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# REPORT OF THE COMPTROLLER GENERAL OF THE UNITED STATES

## Suffolk County Sewer Project Long Island, New York: Reasons For Cost Increases And Other Matters

Environmental Protection Agency

Total estimated costs to construct the project increased about \$1 billion between 1969 and 1976. Inflation, a longer than anticipated construction schedule, and higher interest rates caused the increase.

Although the selection of and fees paid to consulting engineers had been questioned, no violations of applicable regulations in effect at the time were found. In March 1976 new regulations took effect, greatly changing the procurement of professional engineering services.

The county had performed some limited audits of project costs, but the Environmental Protection Agency had not. The Agency inspected project construction for the first time in December 1975.

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MARCH 22, 1977



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

B-166506

*AGC 000 24*

The Honorable Thomas J. Downey  
House of Representatives

*DLG 0415<sup>6</sup>*  
*DLG 0415<sup>7</sup>*

Dear Mr. Downey:

Your April 27, 1976, letter requested that we review the administration of the construction of a sewer system in the Southwest Sewer District of Suffolk County, New York. The Environmental Protection Agency, which had granted the district \$135.5 million as of December 31, 1976, is partially funding construction. You were concerned about a considerable increase in estimated project costs and various allegations of project mismanagement. Because other agencies were conducting investigations of possible criminal behavior and other matters at the time of your request, we agreed to limit the review to:

- increases in construction costs and related financing costs,
- selection of consulting engineers and fees paid to the firms, and
- audits of project costs and inspections of project construction.

Total estimated costs of the project had increased about \$1 billion. In 1969 total estimated project costs were \$521 million, whereas by 1976, the estimate had increased to \$1.5 billion. Inflation, an extended construction schedule, and higher financing costs were the primary factors accounting for the increase in project costs.

The cost estimate made in 1969 was stated in terms of 1969 dollars and made no provision for inflation. Since then, the "Engineering News Record" construction price index increased 83 percent and the Agency's sewer price index increased 93 percent. Originally, the project was estimated to be completed in 5 years, but it now appears that construction will take more than 10 years. Financing costs for borrowed funds

have also increased greatly. Interest rates on long-term bonds rose from about 5 percent in 1971 to almost 10 percent in December 1975.

The local news media raised certain questions concerning the selection of consulting engineers for the project and the reasonableness of fees paid to them. We did not find any violations of regulations in effect at the time consulting contracts were awarded. Since then, the Agency has changed the regulations concerning the procurement of engineering services in the construction grants program.

Although Suffolk County had performed some limited audits of engineering costs, the Agency had not audited project costs, and its first inspection of construction was conducted in December 1975.

On September 24, 1976, we testified on the results of our review before the Subcommittee on Investigations and Review, House Committee on Public Works and Transportation. The following sections of this report explain the results in greater detail and provide some additional facts which were not included in our testimony.

We made our review at Suffolk County's Department of Environmental Control and Department of Audit and Control, New York State Department of Environmental Conservation, and Environmental Protection Agency's region 2 and its headquarters. We reviewed applicable regulations, held discussions with cognizant officials, examined project files, and visited the construction site.

WASTE TREATMENT CONSTRUCTION GRANT  
PROGRAM AND THE SUFFOLK COUNTY PROJECT

The Federal Water Pollution Control Act Amendments of 1956 (Public Law 84-660, 70 Stat. 498) authorized the first Federal grants to assist in constructing sewage treatment facilities. This act authorized assistance of up to 30 percent of eligible project costs to a maximum of \$250,000. Amendments to the act in 1966 removed the maximum dollar limitation on grants and increased the Federal share to a maximum of 55 percent. The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 *et seq.*, Supp. V, 1975), commonly referred to as Public Law 92-500, increased the Federal share to 75 percent of eligible costs and expanded

the scope of eligible projects. These amendments provided contract authority of \$18 billion for sewer systems and sewage treatment plants.

The Agency's Municipal Construction Division in Washington, D.C., and its 10 regional offices administer the construction grants program. The Agency allocates funds to each State on the basis of a statutory formula. State water pollution control agencies then determine which projects will be funded and the order of funding. The responsible New York State agency is the Department of Environmental Conservation.

