



**BOROUGH OF SOUTH RIVER
MIDDLESEX COUNTY, NEW JERSEY**

**WATER DISTRIBUTION
SYSTEM EVALUATION**

JULY 1998

MAYOR THOMAS J. TOTO

BOROUGH COUNCIL

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DAVID J. SAMUEL, P.E., P.P.....BOROUGH ENGINEER**

PREPARED BY:

**DAVID J. SAMUEL
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. 25838**

Our File: P-SR-00017-03



CONSULTING AND MUNICIPAL ENGINEERS

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July 13, 1998

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Mayor and Borough Council
Borough of South River
48 Washington Street
South River, NJ 08884

Re: Water Distribution System Evaluation
South River, New Jersey
Our File No.: P-SR-00017-03/1-160-0000-01

Dear Mayor and Borough Council:

Pursuant to your authorization, we have completed the above captioned report and respectfully submit same for your review.

The report reviews the Borough's Water Distribution System, makes recommendations for improving same and provides a preliminary construction cost estimate.

We trust that this report is satisfactory and provides the Borough with a financial planning tool for future Water Distribution System Improvements.

Should you have any questions regarding this matter, please do not hesitate to contact this office.

Very truly yours,

Bruce M. Koch, P.E., P.P.
Borough Engineer's Office

BMK/blr

Attachment

cc: All Council Members
Business Administrator
Borough Attorney
Borough Clerk
Chief Financial Officer
Water Plant Operators





I. INTRODUCTION

The purpose of this report is to provide the Mayor and Council of the Borough of South River with an evaluation of the existing Water Distribution System and to make recommendation for improving same. The report will also provide Preliminary Construction Cost Estimates for the recommended work.

II. DISTRIBUTION FACILITIES

The Borough's Water Distribution System consists of mains ranging in size from 4" diameter to the new 20" diameter transmission line. A number of the water lines date back as far as 1929 and earlier.

The piping network is extensive in that most of the Borough is covered by interconnected water mains however, many of these mains consist of four (4") inch and six (6") inch diameter cast iron pipes which do not have sufficient capacity to provide both consumption and fire flows. The breakdown of sizes and approximate lineal footage of cast iron water lines are as listed below.

<u>SIZE AND TYPE</u>	<u>ESTIMATED QUANTITY</u>	<u>PERCENT OF TOTAL</u>
4" Cast Iron	84,000 L.F. $\pm$	36.4%
6" Cast Iron	82,200 L.F. $\pm$	35.7%
8" Cast Iron	26,000 L.F. $\pm$	11.3%
10" Cast Iron	14,500 L.F. $\pm$	6.3%
12" Cast Iron	13,000 L.F. $\pm$	5.6%





<u>SIZE AND TYPE</u>	<u>ESTIMATED QUANTITY</u>	<u>PERCENT OF TOTAL</u>
14" Cast Iron	3,100 L.F. $\pm$	1.3%
16" Cast Iron	3,500 L.F. $\pm$	1.5%
20" Cast Iron	4,500 L.F. $\pm$	1.9%
		100%

TOTAL ESTIMATED LENGTH 230,800 L.F. $\pm$

TOTAL ESTIMATED LENGTH 43.7 miles $\pm$

III. EVALUATION

We reviewed the Borough's Water Map, the Borough's older Water System Improvement Plans and the Water Facilities Report prepared by the Borough Engineer's Office in 1978 to examine the water system, evaluate its condition and to make recommendations for improvements.

The Borough's Water Distribution System seems to suffer from two (2) general problems. The first is, as previously indicated, the system is comprised of a large amount of 4" and 6" cast iron mains, which are undersized by today's standards. These lines are generally unable to provide the required domestic and fire protection needs. Many of these lines are long dead ends, which need to be looped to improve flow and water quality.





The second problem is the majority of the Borough's Water Distribution System is comprised of unlined cast iron pipe. These unlined pipes become encrusted with corrosion and mineral deposits.

The internal pipe corrosion within the Borough's Distribution System results in the following negative impacts: reduced hydraulic capacity and increased headloss which results in a reduction of pressure; a reduction in available fire flow capacity which presents dangerous situations to the Borough; potential main breaks due to deterioration from internal pipe corrosion; aesthetic impacts as the tuberculation can impart a brown color to the water and safe drinking water concerns caused by possible contamination through cracked pipes.

IV. DISTRIBUTION SYSTEM REINFORCEMENT

Problems associated with corrosion and encrustation in the older water mains in the Borough as well as the inadequate looping of large diameter lines has resulted in the poor available fire flows reflected in flow tests and fluctuations in system pressure during periods of peak demand. In addition, it is anticipated that unless steps are initiated to mitigate the increase of corrosion and encrustation and to improve the Distribution System, the Borough can anticipate significant problems in the future with regard to the satisfactory distribution of water throughout the Borough.

In order to mitigate the aforementioned deficiencies, the Borough can either replace the system piping with cement-lined ductile iron pipe, install dual or parallel mains within





deficient areas of the system, or clean and line the existing system piping. Removal of tuberculation by in-place cleaning and cement mortar lining is a less costly solution than replacement and also results in less disturbance to existing roadways. A smooth lining is necessary to minimize the loss of carrying capacity.

