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THE IMPACT OF WATER POLLUTION ABATEMENT COSTS
ON FINANCING OF MUNICIPAL SERVICES
IN NORTH CENTRAL TEXAS

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

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The purpose of this study is to determine the effects of water pollution control on financing municipal water pollution control facilities in selected cities in North Central Texas. This objective is accomplished by addressing the following topics: (1) the cost to municipalities of meeting federally mandated water pollution control, (2) the sources of funds for financing sewage treatment, and (3) the financial implications of employing these financing tools to satisfy water quality regulations. For the purposes of this study the cost of wastewater treatment is limited to those identified in the 1974 Needs Survey which was conducted jointly by the Texas Water Quality Board and the U. S. Environmental Protection Agency. The sources of funds for financing water pollution control are limited to four Alternative Municipal Wastewater Facility Financing Conditions:

1. The total waste treatment needs of a city are financed through the sale of Water and Sewer Fund revenue bonds.
2. Treatment needs are financed from a federal construction grant amounting to 35 per cent of the cost of needs; the remaining 65 per cent of needs are generated through the sale of revenue bonds.

3. The municipality finances its needs by receiving a state grant in the amount of 100 per cent of total waste treatment needs.

4. Seventy-five per cent of a municipality's needs are provided from a federal grant; the remaining 25 per cent is financed through the sale of revenue bonds.

The implications of employing these Financing Alternatives were determined by the analysis of data collected from a survey of twenty-six cities in the Dallas and Fort Worth Standard Metropolitan Statistical Areas. The data collected consisted of income, expenses, and capital structure information for the Water and Sewer Fund of each city. Analysis of the collected data was undertaken in three stages. Stage I involved the conversion of financial data to standard income and capital structure statement formats and the conversion of all dollar values to June 1973 dollars. Constant dollar conversion was based on the EPA's Sewage Construction Cost Index. In Stage II, trends were established for forecasting water and sewer operating income and capital structure for the year 1990. Stage III consisted of developing pro forma income and capital structure statements for each city and each Alternative Financing Condition based on the trend analysis of income and capital structure and the needs reported in the Needs Survey.

The study makes the following conclusions regarding the impact of water pollution control costs on municipalities in the North Central Texas Region:

1. The financing of the wastewater treatment requirements of the Water Pollution Control Act Amendments of 1972 will cause many municipalities to report operating deficits for their Water and Sewer Fund.

2. A federal grant program funded at the rate of 75 per cent of waste treatment needs will prevent operating deficits in the majority of cities in which 1990 waste treatment needs constitute 20 per cent or more of the expected Water and Sewer Fund capital structure.

3. A federal grant program funded at the average rate of 35 per cent of needs will benefit only a small number of cities.

4. The federal grant program does not improve the operating position of cities in which needs are less than 20 per cent of the total expected capital structure.

5. The state grant program shows the greatest incidence of producing municipal Water and Sewer Fund operating deficits.

6. In order to eliminate operating deficits, cities will need to increase Water and Sewer Fund income in amounts ranging from 0.3 per cent to 571.6 per cent.

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CHAPTER I

INTRODUCTION

Municipal financial problems have been brought to the forefront of public attention by New York City's fiscal imbalance. A recent Wall Street Journal article noted that many responsible civic leaders are calling for cities to "get their fiscal houses in order."¹ The consensus of expert opinion is that the majority of municipal fiscal problems are the result of the combined effect of two factors: (1) increasing demand by urban dwellers for public services, and (2) increasing taxpayer resistance to paying for services rendered by local governments. Catalytic elements contributing to the combined effects of increasing service demands and incommensurate increases in tax revenues include shifts in the tax base from "core" areas to suburban areas and the growth in the urban population. These catalytic elements combine with the major factors and precipitate urban fiscal problems.

Since the Depression the history of the urban experience has been marked by increases in services provided by local government to its constituents. To meet these service demands, local expenditures have increased at a compound average annual

¹The Wall Street Journal, December 10, 1975, p. 1.

rate of 8.8 per cent per year.² While some of the increase in public expenditures represents a shift in government functions from the federal level to the state and local level, a significant portion of the increase is the direct result of expanding public service demands.³ Municipal fiscal problems may be described as an irresistible force (public service demand) meeting an immovable object (financial resources). Cowden stresses this analogy:

The present known financial resources available to an American city are limited. In the past few years, city income has often been shrinking while the demand for services and higher salaries has grown. Any city manager realizes these problems when he tries to formulate municipal budgets to be presented to the city council. He must take into consideration the rising costs of operation and maintenance, capital project development, salary increases needed to meet inflation pressures,⁴ and reserve funds to allow for economic variables.

