an enforcement letter. If the account is still delinquent after 90 to 120 days, DOF initiates legal action in the name of the Board and a process server delivers a summons to the delinquent customer. If there is no response to the summons, DOF obtains a default judgment and enforces it by levy against the customer's bank account or garnishment of his wages. DOF developed and implemented the Water Enforcement Delinquency and Tracking System ("WENDY"). WENDY monitors and reports on the status of delinquent accounts and automatically schedules and initiates collection enforcement actions.

Both DEP and DOF have identified major customer service and support issues relating to the universal metering program. Among these are a need to respond to expected increases in customer inquiries regarding meter installations, initial bills and consumption. Existing record-keeping systems are inadequate to support this increased service requirement in addition to typical utility customer information, classification and billing practices. A joint DEP/DOF program has been initiated to generate key customer account information that is currently contained in various paper and electronic files in both agencies and to jointly design, procure and operate a single automated utility customer information and billing system. Funds for this system are included in the Board's budget for Fiscal Year 1991. Integrating operations which are now divided among three computer centers and operating systems will eliminate inefficient procedures and improve the capacity to sort and report water/sewer customer account information.

Actual Fiscal Year 1990 revenues of the Water and Sewer System were significantly higher than Fiscal Year 1989 revenues but resulted in a smaller surplus than the amounts anticipated in the previous forecast of the Authority. The shortfall in the surplus attributable to current revenues was approximately \$23 million, or less than 3% of total revenues. Based on a preliminary review, the reasons for the difference include several non-recurring circumstances and slower than anticipated payment of water and sewer bills by metered customers. A task force comprised of DEP, DOF and other City and Authority representatives will be reviewing the billing and collection system to ensure that adequate steps are taken to encourage the prompt payment of water and sewer bills.

The New York City Housing Authority ("Housing Authority") is the System's largest customer having been billed approximately \$23.8 million in calendar year 1989 for water and sewer services. The next largest customer is The City of New York with a Fiscal Year 1990 water and sewer bill of \$16.3 million. Other large customers include the New York City Health and Hospitals Corporation, Consolidated Edison Company of New York, Inc., the Board of Education of the City of New York and the Riverbay Corporation (Co-op City). Annual water and sewer charges for these customers range up to approximately \$5 million.

## FINANCIAL OPERATIONS

The following tables present certain historical data relating to the System which have been derived from the books and records of the City, the Authority and the Board.

### Revenues

The following table presents System revenues for Fiscal Years 1986 through 1990. The System revenues for Fiscal Years 1986 through 1989 have been derived from annual audited financial statements. The Fiscal Year 1990 results are forecast. The audit of the Fiscal Year 1990 results is expected to be completed in November, 1990. All Fiscal Years are presented on a cash basis.

<b>System Revenues</b>					
(thousands)					
<u>Revenue Category</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Flat Rate—Water Charges (1) .....	\$194,547	\$189,016	\$205,751	\$265,435	\$279,667
Flat Rate—Sewer Charges (1) .....	117,530	118,154	143,666	176,790	263,036
Metered—Water Charges (1)(2) .....	80,276	96,124	105,167	121,186	108,883
Metered—Sewer Charges (1)(3) .....	41,971	50,898	63,415	74,291	87,445
Miscellaneous Revenues (4) .....	10,106	22,290	20,902	45,003	24,960
Interest Penalty—Late Charges .....	11,385	13,066	11,609	11,606	14,089
Total .....	<u>\$455,815</u>	<u>\$489,548</u>	<u>\$550,510</u>	<u>\$694,311</u>	<u>\$778,080</u>

- (1) Includes both current payments and payments relating to accounts in arrears.
- (2) Includes charges collected from certain upstate communities which are supplied water by the System.
- (3) Includes industrial surcharges to certain users of the Sewer System.
- (4) Miscellaneous Revenues are primarily comprised of water and sewer connection and disconnection fees, repair fees, meter installation fees, water usage permits, special meter reading fees and investment income.

### Expenditures

The following table presents System expenditures for Fiscal Years 1986 through 1990. The System expenditures for Fiscal Years 1986 through 1989 have been derived from annual audited financial statements. The Fiscal Year 1990 results are forecast. The audit of the Fiscal Year 1990 results is expected to be completed in November, 1990. All Fiscal Years are presented on an accrual basis.

<b>System Expenditures</b>					
(thousands)					
<u>Expenditure Category</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Water (1)					
Personal Service (2) .....	\$ 56,976	\$ 57,042	\$ 57,248	\$ 64,531	\$ 69,524
Other Than Personal Service (3) .....	70,740	62,098	59,896	72,365	86,791
Total .....	<u>127,716</u>	<u>119,140</u>	<u>117,144</u>	<u>136,896</u>	<u>156,315</u>
Sewer (1)					
Personal Service (2) .....	85,730	95,014	103,229	117,358	129,527
Other Than Personal Service (3) .....	31,243	37,654	49,988	65,821	100,363
Total .....	<u>116,973</u>	<u>132,668</u>	<u>153,217</u>	<u>183,179</u>	<u>229,890</u>
Sub-Total .....	244,689	251,808	270,361	320,075	386,205
Other Expenditures (4) .....	14,526	15,232	19,286	20,557	26,252
Total System .....	<u>\$259,215</u>	<u>\$267,040</u>	<u>\$289,647</u>	<u>\$340,632</u>	<u>\$412,457</u>

- (1) Certain historical, administrative and overhead costs of DEP were allocated to the water and sewer functions based upon the proportion of applicable personnel within DEP.
- (2) Personal Service costs include salaries, fringe benefits and pension costs.
- (3) Other Than Personal Service costs include real estate taxes paid to upstate communities for watershed properties and electricity, chemical and supply costs.
- (4) Other Expenditures include City agency support, customer accounting, and judgments and claims costs.

The Fiscal Year 1991 Revenue and Expenditure forecast is included in the Forecasted Cash Flows contained in Appendix B.

### Capital Program

The following table presents capital commitments and capital expenditures of the System for Fiscal Years 1986 through 1990. Capital commitments are contractual obligations entered into during the Fiscal Year while capital expenditures represent cash payments made during the Fiscal Year.

#### System Capital Commitments and Expenditures<sup>(1)</sup>

Commitments	(millions)									
	1986		1987		1988		1989		1990	
	System Funds(2)	All Funds(3)	System Funds(2)	All Funds(3)	System Funds(2)	All Funds(3)	System Funds(2)	All Funds(3)	System Funds(2)	All Funds(3)
Water Supply .....	\$ 23	\$ 23	\$ 16	\$ 16	\$ 52	\$ 52	\$ 4	\$ 4	\$ 68	\$ 68
Water Mains .....	88	88	197	197	112	112	109	110	90	90
Sewer .....	132	132	118	118	137	137	143	143	158	158
Water Pollution										
Control .....	90	242	122	243	106	289	119	276	499	499
Total .....	<u>\$333</u>	<u>\$485</u>	<u>\$453</u>	<u>\$574</u>	<u>\$407</u>	<u>\$590</u>	<u>\$375</u>	<u>\$533</u>	<u>\$815</u>	<u>\$815</u>
<b>Expenditures</b>										
Water Supply .....	\$ 95	\$ 95	\$ 71	\$ 71	\$ 51	\$ 51	\$ 44	\$ 44	\$ 35	\$ 35
Water Mains .....	51	51	78	78	109	109	134	134	134	134
Sewer .....	87	89	114	114	142	142	165	165	140	140
Water Pollution										
Control .....	76	306	90	297	92	252	89	258	136	302
Total .....	<u>\$309</u>	<u>\$541</u>	<u>\$353</u>	<u>\$560</u>	<u>\$394</u>	<u>\$554</u>	<u>\$432</u>	<u>\$601</u>	<u>\$445</u>	<u>\$611</u>

- (1) Figures do not include a small amount spent annually on the purchase of vehicles and equipment.
- (2) System Funds include the proceeds of Authority bonds sold directly to the public and privately placed with the Environmental Facilities Corporation under the revolving loan fund program.
- (3) All Funds include Federal and State capital grants.

### LABOR RELATIONS

During the last decade, there have been no strikes or major work stoppages of DEP employees affecting the System.

Approximately 5,000 of DEP's 5,500 active employees are members of labor unions which represent such employees in collective bargaining with the City. This includes approximately 1,950 laborers, mechanics, and workers in other crafts governed by the provisions of Section 220 of the State Labor Law. The salary increases of these employees are decided pursuant to the determination of the City's Comptroller as to "prevailing rates". Almost all of the approximately 2,000 DEP employees represented by District Council 37, American Federation of State, County and Municipal Employees and the approximately 200 employees represented by the Communications Workers of America are currently covered by collective bargaining agreements that expire on September 30, 1990. The International Brotherhood of Teamsters representing approximately 400 DEP employees was covered by a collective bargaining agreement which expired December 31, 1989. Contracts are currently under negotiation.

There are 300 DEP employees holding management or "original jurisdiction" positions who are not members of unions and are not covered by Labor Law Section 220, but do receive comparable benefits. Wages for these employees are set by the order of the Mayor.

## CAPITAL IMPROVEMENT PROGRAM

Major investments in the City's water and sewer infrastructure have been made since the nineteenth century. To maintain and improve the integrity of the System, the current CIP was developed in April 1988 and anticipates an investment of approximately \$8.535 billion through Fiscal Year 1998. The Authority estimates that more than 95% of the cost of the CIP will be provided from System funds. It is anticipated that the System's portion of the program will be funded from proceeds derived from the sale of Bonds, including the Series A Bonds. Since April 1988, DEP identified an additional \$1.7 billion in required capital improvements. It is anticipated that System funds will be used to pay for such costs. For further information regarding the CIP, including the current forecast for Fiscal Years 1991-1994, see "Appendix A—REPORT ON THE ENGINEERING FEASIBILITY OF THE WATER AND SEWER SYSTEM SERVING THE CITY OF NEW YORK".

### Capital Improvement Plan Funding

The following table sets forth the proposed sources of funding as reflected in the current CIP. The State is expected to make additional capital financing available to the System at below market interest rates through a revolving loan fund.

**Summary of Capital Improvement Plan Funding**  
(thousands)

<u>Bureau</u>	<u>System Funds</u>	<u>State and Federal Funds</u>	<u>Total</u>
Water Supply .....	\$4,031,642	\$ —	\$4,031,642
Sewers .....	1,829,912	—	1,829,912
Water Pollution Control .....	2,183,996	404,261	2,588,257
Equipment .....	85,447	—	85,447
Total .....	<u>\$8,130,997</u>	<u>\$ 404,261</u>	<u>\$8,535,258</u>

Federal funds are provided pursuant to the Clean Water Act, in a program administered by the states, for construction and reconstruction of wastewater treatment facilities. The City is currently using these funds for five sewage treatment plants: Oakwood Beach, Coney Island, Owls Head, Red Hook and North River. Federal construction funds under the Clean Water Act have been authorized through September 30, 1991. The Clean Water Act requires states to use Federal funds in revolving loan programs for wastewater treatment facilities in the future, rather than grant programs for such facilities. To this end, a revolving loan program has been established by the State, pursuant to the Water Quality Act of 1987, in order to utilize federal financial assistance together with state matching grants in a program to assist municipalities to construct eligible sewage facilities by providing subsidized loans. The Authority has participated in an initial loan under the revolving loan program and anticipates further borrowing under the program. Revolving loan program funding is deemed System Funds as it is obtained through the private placement of Authority bonds with the State Environmental Facilities Corporation. (SEE "WASTEWATER REGULATION—Federal").

Implementation of the CIP is dependent upon the Authority's ability to market its securities successfully in the public credit markets and the anticipated receipt of State and Federal construction funds. Sales of securities are subject to market conditions, and State and Federal grants are subject to appropriation, allocation and the System's compliance with regulatory conditions.

### Water System

**Tunnel 3.** The CIP provides for the completion of Stages I and II including completion of the Brooklyn/Queens and Manhattan segments. Excavation of Stage I of Tunnel 3 was completed in 1985. Since that time, all concrete lining has been finished, and valves and other mechanical equipment have been installed in approximately half of the shafts. Stage I will be operational by 1993 and will improve the reliability of the transmission system. Completion of the Brooklyn/Queens segment of Stage II will improve

services to Staten Island, Brooklyn and Queens. Construction of the Manhattan segment of Stage II will follow completion of the Brooklyn/Queens segment of Stage II. Tunnel 3 will create a more flexible system, providing delivery alternatives in the event of disruption in any of the Tunnels. It will permit the shutdown of tunnels for inspection and any necessary rehabilitation. The CIP includes funding for surveys and preparation of environmental impact statements for Stage III.

Tunnel I Reconstruction. Preliminary analysis is to be made to determine the work required to reconstruct Tunnel I, which would be taken off-line for inspection following completion of Stage II of Tunnel 3, which is anticipated to begin operation by 2005.

Croton Watershed Dam Safety Program. Engineering reports sponsored by the U.S. Army Corps of Engineers indicated that with the exception of the Boyds Corner Dam, the dams and reservoirs in the Croton System are safe but in need of rehabilitation and reconstruction. The Boyds Corner Dam was rated unsafe and the Boyds Corner Reservoir has been drained. Reconstruction of that dam is expected to be completed in the fall of 1990. An ongoing reconstruction program has been established that includes rehabilitation of dams within the Croton watershed and the Kensico Dam. This program will bring those dams up to the more stringent national safety standards established in 1976.

Croton Filter Project. Due to development in the watershed area, the quality of Croton System water has shown some deterioration. To ensure that water supplied by the Croton watershed meets all standards set by the NYSDOH and NYCDOH, the Croton Filter Project is being constructed. A full-scale filter plant, expected to be completed in the late 1990's, will treat up to 300 mgd of water.

Trunk and Distribution Main Extension. Some developing areas within the City are in need of new or augmented service from the System. Installation of trunk and distribution mains is required to meet these needs.

Trunk and Distribution Main Replacement. In order to maintain essential water service operations, repair and replacement of obsolete or failed trunk and distribution mains must be continually undertaken. Included in this program is water main replacement done in conjunction with highway reconstruction.

New Source Development. A feasibility study for the expansion of the Chelsea pump station beyond its present capacity has been completed and reviewed by an intergovernmental task force. A preliminary investigation will determine the work required to develop a new source of water from the Hudson River. The project is estimated to provide from 300 to 1200 mgd.

Upstate Improvements. Further expenditures are planned for the reconstruction of various upstate watershed facilities. These will include gatehouses, valve chambers, shafts and sewage treatment facilities.

Citywide Anti-Corrosion System. This is a pilot program to study strategies for the control and prevention of external corrosion of water mains.

Brooklyn-Queens Aquifer Study. This is a study to evaluate the supply potential and determine the work that would be required to make use of the existing underground water supplies in the Brooklyn-Queens Aquifer to supplement the City's upstate reservoir supply.

Reconstruction of Croton Aqueduct Shafts. Design work will be performed for the reconstruction of the inner structures and equipment of certain shafts of the New Croton Aqueduct to ensure reliability.

## **Sewer System**

Chronic Malfunction and Emergency Replacement. This program provides for the replacement of sewers which have already collapsed or experience chronic malfunctions that cannot be overcome through maintenance (*i.e.*, sagging, bends or improper alignment), or experience chronic malfunction due to inadequate capacity.

**Programmatic Replacement.** Systematic replacement of sewers constructed with what are now considered to be substandard methods and materials or with materials that have exceeded their useful life has been undertaken. This will avoid more costly future repairs and will improve the general reliability of the System.

**Programmatic Response to Legal Mandates.** A program to address the mandated construction of new sewers required by the Clean Water Act has been established. This construction will eliminate the occasional discharge of untreated sewage.

**Replacement or Augmentation to Existing System.** The combined sewers must be large enough to convey a certain amount of both stormwater and sewage flow based on population density, industrial discharges and stormwater runoff in the sewered area. Some existing sewers fail to handle this flow adequately due to events occurring subsequent to their original design. The failures usually can be attributed to one or more of the following conditions:

- Sewers meet design expectations but land use or other design conditions have changed, increasing flows to levels greater than the original maximum design flow.
- The original design criteria do not meet current standards.
- The physical integrity of the sewers is damaged through a partial collapse, blockage or uneven settling, reducing the capacity of the sewers to convey stormwater and sewage.
- Unauthorized private stormwater connections to the Sewer System add an additional flow to the sewers and displace capacity reserve for the original design flows.

The sewer projects contained within this category will increase the capacity of these sewers to adequate levels through reconstruction, repair, replacement or diversion of flow into supplemental sewer pipe. In addition, where stormwater connections are determined to be unauthorized, DEP can require private construction of stormwater collection and retention facilities.

Also included in this category are sewer projects which are undertaken primarily because other infrastructure projects make such sewer work desirable. These projects include the construction of sewers in conjunction with: other utilities (such as water, gas and electric); road reconstruction; and major land use changes (such as the Javits Convention Center).

**Sewer System Extensions.** The City is legally mandated to provide acceptable sewage disposal methods for residents within its jurisdiction and must therefore construct new sewers as required. The construction of sewers to replace septic tanks in populated areas avoids health problems associated with viruses, bacteria and other sewage-related pollutants and minimizes stormwater flooding.

## **Water Pollution Control**

**Consent Decree Construction and Upgrading.** The Clean Water Act and the State Consent Decrees require construction of an intercepting sewer for one plant, and the upgrading of three plants. These projects are designed to improve the quality of the surrounding waters. The following projects are included in this segment of the CIP:

***Oakwood Beach Water Pollution Control Plant Consent Decree Project:*** This project involves the construction of a sewer interceptor and pump stations on Staten Island. The interceptor will convey sewage from the Tottenville and South Shore drainage areas to the plant.

***Coney Island Water Pollution Control Plant Upgrade:*** This plant provides partial secondary treatment of sewage. This upgrading involves rehabilitating the deteriorated portions of the plant, as well as constructing additional facilities to enable the plant to provide Full Secondary Treatment for up to 100 mgd of sewage. Under storm conditions, the plant will be able to treat up to 200 mgd of sewage.

***Owls Head Water Pollution Control Plant Upgrade:*** This plant provides partial secondary treatment of sewage. This upgrading involves rehabilitating the deteriorated portions of the plant, as well as constructing

additional facilities to provide Full Secondary Treatment for up to 120 mgd. Under storm conditions, the plant will be able to treat up to 240 mgd of sewage.

*Newtown Creek Water Pollution Control Plant Upgrade:* This plant provides partial secondary treatment of sewage and will be upgraded to provide Full Secondary Treatment. DEP has recently determined that this plant will also require additional capacity. The current CIP provision for improvement of this plant is substantially below DEP's current estimate of the cost. See "THE SYSTEM—The Sewer System—Sewage Treatment Facilities".

Sludge Disposal. Under Federal court order, the Ban Act, MPRSA and USEPA regulations promulgated thereunder, the System is also required to have a permit for dumping the sludge generated by its sewage treatment plants into the Atlantic Ocean and to cease ocean disposal of sludge by June 30, 1992. See "THE SYSTEM—The Sewer System—Sludge Disposal".

Plant Stabilization: This program includes the interim replacement and reconstruction of failing components within the plants and their related facilities necessary to maintain process reliability. In some cases, this segment of the CIP provides for the replacement or rehabilitation of plant components required prior to comprehensive reconstruction at older plants which are not yet fully upgraded. Stabilizing these plants enables the City to maintain and improve water quality.

Water Quality Mandates. During periods of heavy rainfall, a combination of stormwater and sewage bypasses treatment and is released into the City's waterways. This program provides for the study, design and construction of the facilities necessary to control the polluting effects of such releases. In addition, Infiltration/Inflow studies and SSES are a prerequisite for receipt of Federal water pollution control construction grants for construction of facilities. The purpose of these evaluations is to determine whether excess water (rain leachate or tidal flows) is entering the Sewer System, thereby reducing the effectiveness of the treatment process.

Miscellaneous Upgrading and Reconstruction. This program includes various projects undertaken to upgrade or reconstruct sewage pump stations, motor vessels, regulators and other components of the plant and treatment system.

For further information regarding the CIP, including the current forecast for Fiscal Years 1991-1994, see "Appendix A—REPORT ON THE ENGINEERING FEASIBILITY OF THE WATER AND SEWER SYSTEM SERVING THE CITY OF NEW YORK".

## DEBT SERVICE REQUIREMENTS

The following schedule sets forth the debt service requirements for the Bonds. The anticipated issuance of additional Bonds to finance the CIP is reflected in Appendix B.

Fiscal Year Ending June 30	Outstanding Bonds Total Debt Service	Series A Bonds			Total Debt Service
		Principal	Interest	Total	
1991 .....	\$192,056,486	\$ 4,095,000.00	\$ 9,799,982.50	\$13,894,982.50	\$212,430,345.82
1992 .....	190,988,003	5,420,000.00	19,346,075.00	24,766,075.00	215,754,078.00
1993 .....	194,988,806	1,760,000.00	19,004,615.00	20,764,615.00	215,753,421.00
1994 .....	194,989,294	1,870,000.00	18,890,215.00	20,760,215.00	215,749,509.00
1995 .....	194,993,504	1,990,000.00	18,766,795.00	20,756,795.00	215,750,299.00
1996 .....	194,996,967	2,120,000.00	18,633,465.00	20,753,465.00	215,750,432.00
1997 .....	194,989,682	2,275,000.00	18,489,305.00	20,764,305.00	215,753,987.00
1998 .....	194,994,877	2,425,000.00	18,332,330.00	20,757,330.00	215,752,207.00
1999 .....	195,002,392	2,585,000.00	18,162,580.00	20,747,580.00	215,749,972.00
2000 .....	194,982,482	2,790,000.00	17,979,045.00	20,769,045.00	215,751,527.00
2001 .....	195,006,269	2,965,000.00	17,778,165.00	20,743,165.00	215,749,434.00
2002 .....	195,002,274	3,185,000.00	17,563,202.50	20,748,202.50	215,750,476.50
2003 .....	194,998,414	3,420,000.00	17,330,697.50	20,760,697.50	215,749,111.50
2004 .....	195,001,641	3,670,000.00	17,077,617.50	20,747,617.50	215,749,258.50
2005 .....	194,996,839	3,950,000.00	16,806,037.50	20,756,037.50	215,752,876.50
2006 .....	194,999,481	1,373,208.80	19,376,578.70	20,749,787.50	215,749,268.50
2007 .....	194,999,640	1,278,826.40	19,470,961.10	20,749,787.50	215,749,427.50
2008 .....	194,991,604	1,193,699.50	19,566,090.00	20,759,787.50	215,751,391.50
2009 .....	195,002,434	1,109,059.80	19,640,730.70	20,749,787.50	215,752,221.50
2010 .....	194,994,433	1,035,215.00	19,724,572.50	20,759,787.50	215,754,220.50
2011 .....	194,999,622	4,240,000.00	16,509,787.50	20,749,787.50	215,749,409.50
2012 .....	195,001,575	4,550,000.00	16,202,387.50	20,752,387.50	215,753,962.50
2013 .....	178,754,217	21,125,000.00	15,872,512.50	36,997,512.50	215,751,729.50
2014 .....	178,756,094	22,655,000.00	14,340,950.00	36,995,950.00	215,752,044.00
2015 .....	178,747,162	24,305,000.00	12,698,462.50	37,003,462.50	215,750,624.50
2016 .....	178,763,006	26,055,000.00	10,936,350.00	36,991,350.00	215,754,356.00
2017 .....	178,764,444	28,005,000.00	8,982,225.00	36,987,225.00	215,751,669.00
2018 .....	107,934,960	35,105,000.00	6,881,850.00	41,986,850.00	149,921,810.00
2019 .....	46,915,550	9,465,000.00	4,248,975.00	13,713,975.00	60,629,525.00
2020 .....	7,532,000	58,985,000.00	3,539,100.00	62,524,100.00	70,056,100.00

Note: Totals may not add due to rounding.

### COVENANT OF THE STATE

Section 1045-t of the Act constitutes a pledge of the State to the holders of Bonds not to limit or alter the rights vested in the Authority or the Board by the Act to fulfill the terms of any agreement made with or for the benefit of the holders of the Bonds until such obligations together with the interest thereon are fully met and discharged.

### PENDING LEGISLATION

A number of bills have been introduced in recent sessions of the State Legislature which propose to limit or restrict the rights and powers of the Authority and the Board or otherwise affect the activities of the Authority and the Board. It is not possible to predict whether any of such bills will be enacted.



## LITIGATION

There is no action, suit, proceeding or investigation, at law or in equity, before or by any court, public board or body pending or, to the best knowledge of the Authority, threatened against or affecting the Authority to restrain or enjoin the issuance, sale or delivery of the Series A Bonds, or in any way contesting or affecting the validity of the Series A Bonds or any proceedings of the Authority, the Board or the City taken with respect to the issuance or sale of the Series A Bonds or with respect to the Resolution or the pledge or application of any money or security provided for the payment of the Series A Bonds, or the existence or powers of the Authority or the Board.

Pursuant to the Lease and the Agreement, the City has agreed, subject to certain conditions, to indemnify the Authority and the Board against any and all liability in connection with any act done or omitted in the exercise of their powers which is taken or omitted in good faith in pursuance of their purposes under the Act. The City, however, is entitled to reimbursement by the Board for the amount of any judgment or settlement paid by the City (and not otherwise reimbursed from any other source) arising out of a tort or contract claim to the extent that the City's liability therefor is related to the operation, maintenance and improvement of the System, provided, however, that the Board is not required to reimburse the City in any one year for tort claims in excess of 5% of the Revenues of the Board for such Fiscal Year.

There are numerous claims seeking damages and injunctive and other relief against the City related to the System. Except as noted below, these claims represent routine litigation incidental to the performance of the City's governmental functions in connection with the operation, maintenance and improvement of the System. The City has paid an average of approximately \$1.7 million per year from Fiscal Years 1985 through 1989 in satisfaction of tort claims relating to the operation of the System. Contract claims on water supply, sewer and water pollution control projects arise in varying amounts based on alleged change orders and related matters. Numerous lawsuits relating to construction contract claims are currently pending. Four of these actions each seek damages in excess of \$5 million in amounts ranging up to \$13.8 million. While the probable outcome of these actions cannot be determined at this time, contract claims are expected to be funded through the CIP, which may be revised from time to time to accommodate such claims as well as other changes therein.

The following paragraphs describe certain legal proceedings and claims involving the System, other than routine litigation incidental to construction, the collection of rates, fees and charges and certain other litigation arising out of alleged constitutional violations, torts, breaches of contract and other violations of law and condemnation proceedings. While the ultimate outcome of the proceedings and claims described below is not currently predictable, and unfavorable determinations in certain of them could result in substantial judgments, the City has estimated that as of June 30, 1989, potential future liability for claims involving the System was \$134 million.

### Torts

1. Approximately 50 actions, including a purported class action, have been commenced against the City alleging damages of approximately \$1.5 billion arising out of an August 10, 1983 water main break and electrical blackout.
2. Approximately 69 actions seeking damages of approximately \$24 million are pending as a result of sewer backup and street flooding during an unusually heavy rainfall in 1984.
3. The City has received in excess of 450 notices of claims, nine of which have thus far been commenced as actions, seeking damages for personal injuries and property damage in connection with an explosion of a Con Edison steam pipe which occurred in Gramercy Park on August 19, 1989. While not all of the claims specify a dollar amount sought, claims which do indicate an amount for damages seek in the aggregate in excess of \$1.3 billion and include a claim filed by Con Edison seeking \$72 million in damages.

### Environmental

The City is currently in compliance with the United States District Court Decree which directs ending the discharge of approximately 215 mgd of untreated sewage into the Hudson and East Rivers. Projects

undertaken pursuant to the Decree and the State Consent Decree to enforce compliance with the Clean Water Act are described herein under "GOVERNMENTAL REGULATION—Wastewater Regulation".

### **Contracts**

By complaint dated June 22, 1990, J.A. Jones Construction and Daidone Electric of N.Y., Inc., a joint venture ("plaintiff"), brought a declaratory judgment action against the City in the United States District Court, Southern District of New York. The suit concerns payment for work done pursuant to a contract between the plaintiff and the City at the North River plant, a sewage treatment plant whose construction was largely funded by USEPA monies. The contract provides for payment for work changes but excludes payment for any delays that may occur during the work period. Plaintiff, who is performing construction work at the plant, alleges that the City has failed to adhere to Federal regulations regarding payments for work changes and delays that occurred during the course of work plaintiff has performed. Plaintiff claims that the City's failure to adhere to these regulations has caused it substantial damages. A judgment in plaintiff's favor could affect all projects which are USEPA assisted. The City has moved to dismiss the suit on jurisdictional grounds and plaintiff has moved for summary judgment.

### **UNDERWRITING**

The Underwriters have jointly and severally agreed, subject to certain conditions, to purchase the Series A Bonds from the Authority at a price which is \$2,527,950.04 less than the total of the initial offering prices. The Underwriters' obligations are subject to certain conditions precedent, and they will be obligated to purchase all of the Series A Bonds if any of the Series A Bonds are purchased. The Series A Bonds may be offered and sold to certain dealers (including the Underwriters and other dealers depositing the Series A Bonds into investment trusts) and others at prices lower than such public offering prices and such public offering prices may be changed, from time to time, by the Underwriters. The Underwriters have designated Smith Barney, Harris Upham & Co. Incorporated as their Representative.

### **APPROVAL OF LEGAL PROCEEDINGS**

The issuance of the Series A Bonds is subject to the approval of legality by Willkie Farr & Gallagher, New York, New York, Bond Counsel. Certain legal matters will be passed upon for the City and the Board by the City's Corporation Counsel. Certain legal matters will be passed upon for the Underwriters by Brown & Wood, New York, New York.

### **LEGALITY FOR INVESTMENT AND DEPOSIT**

Under the Act, the Bonds are made securities in which all public officials and bodies of the State and all municipalities, all insurance companies and associations and other persons carrying on an insurance business, all banks, bankers, trust companies, savings banks and savings associations, including savings and loan associations, investment companies and other persons carrying on a banking business, and administrators, guardians, executors, trustees and other fiduciaries and all other persons whatsoever, who are now or may hereafter be authorized to invest in the Bonds or other obligations of the State, may properly and legally invest funds including capital in their control or belonging to them in such Bonds. The Act further provides that the Bonds are securities which may be deposited with and may be received by all public officers and bodies of the State and all municipalities for any purposes for which the deposit of bonds or other obligations of the State is or may hereafter be authorized.

## **FINANCIAL STATEMENTS**

The financial statements of the New York City Water and Sewer System included in this Official Statement have been audited by KPMG Peat Marwick, independent certified public accountants, to the extent and for the periods indicated in their report thereon. Such financial statements have been included in reliance upon the report of KPMG Peat Marwick.

## **EXPERTS**

The engineering feasibility report in Appendix A is based upon studies by and has been included in reliance upon the authority of Metcalf & Eddy of New York, Inc. The financial forecast in Appendix B has been examined by Ernst & Young, Certified Public Accountants, as set forth in their report appearing in Appendix B, and is included in reliance upon the authority of such firm as experts in presentation and examination of financial forecasts.

## **TAX EXEMPTION**

In the opinion of Willkie Farr & Gallagher, New York, New York, Bond Counsel, based on existing statutes and court decisions and assuming continuing compliance by the Authority and the Board with certain covenants in the documents and requirements of the Code regarding use, expenditures, investment of Bond proceeds and the timely payment of certain investment earnings to the U.S. Treasury, interest on the Series A Bonds will not be includable in the gross income of the owners of the Series A Bonds for Federal income tax purposes. Interest on the Series A Bonds will be exempt from personal income taxes imposed by the State or any political subdivision thereof, including the City.

Interest on the Series A Bonds will not be a specific preference item for purposes of the Federal individual or corporate alternative minimum taxes or the Federal corporate environmental tax. The Code contains other provisions that could result in other tax consequences as a result of ownership of the Series A Bonds or the inclusion in certain computations (including without limitation those related to the corporate alternative minimum tax and environmental tax) of interest that is excluded from gross income.

Ownership of tax-exempt obligations may result in tax consequences to certain taxpayers, including, without limitation, financial institutions, property and casualty insurance companies, certain foreign corporations doing business in the United States, certain S Corporations with excess passive income, individual recipients of Social Security or Railroad Retirement benefits and taxpayers who may be deemed to have incurred or continued indebtedness to purchase or carry tax-exempt obligations. Prospective purchasers of the Series A Bonds should consult their tax advisors as to the applicability of any such collateral consequences.

The respective initial public offering prices of the Capital Appreciation Bonds and the Series A Bonds maturing in 1992, 2004, 2015, 2019 and 2020 (collectively, the "Discount Bonds") are less than the amounts payable at maturity. An amount not less than the difference between the respective initial public offering prices of the Discount Bonds and most or all of the amount payable at maturity constitutes original issue discount, which will be excludable from gross income for Federal, State and City income tax purposes. A portion of the original issue discount that accrues in each year to an owner of a Discount Bond which is a corporation will be included in the calculation of the corporation's Federal alternative minimum tax liability and Federal environmental tax liability. Consequently, corporate owners of any Discount Bond should be aware that the accrual of original issue discount in each year may result in an alternative minimum tax liability or an environmental tax liability although the owner of such Discount Bond has not received cash attributable to such original issue discount in such year.

Owners of Discount Bonds should consult their personal tax advisors with respect to the determination for Federal income tax purposes of the amount of original issue discount or interest properly accruable with respect to such Discount Bonds, and with respect to the other State and local tax consequences of holding the Series A Bonds.



**APPENDIX A**

**REPORT ON THE ENGINEERING  
FEASIBILITY OF THE WATER AND SEWER SYSTEM  
SERVING THE CITY OF NEW YORK**

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**Metcalf & Eddy of New York, Inc.**  
**Engineers & Planners**

60 East 42nd Street  
New York, New York 10165  
Telephone (212) 867-3076

Mark Page, Executive Director  
New York City Municipal Water Finance Authority  
Municipal Building  
1 Centre Street  
New York, New York 10007

Re: New York City Municipal Water Finance Authority  
Water and Sewer System Revenue Bonds

Dear Mr. Page:

We are delighted to submit Metcalf & Eddy's Report on the Engineering Feasibility of the Water and Sewer System Serving The City of New York. This report is based on the work that Metcalf & Eddy has performed as consulting engineer for the New York City Water and Wastewater Operations Evaluation Project and then as consulting engineer for the Authority.

Our overall conclusion is that the water and sewer system (the "System") serving The City of New York (the "City") continues to be operated in a professional and prudent manner. Specific conclusions are listed below:

- The condition of the System continues to receive the highest rating of our three rating categories (adequate).
- The expense allocations for Fiscal Year 1991 are adequate to assure continued reliable operation of the System.
- The Capital Improvement Program (the "CIP"), as proposed to be modified to accommodate costs for additional improvements at the Newtown Creek plant and sludge disposal, and the current forecast of the capital program for Fiscal Years 1991-1994 (the "1991-1994 Current Forecast") are comprehensive and responsive to the long-term operating requirements of the service area.
- Staffing for the System is adequate to assure proper operation and maintenance.

The forecasted cash flows relating to the New York City Municipal Water Finance Authority's plans to finance water and sewer facilities as specified under the CIP and the 1991-1994 Current Forecast are set forth in Appendix B, "Report on the Forecasted Cash Flows of the Water and Sewer System Serving The City of New York". The forecasted cash flows were independently examined by Ernst & Young as described in Appendix B.

We have no responsibility to update this report for events and circumstances occurring after the date of this report.

Very truly yours,

**METCALF & EDDY OF NEW YORK, INC.**  
August 9, 1990

## INTRODUCTION

### **Purpose and Scope of the Report**

The purpose of this report is to provide engineering information pertinent to the issuance of the Water and Sewer System Revenue Bonds, Fiscal 1991 Series A (the "Series A Bonds") by the New York City Municipal Water Finance Authority (the "Authority"). This report presents the findings of engineering analysis performed by Metcalf & Eddy of New York, Inc. ("Metcalf & Eddy") regarding the water and sewer system (the "System") serving The City of New York (the "City"). Certain studies and analyses were performed in anticipation of the creation of the Authority and were used in developing this report. The following sets forth a brief outline of the major tasks addressed by this report:

- An overview of the System's service area and major facilities, including a general assessment of the capacity and condition of existing water, wastewater and drainage facilities and a review of recently completed improvements.
- An analysis of the System's Capital Improvement Program (the "CIP") for the period 1989-1998 as proposed to be modified to accommodate costs for additional improvements at the Newtown Creek plant and sludge disposal and the current forecast for Fiscal Years 1991-1994 and the funding needed to carry out the CIP.
- An analysis of the management of the System and current and anticipated operating programs.

### **Methodology and Division of Responsibilities**

This summary report has been prepared to document the results of analyses carried out during the period of August, 1983 to the present by personnel of Metcalf & Eddy. Interviews with staff members of the Authority and the City were conducted, and current engineering and financial reports, System operating data and other documents were reviewed and major facilities were inspected. Audited financial statements of the City and data supplied by the Authority were also reviewed to identify historical costs and revenues. The evaluation of current needs and future conditions was made by analyzing historical data, assessing the effectiveness of current City maintenance programs, reviewing the plans of key outside agencies, and taking into account current trends and the anticipated impact of the CIP, as proposed to be modified.

The physical condition of the facilities was rated by Metcalf & Eddy. A uniform rating system, standard among engineering firms providing similar services, was established consisting of three rating categories—adequate, marginal, and inadequate as described below:

- **Adequate:** Shows no signs of deterioration, meets design intent, and requires only routine maintenance to meet or exceed expected useful life.
- **Marginal:** Facility is functional but does not meet design intent, and requires non-routine maintenance or capital replacement to restore to adequate condition.
- **Inadequate:** Facility does not provide functional operation, and requires major reconstruction to restore to adequate condition.

### **The Consulting Engineer**

Metcalf & Eddy has served the City as consulting engineers for over 25 years in capacities dealing with water supply, water distribution, sewage collection, and wastewater treatment. Metcalf & Eddy is one of the largest consulting engineering firms and is recognized in the United States and internationally as a leader in services to the water and sewer industry.

Since 1983 Metcalf & Eddy has provided engineering services related to the City's Water and Wastewater Operations Evaluation Study. During this period Metcalf & Eddy has performed an evaluation of the condition of the System, independently reviewed the capital plans for water and wastewater pro-



grams, and jointly with the rate consultant reviewed the operating programs of the New York City Department of Environmental Protection ("DEP"). Twelve topics were addressed in this effort as listed below:

- Present Condition of Physical Facilities
- Remaining Useful Life of Facilities
- Reliability of Utility Systems
- Operation and Maintenance Programs
- Current Utility Use
- Maximum Existing Capacity
- Needs for Routine Maintenance, Upgrading and Expansion
- Needs for Non-Routine Maintenance, Upgrading and Expansion
- Evaluation of Legal Mandates
- Overview of Present Capital Improvement Program
- Capital Improvement Requirements
- Safety Practices and Potential for Catastrophe

#### **Conclusion of the Report**

The System is well managed and in adequate condition (the highest rating category). The CIP, as proposed to be modified, and anticipated operating programs are also sufficient for the maintenance of water and wastewater services during the forecast period. The capital budget allocation for Fiscal Year 1991 will continue to advance the CIP on a reasonable timetable. The expense budget for Fiscal Year 1991 contains sufficient funds for the proper operation and maintenance of the System. Current staffing levels are adequate for operation and maintenance of existing water and wastewater facilities.

#### **THE AUTHORITY AND THE BOARD**

The Authority is a public benefit corporation created by the New York State Legislature. Among its powers, the Authority may borrow money, issue debt and enter into agreements with the City and the New York City Water Board (the "Board") for the financing of capital improvements to the System. The City is responsible for construction of capital improvements to the System financed by the Authority and the operation, maintenance and repair of the System.

The Board is a public benefit corporation of the State. The primary responsibility of the Board is to fix, revise, charge, collect and enforce rates and other charges for the System. The Board is required to establish rates that will provide adequate funds to pay the debt service on outstanding Authority indebtedness and the City's cost of operating and maintaining the System. Any surplus of funds remaining, to the extent not needed for other authorized purposes, will be deposited in an account of the Operation and Maintenance Reserve Fund and will be available either as a source of funding for System expenditures or upon the certification of the City for deposit to the Authority's Construction Fund to pay for the costs of System capital projects.

The Board has a leasehold interest in the System with a term of 40 years or until all Bonds issued by the Authority are paid in full or provision for payment has been made, whichever is later.

## **SYSTEM DESCRIPTION AND EVALUATION**

In order to evaluate the System, the System has been divided into four areas:

1. The water supply system includes dams, reservoirs, aqueducts, and related facilities located outside the City limits which provide water to the City (the "Water Supply System"). This system is currently managed by the Bureau of Water Supply and Wastewater Collection of DEP.
2. The water distribution system delivers water from the Water Supply System to consumers (the "Distribution System"). These facilities are also managed by the Bureau of Water Supply and Wastewater Collection of DEP.
3. The sewage collection system collects and conveys wastewater away from its sources into larger interceptor systems (the "Collection System"). This system is managed by the Bureau of Water Supply and Wastewater Collection of DEP.
4. The wastewater treatment system conveys, treats, and discharges wastewater from the Collection System. These facilities include interceptors, sewer regulators, pump stations, and treatment plants (the "Wastewater Treatment System"). This system is managed by the Bureau of Wastewater Treatment of DEP.

This report describes the service areas, present condition and remaining useful life of physical facilities of the System and the recommended CIP, as proposed to be modified, and operating programs from 1991 through 1994. Based on the evaluations performed, the implementation of the CIP and operating programs over the analysis period will provide cost-effective and reliable service for the users of the System.

### **Water Supply System**

The City has operated a public water supply system since the late 1700's. The Water Supply System currently supplies over 95% of all water used in the City from three large watershed systems located in upstate New York and a pump station at Chelsea, New York on the Hudson River (see map located in center). A small percentage of water used in the City is supplied by a privately owned water company, the Jamaica Water Supply Company ("Jamaica"). In addition, the Water Supply System is obligated by law to supply water in specified quantities to municipalities in any County in which water supply facilities are located. The Water Supply System currently supplies approximately 113 million gallons per day ("mgd") of water to four counties outside the City.

The amount of water that can be safely drawn from a watershed during the drought of record is the "Dependable Yield". During the drought of record in the mid-1960's the System furnished an average of 1,290 mgd. During periods of normal rainfall watersheds supply more than the Dependable Yield. Water consumption varies by season of the year with the summer months having the largest demand and the winter months the lowest. Peak flows in the Water Supply System can exceed a rate of 2,000 mgd.

The Water Supply System obtains its water from three upstate reservoir systems, the Croton, Catskill and Delaware Systems, which include 18 reservoirs and three controlled lakes. The available storage capacity of the Water Supply System is approximately 550 billion gallons. Water is conveyed from the upstate reservoirs by gravity through large aqueducts up to 19.5 feet in diameter. Within the City water is distributed through two major tunnels and local distribution facilities. The condition of the Water Supply System is judged to be adequate (the highest rating category).

The following tables set forth the capacities and in-service dates of the Water Supply System's collecting and balancing reservoirs and distribution facilities.

**Collecting Reservoirs**

<u>Name</u>	<u>Available (1) Capacity (Billion Gallons)</u>	<u>In-Service Date</u>
<b>Croton</b>		
New Croton .....	19.0	1905
Croton Falls Main .....	14.2	1911
Cross River .....	10.3	1908
West Branch .....	8.0	1895
Titicus .....	7.2	1893
Amawalk .....	6.7	1897
East Branch .....	5.2	1891
Muscoot .....	4.9	1905
Bog Brook .....	4.4	1892
Middle Branch .....	4.1	1878
Boyds Corner(2) .....	1.7	1873
Croton Falls Diverting .....	<u>0.9</u>	1911
Total .....	86.6	
<b>Catskill</b>		
Ashokan .....	122.9	1915
Schoharie .....	<u>17.6</u>	1926
Total .....	140.5	
<b>Delaware</b>		
Pepacton .....	140.2	1954
Cannonsville .....	95.7	1965
Rondout .....	49.6	1951
Neversink .....	<u>34.9</u>	1950
Total .....	<u>320.4</u>	
<b>Total Available Capacity</b> .....	<u><u>547.5</u></u>	

- (1) Capacity above minimum operating level.  
(2) Currently drained, returning to service fall, 1990.

**Balancing Reservoirs and Distribution Facilities**

<u>Name</u>	<u>Storage Capacity (Billion Gallons)</u>	<u>In-Service Date</u>
<b>Balancing Reservoirs</b>		
Kensico .....	30.6	1915
Hillview .....	<u>0.9</u>	1915
Total .....	31.5	
<b>Distribution Facilities</b>		
Central Park .....	1.0	1862
Jerome Park .....	0.8	1905
Ridgewood (basin no. 3) (1) .....	0.1	1875
Silver Lake (tanks) .....	<u>0.1</u>	1970
Total .....	<u>2.0</u>	
<b>Total Storage Capacity</b> .....	<u><u>33.5</u></u>	

- (1) Currently only one of three basins is operational.

In comparison to water systems of other major cities, the Water Supply System is both economical and flexible. Approximately 95% of the total water supply normally is delivered to the consumer by gravity, which virtually eliminates the need for pumping. This also makes the System's operating costs comparatively insensitive to fluctuations in the cost of power. Only about 5% of the water supply is regularly pumped to maintain the desired pressure to areas with higher elevations. From time to time in drought conditions, additional pumping is required.

For operational flexibility, the three reservoir systems were designed and built with various interconnections which permit water from one system to be introduced into and mixed with water from another. Interconnections permit the Water Supply System to mitigate localized droughts or to take advantage of excess water in any of the three watersheds. Croton System water, for example, can be introduced into the Delaware Aqueduct at West Branch, Cross River and Croton Falls Main Reservoirs; Delaware and Catskill System waters can be introduced into the Croton System at West Branch and New Croton Reservoirs, respectively.

Croton System. The Croton System watershed has a total available storage capacity of 86.6 billion gallons. The Dependable Yield of the Croton System is currently estimated to be 240 mgd or 19% of the City's total Dependable Yield.

The Croton System includes three controlled lakes and twelve reservoirs with dams across the Croton River, its three branches and three other tributaries. Operation of the Croton System commenced in 1842. The Croton System is divided into three subsystems: West Branch, Croton Falls and Muscoot.

The West Branch subsystem is comprised of Boyds Corner and West Branch Reservoirs. West Branch Reservoir is connected to both the Delaware Aqueduct and the Croton Falls Main Reservoir. Water from the West Branch Reservoir is normally fed into the Delaware Aqueduct to take advantage of the high hydraulic head available.

The Croton Falls subsystem is made up of the Bog Brook, East Branch, Croton Falls Diverting, Middle Branch, and Croton Falls Main Reservoirs. Bog Brook and East Branch Reservoirs are connected by a 10-foot tunnel. Water from Croton Falls Diverting Reservoir can flow to either Croton Falls Main Reservoir or the Muscoot Reservoir. Water from Middle Branch Reservoir flows to Croton Falls Main Reservoir. Water from Croton Falls Main Reservoir can be pumped into the Delaware Aqueduct by operating the Croton falls Hydraulic Pump Station or can flow to the Muscoot Reservoir.