Concern over increasing contamination of the ground-water supply, which the county uses for drinking water, gave rise to an engineering survey of Suffolk County sewer needs in the early 1960s. A referendum proposing a sewer project was defeated in 1967 but, in November 1969, district residents approved the current project by a narrow margin.

The project is the first major sewer system to be constructed in Suffolk County. It is administered by the Southwest Sewer District, an administrative agency of the county. The project will serve an area of 57 square miles, or about 6 percent of the county's total area, and about 300,000 persons, or about 23 percent of the county's current estimated population. The project includes construction of about 900 miles of lateral and interceptor sewers, a sewage treatment plant capable of handling 30 million gallons of wastewater a day, 1 main and 10 smaller pumping stations, and an out fall sewer extending 2-1/2 miles into the ocean.

The State Department of Environmental Conservation approved the project for funding in 1970 and Federal grant approval followed in 1971. Initial construction began in August of that year. In March 1972 construction began on an interceptor sewer which was eligible for Federal and State aid and construction was largely completed in January 1973. As of November 15, 1976, county officials reported that construction of lateral and interceptor sewers was about 55 percent completed and construction of the sewage treatment plant was about 40 percent completed. Construction of the out fall and main pumping station had not begun. The County Commissioner of Environmental Control estimated that the project would be completed by 1981.

The county has applied for Federal funds for the project under both Public Law 84-660 and Public Law 92-500. The grant

under Public Law 84-660 was originally approved in 1971. The Federal commitment under this grant totals \$135.5 million, or 44 percent of project costs which were eligible for Federal aid. As of December 31, 1976, about \$23 million in Federal funds had been expended.

Under Public Law 92-500 the county has submitted a grant application for \$109 million to construct lateral sewers and certain interceptor sewers which were ineligible for Federal aid under the old law. The Agency's region 2 office was reviewing this grant application as of December 31, 1976. If approved, Federal funds for the project will total about \$245 million.

The total estimated project costs of \$1.5 billion include construction costs and financing charges. (App. I summarizes Federal, State, and county funding of project construction costs and expenditures as of December 31, 1976.)

#### CONSTRUCTION COST INCREASES

Estimates of total construction costs for the project increased from \$269 million in 1969 to \$612 million in 1976. Our review disclosed a number of factors which contributed to the large increase in estimated construction costs. Inflation and an extended construction period appear to have been the major factors. Others were changes in the scope of the project and the cost of engineering services. (App. II compares cost estimates made in 1969 and 1976.)

The initial cost estimate was stated in 1969 dollars with no allowance for later price increases. From January 1969 to April 1976, the "Engineering News Record" construction price index increased 83 percent, and the Agency's sewer price index increased 93 percent. For example, the estimated cost of the sewage treatment plant rose from \$30 to \$77 million, largely due to high prices of steel and other construction materials. The current cost estimate of \$612 million includes inflation to date plus an 8.61-percent annual inflation factor on unbid construction contracts.

Extensions to the construction schedule have compounded the effects of inflation, and obtaining approvals from the State Department of Environmental Conservation and Agency contributed to the extended construction schedule. For example, the county submitted a preliminary engineering design report on the treatment plant to the State in July

1971, but the State did not accept it until August 1973. The State did not initially comment on the report until January 1972, and the balance of the period involved obtaining additional data from the county on population projections and other matters, and resolving unacceptable design parameters. The Agency tentatively approved the plant in January 1974, and the county received bids in July 1974 to construct the plant. Construction began in March 1975.

Besides inflation, the estimated cost of the project increased because the scope of the project changed. For example, the estimate for the out fall had risen from \$12 to \$70 million, an increase of 483 percent. The current estimate includes plans to extend the out fall 2-1/2 miles into the ocean whereas initial plans were for a 1-1/2 mile ocean out fall. Also, the cost estimate for this out fall was increased when a bid received on an out fall to be constructed in neighboring Nassau County exceeded the pre-bid estimate by 40 percent. Suffolk County will not solicit bids to construct the out fall until the Army Corps of Engineers issues a permit for the project.