The problem of financing public goods and services implies that local units of government have the responsibility to satisfy human needs. Jack and Reuss note that the primary role of the local government is "to supply goods and services

²Michael E. Levy, "Trends and Prospects in Local Government Finances--An Introduction," in Juan de Torres, Financing Local Government (New York, 1967), p. 2.

³Alan K. Browne, "Principles and Problems of Municipal Financing," American Water Works Association Journal, LXIV (June, 1972), 346.

⁴R. W. Cowden, "Municipal Problems in Financing Water Pollution Control," Water Pollution Control Federation Journal, XLII (November, 1970), 1998.

to fulfill public wants."⁵ A major difficulty with such a broad statement of social responsibility is the identification of legitimate "public wants"--those wants that will benefit the entire community upon satisfaction. Since municipal resources are limited and all wants cannot be satisfied, it is essential for civic leaders to identify the legitimate needs for public services. Scheffer suggests that the "legitimate needs" cannot be identified unless an effective education and information program is undertaken by municipalities. Having adequate information is essential in order for citizens to make the necessary choices and associated sacrifices.⁶

The identification of justifiable wants does not ensure municipal financial bliss, the means of financing selected alternatives must be identified. Historically, the most common source of revenue for municipal financing has been general tax levies. While taxes remain a significant source of local government revenue, their viability is diminishing as taxpayers increasingly resist tax increases.⁷ The diminishing share of local government revenue provided by

⁵John W. Jack and Paul C. Reuss, "Financing Municipal Government: Fiscal Challenge of the Seventies," Municipal Finance, XLIII (February, 1971), 141.

⁶Walter F. Scheffer, "Problems in Municipal Finance," The Western Political Quarterly, XV (September, 1962), 524.

⁷The Wall Street Journal, December 24, 1971, p. 1.

taxes is illustrated by Table I. In 1950, taxes provided 53.4 per cent of total municipal revenue; this share decreased to 41.8 per cent in 1969. This proportional decline occurred during a period when total tax revenues increased by 224 per cent. Cowden poignantly and appositely illustrates that declining tax revenues are partially the result of the deterioration of central urban areas.

There has been a marked deterioration of the core area of most American cities with businesses that formerly made large contributions to the tax base of the community moving to suburban shopping centers and other locations without being replaced by other large taxpayers.⁸

Not only have changes in the location of business contributed to the erosion of city tax bases, but also changes in the income "balance" of central urban areas have contributed to the fiscal problems of large municipalities. Levy notes that the trend in urban demography is the replacement of above average income groups by persons with "substantially lower skills and resources."⁹ This population shift has not only increased financial problems in central cities, but also has contributed to financial difficulties in the suburbs.¹⁰

⁸Cowden, p. 1998.

⁹Levy, p. 13.

¹⁰Ibid.

TABLE I
 COMPARISON OF MUNICIPAL REVENUE SOURCES,
 SELECTED YEARS 1950 to 1969
 (millions of dollars)

Source	1950		1955		1960		1965		1969		Percent Change from 1950 to 1969
	Amount	Percent of Total	Amount	Percent of Total	Amount	Percent of Total	Amount	Percent of Total	Amount	Percent of Total	
Taxes	2017.2	53.4	2797.3	52.1	2828.1	51.5	4984.2	49.4	6534.5	41.8	224.0
Charges & Misc.	264.5	7.0	618.0	11.5	949.0	12.7	1298.7	12.9	1884.5	12.0	612.5
Subtotal-Revenue from own Sources	2281.7	60.5	3415.3	63.6	4787.2	64.2	6282.9	62.3	8419.0	53.8	269.0
Intergovernmental Revenue	639.2	16.9	856.5	16.0	1269.2	17.0	2004.2	19.9	4913.8	31.4	668.7
Utility Revenue	684.6	18.1	863.8	16.1	1046.1	14.0	1300.5	12.9	1624.6	10.4	137.3
Employee Retirement Revenue	169.3	4.5	233.1	4.3	349.0	4.7	494.7	4.9	690.7	4.4	308.0
Total	3774.8	100.0	5368.7	100.0	7451.5	100.0	10082.3	100.0	15648.1	100.0	314.7

Source: John W. Jack and Paul C. Reuss, "Financing Municipal Government: Fiscal Challenge of the Seventies," Municipal Finance, XLIII (February, 1971), 142.