The Muscoot subsystem is made up of the Titicus, Amawalk, and Cross River Reservoirs which all empty into the Muscoot Reservoir. Water from Cross River Reservoir can also be pumped into the Delaware Aqueduct by the Cross River Hydraulic Pump Station. The Muscoot Reservoir empties into the New Croton Reservoir. Water is then conveyed through the New Croton Aqueduct to Jerome Park Reservoir in the Bronx for distribution to consumers.

Recent engineering reports sponsored by the U.S. Army Corps of Engineers indicated that the dams and reservoirs in the Croton System are safe but in need of some rehabilitation and reconstruction work. One dam in the Croton System, at Boyds Corner Reservoir, was identified as unsafe. The Boyds Corner Reservoir has been drained, and reconstruction of its dam, spillway and outlet works is expected to be completed in the fall of 1990. An ongoing reconstruction program has been established and funded in the CIP. The majority of the rehabilitation includes replacement and refurbishment of the outlet works and mechanical equipment within the gatehouses, improvements to the dam structures, maintenance of grounds and enlargement of the spillway capacities. Upon completion of the proposed reconstruction all facilities in the Croton System will be in satisfactory condition and will comply with the new national dam safety guidelines established in 1976.

The quality of the water in the Croton System, the City's oldest, does not consistently meet turbidity and color standards established by the New York State Sanitary Code (the "Sanitary Code"). As a result, the New York State Department of Health ("NYSDOH") has mandated treatment to ensure the Croton System water continues to meet all quality standards. This treatment program, the Croton Filter Project, is currently under way. The key features of this program are the construction of a demonstration water treatment plant at the Jerome Park Reservoir (which was completed in October, 1988), site work improvements at the same location (to be completed by the end of 1990), the construction of a full-scale water treatment

plant (to be completed by the late 1990's), improvements to the distribution system in Manhattan (to be completed by late 1990), and the reconstruction of the Croton Lake gatehouse (to be completed by 1993).

**Catskill System.** The total available storage capacity in the Catskill System is 140.5 billion gallons. The Dependable Yield of the Catskill System is currently estimated to be 470 mgd or 36% of the total Dependable Yield of the Water Supply System. All facilities in the Catskill System are in adequate condition.

The Catskill System is comprised of the Schoharie and Ashokan Reservoirs and the Catskill Aqueduct. The Schoharie Reservoir is formed by the Gilboa Dam across the Schoharie Creek. The Ashokan Dam across the Esopus Creek forms the Ashokan Reservoir. Catskill System water has its origin in the Esopus Creek and Schoharie Creek watersheds. These watersheds, occupying the central and eastern portions of the Catskill Mountains, collect stream flow from the mountains of sparsely populated areas. The Esopus Creek watershed drains into the Hudson River and has an area of about 257 square miles. The Schoharie Creek watershed drains into the Mohawk River and has an area of about 314 square miles. The greater part of the water from these two watershed areas is stored in the Ashokan Reservoir and the balance is held in the Schoharie Reservoir.

Water from the Schoharie Reservoir is conveyed via the Shandaken Tunnel and Esopus Creek to Ashokan Reservoir and from there to Kensico Reservoir via the Catskill Aqueduct. The Catskill Aqueduct passes under the Hudson River and the New Croton Reservoir. At the New Croton Reservoir it is possible to introduce water from Ashokan Reservoir to the New Croton Reservoir. The Kensico Reservoir does not have a significant drainage area, but rather serves as a balancing reservoir for both the Catskill and Delaware Systems.

From the Kensico Reservoir Catskill System water flows to the Hillview Reservoir in Yonkers via the Catskill Aqueduct. Water is delivered from Hillview Reservoir to the City through Tunnels 1 and 2. It is also possible for the Catskill Aqueduct to bypass both Kensico and Hillview Reservoirs. Except for river crossings and a few sections of tunnel, the Catskill Aqueduct is a cut-and-cover conduit laid on grade. The Catskill System was completed between 1915 and 1927.

**Delaware System.** The total available storage capacity of the Delaware System is 320.4 billion gallons. The Dependable Yield of the Delaware System is estimated to be 580 mgd, which is 45% of the total Dependable Yield of the Water Supply System. All facilities in the Delaware System are in adequate condition.

The Delaware System is made up of four drainage areas, three in the Delaware River Basin and one in the Hudson River Basin. Delaware System water flows into the Neversink, Pepacton, and Cannonsville Reservoirs. The Neversink Reservoir is formed by a dam across the Neversink River which is a tributary of the Delaware River. The Downsview Dam, across the east branch of the Delaware River, forms the Pepacton Reservoir. On the west branch of the Delaware River, the Cannonsville Reservoir is formed by the Cannonsville Dam at Deposit, New York. These reservoirs are connected to the downstream Rondout Reservoir by the Neversink, East Delaware, and West Delaware Tunnels, respectively.

Rondout Reservoir is formed by the Merriman Dam across Rondout Creek, which is a tributary of the Hudson River. From Rondout Reservoir, water is conveyed via the Delaware Aqueduct to the West Branch Reservoir in the Croton System and then to Kensico Reservoir. Between the Rondout and West Branch Reservoirs, Hudson River water can be pumped into the Delaware Aqueduct from the Chelsea Pump Station. This pump station has been used only in drought situations and not during normal operating periods. Between the West Branch and Kensico Reservoirs, Croton System water can be pumped into the Delaware Aqueduct from the Croton Falls and Cross River Reservoirs. From Kensico Reservoir the Delaware Aqueduct continues on to Hillview Reservoir. Although water was available from portions of the Delaware System in 1951, the final reservoir was not completed until 1965.

**Sewage Treatment Plants.** The System also includes several upstate sewage treatment plants to prevent untreated sewage from being released into the watersheds. These plants were originally constructed between 1921 and 1959. Although they are still functional, many are reaching the end of their useful lives and will be undergoing reconstruction within the next 10 years. Capacities of these plants range from under 0.1 to over 0.8 mgd. The CIP contains adequate funds to maintain and improve these facilities and to insure that discharge from upstate municipalities continues to be properly treated.

**Long-Term Water Supply Planning.** On July 26, 1985, the Mayor's Intergovernmental Task Force on New York City Water Supply Needs (the "Task Force") was convened. The Task Force was formed to reassess the System's long-range water supply needs in light of the 1980-81 and 1985 droughts and to review the adequacy of planning efforts to meet those needs. The goal of the Task Force is to recommend what the City's long-term priorities should be and the actions that should be taken to ensure that those priorities can be achieved.

In the Interim Report of the Task Force dated February 11, 1986 (the "Interim Report"), the recommendations listed below were presented.

- Take every reasonable measure to control and contain water demand through metering, rate setting, leak detection and prevention, conservation, increased use of ground-water resources and recycling.
- Develop a supplemental supply of 200 to 300 mgd before the year 2000.
- Develop an additional water supply source, yielding between 300 and 1200 mgd to meet the long-term needs of the System.

As a result of the work of the task force, a study of system water demand was instituted in December, 1986. This study is being done as an amendment to an existing State Water Resource Management Strategy contract. In addition, a universal metering program was adopted for the System in 1986 and began in Fiscal Year 1988.

The first interim report of the task force concluded that expanded pumping of Hudson River water represents the only large source of supplemental supply which can be realistically developed within the next 10 to 15 years. The current CIP includes expansion of the Chelsea Pump Station to a maximum capacity of 300 mgd which is estimated to cost approximately \$445 million. The second interim report of the task force, which builds upon the recommendations of the first interim report, was completed in December, 1987. The final task force report is expected to be completed by late 1990.

**Chelsea Pump Station.** The Chelsea Pump Station, located near Chelsea, New York on the eastern bank of the Hudson River was reactivated during the most recent drought (1989). The station operated from May 1, 1989 to May 16, 1989 under the direction of the NYSDOH. During this period a total of 1.4 billion gallons of water was pumped from the Hudson River. The Chelsea Pump Station had previously been operated during drought conditions in 1965-1966 and 1985.

The Chelsea Pump Station is capable of pumping up to 100 mgd of Hudson River water into the System. The City has submitted an application for a five-year permit to the New York State Department of Environmental Conservation ("NYSDEC") to operate the pump station on an emergency basis at the maximum rate of 100 mgd. Final adjudicatory hearings commenced in April, 1988, and are continuing to date.

Tests made of the Hudson River water, which serves as the sole source of supply to a number of population centers, indicate that the untreated water meets virtually all Federal and State standards for treated water. Hudson River water compares favorably to the supplies available to major population centers outside of the Hudson River Basin.

## **Distribution System**

The Distribution System furnishes water to consumers through a series of aqueducts and tunnels and a network of distribution mains. The New Croton Aqueduct and Tunnels 1 and 2 connect water supply reservoirs to the distribution mains. From shafts located along the tunnels and from Jerome Park and Central Park Reservoirs trunk mains carry water to the service areas. Trunk mains are usually greater than 20 inches in diameter. Water then flows through successively smaller pipes for delivery to the consumer. A third water tunnel now under construction will supplement the Distribution System capacity and improve reliability. The principal elements of the Distribution System are described below.

**The New Croton Aqueduct.** The New Croton Aqueduct consists of two parts. The first is a masonry conduit from the inlet gatehouse located near the Old Croton Dam and three miles north of the New Croton Dam to Gatehouse No. 1 near the Jerome Park Reservoir, a distance of about 24 miles. The nominal capacity of this portion is 300 mgd. The second part is a pressurized masonry conduit running from Jerome Park Reservoir to the 135th Street gatehouse in Manhattan. This portion forms a long inverted siphon with a diameter of 12.25 feet, except in the tunnel under the Harlem River, where it was reduced to 10.5 feet to increase the velocity of current in order to prevent deposits of silt. The capacity of this section is approximately 250 mgd. In addition, a branch of the New Croton Aqueduct transmits water from Gatehouse No. 1 to the Jerome Park Reservoir.

**The Catskill Aqueduct.** The Catskill Aqueduct is 92 miles long and extends from the Ashokan Reservoir to Kensico and Hillview Reservoirs. Four distinct types of aqueduct construction were required due to the terrain between the Catskill Mountains and the City. The Catskill Aqueduct is for the most part a 17 feet high by 17.5 feet wide horseshoe-shaped cut-and-cover conduit. The Catskill Aqueduct is also composed of a number of steel pipe siphons and grade and pressure tunnels where topography requires. A deep rock tunnel siphon 14 feet in diameter and 1,114 feet below sea level crosses beneath the Hudson River near Cornwall. The delivery capacity of the Catskill Aqueduct from the Ashokan Reservoir to the Kensico Reservoir is about 610 mgd and about 800 mgd from the Kensico Reservoir to the Hillview Reservoir. The Catskill Aqueduct passes under the New Croton Reservoir. At this point it is possible to transfer water from Ashokan Reservoir to New Croton Reservoir.

**The Delaware Aqueduct.** The Delaware Aqueduct transmits water from Rondout Reservoir to West Branch Reservoir, in the Croton System, and from West Branch Reservoir to Kensico Reservoir and to Hillview Reservoir. The Delaware Aqueduct is a circular, cement-lined, pressurized, bedrock tunnel 85 miles long located 300 to 1,000 feet underground, passing beneath the Hudson River at a depth of about 600 feet below sea level. Water in this aqueduct is directed by uptake and downtake shafts to the Kensico and West Branch Reservoirs. The Delaware Aqueduct has a diameter of 13.5 feet to 19.5 feet. The capacity of the section from Rondout Reservoir to West Branch Reservoir is about 890 mgd and delivers water from the Rondout, Neversink, Pepacton and Cannonsville Reservoirs. Interconnection with the Catskill System is possible at both the Kensico and Hillview Reservoirs. The delivery capacity of the Delaware Aqueduct from West Branch to Kensico Reservoirs is about 1,045 mgd and about 1,450 mgd from the Kensico to the Hillview Reservoir.

**Tunnel 1.** Water from the Catskill and Delaware Systems is delivered from Hillview Reservoir into the City by a circular, cement-lined, pressurized, bedrock tunnel, reducing in diameter from 15 to 11 feet. Tunnel 1 extends 18 miles south from Hillview Reservoir through the West Bronx to Manhattan and Brooklyn. Steel and standby cast iron pipe lines extend from two terminal shafts in Brooklyn into Queens and Richmond. Tunnel 1 is located at depths of 200 to 750 feet below the street surface, thus avoiding interference with streets, buildings, subways, sewers and pipes. These depths are also necessary to secure a substantial rock covering to withstand the bursting pressure of the water inside and to afford the requisite watertightness. Tunnel 1 was placed in service in 1917 and has a capacity of approximately 1,000 mgd.

**Tunnel 2.** Tunnel 2 also delivers Catskill and Delaware water from Hillview Reservoir. It is a circular, cement-lined, pressurized, bedrock tunnel located at depths of 200 to 800 feet, reducing in diameter from 17 to 15 feet. Tunnel 2 extends south from Hillview Reservoir, east of Tunnel 1, through the West Bronx, under the East River at Rikers Island, through Queens and Brooklyn, connecting with Tunnel 1 at Fort Greene Park and also at State and Nevins Streets in Brooklyn. The total length of the tunnel is 20 miles and it was placed in service in 1936. Connecting to Tunnel 2 in Brooklyn is the 10 foot diameter, 5 mile long Richmond Tunnel which was completed in 1970 and carries water to Staten Island. Tunnel 2 has a capacity of approximately 1,000 mgd.

**Richmond Tunnel and Project.** The Richmond Project was constructed to improve the water supply facilities for Staten Island. The principal components of the project are the Richmond Tunnel, which was completed in 1970, the Richmond Distribution Chamber, the Richmond Aqueduct and the Silver Lake underground storage tanks. The Richmond Tunnel lies 900 feet beneath Upper New York Bay and is 10 feet in diameter and approximately 5 miles long. The Silver Lake storage tanks (among the world's largest) have a combined capacity of 100 million gallons and have replaced the Silver Lake Reservoir (now Silver Lake). The Richmond Project also replaced the original water delivery facilities which served Staten Island by means of two cast iron pipelines (one 36 inches and one 42 inches in diameter) in the bed of upper New York Bay. These lines are available in case of an emergency.

**Tunnel 3.** Most parts of the City are supplied water through either Tunnel 1 or Tunnel 2. Although it is unlikely that a section of one of these tunnels would fail, the occurrence could leave parts of the City without water for an extended period of time. Tunnel 3 is currently under construction to guard against this possibility, to enable the two existing tunnels to be taken out of service for inspection and repair, and to provide Staten Island and other outlying areas with more water. This project is a multi-phase effort extending over many years. Planning for this project was started in the mid-1950's and construction began in 1970. Portions of Tunnel 3 will be operating by the early 1990's.

Tunnel 3 will be built in four stages:

- **STAGE I**, currently under construction and fully funded to completion in the CIP, is a 24-foot reducing to 20-foot circular, cement-lined, pressurized, bedrock tunnel 200 to 800 feet below the street surface. It is a 13-mile tunnel which extends south from Hillview Reservoir in Yonkers under Central Park Reservoir in Manhattan, and then east under the East River and Roosevelt Island to Long Island City in Queens. Stage I parallels Tunnel 1 along most of this route. Stage I has three chambers which allow interconnection with subsequent stages. Such chambers will also provide access to maintain flow control or shut sections while the remainder of Tunnel 3 continues to operate. Construction of Stage I is scheduled to be completed in 1991. Completion of Stage I will permit greater quantities of water to be delivered to the City as well as provide redundancy to protect the System in the event of failure of Tunnel 1 or Tunnel 2.
- **STAGE II**, fully funded in the CIP, will consist of a Brooklyn/Queens segment and a lower Manhattan segment. The Brooklyn/Queens segment will extend from the eastern end of Stage I on a route east of Tunnel 2 to supply Queens, Brooklyn and Staten Island. The lower Manhattan segment will extend south from the interconnecting chamber of Stage I at Central Park into lower Manhattan. Construction of Stage II began in 1987 and is scheduled to be completed in 2004. Completion of the Manhattan segment will provide system redundancy in Manhattan which does not presently exist and will allow Tunnel 1 to be taken out of service. The Brooklyn/Queens segment will permit greater quantities of water to be supplied to Brooklyn, Queens and Staten Island and will allow Tunnel 2 to be taken out of service.



- **STAGE III** will extend from Kensico Reservoir to the interconnecting chamber of Stage I south of Hillview Reservoir. It parallels the Delaware and Catskill Aqueducts between the two reservoirs. Completion of Stage III provides the System with redundancy for the Delaware and Catskill Aqueducts and allows the System to function at the higher Kensico Reservoir pressure. The completion of this stage will also permit Hillview Reservoir to be taken out of service for maintenance or in the event of contamination. This flexibility does not currently exist. The CIP includes funding for surveys and preparation of environmental impact statements for Stage III.
- **STAGE IV** would increase delivery capacity to the eastern parts of the Bronx and Queens. As now contemplated, it would extend southeast from the northern end of Stage I to Flushing, Queens, and then southwest to interconnect with the eastern junction of Stages I and II. In addition, Stage IV could serve as an important link to Long Island in a future regional water supply system.

**Water Mains.** The Distribution System includes 5,760 miles of water pipe varying in size from six to 84 inches in diameter. Some pipe was installed before 1870 and approximately 6.2% is over 100 years old. The following tables set forth distribution of pipe by size and age, based on the City's 1989 fixed asset inventory files.

**Water System Pipe Inventory: Diameter**

<u>Diameter (inches)</u>	<u>Length (miles)</u>
6 .....	420
8 .....	2,490
12 .....	1,822
16 .....	171
20 .....	443
24 .....	52
30 .....	50
36 .....	71
48 .....	164
54 .....	*
60 .....	40
72 .....	37
84 .....	*
<b>Total .....</b>	<b><u>5,760</u></b>

\* Less than one mile in length

**Water System Pipe Inventory: Age**

<u>Installation Year</u>	<u>Length (miles)</u>	<u>Percent of System</u>
Pre-1870 .....	54	0.9%
1870-1879 .....	207	3.6
1880-1889 .....	93	1.6
1890-1899 .....	256	4.4
1900-1909 .....	464	8.0
1910-1919 .....	908	15.8
1920-1929 .....	1,032	18.0
1930-1939 .....	702	12.2
1940-1949 .....	448	7.8
1950-1959 .....	576	10.0
1960-1969 .....	501	8.7
1970-1979 .....	296	5.1
1980-1989 .....	223	3.9
<b>Total .....</b>	<b><u>5,760</u></b>	<b><u>100.0%</u></b>

Of the 5,760 miles of pipe in service, about 3,015 miles are unlined cast iron laid before 1930. Pipe laid between 1930 and 1969 is concrete-lined cast iron and comprises about 2,226 miles of the Distribution System. Pipe laid after 1970 is concrete-lined ductile iron and comprises about 519 miles of the Distribution System. The Distribution System also includes over 88,000 mainline valves, about 96,000 hydrants, four distribution facilities, 15 gatehouses, 15 pump stations, and eight maintenance and repair yards.

Water pressure in the Distribution System is regulated so that it ranges between 35 and 60 pounds per square inch at street level. This range is sufficient to supply water to the top of a five- or six-story building. Normally about 95% of the total consumption is delivered to the network by gravity. The system regularly operates only three staffed pump stations, one in Manhattan, one in Queens and one in Staten Island, to deliver the majority of the remaining 5% to areas of higher elevation in order to keep the pressure within the desired range. Additional pumping may be necessary during periods of drought.

The Distribution System is judged to be in adequate condition (the highest rating category) based upon evaluation of key water system parameters: water main breaks, pressure tests, flow tests and leak detection. Based on studies conducted by the U.S. Army Corps of Engineers on the fewest pipeline breaks per 1,000 miles, the Distribution System has the fourth-lowest number of such breaks of 17 major United States cities. With few exceptions, all areas served by the Distribution System enjoy reliable water supply service at adequate pressure. During peak flow periods low and inadequate pressures may exist in certain areas of the City. Parts of Staten Island, the Co-op City complex in the Bronx and the Starrett City complex in Brooklyn require improvements either to provide greater pressure or redundant feeds to improve reliability. Growth and development resulting in increasing water demands in Staten Island also require that provision be made to supply more water to that Borough in the near future. Design contracts associated with Staten Island and The Bronx are currently in progress, to be followed by construction within the next two years. Problems associated with the Starrett City complex will be alleviated by construction, including the installation of a 60-inch trunk main, which is now underway.

**Collection System**

The Collection System collects and conveys wastewater from the user's service connection to the point where the sewage is discharged into Wastewater Treatment System.

The Collection System includes 6,300 miles of sewer pipe, divided into 14 drainage areas together with manholes, catch basins, and maintenance and repair yards. Some pipe in the Collection System was installed before 1870, and about 6.5% of all sewer pipe in the Collection System is over 100 years old. The following table sets forth an inventory of sewer pipe by hydraulic diameter based on the City's 1989 fixed asset inventory files. (The hydraulic diameter of a given pipe is the diameter of a circular pipe with the same cross-sectional area.)

**Collection System Pipe Inventory: Hydraulic Diameter**

<u>Hydraulic Diameter (inches)</u>	<u>Length (miles)</u>
6-10 .....	1,873
11-13 .....	1,708
14-19 .....	907
20-29 .....	356
30-39 .....	470
40-49 .....	372
50-59 .....	89
60-89 .....	286
over 89 .....	239
<b>Total .....</b>	<b><u>6,300</u></b>

The sewer pipe inventory by age as of June 30, 1989 is shown in the following table:

**Collection System Pipe Inventory: Age**

<u>Installment Year</u>	<u>Length (miles)</u>	<u>Percent of System</u>
Pre-1870 .....	205	3.3%
1870-1879 .....	82	1.3
1880-1889 .....	120	1.9
1890-1899 .....	686	10.9
1900-1909 .....	494	7.8
1910-1919 .....	723	11.5
1920-1929 .....	1,023	16.2
1930-1939 .....	996	15.8
1940-1949 .....	594	9.4
1950-1959 .....	590	9.4
1960-1969 .....	441	7.0
1970-1979 .....	225	3.6
1980-1989 .....	121	1.9
Total .....	<u>6,300</u>	<u>100.0%</u>

The Collection System is in adequate condition (the highest rating category) based on evaluation of Infiltration/Inflow studies. These studies have been completed for 11 of the 14 drainage areas and indicate that infiltration rates in the Collection System are relatively low. In addition to the results of Infiltration/Inflow studies prepared by consultants, the Bureau of Water Supply and Wastewater Collection has extensive data available from in-house studies assessing the adequacy of pipelines. This information is considered when developing capital projects. Maintenance yards in the Collection System are generally adequate for their purpose. Minor repair work and relocation of these yards is planned to correct deficiencies. Some sewer maintenance equipment is at or has exceeded its useful life and is scheduled for replacement.

The System must also provide new or larger sewers to serve newly developed sections of the City, particularly in Staten Island. In recent years the Bureau of Water Supply and Wastewater Collection has undertaken an extensive review of sewer service throughout the City. This review has led to the inclusion of two sewer construction programs in the CIP. The first program addresses the augmentation of sewer lines in areas of the City which are undergoing rapid development or where land use patterns have changed. The second program will provide sewers in areas which are not presently served.

**Wastewater Treatment System**

The Bureau of Heavy Construction of DEP is responsible for the design and construction, and the Bureau of Wastewater Treatment of DEP is responsible for the operation and maintenance of all facilities related to the treatment of sewage, including 14 currently operating water pollution control plants, one storm-overflow retention plant, 88 pump stations, five wastewater laboratories, three inner-harbor vessels and four ocean-going barges which dispose of digested sludge, a by-product of the sewage treatment process (the "Wastewater Treatment System"). Overall the condition of the Wastewater Treatment System is judged to be adequate (the highest rating category).

Public officials and local conservationists have been concerned with water pollution control for almost a century. The first water pollution control facility in the City was opened in 1886, when a small plant was constructed in Coney Island to protect the bathing beaches. In 1931 a massive plant construction program was begun to construct a system of water pollution control plants and associated facilities to treat and control all wastewater produced within the City. The first of these modern plants, Coney Island, opened in 1935 and three more large plants, Wards Island, Tallmans Island and Bowery Bay, were placed into operation before the end of the decade. During the 1940's two other plants, Jamaica and 26th Ward, were opened.

The postwar years witnessed an intensified effort and by 1968 twelve major plants were in operation treating about 1,000 mgd at an average removal efficiency of about 65%. This was at a time when most other urban areas were providing only about 35% removal efficiency.

In 1972 the City began a program of upgrading its existing plants to operate in conformance with the requirements of the Federal Clean Water Act (the "Clean Water Act"), which requires effluent suspended solids and five day biological oxygen demand (BOD<sub>5</sub>) to be 30 milligrams per liter ("mg/l") or less, or that the plant remove 85% or more of these pollutants, whichever provision is more stringent ("Full Secondary Treatment"). Ten of the System's 14 plants have already been upgraded at a construction cost of \$1.4 billion. In 1983 the City commenced the upgrading to full secondary treatment of an additional two plants in Brooklyn, Owl's Head and Coney Island. Upgrading of these plants will be completed in 1995 and 1994, respectively at an estimated total cost of \$1.1 billion. Issues of treatment capacity have been raised in the System, particularly in connection with the Wards Island, Newtown Creek, and Coney Island plants. On February 2, 1989, the City signed a consent order which mandates various water conservation measures to reduce flow to the Wards Island plant and requires expansion of the plant. The estimated cost of the expansion is approximately \$100 million, which is not currently funded in the CIP. The upgrade of the Newtown Creek plant to full secondary treatment and expansion of its capacity are now estimated to cost \$1.2 billion, \$342 million of which is funded in the CIP. Current planning provides for completion of increased capacity and treatment upgrading of the Newtown Creek plant by 1999. Interim conservation measures to reduce flow to the plant have recently been negotiated with NYSDEC. DEP believes that the actual capacity of the Coney Island plant exceeds its current rating and can accommodate expected flow. DEP is therefore seeking an increase to the Coney Island plant's rated capacity from the State.

Two new plants, North River and Red Hook, have been constructed thereby enabling the System to treat virtually all of the dry weather sewage generated by the City. The North River plant, designed to treat 170 mgd of sewage, is located on the upper west side of Manhattan. In March, 1986 it began advanced preliminary treatment of sewage which formerly was discharged into the Hudson River. The Red Hook plant, in the Brooklyn Navy Yard, is designed to treat approximately 60 mgd of sewage. It began full secondary treatment in May, 1989. The total cost of constructing these two new plants is approximately \$1.5 billion.

Many of the construction programs which affect the System's water pollution control facilities are subject to Federal and New York State regulations. Substantial amounts of funding are also available from these sources.

The System operates and maintains 88 wastewater pump stations located throughout the City. These stations are used to convey wastewater over long distances, to drain low-lying areas, and to lift wastewater to treatment plants. Many of the stations were constructed in the 1930's and earlier. The majority of the stations are in need of some reconstructive work. The CIP includes an ongoing program to reconstruct and refurbish the stations at a rate of four or five stations per year.

The System has 490 sewer regulators and 552 tide gates which control flow in the Collection System. Recent inspections of the regulator system have found it to be structurally adequate, but many portions are in need of mechanical reconstruction. A detailed evaluation of the regulator and tide gate system has been completed and funds have been provided in the CIP for mechanical refurbishment of these facilities.

The following table describes wastewater treatment plants currently in service.

### Water Pollution Control Facilities

<u>Plants in Service</u>	<u>Design Capacity (mgd)</u>	<u>Year of Completion</u>	<u>Completion of Upgrading to Full Secondary Treatment or Reconstruction</u>
Newtown Creek .....	310	1967	1999
Wards Island .....	250	1937	1979
Hunts Point .....	200	1952	1978
Bowery Bay .....	150	1939	1978
Owls Head .....	120	1952	1995
Coney Island .....	100	1935	1994
Jamaica .....	100	1943	1978
26th Ward(1) .....	85	1944	1979
Tallmans Island .....	80	1939	1978
Port Richmond .....	60	1953	1979
Rockaway .....	45	1952	1978
Oakwood Beach .....	40	1956	1979
North River .....	170	1986	1991
Red Hook .....	60	1987	1989
Total System-wide Capacity .....	<u>1,770</u>		

(1) There is a storm-overflow retention Facility at Spring Creek, which is connected to the 26th Ward Plant.

All but four of the plants listed above currently use the step aeration process which meets Federal requirements for full secondary treatment. The North River plant will use the step aeration process when secondary treatment facilities are completed. The Coney Island and Owls Head plants are being converted to this process from the less efficient modified aeration process. Agreement has been reached with the State to upgrade the System's Newtown Creek plant to provide secondary treatment meeting the standard of 30 mg/l or less of suspended solids and BOD<sub>5</sub> in the effluent or at least 85% removal, whichever is more stringent.

The useful life of some of the mechanical components of the Wastewater Treatment System is less than 20 years. To maintain desired treatment levels, corrective and preventive maintenance programs are carried out and periodic major refurbishment of such mechanical components is provided for in the CIP.

Sludge Disposal. Pursuant to the Marine Protection, Research and Sanctuaries Act of 1972 ("MPRSA") as amended by the Ocean Dumping Ban Act of 1988 (the "Ban Act") DEP is permitted to dispose of all of the sludge generated by its sewage treatment plants in the Atlantic Ocean 106 miles offshore (the "106 Mile Site"). The Ban Act prohibits the ocean disposal of sludge after August 14, 1989 without a permit from the United States Environmental Protection Administration ("USEPA"). DEP entered into a Consent Decree And Enforcement Agreement ("Consent Decree") with the United States and the State of New York on August 1, 1989 and was granted a permit to continue to use the 106 mile site on condition that the City develop alternative sludge disposal technologies and cease all ocean disposal by June 30, 1992. The Consent Decree provides a timetable with specific milestones to be achieved in order to meet the June 1992 deadline. The Consent Decree, pursuant to the Ban Act, also provides for the imposition of fees and penalties for each dry ton of sewage sludge disposed of in the ocean until such disposal is terminated.

The Consent Decree requires the implementation of interim measures and a long-term program to end ocean disposal. As part of the interim measures, DEP is proceeding with the purchase and installation of facilities to dewater its sludge and reduce its volume. Sludge dewatering is a necessary first step in the process of ending ocean disposal and is consistent with any interim or long-term alternative sludge disposal program. Sludge dewatering facilities will be located at 8 of the 14 sewage treatment plants with capacity to dewater all of the sludge generated by the System. DEP is also reviewing proposals from private firms for the disposal of its dewatered sludge to meet the Consent Decree requirement to reduce the quantity of sludge disposed of in the ocean by 20% by December 31, 1991 and to end ocean disposal by June 30, 1992. The Consent Decree also requires DEP to explore long-term solutions (land application and incineration technologies) for sludge disposal which may rely on additional DEP facilities or private firms and to implement long-term solutions capable of processing 50% of the City's sludge by December 31, 1995 and 100% by June 30, 1998. The capital cost for dewatering facilities is currently estimated at approximately \$800 million. The ultimate cost of alternatives to ocean disposal of sludge is not now known.

Ocean disposal fees and penalties imposed by the Ban Act and the Consent Decree amounted to approximately \$13.7 million in Fiscal Year 1990. Even with the timely implementation of the sludge disposal alternatives described above, DEP expects such fees and penalties will be approximately \$25.5 million in Fiscal Year 1991, and \$49.6 million in Fiscal Year 1992. After June 30, 1992 it is expected that DEP will cease the ocean disposal of sludge. In the event the anticipated timetable for ending ocean disposal is accelerated, the penalties will be less. If the termination of ocean disposal is delayed, the above mentioned fees and penalties will continue to be imposed as well as substantial stipulated penalties. The Ban Act and the Consent Decree provide that 85% of the fees and penalties payable shall be deposited into a Trust Account and shall be available to reimburse the City for costs incurred in developing alternative sludge disposal facilities. A portion of the balance of the fees and penalties accruing shall be paid to USEPA with the remainder divided equally between the New York State Water Pollution Control Revolving Fund and the New York State Clean Oceans Fund. Amounts paid to the Clean Oceans Fund are also available to reimburse the costs of developing alternative sludge management programs. In addition, the Financial Plan contains an additional \$8.8 million in Fiscal Year 1992, \$92.4 million in Fiscal Year 1993 and \$103.1 million in Fiscal Year 1994. Since entering into the Consent Decree, DEP does not expect that these funds will be paid as fees or penalties. However, they have been retained in the System as a reserve to offset the costs of private disposal of sludge.

### **Staffing Evaluation**

Current Staffing. Current staffing levels are adequate for operation and maintenance of existing water and wastewater facilities.

Future Staffing. To assure that staffing levels will continue to be adequate a review of DEP's manpower planning process was undertaken. The planning process was found to be comprehensive and responsive to the long-term needs of the System. It is concluded, therefore, that future staffing should be adequate to implement the CIP and associated operating programs.

## **CAPITAL IMPROVEMENT PROGRAM**

### **Capital Improvement Program 1989-1998**

In April 1988 the City published its most recent biennial Ten Year Capital Plan (1989-1998) (the "Ten Year Capital Plan"), which provides for the rebuilding of the City's infrastructure, including water and sewer facilities. The City's Ten Year Capital Plan included projected expenditures of over \$8.5 billion for water and sewer facilities.

The CIP is based on an extensive review of the Ten Year Capital Plan in conjunction with a review of the present condition and long-term needs of the plant and equipment constituting the System. The CIP incorporates the requirements of legal mandates, the present replacement cycle for these facilities, exten-

sions to the present service area, and programs to enhance and optimize the operation of the System. Adequate allowances are included in the CIP for emergency repair and replacement.

An annual allowance for escalation in cost due to inflation of 5% has been included, using 1988 as the base year. The costs identified in the table below represent estimated capital commitments for specific projects in each Fiscal Year. The System's annual cash flow requirements are based upon these commitments and are used to determine annual construction financing needs.

The sequence of projects in the CIP is based on the relative need and importance of each improvement as determined by a uniform rating system used by the Bureaus of Water Supply and Wastewater Collection, Wastewater Treatment, and Heavy Construction. The time required for planning and design work, legally mandated schedules, and the extent to which modifications and extensions to the System could be implemented without affecting ongoing operations were also considered.

The validity of the Ten Year Capital Plan for water and sewer facilities, as proposed to be modified in connection with developments described herein, was evaluated independently under this study. We concluded that the plan was comprehensive and responsive to the long-term needs of the operation of the System.

### **Elements of the Capital Improvement Program**

#### **Water Supply and Transmission.**

*Tunnel 3 - Stage I:* This stage consists of 13 miles of tunnel from Hillview Reservoir in Yonkers passing under Central Park in Manhattan and then east under the East River and Roosevelt Island to Long Island City in Queens. Stage I parallels Tunnel 1 most of this route. This leg of the tunnel will improve the reliability of the water supply system.

*Tunnel 3 - Stage II:* This stage consists of a section from Roosevelt Island to Brooklyn and Queens and a section from Central Park to lower Manhattan. Funding for completion of both sections is included in the CIP. Completion of this stage will improve delivery reliability and service pressures.

*Tunnel 3 - Stage III:* This stage consists of a section extending from Kensico Reservoir to the interconnecting chamber of Stage I south of Hillview Reservoir.

*City Tunnel No. 1 Reconstruction:* This program provides for preliminary analysis to determine the work required to reconstruct City Tunnel No. 1, which could be taken off-line for inspection following the anticipated opening of Stage II of Tunnel No. 3 in 2005.

*Miscellaneous Expenditures:* This program will provide for greater control of water pressure in the Delaware System.

#### **Water Distribution.**

*Croton Watershed Dam Safety Program:* This program will bring dams in the Croton System into compliance with recently established national standards.

*Croton Filter Project:* This program will provide facilities to ensure that water from the Croton System consistently meets turbidity, bacteriological and chemical standards set by the State.

*Trunk and Distribution Main Extension:* This program will provide improved reliability and redundancy within the Water Supply System. Specific areas have been targeted to prevent low pressure during peak demand periods and to ensure emergency service.

*Trunk and Distribution Main Replacement:* This program consists of the replacement of mains prone to failure and those affected by sewer and highway programs. The program to avoid pipeline breaks includes the systematic replacement of small diameter water mains and mains installed prior to 1870.

*New Source Development:* This program includes the development of water supply facilities to provide 300 to 1200 mgd from the Hudson River.

***Upstate Improvements:*** This program provides for the annual upgrading of reservoirs, gatehouses, shafts, and other upstate facilities.

***Miscellaneous Expenditures:***

(a) ***Citywide Anti-Corrosion System.*** This is a pilot program to study strategies for the control and prevention of external corrosion of water mains.

(b) ***Brooklyn-Queens Aquifer Study.*** This is a study to determine supply potential and the work that would be required to make use of the existing underground water supplies in the Brooklyn-Queens Aquifer to supplement the System's upstate reservoir supply.

(c) ***Mapping and Telemetry.*** Citywide distribution system maps will be updated for use in reconstruction and maintenance programs.

**Sewers.**

***Chronic Malfunction and Emergency Replacement:*** This program includes replacement of components of the Sewer System that have already collapsed or that experience chronic malfunction which maintenance fails to correct. In addition, it includes replacement of components which experience chronic malfunction due to inadequate capacity.

***Programmatic Replacement:*** This program provides for systematic replacement of cement sewers in Brooklyn and Queens and lining of brick sewers.

***Program Response to Legal Mandates:*** This program allocates funds to the construction of sewers to eliminate the discharge of untreated sewage into the surrounding bodies of water as dictated by Section 208 of the Clean Water Act.

***Replacement or Augmentation to Existing System:*** This program allocates funds for construction to increase the capacity of sewers by increasing their size or installing additional pipes to provide proper service levels. It also provides for the replacement of components which will be affected by other construction programs.

***Sewer System Extensions:*** This program will provide sewer service in portions of the City where such service is not presently available.

**Water Pollution Control.**

***Consent Decree Construction and Upgrading:*** This program provides for the upgrading of the Coney Island, Owls Head and Newtown Creek plants to provide Full Secondary Treatment as required by the Clean Water Act and construction of the interceptor for the Oakwood Beach plant. Due to increased development in the area serviced by the Newtown Creek plant and subsequent to the development of the CIP, it has been determined that a further upgrade and expansion of such plant will be necessary. This could result in a substantial increase in costs provided by the CIP. See "SYSTEM DESCRIPTION AND EVALUATION—Wastewater Treatment System".

***Sludge Disposal:*** This program has provided for construction of barges and on-site facilities or other measures which were necessary to meet USEPA regulations for disposal of sewage sludge at a 106-mile offshore site. However, because of the sludge legislation dumping at such site must terminate by June 30, 1992. This will result in a substantial increase in costs above those provided by the CIP to develop a land based sludge disposal alternative.

***Plant Stabilization:*** This program will provide for interim reconstruction necessary to maintain process reliability before full-scale reconstruction takes place.

***Water Quality Mandates:*** This program will provide for studies, design, and construction to eliminate impact of wastewater bypass during periods of heavy rainfall and to reduce pollution in tributaries around



the City. It also includes studies pursuant to Section 208 of the Clean Water Act to assess the impact of industrial wastes, runoff and tidal flows on treatment plant operation.

*Miscellaneous Upgrading and Reconstruction:* This program will provide for the upgrading and reconstruction of components of the System to ensure continuous and reliable operation.

The CIP illustrated on the following table was promulgated in April 1988 and is re-examined from time to time. Under a new City Charter as adopted by recent referendum, the next ten year plan revision will be published in the Spring of 1991. Actual construction costs to be incurred may vary from the estimates shown due to changes in business conditions, service requirements, environmental requirements, and availability and cost of equipment, labor and materials. Since the publication of the CIP in April, 1988, DEP has identified an additional \$1.7 billion in required capital improvements. These include the upgrade of the Newtown Creek plant to full secondary treatment and expansion of its capacity, the expansion of the Wards Island plant and the costs associated with constructing sludge dewatering facilities, the first phase in the development of an alternative to ocean disposal of sludge. Additional costs associated with construction of post-dewatering facilities cannot be determined at this time.

**Capital Improvement Program**  
(thousands)

<u>SYSTEM FUNDS</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>TOTAL</u>
<b>WATER SUPPLY AND TRANSMISSION</b>											
Tunnel 3 Stage I	\$ 11,091	\$ 14,403	\$ 5,060	\$ 340	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 30,894
Tunnel 3 Stage II	52,292	31,760	34,867	157,997	458,426	278,014	120,004	0	95,002	0	1,228,362
Tunnel 3 Stage III	0	0	0	0	10,468	0	0	0	0	0	10,468
Tunnel 1 Reconstruction	0	0	0	0	0	0	0	0	0	1,070	1,070
Misc. Expenditures	0	0	1,600	0	0	0	0	0	0	0	1,600
Subtotal	63,383	46,163	41,527	158,337	468,894	278,014	120,004	0	95,002	1,070	1,272,394
<b>WATER DISTRIBUTION</b>											
Croton Watershed Dam Safety Program	13,340	0	45,980	100,760	5,611	0	0	0	0	0	165,691
Croton Filter Project	3,306	9,999	0	225,939	0	27,680	0	22,467	0	0	289,391
Trunk & Distribution Main Extension	15,487	187,671	11,160	71,133	31,973	31,282	38,680	38,632	5,652	0	431,670
Trunk & Distribution Main Replacement	94,655	72,903	115,687	252,038	158,309	77,246	136,480	137,657	142,428	141,934	1,329,337
New Source Development	0	7,184	0	0	21,842	0	415,483	0	0	0	444,309
Upstate Improvements	2,822	4,570	6,367	17,160	21,627	6,617	3,480	17,168	3,727	3,856	87,394
Misc. Expenditures	7,335	1,207	0	0	0	0	2,714	0	0	0	11,256
Subtotal	136,945	283,534	179,194	667,030	239,362	142,825	596,837	215,924	151,807	145,790	2,759,248
<b>SEWERS</b>											
Sewer System Extensions	70,555	45,377	44,271	60,252	57,962	51,070	50,000	53,977	46,958	30,470	510,892
Chronic Malfunction & Emergency Replacement	57,024	54,447	62,208	66,757	70,000	75,000	80,000	85,000	90,000	95,000	735,436
Programmatic Replacement	26,394	23,142	15,579	18,048	37,368	31,312	33,353	29,382	16,854	32,400	263,832
Replacement or Augmentation to Existing System	36,260	37,258	26,347	33,934	35,761	0	27,102	10,000	10,000	10,000	226,662
Program Response to Legal Mandates	7,813	29,351	16,405	6,667	11,750	18,104	0	2,000	0	1,000	93,090
Subtotal	198,046	189,575	164,810	185,658	212,841	175,486	190,455	180,359	163,812	168,870	1,829,912
<b>WATER POLLUTION CONTROL</b>											
Consent Decree Construction and Upgrading	41,046	2,205	42,102	135,530	119,440	112,000	112,000	0	0	0	564,323
Sludge Disposal	14,526	10,701	6,270	3,000	9,000	0	0	0	0	0	43,497
Plant Stabilization	1,650	1,100	1,749	1,799	33,499	22,100	21,800	0	0	0	83,697
Water Quality Mandates	24,423	10,740	23,000	318,100	19,500	281,301	246,000	69,999	10,000	0	1,003,063
Misc. Upgrading & Reconstruction	39,082	33,233	50,234	56,453	60,433	62,876	53,478	56,651	40,308	36,668	489,416
Subtotal	120,727	57,979	123,355	514,882	241,872	478,277	433,278	126,650	50,308	36,668	2,183,996
<b>EQUIPMENT</b>											
Total System Funds	13,387	9,482	22,867	7,209	4,780	5,019	5,268	5,531	5,807	6,097	85,447
Subtotal	532,488	586,733	531,753	1,533,116	1,167,749	1,079,621	1,345,842	528,464	466,736	358,495	8,130,997
<b>STATE AND FEDERAL FUNDS</b>											
<b>WATER POLLUTION CONTROL</b>											
Consent Decree Construction & Upgrading	137,767	12,494	254,000	0	0	0	0	0	0	0	404,261
Total State and Federal Funds	137,767	12,494	254,000	0	0	0	0	0	0	0	404,261
<b>TOTAL FUNDS—ALL SOURCES</b>	<b>670,255</b>	<b>599,227</b>	<b>785,753</b>	<b>1,533,116</b>	<b>1,167,749</b>	<b>1,079,621</b>	<b>1,345,842</b>	<b>528,464</b>	<b>466,736</b>	<b>358,495</b>	<b>8,535,258</b>

## Current Capital Program Forecasts 1991-1994

In May 1990, DEP revised the forecast capital program levels for Fiscal Years 1991-1994 as set forth below (the "1991-1994 Current Forecast").

### 1991-1994 Current Forecast (thousands)

<u>SYSTEM FUNDS</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>
<b>WATER SUPPLY AND TRANSMISSION</b>				
Tunnel 3 Stage I .....	\$ 14,890	\$ 525	\$ 11,251	\$ 11,752
Tunnel 3 Stage II .....	200,561	291,504	—	190,000
Misc. Expenditures .....	—	—	1,764	—
Subtotal .....	215,451	292,029	13,015	201,752
<b>WATER DISTRIBUTION</b>				
Croton Watershed Dam Safety Program .....	14,638	48,275	90,351	25,520
Croton Filter Project .....	26,500	5,500	—	363,825
Trunk and Distribution Main Extension .....	58,789	147,081	8,270	3,953
Trunk and Distribution Main Replacement .....	198,813	185,326	93,155	114,562
New Source Development .....	6,300	—	—	—
Upstate Improvements .....	12,235	18,757	3,606	9,703
Misc. Expenditures .....	172	3,830	—	—
Subtotal .....	317,447	408,769	195,382	517,563
<b>SEWERS</b>				
Replacement or Augmentation to Existing System .....	61,886	40,357	35,491	23,973
Sewer System Extensions .....	82,071	59,077	63,338	58,929
Program Response to Legal Mandates .....	3,875	14,057	—	21,802
Programmatic Replacement .....	10,567	11,423	13,765	10,156
Chronic Malfunction & Emergency Replacement .....	56,135	56,849	51,045	54,927
Subtotal .....	214,534	181,763	163,639	169,787
<b>WATER POLLUTION CONTROL</b>				
Consent Decree Construction and Upgrading .....	192,793	397,341	14,440	227,500
Misc. Upgrading & Reconstruction .....	68,837	36,685	70,900	70,780
Sludge Disposal .....	380,234	3,000	9,000	—
Plant Stabilization .....	3,063	6,200	22,450	107,365
Water Quality Mandates .....	37,625	28,187	338,205	240,000
Subtotal .....	682,552	471,413	454,995	645,645
<b>EQUIPMENT</b>				
.....	24,959	9,107	7,780	5,463
<b>Total System Funds</b> .....	<u>1,454,943</u>	<u>1,363,081</u>	<u>834,811</u>	<u>1,540,210</u>
<b>STATE AND FEDERAL FUNDS</b>				
<b>WATER POLLUTION CONTROL</b>				
Consent Decree Construction & Upgrading .....	134,063	—	—	—
<b>Total State and Federal Funds</b> .....	<u>134,063</u>	<u>—</u>	<u>—</u>	<u>—</u>
<b>TOTAL FUNDS—ALL SOURCES</b> .....	<u>1,589,006</u>	<u>1,363,081</u>	<u>834,811</u>	<u>1,540,210</u>

### Comparison of the CIP and the 1991-1994 Current Forecast

The differences between the 1991-1994 Current Forecast and the CIP reflect an increase of about \$881 million in System funds and a decrease of \$120 million in State and Federal funds through Fiscal Year 1991. The following table presents a comparison of the 1991-1994 portion of the CIP with the 1991-1994 Current Forecast. A discussion of the major changes follows the table.