Project costs also increased due to the method of paying for consulting engineering services. Reimbursement for these services was based on a percentage of costs, therefore, as total costs increased, the costs of these services also increased.

Agency, State, and county officials agreed that the primary factor causing the overall cost increase was inflation. These officials said that the original estimates were based on preliminary engineering plans, which are not as firm as detailed plans and specifications. Basically, the Agency found that the estimated project cost was reasonable and that the cost escalation was not uncommon.

#### FINANCING THE COST OF THE PROJECT

The estimated cost to the county in interest charges to finance project construction rose from \$252 million in 1969 to more than \$900 million in 1976. The increase resulted from considerably higher construction and engineering costs and interest rates.

In 1969 Merrill Lynch, Pierce, Fenner & Smith, Inc., proposed that the county finance the capital costs of the

sewer district through 10 long-term bond issues, the last maturing in the year 2018. The county sold \$19 million in long-term bonds at an interest rate of 5.25 percent in October 1971. However, it financed the project with short-term notes thereafter until December 1975 when it sold more long-term bonds.

During 1972 the county sold three issues of 1-year bond anticipation notes, totaling \$180 million, at interest rates from 3.0 to 3.3 percent. The long-term rate in 1972 for a comparable obligation was about 5.5 percent. These short-term notes were renewed in 1973, 1974, and 1975 at interest rates ranging from 4.2 to 6.8 percent. In April 1976, \$54 million in bond anticipation notes, due in September 1976, were sold at an interest rate of 6.75 percent. In July 1976 the county sold \$60 million in notes, due in December 1976, at a rate of 9.35 percent.

In November 1975 the county attempted to sell \$54 million in long-term bonds but received no bids. An issue, dated December 1, 1975, and maturing in 1997, was later sold at an interest rate of about 9.8 percent. On August 1, 1976, the county sold an additional \$150 million in long-term bonds at an interest rate of 8.9 percent. (A schedule of project financing appears in App. III.)

County officials stated that initially the decision to go short term was based on market conditions. They pointed out that during the early years of project financing they were able to invest the proceeds of the short-term issues at interest rates higher than they were paying on the notes. The officials said they could not foresee the changes in the bond market in 1975 caused, in part, by the fiscal crisis in New York City and New York State agencies.

The current estimate of \$913 million in interest charges is based on a number of assumptions, including the amount of future borrowings, the cost of money, and the repayment period. Changes in any of these factors could affect total interest charges incurred on the project.

The county plans to pay for the costs of debt service on its bonds and for operating the sewer system by levying the following annual charges on homeowners in the sewer district:

--A preconnection charge of 12-1/2 cents for each \$100 of full value for 3 years.

--A sewer use charge of \$50.

--A real property tax of 60 cents for each \$100 of full value.

The uncertainties associated with future construction costs and the condition of the bond market make projecting the annual cost to the homeowner in the district very difficult. In the prospectus for the county's August 1976 bond issue, however, it was estimated that the annual cost for a house with a full valuation of \$30,000 would be \$230, including the annual use charge of \$50 but not the preconnection charge.

The county has also pledged as security for project bonds up to 1 cent of the existing 3-cent sales and use tax collected in the county, effective January 1, 1980. If the revenue from these sources is insufficient, all the taxable property in the county can be taxed to pay the bonds and related interest charges.

SELECTION OF CONSULTING  
ENGINEERS AND FEES PAID

In April 1970 the county legislature established a committee to select consulting engineers for the project. The Commissioner and Principal Engineer of the county's Department of Environmental Control made recommendations to the committee based on their evaluation of questionnaires submitted by 59 consulting firms. The Agency and State Department of Environmental Conservation did not participate in selecting engineering firms for projects.

The county selected Bowe, Walsh & Associates to provide design engineering services for all interceptor sewers, the out fall, and most of the lateral sewers. This firm was also selected to technically inspect all project interceptors, trunk lines, and lateral sewers. In addition to Bowe, Walsh & Associates, seven other consultants were responsible for other project components.