This scenario of urban demographic change is presented by Miller and Tabb in a recent article:

As families migrate from the rural areas into the central city, the income mix of the population residing in the city changes such that relatively fewer high income people are living there. Furthermore, services deteriorate and the tax burden increases, leading to the exodus of those able to move who find the public service to tax burden ratio attractive in the suburbs.¹¹

These population shifts lead to growth in the suburbs as well as urban centers. As the population of a city grows it becomes increasingly difficult to finance public services. For central cities the increasing financial burden is concentrated in the areas of education and welfare.¹² In the suburbs and small municipalities, changes in the service mix contribute to fiscal problems because it has been demonstrated that as cities grow they move from supplying service "necessities" to offering "conveniences" and finally into the stage of "extending luxury services." These changes synthesize into the trend that as cities become larger total service costs and per capita service costs increase.¹³

The declining share of total municipal revenue from tax sources has been replaced primarily by increases in two other categories of revenue: (1) intergovernmental revenue and

¹¹Stephen M. Miller and William K. Tabb, "A New Look at a Pure Theory of Local Expenditures," National Tax Journal, XXVI (January, 1973), 162.

¹²Levy, p. 13.

¹³Scheffer, p. 524.

(2) user charges. Table I indicates that the most rapidly growing category of municipal revenue is intergovernmental transfers. These transfers include revenue sharing and various federal grant programs. The second most rapidly expanding source of revenue is service charges. Perhaps nowhere are these two sources of finance more important than in the area of financing municipal water and sewage treatment facilities.¹⁴ The essentiality of service charges and federal grants in financing water pollution control is demonstrated by the increasing expenditures for water pollution control facilities during the last decade. The value of capital outlays for water pollution control was expected to increase 152 per cent between 1965 and 1975.¹⁵ Continuing increases in expenditures for water pollution control facilities in conjunction with diminishing tax revenues and the need for increases in user charges signal municipal water and sewer departments as potential financial problem areas.

The Role of Water Pollution in Municipal Fiscal Affairs

For health reasons alone, the maintenance of adequate and safe supplies of clean water is a legitimate want which

¹⁴Federal Water Pollution Control Administration, The Cost of Clean Water--Economic Impact on Affected Units of Government, The Cost of Clean Water Series (Washington, 1968), p. 38.

¹⁵Federal Water Pollution Control Administration, 1969 Sewerage Charges, Vol. 3 of The Cost of Clean Water and its Economic Impact, 3 vols., (Washington, 1969), p. 2.

should be satisfied by local units of government. Cowden supports this thesis in his writing: "adequate wastewater disposal facilities and adequate drinking water facilities are essential to the health and wellbeing of the citizens."¹⁶ For example, insufficient supplies of clean water and waste disposal facilities hamper local economic growth as the experience of Mt. Washington, Kentucky, demonstrates: "an inadequate water supply and an outmoded sewage system combined to discourage expansion of business and housing in Mt. Washington, a small community 12 miles south of Louisville, Kentucky."¹⁷ Not until recently has the public devoted considerable attention to the cost of providing pollution control. This attitude of neglect is reflected in a statement from a 1963 issue of Dun's Review: "most people consider the cost of pollution control facilities to be negligible."¹⁸ The public attitudes of this era are further demonstrated by congressional funding activity for water pollution control facilities. For example, Congress did not appropriate funds to support the federal construction grant program authorized in the Federal Water Pollution Control Act Extension, PL 82-579.¹⁹

¹⁶Cowden, p. 1999.

¹⁷"Pollution and Water Problems Solved by Mt. Washington, Ky.," Water and Sewage Works, CXXI (April 30, 1974), R-82.

¹⁸"The Multibillion Dollar Fight Against Pollution," Dun's Review and Modern Industry, LXXXI (March, 1963), 5113.

¹⁹Hearings before the Senate Committee on Water and Air Pollution Control, 84th Congress, 1st Session, 1964, p. 52.