**Comparison of 1991-1994 Capital Projections  
(thousands)**

<u>SYSTEM FUNDS</u>	<u>CIP</u>	<u>1991-1994 Current Forecast</u>	<u>Increase/ (Decrease)</u>
WATER SUPPLY AND TRANSMISSION .....	\$ 946,772	\$ 722,247	\$ (224,525)
WATER DISTRIBUTION .....	1,228,413	1,439,161	210,748
SEWERS .....	738,788	729,723	(9,065)
WATER POLLUTION CONTROL .....	1,358,393	2,254,605	896,212
EQUIPMENT .....	39,874	47,309	7,435
Total System Funds .....	<u>\$4,312,240</u>	<u>\$5,193,045</u>	<u>\$ 880,805</u>
<b><u>STATE AND FEDERAL FUNDS</u></b>			
WATER POLLUTION CONTROL .....	253,999	134,063	(119,936)
TOTAL FUNDS—ALL SOURCES .....	<u>\$4,566,239</u>	<u>\$5,327,108</u>	<u>\$ 760,869</u>

A major difference in System funds between the CIP and the 1991-1994 Current Forecast is an increase of \$896 million in the Water Pollution Control program. The 1991-1994 Current Forecast includes an increase of \$275 million for the upgrade and expansion of Newton Creek sewage treatment plant. In addition, the 1991-1994 Current Forecast includes \$380 million for the construction of sludge dewatering facilities. There is also an additional \$90 million for the expansion of the Wards Island sewage treatment plant. There will also be approximately \$120 million of work funded by System funds previously assumed to be paid for by State and Federal funds.

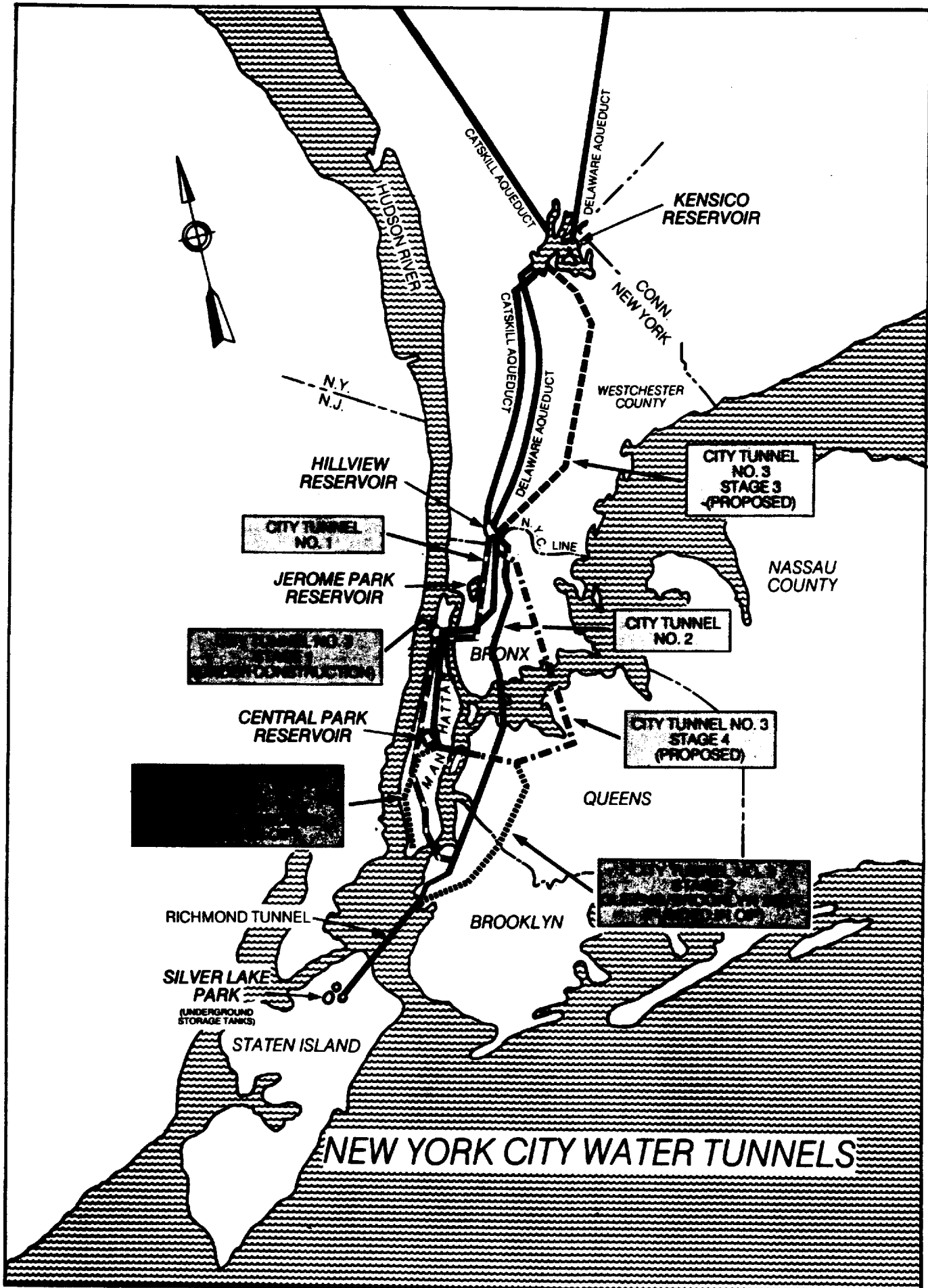
The increase of \$211 million in the Water Distribution program is due mainly to (a) an increase of \$142 million in the Croton Filter Project as a result of increased estimates, and (b) an increase of \$55 million in the extension category to maintain coordination with highway projects.

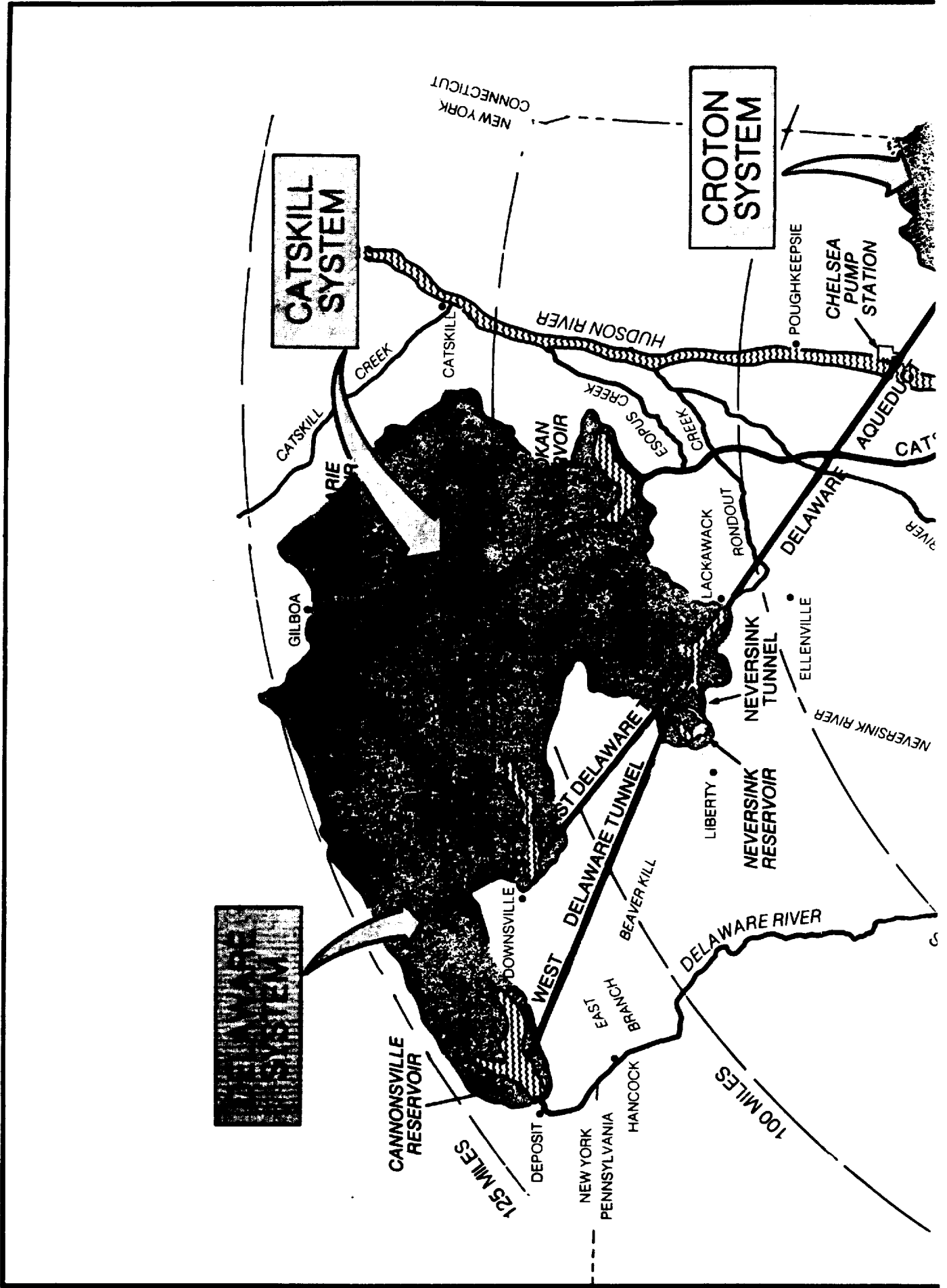
The decrease of \$225 million in the Water Supply and Transmission program reflects the rescheduling of and revised estimates for Stage II of City Tunnel Number 3.

The actual work done in any given year will differ from that outlined in the CIP. Likewise, actual forecasts of the capital program contained in the 1991-1994 Current Forecast, since they are revised more frequently than the ten-year plan embodied in the CIP, have differed and will differ from those of the CIP. However, work is proceeding as originally scheduled on time-sensitive projects that are important to the System's performance. These include various consent decree projects, such as the North River and Red Hook sewage treatment plants. Both North River and Red Hook have begun operations as scheduled, within projected costs.

Projections contained in the CIP concerning routine replacement and extension work on the System and its components are likely to vary from actual performance. Generally, work occurs more slowly in aggregate than originally projected. The CIP presents the maximum authorized levels of work, however unforeseen events may result in delays. Timing of this work is not critical to the welfare of the System. Works projected in the CIP substantially exceed those levels required in order to maintain the currently top-rated condition of the System.

Since the publication of the CIP in April, 1988, DEP has identified an additional \$1.7 billion in required capital improvements. These include the upgrade of the Newtown Creek plant to full secondary treatment and expansion of its capacity, the expansion of the Wards Island plant and the costs associated with constructing sludge dewatering facilities, the first phase in the development of an alternative to ocean disposal of sludge. Additional costs associated with construction of post-dewatering facilities cannot be determined at this time.





**CATSKILL SYSTEM**

**CROTON SYSTEM**

NEW YORK  
CONNECTICUT

POUGHKEEPSIE  
CHELSEA PUMP STATION

CATSKILL CREEK  
CATSKILL RIVER

HUDSON RIVER

ESOPUS CREEK  
CREEK

DELaware AQUEDUCT

GILBOA

SHAWANGUNK RESERVOIR

RONDOUIT

LACKAWACK

NEVERSINK TUNNEL

ELLENVILLE

NEVERSINK RIVER

NEVERSINK RESERVOIR

LIBERTY

WEST DELaware TUNNEL

BEAVER KILL

DELaware RIVER

CANNONSVILLE RESERVOIR

DOWNSVILLE

EAST DELaware TUNNEL

BRANCH

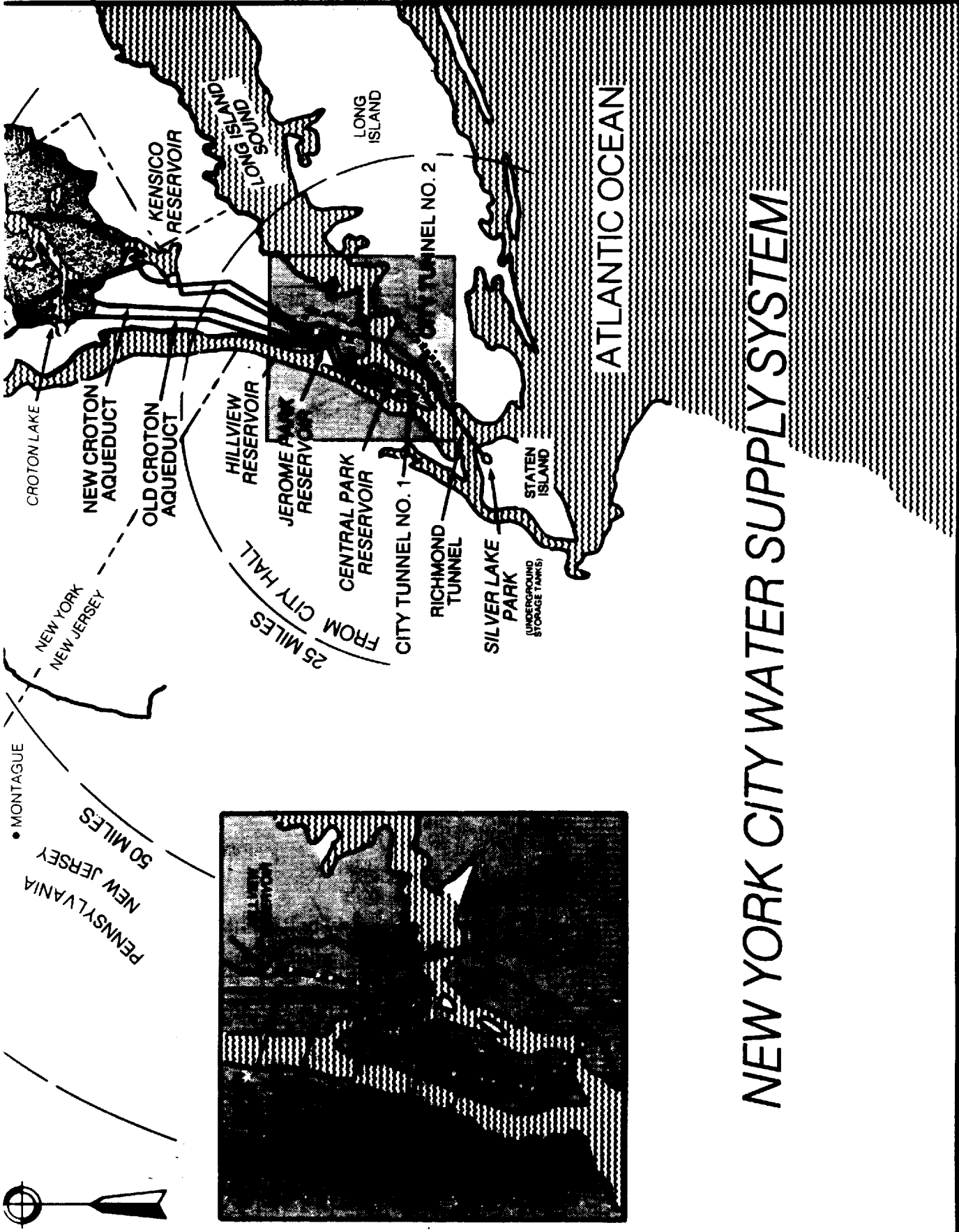
100 MILES

DEPOSIT

NEW YORK  
PENNSYLVANIA

HANCOCK

125 MILES



# NEW YORK CITY WATER SUPPLY SYSTEM

Plant Location	Capacity (MGD)
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MANHATTAN	
Wards Island	250
North River	170

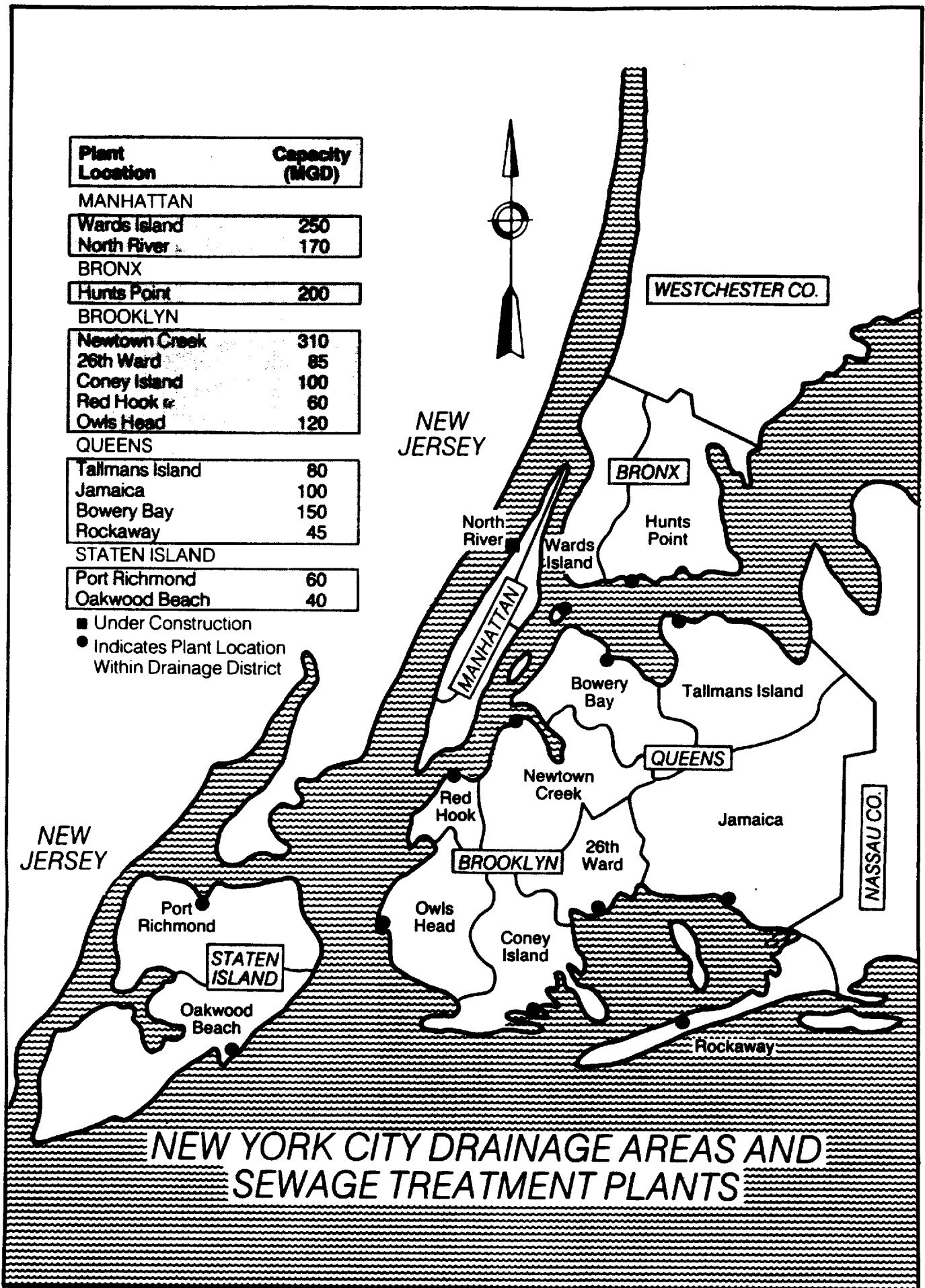
BRONX	
Hunts Point	200

BROOKLYN	
Newtown Creek	310
26th Ward	85
Coney Island	100
Red Hook	60
Owls Head	120

QUEENS	
Tallmans Island	80
Jamaica	100
Bowery Bay	150
Rockaway	45

STATEN ISLAND	
Port Richmond	60
Oakwood Beach	40

- Under Construction
- Indicates Plant Location Within Drainage District





**REPORT ON THE FORECASTED CASH FLOWS  
OF THE WATER AND SEWER SYSTEM  
SERVING THE CITY OF NEW YORK**

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# **Ernst & Young**

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787 Seventh Avenue  
New York, New York 10019  
Telephone: (212) 773-3000

**Mark Page, Executive Director**  
New York City Municipal Water Finance Authority  
Municipal Building  
1 Centre Street  
New York, New York 10007

**RE: New York City Municipal Water Finance Authority  
Water and Sewer System Revenue Bonds  
Fiscal 1991 Series A**

Dear Mr. Page:

We have examined the forecasted cash flows of the New York City Municipal Water Finance Authority (the "Authority") for the Fiscal Years ending June 30, 1991 through June 30, 1995. The forecast includes provisions for the financing of improvements to the City of New York (the "City") water and sewer system (the "System") in accordance with the current forecast of the capital improvement program for Fiscal Years 1991-1994 (the "1991-1994 Current Forecast"). The forecasted cash flows set forth the ability of the System to meet the operating costs, working capital needs and other financial requirements of the System, including the debt service requirements associated with the outstanding amount of Water and Sewer System Revenue Bonds (the "Outstanding Bonds"), the Authority's proposed Fiscal 1991 Series A Bonds (the "Series A Bonds") and additional Bonds to be issued by the Authority during the five years ending June 30, 1995.

The System and proposed improvements and additions to the System under the capital improvement program for Fiscal Years 1989-1998 (the "CIP") and the 1991-1994 Current Forecast were independently evaluated and confirmed by Metcalf & Eddy of New York, Inc. ("Metcalf & Eddy") in a separate "Report on the Engineering Feasibility of the Water and Sewer System Serving the City of New York". Our opinion and conclusions on the forecasted cash flows take into account the conclusions of Metcalf & Eddy, regarding the adequacy of planned funding levels for the CIP, the 1991-1994 Current Forecast and operation and maintenance during the forecast period.

The estimated financing required for the Fiscal Year ending June 30, 1991 includes construction and related costs, funding of certain reserve funds (the "Reserve Funds") and costs of issuance. Debt service on the Authority's bonds is to be paid from revenues of the System.

The accompanying forecasted cash flows of the System for the annual periods ending June 30, 1991 through 1995 are based upon assumptions of the Authority. We participated in the gathering of other information, and assembled the accompanying forecasted cash flows based upon those assumptions. The forecasted cash flows reflect the Authority's best estimate, based on present circumstances, of the expected conditions and its expected course of action. Statements of financial position and results of operations are not presented.

Our examination of the accompanying forecasted cash flows of the System for the annual periods ending June 30, 1991 through June 30, 1995 was made in accordance with standards for examination of a

forecast established by the American Institute of Certified Public Accountants and, accordingly, included such procedures as we considered necessary to evaluate both the assumptions used by management and the preparation and presentation of the forecast. Our procedures included analysis of the records and reports of the City, the Authority and the New York City Water Board (the "Board") and inquiries of management regarding the assumptions employed in developing the accompanying forecasted cash flows.

The interest rates, principal payments, costs of the 1991-1994 Current Forecast, estimated financing in future years and other financing assumptions are described in the section entitled "Summary of Significant Forecast Assumptions." If actual interest rates, principal payments and funding requirements for the Series A Bonds and anticipated future bond issues are different from those assumed, the amount of the bond issues and debt service requirements would need to be adjusted accordingly from those indicated in the forecasted cash flows.

In our opinion, the accompanying forecast is presented in conformity with guidelines for presentation of a forecast established by the American Institute of Certified Public Accountants and the underlying assumptions provide a reasonable basis for the accompanying forecasted cash flows.

Furthermore we have reached the following conclusions:

- The assumption of an increase in water and sewer user payments in Fiscal Year 1991 compared to Fiscal Year 1990 is reasonable based upon previously enacted rate increases effective January 1, 1990. No additional increases in water and sewer rates are anticipated during Fiscal Year 1991. Further, the assumption of future increases in water and sewer payments based upon water and sewer rate increases of 18.3% in Fiscal Year 1992, 18.9% in Fiscal Year 1993, 16.0% in Fiscal Year 1994 and 11.9% in Fiscal Year 1995 is reasonable. In arriving at these conclusions an important consideration has been the Board's enactment of previous rate increases to meet the revenue requirements of the System. In addition, current System rates compare favorably to major cities in the United States for residential and commercial customers. While charges for large industrial customers are higher than the average charges of other cities, there are a limited number of large industrial customers of the System.
- The ongoing universal metering program for the System's flat-rate accounts may impact the actual rate increases necessary to achieve the assumed increases in water and sewer user payments in future years. A discussion regarding the impact of the metering program on billings and collections is included in the Summary of Significant Forecast Assumptions.
- With the assumed annual increases in user payments identified above, the accompanying forecasted cash flows indicate that sufficient funds would be generated during the forecast period to meet the System's debt service requirements associated with the Outstanding Bonds and the proposed Series A Bonds, the debt service requirements of anticipated future bond issues as set forth in the Summary of Significant Forecast Assumptions, and the operating costs and working capital needs.

There will usually be differences between the forecasted and actual results because events and circumstances frequently do not occur as expected and those differences may be material.

We have no responsibility to update this report for events and circumstances occurring after the date of this report.

Very truly yours,

**ERNST & YOUNG**  
August 9, 1990

## FORECASTED CASH FLOWS

The following table sets forth the forecasted cash flows for the System. The assumptions used to prepare this table are presented under "Summary of Significant Forecast Assumptions" immediately following the table.

### Forecasted Cash Flows Fiscal Years 1991 through 1995 (Thousands)

	1991	1992	1993	1994	1995
<b>Operating Revenues:</b>					
Water and Sewer User Payments .....	\$833,087	\$971,909	\$1,134,001	\$1,304,766	\$1,460,485
Upstate Revenue .....	4,250	4,250	4,250	4,250	4,250
Miscellaneous Revenue .....	8,800	9,100	9,400	9,700	10,000
<b>Other Revenues:</b>					
Miscellaneous Interest Income .....	11,816	11,816	11,816	11,816	11,816
Interest income on Authority funds .....	24,229	27,931	35,496	41,194	39,539
<b>Current Revenues available for</b>					
Debt Service .....	882,182	1,025,006	1,194,963	1,371,726	1,526,090
Carry forward revenues .....	10,000	366	401	325	840
<b>Gross System Revenues .....</b>	<b>892,182</b>	<b>1,025,372</b>	<b>1,195,364</b>	<b>1,372,051</b>	<b>1,526,930</b>
<b>Debt Service:</b>					
Outstanding Bonds .....	192,056	190,988	194,989	194,989	194,994
Less: Capitalized Interest .....	(9,547)	(4,028)	—	—	—
Fiscal 1991 Series A Bonds .....	20,374	24,786	20,765	20,760	20,757
Anticipated future Bonds .....	—	61,238	155,126	277,792	397,872
<b>Total Debt Service .....</b>	<b>202,883</b>	<b>272,984</b>	<b>370,880</b>	<b>493,541</b>	<b>613,623</b>
<b>Revenues less Debt Service .....</b>	<b>689,299</b>	<b>752,388</b>	<b>824,484</b>	<b>878,510</b>	<b>913,307</b>
<b>Operating Expenses:</b>					
Authority/Board Operations .....	6,050	6,100	6,150	1,200	1,260
Water System O&M .....	181,703	191,253	203,154	215,648	226,430
Wastewater System O&M .....	296,943	298,313	315,101	432,358	453,976
Sewage Sludge Charges .....	25,550	58,400	92,418	103,070	115,997
Indirect Expenses .....	20,885	21,929	23,025	24,176	25,385
Water/wastewater judgments and claims .....	5,105	5,360	5,628	5,910	6,206
<b>Total Operating Expenses .....</b>	<b>536,236</b>	<b>581,355</b>	<b>645,476</b>	<b>782,362</b>	<b>829,254</b>
Less: State Grants .....	(16,638)	(10,297)	(11,784)	(84,291)	(88,506)
<b>Net Operating Expenses .....</b>	<b>519,598</b>	<b>571,058</b>	<b>633,692</b>	<b>698,071</b>	<b>740,748</b>
Rental payment to The City of New York .....	169,335	180,929	190,467	179,599	172,270
<b>Total Expenses .....</b>	<b>688,933</b>	<b>751,987</b>	<b>824,159</b>	<b>877,670</b>	<b>913,018</b>
<b>Net Surplus(1) .....</b>	<b>\$ 366</b>	<b>\$ 401</b>	<b>\$ 325</b>	<b>\$ 840</b>	<b>\$ 289</b>
<b>Debt Service Coverage(2) .....</b>	<b>1.79</b>	<b>1.66</b>	<b>1.51</b>	<b>1.36</b>	<b>1.28</b>

(1) Net Surplus amounts at the end of each fiscal year are carried forward to the following fiscal year.

(2) Debt Service Coverage is computed using Current Revenues available for Debt Service less Net Operating Expenses, divided by Total Debt Service.

## Summary of Significant Forecast Assumptions

### Basis of Presentation.

The accompanying forecasted cash flows are based on current estimates of Fiscal Year 1991 revenues and expenditures and assumptions of the Authority concerning future events and circumstances and the most likely courses of action to be taken by the Authority, the Board and the City. It includes estimates of future operating expenses as estimated by the City in May, 1990. The forecast is the best estimate of the cash flows to be expected for Fiscal Year 1991 and from future operations of the System. Debt service assumptions include financing required by the current forecast of the 1991 through 1994 capital program which differs from and generally exceeds the corresponding years in the CIP. Unanticipated events and circumstances are likely to occur subsequent to the date of the forecast which will cause actual cash flows to be different from the forecasted cash flows. Such differences may be material. The significant assumptions used in preparing the accompanying forecasted cash flows are explained below.

### Operating Revenues.

*Water and Sewer User Payments:* Water and Sewer User Payments include the payments received from customers of the System within the City (including The City of New York). For the first time, in 1986 the City was charged for its use of water and sewer services. In Fiscal Year 1991, the City's charge is computed to be \$18.2 million.

Payments have been estimated based upon: (a) a constant user base, (b) reduced water consumption levels in Fiscal Year 1991, (c) water consumption levels typically experienced under normal (non-drought) operating conditions in Fiscal Years 1992 through 1995, (d) previously adopted water and wastewater rate increases in Fiscal Year 1990, (e) no additional increase in rates in Fiscal Year 1991, (f) anticipated increases in water and wastewater user rates of 18.3%, 18.9%, 16.0% and 11.9% per year in each of Fiscal Years 1992 through 1995 and (g) the annual billing of flat-rate accounts on the same schedule each Fiscal Year. The assumption of a constant user base has been made for revenue purposes, recognizing that the physical characteristics of the user base are normally undergoing some degree of change as buildings are renovated, demolished or new construction takes place.

Actual Fiscal Year 1990 revenues of the Water and Sewer System were significantly higher than Fiscal Year 1989 revenues but resulted in a smaller surplus than the amounts anticipated in the previous forecast of the Authority. The shortfall in the surplus attributable to current revenues was approximately \$23 million, or less than 3% of total revenues. Based on a preliminary review, the reasons for the difference include several non-recurring circumstances and slower than anticipated payment of water and sewer bills by metered customers. A task force comprised of Department of Environmental Protection ("DEP"), Department of Finance ("DOF") and other City and Authority representatives will be reviewing the billing and collection system to ensure that adequate steps are taken to encourage the prompt payment of water and sewer bills.

The forecasted cash flows anticipate that Fiscal Year 1991 revenues will be collected at previously forecasted levels. The lower than anticipated Fiscal Year 1990 collections are expected to have no adverse effect on Fiscal Year 1991 revenues. The forecasted cash flows assume that \$10,000,000 of surplus Fiscal Year 1990 revenues will be carried forward to Fiscal Year 1991 and it is currently estimated that, subject to audit, actual carryforward revenues from Fiscal Year 1990 will total \$15,000,000 which will fund the General Account in the Operation and Maintenance Reserve. The funds available in the Reserve, combined with customary levels of underspending in the System, would adequately fund the System in 1991 in the event Fiscal Year 1991 revenues do not reach anticipated levels.

Historical revenues from user payments for Fiscal Year 1986 through Fiscal Year 1990 are as follows:

<b>Historical Revenues</b>	
<u>Fiscal Year</u>	<u>Actual Revenues</u>
1986 .....	\$389,721,000
1987 .....	453,916,000
1988 .....	517,999,000
1989 .....	637,702,000
1990 .....	739,031,000

All revenues from user payments reflect current payments and arrears assumed to be principally from the previous Fiscal Year. In Fiscal Years 1986 through 1990, the majority of the annual revenues from user payments have been received in the first quarter of each Fiscal Year.

The assumed increase in user payments over the 1991 through 1995 period is predicated on the ability of the Board to raise rates each year. In Fiscal Year 1989, the Board increased the additional family flat rate charge by 87.8% and sewer charges from 70% to 75% of the water charge for all customers. The system-wide effect of the rate adjustments was equivalent to an approximate 14% increase in water and sewer rates. At the beginning of Fiscal Year 1990, the Board increased the additional family charge by 59%, increased the charge for sewer services from 75% of the water charge to 88% of the water charge and further increased all metered and unmetered water rates across the board by 7.8%. Effective January 1, 1990, the Water Board increased sewer rates from 88% of the water charge to 112% of the water charge and increased all water rates by 9%. An issue in assessing the ability to increase rates further is how such rates compare with those of other comparable cities and how the assumed user rate increases compare with the anticipated rate of inflation. Current user costs for water and sewer services are generally less than the average costs for water and sewer services in other cities. See "Comparison of Current New York City Water and Sewer Rates to those of Other Cities" for additional information concerning the user base, the existing rate structure and current methods of billing and collection.

*Upstate Revenue:* The City is required by State law to make water available for sale to communities in upstate counties in which sources of supply or transmission facilities for providing water to the City are located. State law and individual agreements between communities and the System regulate the sale and pricing of such water. Such law and agreements limit the ability to raise rates for upstate water sales. Payments are made based upon the metered gallonage sold and specified rates per volume of use which are generally less than System rates for customers in the City. Upstate usage beyond the per capita usage rate for the City requires that the excess be billed at the user rate level for the City.

Upstate water consumption averaged 113 mgd for 1989. In view of the State law and individual agreements, revenue from upstate communities is currently assumed to be constant over the forecast period. The Board has authorized its Rate Consultant to review upstate charges in order to assess whether rate increases may be appropriate. If an increase in upstate water consumption occurs during the forecast period or rates are increased, upstate revenues would increase.

*Miscellaneous Revenue:* Miscellaneous revenue includes user fees for specific services provided, such as the review, inspection and approval of connections to the System as well as industrial surcharges for sewage treatment. Industrial surcharges are computed based upon the quantity and quality of the sewage being discharged with those users discharging higher-than-normal-strength sewage paying a surcharge under the current system of charges.

#### Other Revenues.

*Miscellaneous Interest Income:* Miscellaneous interest income includes interest paid on overdue accounts by users of the System. The interest rate is established by June 22 of each year at the rate of 6% above the then current prime rate. Since both arrears payments and interest rates can fluctuate from year to year, miscellaneous interest income in Fiscal Years 1991-1995 is anticipated to be relatively constant.

*Interest Income on Authority Funds:* Interest income results from investment of balances in the Construction Fund and certain reserve funds. Investment of the proceeds of the Series A Bonds and anticipated future bond issues has been assumed at interest rates between 6½% and 7½%.

#### Debt Service.

*Outstanding Bonds:* The debt service payments for the Outstanding Bonds reflect the principal amount of \$2,376,611,980.10. Interest is to be paid semi-annually, with principal paid on an annual basis.

*The Series A Bonds:* The debt service payments for the Series A Bonds reflect a principal amount of \$285,000,004.50.

Principal amounts for the Capital Appreciation Bonds reflect the original principal amounts thereof.

**Anticipated Future Bond Issues:** Debt service payments on anticipated future Bond issues of the Authority reflect a 30 year term and an assumed interest rate of 8.0% with level annual payments. Varying principal amounts are necessary to meet the annual capital needs identified by Metcalf & Eddy. The principal amounts include funds necessary for construction, Reserve Funds and the costs of issuance. The assumed principal amounts are as follows:

<b>Anticipated Future Bond Issues</b>	
<u>Fiscal Year</u>	<u>Principal Amount</u>
1991 .....	\$ 347,499,995.50
1992 .....	920,000,000.00
1993 .....	1,322,500,000.00
1994 .....	1,414,500,000.00
1995 .....	1,183,350,000.00
Total .....	<u>\$5,187,849,995.50</u>

Debt service amounts for anticipated future Bond issues in the forecasted cash flows reflect the assumption of two Bond issues each Fiscal Year of equal principal amounts with October 1 and May 1 issue dates.

**Authority/Board Operations:** The operating expenses of the Authority and Board include administrative costs associated with the day to day operation of the Authority and Board. In Fiscal Years 1991 through 1993, Authority/Board operations costs include an allowance for the development and installation of a new water/sewer billing system.

#### Operating Expenses.

**Water System Operation and Maintenance:** The operating costs of the Water System include direct operation and maintenance costs applicable to one or more functional areas of the Water System and the Distribution System as well as certain indirect operating costs of DEP which are allocated between the Water System and the Sewer System.

The operating costs of the Water System are divided into Personal Services ("PS") costs and Other Than Personal Services ("OTPS") costs. PS costs include direct salary costs plus fringe benefit and pension costs.

OTPS costs include property taxes paid to upstate communities for watershed properties as well as chemicals, electricity and other expenses. As indicated by Metcalf & Eddy, all but a small percentage of the Water System functions by gravity so that electricity costs necessary to maintain normal water distribution are relatively small. In drought conditions additional pumping, and thus increased electricity costs, is necessary for optimal distribution of water available from the System.

Some of the major OTPS cost components and the amounts by Fiscal Year include:

<b>Major OTPS Cost Components—Water (thousands)</b>					
	<u>1987 (Actual)</u>	<u>1988 (Actual)</u>	<u>1989 (Actual)</u>	<u>1990 (Forecast)</u>	<u>1991 (Forecast)</u>
Property Taxes .....	\$34,999	\$36,513	\$39,412	\$41,200	\$44,738
Chemicals .....	3,204	4,409	6,420	7,200	8,170
Electricity .....	3,427	2,878	1,854	2,723	3,292
Electricity-Drought .....	—	—	866	375	—
Total .....	<u>\$41,630</u>	<u>\$43,800</u>	<u>\$48,552</u>	<u>\$51,498</u>	<u>\$56,200</u>



Combined PS and OTPS costs are assumed to increase at an estimated rate of 5% per year for the forecast period. Certain other cost adjustments are reflected in the forecasted cash flows as adjustments are made to specific operating programs based upon System needs.

*Wastewater System Operation and Maintenance:* The operating costs of the Sewer System include direct operation and maintenance costs applicable to one or more functional areas of the Sewer System as well as certain indirect operating costs of DEP allocated to the Water System and the Sewer System.

The operating costs of the Sewer System are also divided into PS costs and OTPS costs. PS costs include direct salary costs plus fringe benefits and pension costs.

OTPS costs include electricity for the wastewater treatment plants, pump stations and service yards, chemicals, and other expenses. Electricity, which represents a significant expense in operating the treatment plants and pump stations, is supplied primarily by the Power Authority of the State of New York. Two of the major OTPS cost components and the amounts by Fiscal Year include:

**Major OTPS Cost Components—Wastewater**  
(thousands)

	<u>1987</u> (Actual)	<u>1988</u> (Actual)	<u>1989</u> (Actual)	<u>1990</u> (Forecast)	<u>1991</u> (Forecast)
Electricity .....	\$15,667	\$16,707	\$19,661	\$18,341	\$20,018
Chemicals .....	<u>6,000</u>	<u>6,380</u>	<u>6,642</u>	<u>7,500</u>	<u>8,383</u>
Total .....	<u>\$21,667</u>	<u>\$23,087</u>	<u>\$26,303</u>	<u>\$25,841</u>	<u>\$28,401</u>

Combined PS and OTPS costs are assumed to increase at an estimated rate of 5% per year for the forecast period. Certain other cost adjustments are reflected in the forecasted cash flow as adjustments are made to specific operating programs based upon System needs.

*Universal Metering Program:* The City and the Board are implementing a comprehensive program to convert all flat-rate customer accounts to metered accounts by the end of Fiscal Year 1997. This program began in Fiscal Year 1988. The City is responsible for purchasing the meters and obtaining the services of private contractors for installation and testing with the exception of certain large buildings which may retain their own contractors for meter installations. In addition, the City will replace many existing meters over the ten-year period.

The annual costs of the universal metering program are anticipated to be provided from revenues each year during the ten-year program. The costs which are included in the operations and maintenance expenses in the forecasted cash flows reflect anticipated meter purchasing costs, meter installation and testing costs, the cost of improvements to the billing and collection system and certain additional operating costs of the City.

*Sludge Disposal:* Pursuant to the Marine Protection, Research and Sanctuaries Act of 1972 ("MPRSA") as amended by the Ocean Dumping Ban Act of 1988 (the "Ban Act") DEP is permitted to dispose of all of the sludge generated by its sewage treatment plants in the Atlantic Ocean 106 miles offshore (the "106 Mile Site"). The Ban Act prohibits the ocean disposal of sludge after August 14, 1989 without a permit from the United States Environmental Protection Administration ("USEPA"). DEP entered into a Consent Decree And Enforcement Agreement ("Consent Decree") with the United States and the State of New York on August 1, 1989 and was granted a permit to continue to use the 106 Mile Site on condition that the City develop alternative sludge disposal technologies and cease all ocean disposal by June 30, 1992. The Consent Decree provides a timetable with specific milestones to be achieved in order to meet the June 1992 deadline. The Consent Decree, pursuant to the Ban Act, also provides for the imposition of fees and penalties for each dry ton of sludge disposed of in the ocean until such disposal is terminated.

The Consent Decree requires the implementation of interim measures and a long-term program to end ocean disposal. As part of the interim measures, DEP is proceeding with the purchase and installation of facilities to dewater its sludge and reduce its volume. Sludge dewatering is a necessary first step in the process of ending ocean disposal and is consistent with any interim or long-term alternative sludge disposal

program. DEP is also soliciting proposals from private firms for the disposal of its dewatered sludge to meet the Consent Decree requirement to reduce the quantity of sludge disposed of in the ocean by 20% by December 31, 1991 and to end ocean disposal by June 30, 1992. The Consent Decree also requires DEP to explore long-term solutions (land application and incineration technologies) for sludge disposal which may rely on additional DEP facilities or private firms and to implement long-term solutions capable of processing 50% of the City's sludge by December 31, 1995 and 100% by June 30, 1998. The capital cost for dewatering facilities is currently estimated at approximately \$800 million. The ultimate cost of alternatives to ocean disposal of sludge is not now known.

Even with the timely implementation of the sludge disposal alternatives described above, DEP expects that the ocean disposal fees and penalties imposed by the Ban Act and the Consent Decree will amount to approximately \$25.5 million in Fiscal Year 1991, and \$49.6 million in Fiscal Year 1992. After June 30, 1992 it is expected that DEP will cease the ocean disposal of sludge. In the event the anticipated timetable for ending ocean disposal is accelerated, the penalties will be less. If the termination of ocean disposal is delayed, the above mentioned fees and penalties will continue to be imposed as well as substantial stipulated penalties. The Ban Act and the Consent Decree provide that 85% of the fees and penalties payable shall be deposited into a Trust Account and shall be available to reimburse the City for costs incurred in developing alternative sludge disposal facilities. A portion of the balance of the fees and penalties accruing shall be paid to USEPA with the remainder divided equally between the New York State Water Pollution Control Revolving Fund and the New York State Clean Oceans Fund. Amounts paid to the Clean Oceans Fund are also available to reimburse the costs of developing alternative sludge management programs. In addition, the Financial Plan contains an additional \$8.8 million in Fiscal Year 1992, \$92.4 million in Fiscal Year 1993, \$103.1 million in Fiscal Year 1994 and \$116.0 million in Fiscal Year 1995. Since entering into the Consent Decree DEP does not expect that these funds will be paid as fees or penalties. However, they have been retained in the System as a reserve to offset the costs of private disposal of sludge.

Capital costs associated with the cessation of ocean dumping of sludge are currently reflected in the Forecast at \$380 million. Recent estimates for the cost of sludge dewatering are \$800 million and the cost of alternative disposal options is unknown at this time. Although these costs are not provided in the CIP, a substantial portion of the fees and penalties imposed by the Federal Legislation, now funded in the cash flow projections for the System, is expected to be available to offset the cost of capital investment in sludge disposal alternatives.

*Indirect Expenses:* Indirect Costs reflect costs allocated to the System for support provided by various City agencies and departments. Services provided include budget preparation and review, cost and revenue accounting, billing and collection and legal support. The method of allocating these costs to the System is based upon costs initially allocated to DEP and subsequently divided between those attributable to water and sewer and those costs associated with other activities of DEP. The costs allocated to DEP as a whole are derived from the total costs of City support agencies and departments and a formalized cost allocation plan which distributes the costs to affected departments and agencies. Indirect expenses for Fiscal Years 1992-95 are expected to increase at the rate of 5% per year.

*Water and Wastewater Judgments and Claims:* An allowance has been made for the payment of judgments against the System or claims settled by the City. Records of the City indicate that annual tort judgments and claims payments have averaged approximately \$1.7 million per year over Fiscal Years 1985 through 1989.

The forecasted cash flow assumes an allowance of \$5.105 million for tort judgments and claims in Fiscal Year 1991 with future allowances increased at the rate of 5% per year. It is recognized that actual judgments and claims payments will vary in each Fiscal Year depending upon the number of settlements, types of claims and other factors.

Construction contract claims are not included in the allowance assumed above but are paid as a normal part of capital construction costs. Historically, virtually all final claims settled have been significantly less than initial claims filed.

**State Grants:** In Fiscal Year 1991, DEP will begin the remediation of six hazardous sites within the City. The 1986 Environmental Quality Bond Act provides for State reimbursement of up to 75 percent of these costs. Subsequent to remediation, DEP plans to provide processed sludge as intermediate and final landfill cover. The costs for remediation are included in the forecasted expenses for the wastewater system.