In June 1976 Price Waterhouse & Co. estimated total costs of engineering services through project completion to be between \$72 and \$80 million. Through July 31, 1976, Bowe, Walsh & Associates had been paid about \$30 million--



approximately \$10 million for basic services and \$20 million in special services fees.

Basic services include preparing preliminary and detailed plans and specifications and estimates of the cost of proposed work. Special services include inspecting work, preparing applications and support for government grants, and assisting the grantee as an expert witness in litigation arising from the project.

Before March 1976 consulting engineers were reimbursed for basic services generally at 5.23 percent of construction costs. This rate appeared in the American Society of Civil Engineers' Guide for the Engagement of Engineering Services, issued in 1968, for projects of above average complexity with net construction costs of \$100 million or more.

Consulting engineers were reimbursed for most special services based on a multiplier of two times salaries plus benefits, with reimbursement for actual travel and related expenses. Using the multiplier is also cost plus a percentage of cost contracting. American Society of Civil Engineers' guidelines on using multipliers stated that the multiplier which is applied to salary cost is a factor which compensates the engineer for overhead plus a reasonable margin for contingencies, interest on invested capital, readiness to serve, and profit.

We have consistently advocated avoiding contracts which base fees on a percentage of cost because it gives contractors positive incentive to inflate costs for increasing profits. We reported our views of such contracts to the Agency in August 1974 and again in May 1975. The Agency's Office of Audit also commented on the unacceptability of such contracts in several audit reports. Since March 1, 1976, the Agency has prohibited engineering contracts which base fees on a percentage of construction costs; and where multiplier contracts are used, the multiplier and portions of the multiplier allocable to overhead and profit must be specifically negotiated and separately identified in the contract. In all architect-engineer contracts, the Agency requires that a maximum fee be fixed, subject to renegotiation if the scope of work should change.

The new regulations also provide guidance to grantees on the procurement of engineering services. These guidelines are designed to assure that grantees procure engineering

services on the basis of competence and qualifications. The Agency is required to review the entire procurement process.

#### AUDIT OF PROJECT COSTS

Regulatory procedures under both Public Law 84-660 and Public Law 92-500 require a fiscal audit only at project completion, before making final payment. Interim audits are not required but may be made if deemed necessary. As of November 15, 1976, the Agency had not conducted an interim audit of the project and none was scheduled.

The New York State Department of Audit and Control and the Suffolk County Department of Audit and Control have made limited reviews of the fees paid to Bowe, Walsh & Associates. The State audit agency reported in 1976 that since the consulting engineer was paid on one basis for basic services, on another basis for special services, and on still another basis for work it subcontracted, inadequate cost control over engineering services is possible. The State agency also reported that reasonableness of profits could not be measured and that the current reimbursement method for special services limited the county's ability to control costs during a period of inflation, since fees were based on a percentage of costs.

A 1972 county audit of special services fees paid to Bowe, Walsh & Associates disclosed deficiencies which raised questions about the propriety of certain charges under the contract. During a followup audit underway as of November 15, 1976, the county requested various records which the firm at first hesitated to provide. We were told this matter was resolved to the satisfaction of the county.

#### INSPECTION OF CONSTRUCTION

A number of allegations were made about interceptor I-9 which is the first interceptor sewer project to be constructed and was largely completed as of January 1, 1973. The allegations involved excessive leaks, improper slope, and structural cracks. Neither the State Department of Environmental Conservation nor the Agency had been deeply involved in the inspection of the project, and the Agency did not inspect interceptor I-9 during its construction. A recent test of the interceptor conducted by the county at the request of the Agency disclosed that it was in acceptable condition.

The recipient of a Federal water pollution construction grant has the primary responsibility to inspect and assure the adequacy of construction in progress. Regulatory procedures under Public Law 84-660 required the cognizant Federal agency to inspect the project after completion and before final payment and it stated that interim inspections could be made. Regulatory procedures under Public Law 92-500 state that interim inspections may be made by either the State or the Agency; the Agency has the responsibility for conducting final inspections.