Professionals in the field of wastewater management were, perhaps, the first to recognize potential serious problems associated with financing water pollution control. One of these professionals has noted: "the public has shown an interest in controlling water pollution, but it does not yet seem to realize the problem municipalities face when trying to finance water pollution control facilities."²⁰ Federal financial assistance to local governments for public sewerage also reflects the changing public attitude regarding the cost of environmental protection. During the period 1956 through 1961, federal aid for public wastewater treatment works amounted to 5 per cent of total expenditures for such purposes; in 1967 the federal share has risen to 18 per cent.²¹ In the opinion of some experts, the federal share will probably rise to 35 per cent by 1980.²²

Similar to other public services, municipalities have relied upon ad valorem taxes to finance sewerage projects.²³ Increasing voter resistance to taxes and the subsequent decline in the importance of tax revenue has forced municipalities to develop alternative sources of financing for

²⁰Cowden, p. 1998.

²¹Federal Water Pollution Control Administration, The Economics of Clean Water, Vol. 1 (Washington, 1970), p. 72.

²²Personal interview with Don Morriss, Construction Grant Programs, Texas Water Quality Board, September 12, 1975.

²³Russell J. deLucia and others, Evaluation of Alternative Methods for Financing Municipal Waste Treatment Works, (Washington, 1975), p. 30.

public sewerage. The most popular sources of financing are (1) service charges, (2) special assessments, and (3) federal and state grants. Sanitary sewer service charges are not a new method of financing, having been employed by Brockton, Massachusetts, in 1564; however, the widespread use of these charges is a modern phenomenon.²⁴ Service or user charges are increasing in importance because they can be effectively used to replace declining tax revenues.²⁵ The use of user charges, however, has been assailed for the following reasons: (1) administrative difficulties,²⁶ (2) inequitable sharing of the charges among the user population,²⁷ and (3) inability to generate sufficient revenue as customers resist higher fees.²⁸

Special assessments are generally initiated by municipalities to finance the extension of sewer lines to new or existing property developments. The value of special assessments as a reliable financial tool is limited because they do not represent stable sources of funds.²⁹ Special assessments

²⁴C. H. Hoper, "Service Charges for Sanitary Sewers," Water and Sewage Works, CVII (February, 1960), 51.

²⁵Jack and Reuss, p. 142.

²⁶John C. Adams, Jr. and Vito Pennacchio, "Handling Revenue and Cost Elements in Rate Setting," American Water Works Association Journal, LXII (December, 1970), 754-795.

²⁷Federal Water Pollution Control Administration, Sewerage Charges, Vol. III of The Cost of Clean Water and its Economic Impact, 3 vols., (Washington, 1969), p. 9.

²⁸Hoper, p. 53.

²⁹deLucia, pp. 31-32.

are usually set at such a level that they may be less than the cost of providing the service extensions. A further limitation of special assessments is encountered in low population density areas where such assessment may represent an overwhelming burden on those properly assessed.³⁰

It has been a long standing policy of the American Water Works Association (AWWA) that municipal water and wastewater utilities should be self-supporting. Public desire to elevate the quality of the nation's waters through stringent environmental legislation has made this policy an unattainable objective. The inability of municipalities to maintain self-sustaining water utilities is illustrated by the following passage from an issue of the American Water Works Association Journal:

. . . demands of state and federal involvement, (public wastewater utilities) will be driven to financial plans that are not compatible with rates the AWWA has stated publicly in hearings as the only way the federal government is going to get the wastewater operations 'off its back' financially is to establish them as well-managed and well-financed operating entities. A massive program of federal aid, although needed to catch up with and to establish objectives, should not go on forever. However, if present financial demands, required to meet the instantaneous demands of the environmentalists, are not checked, it is highly likely that the capability of utilities to finance themselves from revenue bonds in the future will be destroyed for some time to come.³¹

³⁰Ernest A. Highley, "Financing Water-Works Improvements," American Water Works Association Journal, LXIII (June, 1971), 323.

³¹Henry J. Graeser, "Utility Rates for Wastewater Operations," American Water Works Association Journal, LXII (December, 1970), 82-83.