**Rental Payment to The City of New York**

Pursuant to a lease agreement (the "lease") between the City and the Board, the City can request a rental payment from the Board in each fiscal year not to exceed the greater of (a) the principal and interest payable on general obligation bonds issued by the City for water and sewer purposes certified by the City to be paid within such Fiscal Year or (b) 15% of the principal and interest payable on bonds of the Authority within such Fiscal Year. In Fiscal Year 1990, the City increased the rental payment it required from the Board to the allowable maximum under the lease which may not be amended without the consent of the Trustee. This increase eliminated the previous City subsidy to the System. In future years, it is assumed that the City will continue to request the allowable maximum under the lease.

**Water and Sewer Rates**

A survey was performed by Ernst & Young in 1990 for purposes of identifying rate structures used by major cities and establishing typical rates for three classes of users: single-family residential, commercial and industrial. Based upon data provided by 24 cities, typical user rates were computed as follows:

**Comparison of Current Annual New York City Water and Sewer Rates to those of Other Cities**

<u>Customer Class</u>	<u>Range of User Costs (1)</u>	<u>Average Cost</u>	<u>N.Y. City Costs(2)</u>	<u>N.Y. City Ranking(3)</u>
Single-Family Residential . . . . .	\$ 205 to 455	\$ 331	\$ 269	7
Commercial . . . . .	1,718 to 5,444	2,863	2,693	14
Industrial . . . . .	136,494 to 547,022	260,872	269,251	15

- (1) Charges reflect rate schedules in effect in early 1990.
- (2) Charges reflect the rate schedule effective July 1, 1990.
- (3) The lowest rate in each category is ranked 1.

Assumptions were made relative to typical daily water consumption and sewage discharge for each of the above listed customer classifications with the assumptions applied uniformly to the rate structure of each city. The use of a constant per gallon charge in the City as opposed to quantity discounts is the principal reason for the change in the City's ranking between customer classifications.

**Current Water and Sewer Rate Structure and Customer Base:** The current rate structure for water and sewer services is based upon two forms of billing computation: metered consumption and a non-metered rate structure where flat-rate bills are computed on the basis of property frontage, fixtures in the household and other factors. Currently, there are approximately 320,000 metered customers and 480,000 flat-rate customers of the System. Both water and sewer services are provided to approximately 247,000 metered customers and approximately 463,000 flat-rate customers. The remaining customers primarily receive only sewer services with water service provided by the Jamaica Water Supply Company. Commercial and industrial customers are required to have meters. The remaining metered customers comprise a variety of customer classifications including some single-family residences.

The City and the Board are implementing the universal metering of all flat-rate customers as described under Universal Metering Program. With the gradual transition to a rate structure and billing system based upon water consumption, changes in the timing of the receipt of revenues and collection efficiency may occur. As individual flat-rate accounts are metered, revenues from such users may increase or decrease somewhat depending upon how closely the flat-rate billing factors previously used compare to the actual

metered water consumption of the user. Based upon historical data, some decrease in collection efficiency will most likely be experienced as accounts are metered. This is due to the fact that flat rate bills are mailed to the property tax payer while metered bills are sent to the property address. While the estimated increases in user rates are defined for Fiscal Years 1992-95, the actual rate increases necessary to achieve the needed increase in user payments may vary from the percentage increases in user payments depending upon the changes in revenue receipts experienced with universal metering, among other factors.

The customer base contains many different types of users. Based upon 1987 billing data, the principal customer classifications and the percentage of billed user charges by classification include:

#### System Customer Base

<u>Customer Classification</u>	<u>Percent of Billings</u>
Single-Family Dwellings .....	9.6%
Two-Family Dwellings .....	10.3
Walkup Apartments(1) .....	19.0
Elevator Apartments(1) .....	25.7
Factory and Industrial Buildings .....	5.2
Stores .....	8.3
Office Buildings .....	5.6
Utility Properties .....	2.8
Loft Buildings .....	2.6
Hospitals and Health Facilities .....	1.5
Hotels .....	2.3
Other .....	7.1
Total .....	<u>100.0%</u>

(1) Certain accounts and billings under this type of account relate to commercial establishments located in apartment buildings.

With the implementation of the universal metering program, metered customers will provide an increasing percentage of System revenues over time. The New York City Water Board is currently evaluating long-term rate structure revisions which could include both fixed and consumption-based annual charges.

At the present time, sewer charges are computed as a percentage of the water charges established for water usage for both metered and flat-rate customers.

#### Description of the Billing and Collection System

The billing and collection functions for the System are administered for the Board by three entities within the City: the Bureau of Water Register in DEP, the Department of Finance (the "DOF") and the Office of the Comptroller.

The Bureau of Water Register collects the data used to generate bills to customers. Through its field offices in each Borough of the City and its central offices in Manhattan, it is responsible for the reading of meters and checking of meter accuracy as well as the maintenance of current information for those customers on the flat-rate system of billing. Data files for flat-rate customers are updated through inspections by Bureau of Water Register personnel. The Bureau of Water Register also collects certain over-the-counter payments for water and sewer services.

The Bureau of Water Register organizes metered consumption data and flat-rate information and forwards all such data to DOF which prepares and mails bills to customers for water and sewer services. Each customer's account is identified by a unique Borough/block/lot number developed through property tax records. DOF bills customer accounts, records these billings and is primarily responsible for the collection process, including procedures for handling delinquent accounts. DOF also administers billing adjustments and works with the Bureau of Water Register to handle customer inquiries. Although shutoffs are infrequent, DOF advises the Bureau of Water Register when a shutoff of services is required for nonpayment of bills.

If an account is delinquent for 60 days, DOF sends a delinquency bill and an enforcement letter. If the account is still delinquent after 90 to 120 days, DOF initiates legal action in the name of the Board and a process server delivers a summons to the delinquent customer. If there is no response to the summons, DOF obtains a default judgment and enforces it by levy against the customer's bank account or garnishment of his wages.

Payment of bills is made to the Board's account at Chemical Bank, which records payments and forwards the recorded data and receipts to the Board. Customer payments are received either directly by Chemical Bank or through hand-delivered payments to Borough offices of DOF, which are deposited to the Board's account at Chemical Bank. Acting on behalf of the Board, the Office of the City Comptroller records the cash receipts from the System.

Ongoing improvements to the billing and collection system include increased automation in both DOF and the Bureau of Water Register to permit better analysis of customer data and to facilitate error recognition, and the use of optical scanning cards as a quality control measure for meter readings and to improve processing efficiency. DOF developed and implemented the Water Enforcement Delinquency and Tracking System ("WENDY"). WENDY monitors and reports on the status of delinquent accounts and automatically schedules and initiates collection enforcement actions.

## **BACKGROUND**

### **The Rate Consultant**

Ernst & Young is the Rate Consultant to the Authority. Ernst & Young is a national accounting, tax and management consulting firm which is headquartered in New York City. The Firm has provided consulting services including feasibility studies, rate studies and organizational analyses to numerous clients in the water and wastewater industry—this includes well over 100 medium size and large jurisdictions.

### **Ernst & Young's Services for the Water and Sewer System**

During the period of August, 1983 to December, 1985 Ernst & Young, pursuant to a contract with DEP, undertook certain analyses which were documented in a financial feasibility study. In connection with the financial feasibility study, Metcalf & Eddy performed certain engineering analyses of the water and sewer system as a subcontractor to Ernst & Young. The financial feasibility study included financial and management analyses of the operating requirements and capital improvement programs of the system. Ernst & Young performed an evaluation of historical revenues and expenditures, the customer base, the billing and collection systems and the organization and management structure for the delivery of water and services. Ernst & Young also developed a computer model for analyzing the impact of operating and capital programs on user charges, surveyed comparative user charges of other major cities and reviewed the financial feasibility study assumptions and estimates.

Since 1986, Ernst & Young has served as Rate Consultant to the Authority. As Rate Consultant, the firm assesses the adequacy of System revenues to meet the planned expenditures of the System. The firm's procedures include analysis of the records and reports of the City, the Authority and the Water Board and evaluation of management's assumptions and estimates. A computer model is used to facilitate the assessment of System revenues. Ernst & Young has also examined the forecasted cash flows of the System in connection with prior bond issues of the Authority.

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**CERTAIN INFORMATION CONCERNING THE CITY OF NEW YORK**

This section presents information regarding certain of the financial developments and the major economic and social factors concerning the City. All information is presented on a calendar-year basis unless otherwise indicated. The data set forth are the latest available. Sources of information are indicated in the text or immediately following the charts and tables. Although the Authority considers the sources to be reliable, the Authority has made no independent verification of the information presented herein from other sources and does not warrant its accuracy.

**Operating Results**

Fiscal Year 1989 marked the ninth consecutive year that the City has achieved operating results balanced in accordance with Generally Accepted Accounting Principles ("GAAP"). The City projects that its operating results for the 1990 Fiscal Year will be balanced in accordance with GAAP. As used herein, "operating results" refers to the City's General Fund revenues and transfers reduced by expenditures and transfers. Since the 1978 Fiscal Year, the City's annual financial statements, prepared in conformity with GAAP, have been audited by certified public accountants.

**The Fiscal Year 1990 Forecast and the 1991-1994 Financial Plan**

Pursuant to the laws of the State, the City prepares an annual four-year financial plan, which is reviewed and revised on a quarterly basis and which includes the City's capital, revenue and expense projections. The current four-year financial plan, which was submitted to the New York State Financial Control Board (the "Control Board") on July 11, 1990 and which relates to the City, the Board of Education and the City University of New York covers the 1991 through 1994 fiscal years (the "1991-1994 Financial Plan" or the "Financial Plan"). The City is required to submit its financial plans to review bodies, including the Control Board. If the City were to experience certain adverse financial circumstances, including the incurrence of an annual operating deficit of more than \$100 million, the Control Board would resume powers of prior approval of City financial plans, proposed borrowings and certain contracts. In addition, the City prepares monthly financial plan statements which set forth forecasts for the current fiscal year.

The City's projected 1990 fiscal year results, as reported on July 9, 1990 (the "1990 Forecast"), reflect significant shortfalls in total revenues compared to the forecast in the financial plan submitted to the Control Board on July 12, 1989. The revenue shortfalls are primarily attributable to a reduction of \$783 million in forecasted non-property tax revenues, which reflects the region's slowing economic growth rate, and a loss of \$246 million caused by a delay in the anticipated sale of the New York City Coliseum site. The gap-closing measures adopted by the City since July 1989 included a reduction of \$360 million in expenditures for City services, a reduction of \$60 million to the general reserve, reduced debt service costs of \$338 million which includes the savings from the refunding of certain outstanding City debt, \$205 million of revenues made available to the City as a result of the sale of bonds by the Battery Park City Authority ("Battery Park City") and a debt refinancing by the New York State Housing Finance Agency (the "HFA") and the release of excess sinking fund balances obtained by refinancing certain outstanding debt.

The 1991-1994 Financial Plan projects revenues and expenditures for the 1991 fiscal year to be balanced in accordance with GAAP. For the 1991 fiscal year, the Financial Plan sets forth gap-closing revenue measures and expenditure reductions proposed during the 1990 fiscal year to offset a total projected budget deficit of \$2.2 billion, compared to the \$686 million projected deficit in the financial plan submitted to the Control Board on July 12, 1989. This increased deficit resulted from decreased tax revenue projections of \$1.2 billion, increases in projected public and medical assistance costs of approximately \$300 million and a loss of \$90 million in budget relief associated with the projected delay in the sale of the New York City Coliseum site. The gap-closing measures are composed of \$240 million in debt service savings, including savings associated with refunding certain outstanding City debt completed in the 1990 fiscal year and a \$290 million reduction in MAC debt service requirements; projected receipts of \$822 million resulting from tax increases, including increases in the real property tax and a personal income tax surcharge; and \$660

million of projected expenditure reductions, and \$200 million of projected revenue increases, resulting in part from enhanced productivity measures and certain fee increases.

The Financial Plan provides a reserve for an annual 1.5% wage increase in the 1991, 1992, 1993 and 1994 fiscal years for all employees after termination of the current collective bargaining agreements, some of which expired on June 30, 1990 and the others of which will expire at various times thereafter. The City estimates that each additional 1% increase in the wage assumption would result in additional expenditures of \$101 million in the first year of the increase and \$140 million, including pension costs, in each year thereafter.

The projections and assumptions contained in the 1991-1994 Financial Plan are subject to revision which may involve substantial change, and no assurance can be given that these estimates and projections, which include actions which the City expects will be taken but which are not within the City's control, will be realized. Although the City has maintained balanced budgets in each of its last nine fiscal years, there can be no assurance that the City will maintain a balanced budget in future years without additional State aid, revenue increases or expenditure reductions.

The State budget for its 1991 fiscal year, adopted on May 18, 1990, is based on significantly lower than expected tax revenues in the State's 1990 fiscal year and reflects a substantial reduction in projected tax revenues for the State's 1991 fiscal year. Any significant reductions in projected State revenues from the levels anticipated by the State's 1991 budget could have an adverse impact on the timing and amount of State aid payments to the City in the future.

#### **Seasonal and Capital Financing Needs**

Since the beginning of its 1981 Fiscal Year, the City has obtained all of its seasonal financing through short-term borrowings in the public credit markets. To date in the 1991 fiscal year, the City has issued \$1.1 billion of notes.

The City anticipates long-term financing needs of approximately \$4.6 billion during its 1991 Fiscal Year, to be funded principally through City public bond issuances and the issuance of water and sewer revenue bonds by the Authority.

#### **Fiscal Oversight Mechanisms**

The City utilizes modern planning and control systems to monitor on a daily, monthly, quarterly and annual basis various aspects of the City's financial, operating and capital conditions, including the Integrated Financial Management System ("IFMS"). IFMS permits the City to monitor on a unified basis its expense and revenue budgets as well as its fixed assets. The systems provide the City with information on a timely basis so that the City is able to make decisions regarding program expenditures should revenues be adversely affected for any reason. The Mayor's Office of Management and Budget and the Office of the Comptroller continuously monitor the City's financial condition. Since 1978, pursuant to State law, the City has annually prepared a four-year financial plan, which is reviewed on a quarterly basis. In 1975, the City encountered severe financial difficulties and lost access to the public credit markets. The City's revision of its financial systems and accounting practices, and the requirement to submit four-year financial plans and budgets for review and, during a Control Period, as defined in the New York State Financial Emergency Act for the City of New York (the "Financial Emergency Act"), approval to various oversight bodies, including the Control Board, were in response to that crisis. In addition, the Municipal Assistance Corporation For The City of New York was organized in 1975 to provide financing assistance for the City and also to exercise certain oversight and review functions with respect to the City's finances.

On June 30, 1986, the City satisfied the statutory conditions for termination of the Control Period. The City, in compliance with its obligations under the Financial Emergency Act, will continue to submit four-year financial plans, terms of proposed borrowings, and certain contracts and other operating information to the Control Board for its review. However, with the termination of the Control Period the Control Board's powers of prior approval have been suspended.



The Financial Plan includes separate plans describing the budgets and operations of various Covered Organizations as defined in the Financial Emergency Act, including the New York City Health and Hospitals Corporation, the New York City Housing Development Corporation and the New York City Transit Authority, among others. As described in the 1991-1994 Financial Plan, each Covered Organization's plan for the current fiscal year is balanced in accordance with generally accepted accounting principles, as became the operative standard in State law this year. Previously, the State law standard required that Covered Organizations plans provide for annual operation of the organization on a cash basis. No assurance can be given that, in the future, Covered Organization financial plans will be balanced in accordance with generally accepted accounting principles.

### Economic Activity, 1969-1987

For at least a decade prior to the end of the fiscal crisis in the mid-seventies, New York City's economy lagged behind the nation, as evidenced by certain of the broad economic indicators. The City's economy improved after the crisis and, since then, certain of the key economic indicators have posted steady growth.

From 1969 to 1976, New York City's population and employment fell, while both expanded nationally. Personal income increased sluggishly (5.4% annually) and fell below the national growth (9.4% annually). Real per capita personal income remained unchanged while increasing 2 percent annually for the nation. As a result, by 1976 real per capita personal income in the City was only 7 percent above the national level, compared to 22 percent above the national level in 1969.

After 1976, the economic indicators started to improve although total employment levels did not increase until 1978, because of the reductions of City government workers in 1977. Personal income growth since 1976 has been close to the national growth. Real per capita personal income since 1976 increased at an average annual rate of 1.7 percent, slightly outpacing the nation, which grew by 1.4 percent during 1977-1987.

	Trends of Major Economic Indicators 1969-1987				
	Levels			Average Annual Percent Change	
	1969	1976	1987	1969-76	1976-87
<b>NYC</b>					
Population(1) (millions) . . . . .	7.9	7.4	7.3	(0.8)%	(0.1)%
Employment(2) (millions) . . . . .	3.8	3.2	3.6	(2.4)	1.1
Personal Income(3) (billions) . . . . .	\$38.6	\$58.1	\$131.4	5.4	8.8
Real Per Capita Personal					
Income(4) . . . . .	\$12,757.4	\$12,871.1	\$15,254.2	0.1	1.6
<b>United States</b>					
Population(1) (millions) . . . . .	202.8	218.1	244.0	1.0	1.0
Employment(2) (millions) . . . . .	70.4	79.4	102.2	1.7	2.3
Personal Income(3) (in billions) . . . . .	\$773.0	\$1,451.4	\$3,777.6	9.4	9.1
Real Per Capita Personal					
Income(4) . . . . .	\$10,385.9	\$11,695.5	\$13,616.5	1.8	1.5

(1) 1970, 1980 figures are based on final census count. All other years are estimates. Source: U.S. Department of Commerce, Bureau of the Census.

(2) Payroll employment based on Bureau of Labor Statistics ("BLS") establishment survey. Source: U.S. Department of Labor, Bureau of Labor Statistics and New York State Department of Labor, Division of Research and Statistics.

(3) In current dollars. Income by place of residence. Source: U.S. Department of Commerce, Bureau of Economic Analysis.

(4) In average dollars for 1982-1984.

## Population Characteristics

The City has been the most populous city in the United States since 1810. The City's population is almost as large as the combined population of the next three most populous cities in the United States.

The population of the City grew steadily through 1950, remained relatively stable between 1950 and 1970 in the aggregate and declined substantially, for the first time in its history, during the 1970's. The Bureau of Census estimates moderately increasing population for the City since the 1980 census results.

### POPULATION OF NEW YORK CITY

Year	Total Population	Distribution of Population by County (Borough)					
		1970=100	Bronx (The Bronx)	Kings (Brooklyn)	New York (Manhattan)	Queens (Queens)	Richmond (Staten Island)
1960 .....	7,781,984	98.6	1,424,815	2,627,319	1,698,281	1,809,578	221,991
1970 .....	7,895,563	100.0	1,471,701	2,602,012	1,539,233	1,987,174	295,443
1980(1) .....	7,071,639	89.6	1,168,972	2,230,936	1,428,285	1,891,325	352,121
1984(2) .....	7,223,100	91.5	1,181,500	2,278,300	1,467,300	1,928,900	367,100
1985(2) .....	7,260,900	92.0	1,190,600	2,291,100	1,477,700	1,930,800	370,700
1986(2) .....	7,322,100	92.7	1,209,600	2,310,800	1,494,200	1,933,100	374,400
1987(2) .....	7,345,000	93.0	1,222,800	2,313,300	1,501,900	1,929,900	377,100
1988(2) .....	7,352,700	93.1	1,223,400	2,314,300	1,509,900	1,925,100	380,000

(1) Final census count, which may reflect an undercount of a significant number of persons and is subject to modification as a result of certain litigation with the Census Bureau.

(2) 1984-1988 based on mid-year population estimate of the Bureau of the Census as of September 1988.

NOTE: Does not include an undetermined number of undocumented aliens.

SOURCE: U.S. Department of Commerce, Bureau of the Census.

The following table sets forth the distribution of the City's population by age between 1960 and 1980.

### DISTRIBUTION OF POPULATION BY AGE

(In Thousands)

Age	1960		1970		1980	
		% of Total		% of Total		% of Total
Under 5 .....	687	8.8	616	7.8	471	6.7
5 to 17 .....	1,478	19.0	1,619	20.5	1,295	18.3
18 to 24 .....	663	8.5	889	11.3	826	11.7
25 to 34 .....	1,056	13.6	1,076	13.6	1,203	17.0
35 to 44 .....	1,071	13.8	916	11.6	834	11.8
45 to 64 .....	2,013	25.9	1,832	23.2	1,491	21.1
65 and Over .....	814	10.4	948	12.0	952	13.4

SOURCE: U.S. Department of Commerce, Bureau of the Census.

The age distribution of the City's population has undergone major changes since 1960 and now differs from that of the nation. The City has been steadily losing its middle-aged population (ages 35 to 64) and the very young (under age 5). However, these losses have been offset somewhat by increases among the elderly (ages 65 and over) and young adults (ages 18 to 34). Recently, the City has experienced a decline in its school age population (ages 5 to 17) as a result of a declining birth rate and the maturing of the post-war "baby boom" generation. By 1980 only 28.1% of the population of the City was age 19 or under, as compared to 32.0% nationally, and the elderly constituted 13.4% of the City's population, as compared to 11.3% nationally.

### Employment Trends

The New York City non-agricultural payroll employment series derived from the Establishment Survey and the employment series derived from the Current Population Survey are constructed using significantly different estimation techniques. Therefore, the two series are not comparable. Trends in both measures of City employment are presented below.

#### *Non-Agricultural Payroll Employment: Establishment Survey*

Non-agricultural employment trends in the City are shown in the table below.

### CHANGES IN PAYROLL EMPLOYMENT IN NEW YORK CITY

(In Thousands)

Industry Sector	Peak Employment (1)		Average Annual Employment					
	Year	Level	1984	1985	1986	1987	1988	1989(4)
<b>Private Sector</b>								
Non-Manufacturing .....	1988	2,638.8	2,467.2	2,522.6	2,574.8	2,629.3	2,638.3	2,647.0
Services(2) .....	1988	1,123.1	1,006.6	1,038.5	1,076.2	1,108.5	1,125.1	1,149.9
Wholesale and Retail Trade .....	1969	749.1	628.6	638.1	638.5	637.6	635.8	633.3
Finance, Insurance and Real Estate .....	1987	549.7	500.5	507.6	529.3	549.7	543.2	530.5
Transportation and Public Utilities .....	1969	323.9	237.0	232.0	217.3	214.9	217.8	213.2
Contract Construction .....	1962	139.1	94.5	106.3	113.7	118.8	120.9	120.1
Mining .....	1967	2.5	1.4	1.2	0.8	0.7	0.6	0.4
Manufacturing .....	1960	946.8	429.6	407.7	391.5	379.6	366.5	360.6
Durable .....	1960	303.6	119.9	112.2	106.5	100.0	97.6	94.1
Non-Durable .....	1960	643.2	309.7	295.5	285.0	279.6	268.9	266.5
<b>Government (3) .....</b>	1988	596.1	535.6	556.6	573.5	580.4	595.8	601.3
<b>Total Non-Agricultural .....</b>	1969	<u>3,797.7</u>	<u>3,433.8</u>	<u>3,488.1</u>	<u>3,540.6</u>	<u>3,590.0</u>	<u>3,605.7</u>	<u>3,609.3</u>

**RECENT MONTHLY TRENDS**  
(Total Payroll Employment In Thousands)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1984	3,366.6	3,383.6	3,412.7	3,417.1	3,435.1	3,451.0	3,435.5	3,414.7	3,446.2	3,464.6	3,482.6	3,496.0
1985	3,427.3	3,439.6	3,462.5	3,464.1	3,485.6	3,483.9	3,487.4	3,495.0	3,491.7	3,512.8	3,547.6	3,559.1
1986	3,480.0	3,492.2	3,524.0	3,525.0	3,536.9	3,552.5	3,543.9	3,535.3	3,544.0	3,566.5	3,585.2	3,600.7
1987	3,523.3	3,537.8	3,568.5	3,577.9	3,588.6	3,610.6	3,582.0	3,584.5	3,588.7	3,615.3	3,641.1	3,661.8
1988	3,557.8	3,575.3	3,609.4	3,603.9	3,603.8	3,625.1	3,578.3	3,583.0	3,595.4	3,611.2	3,651.4	3,665.0
1989	3,565.0	3,582.4	3,608.9	3,617.5	3,622.9	3,643.5	3,598.9	3,578.4	3,587.9	3,608.7	3,633.3	3,664.5
1990	3,593.0	3,601.1	3,622.2	3,617.3	3,629.9	3,643.0 (4)						

- (1) For the period 1960 through 1988.
- (2) "Services" includes mining and miscellaneous establishments. Data for 1981 to present include a phased-in addition of family care attendants employed by social service agencies who previously were hired directly by the individual receiving such services and who were therefore excluded by definitional reasons from tabulations in prior years.
- (3) Excludes military establishments.
- (4) Preliminary.

NOTE: Details may not add up to totals due to rounding. Payroll employment is based upon reports of employer payroll data ("establishment data"), which exclude the self-employed and workers employed by private households or agriculture, forestry and fishery.

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics and State of New York, Department of Labor, Division of Research and Statistics.

Until 1969, total employment in the City was gradually expanding. It reached a peak of 3,797,700 in 1969, an increase of 9.5% over the figure for 1950. This gradual increase was the product of several trends which involved changes in the structure of employment in the City.

While total employment was generally increasing until 1969, employment in manufacturing and mining and contract construction peaked before 1969.

Growth in employment between 1960 and 1969, which amounted to 259,300, an increase of 7%, was concentrated in three sectors: (i) finance, including insurance and real estate; (ii) services; and (iii) government. Between 1960 and 1969 these sectors created over 400,000 new jobs and grew at the rate of 21% for finance, 28% for services and 34% for government. Although these growth rates were substantial, they did not keep pace with the national rate of growth for such sectors. During the 1960's, the long-term decline in manufacturing accelerated; 121,000 manufacturing jobs, or nearly 13%, were lost during the decade. Steep losses continued in the apparel and food processing industries, and the decline in nondurable industries spread to durable industries. By 1969, over 32,000 jobs had also been lost in contract construction from the peak 1962 employment level, a decline of almost 24%.

After 1969 the moderate upward trend in City employment was reversed as the City experienced disproportionately adverse effects from the national recessions of 1969-1970 and 1974-1975, and lagged behind during the subsequent national recoveries. Between 1969 and 1977, the City lost 609,800 jobs, a decline of 16.1%. A loss of 287,000 jobs in the manufacturing sector accounted for nearly half of the City's total employment loss during the period. Declines also occurred in every major industry sector other than services, including losses of 129,000 in trade; 66,000 in transportation and public utilities; 50,000 in finance, insurance and real estate; and 42,000 in construction.

Employment trends in the City began to rebound during the final quarter of 1977, and continued to increase over prior year levels through March 1982. In the second half of 1982, the City's economy began to feel the effects of the national recession, and the City experienced its first job loss following four consecutive years of job gains. During 1983, the City's economy began to recover from the recession with employment growth in each sector other than manufacturing and transportation and public utilities.

From the approximate end of the fiscal crisis in 1977 until 1989, total payroll employment increased by 420,760. Employment growth was concentrated in finance and service sectors, particularly business and professional services. In addition to growth in local government sectors, construction employment increased, based on a resurgence of commercial office building and hotel construction. These gains offset continued employment losses in the manufacturing and trade sectors. The City's private sector basically shows no net gain in employment in 1988.

Based on latest data, total average payroll employment in the City increased by 4,300 in 1989 over 1988. During this period, the only notable employment increases occurred in services and government. Preliminary June 1990 employment data indicates a decrease of 500 jobs over the same period last year.

*Employment, Labor Force and Unemployment: Current Population Survey*

Changes in the employment status of the City's resident labor force are shown in the following table.

**EMPLOYMENT STATUS OF THE RESIDENT POPULATION OF NEW YORK CITY**

Year	Civilian Labor Force (In Thousands)			Labor Force Participation Rate (1)		Unemployment Rate (2)	
	Total	Employed	Unemployed	New York City	United States	New York City	United States
1982 .....	3,093	2,798	296	55.2%	64.0%	9.6%	9.7%
1983 .....	3,047	2,759	288	53.8	64.0	9.4	9.6
1984 .....	3,081	2,806	275	53.9	64.4	8.9	7.5
1985 .....	3,227	2,965	261	56.1	64.8	8.1	7.2
1986 .....	3,220	2,983	236	55.5	65.3	7.4	7.0
1987 .....	3,244	3,058	186	55.6	65.6	5.7	6.2
1988 .....	3,194	3,037	157	54.9	65.8	N/A	5.5
1989 (3) .....	3,441	3,201	240	58.8	66.4	7.0	5.3

**RECENT MONTHLY TRENDS**

Unemployment Rate

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1983.....	9.6%	9.2%	11.0%	9.2%	8.9%	8.9%	10.6%	10.6%	10.1%	9.2%	8.0%	7.8%
1984.....	8.1	9.2	8.4	7.7	7.6	10.0	11.5	10.1	8.8	9.7	7.9	7.9
1985.....	8.2	9.6	9.0	9.1	8.4	7.4	6.9	7.7	8.1	8.4	7.3	7.1
1986.....	7.3	8.4	7.9	8.7	7.9	7.3	7.9	6.9	6.6	6.9	6.1	6.2
1987.....	7.4	6.0	5.8	5.2	5.4	6.0	6.0	5.1	4.5	5.8	6.6	5.0
1988(3) .....	5.3	4.2	4.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1989(3) .....	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.5	7.0
1990.....	7.0	6.5	6.8	5.9	6.9	6.0						

- (1) Percentage of civilian non-institutional population, age 16 and over, in labor force, employed or seeking employment.
- (2) Percentage of civilian labor force unemployed; excludes those persons unable to work and discouraged workers (i.e., persons not actively seeking work because they believe no suitable work is available).
- (3) From April 1988 through October 1989, the monthly Current Population survey was discontinued. The annual 1989 employment information for the City represents year-end (December) data.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics.

The City's labor force participation rate has remained below that of the nation between 1977 and 1988. The participation rate of City residents in the labor force from 1983 through 1987 was significantly lower than the national rate reflecting a greater number of the City's working age population not actively seeking employment.

The unemployment rate in the City was lower than the nation's during the national economic recession of 1981-1982 and also in 1983. In 1984, the City's unemployment rate fell, but the national rate fell more sharply resulting in the City's rate becoming higher than the nation's. Since then, both the City's and national unemployment rates have been declining steadily. In 1987, after four years, the City's rate fell below the nation's reflecting relative strength of the economy, a tight labor market, and a slowly growing labor force.

From January 1988 through October 1989 the U.S. BLS did not release the monthly series on the New York City resident labor force and unemployment, which was based on the Current Population Survey. Based on a Year End Report, the City unemployment rate for the first ten months of 1989 was 5.5%. The series has been resumed as of November 1989. The June 1990 unemployment rate was reported to be 6.0%.

### Income

While per capita personal income for City residents, unadjusted for the effects of inflation and the differential in living costs, has increased in recent years and remains higher than the average for the United States, it fell from 1950 through 1979 as a proportion of both the national and New York metropolitan area levels. This relative decline in per capita income of City residents was partially because the incomes of households moving into the City were substantially lower than those of departing households, which relocated mostly to the City's suburbs. Because of the higher concentration of income derived from interest, dividends and rent in New York City, the relative growth in per capita income of City residents was higher than for the nation as a whole between 1981 and 1984. Relatively little change in per capita income of City residents occurred in 1985 as compared to the nation. However, recent figures indicate a resurgence in per capita income for City residents.

#### PERSONAL INCOME IN NEW YORK CITY(1)

Year	Personal Income			Per Capita Personal Income					
	NYC Total (in billions)	Average Annual % change		NYC	Average Annual % change		New York City as a percent of		
		NYC	U.S.(2)		NYC	U.S.(2)	U.S.(2)	Suburban Counties(3)	Metropolitan Area(4)
1983.....	99.4	8.3	6.3	13,860	7.4	5.4	114.6	82.9	93.0
1984.....	109.3	10.0	9.5	15,136	9.2	8.4	115.4	82.1	92.9
1985.....	116.1	6.1	7.0	15,983	5.6	6.0	115.0	80.7	92.4
1986.....	123.0	6.0	6.0	16,798	5.1	5.0	115.1	79.1	92.1
1987.....	131.4	6.8	7.0	17,883	6.5	6.0	115.6	77.1	91.4
1988.....	141.4	7.6	7.6	19,229	7.5	6.6	116.6	76.8	91.0

(1) In current dollars. Personal Income is a place of residence measure of income which includes wages and salaries, other labor income, proprietors' income, personal dividend income, personal interest income, rental income of persons, and transfer payments.

(2) Excludes income earned abroad.

(3) Suburban Counties consists of the counties of Nassau, Putnam, Rockland, Suffolk, and Westchester in New York State.

(4) Based on Standard Metropolitan Statistical Area (SMSA) which includes New York City, Putnam, Rockland, Westchester and Bergen counties.

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis and the Bureau of the Census.

## Sectoral Distribution of Employment and Income

Data on the sectoral distribution of employment and income reflect a growing concentration of FIRE (finance, insurance and real estate) and services employment and a shrinking manufacturing base in the City relative to the nation. Within FIRE and services, the expanding trend is especially more marked in finance, business and related professional services. FIRE and services employment comprised over 46 percent of total employment in 1989 (31 percent nationally) up from 38 percent in 1977 (24 percent nationally). On the other hand the share of manufacturing employment in the City declined to 10 percent in 1989 (18 percent nationally) from 17 percent in 1977 (24 percent nationally). The FIRE and services sectors added 470,700 jobs and manufacturing lost about 172,000 jobs during 1977-1988.

There are important implications of this structural shift from the manufacturing to the FIRE and services sectors. First, it has increased the overall income and tax revenue generating capacity for the City, because average employee income in finance and related business and professional services has been considerably higher than in manufacturing. Although the employment share of the FIRE sector increased by 2 percentage points, during 1977-1989, its earnings share increased by about 9 percentage points, which reflects its high per employee income. Second, this shift has also been favorable for the City because the finance and services sectors have recently been less prone to recession than the manufacturing sector. This stabilizing effect has been beneficial for budgetary and long-term economic planning. In contrast, the past benefits from the FIRE and services sector do not ensure that future developments will remain beneficial. A sudden shock in the financial industry (the October 1987 stock market crash is an example) would have a disproportionately adverse effect on the City's employment and income relative to the nation. Payroll employment data indicates that through October 1989 the City's FIRE sector lost 23,000 jobs since the crash, significantly offsetting the employment gains in other sectors. The employment losses in Wall Street are not discernible in the U.S. employment figures. Finally, because of the shrinking manufacturing base, the City will not benefit significantly from a national upturn in manufacturing, a recent trend resulting from the falling value of the dollar.

### SECTORAL DISTRIBUTION OF EMPLOYMENT AND EARNINGS(1)

Sector	Employment				Earnings(2)			
	1977		1989		1977		1988	
	NYC	U.S.	NYC	U.S.	NYC	U.S.	NYC	U.S.
<b>Private Sector</b>								
Non-Manufacturing .....	67.2%	57.8%	72.2%	65.6%	70.7%	56.7%	78.4%	63.3%
Services(3) .....	24.6	18.5	30.8	24.8	26.0	19.6	31.1	25.0
Wholesale and Retail trade .....	19.5	22.5	17.3	23.8	16.7	16.6	13.0	16.4
Finance, Insurance and Real Estate ..	13.0	5.4	14.9	6.3	14.4	5.6	23.0	7.4
Transportation and Public Utilities ...	8.1	5.7	5.8	5.3	11.2	7.5	7.0	6.9
Contract Construction .....	2.0	4.7	3.4	4.9	2.3	5.9	3.8	6.5
Mining .....	0.0	1.0	0.0	0.7	0.1	1.5	0.1	1.1
Manufacturing .....	16.9	23.9	10.2	18.1	15.6	26.1	8.8	20.7
Durable .....	5.1	14.1	2.6	10.6	4.5	16.6	2.1	13.1
Non-Durable .....	11.8	9.8	7.4	7.4	11.1	9.5	6.8	7.7
Government(4) .....	15.9	18.3	17.6	16.3	13.7	17.2	12.8	16.0
Total Non-agricultural .....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(1) The sectoral distributions are obtained by dividing each industry's employment or earnings by total non-agricultural employment or earnings.

(2) Includes the sum of wage and salary disbursements, other labor income, and proprietors' income. The latest information available for New York City is 1987 preliminary data.

(3) Services includes miscellaneous establishments.

(4) Excludes military establishments.

Source: The two primary sources of employment and earnings information are U.S. Dept. of Labor, BLS, and U.S. Dept. of Commerce, Bureau of Economic Analysis ("BEA"), respectively.

## Consumer Prices

The following table presents information on consumer price trends for the New York-Northeastern New Jersey and four other metropolitan areas and the nation.

### CHANGES IN CONSUMER PRICE INDEX: SELECTED AREAS

Area(1)	All Items-Urban Areas											
	Percent Increase Over Prior Year											
	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
New York-NE. N.J.(2)	7.4	7.6	11.3	9.7	5.8	4.7	5.0	3.7	3.3	5.1	4.8	5.6
Philadelphia, Pa.-N.J.	6.8	8.2	13.1	10.2	4.9	2.9	4.7	4.5	2.5	4.8	4.8	4.8
Chicago, Ill.-Northwestern Ind.	5.7	8.0	14.5	9.5	6.9	4.0	3.8	3.8	2.1	4.1	3.9	5.0
Detroit, Mich	6.2	7.6	15.9	9.3	4.1	2.9	3.4	3.5	1.4	3.1	3.9	5.3
L.A.-Long Beach, Anaheim, Calif.	5.2	10.6	15.8	9.8	5.9	1.8	4.5	4.6	3.2	4.3	4.6	5.1
U.S. city average	5.9	9.1	13.5	10.3	6.2	3.2	4.3	3.6	2.0	3.6	4.1	4.7

- (1) Area is generally the SMSA, exclusive of farms. L.A.-Long Beach, Anaheim, Calif. is a combination of two SMSA's, and N.Y., N.Y.-Northeastern N.J. and Chicago, Ill.-Northwestern Ind. are the more extensive Standard Consolidated Areas. Area definitions are those established by the U.S. Office of Management and Budget in 1973. Cities in the respective areas had a population of one million or more according to 1980 census.
- (2) Since January 1987, the New York area coverage has been expanded. The New York-Northeastern New Jersey area comprises the five boroughs of New York City, Nassau, Suffolk, Westchester, Rockland, Putnam, and Orange Counties in New York State; Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, and Union Counties in New Jersey; and Fairfield County and parts of Litchfield and New Haven Counties in Connecticut.

Source: U.S. Department of Labor, BLS.

### BY EXPENDITURE CLASS

Expenditure Class	Annual Average % Increase 1979-89		% Increase 1989		% Increase June 1990 over June 1989	
	U.S.	New York-NE. N.J.	U.S.	New York-NE. N.J.	U.S.	New York-NE. N.J.
	All Items	5.5	5.9	4.8	5.6	4.7
Food and Beverages	4.6	5.4	5.7	5.8	5.4	5.0
Housing	5.8	6.2	3.8	5.5	4.4	4.6
Apparel and Upkeep	3.4	2.8	2.8	6.1	4.7	6.3
Transportation	4.9	5.1	5.0	3.3	2.0	2.6
Medical Care	8.3	8.3	7.7	7.6	9.0	10.2
Entertainment	5.1	5.5	5.2	5.5	4.5	5.5
Other Goods and Services	8.0	8.3	7.8	8.9	7.9	7.4

Note: Monthly data are not seasonally adjusted.

Source: U.S. Department of Labor, BLS.

Historically the New York Area inflation rate does not conform very well with the national inflation rate. Since 1960, the difference in the New York Area rate from the national rate varied from 1.6 percentage points higher in 1970 to 2.6 percentage points lower in 1979. Prices in the metropolitan area rose at a rate higher than the nation during the periods 1960-1966, 1968-1972 and 1983-present. During 1967 and the period 1973-1982 prices in the area rose either at par with or more slowly than the nation and many of the 27 metropolitan areas for which CPI data are maintained.



For most of 1983 and 1984, the nation as well as each of the 5 metropolitan areas containing central cities with populations of one million or more had inflation rates lower than the New York Area. During 1985, the New York Area rate decreased to about the median level of those reported for the five metropolitan areas and was running very close to the national rate. The local area inflation rate accelerated in 1986 and stood highest among the reported metropolitan areas in 1987. The rate of inflation in the New York Area as well as the nation started to edge up moderately since March of 1988, after a brief deceleration early in the year. In June 1990, the New York Area rate was 5.1 percent and the U.S. rate was 4.7 percent. The June upturn for the City is attributed primarily to higher prices for clothing, shelter and food; partially offsetting these increases were lower costs in energy and transportation.

#### Public Assistance

Between 1960 and 1972, the number of persons in the City who were recipients of some form of public assistance more than tripled, from 324,200 to 1,265,300. The bulk of the long-term increase occurred in the Aid to Families with Dependent Children ("AFDC") program, which more than quadrupled during that period.

Between 1972 and 1982 the number of recipients, including those in the Supplemental Security Income ("SSI") program, declined fairly steadily, except for temporary increases noted in 1975 and 1976, when the City was experiencing the effects of a national recession. From 1983 until 1987 the number of recipients increased, reflecting lingering effects of the 1982 recession. Figures for 1988 and 1989 indicate a decrease in public assistance recipients.

Public assistance and SSI recipients rose as a proportion of total City population from 4.2% in 1960 to 16.5% in 1975. Between 1975 and 1985, that proportion decreased to 15.8% of total population.

The following table sets forth the number of persons receiving public assistance in the City.

#### PERSONS RECEIVING PUBLIC ASSISTANCE IN NEW YORK CITY

(Annual Averages In Thousands)

Year(1)	Total	Average Annual Change (%)	Home Relief	AFDC	AFDC Unemployed Parent
1983.....	889.0	4.4	148.0	720.9	20.2
1984.....	918.7	3.3	162.5	735.3	20.8
1985.....	926.1	0.8	174.0	731.1	21.0
1986.....	911.5	-1.6	174.3	717.6	19.6
1987.....	871.5	-4.4	162.0	694.2	15.3
1988.....	840.1	-3.6	155.8	671.2	13.0
1989.....	818.5 (2)	-2.6	151.0	641.0	12.0

(1) Figures do not include aged, disabled or blind persons who were transferred from public assistance to the Supplemental Security Income ("SSI") program, which is primarily Federally funded. According to the U.S. Department of Health and Human Services, the SSI program supported, as of December of each year, a total of 227,068 persons in 1979; 223,934 persons in 1980; 217,274 persons in 1981; 207,484 persons in 1982; 206,330 persons in 1983; 211,728 persons in 1984; 217,852 persons in 1985; 223,404 in 1986 and 227,918 in 1987.

(2) Figure includes approximately 14,600 persons receiving public assistance as predetermined grant recipients pending AFDC eligibility.

NOTE: Due to a change in statistical measurements, the decline in public assistance recipients for 1987 may be slightly overstated.

## RECENT MONTHLY TRENDS

(Total Recipients In Thousands)

<u>Year</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
1983	872.7	867.9	881.6	882.8	885.7	887.7	886.8	894.3	894.3	901.5	901.0	912.0
1984	908.9	911.0	914.4	922.9	931.3	927.9	920.8	918.5	910.3	921.2	917.7	919.1
1985	923.9	921.0	931.2	935.7	924.5	925.1	925.8	930.5	922.6	927.6	922.0	922.9
1986	920.2	917.8	918.9	919.7	916.5	913.0	915.6	906.8	904.9	907.8	897.6	898.9
1987	894.8	890.1	893.9	894.0	889.5	885.9	873.5	859.3	854.0	845.2	831.2	847.0
1988	839.4	852.2	856.8	865.1	852.6	846.3	838.9	836.3	826.2	825.9	820.1	822.3
1989	813.4	816.2	821.1	816.7	815.3	815.0	813.0	820.7	817.8	825.1	824.3	823.0
1990	823.6	827.6	839.0	841.7	849.7							

**NOTE:** Details may not add up to totals due to rounding.

**SOURCE:** The City of New York, Human Resources Administration, Office of Budget and Fiscal Affairs, Division of Statistics.

### Economic Base

The City has a highly diversified economic base, and sustains a substantial volume of business activity in the service industry, wholesale and retail trade, and manufacturing.

The largest aggregate of economic activity in the City is the corporate headquarters complex, together with ancillary services. The City is the location of a large number of major corporate headquarters, and is the leading center for corporate services, such as commercial and investment banking, law, accounting and advertising. While the City experienced a substantial number of business relocations during the previous decade, the number of relocations declined significantly after 1976, although declines in front office employment continued. During 1977 and 1982 employment rebounded, primarily in the banking and securities industry. Most of the corporations which relocated moved to sites within the City's metropolitan area, and continue to rely in large measure on services provided by businesses which are still located in the City.

The City is a leading center for the banking and securities industry, life insurance, communications, publishing, fashion design and retailing, among other fields. The City is a major seaport and a focal point for international business. Many of the major corporations headquartered in the City are multinational in scope and have extensive foreign operations. Numerous foreign-owned companies in the United States are also headquartered in the City. These firms, which have increased in number substantially over the past decade, are found in all sectors of the City's economy, but are concentrated in trade, manufacturing sales offices, tourism and finance. Foreign banking activities have increased significantly since the early 1970's and have continued to grow rapidly through the 1980's. Real estate purchases in the United States disclosed by foreigners are heavily concentrated in the City in terms of dollar value. The City is the location of the headquarters of the United Nations, and several affiliated organizations maintain their principal offices in the City. A large diplomatic community exists in the City to staff the 157 missions to the United Nations and the 88 foreign consulates.

Manufacturing, while no longer dominant in the City's economy, remains a major economic activity, and the City is a leading production center, particularly in the apparel and printing and publishing sectors. Nationally the City is one of the largest employment centers for manufacturing and New York County ranked among the top 25 counties in the United States in the value of manufacturing shipments during 1987.

A major world center for culture and the arts, the City is the nation's leading tourist center and tourism is a major revenue producing industry in the City. In 1979, the City hosted a record number of tourists and business visitors, 17.5 million, who injected nearly \$2.3 billion into the local economy and filled the City's hotels to 81% of capacity. During 1982, tourism declined slightly but rebounded during 1983 and 1984. Tourism was down slightly in 1985, but up significantly during 1986. Despite current economic conditions worldwide, tourism continues as one of the City's major economic strengths. During 1988, 19.8 million

people visited the City, up slightly from 1987. Local visitors spent a total of \$9.76 billion, a 9.7% increase from 1987. A rise in overseas visitor business occurred, with the number of foreign visitors increasing to over 4.6 million in 1988, a 15% increase from 1987. Overseas visitors continued to increase for the fourth consecutive year after three years of declines in visitor business from abroad. The number of conventions increased to 973 in 1988 from 965 in 1987 and the number of delegates attending stood at 3.0 million in 1988. In 1989, the hotel occupancy rate in the City was 74.5%, a slight decrease from the 1988 rate.