A major cleaning and lining program would consist of cleaning, cement-mortar lining, testing and disinfecting the water mains of the system. Those sections of existing water mains determined to be unsuitable for cleaning and lining should be removed from service and replaced with new ductile iron, cement-mortar lined water mains. At this time, it is uncertain what quantity of mains will have to be replaced, although it can be anticipated that some may have to be due to the distribution system's age. The cleaning and lining program should also include furnishing and installing new in-line valves to replace leaking or inoperative valves, new valves at locations deficient in adequate valving and hydrant valves to replace leaking or inoperative valves along mains being cleaned and lined. In addition, all hydrants not functioning properly should be replaced and additional hydrants installed where deemed necessary.

Also, new ductile iron cement mortar lined pipe should be installed for replacement of all hydrant laterals, where necessary, along the mains being cleaned and lined. All interior surfaces of any valves, which are not replaced, should be cleaned. Our preliminary construction cost estimate, as outlined in the attached cost estimate in the Appendix is \$13,025,760. This cost estimate includes the installation of most of the





larger diameter water mains recommended in the 1978 Water Master Plan. It should be noted that several changes have been made to the Borough's distribution since the issuance of said report, including the two (2) East Brunswick Interconnections. It is very possible that a cleaning and lining project and the two (2) aforementioned interconnections could eliminate the need for some of the listed improvements. This would reduce the over cost of the project.

This report did not include a computer modeling of the distribution system to evaluate the system including the changes in same since its last study. We strongly recommend the Council consider same before investing in the new water main installations.

V. SUMMARY

As indicated, the Borough's Water System is badly in need of improvements. It is anticipated that the corrosion and encrustation of the unlined mains will continue and pose major distribution and water quality difficulties. A cleaning and lining project will have a positive impact on same.

We trust this document will assist the governing body with creating a long-term financial plan for upgrading their water distribution system in a phased manner.

VI. FUNDING SOURCES

At the present time, there are several methods of financing the phased improvements of the Borough's Water Distribution System at the local, state and federal level.





The most traditional method of financing improvements at the municipal level is by the issuance of capital improvement bonds. A second method of financing the improvements at the municipal level is by special assessment. Those areas of the Borough directly affected by the proposed improvements could be directly assessed for its portion of the cost to improve the water system.

State funding is presently available from the "Water Supply Bond Act". This legislation provides low interest loans for interconnections and rehabilitation or repair of antiquated, obsolete, damaged or inadequately operating municipal water systems. The current interest rate of these loans is in the range of 3.5% to 4.0% per annum with a standard maturity period of ten years and a maximum maturity period of twenty years in certain circumstances. Maximum loan amounts vary depending upon the population of the applicant's service area. This program is being administered through the Bureau of Safe Drinking Water, New Jersey Department of Environmental Protection and Energy.

State funding may also be available through low interest loans from the New Jersey Office of Economic Recovery.

The only known source of federal funding at the present time may be the Department of Agriculture, Farmers Home Administration. This agency previously provided financial assistance in the form of full or partial grants for those areas of municipalities considered eligible under federal guidelines for low income areas. Loans also may be available to the Borough from this agency at an interest rate equal to what the agency must pay for the money.





In addition, many municipalities have utilized connection fees to off-set the costs that the existing users have paid to construct the system.

All of these methods should be reviewed by the Governing Body with the Borough Attorney and Auditor in order to arrive at the means that is best suited for the recommended improvements for the Borough.





APPENDIX

PRELIMINARY CONSTRUCTION COST ESTIMATE



**SOUTH RIVER WATER STUDY/WATER DISTRIBUTION SYSTEM
PRELIMINARY CONSTRUCTION COST ESTIMATE
OUR FILE: P-SR-00017-03
DATE: 7-9-98**