Municipal officials increasingly view federal and state assistance programs as being essential to the financing of wastewater treatment facilities. One writer notes that "few, if any, municipal officials can now justify developing a project without taking advantage of the 75 per cent grant under the new consolidated grant program."³² Many municipal officials view federal and state aid as the means of fully achieving water quality standards which have been established by federal and state agencies.³³ The necessity of federal aid is emphasized by many municipal leaders; these officials note that unless federal aid for waste treatment is received cities will be forced to reduce expenditures for other essential services such as education and public transit.³⁴ The issue of suboptimization of municipal objectives is emphasized by Lopp:

Municipalities find themselves in a triple squeeze--a general shortage of investment funds, high interest rates resulting from the threat of taxation of municipal bonds, interest, and continuing pressure from state and Federal government to place treatment plants in line according to schedules determined in anticipation of substantial federal appropriations. Cities at the same time face

³²K. L. Kollor, "Status of Construction for Environmental Protection," Public Works, XCVIII (March, 1967), 99.

³³Raymond L. Bancroft, "Are Cities Trapped in the Water Pollution Control Funding Gap?," Nation's Cities, VII (September, 1969), 9.

³⁴"St. Joseph, Mo., Faces its Financial Bind," Nation's Cities, VII (September, 1969), 13.

demands to meet other urban needs, and sewage collection and treatment may not be very high on the list of priorities of local interest groups.³⁵

Officials supporting federal assistance programs cite them as having three advantages:

1. Federal aid programs make possible the pursuance of proud national objectives while recognizing the diversity of local abilities to pay and needs.
2. Disperse 'creative innovation' in public services among the levels of government.
3. Aid in rendering equity to the tax system by providing for the release of pressure on overburdened state and local tax systems.³⁶

The federal grant program is no panacea, however; many authorities consider that the program is not fully funded, creating what has been termed a "funding gap."³⁷ Further difficulties in the grant programs involve the methods by which funds are apportioned among the states.³⁸

The current status of municipal financing of water pollution may be characterized as a conundrum--municipalities are placed in the position of being responsible for controlling pollution; however, they do not have adequate resources to finance water quality programs, forcing them to turn to the

³⁵W. James Lopp II, "Alternative Methods of Financing Waste Treatment Facilities," Water and Wastes Engineering, VII (March, 1970), p. 61.

³⁶Robert J. McLeod, "Place of Federal Grants and Loans in Utility Financing," American Water Works Association Journal, LX (October, 1968), II05.

³⁷Bancroft, p. 9.

³⁸Hearings, p. 52.

federal government which inadequately funds the federal grant programs. The ramifications of the combination of factors mentioned above have not been fully explored. Research efforts in the field of water pollution control have generally ignored the ability of municipalities to provide the financial resources necessary to satisfy the water quality programs mandated by federal and state law.

Water Pollution Abatement Economic Research

As the previous sections indicate, there is considerable professional concern about the possible impact of water pollution abatement costs on municipal financing. This concern, however, is generally based on subjective evaluation rather than substantive evidence. Evidence is practically nonexistent because research of the economic ramifications has been limited to two primary areas: (1) determining the cost of compliance with water pollution control legislation by industry and municipalities and (2) an evaluation of federal participation in construction grant programs. The methodologies employed have been limited to time series projections based on engineering data and case studies.³⁹ A review of some of the research that has been conducted in the economics of industrial and municipal pollution abatement will reveal that little is known about the impact of these costs on either industry or local governments.

³⁹Jarir S. Dajani, "Cost Studies of Urban Public Services," Land Economics, IL (November, 1973), 479.

Several research efforts designed to determine the economic impact of water pollution have been performed by the Federal Water Pollution Control Administration (FWPCA) under the auspices of Section 16(a) of the Federal Water Pollution Control Act⁴⁰ and by the Environmental Protection Agency as authorized by Section 26(a) of the Federal Water Pollution Control Act Amendments of 1972.⁴¹ The results of this research are presented in a series of reports entitled The Cost of Clean Water and The Economics of Clean Water. The methodology employed is consistent throughout the series of publications, with only slight modifications to allow for the consideration of differences between the composition of water depollution cost for industries and municipalities.

Cost studies for industrial water pollution involved two methodologies: (1) determination of the treatment cost requirements for industry based on estimates of existing waste treatment applications as reported in the Water Use in Manufacturing and combining these estimates with "established cost factors for conventional waste treatment requirements"⁴² and (2) the combinations expert estimates of industrial pollution control techniques with

⁴⁰The Cost of Clean Water and its Economic Impact, I, ii.

⁴¹U. S. Environmental Protection Agency, The Economics of Clean Water (Washington, 1972), p. v.

⁴²U. S. Federal Water Pollution Control Administration, Summary Report, Vol. I of The Cost of Clean Water, 4 vols. (Washington, 1968), 7.