#### NUMBER OF VISITORS AND HOTEL OCCUPANCY RATE IN NEW YORK CITY

Year	Visitors(1)	Hotel Occupancy Rate(2)
	(in Millions)	Annual Average of Monthly Rates
1980	17.1	78.4%
1981	17.0	72.8
1982	16.9	69.7
1983	17.1	71.9
1984	17.2	75.1
1985	17.1	72.2
1986	17.4	76.0
1987	19.8*	76.2
1988	19.8*	76.7
1989	NA	74.5

(1) SOURCE: New York City Convention & Visitors Bureau, Inc.

(2) SOURCE: Pannell, Kerr, Forster & Company, Statistics and Trend of Hotel and Motor Hotel Survey and Report.

\* 1987 and 1988 figures have been revised and are inconsistent with the rest of this series.

The City is a major retail trade market, and has the greatest volume of retail sales of any city in the nation.

#### RETAIL SALES IN NEW YORK CITY

Year	Total Retail Sales		Annual Percent Change					
	(in billions)		Total Retail Sales		Non-Durable(1)		Durable(2)	
	NYC	U.S.	NYC	U.S.	NYC	U.S.	NYC	U.S.
1980	22.3	957.4	16.3%	6.9%	14.2%	11.7%	24.1%	-2.3%
1981	23.4	1,038.7	4.8	8.5	8.1	8.5	-6.0	8.6
1982	23.4	1,069.4	0.2	3.0	-1.7	2.7	7.4	3.5
1983	25.5	1,170.8	8.6	9.5	5.9	6.3	18.2	16.2
1984	27.0	1,287.8	6.0	10.0	4.7	6.8	9.8	16.3
1985	29.2	1,375.7	8.4	6.8	6.7	5.3	13.5	9.6
1986	33.5	1,450.3	14.6	5.4	9.2	3.6	29.6	8.6
1987	33.6	1,542.1	0.4	6.3	1.1	6.2	-1.3	6.5
1988	37.0	1,650.0	9.9	7.0	8.9	5.9	12.3	8.8
1989	36.7	1,733.7	-0.7	5.1	0.2	6.4	-2.8	3.0

(1) Includes food stores, eating and drinking places, gasoline stations, liquor stores, drug stores, fuel dealers, florists, hay-grain-feed stores, farm and garden supply stores, stationery stores, newsstands and news-dealers, cigar stores and ice dealers and general merchandise and apparel stores.

(2) Includes building materials, hardware, garden supply and mobile home dealers, automotive dealers, and furniture, home furnishings and equipment stores.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Business Reports, Monthly Retail Trade.

## BUSINESS ACTIVITY INDEX

(Annual Average: 1977 = 100)

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990(1)</u>
New York City .....	109	112	116	121	124	125	128
New York State .....	114	119	124	129	135	136	140

(1) Through April 1990.

SOURCE: State of New York, Department of Commerce, Division of Economic Research and Statistics.

NOTE: The Business Activity Index comprises seven basic business activities, which include: factory output; retail; service; wholesale; construction; transportation; communications and public utilities; and finance, insurance and real estate.

After a very large increase in 1980, retail sales growth in New York City moderated in 1981 and almost came to a standstill in 1982, which was a recession year. Between 1984 and 1986, retail sales, particularly of durable goods, grew at an increased rate, outpacing the nation in 1985 and 1986. Retail sales increased a paltry 0.14% in 1987 mainly because consumers shifted their purchases into 1986 (sales increased 14.6%) to take advantage of the expiring sales tax deductibility on federal income tax returns. The October 1987 stock market crash had a temporary dampening effect on retail sales. In 1988, sales increased by 9.9%. The March 1990 figures indicate an increase of 3.8% compared to March 1989.

The Business Activity Index for the City reflects both long-term trends in the City's economic base and short-term fluctuations reflecting the performance of the national economy. Due to a partial erosion of its economic base, the City was particularly vulnerable to national economic downturns, while lagging behind in times of national expansion during the 1970's. The impact of the national economic recession of 1974-1975 was particularly severe. From a peak of 111 early in 1973, the BAI for the City declined to a low of 96 during the spring of 1975. The effects of the 1980 and 1981-1982 national recessions were less severe to the City's economy. Business activity increased steadily from 1983 through 1985. Business activity continued to expand during 1986 and 1987. The 1988 figure was higher than that of 1987. The April 1990 figures for both New York State and New York City show improvement over those for the same period in 1989.

Many factors have been cited as placing the City during the early 1970's at a competitive disadvantage as a business location in relation to its suburbs and the Sunbelt region and contributing to the erosion of the City's economic base. Among these factors were the City's tax burden, energy costs, labor costs, office space market and cost of living.

The combined state and local tax burden on residents of the City is one of the highest among all cities in the United States. In the 1986 fiscal year, average per capita City taxes were \$1,548 and average per capita State taxes paid by residents of the state were \$1,280, a combined tax burden of \$2,828 per capita. Nationwide, per capita local taxes averaged \$601 and per capita state taxes averaged \$946 for the 1986 fiscal year for a combined tax burden of \$1,547. During the 1970's the rate of increase in per capita state and local taxes for City residents was similar to the national average. The ratio of City taxes to total personal income of City residents peaked in the 1977 fiscal year at 10.6%, and declined to 9.2% in the 1984 fiscal year. A series of tax reductions affecting businesses and individuals was adopted during the late 1970's and these reductions were a major factor in the declining ratio of City taxes to total personal income of City residents.

The City is one of the most energy-efficient areas in the nation, primarily as a result of its concentration of multi-family dwellings and extensive use of mass transit. Producing virtually no primary energy for its own consumption, the City is heavily reliant upon imported petroleum to meet its energy needs. The cost of energy in the City is one of the highest in the nation, particularly for electricity.

The City's industrial sector is especially dependent upon electricity to supply its energy needs. In 1968, typical electric costs for large industrial users were 67% higher in the City than the national average for large cities. Through the mid-1970's electric costs increased at a higher rate in the City, widening the differential to 133% by 1975. Between 1975 and 1986, the national average increases in typical electric costs for large industrial users were significantly higher than increases experienced in the City. By 1985, electric costs in the City were 71% higher than nationally for industrial usage and in 1986 the cost differential increased significantly to 91%.

In the mid-1960's, the demand for office space in the City greatly exceeded the available supply; as a result, the rental cost of available space escalated sharply. By the late 1960's, annual rent in new office buildings had risen much more sharply in the City than either in its suburbs or in many other cities in the United States, particularly those in the South and West. The construction of new office space in the early 1970's, along with the City's loss of jobs and industry, greatly increased the amount of available office space. The increased supply of office space raised the vacancy rate and caused commercial rents to decline. However, beginning in 1977 and continuing through most of 1982, the office space market tightened in response to an increase in demand. At the end of 1982 and in early 1983, construction activity increased and the office market softened. Recent data indicate that the office market in the City, particularly in the downtown area where older, poorly maintained buildings have been vacated, could further soften due to an increased supply of office space.

### **Infrastructure**

The physical infrastructure of a city, its systems of water supply, sewers, bridges, streets and mass transit, is the underlying component of its economic base and is vital to its economic health.

The City owns and operates an upstate reservoir system covering in excess of 1,950 square miles. Water is carried to the City by a transmission system, consisting of three aqueducts, two tunnels and over 5,700 miles of trunk and distribution lines. The City has undertaken construction of a third water tunnel project to enhance the delivery capabilities and proper maintenance of the City's distribution system. In addition to supplying the needs of its residents and businesses, the City is required by State law to sell water to municipalities in counties where its water supply facilities are located. The City and its upstate watershed areas are subject to periodic drought conditions, which led the City to impose mandatory water conservation measures during 1965, 1981 and 1985.

The sewer system contains approximately 6,300 miles of sewer lines and the City's water pollution system includes 14 operating treatment facilities. The City's road network consists of some 6,200 miles of streets and arterial highway, and more than 1,300 bridges and tunnels.

The Department of Sanitation operates the City's two landfills. The capacity of the Fresh Kills site, the primary of the two, is expected to last until approximately 2015. The City's Ten-Year Capital Plan reflects the estimated costs of capital improvements necessary to maximize current waste disposal capacity and to provide for the construction of six resource recovery plants at an estimated cost of \$2.4 billion.

The City's mass transit system includes a subway system which covers over 233 route-miles with 469 stations and is the most extensive underground system in the world. The concentration of employment in the City and its metropolitan area in the Manhattan central business district increases the importance of the City's mass transit system to the City's economy. Two-fifths of all workers residing in the New York area use public transportation to reach their workplace, the largest proportion among 26 large areas surveyed. New York City's subway system continues to undergo its most extensive overhaul since it was completed 50 years ago.

The City has developed a ten-year capital program for the period 1989-1998 which projects available capital funds over this period of \$57.3 billion, of which \$40.0 billion would be obtained from City sources. A portion of these funds is for rehabilitation or replacements of various elements of the infrastructure. Included in the ten-year estimates is the last year of the Transit Authority's portion of a five-year \$8.5 billion capital program designed to upgrade the performance of the MTA's transportation systems and to

supplement, replace and rehabilitate equipment, which was approved by the State Legislature in 1981, and City projections of funding expected for the subsequent nine years.

### Housing

The housing stock in the City in 1987 consisted of 2,840,257 housing units, excluding units in special places, primarily institutions such as hospitals and universities. The 1987 housing inventory represented an increase of 36,988 units, or 1.3%, since 1984. While the total population of the City declined by 10.4% between 1970 and 1980, housing in the City remains in short supply. A concurrent trend toward smaller sized households resulted in a decrease during the 1970's of only 1.7% in the total number of resident households. The following table presents the housing inventory in the City.

### HOUSING INVENTORY IN NEW YORK CITY

(Housing Units in Thousands)

<u>Ownership/Occupancy Status</u>	<u>1981</u>	<u>1984</u>	<u>1987</u>
Total Housing Units .....	2,792	2,803	2,840
Owner Units .....	755	807	837
Owner-Occupied .....	746	795	817
Conventional Home .....	581	598	576
Cooperative (1) .....	165	197	242
Vacant for Sale .....	9	12	19
Rental Units .....	1,976	1,940	1,932
Renter-Occupied .....	1,934	1,901	1,884
Vacant for Rent .....	42	40	47
Vacant, Not Available For Sale Or Rent (2) .....	62	56	72

(1) Includes condominiums.

(2) Vacant units that are dilapidated, intended for seasonal use, held for occasional use, held for maintenance purposes or other reasons.

NOTE: Details may not add up to totals due to rounding.

SOURCES: Stegman, Michael A., *Housing and Vacancy Report: New York City*. The City of New York Department of Housing Preservation and Development (New York: April 1988).

The 1987 Housing and Vacancy Survey indicates that rental housing units predominate in the City. Of all occupied housing units in 1987, 30.2% were conventional home-ownership units, 8.8% were cooperatives or condominiums and 69.8% were rental units. Most of the recent growth in owner-occupied units has come from the conversion of existing rental units to cooperatives rather than through the new construction of housing for sale to occupants in the City. The vacancy rate for rental housing was 2.46% in 1987, and median rent consumed 29% of the gross income of tenants. The housing condition of occupied rental units improved greatly since 1984, with a decrease in the proportion of rental units in dilapidated or deficient condition. Only 2% of renter-occupied housing units were located in dilapidated structures, and 14% were in structures with at least three serious maintenance deficiencies.

After a significant decline during the early 1970's, a slight recovery in housing construction occurred between 1975 and 1979. However, in 1980, new housing construction declined again. Of all new housing units constructed in the City between 1975 and 1978, over two-thirds were government financed or government aided; of privately financed housing units, nearly half received full or partial tax exemptions. Rehabilitation of existing housing units and conversions of housing units from other uses, through private financing and City-administered Federal funds or tax abatement programs, has increased substantially in recent years, and is now a significant segment of the City's housing market.

## Construction

The following table presents indicators of construction activity in the City.

### CONSTRUCTION ACTIVITY IN NEW YORK CITY

Year	Cost of Construction (In Millions)(1)			New Housing Units(1)	Manhattan Central Business District(2) Office Building Completions	
	Total	New Residential	New Non- Residential		No. of Buildings	Rentable Area (In Thousands of Sq. Ft.)
1981	940	322	415	11,060	4	2,558
1982	1,396	286	786	7,649	14	8,486
1983	882	407	281	11,795	18	9,850
1984	1,024	466	359	11,566	7	4,931
1985	2,540(3)	1,321	949	23,368(3)	9	6,325
1986	1,424	567	574	10,552	12	5,999
1987	2,272	935	722	13,764	15	9,075
1988	1,422	591	372	9,897	8(4)	3,298(4)

- (1) Based on building permits issued. Total "Cost of Construction" includes the value of additions and alterations not presented separately.
- (2) The "Manhattan Central Business District" comprises, generally, the area of the Borough of Manhattan south from Sixty-fifth Street to the Battery.
- (3) With mortgage interest rates falling to their lowest point in six years, a strong State economy, and the luxury construction boom in Manhattan, residential construction activity reached its highest level in twelve years.
- (4) The number of building completions and the rentable area for 1988 includes figures for midtown only since there were no completions for the downtown area for this period.

NOTE: Details may not add up to totals due to rounding.

SOURCES: Data regarding "Cost of Construction" and "New Housing Units" from the State of New York, Executive Department, Division of Housing and Community Renewal; data regarding "Manhattan Central Business District Office Building Completions" from Cushman and Wakefield Inc.

Office building construction in the Manhattan Central Business District is undergoing a resurgence after experiencing significant declines during the 1970's. Between 1954 and 1968 an annual average of more than 4.7 million square feet of new office space was completed. An unusual surge of construction activity occurred between 1969 and 1972, when 61 new office building completions added a total of 51.2 million square feet of office space to the market, during a period of substantial decline in employment in the City. Construction activity declined after 1972, and by 1979 only 110,000 square feet of office space entered the market as a result of building completions. During the late 1970's demand for office space, as a result of increased employment in the services and finance sectors of the City's economy and an increase in office space per employee, reduced the vacancy rate in the office space market from an estimated 15% in 1972 to 2% in 1981. The vacancy rate rose to 5.4% in 1983, 7.1% in 1984 and 8.2% in 1985 due to the strong upswing in construction activity. This trend continued during 1986 indicating a vacancy rate of 8.4%. In 1987 construction in the City had increased while commercial rents declined.

During 1980, new office building completions in the Manhattan Central Business District increased the level of rentable space by 412,000 square feet, and construction was started on a number of new projects, raising the value of all new construction in the City to over \$1 billion, the largest amount since 1973. Four new office building completions in 1981 added 2.5 million square feet of office space. During 1982, a total of 14 newly constructed or wholly renovated buildings with over 8.4 million square feet of space were

completed. During 1983, a total of 18 newly constructed or wholly renovated buildings with over 9.8 million square feet of space were completed. A total of 7 new office building completions in 1984 added over 4.9 million square feet of office space. A total of 9 new office buildings were completed in 1985 adding over 6.3 million square feet of office space. During 1986, 12 new office building completions added almost 6.0 million square feet of office space. During 1987, a total of 15 new office buildings were completed, adding over 9.0 million square feet of office space.

Between 1975 and 1979, the number of building permits for new housing units and the value of all new construction increased, indicating that a partial recovery in construction activity in the City occurred, although at a level much reduced from the 1962 peak. During 1980, permits were issued for 7,800 new housing units, compared to 14,524 issued in 1979, and the value of all new construction rose to \$1.063 billion, up from \$589 million in 1979. During 1981, building permits were issued for 11,060 new housing units, a 42% increase from 1980. However, during 1981, the total value of construction declined to \$940 million, including a decline in the value of new non-residential construction to \$415 million. During 1982, the number of new housing units for which permits were issued declined to 7,649, while the value of all new construction rose to \$1.396 billion reflecting a substantial increase in new non-residential construction. During 1983, the number of new housing units for which permits were issued increased to 11,795, however, the total value of construction declined to \$882 million, reflecting a substantial decline in the value of new non-residential construction. During 1984, the number of new housing units for which permits were issued declined to 11,566, while the total value of construction increased to \$1.024 billion reflecting increases in both new residential and new non-residential construction.

During 1985, the number of new housing units for which permits were issued substantially increased to 23,368, while the total value of construction increased to \$2.540 billion from 1984, reflecting a significant increase in luxury unit construction. During 1986, the value of construction in the City decreased 44% from 1985, primarily due to the termination of the Section 421-a tax abatement program in 1985. This caused residential construction to surge in 1985 as an estimated 7,500 units were borrowed from 1986 as developers accelerated construction schedules. In 1986, non-residential construction decreased 40% over the previous year to \$574 million while residential construction decreased 57% from 1985, totalling \$567 million. New housing unit construction for 1986 decreased from 1985 levels to 10,552 units, indicating a 55% decrease. From 1986 to 1987, non-residential construction increased 26% to \$722 million, and residential construction rose by 65% to \$935 million. During the same period, new housing unit construction for 1987 increased 30% to 13,764 units. Recent figures show a decline from this level of 39% to 9,897 units.

**Real Estate Valuation**

The following tables present data on a fiscal year basis regarding recent trends in the assessed valuation of taxable real property in the City.

**TRENDS IN ASSESSED VALUATION OF TOTAL TAXABLE REAL PROPERTY  
IN NEW YORK CITY  
(In Millions)**

<u>County (Borough)</u>	<u>Fiscal Year</u>				
	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Bronx (The Bronx) .....	\$ 3,336	\$ 3,444	\$ 3,670	\$ 3,973	\$ 4,330
Kings (Brooklyn) .....	7,623	7,892	8,363	9,023	9,723
New York (Manhattan) .....	32,027	35,183	38,928	42,889	47,227
Queens (Queens) .....	9,931	10,310	10,807	11,543	12,386
Richmond (Staten Island) .....	2,172	2,283	2,374	2,627	2,669
<b>Total</b> .....	<b>\$55,089</b>	<b>\$59,112</b>	<b>\$64,142</b>	<b>\$70,054</b>	<b>\$76,334</b>

**NOTE:** Details may not add up to totals due to rounding. Totals do not include the value of certain property eligible for the veterans' real property tax exemption.

**SOURCE:** The City of New York, Department of Finance, Bureau of Real Property Assessment.



**ASSESSED VALUATION OF TOTAL TAXABLE REAL ESTATE BY  
COMPONENTS FOR NEW YORK CITY**

Type of Property	Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989		Fiscal Year 1990	
	Assessed Value (In Millions)	Percentage Of Taxable Real Estate	Assessed Value (In Millions)	Percentage Of Taxable Real Estate	Assessed Value (In Millions)	Percentage Of Taxable Real Estate	Assessed Value (In Millions)	Percentage Of Taxable Real Estate
One-Family Dwellings	\$ 3,385.6	6.1%	\$ 3,530.0	6.0%	\$ 3,721.9	5.8%	\$ 3,911.4	5.6%
Two-Family Dwellings	2,660.8	4.8	2,794.3	4.7	2,920.7	4.5	3,051.9	4.4
Walk-Up Apartments	3,962.3	7.2	4,101.5	6.9	4,488.6	7.0	5,019.8	7.2
Elevator Apartments	10,214.7	18.5	11,183.5	18.9	12,094.6	18.9	13,176.9	18.8
Warehouses	577.1	1.0	582.8	1.0	668.1	1.0	767.1	1.1
Factory and Industrial Buildings	1,110.9	2.0	1,176.6	2.0	1,263.8	2.0	1,429.1	2.0
Garages and Gasoline Stations	653.4	1.2	702.6	1.2	779.0	1.2	883.5	1.3
Hotels	1,030.0	1.9	1,081.7	1.8	1,218.9	1.9	1,429.7	2.0
Hospitals and Health	332.0	0.6	371.0	0.6	400.9	0.6	374.6	0.5
Theatres	134.6	0.2	145.3	0.2	151.5	0.2	165.5	0.2
Store Buildings	2,765.7	5.0	3,218.5	5.4	3,898.2	6.1	4,479.3	6.4
Loft Buildings	1,815.9	3.3	1,989.3	3.4	2,135.4	3.3	2,467.1	3.5
Churches, Synagogues, Etc.	34.0	0.1	29.9	0.1	30.9	0.1	30.5	0
Asylums and Homes	36.4	0.1	40.3	0.1	48.7	0.1	53.4	0.1
Office Buildings	14,899.2	27.0	16,780.7	28.4	18,493.0	28.8	20,980.8	29.9
Places of Public Assembly	92.7	0.2	96.6	0.2	99.6	0.2	107.9	0.2
Outdoor Recreation Facilities	66.0	0.1	69.4	0.1	75.0	0.1	85.4	0.1
Condominiums	914.2	1.7	1,252.8	2.1	2,144.4	3.3	2,812.9	4.0
Residence Multi-Use	183.9	0.3	206.3	0.3	228.7	0.4	267.5	0.4
Transportation Facilities	24.9	0	27.1	0	24.4	0	26.5	0
Utility Bureau Properties	0.1	0	0.1	0	0.1	0	0.1	0
Vacant Land	509.2	0.9	538.6	0.9	613.5	1.0	758.8	1.1
Educational Structures	87.7	0.2	86.3	0.1	106.4	0.2	119.4	0.2
Selected Government Installations	5.4	0	6.9	0	2.5	0	2.4	0.0
Miscellaneous	219.9	0.4	218.4	0.4	219.0	0.3	227.9	0.3
Real Estate of Utility Corporations and Special Franchises	9,372.8	17.0	8,881.2	15.0	8,311.8	13.0	7,424.6	10.6
<b>Total</b>	<b>\$55,089.4</b>	<b>100.0%</b>	<b>\$59,111.6</b>	<b>100.0%</b>	<b>\$64,141.6</b>	<b>100.0%</b>	<b>\$70,053.9</b>	<b>100.0%</b>

NOTE: Details may not add up to totals due to rounding. Totals do not include the value of certain property eligible for the veterans' real property tax exemption.

SOURCE: The City of New York, Department of Finance, Bureau of Real Property Assessment.

No single taxpayer accounts for 10% or more of the City's real property tax. For the 1990 fiscal year, the assessed valuation of real estate of utility corporations is \$4.6 billion. The following are 42 non-utility, non-residential properties having the greatest assessed valuations in the 1990 fiscal year.

**Largest Real Estate Taxpayers (1)**

Property	1990 Fiscal Year Assessed Valuation	Property	1990 Fiscal Year Assessed Valuation
Exxon Building	\$ 213,000,000	Bristol Meyers	\$ 120,800,000
Pan Am Building	212,000,000	Burlington House	118,700,000
55 Water Street Building	204,800,000	Architects Building	117,400,000
General Motors Building	170,200,000	American Brands Building	115,720,000
The Chase Manhattan Building	168,200,000	Morgan Guaranty Trust	115,000,000
McGraw-Hill Building	167,810,000	Dai-Ichi Seimei-Citicorp Center	114,073,600
One New York Plaza Building	161,200,000	Produce Exchange	113,000,000
Empire State Building	158,780,000	Simon & Schuster Building	110,677,000
Equitable Life Association	155,571,651	Carpet Center	104,480,000
One Liberty Plaza	145,000,000	American Express Plaza	104,200,000
International Building	144,538,000	Continental Illinois Center	101,500,000
One Penn Plaza	143,150,000	Mobil Building	101,400,000
Time & Life Building	137,400,000	One Banker Trust Plaza Building	100,600,000
Sperry Rand Building	136,800,000	W. R. Grace Building	91,120,000
Tishman Building	134,000,000	Chemical Bank Building	91,120,000
Paramount Plaza	133,300,000	Citibank-Citicorp	90,601,420
Solow Building	132,540,000	Marine Midland Building	88,500,000
Equitable Building	128,128,327	595 Lexington Avenue	88,360,000
Celanese Building	123,200,000	The Equitable Building	86,200,000
Manufacturers Hanover Building	121,000,000	Seagram Building	85,820,000
J.C. Penny Building	120,970,000	Park Avenue Plaza	85,412,000

(1) Excludes real estate of public utilities.

SOURCE: The City of New York, Department of Finance, Bureau of Real Property Assessment.

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## GLOSSARY AND SUMMARY OF CERTAIN DOCUMENTS

## GLOSSARY

The following are definitions of certain terms contained in the Agreement, the Lease and the General Resolution and not otherwise defined in this Official Statement:

**Adjusted Aggregate Debt Service:** For any Fiscal Year and as of any date of calculation is the sum of the Adjusted Debt Service for all Series of Bonds Outstanding during such Fiscal Year.

**Adjusted Debt Service:** For any Fiscal Year, as of any date of calculation and with respect to any Series of Bonds, is the Debt Service for such Fiscal Year for such Series except that, if any Refundable Principal Installment of such Series of Bonds is included in Debt Service for such Fiscal Year, Adjusted Debt Service shall mean Aggregate Debt Service determined as if each such Refundable Principal Installment had been payable over a period extending from the due date of such Refundable Principal Installment through the last date on which such Series of Bonds could have been stated to mature under the Act as in effect on the date of issuance of such Series, in installments which would have required equal annual payments of Principal Installments and interest over such period. Interest deemed payable in any Fiscal Year after the actual due date of any Refundable Principal Installment of any Series of Bonds shall be calculated at the actual interest cost payable on the Bonds of such Series (using the actuarial method of calculation).

**Aggregate Debt Service:** For any Fiscal Year, as of any date of calculation, the sum of the Debt Service for all Bonds Outstanding during such Fiscal Year.

**Authority Expenses:** All reasonable or necessary current expenses of the Authority, including all salaries, administrative, general, commercial, engineering, advertising, public notices, auditing and legal expenses, insurance and surety bond premiums, fees paid to banks, insurance companies or other financial institutions for the issuance of Credit Facilities, consultants' fees and charges, payment to pension, retirement, health and hospitalization funds, costs of public hearings, ordinary and current rentals of equipment and other property, lease payments for real property or interests therein, expenses, liabilities and compensation of any Fiduciary and all other expenses necessary, incidental or convenient for the efficient operation of the Authority.

**Authorized Representative:** In the case of both the Authority and the Board, their respective Chairman or Executive Director, or such other person or persons so designated by resolution of the Authority or the Board, as the case may be, and in the case of the City, the Mayor, unless a different City official is designated to perform the act or sign the document in question.

**Bond or Bonds:** For purposes of the Agreement and the Resolution, means the bonds, notes or other evidences of indebtedness issued by the Authority under and pursuant to the Act and the Resolution, including Parity Bond Anticipation Notes and Parity Reimbursement Obligations; but shall not mean Subordinated Indebtedness or other Bond Anticipation Notes or Reimbursement Obligations; and for purposes of the Lease, means any bonds, notes or other evidences of indebtedness for borrowed money issued by the Authority.

**Cash Flow Requirement:** Means for each Fiscal Year and as of any date of certification, the amount, certified by the Authority to the Trustee and the Board equal to the difference between (A) the sum of (i) the estimated Aggregate Debt Service for such Fiscal Year, (ii) the Projected Debt Service for such Fiscal Year, (iii) the estimated Authority Expenses for such Fiscal Year, and (iv) the other Required Deposits estimated for such Fiscal Year and (B) (i) if the certification is made prior to the commencement of the Fiscal Year, the amount anticipated by the Authority as of such date of calculation to be held by the Trustee, as of the first day of such Fiscal Year, in the Revenue Fund and (ii) if the certification is made after the commencement of such Fiscal Year, the amount which had been anticipated pursuant to (B) (i) above.

**Consulting Engineer:** Means Metcalf & Eddy of New York, Inc. or such other independent engineer or engineering firm of recognized standing selected by the Authority and satisfactory to the Board.

**Corporation:** The New York State Environmental Facilities Corporation and any successor entity which may succeed to its rights and duties respecting the State Revolving Fund.

**Cost or Costs of a Water Project:** The cost of construction, as such term is defined in the Act, including, without limiting the generality of the foregoing, the erection, alteration, improvement, enlargement or rehabilitation of the System or a Water Project, the inspection and supervision thereof, the engineering, architectural, legal, fiscal, economic and environmental studies, designs, plans, specifications, procedures and other actions incidental thereto; the cost of the acquisition of all Property; the cost of demolishing, removing or relocating any buildings or structures on lands so acquired (including the cost of acquiring any lands to which such buildings or structures may be moved or relocated); the cost of all systems, facilities, machinery, equipment, financing charges and interest prior to, during and after construction (if not paid or provided for from revenues or other sources); the cost of engineering and architectural surveys, plans and specifications; the cost of consultants' and legal services; the cost of lease guarantee or bond insurance; other expenses necessary, reasonably related or incidental to the construction of such Water Project and the financing of the construction thereof, including the cost of Credit Facilities, the amounts authorized in the Resolution to be paid into any reserve or other special fund from the proceeds of Bonds and the financing or the placing of any Water Project in operation, including reimbursement to any governmental entity or any other person for expenditures that would be Costs of such Water Project and all claims arising from any of the foregoing.

**Credit Facility:** A letter of credit, revolving credit agreement, standby purchase agreement, surety bond, insurance policy or similar obligation, arrangement or instrument issued by a bank, insurance company or other financial institution which provides for payment of all or a portion of the Principal Installments or interest due on any Series of Bonds or provides funds for the purchase of such Bonds or portions thereof.

**Debt Service:** For any Fiscal Year or part thereof, as of any date of calculation and with respect to any Series, means an amount equal to the sum of (a) interest payable during such Fiscal Year or part thereof on Bonds of such Series, except to the extent that such interest is to be paid from amounts representing Capitalized Interest and (b) the Principal Installments of the Bonds of such Series payable during such Fiscal Year or part thereof. Such interest and Principal Installments for such Series shall be calculated on the assumption that (x) no Bonds of such Series Outstanding at the date of calculation will cease to be Outstanding except by reason of the payment thereof upon stated maturity or upon mandatory redemption by application of Sinking Fund Installments and (y) Variable Rate Bonds will bear interest at the greater of (A) the rate or rates which were assumed by the Authority in the Authority Budget for such Fiscal Year to be borne by Variable Rate Bonds during such Fiscal Year or (B) the actual rate or rates borne by such Variable Rate Bonds on such date of calculation.

**Debt Service Reserve Requirement:** As of any date of calculation and for any Fiscal Year, means an amount equal to the maximum Adjusted Aggregate Debt Service in the current or any future Fiscal Year on all Bonds Outstanding; provided, however, that, with respect to any Bonds secured by a Special Credit Facility, the Supplemental Resolution authorizing such Bonds may provide that the Debt Service Reserve Requirement for such Bonds be an amount not in excess of the maximum Adjusted Debt Service payable on such Bonds in the current or any future Fiscal Year.

**DEC:** The New York State Department of Environmental Conservation and any successor entity which may succeed to its rights and duties respecting the State Revolving Fund.

**Defeasance Obligations:** The obligations described in clause (ii) of the definition of Investment Securities below.

**Financial Guaranties:** Means one or more of the following: (i) irrevocable, unconditional and unexpired letters of credit issued by a banking institution the senior long-term debt obligations of which (or the holding company of such banking institution) have (at the time of issue of such letter of credit) a rating of Aa2 or better by Moody's Investors Service Inc. or AA or better by Standard & Poor's Corporation or (ii) an irrevocable and unconditional policy or policies of insurance in full force and effect and issued by a municipal bond insurer the obligations insured by which are eligible for a rating of Aa or better by Moody's

**Investors Service Inc. or AA or better by Standard & Poor's Corporation;** in each case providing for the payment of sums for the payment of Principal Installments of and interest on Bonds in the manner provided in Section 508 of the Resolution; and providing further that any such Financial Guaranty must be drawn upon, on a date which is at least thirty days prior to the expiration date of such Financial Guaranty, in an amount equal to the deficiency which would exist if the Financial Guaranty expired, unless a substitute Financial Guaranty is acquired prior to such thirtieth day as provided in a related Supplemental Resolution.

**Fiscal Year:** The twelve-month period commencing on July 1 of each year; provided, however, that the Authority, the Board and the City may agree on a different twelve-month period as the Fiscal Year and in such event the dates set forth in the Agreement, the Lease and the Resolution shall be adjusted accordingly.

**Investment Securities:** Mean and include any of the following securities, if and to the extent the same are at the time legal investments by the Authority of the funds to be invested therein and conform to the policies set forth in any investment guidelines adopted by the Authority and in effect at the time of the making of such investment:

(i) direct obligations of, or obligations guaranteed as to principal and interest by, the State or direct obligations of any agency or public authority thereof provided such obligations are rated, at the time of purchase, in one of the two highest rating categories by a Rating Agency;

(ii) (A) any bonds or other obligations which as to principal and interest constitute direct obligations of, or are guaranteed by, the United States of America, including obligations of any agency thereof or corporation which has been or may hereafter be created pursuant to an Act of Congress as an agency or instrumentality of the United States of America to the extent unconditionally guaranteed by the United States of America or (B) any other receipt, certificate or other evidence of an ownership interest in obligations or in specified portions thereof (which may consist of specified portions of the interest thereon) of the character described in subclause (A) of this clause (ii);

(iii) obligations of any agency, subdivision, department, division or instrumentality of the United States of America; or obligations fully guaranteed as to interest and principal by any agency, subdivision, department, division or instrumentality of the United States of America;

(iv) banker's acceptances or certificates of deposit issued by a commercial bank with its principal place of business within the State and having a capital and surplus of more than \$100,000,000;

(v) corporate securities, including commercial paper and fixed income obligations, which are, at the time of purchase, rated by a Rating Agency designated by the Authority in its highest rating category for comparable types of obligations; and

(vi) any repurchase agreement which is fully collateralized by any one or more of the securities described in clause (ii) (A) above; provided, however, that any such repurchase agreement shall (A) not be for a period in excess of 90 days, (B) provide that the Authority or the Trustee (or the agent thereof, which shall not be the seller) shall take physical possession of such collateral or the Authority or the Trustee shall be named the record owner thereof in the records of the Federal Reserve Bank of New York and (C) be entered into only with (x) a bank or trust company organized under the laws of the State or the United States, which is a member of the Federal Reserve System and the Federal Deposit Insurance Corporation, having capital of not less than \$50,000,000 or (y) a government bond dealer reporting to, trading with and recognized as a primary dealer by, the Federal Reserve Bank of New York.

Obligations of the Trustee or any affiliate thereof may be Investment Securities, provided that they otherwise qualify.

**Leased Property:** The real and personal property and other rights therein leased by the City to the Board pursuant to Article II of the Lease.

**Local Water Fund:** The special trust fund by that name established by the Act in the custody of the Board into which all Revenues are required to be deposited promptly upon receipt thereof by the Board.

**Minimum Monthly Balance:** For each Series of Bonds Outstanding, the monthly amount calculated in accordance with Section 4.3(a) of the Agreement. See "SUMMARY OF CERTAIN DOCUMENTS—Summary of the Agreement—Minimum Monthly Balance" in this Appendix D.

**O&M Reserve Requirement:** For each Fiscal Year, the amount equal to the respective proportion set forth below of the Operating Expenses as set forth in the Annual Budget:

<u>Fiscal Year</u>	<u>Proportion of Operating Expenses</u>
1986-1987 .....	1/30
1987-1988 .....	2/30
1988-1989 .....	3/30
1989-1990 .....	4/30
1990-1991 and thereafter .....	1/6

**Operating Expenses:** All reasonable or necessary current expenses of maintaining, repairing, operating and managing the System net of governmental operating aid, including: all salaries; administrative, architectural, engineering, advertising, public notice, auditing, billing, collection, enforcement and legal expenses; insurance and surety bond premiums; consultants' fees; payments to pension, retirement and hospitalization funds; taxes; payments in lieu of taxes; costs of public hearings; ordinary and current rentals of equipment or other property; hydrant rentals; lease payments for real property or interests therein; depository expenses; reasonable reserves for maintenance and repair and all other expenses necessary, incidental or convenient for the efficient operation of the System; but only to the extent properly attributable to the Board or the System and payable by the Board to the City pursuant to the Lease.

**Option Bonds:** Bonds which by their terms may be tendered by and at the option of the owner thereof for payment by the Authority prior to the stated maturity thereof, or the maturities of which may be extended by and at the option of the owner thereof.

**Outstanding:** When used with reference to Bonds, means, as of any date, all Bonds theretofore or thereupon being authenticated and delivered under the Resolution except:

- (a) any Bonds cancelled by the Trustee at or prior to such date;
- (b) any Bond (or portion thereof) for the payment or redemption of which there shall be set aside and held in trust under the Resolution either:
  - (i) moneys in an amount sufficient to pay when due the Principal Installments or Redemption Price thereof, together with all accrued interest,
  - (ii) Defeasance Obligations in such principal amounts, of such maturities, bearing such interest and otherwise having such terms and qualifications, as are necessary to provide moneys (whether as principal or interest) in an amount sufficient to pay when due the Principal Installments or Redemption Price thereof, together with all accrued interest, or
  - (iii) any combination of (i) and (ii) above,

and, if such Bond or portion thereof is to be redeemed, for which notice of redemption has been given as provided in Article VI of the Resolution or provision satisfactory to the Trustee has been made for the giving of such notice;

(c) any Bond in lieu of or in substitution for which other Bonds have been authenticated and delivered; and

(d) any Bond deemed to have been paid as provided in Section 1201(b) of the Resolution.

**Parity Bond Anticipation Notes:** Bond Anticipation Notes the interest on which is payable from and secured by a pledge of Revenues on a parity with all other Bonds.

**Permitted Encumbrances:** When used with reference to the System, (i) any and all liens, encumbrances, security interests or other defects in or clouds on title existing on the Effective Date, (ii) the Lease, (iii) easements, rights of way and exceptions which do not materially impair the operation or maintenance of the Leased Property or the Revenues therefrom, (iv) mechanics', materialmen's, warehousemen's and other similar liens, as permitted by law and liens for taxes at the time not delinquent or being contested and (v) agreements for the sale and leaseback of elements of the System.

**Principal Installment:** As of any date of calculation and with respect to any Series, so long as any Bonds thereof are Outstanding, (i) the principal amount of Bonds (including (x) any amount designated in, or determined pursuant to, the applicable Supplemental Resolution, as the "principal amount" with respect to any Bonds which do not pay full current interest for all or any part of their term) (y) the Tender Option Price of any Option Bonds which may be tendered for purchase or payment prior to the stated maturity thereof in accordance with the terms of the Supplemental Resolution authorizing such Option Bonds, unless such amount is secured by a Credit Facility which is not in default and (z) the principal amount of any Parity Reimbursement Obligations of such Series due (or so tendered for payment) on a certain future date for which no Sinking Fund Installments have been established, or (ii) the unsatisfied balance of any Sinking Fund Installments due on a certain future date for Bonds of such Series, or (iii) if such future dates coincide as to different Bonds of such Series, the sum of such principal amount of Bonds and of such unsatisfied balance of Sinking Fund Installments due on such future date. "Principal Installment" does not include the principal of Parity Bond Anticipation Notes.

**Project Financing Agreement:** Any Project Financing Agreement to be entered into among the Authority, the City, DEC and the Corporation pursuant to the State Revolving Fund Act.

**Projected Debt Service:** For any Fiscal Year or part thereof means, as of any date of calculation and with respect to any Projected Series of Bonds, an amount, certified by the Authority to the Trustee and the Board, as provided in the Agreement, equal to the Adjusted Debt Service estimated by the Authority to be payable during such Fiscal Year on such Projected Series.

**Projected Series of Bonds:** Any Series of Bonds described in an Authority Budget as anticipated to be issued in the Fiscal Year to which such Authority Budget relates.

**Rate Consultant:** Ernst & Young or such other independent accountant or firm of independent accountants, or a management consultant or firm of management consultants, or independent engineer or firm of independent engineers, having, in any case, a recognized standing in the field of water and sewer system consulting selected by the Authority and satisfactory to the Board. The Rate Consultant may be the same firm as the Consulting Engineer.

**Redemption Price:** When used with respect to a Bond or portion thereof, the principal amount thereof plus the applicable premium, if any, payable upon either optional or mandatory redemption thereof pursuant to the Resolution.

**Refundable Principal Installment:** Any Principal Installment for any Series of Bonds which the Authority intends to pay with moneys which are not Revenues, provided that such intent shall have been expressed in the Supplemental Resolution authorizing such Series of Bonds and provided further that such Principal Installment shall be a Refundable Principal Installment only through the date of the Authority Budget adopted during the Fiscal Year immediately preceding the Fiscal Year in which such Principal Installment comes due unless the Authority has delivered to the Trustee a certificate of an Authorized Representative that it has made provision for the payment of such Principal Installment from a source other than Revenues.

**Refunding Bond:** Any Bond authenticated and delivered on original issuance pursuant to Section 206 or Section 207 of the Resolution for the purpose of refunding any Outstanding Bonds, or thereafter authenticated and delivered in lieu of or substitution for such Bond pursuant to the Resolution.

**Reimbursement Obligation:** The obligation of the Authority described in the Resolution to directly reimburse the issuer of a Credit Facility for amounts paid by such issuer thereunder, whether or not such obligation to so reimburse is evidenced by a promissory note or other similar instrument.

**Required Deposits:** Means, for any period, amounts payable into the Authority Expense Fund, the Debt Service Reserve Fund and the Subordinated Indebtedness Fund but only to the extent such payments are required to be made from Revenues pursuant to the Resolution.

**Revenues:** Means (a) all the rents, fees, charges, payments and other income and receipts derived by the Board from users of the System, and (b) investment proceeds and proceeds of insurance (other than the proceeds of insurance with respect to the damage or destruction of all or any portion of the System), together with all operating aid therefor from any governmental entity, Federal, State or local, to the Board, but shall not include (w) amounts required to be refunded because of billing or payment errors, (x) any amount attributable to any of the foregoing sources described in clause (a) which (i) is expressly excluded by the Agreement or the Lease, or (ii) is derived from a use of the System not directly related to the supply, treatment and distribution of water to the consumers thereof or the collection, disposal or treatment of sewage, (y) any amount from any governmental entity, Federal, State or local, in aid of or for or with respect to the Costs of Water Projects or (z)(i) fines (excluding interest on late payments which shall constitute Revenues), (ii) amounts from the use of water to generate electricity, (iii) amounts from the State as a result of mandatory water discharges from reservoirs or (iv) amounts from the granting of easements, licenses, rights-of-way or other interests in the real property constituting a part of the System.

**Special Credit Facility:** Means, with respect to any Series of Bonds or portion thereof, a Credit Facility (a) which provides funds for (i) the direct payment of the Principal Installments of and interest on such Bonds when due or (ii) the payment of the Principal Installments of and interest on such Bonds in the event amounts otherwise pledged to the payment thereof are not available when due or (iii) the payment of the Tender Option Price of any Option Bond which may be tendered to the Authority for purchase or payment in accordance with the Supplemental Resolution authorizing such Option Bond (in any case, regardless of whether such Credit Facility provides funds for any other purpose) and (b) which (i) requires the Authority to directly reimburse the issuer of such Credit Facility for amounts paid thereunder and (ii) provides that such obligation is a Parity Reimbursement Obligation.

**State Revolving Fund:** The New York State Water Pollution Control Revolving Fund established pursuant to the State Revolving Fund Act.

**State Revolving Fund Act:** Chapter 565 of the laws of New York of 1989, as amended.

**Subordinated Indebtedness:** Any bond, note or other evidence of indebtedness issued by the Authority in furtherance of its corporate purposes under the Act and payable from the Subordinated Indebtedness Fund.

**System:** The Water System and the Sewerage System, collectively, as such terms are defined in the Act.

**Tender Option Price:** With respect to any Option Bond tendered for purchase or payment, an amount equal to the principal amount thereof plus interest accrued and unpaid thereon to the date of such tender.

**Variable Rate Bond:** Any Bond on which the interest rate borne thereby may vary during any part of its remaining term.

**Water Project:** Any sewerage facility, water facility or water and sewerage facility, as the case may be, including the planning, development, financing or construction thereof.

## SUMMARY OF CERTAIN DOCUMENTS

The following are brief summaries of certain provisions of the Agreement, the Lease and the Resolution. These summaries do not purport to be complete and are subject in all respects to the provisions of, and are qualified in their entirety by, reference to the respective documents to which they relate.

### Summary of the Agreement

**Financing of Water Projects.** The Authority agrees to use its best efforts to finance all or a part of the Cost of all Water Projects described in Appendix A to the Agreement. In consideration for the Authority's issuance of the Bonds, the Board gives, grants, conveys and transfers to the Authority all of its right, title



and interest in the Revenues, including without limitation, all of its rights to collect and receive said Revenues subject only to provisions of the Act, the Agreement and the Resolution permitting the application of said Revenues to the purposes therein set forth. The Board itself incurs no indebtedness under the terms of the Agreement, Lease, Resolution or any other document executed in connection therewith. (Sections 2.1, 2.2 and 2.4)

Transfer of Funds. The Authority shall deposit the proceeds of each Series of Bonds with the Trustee in accordance with the provisions of the Resolution and the Supplemental Resolution authorizing such Series; provided, however, that the portion of the proceeds designated to pay the Costs of any Water Project shall be held only in the Construction Fund established pursuant to the Resolution.

The Authority shall authorize payment of such Costs in the manner set forth in the Resolution once evidence thereof is provided in a Certificate signed by an Authorized Representative of the Board or City, as the case may be. Neither the Authority nor the Trustee shall be required to provide funds to pay the Costs of Water Projects from any source other than the Construction Fund, and neither the Authority nor the Trustee shall pay to the City from such Fund any amount in excess of that set aside for the purposes thereof, or for the Projects listed in Appendix A to the Agreement. (Sections 3.1 and 3.2)

Local Water Fund. The Board shall deposit all Revenues, as promptly as practicable after receipt, into the Local Water Fund. There shall also be deposited in the Local Water Fund all amounts received by the Board from the Trustee pursuant to the Resolution. (Section 4.1)

Establishment of Certain Funds and Application of Revenues in Local Water Fund. The Board shall establish two special funds (in addition to the Local Water Fund) to be held by the Board at a Depository: the Board Expense Fund and the Operation and Maintenance Reserve Fund, with the General Account therein. The Board shall hold such funds as trust funds and the amounts on deposit shall only be applied for the purposes provided in the Agreement.