Suffolk County entered into an agreement with its primary consulting engineer to conduct day-to-day inspections of the lateral and interceptor sewers and to submit weekly inspection reports to the county. The county also assigned some of its own personnel to perform inspections of those same components.

On September 17, 1973, the consulting engineer told the county that all work on I-9 was completed, tested, reviewed, and was deemed satisfactory. A maintenance inspection of the interceptor sewer conducted in 1975 disclosed deficiencies, including house connection leaks, manhole defects, and minor structural defects. The 1975 test showed that leaks in the system totaled about 56,000 gallons a day more than allowable. Subsequently, all defective work was reportedly corrected by the construction contractor and all major portions of the contract were determined to be within allowable limits, but only after the fifth retest of the system.

The Agency did not inspect project construction until December 1975 but has made several inspections since then. State officials informed us that the nine inspections they had performed by July 22, 1976, three of which covered I-9, were not in-depth inspections, and the county and consulting engineer were notified in advance that inspections would be made. In April 1976 the director of the State Division of Pure Waters said that more frequent inspections of the Suffolk County sewer project would be initiated. (A schedule of Agency and State inspections appears in App. IV.)

In July 1976, in an attempt to resolve questions concerning interceptor I-9, the Agency requested the county to dewater the interceptor and to visually inspect it to determine the adequacy of construction. The inspection has been completed and portions of the interceptor eligible for Federal and State aid were found to be satisfactory. Ineligible portions

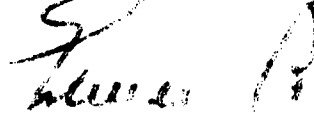
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initially failed the test but repairs were made and it passed a retest. The State is also reviewing the adequacy of the construction and inspection and the qualifications of the inspectors employed by the consulting engineer. As of November 1976 this review was still underway.

Since most of the information in this report has been presented in a public hearing, we did not obtain formal comments on the report's contents from Federal, State, county, and private organizations from which we obtained information. We did, however, obtain and consider the informal comments of appropriate officials.

We are sending a similar report on the results of our review today to the Chairman, Subcommittee on Investigations and Review, House Committee on Public Works and Transportation and the various State, county, and private organizations involved. Copies of this report are being sent to the Administrator of the Environmental Protection Agency.

Sincerely yours,



Comptroller General  
of the United States

SUFFOLK COUNTY SOUTHWEST SEWER DISTRICT  
FEDERAL, NEW YORK STATE, AND  
SUFFOLK COUNTY SHARE OF ESTIMATED  
CONSTRUCTION COSTS AND TOTAL PROJECT  
EXPENDITURES AS OF DECEMBER 31, 1976

<u>Participants</u>	<u>Total estimated construction costs</u>	<u>Total project expenditures</u>
Federal	a/ \$244,872,500	\$ 22,566,710
New York State	94,368,756	15,858,080
Suffolk County	<u>272,386,744</u>	<u>192,613,490</u>
Total	b/ <u>\$611,628,000</u>	<u>\$231,038,280</u>

a/ This amount assumes Federal approval of the pending grant application under Public Law 92-500.

b/ In 1974 the county estimated total construction costs at \$641 million. County officials informed us that various factors accounted for the decrease in estimated costs. These included awarding contracts at lower prices than projected, eliminating from the estimate unused contingency allowances applicable to largely completed contracts, and reducing the contingency allowance on unbid contracts from 10 to 5 percent.

SUFFOLK COUNTY SOUTHWEST SEWER DISTRICTESTIMATED PROJECT COSTS

	<u>Estimated costs</u>		Percentage increase <u>(note c)</u>
	<u>1969</u> <u>(note a)</u>	<u>1976</u> <u>(note b)</u>	
	(000 omitted)		
Disposal facilities:			
Interceptors	\$ 50,575	\$ 119,149	136
Sewage treatment plant	30,000	77,280	158
Pump station	1,400	3,500	150
Outfall sewer	12,000	70,000	483
Development expense	<u>14,096</u>	<u>33,812</u>	140
Total	<u>110,021</u>	<u>303,741</u>	176
Collection facilities:			
Lateral sewers and appurtenances	134,715	261,133	94
Pumping stations and force mains	1,428	3,396	138
Development expense	20,421	40,204	97
Land, easements, and right-of-way	<u>4,430</u>	<u>3,154</u>	-
Total	<u>159,044</u>	<u>307,887</u>	94
Total disposal and collection costs	<u>269,065</u>	<u>611,628</u>	127
Interest costs:	<u>252,314</u>	<u>912,893</u>	262
Total	<u>\$521,379</u>	<u>\$1,524,521</u>	192