"economic/engineering studies of specific industrial groups."⁴³ Both of the techniques made the assumption that, for purposes of projection, costs would increase at a constant rate over the period covered by the report. For example, in the 1968 report the FWPCA assumed that industrial plant construction costs would increase at an annual rate of 3.6 per cent "over the next five years."⁴⁴

The logic underlying studies of municipal investment requirements is presented in Figure 1. As the flow diagram indicates, the determination of "aggregate investment requirements was based on three input factors: (1) an inventory of waste municipal wastewater facilities and needs, (2) engineering cost data for waste treatment plants of various sizes, and (3) projections based on a constant rate of cost increase over the period encompassed by the report.

Neither the methodologies employed for cost studies in industrial water pollution control nor those for municipal wastes measured the capacity of cities or firms to finance the waste treatment requirements. The EPA conducted a study to determine the ability of the federal grant program to aid municipalities in meeting the fiscal requirements of water pollution control. The methodology employed was that of developing a mathematical model of the municipal budgeting process and the construction grant program. By combining

⁴³Ibid.

⁴⁴Ibid., p. 8.

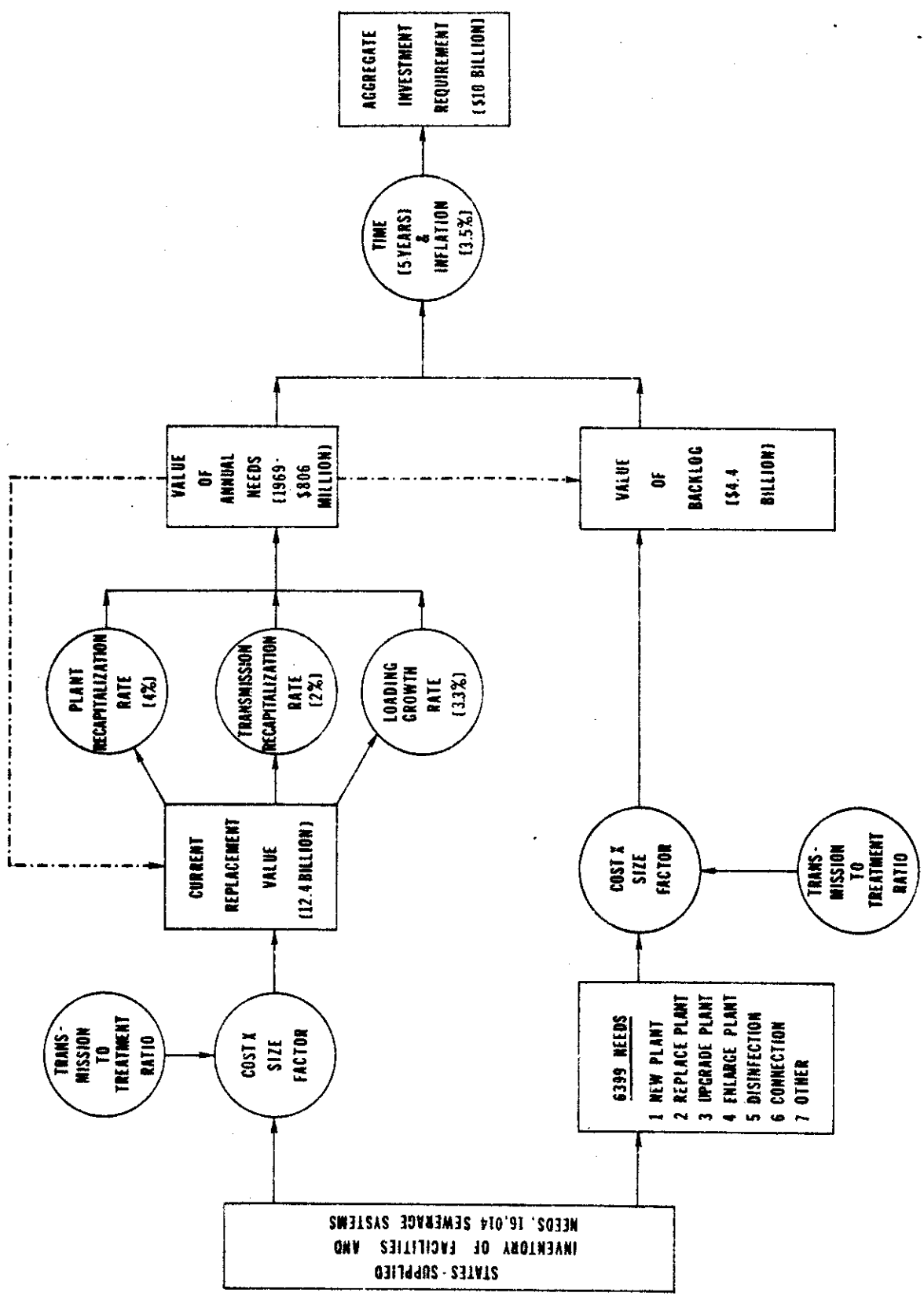


Fig. 1--Cost of clean water research methodology flow diagram.

Source: U. S. Federal Water Pollution Control Administration, The Economics of Clean Water, Vol. I (Washington, 1970), p. 162.

these two models the researchers were able to evaluate the efficiency, equity, and administrative difficulties associated with the grant program. The study utilized several cities as case studies for model validation and development of projections. The report, however, did not address the extent to which local debt or service charges would be affected by various levels of federal grants.⁴⁵

Watters has stated that the question which needs answering is not whether state and localities can make ends meet, but rather on what terms this financing will be achieved.⁴⁶

Dajani emphasized that a "highly cost-effective exercise" would be the examination of the cost relationships of providing urban public services.⁴⁷ Included in such studies would be the impact of the cost of providing these services on prices of services, and federal aid to municipalities. This report will address the ramifications of water pollution control costs on local governments in the North Central Texas area.

⁴⁵ deLucia, p. 62-110.

⁴⁶ Elsie M. Watters, "Fiscal Outlook for State and Local Governments," Needs vs. Revenue: The Dilemma of Urban America, edited by James C. Cotham III and Kenneth E. Quindry, (Knoxville, Tennessee, 1971), p. 29.

⁴⁷ Dajani, p. 483.

Purpose