Beginning on the first day of each month in each Fiscal Year, the Board is required to apply the Revenues in the Local Water Fund, *first*, to the Trustee for deposit in the Revenue Fund until the amount on deposit in the Revenue Fund equals the Minimum Monthly Balance for such month and the Trustee shall have received the amounts, if any, required to be deposited in the Authority Expense Fund, the Debt Service Reserve Fund and the Subordinated Indebtedness Fund for such month. Thereafter, in such month from the balance remaining in the Local Water Fund, the Board is required, after making provision for Board Expenses, to pay to the City  $\frac{1}{12}$ th of the operating expenses for such Fiscal Year. After making such payments, any amounts remaining in the Local Water Fund in each month are applied daily (i) to satisfy the Cash Flow Requirement (if the required payments to the City for Operating Expenses have been made), (ii) to satisfy required payments to the City for Operating Expenses (if the Cash Flow Requirement has been satisfied) or (iii) proportionately, to the Trustee for deposit in the Revenue Fund and to the City for the payment of Operating Expenses, until the total of all amounts deposited in the Revenue Fund during such Fiscal Year equals the Cash Flow Requirement and all Operating Expenses required to be paid shall have been paid. Thereafter, as long as the amount on deposit in the Revenue Fund in each month is equal to the Minimum Monthly Balance and the Cash Flow Requirement continues to be met, all such amounts in the Local Water Fund shall be paid as follows: *first*, to the Authority until the total of the amounts so paid equals the principal of and interest on any bonds, notes or other obligations of the Authority (other than Bonds, Bond Anticipation Notes, and Subordinated Indebtedness) payable within the then current Fiscal Year, together with all other amounts necessary to make the required deposits to the reserve and other funds and amounts established for such bonds, notes or other obligations; *second*, to the City until the amounts so paid are equal to the rental payment for such Fiscal Year and the unsatisfied balance, if any, of the rental payment for any prior Fiscal Year; and, *third*, to the Operation and Maintenance Reserve Fund, until the amount therein on deposit is equal to the O&M Reserve Requirement for such Fiscal Year. Any amounts remaining in the Local Water Fund on the last day of each Fiscal Year shall be paid to the General Account in the Operation and Maintenance Reserve Fund. (Section 4.2)

**Minimum Monthly Balance.** The Minimum Monthly Balance shall be calculated as of the first day of the month and shall be equal to the sum of:

(i) For each Series of Bonds which is Outstanding during the current Fiscal Year, an amount equal to the amount of interest due or projected to be due on the next succeeding Bond Payment Date for such Series multiplied by a fraction, the numerator of which is the number of full months since the end of the month preceding the last Bond Payment Date for such Series (or, with respect to the first Bond Payment Date for such Series, the number of full months since the last day of the month preceding the date of issuance of such Series) and the denominator of which is the number of months between Bond Payment Dates minus one (or, with respect to the first Bond Payment Date for a Series, the number of months between the last day of the month preceding the date of issuance of such Series and the first Bond Payment Date minus one); provided, however, that if this formula would produce (A) a fraction greater than one, then the fraction shall be equal to one, or (B) a denominator less than one, then the fraction shall be equal to one; plus

(ii) For each Series of Bonds which is Outstanding during the current Fiscal Year, an amount equal to the Principal Installment due or projected to be due on the next succeeding Bond Payment Date for such Series which falls within twelve months or less on which a Principal Installment is due, multiplied by a fraction, the numerator of which is the number of full months since the last day of the month preceding the last Bond Payment Date on which a Principal Installment was due (or, with respect to the first such Bond Payment Date, twelve minus the number of full months to the first Bond Payment Date on which a Principal Installment is due), and the denominator of which is eleven; provided, however, that if this formula would produce a fraction greater than one, then the fraction shall be equal to one. (*Section 4.3*)

**Deposits to Operation and Maintenance Reserve Fund.** There shall be deposited to the Operation and Maintenance Reserve Fund in each Fiscal Year from the sources described below the amount required, if any, so that the amounts on deposit therein satisfy the O&M Reserve Requirement for the ensuing Fiscal Year.

Deposits to the Operation and Maintenance Reserve Fund may be made from the proceeds of the sale of Bonds of the Authority, from the Local Water Fund, or from any other moneys lawfully available therefor, subject to the following limitations:

(i) The maximum deposit to the Operation and Maintenance Reserve Fund from the proceeds of Bonds of the Authority, as of any time of calculation, may not exceed the O&M Reserve Requirement then in effect, reduced by the cumulative sum of prior deposits thereto from proceeds of Bonds of the Authority.

(ii) Deposits to the Operation and Maintenance Reserve Fund from the Local Water Fund shall be subject to the priorities established in Section 4.2 of the Agreement.

(iii) If there shall be a deficit in the Operation and Maintenance Reserve Fund on May 1 of any Fiscal Year, and if as of such May 1 the Board does not project that available Revenues will at least equal the O&M Reserve Requirement for such Fiscal Year by June 30 of such Fiscal Year, then the Board shall include in its Annual Budget for the ensuing Fiscal Year an amount sufficient, together with other amounts available therefor, to at least equal the O&M Reserve Requirement for the ensuing Fiscal Year.

If on July 1, 1991 (or July 1 of any Fiscal Year thereafter), the amount on deposit in the Operation and Maintenance Reserve Fund is less than the O&M Reserve Requirement, such deficit shall (subject to paragraph (i) above) be made up from the proceeds of the sale of Bonds issued during such Fiscal Year; provided, however, if, prior to May 1 of such Fiscal Year such deficit has not been made up from Bond proceeds, the Board shall include the amount of such deficit in its Annual Budget for the ensuing Fiscal Year and the amounts necessary to restore such deficit shall be deposited in the Operation and Maintenance Reserve Fund.

Amounts required to be deposited in the General Account shall be held separate and apart from other amounts held in the Operation and Maintenance Reserve Fund and applied as described below. (Section 4.4)

Application of Moneys in the Operation and Maintenance Reserve Fund. If on the first day of any month the Board has not paid to the City an amount equal to the product of (i) the amount required to be paid for Operating Expenses pursuant to Section 8.1 of the Lease, multiplied by (ii) a fraction the numerator of which is the number of months which have commenced during such Fiscal Year, and the denominator of which is 12, the Board shall withdraw from the Operation and Maintenance Reserve Fund and pay to the City, on demand, an amount equal to  $\frac{1}{12}$ th of the amount so required to be paid pursuant to Section 8.1 of the Lease, or the entire balance in such Fund if less than sufficient. Amounts on deposit in the General Account may be applied to purposes provided for in Section 4.2 or to the Costs of Water Projects, but shall be retained therein to the extent required by the Annual Budget. (Section 4.5)

Application of Moneys in Board Expense Fund. Amounts on deposit in the Board Expense Fund shall be applied by the Board solely for the purposes of paying expenses of the Board, in accordance with the Annual Budget. (Section 4.6)

Application of Revenues After Default. The Board has covenanted that if an "event of default" (as defined in the Resolution) shall occur, the Board shall pay or cause to be paid to the Trustee, upon its request, all moneys and securities then held by the Board in the Local Water Fund and thereafter the Revenues as promptly as practicable after receipt. (Section 4.7)

Amounts Remaining. Any amounts received or held by the Authority or the Trustee pursuant to the Resolution, any similar document or the Agreement after all Bonds and other evidences of indebtedness have been paid in full or are no longer Outstanding and after payment of all other obligations and expenses of the Authority, or provision for payment thereof has been made, shall be paid to the City.

Any payments by the City to the Water Board pursuant to Section 1045-h(3) of the Act shall be confined to consideration for the sale of goods or the rendering of services by the Water Board to the City pursuant to the Lease or the Agreement as contemplated by the Act. (Section 4.8)

Rate Covenant. The Board has covenanted and agreed to establish, fix and revise fees, rates or other charges for the use of or services furnished by the System which, together with any other available funds, are adequate to provide for (i) the timely payment of the Principal Installments of and interest on all Bonds and the principal of and interest on any other indebtedness of the Authority payable from Revenues, (ii) the proper operation and maintenance of the System, (iii) all other payments required for the System not otherwise provided for and (iv) all other payments required pursuant to the Agreement and the Lease. Without intending to limit the generality of the foregoing, the Board has also covenanted to establish and collect rates, fees and charges sufficient in each Fiscal Year so that Revenues collected in such Fiscal Year will be at least equal to the sum of (i) 115% of estimated Aggregate Debt Service and Projected Debt Service payable in such Fiscal Year (excluding any Refundable Principal Installment if payable from funds held in trust therefor and assuming with respect to Variable Rate Bonds that the effective rate of interest is that which the Authority determines so long as such rate is not less than the rate such Bonds bear at the time Aggregate Debt Service is determined), (ii) 100% of the Operating Expenses and Authority Expenses payable in such Fiscal Year and (iii) 100% of the amount necessary to pay the other Required Deposits for such Fiscal Year. However, a failure to generate such Revenues does not constitute an "event of default" if the Board takes timely action to correct any such deficit. The Board shall review, at least annually, such rates, fees and charges to determine whether such rates, fees and charges are, or will be, sufficient to meet the requirements thereof and shall promptly take action to cure or avoid any deficiency. Except to the extent required by law or by existing agreements (including any successor agreements), the Board will not furnish or supply any product, use or service of the System free of charge or at a nominal charge. (Section 6.1)

Consulting Engineer and Rate Consultant. The Authority shall employ a Consulting Engineer and a Rate Consultant whose duties, respectively, shall be to make any certificates and perform any other acts required or permitted of the Consulting Engineer and the Rate Consultant under the Agreement and the

**Resolution.** If so determined by the Authority, the same person or firm may perform the duties and functions of the Consulting Engineer and Rate Consultant.

In each Fiscal Year, the Consulting Engineer shall make an examination of, and shall report to the Authority, the Board, the City and the Trustee, on the properties and operations of the System. The report of the Rate Consultant shall set forth among other findings, the Rate Consultant's recommendation as to any necessary or advisable revisions of rates, fees and charges for the ensuing Fiscal Year and such other advice and recommendation as it may deem desirable. The Consulting Engineer's report shall set forth its findings as to whether the System has been maintained in good repair and sound operating condition, and its estimate of the amount, if any, required to be expended to place such properties in such condition and the details of such expenditures and the approximate time required therefor. The City covenants that if any such report of the Consulting Engineer shall set forth that the properties of the System have not been maintained in good repair and sound operating condition, it will promptly restore the properties to good repair and sound operating condition with all expedition practicable. *(Section 6.2)*

**Covenant to Operate and Maintain System.** The City has covenanted that it shall, at all times:

(a) in accordance with the advice and recommendations of the Consulting Engineer, operate the System properly and in a sound and economical manner and maintain, preserve, and keep the same preserved and kept with the appurtenances and every part and parcel thereof, in good repair, working order and condition, and from time to time make, or cause to be made, all necessary and proper repairs, replacements and renewals so that at all times the operation of the System may be properly and advantageously conducted, regardless of any failure on the part of the Board to make the payments to the City required by Section 8.1 of the Lease; provided, however, that nothing contained in the Agreement shall require the City to operate, maintain, preserve, repair, replace, renew or reconstruct any part of the System if there shall be filed with the Board, the Authority and the Trustee (i) a certificate of the Commissioner acting as the Authorized Representative of the City stating that in the opinion of the City abandonment of operation of such part of the System will not adversely affect the operation of the System or the amount of Revenues derived therefrom and is not prejudicial to the interests of the Board, the Authority or the Bondholders and (ii) a Certificate of the Consulting Engineer concurring with such statement;

(b) enforce the rules and regulations governing the operation, use and services of the System established from time to time by the Board or the City;

(c) observe and perform all of the terms and conditions contained in the Act, and comply with all valid acts, rules, regulations, orders and directions of any legislative, executive, administrative or judicial body having competent jurisdiction of the City or the System; provided, however, that the failure of the City to comply with the covenant contained in this subsection (c) for any period shall not constitute a default on its part so long as the City (i) is taking reasonable and timely steps to permit compliance and (ii) the City shall have delivered to the Board and to the Authority a Certificate of the Consulting Engineer which (1) sets forth in reasonable detail the facts and circumstances attendant to such non-compliance, (2) sets forth the steps being taken by the City to permit compliance, (3) sets forth the estimated date on which the City will be in compliance and (4) states that in the opinion of the Consulting Engineer such non-compliance during the period described will not adversely affect the operation of the System or the amount of Revenues to be derived therefrom; and

(d) not create or suffer to be created any lien or charge upon the System or any part thereof except for Permitted Encumbrances. *(Section 6.3)*

**Annual Budget.** On May 1 of each year (or on such later date as the Authority, the Board and the City may agree) the Authority shall deliver to the Board a certified copy of the Authority Budget for the ensuing Fiscal Year showing the Cash Flow Requirement for such Fiscal Year. Based upon the information contained in (a) the Authority Budget, (b) the City's certification pursuant to Section 8.3 of the Lease and (c) the Certificate of the Consulting Engineer delivered to the Board pursuant to Section 8.3 of the Lease (collectively, the "Budget Documents"), the Board shall prepare the Annual Budget for the ensuing Fiscal Year. In addition to the information contained in the Budget Documents the Board shall also make provi-

sion in the Annual Budget for Board Expenses for the ensuing Fiscal Year, for the amount, if any, required to be deposited in the Operation and Maintenance Reserve Fund in accordance with Section 4.4 of the Agreement, and for the application of the amounts in the General Account therein. Thereafter, but in no event later than 15 days after the date of publication of the Executive Budget of the City, the Board shall adopt such Annual Budget. Promptly after adoption of the Annual Budget, and in no event later than June 10 (or such other date as the Authority, the Board and the City may agree) of each year, the Board shall establish the rates, fees and charges for the use of the System for the ensuing Fiscal Year. The Board may from time to time, either before or after commencement of the Fiscal Year to which it relates, amend the Annual Budget, but (except for its own expenses) only in accordance with and after receipt of amended Budget Documents. If as of the first day of any Fiscal Year an Annual Budget has not been adopted, the Annual Budget for the immediately preceding Fiscal Year shall be the Annual Budget for such Fiscal Year until a new Annual Budget is adopted. (Section 6.4)

**Tax Exemption.** The City and the Board have covenanted that so long as any Bonds shall be Outstanding, neither will take any action, nor fail to take any action, which, if taken or not taken, as the case may be, would adversely affect the tax-exempt status of the interest payable on the Bonds then Outstanding. (Section 6.5(b))

**Discontinuance of Service.** The Board has covenanted to enforce or cause the City to enforce the rules and regulations providing for discontinuance of, or disconnection from, the supply of water or the provision of sewer service, or both, as the case may be, for non-payment of fees, rents, rates or other charges imposed by the Board, provided that such discontinuance or disconnection shall not be carried out except in the manner and upon the notice as is required of a waterworks corporation pursuant to Sections 89(b)(3)(a)-(c) and 116 of the Public Service Law of the State. (Section 6.7)

**Covenant of City as to Rates and Charges.** The City has covenanted that, upon the issuance of the Bonds by the Authority, the City will not thereafter levy user fees, rents and other charges with respect to the System until all Bonds are paid or are no longer Outstanding pursuant to the terms of the Resolution; provided, however, that the City may levy *ad valorem* taxes to pay the costs and expenses of the System or to pay the principal of and interest on general obligation bonds of the City heretofore or hereafter issued to finance the System or any part thereof. (Section 6.9)

**Books and Records.** Each of the Authority and the Board shall keep or cause to be kept proper books of record and account in which complete and correct entries shall be made of all transactions relating to their corporate purposes under the Act. In accordance with Section 1045-y of the Act, the Authority and the Board shall annually submit to the Mayor, the Comptroller and the Director of Management and Budget of the City a detailed report concerning their activities for the Fiscal Year. In addition, the Authority and the Board shall submit to the Mayor, the Comptroller and the Director of Management and Budget of the City audited annual financial statements of the Authority and the Board together with a report thereon of an accountant satisfactory to the Board. (Section 6.11)

**Liens.** Until the Bonds or other evidences of indebtedness issued by the Authority for its purposes under the Act have been paid in full or provision has been made therefor in accordance with the Resolution or similar document, the Agreement provides that the Board shall not create, and, to the extent it has the power to do so, shall not permit to be created, any lien upon or pledge of the Revenues except the lien and pledge thereon created by the Act. (Section 6.12)

**Security Interests.** Except to the extent provided in the Act, neither the Board nor the Authority may grant any Bondholder any security interest in any of the assets or Properties of the Board. (Section 6.13)

**Financing through State Revolving Fund.** In connection with the financing of Water Projects by the Authority with funds provided from the State Revolving Fund, the City may enter into a Project Financing Agreement or Agreements among DEC, the Corporation and the Authority and make in any such agreement certain representations, warranties, covenants and agreements. (Section 6.16)

**Agreement of the State.** Under the provisions of the Agreement, the parties pledge and agree, for and on behalf of the State as provided in the Act, that the State will not alter or limit the rights vested by the Act in the Authority or the Board to fulfill the terms of any agreement made with or for the benefit of the

**Bondholders, or in any way impair the rights and remedies of Bondholders, until the Bonds, together with the interest thereon, interest on any unpaid installment of interest, and all costs and expenses incurred in any action or proceeding by or on behalf of such holders, are fully met and discharged. (Section 7.1)**

**Events of Default and Remedies.** An "event of default" or a "default" means any one of the following events: (i) failure by the Board to pay the Authority those amounts required under the Agreement; (ii) failure of the City or the Board to observe any covenant, term or condition of the Agreement (other than the payments the Board shall make to the Authority) and such failure shall have continued for a period of sixty (60) days after written notice, specifying such failure and requesting that it be remedied, is given to the City or the Board, or both, by the Authority unless the Authority shall agree in writing to extend such time prior to its expiration, provided such extension shall not be unreasonably withheld if the City or the Board has instituted and is diligently pursuing corrective action which cannot be completed within the applicable period; (iii) the Authority shall file a petition, or otherwise seek relief, under any federal or State bankruptcy or similar law; and (iv) the terms, conditions and security provided under the Agreement and the Resolution or the respective provisions of the Act pursuant to which the Resolution has been adopted or the Bonds have been issued or entered into (including, without limitation, the provisions under which the lien upon the Revenues has been created pursuant to the Agreement and the Resolution and the provisions establishing the powers and obligations of the Board and the relationship of the Authority to the Board and the City) shall be materially and adversely limited, altered or impaired by any legislative action or any final judgment. (Section 8.1)

Whenever an event of default shall have occurred and be continuing, the Authority and the Trustee may take whatever legal action may appear necessary or desirable to: (i) collect the payments then due and as they thereafter become due and (ii) so long as any Bonds are Outstanding, enforce performance and observance of any obligation or covenant of the City or the Board under the Agreement. In addition, if the Board defaults in making the payments to the Authority required under the Agreement as a result of its failure to impose sufficient fees, rates, rents or other charges, the Authority may petition for the appointment of a receiver to administer the affairs of the Board in order to achieve Revenues sufficient to make such payments by establishing fees, rates, rents or other charges at least sufficient therefor. The remedies conferred upon or reserved to the Authority in respect of any event of default are not exclusive of other available remedies, but shall be in addition to every other remedy given under the Agreement or existing at law or in equity or by statute. (Sections 8.2 and 8.3)

**Termination.** The Agreement shall terminate and the covenants and other obligations contained therein shall be discharged and satisfied, when (i) payment of all indebtedness of the Authority has been made or provided for in accordance with the Resolution or similar document securing such indebtedness and (ii) either all payments required thereunder have been made in full, or provision for such payments satisfactory to the Authority has been made, or the City pays or assumes all liabilities, obligations, duties, rights and powers of the Authority under the Agreement. (Section 9.1)

**Amendments.** The parties to the Agreement may enter into any amendment, change or modification of the Agreement (if in writing, signed by each of the parties and consented to in writing by the Trustee if required by the Resolution) including, without limitation, amendments to Appen . . . A; provided that the parties shall enter into no such change or modification which adversely affects the rights of the holders of any Bonds by modifying certain enumerated provisions of the Agreement without first complying with the applicable provisions of the Resolution. (Section 10.1)

**Conflicts.** The Agreement provides that its provisions shall not change or in any manner alter the terms of the Resolution, or the security, rights or remedies of the Trustee or the Bondholders. In the event any provision of the Agreement conflicts at any time, or in any manner, with the provisions of the Resolution or any Bond, the provisions of the Resolution or Bond shall be controlling and conflicting provisions of the Agreement shall be disregarded. (Section 12.1)

#### **Summary of the Lease**

**Term of Lease and Demise of Leased Property.** The City has leased the Leased Property to the Board for the term of the Lease (the "Lease Term"). The Lease Term commenced on the Effective Date (July 1,

1985) and continues until the later of the 40th anniversary of the Effective Date or the date on which all bonds, notes or other obligations of the Authority are paid in full or provision for such payment is made pursuant to the resolution, trust indenture or other instrument under which such bonds, notes or other obligations are issued. During the Lease Term the Board may use the Leased Property only for its corporate purposes and upon the terms and conditions contained in the Lease.

The Leased Property includes (whether now in use or hereafter acquired, and whether or not located within the boundaries of the City) all of the City's right, title and interest in: (i) the City's sewerage system, including but not limited to all plants, structures, equipment and other real and personal property or rights therein acquired, rehabilitated or constructed (including all work in progress as soon as commenced) and used for the purpose of collecting, treating, pumping, neutralizing, storing and disposing of sewage, including, but not limited to, main, collecting, outlet or other sewers, pumping stations, groundwater recharge basins, backflow prevention devices, sludge dewatering facilities, vessels, barges, clarifiers, filters and phosphorous removal equipment, vehicles and other property used in connection with the sewer system; (ii) the City's water system, including but not limited to all plants, structures and other real and personal property or rights therein, acquired, rehabilitated or constructed (including all work in progress as soon as commenced) and used or to be used for the purpose of supplying, distributing, accumulating or treating water, including, but not limited to, reservoirs, basins, dams, canals, aqueducts, pipelines, mains, pumping stations, water distribution systems, intake systems, water-works, sources of water supply, purification or filtration plants, water meters and rights of flowage or diversion, vehicles and other property used in connection with the water system; and (iii) any other materials, supplies, plans and property contained in the above-mentioned plants and structures incidental to, or necessary or useful and convenient for, the operation of such facilities; provided, however, that the Leased Property shall not include the City's right, title and interest in the following: (i) any property or rights of the City the conveyance of which pursuant to the Lease would cause a reversion to or in favor of, or permit a reentry by or in favor of, any third party; (ii) all mines and minerals whatsoever (but not including surface or subsurface waters) now or hereafter found and discovered, crops and timber, on or under the lands to be conveyed pursuant to the Lease; with power and authority for the City to perform certain mineral extraction and agricultural/timber activities; provided, however, that the City shall not undertake any such activities which interfere with the operation, maintenance or collection of Revenues of the System. (*Section 2.1*)

Right of City to Enter Leased Property. The City retains the right to enter upon any portion of the Leased Property, to use any property not constituting a part thereof which is located in, across or upon the Leased Property or for any purpose unless, in the reasonable judgment of the Board, such entry or use would adversely affect the collection of Revenues. (*Section 2.2*)

Substitution of Board for City. Where necessary or desirable and to the extent permitted by law, the City and the Board agree to use their best efforts to substitute the Board for the City with respect to any application or proceedings filed or commenced in relation to the Leased Property with the various State and Federal regulatory bodies having jurisdiction. (*Section 2.5*)

Indemnification. The City agrees, to the extent permitted by law and subject to certain conditions, to hold the Board harmless from any and all liability, loss or damage from or in connection with any act the Board does or omits in the exercise of its powers if taken or omitted in good faith and in pursuance of its corporate purposes. (*Sections 3.1, 3.2 and 7.2*)

Operation and Maintenance of the Leased Property. The City shall administer and operate the Leased Property, maintain the Leased Property in good and safe order and condition and make all repairs therein. The City's duty to "maintain" and "repair" shall include all necessary repairs, replacements, renewals, alterations and additions, whether structural, non-structural, ordinary or extraordinary and its duty to "administer" shall include, without limitation, the enforcement of regulations of the Board and the City relating to the use of the System. However, the Lease shall not impose any obligation or liability upon the City for the administration, operation, maintenance and repair of the System not previously imposed upon it in connection with its prior operation and maintenance of the System. Both the Board and the City shall use all reasonable care to prevent the occurrence of waste, damage or injury to the Leased Property. The System

shall be used and operated and maintained in accordance with all applicable laws, rules and regulations. (Sections 4.1, 4.2 and 4.3)

**Construction and Acquisition.** The Board authorizes the City to perform the construction and effectuation of any Water Project specified in the Agreement and the City may incur Costs in connection therewith. The City may acquire all real and personal property, or any interest therein, necessary or useful for the construction or effectuation of a Water Project; provided that all such property or interest acquired by the City through the exercise of the power of eminent domain shall be taken in the name of the City. (Sections 5.1, 5.2 and 5.3)

**Billing and the Levy of Water and Sewer Charges.** The City has agreed to provide billing services to the Board. Such services include but are not limited to: (i) notification to users of the System of the water and sewer charges levied by the Board, (ii) collection of such charges (including the City's use of its power of enforcement and collection of unpaid taxes under the laws of the State to enforce and collect any delinquent water and sewer charges from the persons and property liable therefor) and (iii) maintenance of the books, records and accounts of the billing systems. (Sections 6.1 and 6.2)

**Late Payments.** All late payments of water and sewer charges are the property of the Board and shall be collected by the City on behalf of the Board. Notwithstanding the foregoing, the Board has assigned to the City all of its rights and interest in and to all outstanding charges levied and uncollected on all properties at the time title thereto is vested in the City pursuant to *in rem* proceedings in consideration for the City's payment to the Board, in each Fiscal Year after the Effective Date, of an amount equal to 2% of such outstanding charges (unless, during the Lease Term, the City and the Board mutually agree on a different procedure for allocating such outstanding charges). (Section 6.3)

**Discontinuance of Billing Services.** If either the City or the Board no longer desires that the City provide the Board with billing services, the party desiring termination shall give written notice of such fact to the other party at least two years prior to the termination. Notwithstanding such termination of billing services, Section 6.2 of the Lease shall remain in full force and effect. (Section 6.4)

**Legal Services.** The Board has hired the City's Law Department to provide it with legal services. However, the Board may hire a different attorney or firm of attorneys to provide it with legal services. If the Board retains counsel to defend a claim against it without the prior approval of the Corporation Counsel of the City (which approval shall not be unreasonably withheld), the Board shall not be entitled to the indemnification from the City provided in Article III of the Lease with respect to such claim, unless the City elects in writing to provide such indemnification. (Sections 7.1 and 7.2)

**Payments of Costs by the Board.** The Board has agreed to pay to the City amounts sufficient to: (i) pay the cost of administration, maintenance, repair and operation of the Leased Property, including overhead costs incurred by the City attributable to the Leased Property (but less the amount of any governmental operating aid received or receivable within the current Fiscal Year with respect to the System), the cost of materials and supplies, and the amount of any judgment or settlement paid by the City arising out of a tort claim (but only if the costs of such claim are not otherwise reimbursed, the City's liability for such claim is related to Construction of a Water Project or operation or maintenance of the System and the costs of such claims do not exceed for any Fiscal Year 5% of the aggregate revenues shown on the Board's last year-end audited financial statements); (ii) reimburse the City for capital Costs incurred by the City in the Construction of Water Projects (if requested by the City and not otherwise reimbursed) including, without limitation, the payment of any judgment or settlement arising out of a contract claim related to the Construction of any Water Project; (iii) pay the cost of billing and collection services provided by the City; (iv) pay the cost of legal services provided by the City; and (v) reimburse the City for the compensation, or the costs of the services, of any City officers and employees provided on a full-time or part-time basis to the Board. (Section 8.1)

**Base Rental Payments.** In addition, the Board shall pay the City a rental payment for the System, but only to the extent requested by the City, and not to exceed the greater of (i) the principal and interest payable on general obligation bonds issued by the City for water and sewer purposes and certified by the



City to be paid within such Fiscal Year, or (ii) 15% of the amount of principal and interest payable on the Bonds of the Authority and certified by the Authority to be paid within such Fiscal Year. (Section 8.2)

**Method of Payment.** The City shall certify within five business days after publication of the City's Executive Budget for the ensuing Fiscal Year the (i) amount which the City reasonably anticipates it will expend in connection with the costs described in Section 8.1 of the Lease and (ii) the amount of the payments described in Section 8.2 of the Lease; provided that, prior to the Board's payment to the City the Board shall have received, in addition to such certification by the City, a certificate of the Consulting Engineer to the effect that such amounts certified by the City for such payments and costs are reasonable and appropriate. Upon the Board's payment of all such amounts so certified or requested and any other payments required under the Act, or, after provisions for their payment have been made, the Board shall pay to the City, as Additional Rent in each Fiscal Year, any surplus of funds received. (Section 8.3)

**Disposition of Property.** The Board agrees that it will not sell, lease, sublease, assign, transfer, encumber (other than Permitted Encumbrances) or otherwise dispose of any part of the Leased Property, or any other real property or personal property which may be acquired by the Board, or its interest in the Lease, without the prior written approval of the City.

The City will not sell, transfer or otherwise dispose of real property or personal property included in the Leased Property without the Board's written consent. In the case of personal property, the value of which is less than \$1 million per unit (or of greater value if the Board designates), the Board will adopt rules and procedures for the expedited disposition thereof. Upon the City's request to dispose of any real property or personal property valued in excess of \$1 million, the Board will give such consent only upon receipt of a certificate signed by the Consulting Engineer to the effect that such real or personal property may be disposed of without materially adversely affecting the Revenues of the System or impairing the ability of the Board to make any payments required by the Lease or the Agreement or any other agreement to which it may be a party or be bound. The City may also, with the prior written consent of the Board, grant interests in the Leased Property which, in the reasonable judgment of the Board, do not interfere with the operation and maintenance of the System and the collection of the Revenues from the System. (Section 11.1)

**Encumbrances.** The Board may not encumber the Leased Property without the prior written approval of the City. The City may grant temporary licenses for use of the Leased Property which do not interfere with the operation and maintenance of the System or the collection of Revenues therefrom. (Section 11.3)

### **Summary of the Resolution**

**Pledge of Revenues and Funds.** The Authority pledges for the payment of the Principal Installments or Redemption Price of and any interest on the Bonds, in accordance with their terms and the provisions of the Resolution: (i) all Revenues, (ii) all moneys or securities in any of the Funds and Accounts created under the Resolution, and (iii) all other moneys and securities to be received, held or set aside by the Authority or by any Fiduciary pursuant to the Resolution; subject only to the provisions of the Resolution and the Agreement permitting the application of such amounts for or to the purposes and on the terms and conditions therein set forth. It is the intention of the Authority that, to the fullest extent permitted by law, such pledge shall be valid and binding from the time when it is made; that the Revenues, moneys, securities and other funds so pledged, and then or thereafter received by the Authority, shall immediately be subject to the lien of such pledge; and that the obligation to perform the contractual provisions therein contained shall have priority over any or all other obligations and liabilities of the Authority and shall be valid and binding as against all parties having claims of any kind in tort, contract or otherwise against the Authority, irrespective of whether such parties have notice thereof.

As further security for the payment of the Bonds, the Authority, under the Resolution, assigns, transfers and pledges to the Trustee all of its rights and interests under and pursuant to the Agreement (excluding rights to notice and other procedural rights, its right to indemnification and rights and interests not material to Bondholders), including, without limiting the generality of the foregoing, the present and continuing right: (i) to claim, collect or receive from the Board, all Revenues thereunder, (ii) to bring actions and proceedings thereunder for enforcement of such right of collection, and (iii) to do any and all

things which the Authority is or may become entitled to do under the Agreement; provided that such assignment shall not impair or diminish any obligation of the Authority under the Agreement.

The Bonds are special obligations of the Authority payable solely from the Revenues and other amounts described in the Resolution and do not and will not constitute an indebtedness of the State, the City or the Board and neither the State, the City nor the Board shall be in any way liable thereon. (*Sections 203 and 501*)

Establishment of Funds and Accounts. The Resolution establishes the following Funds:

- (1) Construction Fund;
- (2) Revenue Fund;
- (3) Debt Service Fund;
- (4) Authority Expense Fund;
- (5) Debt Service Reserve Fund;
- (6) Subordinated Indebtedness Fund; and
- (7) Surplus Fund.

The Resolution establishes in the Debt Service Reserve Fund a separate account known as the "Common Account", and provides that any Supplemental Resolution which authorizes a Special Credit Facility may establish one or more "Special Accounts" in the Debt Service Reserve Fund. The Resolution also establishes in the Debt Service Fund a separate account to be known as the "Capitalized Interest Account".

The Trustee shall hold all of the Funds and Accounts, except the Authority Expense Fund, which shall be held by the Authority.

The Trustee is directed to make withdrawals and transfers from the Funds and Accounts established by the Resolution in order to comply with any agreement entered into upon or after the date of issuance of the Authority's Fiscal 1987 Series A Bonds providing for the rebate of certain arbitrage earnings to the United States. (*Section 502*)

Construction Fund. The Authority shall deposit from time to time in the Construction Fund the net proceeds from the sale of each Series of Bonds and make the deposits in the Funds and Accounts required by the applicable Supplemental Resolutions. The Authority shall also deposit from time to time in the Construction Fund any other amounts required to be deposited therein pursuant to the Resolution or the Agreement, including amounts received by the Authority for or in connection with the System and determined by the Authority to be deposited therein. Any proceeds of insurance maintained by the Board or the City against physical loss of or damage to the System, or of contractors' performance bonds pertaining to the construction of the System, shall also be paid into the Construction Fund.

Except as otherwise provided, amounts in the Construction Fund may only be expended to pay Costs of Water Projects (including Costs of Issuance). The Trustee shall make payments from the Construction Fund, except as otherwise provided, only upon receipt of a Disbursement Request signed by an Authorized Representative of the Authority.

To the extent that other moneys are not available therefor in any other Fund or Account, amounts in the Construction Fund shall be applied to the payment of principal of and interest on Bonds when due. (*Section 503*)

Allocation of Revenues—Revenue Fund. The Authority shall cause all Revenues received from the Board pursuant to the Agreement to be paid to the Trustee and deposited promptly upon receipt in the Revenue Fund. There shall also be deposited in the Revenue Fund all other amounts required by the Resolution or the Agreement to be so deposited. (*Section 504*)

Payments Into Certain Funds. From the Revenues in the Revenue Fund, the Trustee shall make, as soon as practicable in each month, the following deposits in the following order:

- (i) to the Debt Service Fund all such amounts until the amount therein on deposit in such month equals the Minimum Monthly Balance for such month for all Series of Bonds Outstanding;

(ii) from the balance, if any, remaining in such month after making the deposits required in (i) above, to the Authority Expense Fund the entire balance until the total on deposit therein in such month is equal to the product obtained by multiplying (A) the sum of the Authority Expenses for the then current Fiscal Year plus (if included in the Authority Budget for the then current Fiscal Year) an amount (the "Reserve for Expenses") equal to one-sixth ( $\frac{1}{6}$ th) of such Authority Expenses by (B) a fraction, the numerator of which is 12 minus the number of full months, excluding the month of calculation, remaining in the Fiscal Year, and the denominator of which is 12;

(iii) from the balance, if any, remaining after making the deposits required in (i) and (ii) above, *first*, to the Common Account in the Debt Service Reserve Fund, the amount, if any, necessary to make the total on deposit in the Common Account equal to the Debt Service Reserve Requirement for the Bonds to which such Common Account relates or, if less than sufficient, the entire balance and, *second*, to each Special Account until the amount therein on deposit equals the Debt Service Reserve Requirement for the Bonds to which each Special Account relates; provided, however, if the balance remaining is less than sufficient to credit in full each Special Account, credit shall be made pro rata among all Special Accounts in the same ratio as the Debt Service Reserve Requirement related to such Special Account bears to the sum of the Debt Service Reserve Requirements for all of the Bonds related to the Special Accounts; and

(iv) from the balance, if any, remaining after making the deposits required in (i), (ii) and (iii) above, to the Subordinated Indebtedness Fund the amount required to be deposited in accordance with the Authority Budget, or the entire balance, if less than sufficient.

Beginning with the first day of each Fiscal Year, the Trustee shall calculate the amounts deposited in the Revenue Fund on a daily basis until the total of all amounts deposited therein during such Fiscal Year is at least equal to the Cash Flow Requirement. On such date, if any, the Trustee is directed to give the notice to the Authority and the Board provided in Section 4.3(b) of the Agreement. Thereafter, during each Fiscal Year, no further Revenues shall be paid to the Trustee pursuant to paragraph FOURTH of Section 4.2(c) of the Agreement so long as the Cash Flow Requirement, as the same may be revised from time to time, continues to be met.

**Debt Service Fund.** The Trustee shall, for each Series of Bonds Outstanding, pay from the Debt Service Fund the amounts due on each Bond Payment Date for the payment of the Principal Installments, if any, and from the moneys in the Debt Service Fund, including moneys in the Capitalized Interest Account in such Fund, interest on the Outstanding Bonds and on the redemption date or date of purchase, the amounts required for the payment of accrued interest on Bonds to be redeemed or purchased on such date unless the payment of such accrued interest shall be otherwise provided.

The Trustee may, and if so directed by an Authorized Representative of the Authority shall, prior to the forty-fifth day preceding the due date of each Sinking Fund Installment, apply the amounts accumulated in the Debt Service Fund for such Sinking Fund Installment, together with any interest on the Bonds for which such Sinking Fund Installment was established: (i) to the purchase of Bonds of like Series and maturity at prices (including any brokerage and other charges) not exceeding the Redemption Price payable for such Bonds when such Bonds are redeemable with such Sinking Fund Installment plus unpaid interest accrued or (ii) to the redemption of such Bonds, if redeemable by their terms, at or below said Redemption Price. Upon such purchase or redemption of any Bond, the Trustee shall then credit an amount equal to the principal of the Bond so purchased or redeemed toward the next Sinking Fund Installments thereafter to become due and the amount of any excess over the amount of such Sinking Fund Installment shall be credited against future Sinking Fund Installments in direct chronological order.

In any event, the Trustee shall, as soon as practicable after the forty-fifth day preceding the due date of any such Sinking Fund Installment, call for redemption a sufficient amount of Bonds of like Series and maturity to complete the retirement of the principal amount specified for such Sinking Fund Installment of such Bonds whether or not it then has moneys in the Debt Service Fund to pay the applicable Redemption

Price thereof on the redemption date. The Trustee shall apply to the redemption of the Bonds on each such redemption date the amount required for the redemption of such Bonds. *(Sections 506 and 514)*

**Authority Expense Fund.** The Authority shall apply amounts credited to the Authority Expense Fund to the payment of Authority Expenses. Any moneys in the Authority Expense Fund which the Authority determines are in excess of that needed to meet the sum of the unpaid Authority Expenses for such Fiscal Year plus (if such amount was included in the Authority Budget for such Fiscal Year) the Reserve for Expenses, shall be applied toward any deficiencies in the following Funds and Accounts in the order stated: the Debt Service Fund, Debt Service Reserve Fund and Subordinated Indebtedness Fund. Any remaining amounts shall be credited to the Revenue Fund. *(Section 507)*

**Debt Service Reserve Fund.** The Resolution establishes a Debt Service Reserve Fund and a Common Account therein. In addition, the Resolution provides that any Supplemental Resolution which provides for a Special Credit Facility to secure the principal, interest or Tender Option Price of any Bonds may establish one or more "Special Accounts" in the Debt Service Reserve Fund. From the proceeds of each Series of Bonds there shall be deposited in the Debt Service Reserve Fund the amount, if any, necessary to make the amount on deposit therein equal to the Debt Service Reserve Requirement, after giving effect to the issuance of such Bonds; and all such amounts will be credited to the Common Account, unless a Supplemental Resolution requires a deposit in a Special Account. Amounts on deposit in the Common Account will be applied, to the extent necessary, to pay the Principal Installments of and interest on the Bonds; provided, however, that the amounts in the Common Account may not be applied to pay the Principal Installments or Tender Option Price of or interest on Bonds for which such payments are secured by a Special Credit Facility, if the Supplemental Resolution authorizing such Bonds has established a Special Account. Likewise, amounts in any Special Account may not be applied to pay the Principal Installments of or interest on any Bond for which such payments may be made from the Common Account. Amounts on deposit in each of the Accounts in the Debt Service Reserve Fund shall be applied, to the extent other funds are not available in the Surplus Fund, the Subordinated Indebtedness Fund and the Authority Expense Fund, to pay the Principal Installments of, and interest on the Bonds to which such Account relates when due. Amounts so applied shall be derived first from cash or Investment Securities on deposit, and second from draws and demands on Financial Guaranties.

If, as of June 30 of each year, the amount in any Account in the Debt Service Reserve Fund exceeds the applicable Debt Service Reserve Requirement after giving effect to any Financial Guaranty deposited in such Fund, the Trustee shall withdraw from such account the amount of any excess therein over the applicable Debt Service Reserve Requirement as of the date of such withdrawal and deposit the moneys so withdrawn into the Surplus Fund. If, as of February 1 of each year, the amount in any Account in the Debt Service Reserve Fund is less than the applicable Debt Service Reserve Requirement and, to the extent that such deficiency has not been made up by May 1 of such year by either (i) deposits pursuant to Section 505 of the Resolution or (ii) an increase in the market value of the Investment Securities therein, or (iii) a combination of (i) and (ii), the Authority shall, in its Authority Budget for the ensuing Fiscal Year, include the amount necessary to make up such deficiency as a Required Deposit.

Whenever the amount (exclusive of Financial Guaranties) in all of the Accounts in the Debt Service Reserve Fund, together with the amount in the Debt Service Fund, is sufficient to pay all Outstanding Bonds in accordance with their respective terms, the funds on deposit in the Debt Service Reserve Fund shall be transferred to the Debt Service Fund and applied to the redemption or payment at maturity of all Bonds Outstanding.

In lieu of the required deposits and transfers to the Debt Service Reserve Fund, the Authority may cause to be deposited into the Debt Service Reserve Fund Financial Guaranties in an amount equal to the difference between the Debt Service Reserve Requirement and the sums, if any, then on deposit in the Debt Service Reserve Fund or being deposited in the Debt Service Reserve Fund concurrently with such Financial Guaranties. The Financial Guaranties shall be payable (upon the giving of notice as required thereunder) on any date on which moneys will be required to be withdrawn from the Debt Service Reserve Account and applied to the payment of a Principal Installment of or interest on any Bonds and such withdrawal cannot be

met by amounts on deposit in the Debt Service Reserve Fund. If a disbursement is made pursuant to Financial Guaranties, the Authority shall be obligated either (i) to reinstate the maximum limits of such Financial Guaranties or (ii) to deposit into the Debt Service Reserve Fund, funds in the amount of the disbursement made under such Financial Guaranties, or a combination of such alternatives, as shall provide that the amount in the Debt Service Reserve Fund equals the Debt Service Reserve Requirement.

In the event of the refunding of any Bonds, the Trustee shall, upon the written direction of the Authority, withdraw from the Debt Service Reserve Fund all or any portion of amounts accumulated therein with respect to the Bonds being refunded and deposit such amounts as provided in such written direction; provided that such withdrawal shall not be made unless (a) immediately thereafter the Bonds being refunded shall be deemed to have been paid pursuant to Section 1201 of the Resolution, and (b) the amount remaining in the Debt Service Reserve Fund after such withdrawal shall not be less than the Debt Service Reserve Requirement. (Section 508)

Subordinated Indebtedness Fund. The Trustee shall apply amounts on deposit in the Subordinated Indebtedness Fund solely to the maintenance of reserves for, or the payment of, Subordinated Indebtedness (or as otherwise provided by the resolution of the Authority authorizing each issue of Subordinated Indebtedness). The Trustee shall withdraw from the Subordinated Indebtedness Fund any amount necessary to render the balances in the Debt Service Fund or Debt Service Reserve Fund sufficient to meet the requirements of such Funds. (Section 509)

Surplus Fund. The Trustee shall, on each Bond Payment Date, apply moneys credited to the Surplus Fund in the following amounts: (i) to the Debt Service Fund the amount, if any, necessary (or all the moneys in the Surplus Fund if less than the amount necessary) to make up any deficiency in the amount required to be on deposit in such Fund and (ii) to the Debt Service Reserve Fund the amount, if any, necessary (or all the moneys in the Surplus Fund if less than the amount necessary) to make up any deficiency in the amount required to be on deposit in any Account in such Fund. Such transfer shall be made notwithstanding any other provisions of this Resolution requiring deposits in such Funds. Amounts on deposit in the Surplus Fund on the last day of a Fiscal Year shall be withdrawn from such Fund and transferred to the Board for deposit in the Local Water Fund. (Section 510)

Subordinated Indebtedness. The Authority may issue Subordinated Indebtedness payable out of and secured by a pledge of and lien on amounts in the Subordinated Indebtedness Fund available for such payment. Such Subordinated Indebtedness, however, shall be issued only for the purposes set forth in the Resolution and shall be secured by a pledge subordinate in all respects to the pledge created by the Resolution as security for the Bonds. (Section 511)

Depositaries. All moneys and/or securities held by the Trustee shall constitute trust funds and the Trustee may and shall, if directed by the Authority, deposit such moneys or securities with one or more Depositaries. All moneys or securities held by the Authority in the Authority Expense Fund shall be deposited with one or more Depositaries. All moneys deposited under the provisions of the Resolution with the Trustee or any Depositary shall be held in trust and applied only in accordance with the provisions of the Resolution, and each of the Funds established by the Resolution shall be a trust fund for the purposes thereof.

Each Depositary holding moneys or securities in trust for the Trustee shall be a bank or trust company organized under the laws of the State or a national banking association (having its principal office within the State), having capital stock, surplus and undivided earnings aggregating at least \$100,000,000 and willing and able to accept the office on reasonable and customary terms and authorized by law to act in accordance with the provisions of the Resolution. (Section 512)

Investment of Certain Funds. Moneys held in the Debt Service Fund, the Debt Service Reserve Fund and the Subordinated Indebtedness Fund (subject to the terms of any resolutions or other instruments securing any issue of Subordinated Indebtedness) shall be invested and reinvested to the fullest practicable extent in Investment Securities which mature not later than such times as shall be necessary to provide moneys when needed to make payments required from such Funds; provided that in the case of the Debt

Service Reserve Fund maturation may not occur later than fifteen years from the date of such investment, and in the case of the Debt Service Fund, investments shall be of the type described in clauses (ii), (iii) and (vi), and in the case of the Debt Service Reserve Fund, clauses (ii) and (iii), of the definition of "Investment Securities" (in either case, to the fullest extent practicable). Moneys in the Authority Expense Fund, the Revenue Fund, the Construction Fund and the Surplus Fund may be invested in Investment Securities which mature no later than such times as shall be necessary to provide moneys when needed to make payments from such Funds. The Trustee shall make all investments in accordance with written instructions from any Authorized Representative of the Authority. Moneys in any Fund or Account may be combined with moneys in any other Fund or Account for the purpose of making such investments in Investment Securities.

Interest (net of that which represents a return of accrued interest paid in connection with the purchase of any investment) earned on any moneys or investments in such Funds and Accounts, other than the Construction Fund and the Debt Service Reserve Fund, shall be paid into the Revenue Fund as and when received. Interest (net of that which represents a return of accrued interest paid in connection with the purchase of any investment) earned on any moneys or investments in (i) the Debt Service Reserve Fund shall be paid into the Surplus Fund, and (ii) the Construction Fund shall be paid to the Board for deposit in the Local Water Fund quarterly, on the 15th day of each July, October, January and April of each Fiscal Year upon receipt of a written request and a certificate of the Authority relating to the satisfaction of the Cash Flow Requirement.