ITEM #	DESCRIPTION	TOTAL	UNIT PRICE	TOTAL PRICE	% ADDED
1	FURNISH AND INSTALL BY-PASS PIPING	LS	LS	\$2,085,000.00	0%
2	REMOVE AND REPLACE 4" GATE VALVE	84	\$800.00	\$67,200.00	0%
3	REMOVE AND REPLACE 6" GATE VALVE	82	\$900.00	\$73,800.00	0%
4	REMOVE AND REPLACE 8" GATE VALVE	27	\$1,000.00	\$27,000.00	10%
5	REMOVE AND REPLACE 10" GATE VALVE	15	\$1,600.00	\$24,000.00	10%
6	REMOVE AND REPLACE 12" GATE VALVE	13	\$2,000.00	\$26,000.00	0%
7	REMOVE AND REPLACE 14" GATE VALVE	3	\$4,800.00	\$14,400.00	10%
8	REMOVE AND REPLACE 16" GATE VALVE	4	\$6,000.00	\$24,000.00	0%
9	REMOVE AND REPLACE 20" GATE VALVE	5	\$7,000.00	\$35,000.00	0%
10	FURNISH AND INSTALL NEW 4" GATE VALVE	42	\$800.00	\$33,600.00	0%
11	FURNISH AND INSTALL NEW 6" GATE VALVE	41	\$900.00	\$36,900.00	0%
12	FURNISH AND INSTALL NEW 8" GATE VALVE	13	\$1,000.00	\$13,000.00	0%
13	FURNISH AND INSTALL NEW 10" GATE VALVE	8	\$1,600.00	\$12,800.00	0%
14	FURNISH AND INSTALL NEW 12" GATE VALVE	7	\$2,000.00	\$14,000.00	0%
15	FURNISH AND INSTALL NEW 14" GATE VALVE	2	\$4,800.00	\$9,600.00	0%
16	FURNISH AND INSTALL NEW 16" GATE VALVE	2	\$6,000.00	\$12,000.00	0%
17	FURNISH AND INSTALL NEW 20" GATE VALVE	3	\$7,000.00	\$21,000.00	0%
18	REMOVE AND REPLACE EXISTING FIRE HYDRANT	180	\$2,500.00	\$450,000.00	0%
19	FURNISH AND INSTALL FIRE HYDRANT ASSEMBLY	72	\$2,500.00	\$180,000.00	0%
20	CLEAN AND CEMENT MORTAR LINE EXISTING 4" PIPE OR REPLACE WITH 6" WATER MAIN	84000	\$50.00	\$4,200,000.00	0%
21	CLEAN AND CEMENT MORTAR LINE EXISTING 6" PIPE	82200	\$20.00	\$1,644,000.00	0%
22	CLEAN AND CEMENT MORTAR LINE EXISTING 8" PIPE	28000	\$22.00	\$572,000.00	0%
23	CLEAN AND CEMENT MORTAR LINE EXISTING 10" PIPE	14500	\$24.00	\$348,000.00	0%
24	CLEAN AND CEMENT MORTAR LINE EXISTING 12" PIPE	13000	\$28.00	\$338,000.00	0%
25	CLEAN AND CEMENT MORTAR LINE EXISTING 14" PIPE	3100	\$28.00	\$86,800.00	0%
26	CLEAN AND CEMENT MORTAR LINE EXISTING 16" PIPE	3500	\$30.00	\$105,000.00	0%
27	CLEAN AND CEMENT MORTAR LINE EXISTING 20" PIPE	4500	\$34.00	\$153,000.00	0%
28	PRENTICE, WILLETT, SOUTHSIDE AND MAGIERA STREETS AREA				
	A. FURNISH AND INSTALL 10" PIPE	900	\$70.00	\$63,000.00	
	B. FURNISH AND INSTALL 8" PIPE	1800	\$80.00	\$96,000.00	
29	ROOSEVELT STREET-MAIN STREET CONNECTION 8" PIPE	900	\$80.00	\$54,000.00	0%
30	RUBIN STREET-REINFORCEMENT 10" PIPE	200	\$70.00	\$14,000.00	0%
31	WHITEHEAD AVENUE-WILLIAM STREET TRANSMISSION MAIN 12" PIPE	5200	\$80.00	\$416,000.00	0%
32	NORTHERN STREET SYSTEM-REINFORCEMENT 8" PIPE	350	\$60.00	\$21,000.00	0%
33	BURTON STREET SYSTEM - REINFORCEMENT 8" PIPE	300	\$70.00	\$21,000.00	10%
34	MONUSH AVENUE (NORTH) SYSTEM - REINFORCEMENT 8" PIPE	350	\$80.00	\$21,000.00	10%
35	SUNSET STREET SYSTEM REINFORCEMENT 8" PIPE	200	\$80.00	\$12,000.00	10%
36	CLAREMONT, JAMES AND ARLINGTON 8" PIPE	1650	\$60.00	\$99,000.00	10%
37	OLD BRIDGE TURNPIKE-KAMM TO MAIN STREET 8" PIPE	2800	\$80.00	\$156,000.00	10%
38	OLD BRIDGE TURNPIKE-BURTON TO CLARE PLACE 10" PIPE	900	\$70.00	\$63,000.00	10%
39	RUBIN STREET-PROSPECT TO BURTON STREET 10" PIPE	350	\$70.00	\$24,500.00	10%
40	DEVOE STREET 8" PIPE	1600	\$60.00	\$96,000.00	10%
41	MISCELLANEOUS 8" PIPE FOR LOOPING				
	DEAD END MAINS AND SYSTEM REINFORCEMENT	1650	\$80.00	\$99,000.00	10%
	TOTAL			\$11,841,600.00	
	10% CONSTRUCTION CONTINGENCY			\$1,184,160.00	
	PRELIMINARY CONSTRUCTION COST ESTIMATE			\$13,025,760.00	

THE ABOVE COSTS ARE CONSTRUCTION COSTS ONLY AND DO NOT INCLUDE
ANY LEGAL, BONDING, ADVERTISING, ENGINEERING AND EASEMENT/PROPERTY
ACQUISITION COSTS.