a/ Figures obtained from 1969 reports prepared by Merrill Lynch, Pierce, Fenner & Smith, Inc., and Bowe, Walsh & Associates.

b/ Figures obtained from prospectus for the county's August 1976 bond issue, prepared by Smith Barney, Harris Upham, & Co., Inc.

c/ Increases are based on 1969 estimates.

SUFFOLK COUNTY SOUTHWEST SEWER DISTRICT  
PROJECT FINANCING THROUGH AUGUST 1, 1976

	<u>Amount</u>	<u>Date of issue</u>	<u>Date of maturity</u>	<u>Interest rate (percent)</u>
	(000 omitted)			
Long-term serial bonds	\$ 19,000	10/ 1/71	1/1/2010	5.25
	54,000	12/ 1/75	3/1/1997	9.77
	150,000	8/ 1/76	4/1/2010	8.91
Short-term bond anticipation notes:				
1970	7,365	12/23/70	12/23/71	3.09
1972:				
First series	60,000	7/ 5/72	7/ 5/73	3.21
Second series	60,000	9/28/72	9/28/73	3.29
Third series	60,000	12/ 5/72	12/ 5/73	3.00
1973: (Renewal of 1972 bond anticipation note issues)				
First series	60,000	7/ 5/73	7/ 5/74	4.92
Second series	60,000	9/28/73	3/ 4/74	5.62
Third series	60,000	12/ 5/73	5/ 6/74	5.05
1974: (Renewal of 1973 bond anticipation note issues less a \$2 million principal payment for each series)				
First series	58,000	3/ 4/74	3/ 4/75	4.26
Second series	58,000	5/ 6/74	5/ 6/75	6.04
Third series	58,000	7/ 5/74	7/ 3/75	6.81
1975: (Renewal of 1974 bond anticipation note issues less a \$2 million principal payment for each series)				
First series	56,000	3/ 4/75	5/ 4/76	4.16
Second series	56,000	5/ 6/75	5/ 6/76	5.66
Third series	56,000	7/ 3/75	7/ 2/76	5.80
1976:				
Second series (Renewal of 1975 bond anticipation note issue less a \$2 million principal payment)	54,000	4/26/76	9/15/76	6.75
Third series (Renewal of 1975 bond anticipation note issue less a \$2 million principal payment, and \$6 million in new money also sold)	60,000	7/ 2/76	12/15/76	9.35

SUFFOLK COUNTY SOUTHWEST SEWER DISTRICT  
ENVIRONMENTAL PROTECTION AGENCY AND  
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
PROJECT INSPECTIONS THROUGH JULY 22, 1976

<u>Date of inspection</u>	<u>Sewage treatment plant</u>	<u>Interceptor contracts</u>				
		<u>I-7</u>	<u>II-10AR</u>	<u>III-8</u>	<u>I-9 (note a)</u>	<u>II-8</u>
March 20, 1972					Dept.	
Sept. 20, 1972					Dept.	
Nov. 28, 1972					Dept.	
Sept. 24, 1975						Dept.
Dec. 4, 1975	Agency/Dept.					Agency/Dept.
Apr. 22, 1976	Dept.					
May 11, 1976	Agency/Dept.	Agency/Dept.	Agency/Dept.	Agency/Dept.		
June 18, 1976	Agency/Dept.		Agency/Dept.			
July 22, 1976	Agency/Dept.	Agency		Agency/Dept.		

a/ Work under contract I-9 was eligible for Federal and State aid and was substantially completed in January 1973. Work did not begin on other eligible portions until March 1975.