All Investment Securities acquired with moneys in any Fund or Account, including any Fund or Account held by the Authority, shall be held by the Trustee in pledge or by a Depository as agent in pledge in favor of the Trustee. (*Section 514*)

Additional Bonds. The Authority may issue Bonds from time to time without limitation as to amount except as provided in the Resolution or as specified by law to generate funds sufficient to meet the Costs of Water Projects, to make deposits in the Funds and Accounts or to refund Outstanding Bonds, Bond Anticipation Notes, Subordinated Indebtedness or outstanding bonds of the City issued to pay the capital costs of the System. All Bonds shall be issued subject to the terms, conditions and limitations established in the Resolution and in one or more Series as therein provided.

Bonds shall be authenticated and delivered only upon the Trustee's receipt of, among other items:

- (a) a certified copy of the Supplemental Resolution authorizing such Series;
- (b) (i) in the case of the initial Series of Bonds, an executed copy of the Agreement and the Lease; and (ii) in the case of any subsequent Series of Bonds, an executed copy of any amendment or supplement to the Agreement or the Lease not theretofore delivered to the Trustee;
- (c) with respect to each Series of Bonds issued in Fiscal Year 1986, a certificate of an Authorized Representative of the Authority showing that the aggregate principal amount of all Bonds issued and Outstanding in such Fiscal Year, after giving effect to the Series of Bonds to be issued is not in excess of \$400,000,000;
- (d) except in the case of Series of Bonds issued prior to July 1, 1986 and any Series of Refunding Bonds issued pursuant to Section 207 of the Resolution, a certificate of an Authorized Representative of the Authority setting forth (i) the Revenues for either of the last two full Fiscal Years immediately preceding the Fiscal Year in which such Bonds are to be issued and (ii) the Aggregate Debt Service during such Fiscal Year for which Revenues are set forth pursuant to clause (i) above (excluding from Aggregate Debt Service any Principal Installment or portion thereof which was paid from sources other than Revenues) and (iii) the sum of the Operating Expenses and the Required Deposits for such period, and showing that the amount set forth in (i) is at least equal to the sum of (x) an amount equal to 115% of the amount set forth in (ii) and (y) an amount equal to 100% of the amount set forth in (iii);
- (e) except in the case of the initial Series of Bonds under the Resolution and any Series of Refunding Bonds issued pursuant to Section 207 of the Resolution, a certificate of the Consulting Engineer setting forth the projected Operating Expenses for each of the five Fiscal Years following the Issuance of such Series of Bonds (plus the Fiscal Year in which such Bonds are issued);

(f) except in the case of the initial Series of Bonds under the Resolution and any Series of Refunding Bonds issued pursuant to Section 207, a certificate, signed by an Authorized Representative of the Authority setting forth the estimated Required Deposits for each of the five Fiscal Years following the issuance of such Series of Bonds (plus the Fiscal Year in which such Bonds are issued); and

(g) except in the case of the initial Series of Bonds under the Resolution and any Series of Refunding Bonds issued pursuant to Section 207, a certificate of the Rate Consultant (i) setting forth the estimated Revenues for each of the five Fiscal Years following the issuance of such Series of Bonds (including the Fiscal Year in which such Bonds are issued) after giving effect to any increases or decreases in rates, fees and charges projected for such Fiscal Years and (ii) showing for each such Fiscal Year that the estimated Revenues for such Fiscal Year will be at least equal to the sum of (A) 115% of the maximum estimated Adjusted Aggregate Debt Service on all Bonds then Outstanding including the Bonds to be issued, and (B) 100% of the sum of the projected Operating Expenses and Required Deposits, as shown on the Certificate of the Consulting Engineer delivered pursuant to paragraph (e) above and the Certificate of the Authority delivered pursuant to paragraph (f) above, respectively. *(Sections 204 and 206)*

**Refunding Bonds.** One or more Series of Refunding Bonds may be issued pursuant to Section 207 of the Resolution at any time to refund any Outstanding Bonds provided that (i) estimated average annual Debt Service on such Series of Refunding Bonds shall not exceed the average annual Debt Service on the Bonds to be refunded and (ii) the maximum Debt Service in any Fiscal Year on such Series of Refunding Bonds shall not exceed the maximum Debt Service in any Fiscal Year on the Bonds to be refunded, all as shown in a Certificate signed by an Authorized Representative of the Authority and delivered to the Trustee prior to the authentication and delivery of such Series of Refunding Bonds. Refunding Bonds shall be issued in a principal amount sufficient, together with other moneys available therefor, to accomplish such refunding and to make the deposits in the Funds and Accounts required by the provisions of the Supplemental Resolution authorizing such Bonds. *(Section 207)*

**Bond Anticipation Notes.** Whenever the Authority shall authorize the issuance of a Series of Bonds, the Authority may, by resolution, authorize the issuance of notes (and renewals thereof) in anticipation of such Series of Bonds. The principal of and interest on such notes and renewals thereof shall be payable from the proceeds of such notes or from the proceeds of the sale of the Series of Bonds in anticipation of which such notes are issued. The proceeds of such Bonds may be pledged for the payment of the principal of and interest on such notes and any such pledge shall have a priority over any other pledge of such proceeds created by the Resolution. The Authority may also pledge the Revenues to the payment of the interest on, and subject to Section 707 of the Resolution, the principal of such notes. A copy of the Resolution of the Authority authorizing such notes, certified by an Authorized Representative of the Authority, shall be delivered to the Trustee following its adoption, together with such other information concerning such notes as the Trustee may reasonably request. *(Section 208)*

**Credit Facilities.** In connection with the issuance of any Series of Bonds, the Authority may obtain or cause to be obtained one or more Credit Facilities providing for payment of all or a portion of the Principal Installments, or Redemption Price or interest due or to become due on such Bonds, providing for the purchase of such Bonds by the issuer of such Credit Facility or providing funds for the purchase of such Bonds by the Authority.

The Authority may secure such Credit Facility by an agreement providing for the purchase of the Series of Bonds secured thereby with such adjustments to the rate of interest, method of determining interest, maturity or redemption provisions as specified by the Authority in the applicable Supplemental Resolution. The Authority may also in an agreement with the issuer of such Credit Facility agree to directly reimburse such issuer for amounts paid under the terms of such Credit Facility, together with interest thereon (the "Reimbursement Obligation"); provided, however, that no Reimbursement Obligation shall be created until amounts are paid under such Credit Facility. Any such Reimbursement Obligation (a "Parity Reimbursement Obligation") may be secured by a lien on Revenues on a parity with the lien created by

**Section 501 of the Resolution.** Upon the payment of amounts under the Credit Facility which payment results in the Parity Reimbursement Obligation becoming due and payable, such Parity Reimbursement Obligation shall be deemed to be part of the Series of Bonds to which the Credit Facility which gave rise to such Parity Reimbursement Obligation relates.

Any such Credit Facility shall be for the benefit of and secure such Series of Bonds or portion thereof, as specified in the applicable Supplemental Resolution. *(Section 209)*

**Tax Covenants.** The Resolution provides that the Authority shall not permit the use of the proceeds of the Bonds (or other funds of the Authority): (i) to purchase securities or obligations the acquisition of which would cause any Bond to be an "arbitrage bond" as defined in Section 148 of the Internal Revenue Code of 1986 (the "Code") or (ii) in a manner which would result in the exclusion of any Bond from the treatment afforded by Section 103 of the Code. The Authority shall also provide for any required rebate to the United States. *(Section 705)*

**Accounts and Periodical Reports and Certificates.** The Authority shall keep or cause to be kept proper books of record and account (separate from all other records and accounts) in which complete and correct entries shall be made of its transactions under the Resolution and which, together with all other books and papers of the Authority, shall at all reasonable times be subject to the inspection of the Trustee or the representative, duly authorized in writing, of the holder or holders of not less than 25% in principal amount of the Bonds then Outstanding. *(Section 706)*

**Indebtedness and Liens.** The Resolution provides that the Authority shall not issue any bonds, or other evidences of indebtedness, other than the Bonds, Bond Anticipation Notes, Subordinated Indebtedness and Parity Reimbursement Obligations, secured by a pledge of or other lien on the Revenues and shall not create or cause to be created any lien on such Revenues or on any amounts held by any fiduciary, under the Resolution; however, the Authority may: (i) issue notes payable from the proceeds of Bonds or other obligations for the corporate purposes of the Authority payable or secured by Revenues derived on and after such date as the pledge of the Revenues provided in the Resolution is discharged and satisfied and (ii) issue bonds or other obligations for the corporate purposes of the Authority payable out of or secured by the pledge of amounts in the Local Water Fund after satisfaction of the Cash Flow Requirement for the then current Fiscal Year, and which recite on their face that such pledge of said amounts is and shall be in all respects subordinate to the provisions of the lien and pledge created by the Resolution. *(Section 707)*

**Agreement of the State.** In accordance with Section 1045-t of the Act, the Authority agrees, for and on behalf of the State, that the State will not alter or limit the rights vested by the Act in the Authority or the Board to fulfill the terms of any agreement made with or for the benefit of the Bondholders, or in any way impair the rights and remedies of Bondholders, until the Bonds, together with the interest thereon, with interest on any unpaid installment of interest, and all costs and expenses in connection with any action or proceeding by or on behalf of such holders, are fully met and discharged. *(Section 711)*

**Authority Budget.** The Authority shall, on or before May 1, in each Fiscal Year, adopt and file with the Trustee, the Board and the City, a certified copy of the Authority Budget showing the estimated Cash Flow Requirement and the components thereof (on a monthly basis) for the ensuing Fiscal Year, together with any other information required to be set forth therein by the Resolution or the Agreement. Such Authority Budget may set forth such additional information as the Authority may determine or as the Board or the City may request. If for any reason the Authority shall not have adopted the Authority Budget before such May 1, the Authority Budget for the then current Fiscal Year shall be deemed to be the Authority Budget for the ensuing Fiscal Year until a new Authority Budget is adopted. The Authority may at any time adopt an amended Authority Budget for the then current or ensuing Fiscal Year, but no such amended Authority Budget shall supersede any prior Budget until the Authority shall have filed with the Trustee, the Board and the City a copy of such amended Authority Budget. Each month the Authority shall recalculate the Cash Flow Requirement. *(Sections 712 and 713)*



**Supplemental Resolutions.** The Resolution permits the modification or amendment of the rights and obligations of the Authority and of the holders of the Bonds thereunder by a Supplemental Resolution, with the written consent of the holders of two-thirds of the principal amount of: (i) the Bonds then Outstanding and (ii) in case less than all of the several Series of Bonds then Outstanding are affected by the modification or amendment, of the Bonds of the Series so affected and then Outstanding; however, if such modification or amendment will, by its terms, not take effect so long as any Bonds of any specified like Series and maturity remain Outstanding, the consent of the holders of such Bonds shall not be required and such Bonds shall not be deemed to be Outstanding for the purpose of modification; provided no such modification or amendment shall change the terms of redemption, maturity of principal, installment of interest, or reduce the principal amount, Redemption Price, or rate of interest without the consent of the holder of the affected Bond, or reduce the percentages of consents required to effect any future modification or amendment.

The Authority may adopt (without the consent of any holders of the Bonds) supplemental resolutions to authorize additional Bonds; to add to the restrictions contained in the Resolution upon the issuance of additional indebtedness; to add to the covenants of the Authority contained in, or surrender any rights reserved to or conferred upon it by, the Resolution; to confirm any pledge under the Resolution of Revenues or other moneys; to preserve the Federal tax exemption of interest on the Bonds; or otherwise to modify any of the provisions of the Resolution (but no such other modification may be effective while any of the Bonds of any Series theretofore issued are Outstanding); or to cure any ambiguity, supply any omission or to correct any defect in the Resolution or to insert such provisions clarifying matters or questions arising under the Resolution as are necessary or desirable, and are not contrary to or inconsistent with the Resolution as theretofore in effect or to provide for additional duties of the Trustee (provided that the Trustee shall consent thereto). (*Arts. VIII and IX*)

**Defaults and Remedies.** The Resolution provides that if one or more of the following Events of Default shall occur, namely: (i) a default in the payment of the principal or Redemption Price of any Bond; (ii) a default in payment of any installment of interest on any Bond; (iii) a default by the Authority in the performance or observance of any other of its covenants, agreements or conditions in the Resolution for a period of 45 days after written notice thereof; (iv) a default under the Agreement or the Lease for a period of 45 days after written notice thereof; or (v) a filing of a petition for relief under any Federal or State bankruptcy or similar law by the Authority; then, upon the happening and continuance of any Event of Default, the Trustee may, and upon the written request of the holders of not less than a majority in principal amount of the Bonds Outstanding the Trustee shall, declare the principal and accrued interest on all the Bonds then Outstanding, due and payable immediately subject, however, to rescission of such declaration and annulment of the default upon the remedying thereof.

The Authority covenants that upon the occurrence of an Event of Default, the books of record and account of the Authority shall at all times be subject to the inspection and use of the Trustee and of its agents and attorneys and that, upon demand of the Trustee, the Authority will account, as if it were the trustee of an express trust, for all Revenues and other moneys, securities and funds pledged or held under the Resolution for such period as shall be stated in such demand.

Upon default, the Trustee may proceed to protect and enforce its rights and the rights of the holders of the Bonds under the Resolution forthwith by a suit or suits in equity or at law, whether for the specific performance of any covenant therein contained, or in aid of the execution of any power therein granted, or for an accounting against the Authority as if the Authority were the trustee of an express trust, or in the enforcement of any other legal or equitable right as the Trustee, being advised by counsel, shall deem most effectual to enforce any of its rights or to perform any of its duties under the Resolution. During the continuance of an Event of Default, Revenues shall be applied first, to the reasonable and proper charges and expenses of the Trustee; then (unless the principal of all of the Bonds shall have been declared payable) to the payment of all unpaid interest ratably, and then to unpaid principal or Redemption Price, ratably; and if all of the principal of the Bonds shall be due and payable, to the payment of unpaid principal and interest, without preference or priority of interest over principal, principal over interest or of any Bond or installment over any other Bond or installment, without any discrimination or preference. No Bondholder has any right to institute suit to enforce any provision of the Resolution or the execution of any trust thereunder or for any

remedy thereunder, unless the Trustee has been requested by the holders of at least a majority in principal amount of the Bonds to take such action and has been offered adequate security and indemnity and has failed to commence such suit in the manner provided in the Resolution. The right to appoint a statutory trustee under Section 1045-p of the Act is expressly abrogated. (*Art. X*)

**Defeasance of Bonds Other than Variable Rate or Option Bonds.** Any Outstanding Bond shall prior to the maturity or redemption date thereof be deemed to have been paid and shall cease to be entitled to any lien, benefit or security under the Resolution if (i) in the case of any Bonds to be redeemed prior to their maturity, the Authority shall have given to the Trustee irrevocable instructions accepted in writing by the Trustee to publish on such date the notice of redemption therefor (other than Bonds purchased by the Trustee prior to the publication of the notice of redemption), (ii) there shall have been deposited with the Trustee either moneys in an amount sufficient, or Defeasance Obligations the principal of and the interest on which, when due, without reinvestment, will provide moneys which, together with the moneys deposited shall be sufficient, to pay when due the principal or Redemption Price (if applicable) and interest due and to become due on said Bonds and (iii) in the event said Bonds are not by their terms subject to redemption within the next succeeding 60 days, the Authority shall have given the Trustee irrevocable instructions to publish, as soon as practicable, a notice to the holders of such Bonds that the deposit required above has been made with the Trustee and that said Bonds are deemed paid in accordance with the Resolution and stating such maturity or redemption date upon which moneys are to be available to pay the principal or Redemption Price, if applicable, on such Bonds (other than Bonds purchased by the Trustee prior to the publication of the notice of redemption); provided that any notice published for Bonds constituting less than all of the Outstanding Bonds of any maturity within a Series shall specify the letter and number or other distinguishing mark of each such Bond. The Trustee shall, to the extent necessary, apply moneys to the retirement of said Bonds in amounts equal to the unsatisfied balances of any Sinking Fund Installments thereto.

The Trustee shall, if so directed by the Authority prior to the maturity date of Bonds deemed to have been paid which are not to be redeemed prior to their maturity date or prior to the publication of the above notice of redemption for Bonds deemed paid and to be redeemed, apply moneys deposited with the Trustee in respect of such Bonds and redeem or sell Defeasance Obligations so deposited with the Trustee and purchase such Bonds and the Trustee shall immediately thereafter cancel all such Bonds so purchased; provided, however, that the moneys and Defeasance Obligations remaining on deposit with the Trustee after the purchase and cancellation of such Bonds shall be sufficient to pay when due the Principal Installment or Redemption Price, if applicable, and interest due or to become due on all Bonds.

**Defeasance of Variable Rate Bonds.** The Resolution provides that for the purposes of determining whether Variable Rate Bonds shall be deemed to have been paid prior to the maturity or redemption date thereof, by the deposit of moneys, or Defeasance Obligations and moneys (if any), the interest due on such Bonds shall be calculated at the maximum rate permitted; provided, however, that if, as a result of such Bonds having borne interest at less than the maximum rate for any period, the total amount of moneys and Defeasance Obligations on deposit with the Trustee for the payment of interest on such Bonds exceeds the total amount required to be deposited with the Trustee, the Trustee shall, if requested by the Authority, pay the amount in excess to the Authority free and clear of any lien or pledge securing the Bonds or otherwise existing under the Resolution.

**Defeasance of Option Bonds.** Under the Resolution, Option Bonds shall be deemed paid in accordance with the Resolution only if, in addition to satisfying several of the requirements applicable to other than Variable Rate or Option Bonds, there shall have been deposited with the Trustee moneys in an amount which shall be sufficient to pay the maximum amount of principal of and premium due, if any, and interest on such Bonds which could become payable to the holders of such Bonds upon the exercise of any options provided to the holders of such Bonds; provided, however, that if the options originally exercisable by the holder of an Option Bond are no longer exercisable, such Bond shall not be considered an Option Bond. (*Section 1201*)

# WILLKIE FARR & GALLAGHER

## APPENDIX E-1

New York  
Washington, DC  
London  
Paris

### FORM OF OPINION OF BOND COUNSEL

New York City Municipal Water  
Finance Authority  
Municipal Building  
Room 1209  
1 Centre Street  
New York, New York 10007

Dear Sirs:

We have acted as bond counsel to the New York City Municipal Water Finance Authority (the "Authority"), a public benefit corporation of the State of New York (the "State"), created and existing under and by virtue of the New York City Municipal Water Finance Authority Act (which, together with Chapter 515 of the Laws of 1984 of the State, is herein referred to as the "Act"), in connection with the issuance of its \$285,000,004.50 Water and Sewer System Revenue Bonds, Fiscal 1991 Series A (the "1991 Series A Bonds"). The 1991 Series A Bonds are authorized to be issued pursuant to (i) the Act, (ii) a financing agreement, dated as of July 1, 1985, as amended (the "Financing Agreement"), by and among the Authority, the New York City Water Board (the "Board"), a public benefit corporation of the State, created and existing under the laws of the State, including particularly the Act, and The City of New York (the "City"), a municipal corporation of the State, (iii) the New York City Municipal Water Finance Authority Water and Sewer System General Revenue Bond Resolution adopted by the Authority on November 14, 1985, as amended (the "General Resolution"), and pursuant to which Citibank, N.A. has been appointed as "Trustee" and (iv) a resolution entitled "Eleventh Supplemental Resolution Authorizing the Issuance of \$285,000,004.50 Water and Sewer System Revenue Bonds, Fiscal 1991 Series A" (the "Eleventh Supplemental Resolution"), adopted by the Authority pursuant to the General Resolution on August 9, 1990. The General Resolution and the Eleventh Supplemental Resolution are hereinafter collectively referred to as the "Resolutions". All capitalized terms used herein and not otherwise defined shall have the respective meanings ascribed thereto in the Resolutions.

The 1991 Series A Bonds are being issued pursuant to the Act, the Financing Agreement and the Resolutions for the purposes of (i) paying a portion of the Costs of Water Projects which are more specifically identified in the Financing Agreement and (ii) making certain deposits required by the Resolutions.

Pursuant to the Act, the Board and the City have entered into a lease agreement, dated as of July 1, 1985, as amended (the "Lease"), whereby the Board has leased the New York City Water and Sewer System from the City for a term ending on the later of (a) the fortieth anniversary of the Effective Date of the Lease or (b) the date on which all bonds, notes or other obligations of the Authority have been paid in full or provision for such payment shall have been made in accordance with the instruments under which they were issued.

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The 1991 Series A Bonds are dated, will mature on June 15 in the years and in the respective principal amounts, and will bear interest at the respective rates per annum set forth in the Eleventh Supplemental Resolution.

Interest on the 1991 Series A Bonds (other than the Capital Appreciation Bonds) is payable December 15, 1990 and semi-annually thereafter on June 15 and December 15 in each year. Interest on the Capital Appreciation Bonds is compounded semi-annually on June 15 and December 15 of each year commencing December 15, 1990, and is payable only at maturity or prior redemption. The 1991 Series A Bonds are subject to redemption in the manner and upon the terms and conditions set forth in the Resolutions, including mandatory redemption at par. The 1991 Series A Bonds are in the form of fully registered Bonds in the denomination (or maturity payment amounts, in the case of the Capital Appreciation Bonds) of \$5,000 or any integral multiple of \$5,000.

The Authority has the right to issue additional Series of Bonds, ranking equally as to security and payment with the 1991 Series A Bonds, upon the terms and conditions and for the purposes stated in the Resolutions.

In connection with the issuance of the 1991 Series A Bonds, we have examined the following:

(a) The Constitution and statutes of the State, including particularly (i) Article 10, Section 5 of the Constitution which limits the power of the State Legislature to create a single public corporation having both the power to contract indebtedness and the power to collect rates, fees or charges and (ii) the Act, which, among other things, creates as separate and distinct public corporations the Authority, which is empowered to contract indebtedness, and the Board, which is empowered to collect rates, fees or charges.

(b) The Internal Revenue Code of 1986 (the "Code"), the regulations of the United States Treasury Department promulgated thereunder and, to the extent applicable, the regulations of the United States Treasury Department promulgated under Section 103 of the Internal Revenue Code of 1954.

(c) Certified copies of the proceedings of the Authority, including particularly (i) the General Resolution authorizing, among other things, the issuance, from time to time, of Bonds of the Authority to finance the Costs of Water Projects, (ii) the Eleventh Supplemental Resolution authorizing, among other things, the issuance and sale of the 1991 Series A Bonds and the execution and delivery of a Contract of Purchase, dated August , 1990 (the "Contract of Purchase"), by and between the Authority and the underwriters named therein and (iii) the resolutions of the Authority authorizing the execution and delivery of the Financing Agreement and approving the form and substance of the Financing Agreement and the Lease. We have also examined an executed counterpart of each of the Contract of Purchase, the Financing Agreement and the Lease, together with such other opinions, certificates and proofs submitted relative to the issuance and sale of the 1991 Series A Bonds as we deemed necessary or advisable, including, without limiting the generality of the foregoing, the Arbitrage Certificate of the Authority, dated the date hereof.

(d) The form of the 1991 Series A Bonds.

Based upon the foregoing, it is our opinion that:

1. The Authority is a body corporate and politic constituting a public benefit corporation, duly created and existing under the laws of the State, including particularly the Act.

2. The Authority has the right and power under the Act to (a) enter into the Financing Agreement, (b) adopt the Resolutions and (c) issue the 1991 Series A Bonds.

3. The Resolutions have been duly and lawfully adopted by the Authority, are in full force and effect, are valid and binding upon the Authority and are enforceable in accordance with their terms. The General Resolution creates the valid pledge it purports to create of the Revenues and any moneys or securities on deposit in the Funds and Accounts created thereby, subject only to the provisions of the Resolutions and the Financing Agreement permitting the application thereof for or to the purposes and

on the terms and conditions permitted thereby, including the making of any required payments to the United States with respect to arbitrage earnings.

4. The 1991 Series A Bonds have been duly and validly authorized and issued and constitute valid and binding special obligations of the Authority, enforceable in accordance with their terms and the terms of the Resolutions.

5. The 1991 Series A Bonds are payable solely from the Revenues and other amounts pledged to such payment under the Resolutions. The 1991 Series A Bonds are not a debt of the State, the City or the Board and neither the State, the City, the Board nor any other political subdivision of the State is liable thereon.

6. The Lease and the Financing Agreement have been duly authorized, executed and delivered by the respective parties thereto and constitute valid and binding obligations of such parties, enforceable in accordance with their terms.

7. The Revenues derived from the operation of the System are the property of the Board. The Financing Agreement validly transfers the right, title and interest of the Board in the Revenues to the Authority to the extent and as provided in the Financing Agreement, subject only to the provisions of the Act, the Financing Agreement and the Resolutions permitting the application thereof for or to the purposes, and on the terms and conditions, therein set forth.

8. Assuming continuing compliance by the Authority and the Board with their respective covenants relating to certain requirements contained in the Code, interest on the 1991 Series A Bonds is not includable in the gross income of the owners thereof for Federal income tax purposes under existing statutes and court decisions. Moreover, interest on the 1991 Series A Bonds is not an "item of tax preference" for purposes of the individual and corporate alternative minimum taxes and the corporate environmental tax imposed by the Code. However, interest on the 1991 Series A Bonds is includable in the "adjusted net book income" or "adjusted current earnings" of a corporate Bondholder and 50% (75% for taxable years beginning after 1989) of the interest on the 1991 Series A Bonds is thus includable in the tax base for computing a corporation's liability with respect to the 20% alternative minimum tax and the 0.12% environmental tax imposed on corporations by the Code. (Such 0.12% corporate environmental tax is generally scheduled to terminate for taxable years beginning after December 31, 1991.) Moreover, interest on the 1991 Series A Bonds may be subject to a branch profits tax of up to 30% when held by certain foreign corporations. Furthermore, the United States Treasury Department has promulgated regulations which might have the effect of imposing a tax at ordinary income rates with respect to interest on 1991 Series A Bonds held by "S Corporations" in certain cases.

9. Interest on the 1991 Series A Bonds is exempt from personal income taxes imposed by the State of New York or any political subdivision thereof, including The City of New York.

In rendering the opinions set forth in paragraphs 6 and 7 above, we wish to advise you that we have, with your consent, relied upon the opinion of the Corporation Counsel of The City of New York dated the date hereof and addressed to you as to the validity, binding effect and enforceability of the Financing Agreement and the Lease with respect to the Board and the City.

In rendering the foregoing opinions, we also wish to advise you that the enforceability of the Resolutions, the foregoing agreements and the 1991 Series A Bonds may be limited by (i) any bankruptcy, insolvency or other law or enactment now or hereafter enacted by the State or Federal Government affecting the enforcement of creditors' rights and (ii) the unavailability of equitable remedies or the application thereto of equitable principles. We express no opinion regarding other tax consequences arising with respect to the 1991 Series A Bonds.

Very truly yours,

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New York  
Washington, DC  
London  
Paris

**FORM OF OPINION OF BOND COUNSEL  
WITH RESPECT TO ORIGINAL ISSUE DISCOUNT**

New York City Municipal Water  
Finance Authority  
Municipal Building  
Room 1209  
1 Centre Street  
New York, New York 10007

Dear Sirs:

In connection with the delivery today by the New York City Municipal Water Finance Authority (the "Authority") of \$285,000,004.50 of its Water and Sewer System Revenue Bonds, Fiscal 1991 Series A (the "1991 Series A Bonds"), you have requested our opinion as to the Federal income tax treatment of the 1991 Series A Bonds maturing in 1992 and 2004 (the "Serial Bonds"), of the Capital Appreciation Serial Bonds maturing in the years 2006 through 2010, both inclusive, (the "Capital Appreciation Bonds") and of the 1991 Series A Bonds maturing in 2015, 2019 and 2020 (the "Term Bonds" and, collectively with the Serial Bonds and the Capital Appreciation Bonds, the "Discount Bonds"). The Capital Appreciation Bonds bear interest from their date of delivery compounded semi-annually on each June 15 and December 15 commencing December 15, 1990, which interest is payable only at maturity or upon prior redemption. The Serial Bonds and the Term Bonds bear interest from their date of delivery payable December 15, 1990 and semi-annually thereafter on June 15 and December 15.

We are of the opinion with respect to each Discount Bond that, under present Federal income tax law, the original issue discount, as defined below, is, for Federal income tax purposes, excludable from the gross income of a Bondholder who has purchased such Discount Bond pursuant to the original offering, and such holder would not, under present Federal income tax law, realize taxable gain on such amount upon payment of such Discount Bond at maturity. The original issue discount is the difference between the initial selling price to the public of a Discount Bond pursuant to the original offering as stated on the cover of the Official Statement and (i) in the case of a Capital Appreciation Bond, the total amount payable in respect of such Bond at maturity, or (ii) in the case of a Serial Bond and a Term Bond, the principal amount of such Bond.

Further, we are of the opinion that a Bondholder (other than a life insurance company) who acquires a Discount Bond in the original offering will be treated as receiving on each day from the date of issuance of such Discount Bond interest that is excludable from gross income for Federal income tax purposes in an amount computed as described in the next paragraph. The amount representing original issue discount that is treated as being received by the Bondholder will be added to the Bondholder's tax basis for purposes of determining gain or loss upon a sale or redemption of a Discount Bond. Unearned discount and redemption premium, if any, received by the Bondholder upon any redemption of a Discount Bond will not constitute interest that is excludable from gross income for Federal income tax purposes.

To determine the amount of original issue discount which is considered to be received by a holder of a Discount Bond on each day, the period between the issue date of the Discount Bond and the date such Discount Bond matures is first subdivided into a series of shorter periods (the "accrual periods"), the first of which begins on such date of issuance and ends on December 15, 1990 and the remainder of which are six-month periods ending on each successive June 15 and December 15 thereafter during the term of the Discount Bond. A portion of the original issue discount is then allocated to each accrual period in an amount equal to the product of the issue price of the Discount Bond (increased by the amount of original issue discount allocated to all prior accrual periods) and the yield to maturity of the Discount Bond (determined

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on the basis of compounding at the close of each accrual period and properly adjusted for the length of the accrual period). The amount so allocated to an accrual period is reduced by the interest payable on the Discount Bond during and with respect to such period. The original issue discount allocated to a particular accrual period is then allocated ratably to each day in the accrual period.

The foregoing opinion with respect to the Discount Bonds is premised upon the examination of the same matters and is based upon the same assumptions as our opinion of even date herewith with respect to the excludability of the stated interest payable on the 1991 Series A Bonds from the gross income of the owners thereof for Federal income tax purposes, and is subject to the same limitations set forth in such opinion.

Very truly yours,



**FINANCIAL STATEMENTS  
OF  
NEW YORK CITY WATER AND  
SEWER SYSTEM**

**June 30, 1989**

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Independent Auditors' Report

To the Members of the Boards of the New York City  
Municipal Water Finance Authority and  
New York City Water Board:

We have audited the accompanying combined balance sheets of the New York City Water and Sewer System as of June 30, 1989 and 1988, and the related combined statements of revenues, expenses and changes in retained earnings, and cash flows for the years then ended. These combined financial statements are the responsibility of the New York City Water and Sewer System's management. Our responsibility is to express an opinion on these combined financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the combined financial statements referred to above present fairly, in all material respects, the financial position of the New York City Water and Sewer System at June 30, 1989 and 1988, and the results of its revenues, expenses, and its cash flows for the years then ended in conformity with generally accepted accounting principles.

Our audits were made for the purpose of forming an opinion on the basic financial statements taken as a whole. The supplementary information included in Schedules I through IX is presented for purposes of additional analysis and is not a required part of the combined financial statements. Such information has been subjected to the auditing procedures applied in the audits of the combined financial statements and, in our opinion, is fairly presented in all material respects in relation to the combined financial statements taken as a whole.

PEAT MARWICK MAIN & CO.

New York, New York  
October 23, 1989

NEW YORK CITY WATER AND SEWER SYSTEM

Combined Balance Sheets

June 30, 1989 and 1988

(in thousands)

	1989	1988
<b>Assets:</b>		
Utility plant in service, less accumulated depreciation of \$2,212,571 in 1989 and \$2,145,986 in 1988 (notes 3, 4 and 6)	\$ 2,707,260	2,420,469
Construction work in progress	2,271,242	2,478,002
	<u>5,678,502</u>	<u>5,098,472</u>
<b>Current assets:</b>		
Unrestricted cash and cash equivalents (note 5)	7,153	7,077
Accounts receivable:		
Billed, less allowance for uncollectible water and sewer receivables of \$20,161 in 1989 and \$17,306 in 1988	112,734	110,031
Unbilled	39,890	54,805
Receivable from The City of New York (note 7)	4,435	38,783
Accrued interest receivable	50	-
Other receivables	<u>2</u>	<u>4</u>
	<u>164,264</u>	<u>210,700</u>
Total current assets		
Restricted assets (notes 5 and 9):		
Cash and cash equivalents	252,860	23,789
Investments	177,803	284,536
Accrued interest receivables	<u>1,842</u>	<u>7,525</u>
	<u>432,605</u>	<u>315,820</u>
	<u>30,222</u>	<u>22,302</u>
Deferred bond and financing expenses		
Total assets	<u>\$ 7,305,528</u>	<u>\$ 6,617,302</u>
<b>Liabilities and equity:</b>		
Long-term liabilities:		
Bonds payable less current portion (notes 3 and 8)	\$ 2,033,204	1,399,294
Discount on bonds payable	(278,197)	(171,141)
Payable to The City of New York (note 7)	<u>208,588</u>	<u>217,985</u>
	<u>1,863,595</u>	<u>1,446,138</u>
Total long-term liabilities		
Current liabilities:		
Accounts payable and accrued expenses	9,764	7,925
Revenues received in advance	63,262	60,164
Current portion of bonds payable (notes 3 and 8)	<u>26,628</u>	<u>13,020</u>
	<u>99,656</u>	<u>81,109</u>
Total current liabilities	<u>2,063,251</u>	<u>1,529,277</u>
Total liabilities		
Equity:		
Contributed capital, net of allocated depreciation	5,140,995	4,991,611
Retained earnings	<u>101,362</u>	<u>126,617</u>
Total equity	<u>5,242,357</u>	<u>5,118,028</u>
Commitments and contingencies (note 10)		
Total liabilities and equity	<u>\$ 7,305,528</u>	<u>\$ 6,617,302</u>

See accompanying notes to combined financial statements.

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Combined Statements of Revenues, Expenses  
and Changes in Retained Earnings**

**Years ended June 30, 1989 and 1988**

(in thousands)

	<u>1989</u>	<u>1988</u>
<b>Operating revenues:</b>		
Water supply and distribution	\$ 346,272	323,568
Sewer collection and treatment	244,260	215,943
Other operating revenues	<u>18,723</u>	<u>15,987</u>
<b>Total operating revenues</b>	<b><u>609,255</u></b>	<b><u>555,498</u></b>
<b>Operating expenses:</b>		
Operation and maintenance (notes 3 and 6)	548,488	424,596
Administration and general (notes 3 and 6)	<u>554</u>	<u>527</u>
	<b><u>549,042</u></b>	<b><u>425,123</u></b>
<b>Excess of operating revenues over operating expenses before depreciation and amortization</b>	<b>60,213</b>	<b>130,375</b>
Depreciation and amortization	<u>76,688</u>	<u>78,020</u>
<b>Operating income (loss)</b>	<b>(16,475)</b>	<b>52,355</b>
<b>Non-operating revenues (expenses):</b>		
Interest expense	(111,773)	(74,059)
Investment income	<u>33,664</u>	<u>24,539</u>
<b>Net income (loss)</b>	<b>(94,584)</b>	<b>2,835</b>
Retained earnings, beginning of year	126,617	51,760
Depreciation allocated to contributed capital	<u>69,329</u>	<u>72,022</u>
Retained earnings, end of year	\$ <u>101,362</u>	<u>126,617</u>

See accompanying notes to combined financial statements.

NEW YORK CITY WATER AND SEWER SYSTEM

Combined Statements of Cash Flows

Years ended June 30, 1989 and 1988

(in thousands)

	1989	1988
Cash flows from operating activities:		
Operating income (loss)	\$ (16,472)	52,353
Adjustments to reconcile operating income (loss) to net cash provided by (used in) operating activities:		
Depreciation and amortization	76,688	78,020
Changes in assets and liabilities:		
(Increase) decrease in accounts and other receivables and accrued interest receivable	12,164	(37,017)
Increase in accounts payable and accrued liabilities	1,839	4,915
Increase in revenues received in advance	3,098	2,983
(Increase) decrease in receivable from the City	34,348	(35,233)
Decrease in payable to the City	(2,327)	(12,790)
Total adjustments	118,740	878
Net cash provided by operating activities	102,268	53,232
Cash flow from capital and related financing activities:		
Acquisition and construction of capital assets	(651,878)	(489,195)
Contributed capital	218,913	82,000
Proceeds from issuing bonds, notes and other borrowings, net of issue costs	542,921	479,105
Repayments of bonds, notes and other borrowings	(15,050)	(10,575)
Interest paid on bonds, notes and other borrowings	(111,723)	(74,052)
Net cash provided by (used in) capital and related financing activities	(116,867)	(12,724)
Cash flow from investing activities:		
Excess (deficiency) of proceeds from sales and maturities of investments, net of purchases	110,085	(109,026)
Interest on investments	33,654	24,222
Net cash provided by (used in) investing activities	143,739	(84,804)
Net increase (decrease) in cash and cash equivalents	229,147	(43,978)
Cash and cash equivalents, beginning of year	30,866	74,844
Cash and cash equivalents, end of year	\$ 260,013	30,866

Reconciliation of Cash and Cash Equivalents Per Statement of Cash Flows to the Balance Sheet

	Assets		Total
	Unrestricted	Restricted	
Cash and cash equivalents at June 30, 1987	\$ 6,439	68,405	74,844
Net increase (decrease)	638	(44,616)	(43,978)
Cash and cash equivalents at June 30, 1988	7,077	23,789	30,866
Net increase	76	222,071	222,147
Cash and cash equivalents at June 30, 1989	\$ 7,153	252,860	260,013

See accompanying notes to combined financial statement

# NEW YORK CITY WATER AND SEWER SYSTEM

## Notes to Combined Financial Statements

June 30, 1989 and 1988

### (1) Organization

The New York City Water and Sewer System (the "System") provides water supply and distribution, and sewage collection, treatment, and disposal for The City of New York (the "City"). The System, as presented in the accompanying combined financial statements, which began operations on July 1, 1985, consists of two legally separate and independent entities, the New York City Municipal Water Finance Authority (the "Authority") and the New York City Water Board (the "Board"). The Authority was created in accordance with the New York City Municipal Water Finance Act (the "Act"), duly enacted into law as Chapter 513 of the laws of 1984 of the State of New York, as amended by Chapter 514 of the laws of 1984 of the State of New York. The Board was created by Chapter 515 of the laws of 1984 of the State of New York. The Act empowers the Authority to issue bonds or notes to finance the cost of capital improvements to the System and empowers the Board to lease the System from The City and to fix and collect rates, fees, rents and other charges for the use of, or for services furnished, rendered, or made available by the System, to produce cash sufficient to pay debt service on the Authority bonds and to place the System on a self-sustaining basis.

The physical operation and capital improvements of the System are performed by The City Department of Environmental Protection subject to contractual agreements with the Authority and Board.

In accordance with Governmental Accounting Standards Board Codification Section 2100, the Board and the Authority are combined for general purpose external reporting purposes since the Board and Authority are fiscally interdependent. Both are included in The City's financial statements as component units for reporting purposes and are reported as an enterprise fund of The City.

### (2) Summary of Significant Accounting Policies

The accompanying financial statements of the System have been prepared on the accrual basis of accounting wherein revenues are recognized when earned and expenses recognized when incurred. Other significant accounting policies are:

#### (a) Investments and Cash Equivalents

Investments and cash equivalents consist principally of securities of the United States and its agencies, certificates of deposit, open time deposits, and commercial paper and are carried at cost, which approximates market. For purposes of the statement of cash flows, the System generally considers all highly liquid debt instruments purchased with a maturity of three months or less to be cash equivalents.

(Continued)

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

(2), Continued

(b) Restricted Assets

Proceeds from the issuance of debt and monies set aside for the operation and maintenance of the System are classified as restricted by applicable bond indentures.

(c) Bond Discount and Bond Issuance Costs

Bond discount and bond issuance costs are amortized over the life of the related bond issue, using the straight-line method of amortization which does not materially differ from the effective yield method. The above method is effective for all bond issuances with the exception of Fiscal 1987 Series B Capital Appreciation Serial and Term Bonds, Fiscal 1988 Series A Capital Appreciation Serial Bonds, Fiscal 1988 Series B Capital Appreciation Serial Bonds, 1989 Series A Capital Appreciation Serial Bonds and 1989 Series B Capital Appreciation Serial Bonds, whereby the bond discount is amortized over the life of the related bond issues, using the effective yield method.

(d) Utility Plant in Service

Utility plant in service acquired through purchase or internal construction is recorded at cost. Contributed utility plant in service is recorded at its estimated historical cost based on appraisals or other methods when historical cost is not available, net of depreciation. Depreciation is computed using the straight-line method based upon estimated useful lives as follows:

	<u>Years</u>
Buildings	40-50
Water supply and waste water treatment systems	15-50
Water distribution and sewage collection systems	15-75
Equipment	5-35

Depreciation on contributed utility plant in service is allocated to contributed capital after the determination of net income.

Maintenance and repairs of property are charged to maintenance expense. Replacements and betterments are charged to utility plant.

(e) Operating Revenues

Revenues are based on billing rates imposed by the Board based upon customers' water and sewer usage. The System records estimated unbilled revenue at its year end.

(Continued)

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

(2), Continued

(f) Deferred Revenues

Revenues received in advance of the period to which they relate are deferred and recorded as revenue when earned.

(g) Contributed Capital

In accordance with the lease, The City transferred its water and sewer related physical assets at historical cost, net of depreciation, and all work in progress, at cost, to the Board at July 1, 1985. Capital improvements financed by sources other than the proceeds of Authority revenue bonds (e.g., capital grants) are recorded as additions to contributed capital.

(h) Reclassifications

Certain amounts in 1988 have been reclassified to conform to the 1989 financial statement presentation.

(i) Statement of Cash Flows

In 1989, the System adopted Statement of Governmental Accounting Standards No. 9 (SGAS 9), "Reporting Cash Flows of Proprietary and Nonexpendable Trust Funds and Governmental Entities That Use Proprietary Fund Accounting." SGAS 9 requires the inclusion of a statement of cash flows in place of the previously required statement of changes in financial position. The statement of changes in financial position for the year ended June 30, 1988 has been replaced with a statement of cash flows.

(3) Financing Agreement

The Financing Agreement (the "Agreement") provides that the Authority will issue bonds to finance the cost of capital investment in the water and sewer system serving The City. It also sets forth the funding of the debt service costs of the Authority, operating costs of the water and sewer system, and the rental payment to The City. As of June 1, 1988, the Agreement was amended to permit funds to be placed into the Board's O&M reserve account instead of being transferred directly to The City after requirements for debt service, operating costs and rental payments had been satisfied (see notes 6 and 7).

(Continued)



**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

**(4) Utility Plant in Service**

Utility plant in service at June 30, 1989 and 1988 comprised:

	<u>1989</u>	<u>1988</u>
	(in thousands)	
Buildings	\$ 5,543	5,543
Water supply and waste water treatment systems	1,774,607	1,748,892
Water distribution and sewage collection systems	3,086,184	2,960,662
Equipment	<u>53,497</u>	<u>51,358</u>
	4,919,831	4,766,455
 Less accumulated depreciation	 <u>2,212,571</u>	 <u>2,145,986</u>
	\$ <u>2,707,260</u>	<u>2,620,469</u>

**(5) Investments, Cash Equivalents and Cash Deposits**

The Water and Sewer General Revenue Bond Resolution (the "Resolution") authorizes the investment of bond proceeds. The guidelines issued by the Office of the New York State Comptroller, and the Resolution establish the criteria for permissible investments of the System. The System may invest in Federal government obligations or any subdivision or instrumentality thereof, obligations of the State of New York or any subdivision or instrumentality thereof provided that they are in the two highest rating categories of a rating agency, bankers' acceptances or certificates of deposit issued by a New York State commercial bank with capital or surplus in excess of \$100 million, corporate securities or commercial paper rated highest by a rating agency when compared to similar-type securities, or repurchase agreements which are collateralized by obligations of the Federal government.

Investments and deposits held by the System at June 30, 1989 and 1988 comprised:

	<u>1989</u>	<u>1988</u>
	(in thousands)	
Cash and cash equivalents	\$ 7,153	7,077
Restricted cash, cash equivalents and investments (plus accrued interest)	<u>432,608</u>	<u>315,820</u>
	\$ <u>439,761</u>	<u>322,897</u>
 This amount is comprised of:		
Carrying amount of deposits (includes CD's)	46,138	29,793
Investments (plus accrued interest)	<u>393,623</u>	<u>293,104</u>
	\$ <u>439,761</u>	<u>322,897</u>

(Continued)

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

(5), Continued

**Cash Deposits**

The System's bank depositories are designated by the New York City Banking Commission consisting of the comptroller, the mayor, and the finance commissioner. Independent bank rating agencies are used in part to assess the financial soundness of each bank, and the System's banking relationships are under constant operational and credit reviews. Each bank in which the System's cash is deposited is required to have its principal office in New York State and have capital stock, surplus, and undivided earnings aggregating at least \$100 million. Additionally, no amounts can be deposited with any bank in excess of the greater of (i) 2% of its capital or (ii) the amount insured by the Federal Deposit Insurance Corporation (the "FDIC"). The System had \$46.138 million and \$29.793 million on deposit at June 30, 1989 and 1988, respectively. All funds on deposit at June 30, 1989 and 1988 were covered by Federal depository insurance or collateralized with securities held by the pledging financial institution's trust department, which are not in the System's name.

**Investments**

The System's investments are categorized to give an indication of the level of risk assumed by the System at year end. Category 1, the lowest risk, includes investments that are insured or registered, or for which the securities are held by the System or its agent in the System's name. Category 2 includes uninsured and unregistered investments for which the securities are held by the broker's or dealer's trust department or agent in the System's name. Category 3, the highest risk, includes uninsured and unregistered investments for which the securities are held by the broker or dealer, or by its trust department or agent but not in the System's name.

Investments held by the System at June 30, 1989 and 1988 were all classified as Category 1 investments, and are comprised of:

	<u>1989</u>		<u>1988</u>	
	<u>Cost</u>	<u>Market value</u>	<u>Cost</u>	<u>Market value</u>
	(in thousands)			
U.S. Treasury securities	\$ 167,960	165,250	270,496	267,907
Federal agency issues	11,788	11,310	11,799	11,435
Repurchase Agreements	<u>213,875</u>	<u>215,343</u>	<u>10,809</u>	<u>11,342</u>
	\$ <u>393,623</u>	<u>391,903</u>	<u>293,104</u>	<u>290,684</u>

(Continued)

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

**(6) Lease Agreement**

The Board has entered into a long-term lease with The City which transfers all the water and sewer related real and personal property to the Board for the term of the lease. The lease term commenced on July 1, 1985 and continues until the later of the fortieth anniversary of the commencement of the lease or the date on which all bonds, notes or other obligations of the Authority are paid in full or provisions for such payment has been made pursuant to the applicable debt instrument. The lease provides for payments to The City to cover the following:

- (a) an amount sufficient to pay the cost of administration, maintenance, repair and operation of the leased property, which includes overhead costs incurred by The City attributable to the leased property net of the amount of any Federal, state, or other operating grants received by The City;
- (b) an amount sufficient to reimburse The City for capital costs incurred by The City for the construction of capital improvements to the leased property which are not paid or reimbursed from any other source, to the extent requested by The City;
- (c) an amount sufficient to pay the cost of billing and other services provided by The City;
- (d) an amount sufficient to pay the cost of legal services provided by The City;
- (e) an amount sufficient to reimburse The City for the costs of the services of any city officer and employee provided on a full-time or part-time basis to the Board; and
- (f) the amount of any reconciliation payments, as defined.

In addition to the payments described above, the Board pays rent to The City to the extent requested by The City in each fiscal year in an amount not to exceed the greater of (a) the principal and interest payable on general obligation bonds issued by The City for water and sewer purposes certified by The City to be paid within such fiscal year or (b) 15% of principal and interest payable on the bonds of the Authority to be paid within such fiscal year. After all amounts certified by The City have been paid and all other required payments have been made, any surplus funds received by the Board in the current fiscal year are to be placed into the Board's O&M reserve account.

(Continued)

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

**(6), Continued**

A summary of operation and maintenance costs at June 30, 1989 and 1988 is as follows:

	<u>1989</u>	<u>1988</u>
Water transmission and distribution	\$ 121,625,324	103,597,122
Sewer collection systems	155,407,257	128,788,844
Customer accounting	5,974,023	5,739,602
City agency support cost	12,968,779	12,024,457
Fringe benefits	43,042,606	37,975,581
Judgments and claims	1,614,254	1,520,918
Provision for uncollectible water and sewer charges	<u>2,855,453</u>	<u>(10,050,027)</u>
	343,487,696	279,596,497
 Rental payments to The City	 <u>205,000,000</u>	 <u>145,000,000</u>
	\$ <u>548,487,696</u>	<u>424,596,497</u>

The amounts for Sewer Collection Systems are shown net of New York State operating grants of \$3,500,000 and \$7,000,000 in 1989 and 1988, respectively.

**(7) Payable to and Receivable from The City of New York**

As of June 30, 1989 and 1988, all construction work in progress recorded by the Board, which has not been reimbursed to The City has been recorded as a payable to The City of New York, net of the amount of any State or Federal capital grants received by The City. In addition, funds paid to The City for the installation of meters, in accordance with the new metering program, not yet expended by The City at June 30, 1989 were recorded as a receivable from The City of New York.

**(8) Bonds Payable**

In December, 1985, the Authority issued \$200 million Fiscal 1986 Series A Water and Sewer System Revenue Bonds for the purpose of financing a portion of the cost of the capital improvements program to the System, provide for the payment of the Authority's \$5 million note due December 16, 1985 (repaid December 4, 1985), fund certain reserves, and pay costs of issuance. Of the bonds, \$37,850,000 are due serially on each June 15 from 1987 to 1999 with interest at rates ranging from 5.625% to 8.80%, \$36,520,000 of term bonds are due June 15, 2005 with interest at 9.125%, and \$125,630,000 of term bonds are due June 15, 2015 with interest at 9.25%.

In January, 1987, the Authority defeased \$162.2 million of revenue term bonds by placing proceeds of refunding bonds issued, in an irrevocable escrow account to provide for all future debt service payments. Accordingly, the escrow account assets and the liability for the defeased bonds are not included in the Authority's Financial Statements. As of June 30, 1989, none of the defeased bonds had been retired from the assets of the escrow account.

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

(8), Continued

In April, 1986, the Authority issued \$200 million Fiscal 1986 Series B Water and Sewer Revenue Bonds for the purpose of financing a portion of the cost of the capital improvements program to the System, fund certain reserves and pay costs of issuance. Of the bonds, \$50,195,000 are due serially on each June 15 from 1987 to 2001 with interest at rates ranging from 4.60% to 7.70%, \$32,655,000 of term bonds are due June 15, 2006 with interest at 7.80%, and \$117,150,000 of term bonds are due June 15, 2016 with interest at 7.875%.

In January, 1987, the Authority issued \$388,650,000 Fiscal 1987 Series A Water and Sewer System Revenue Bonds for the purpose of financing a portion of the cost of the capital improvements program to the System, fund certain reserves, pay costs of issuance, and to refund certain Fiscal 1986 Series A Water and Sewer Revenue Bonds. Of the bonds, \$60,900,000 are due serially on each June 15 from 1988 to 2000 with interest at rates ranging from 4% to 6.7%, \$51,040,000 of term bonds are due June 15, 2004 with interest at 6.75%, \$207,020,000 of term bonds are due June 15, 2014 with interest at 7%, and \$69,690,000 of term bonds are due June 15, 2017 with interest at 5%.

In June, 1987, the Authority issued \$160,278,231 Fiscal 1987 Series B Water and Sewer Revenue Bonds for the purpose of financing a portion of the costs of the capital improvements program to the System, fund certain reserves, and pay costs of issuance. Of the bonds, \$47,425,000 are due serially on each June 15 from 1988 to 1998 with interest rates ranging from 4.25% to 7.2%, \$82,935,000 of term bonds are due June 15, 2016 with interest at 8.25%, \$13,275,000 of term bonds are due June 15, 2017 with interest at 5% and \$16,643,231 of capital appreciation bonds, of which \$12,452,736 are due serially on each June 15 from 1999 to 2004 with effective annual yields ranging from 7.5% to 7.9% and \$4,190,495 of term bonds are due June 15, 2007 with an effective interest of 8.0%.

In October, 1987, the Authority issued \$244,915,000 Fiscal 1988 Series A Water and Sewer Revenue Bonds for the purpose of financing a portion of the costs of the capital improvements program to the System, fund certain reserves, and pay costs of issuance. Of the bonds, \$62,330,000 are due serially on each June 15 from 1989 to 1999 with interest rates ranging from 6% to 8%, \$27,920,000 of term bonds are due June 15, 2010 with interest at 8.75%, \$136,605,000 of term bonds are due June 15, 2017 with interest at 9% and \$18,060,000 of capital appreciation bonds are due serially on each June 15 from 2000 to 2007 with effective annual yields ranging from 8.1% to 8.9%.

(Continued)

**NEW YORK CITY WATER AND SEWER SYSTEM**

**Notes to Combined Financial Statements**

(8), Continued

In March, 1988, the Authority issued \$245,000,155 Fiscal 1988 Series B Water and Sewer Revenue Bonds for the purpose of financing a portion of the costs of the capital improvements program to the System, fund certain reserves, and pay costs of issuance. Of the bonds, \$72,045,000 are due serially on each June 15 from 1990 to 1999 with interest rates ranging from 5.3% to 7.2%, \$145,030,000 of term bonds are due June 15, 2018 with interest at 7.8% and \$27,925,155 of capital appreciation bonds are due serially on each June 15 from 2000 to 2008 with effective annual yields ranging from 7.2% to 7.8%.

In November, 1988, the Authority issued \$275,001,169.50 Fiscal 1989 Series A Water and Sewer Revenue Bonds for the purpose of financing a portion of the costs of the capital improvements program to the System, fund certain reserves, and pay costs of issuance. Of the bonds, \$80,525,000 are due serially on each June 15 from 1990 to 2000 with interest rates ranging from 5.9% to 7.2%, \$111,995,000 of term bonds due June 15, 2016 with interest at 7.625%, \$56,220,000 of term bonds due June 15, 2018 with interest at 7% and \$26,261,169.50 of capital appreciation bonds due serially on each June 15 from 2001 to 2008 with effective annual yields ranging from 7.3% to 7.7%.

In March, 1989, the Authority issued \$288,057,995.20 Fiscal 1989 Series B Water and Sewer Revenue Bonds for the purpose of financing a portion of the costs of the capital improvements program to the System, fund certain reserves, and pay costs of issuance of the bonds, \$67,865,000 are due serially on each June 15 from 1991 to 2000 with interest rates ranging from 6.9% to 7.3%, \$20,265,000 of term bonds due June 15, 2008 with interest at 7.75%, \$36,585,000 of term bonds due June 15, 2011 with interest at 7.5%, \$28,945,000 of term bonds due June 15, 2013 with interest at 5.75%, \$70,500,000 of term bonds due June 15, 2017 with interest at 7.625%, \$43,695,000 of term bonds due June 15, 2019 with interest at 7% and \$20,202,995.20 of capital appreciation bonds due serially on each June 15 from 2001 to 2006 with effective annual yields ranging from 7.3% to 7.5%.

With respect to all series the Board has agreed to maintain rates and charges to provide revenues at levels sufficient to pay principal and interest requirements. All series are special obligations of the Authority payable solely from and secured by a pledge of and lien on the gross revenue of the System, as defined.

(Continued)

**NEW YORK CITY WATER AND SEWER SYSTEM**  
**Notes to Combined Financial Statements**

(8), Continued

Debt service requirements to maturity at June 30, 1989 are as follows:

<u>Year ending June 30</u>	<u>Principal</u>	<u>Interest</u>	<u>Total</u>
	(in thousands)		
1990	\$ 26,620	128,620	155,240
1991	33,050	122,963	156,013
1992	35,070	120,939	156,009
1993	37,285	118,720	156,005
1994	39,725	116,283	156,008
Five years ending June 30, 1999	244,080	535,977	780,057
Thereafter	<u>1,643,994</u>	<u>1,273,579</u>	<u>2,917,573</u>
Total	<u>\$ 2,059,824</u>	<u>2,417,081</u>	<u>4,476,905</u>

(9) Restricted Assets

Certain cash and investments, plus accrued interest, of the System are restricted as follows:

<u>Board</u>	<u>1989</u>	<u>1988</u>
	(in thousands)	
Operation and maintenance reserve account	\$ 37,748	21,694
<u>Authority</u>		
Debt service account	11,107	6,082
Construction account	217,313	173,636
Revenue account	-	491
Debt service reserve account	<u>166,440</u>	<u>113,917</u>
	<u>\$ 432,608</u>	<u>315,820</u>

(Continued)

## NEW YORK CITY WATER AND SEWER SYSTEM

### Notes to Combined Financial Statements

#### (10) Commitments and Contingencies

##### Construction

The System has unliquidated contractual commitments of approximately \$1.1 billion and \$1.259 billion at June 30, 1989 and 1988, respectively, for water and sewer projects.

##### Contingencies

In accordance with the lease, the Board is required to reimburse The City for any judgment or settlement paid by The City arising out of a tort claim to the extent that The City's liability is related to capital improvements and the operation or maintenance of the System. However, in no event shall the payment made to The City, in any fiscal year, exceed an amount equal to 5% of the aggregate revenues shown on the last year-end audited financial statements of the System. In addition, the System is required to reimburse The City, to the extent requested by The City, for the payment of any judgment or settlement arising out of a contract claim with respect to the construction of capital improvements.

Currently, The City is a defendant in a significant number of lawsuits pertaining to the System. The litigation includes, but is not limited to, actions commenced and claims asserted against The City arising out of alleged torts, alleged breaches of contract, condemnation proceedings and other alleged violations of law. As of June 30, 1989, claims in excess of \$2.1 billion were outstanding against The City for which The City estimated its potential future liability to be \$134 million. This amount is included in The City's General Long-Term Obligations Account Group. The potential future liability is The City's best estimate based on available information. The estimate may be revised as further information is obtained and as pending cases are litigated.



## NEW YORK CITY WATER AND SEWER SYSTEM

## Combined Schedule of Cash Receipts and Disbursements

Years ended June 30, 1989 and 1988

(in thousands)

	<u>1989</u>	<u>1988</u>
<b>Cash receipts:</b>		
Water supply and distribution	\$ 352,713	275,218
Sewer collection and treatment	221,968	180,742
Other operating revenues	18,357	16,469
Revenues received in advance	63,021	59,875
Investment income	<u>38,252</u>	<u>18,206</u>
<b>Total cash receipts</b>	<u>694,311</u>	<u>550,510</u>
<b>Cash disbursements:</b>		
Operation and maintenance	553,013	471,091
Administration and general	386	511
Interest expense	<u>103,167</u>	<u>66,090</u>
<b>Total cash disbursements</b>	<u>656,566</u>	<u>537,692</u>
<b>Excess of cash receipts over cash disbursements before financing sources/uses</b>	<u>37,745</u>	<u>12,818</u>
<b>Financing sources:</b>		
Proceeds from bond sales, net of issuance costs	<u>535,983</u>	<u>476,038</u>
<b>Total financing sources</b>	<u>535,983</u>	<u>476,038</u>
<b>Financing uses:</b>		
Restricted assets	123,624	58,238
Construction payments	434,978	419,403
Repayment of bonds	<u>15,050</u>	<u>10,575</u>
<b>Total financing uses</b>	<u>573,652</u>	<u>488,216</u>
<b>Excess of cash receipts over cash disbursements</b>	76	640
<b>Unrestricted cash and cash equivalents, beginning of year</b>	<u>7,077</u>	<u>6,437</u>
<b>Unrestricted cash and cash equivalents, end of year</b>	\$ <u>7,153</u>	<u>7,077</u>

**NEW YORK CITY WATER AND SEWER SYSTEM**  
**Combining Balance Sheet Schedule**  
**June 30, 1989**  
**(in thousands)**

	<u>New York City</u>			
	<u>Water Board</u>	<u>Municipal Water Finance Authority</u>	<u>Eliminations</u>	<u>Total</u>
<b>Assets:</b>				
Utility plant in service, less accumulated depreciation of \$2,212,571	\$ 2,707,260	-	-	2,707,260
Construction work in progress	<u>3,971,243</u>	<u>-</u>	<u>-</u>	<u>3,971,243</u>
	<u>6,678,503</u>	<u>-</u>	<u>-</u>	<u>6,678,503</u>
<b>Current assets:</b>				
Unrestricted cash and cash equivalents	7,050	103	-	7,153
Accounts receivable:				
Billed, less allowance for uncollectible water and sewer receivables of \$20,161	112,734	-	-	112,734
Unbilled	39,890	-	-	39,890
Receivable from The City of New York	4,435	-	-	4,435
Accrued interest receivable	50	-	-	50
Other receivables	<u>-</u>	<u>2</u>	<u>-</u>	<u>-</u>
Total current assets	<u>164,159</u>	<u>105</u>	<u>-</u>	<u>164,264</u>
Restricted assets:				
Cash and cash equivalents	37,748	215,112	-	252,860
Investments	-	177,803	-	177,803
Accrued interest receivable	<u>-</u>	<u>1,945</u>	<u>-</u>	<u>1,945</u>
	<u>37,748</u>	<u>394,860</u>	<u>-</u>	<u>432,608</u>
Revenue requirement to be billed by and received from The New York City Water Board	-	1,375,452	(1,375,452)	-
Deferred bond and financing expenses	<u>-</u>	<u>30,223</u>	<u>-</u>	<u>30,223</u>
Total assets	<u>\$ 6,880,410</u>	<u>1,800,640</u>	<u>(1,375,452)</u>	<u>7,305,598</u>
<b>Liabilities and equity:</b>				
Long-term liabilities:				
Bonds payable less current portion	-	2,033,204	-	2,033,204
Discount on bonds payable	<u>-</u>	<u>(278,197)</u>	<u>-</u>	<u>(278,197)</u>
Revenue requirements payable to The New York City Municipal Water Finance Authority	1,375,452	-	(1,375,452)	-
Payable to The City of New York	<u>1,289</u>	<u>207,299</u>	<u>-</u>	<u>208,588</u>
Total long-term liabilities	<u>1,376,741</u>	<u>1,962,306</u>	<u>(1,375,452)</u>	<u>1,963,595</u>
Current liabilities:				
Accounts payable and accrued expenses	41	9,723	-	9,764
Revenue received in advance	63,262	-	-	63,262
Current portion of bonds payable	<u>-</u>	<u>26,620</u>	<u>-</u>	<u>26,620</u>
Total current liabilities	<u>63,303</u>	<u>36,343</u>	<u>-</u>	<u>99,646</u>
Total liabilities	<u>1,440,044</u>	<u>1,998,649</u>	<u>(1,375,452)</u>	<u>2,063,241</u>
<b>Equity:</b>				
Contributed capital, net of allocated depreciation	5,140,995	-	-	5,140,995
Retained earnings (deficit)	<u>299,371</u>	<u>(198,009)</u>	<u>-</u>	<u>101,362</u>
Total equity	<u>5,440,366</u>	<u>(198,009)</u>	<u>-</u>	<u>5,242,357</u>
<b>Commitments and contingencies</b>				
Total liabilities and equity	<u>\$ 6,880,410</u>	<u>1,800,640</u>	<u>(1,375,452)</u>	<u>7,305,598</u>

## NEW YORK CITY WATER AND SEWER SYSTEM

## Combining Balance Sheet Schedule

June 30, 1988

(in thousands)

	New York City		Elimi- nations	Total
	Water Board	Municipal Water Finance Authority		
<b>Assets:</b>				
Utility plant in service, less accumulated depreciation of \$2,145,986	\$ 2,620,469	-	-	2,620,469
Construction work in progress	<u>3,478,008</u>	-	-	<u>3,478,008</u>
	<u>6,098,477</u>	-	-	<u>6,098,477</u>
<b>Current assets:</b>				
Unrestricted cash and cash equivalents	7,021	56	-	7,077
Accounts receivable:				
Billed, less allowance for uncollectible water and sewer receivables of \$17,306	110,031	-	-	110,031
Unbilled	54,805	-	-	54,805
Receivable from The City of New York	38,783	-	-	38,783
Other receivables	<u>2</u>	<u>2</u>	-	<u>4</u>
<b>Total current assets</b>	<u>210,642</u>	<u>58</u>	-	<u>210,700</u>
<b>Restricted assets:</b>				
Cash and cash equivalents	18,798	4,991	-	23,789
Investments	2,781	281,755	-	284,536
Accrued interest receivable	<u>115</u>	<u>7,390</u>	-	<u>7,495</u>
	<u>21,694</u>	<u>294,126</u>	-	<u>315,820</u>
Revenue requirement to be billed by and received from The New York City Water Board	-	1,030,052	(1,030,052)	-
Deferred bond and financing expenses	-	<u>22,308</u>	-	<u>22,308</u>
<b>Total assets</b>	<u>\$ 6,330,813</u>	<u>1,346,544</u>	<u>(1,030,052)</u>	<u>6,647,305</u>
<b>Liabilities and Equity:</b>				
<b>Long-term liabilities:</b>				
Bonds payable less current portion	-	1,399,294	-	1,399,294
Discount on bonds payable	-	(171,141)	-	(171,141)
Revenue requirements payable to The New York City Municipal Water Finance Authority	1,030,052	-	(1,030,052)	-
Payable to The City of New York	<u>8,673</u>	<u>209,312</u>	-	<u>217,985</u>
<b>Total long-term liabilities</b>	<u>1,038,725</u>	<u>1,437,465</u>	<u>(1,030,052)</u>	<u>1,446,138</u>
<b>Current liabilities:</b>				
Accounts payable and accrued expenses	6	7,919	-	7,925
Revenue received in advance	60,164	-	-	60,164
Current portion of bonds payable	-	<u>15,050</u>	-	<u>15,050</u>
<b>Total current liabilities</b>	<u>60,170</u>	<u>22,969</u>	-	<u>83,139</u>
<b>Total liabilities</b>	<u>1,098,895</u>	<u>1,460,434</u>	<u>(1,030,052)</u>	<u>1,529,277</u>
<b>Equity:</b>				
Contributed capital, net of allocated depreciation	4,991,411	-	-	4,991,411
Retained earnings (deficit)	<u>240,507</u>	<u>(113,890)</u>	-	<u>126,617</u>
<b>Total equity</b>	<u>5,231,918</u>	<u>(113,890)</u>	-	<u>5,118,028</u>
<b>Commitments and contingencies</b>				
<b>Total liabilities and equity</b>	<u>\$ 6,330,813</u>	<u>1,346,544</u>	<u>(1,030,052)</u>	<u>6,647,305</u>

## NEW YORK CITY WATER AND SEWER SYSTEM

Combining Schedule of Revenues, Expenses  
and Changes in Retained Earnings

Year ended June 30, 1989

(in thousands)

	<u>New York City</u>			<u>Total</u>
	<u>Water Board</u>	<u>Municipal Water Finance Authority</u>	<u>Eliminations</u>	
<b>Operating revenues:</b>				
Water supply and distribution	\$ 346,272	-	-	346,272
Sewer collection and treatment	244,260	-	-	244,260
Other operating revenues	<u>18,723</u>	<u>-</u>	<u>-</u>	<u>18,723</u>
<b>Total operating revenues</b>	<b><u>609,255</u></b>	<b><u>-</u></b>	<b><u>-</u></b>	<b><u>609,255</u></b>
<b>Operating expenses:</b>				
Operation and maintenance	548,488	-	-	548,488
Administration and general	<u>177</u>	<u>377</u>	<u>-</u>	<u>554</u>
	<b><u>548,665</u></b>	<b><u>377</u></b>	<b><u>-</u></b>	<b><u>549,042</u></b>
<b>Excess (deficit) of operating revenues (expenses) over operating revenues (expenses) before depreciation and amortization</b>	<b>60,590</b>	<b>(377)</b>	<b>-</b>	<b>60,213</b>
<b>Depreciation and amortization</b>	<b><u>71,852</u></b>	<b><u>4,836</u></b>	<b><u>-</u></b>	<b><u>76,688</u></b>
<b>Operating income (loss)</b>	<b><u>(11,262)</u></b>	<b><u>(5,213)</u></b>	<b><u>-</u></b>	<b><u>(16,475)</u></b>
<b>Non-operating revenue (expense):</b>				
Interest expense	-	(111,773)	-	(111,773)
Investment income	<u>797</u>	<u>32,867</u>	<u>-</u>	<u>33,664</u>
	<b><u>797</u></b>	<b><u>(78,906)</u></b>	<b><u>-</u></b>	<b><u>(78,109)</u></b>
<b>Net loss</b>	<b>(10,465)</b>	<b>(84,119)</b>	<b>-</b>	<b>(94,584)</b>
<b>Retained earnings (deficit), beginning of year</b>	<b>240,507</b>	<b>(113,890)</b>	<b>-</b>	<b>126,617</b>
<b>Depreciation allocated to contributed capital</b>	<b><u>69,329</u></b>	<b><u>-</u></b>	<b><u>-</u></b>	<b><u>69,329</u></b>
<b>Retained earnings (deficit), end of year</b>	<b>\$ <u>299,371</u></b>	<b><u>(198,009)</u></b>	<b><u>-</u></b>	<b><u>101,362</u></b>

## NEW YORK CITY WATER AND SEWER SYSTEM

Combining Schedule of Revenues, Expenses  
and Changes in Retained Earnings

Year ended June 30, 1988

(in thousands)

	<u>New York City</u>			<u>Total</u>
	<u>Water Board</u>	<u>Municipal Water Finance Authority</u>	<u>Eliminations</u>	
Operating revenues:				
Water supply and distribution	\$ 323,568	-	-	323,568
Sewer collection and treatment	215,943	-	-	215,943
Other operating revenues	<u>15,987</u>	<u>-</u>	<u>-</u>	<u>15,987</u>
Total operating revenues	<u>555,498</u>	<u>-</u>	<u>-</u>	<u>555,498</u>
Operating expenses:				
Operation and maintenance	424,596	-	-	424,596
Administration and general	<u>188</u>	<u>339</u>	<u>-</u>	<u>527</u>
	<u>424,784</u>	<u>339</u>	<u>-</u>	<u>425,123</u>
Excess (deficit) of operating revenues (expenses) over operating revenues (expenses) before depreciation and amortization	130,714	(339)	-	130,375
Depreciation and amortization	<u>73,388</u>	<u>4,632</u>	<u>-</u>	<u>78,020</u>
Operating income (loss)	<u>57,326</u>	<u>(4,971)</u>	<u>-</u>	<u>52,355</u>
Non-operating revenue (expense):				
Interest expense	-	(74,059)	-	(74,059)
Investment income	<u>604</u>	<u>23,935</u>	<u>-</u>	<u>24,539</u>
	<u>604</u>	<u>(50,124)</u>	<u>-</u>	<u>(49,520)</u>
Net income (loss)	57,930	(55,095)	-	2,835
Retained earnings (deficit), beginning of year	110,555	(58,795)	-	51,760
Depreciation allocated to contributed capital	<u>72,022</u>	<u>-</u>	<u>-</u>	<u>72,022</u>
Retained earnings (deficit), end of year	\$ <u>240,507</u>	<u>(113,890)</u>	<u>-</u>	<u>126,617</u>

NEW YORK CITY WATER AND SEWER SYSTEM

Schedule V

Combining Cash Flow Schedule

Year ended June 30, 1989

(in thousands)

	<u>New York City</u>		
	Water Board	Municipal Water Finance Authority	Total
Cash flows from operating activities:			
Operating loss	\$ (11,262)	(5,213)	(16,475)
Adjustments to reconcile operating loss to net cash provided by (used in) operating activities:			
Depreciation and amortization	71,852	4,836	76,688
Changes in assets and liabilities:			
Decrease in accounts and other receivables and accrued interest receivable	12,164	-	12,164
Increase in accounts payable and accrued liabilities	35	1,804	1,839
Increase in revenues received in advance	3,098	-	3,098
Increase in payable to Finance Authority (receivable from Water Board)	345,400	(345,400)	-
Decrease in receivable from the City	34,348	-	34,348
Decrease in payable to The City - other payables	(7,384)	(2,013)	(9,397)
Total adjustments	459,513	(340,773)	118,740
Net cash provided by (used in) operating activities	448,251	(345,986)	102,265
Cash flows from capital and related financing activities:			
Acquisition and construction of capital assets	(651,878)	-	(651,878)
Contributed capital	218,913	-	218,913
Proceeds from issuing bonds, notes and other borrowings, net of issue costs	-	542,921	542,921
Repayments of bonds, notes and other borrowings	-	(15,050)	(15,050)
Interest paid on bonds, notes and other borrowings	-	(111,773)	(111,773)
Net cash provided by (used in) capital and related financing activities	(432,965)	416,098	(16,867)
Cash flows from investing activities:			
Excess (deficiency) of proceeds from sales and maturities of investments, net of purchases	2,896	107,189	110,085
Interest on investments	797	32,867	33,664
Net cash provided by investing activities	3,693	140,056	143,749
Net increase in cash and cash equivalents	18,979	210,168	229,147
Cash and cash equivalents, beginning of year	25,819	5,067	30,886
Cash and cash equivalents, end of year	\$ 44,798	215,215	260,013

Reconciliation of Cash and Cash Equivalents Per Statement of Cash Flows to the Balance Sheet

	<u>Assets</u>		
	<u>Unrestricted</u>	<u>Restricted</u>	Total
Cash and cash equivalents - beginning	\$ 7,077	23,789	30,866
Net increase (decrease)	76	229,071	229,147
Cash and cash equivalents - ending	\$ 7,153	252,860	260,013

NEW YORK CITY WATER AND SEWER SYSTEM

Schedule VII

Combining Cash Flows Schedule

Year ended June 30, 1988

(in thousands)

	<u>New York City</u>		
	Water Board	Municipal Finance Authority	Total
Cash flows from operating activities:			
Operating income (loss)	\$ 57,326	(4,971)	52,355
Adjustments to reconcile operating income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	73,388	4,632	78,020
Changes in assets and liabilities:			
(Increase) in accounts and other receivables and accrued interest receivable	(37,017)	-	(37,017)
Increase (decrease) in accounts payable and accrued liabilities	(55)	4,970	4,915
Increase in revenues received in advance	2,983	-	2,983
Increase in payable to Finance Authority (receivable from Water Board)	358,617	(358,617)	-
Increase in receivable from the City	(35,233)	-	(35,233)
Decrease in payable to the City	(582)	(12,208)	(12,790)
Total adjustments	362,101	(361,223)	878
Net cash provided by (used in) operating activities	419,427	(366,194)	53,233
Cash flows from capital and related financing activities:			
Acquisition and construction of capital assets	(48,195)	-	(48,195)
Contributed capital	82,000	-	82,000
Proceeds from issuing bonds, notes and other borrowings, net of issue costs	-	479,105	479,105
Repayments of bonds, notes and other borrowings	-	(10,575)	(10,575)
Interest paid on bonds, notes and other borrowings	-	(74,059)	(74,059)
Net cash provided by (used in) capital and related financing activities	(407,195)	394,471	(12,724)
Cash flows from investing activities:			
Excess (deficiency) of proceeds from sales and maturities of investments, net of purchases	3,428	(112,454)	(109,026)
Interest on investments	604	23,935	24,539
Net cash provided by (used in) investing activities	4,032	(88,519)	(84,487)
Net increase (decrease) in cash and cash equivalents	16,264	(60,242)	(43,978)
Cash and cash equivalents, beginning of year	9,555	65,289	74,844
Cash and cash equivalents, end of year	\$ 25,819	5,047	30,866

Reconciliation of Cash and Cash Equivalents Per Statement of Cash Flows to the Balance Sheet

	<u>Assets</u>		
	<u>Unrestricted</u>	<u>Restricted</u>	<u>Total</u>
Cash and cash equivalents - beginning	\$ 6,437	68,407	74,844
Net increase (decrease)	640	(44,618)	(43,978)
Cash and cash equivalents - ending	\$ 7,077	23,789	30,866

## NEW YORK CITY WATER AND SEWER SYSTEM

## Combining Schedule of Cash Receipts and Disbursements

Year ended June 30, 1989

(in thousands)

	<u>New York City</u>		<u>Elimi-</u> <u>nations</u>	<u>Total</u>
	<u>Water</u> <u>Board</u>	<u>Municipal</u> <u>Water</u> <u>Finance</u> <u>Authority</u>		
<b>Cash receipts:</b>				
Water supply and distribution	\$ 352,713	-	-	352,713
Sewer collection and treatment	221,968	-	-	221,968
Other operating revenues	18,357	-	-	18,357
Revenues received in advance	63,021	-	-	63,021
Investment income	<u>860</u>	<u>37,392</u>	<u>-</u>	<u>38,252</u>
<b>Total cash receipts</b>	<b><u>656,919</u></b>	<b><u>37,392</u></b>	<b><u>-</u></b>	<b><u>694,311</u></b>
<b>Cash disbursements:</b>				
Operation and maintenance	553,013	-	-	553,013
Administration and general	145	241	-	386
Interest expense	<u>-</u>	<u>103,167</u>	<u>-</u>	<u>103,167</u>
<b>Total cash disbursements</b>	<b><u>553,158</u></b>	<b><u>103,408</u></b>	<b><u>-</u></b>	<b><u>656,566</u></b>
<b>Excess of cash receipts over cash disbursements before financing sources/uses</b>	<b><u>103,761</u></b>	<b><u>(66,016)</u></b>	<b><u>-</u></b>	<b><u>37,745</u></b>
<b>Financing sources:</b>				
Proceeds from sale of bonds, net of offering costs	-	535,983	-	535,983
Transfers from Board, net	<u>-</u>	<u>87,565</u>	<u>(87,565)</u>	<u>-</u>
<b>Total financing sources</b>	<b><u>-</u></b>	<b><u>623,548</u></b>	<b><u>(87,565)</u></b>	<b><u>535,983</u></b>
<b>Financing uses:</b>				
Restricted assets	16,167	107,457	-	123,624
Construction payments	-	434,978	-	434,978
Repayment of bonds	-	15,050	-	15,050
Transfers to Authority, net	<u>87,565</u>	<u>-</u>	<u>(87,565)</u>	<u>-</u>
<b>Total financing uses</b>	<b><u>103,732</u></b>	<b><u>557,485</u></b>	<b><u>(87,565)</u></b>	<b><u>573,652</u></b>
<b>Excess of cash receipts over cash disbursements</b>	<b>29</b>	<b>47</b>	<b>-</b>	<b>76</b>
<b>Unrestricted cash and cash equivalents, beginning of year</b>	<b><u>7,021</u></b>	<b><u>56</u></b>	<b><u>-</u></b>	<b><u>7,077</u></b>
<b>Unrestricted cash and cash equivalents, end of year</b>	<b>\$ <u>7,050</u></b>	<b><u>103</u></b>	<b><u>-</u></b>	<b><u>7,153</u></b>



## NEW YORK CITY WATER AND SEWER SYSTEM

## Combining Schedule of Cash Receipts and Disbursements

Year ended June 30, 1988

(in thousands)

	<u>New York City</u>		<u>Elimi- nations</u>	<u>Total</u>
	<u>Water Board</u>	<u>Municipal Water Finance Authority</u>		
<b>Cash receipts:</b>				
Water supply and distribution	\$ 275,218	-	-	275,218
Sewer collection and treatment	180,742	-	-	180,742
Other operating revenues	16,469	-	-	16,469
Revenues received in advance	59,875	-	-	59,875
Investment income	<u>192</u>	<u>18,014</u>	<u>-</u>	<u>18,206</u>
<b>Total cash receipts</b>	<b><u>532,496</u></b>	<b><u>18,014</u></b>	<b><u>-</u></b>	<b><u>550,510</u></b>
<b>Cash disbursements:</b>				
Operation and maintenance	471,091	-	-	471,091
Administration and general	242	269	-	511
Interest expense	<u>-</u>	<u>66,090</u>	<u>-</u>	<u>66,090</u>
<b>Total cash disbursements</b>	<b><u>471,333</u></b>	<b><u>66,359</u></b>	<b><u>-</u></b>	<b><u>537,692</u></b>
<b>Excess of cash receipts over cash disbursements before financing sources/uses</b>	<b><u>61,163</u></b>	<b><u>(48,345)</u></b>	<b><u>-</u></b>	<b><u>12,818</u></b>
<b>Financing sources:</b>				
Proceeds from sale of bonds, net of offering costs	-	476,038	-	476,038
Transfers from Board, net	<u>-</u>	<u>48,577</u>	<u>(48,577)</u>	<u>-</u>
<b>Total financing sources</b>	<b><u>-</u></b>	<b><u>524,615</u></b>	<b><u>(48,577)</u></b>	<b><u>476,038</u></b>
<b>Financing uses:</b>				
Restricted assets	11,900	46,338	-	58,238
Construction payments	-	419,403	-	419,403
Repayment of bonds	-	10,575	-	10,575
Transfers to Authority, net	<u>48,577</u>	<u>-</u>	<u>(48,577)</u>	<u>-</u>
<b>Total financing uses</b>	<b><u>60,477</u></b>	<b><u>476,316</u></b>	<b><u>(48,577)</u></b>	<b><u>488,216</u></b>
<b>Excess of cash receipts over cash disbursements</b>	<b>686</b>	<b>(46)</b>	<b>-</b>	<b>640</b>
<b>Unrestricted cash and cash equiva- lents, beginning of year</b>	<b><u>6,335</u></b>	<b><u>102</u></b>	<b><u>-</u></b>	<b><u>6,437</u></b>
<b>Unrestricted cash and cash equiva- lents, end of year</b>	<b>\$ <u>7,021</u></b>	<b><u>56</u></b>	<b><u>-</u></b>	<b><u>7,077</u></b>

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FINANCIAL GUARANTY INSURANCE POLICY

Municipal Bond Investors Assurance Corporation
Armonk, New York 10504

Policy No. XXXXXX

Municipal Bond Investors Assurance Corporation (the "Insurer"), in consideration of the payment of the premium and subject to the terms of this policy, hereby unconditionally and irrevocably guarantees to any owner, as hereinafter defined, of the following described obligations, the full and complete payment required to be made by or on behalf of the Issuer to [INSERT NAME OF PAYING AGENT] or its successor (the "Paying Agent") of an amount equal to (i) the principal of (either at the stated maturity or by any advancement of maturity pursuant to a mandatory sinking fund payment) and interest on, the Obligations (as that term is defined below) as such payments shall become due but shall not be so paid (except that in the event of any acceleration of the due date of such principal by reason of mandatory or optional redemption or acceleration resulting from default or otherwise, other than any advancement of maturity pursuant to a mandatory sinking fund payment, the payments guaranteed hereby shall be made in such amounts and at such times as such payments of principal would have been due had there not been any such acceleration); and (ii) the reimbursement of any such payment which is subsequently recovered from any owner pursuant to a final judgment by a court of competent jurisdiction that such payment constitutes an avoidable preference to such owner within the meaning of any applicable bankruptcy law. The amounts referred to in clauses (i) and (ii) of the preceding sentence shall be referred to herein collectively as the "Insured Amounts." "Obligations" shall mean:

[PAR AMOUNT]
[LEGAL TITLE OF OBLIGATIONS]

Upon receipt of telephonic or telegraphic notice, such notice subsequently confirmed in writing by registered or certified mail, or upon receipt of written notice by registered or certified mail, by the Insurer from the Paying Agent or any owner of an Obligation the payment of an Insured Amount for which is then due, that such required payment has not been made, the Insurer on the due date of such payment or within one business day after receipt of notice of such nonpayment, whichever is later, will make a deposit of funds, in an account with Citibank, N.A., in New York, New York, or its successor, sufficient for the payment of any such Insured Amounts which are then due. Upon presentment and surrender of such Obligations or presentment of such other proof of ownership of the Obligations, together with any appropriate instruments of assignment to evidence the assignment of the Insured Amounts due on the Obligations as are paid by the Insurer, and appropriate instruments to effect the appointment of the Insurer as agent for such owners of the Obligations in any legal proceeding related to payment of Insured Amounts on the Obligations, such instruments being in a form satisfactory to Citibank, N.A., Citibank, N.A. shall disburse to such owners, or the Paying Agent payment of the Insured Amounts due on such Obligations, less any amount held by the Paying Agent for the payment of such Insured Amounts and legally available therefor. This policy does not insure against loss of any prepayment premium which may at any time be payable with respect to any Obligation.

As used herein, the term "owner" shall mean the registered owner of any Obligation as indicated in the books maintained by the Paying Agent, the Issuer, or any designee of the Issuer for such purpose. The term owner shall not include the Issuer or any party whose agreement with the Issuer constitutes the underlying security for the Obligations.

Any service of process on the Insurer may be made to the Insurer at its offices located at 113 King Street, Armonk, New York 10504 and such service of process shall be valid and binding.

This policy is non-cancellable for any reason. The premium on this policy is not refundable for any reason including the payment prior to maturity of the Obligations.

This policy is not covered by the Property/Casualty Insurance Security Fund specified in Article 76 of the New York Insurance Law.

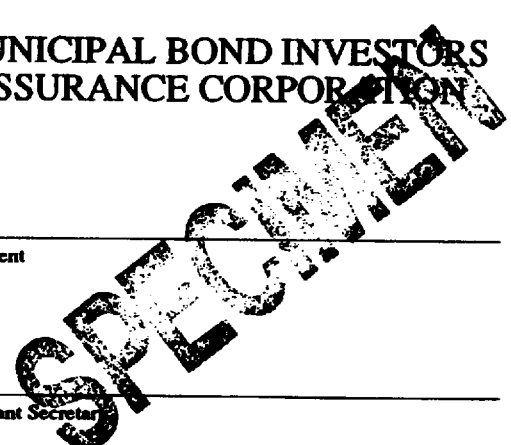
IN WITNESS WHEREOF, the Insurer has caused this policy to be executed in facsimile on its behalf by its duly authorized officers, this [DAY] day of [MONTH, YEAR].

MUNICIPAL BOND INVESTORS ASSURANCE CORPORATION

President

Attest:

Assistant Secretary



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**TABLE OF APPRECIATED PRINCIPAL AMOUNTS FOR CAPITAL  
APPRECIATION BONDS**

(Expressed per \$5,000 maturity payment amount)

Capital Appreciation Bonds due June 15,

<u>Date</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>
August 16, 1990.....	\$1,619.35	\$1,508.05	\$1,404.35	\$1,307.85	\$1,217.90
December 15, 1990.....	1,658.16	1,544.20	1,438.01	1,339.20	1,247.09
June 15, 1991.....	1,718.02	1,599.94	1,489.92	1,387.54	1,292.11
December 15, 1991.....	1,780.30	1,657.94	1,543.93	1,437.84	1,338.95
June 15, 1992.....	1,844.84	1,718.04	1,599.90	1,489.96	1,387.49
December 15, 1992.....	1,911.71	1,780.32	1,657.90	1,543.97	1,437.78
June 15, 1993.....	1,981.01	1,844.86	1,717.99	1,599.94	1,489.90
December 15, 1993.....	2,052.82	1,911.73	1,780.27	1,657.94	1,543.91
June 15, 1994.....	2,127.24	1,981.03	1,844.81	1,718.04	1,599.88
December 15, 1994.....	2,204.35	2,052.84	1,911.68	1,780.32	1,657.87
June 15, 1995.....	2,284.26	2,127.26	1,980.98	1,844.86	1,717.97
December 15, 1995.....	2,367.06	2,204.37	2,052.79	1,911.73	1,780.25
June 15, 1996.....	2,452.87	2,284.28	2,127.20	1,981.03	1,844.78
December 15, 1996.....	2,541.79	2,367.09	2,204.32	2,052.85	1,911.66
June 15, 1997.....	2,633.93	2,452.89	2,284.22	2,127.26	1,980.95
December 15, 1997.....	2,729.41	2,541.81	2,367.02	2,204.37	2,052.76
June 15, 1998.....	2,828.35	2,633.95	2,452.83	2,284.28	2,127.18
December 15, 1998.....	2,930.87	2,729.43	2,541.74	2,367.09	2,204.29
June 15, 1999.....	3,037.12	2,828.37	2,633.88	2,452.90	2,284.19
December 15, 1999.....	3,147.21	2,930.90	2,729.36	2,541.81	2,366.99
June 15, 2000.....	3,261.30	3,037.15	2,828.30	2,633.95	2,452.80
December 15, 2000.....	3,379.52	3,147.24	2,930.83	2,729.43	2,541.71
June 15, 2001.....	3,502.03	3,261.33	3,037.09	2,828.38	2,633.85
December 15, 2001.....	3,628.98	3,379.55	3,147.16	2,930.90	2,729.33
June 15, 2002.....	3,760.53	3,502.06	3,261.25	3,037.15	2,828.26
December 15, 2002.....	3,896.85	3,629.01	3,379.47	3,147.25	2,930.79
June 15, 2003.....	4,038.11	3,760.57	3,501.97	3,261.33	3,037.03
December 15, 2003.....	4,184.49	3,896.89	3,628.92	3,379.56	3,147.12
June 15, 2004.....	4,336.18	4,038.15	3,760.47	3,502.07	3,261.20
December 15, 2004.....	4,493.37	4,184.53	3,896.78	3,629.02	3,379.42
June 15, 2005.....	4,656.25	4,336.22	4,038.04	3,760.57	3,501.93
December 15, 2005.....	4,825.04	4,493.41	4,184.42	3,896.89	3,628.87
June 15, 2006.....	5,000.00	4,656.29	4,336.11	4,038.15	3,760.42
December 15, 2006.....		4,825.08	4,493.29	4,184.53	3,896.73
June 15, 2007.....		5,000.00	4,656.17	4,336.22	4,037.99
December 15, 2007.....			4,824.96	4,493.41	4,184.37
June 15, 2008.....			5,000.00	4,656.30	4,336.05
December 15, 2008.....				4,825.09	4,493.23
June 15, 2009.....				5,000.00	4,656.11
December 15, 2009.....					4,824.90
June 15, 2010.....					5,000.00



# MSRB

20436

## FORM G-36

FULL NAME OF ISSUER AND DESCRIPTION OF ISSUE

New York City Municipal Water Finance Authority  
Water and Sewer System Revenue Bonds Fiscal 1991 Series A

STATE New York

CITY/COUNTY New York

PAR VALUE OF ISSUE ~~285,000,000~~ 285,000,004.50 MSRB

DATE OF FINAL MATURITY June 15, 2010 6-15-2020 MSRB

DATED DATE August 16, 1990

CUSIP NUMBERS (and corresponding maturity dates)

611511 649706NM6

611511 649706NN4

6115120 649706NP9

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MANAGING UNDERWRITER Smith Barney

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JAN - 3 1991





17229/20436

# FORM G-36

## FULL NAME OF ISSUER AND DESCRIPTION OF ISSUE

# 285,000,004.50 New York City Municipal Water Finance Authority  
Water and Sewer System Revenue Bonds Fiscal 1991 Series A

STATE New York

CITY/COUNTY New York

PAR VALUE OF ISSUE ~~285,000,000~~ 285,000,004.50 MS12B

DATE OF FINAL MATURITY June 15, 2010 6-15-2020 MSRB

DATED DATE August 16, 1990

## CUSIP NUMBERS (and corresponding maturity dates)

<u>6/15/91</u>	<u>649706MR6</u>
<u>6/15/92</u>	<u>649706MS4</u>
<u>6/15/93</u>	<u>649706MT2</u>
<u>6/15/94</u>	<u>649706MU9</u>
<u>6/15/95</u>	<u>649706MV7</u>
<u>6/15/96</u>	<u>649706MW5</u>
<u>6/15/97</u>	<u>649706MX3</u>
<u>6/15/98</u>	<u>649706MY1</u>
<u>6/15/99</u>	<u>649706MZ8</u>
<u>6/15/00</u>	<u>649706NA2</u>

MANAGING UNDERWRITER Smith Barney

A1487



20436

# FORM G-36

**FULL NAME OF ISSUER AND DESCRIPTION OF ISSUE**

New York City Municipal Water Finance Authority  
Water and Sewer ~~to~~ System Revenue Bonds Fiscal 1991 Series A

STATE New York

CITY/COUNTY New York

PAR VALUE OF ISSUE 285,000,000 285,000,004.50 - MSRB

DATE OF FINAL MATURITY June 15, 2010 6-15-2020 MSRB

DATED DATE August 14, 1990

**CUSIP NUMBERS (and corresponding maturity dates)**

<u>6/15/01</u>	<u>649706 N B 0</u>
<u>6/15/02</u>	<u>649706 N C 8</u>
<u>6/15/03</u>	<u>649706 N D 6</u>
<u>6/15/04</u>	<u>649706 N E 4</u>
<u>6/15/05</u>	<u>649706 N F 1</u>
<u>6/15/06</u>	<u>649706 N G 9</u>
<u>6/15/07</u>	<u>649706 N H 7</u>
<u>6/15/08</u>	<u>649706 N J 3</u>
<u>6/15/09</u>	<u>649706 N K 0</u>
<u>6/15/10</u>	<u>649706 N L 8</u>

MANAGING UNDERWRITER Smith Barney