The purpose of the study is to determine the effects of water pollution control on financing municipal sewage facilities in selected cities in North Central Texas. This purpose will be accomplished by addressing the following topics: (1) the cost to cities of meeting federally mandated water pollution control, (2) the sources of funds for financing sewerage, and (3) the financial implications of these sources and uses.

Delimitations

The study is constrained by the following:

1. Municipalities included in the study are those in the Dallas and Fort Worth Standard Metropolitan Statistical Areas (SMSA's) with populations of 5,000 or more persons.
2. Municipal water pollution control, as required by the Water Pollution Control Act Amendments of 1972 (PL 92-500), is the exclusive concern of this study.
3. Municipal financial needs are limited to transactions that occur within "water and sewer funds" and between these funds and other municipal fiscal accounts.
4. The historical data base of municipal water and sewer fund financial structure will contain data for the period 1960 through 1974, inclusive.

5. Municipalities which "purchase" waste treatment from Water and Sewer Districts or purchase these services from other municipalities will not be included in this study.

6. Municipalities which are not included in the EPA's 1968 "Survey of Municipal Waste Facilities" will be excluded from the study.

Plan of the Dissertation

Chapter I has presented an introduction to municipal fiscal problems related to the costs of water pollution control, a review of research conducted in the fields of the economics of water depollution, a statement of the problem to be studied, and a glossary of terms germane to water pollution abatement. Chapter II describes the evolution of federal water pollution control laws, and enumerates the major provisions of the Federal Water Pollution Control Act Amendment of 1972 and the Texas Water Quality Act. Water pollution control technology and the cost of this technology are contained in Chapter III. The methodology and research design of this study are described in Chapter IV--the criteria for selecting the population, a description of the data and data collection procedures, and an explanation of the analytical techniques employed in this study. Chapter V contains the collected data and the analysis of the data. The raw data is presented in tabular form. The analysis is in the form of tables, mathematical models, figures, and pro forma

financial statements. Chapter VI contains the summary, conclusions, and recommendations. The summary of the study is presented through a restatement of the problem and a capsule of data collection and analysis. Conclusions are based upon the results of data analysis presented in Chapter V. Also included in Chapter VI are recommendations pertinent to sewerage financing problems of municipalities and needs for further research in subjects related to municipal fiscal affairs and water pollution control.

In addition to the six chapters described above, the dissertation includes supplementary information, as necessary, in the form of appendices and a bibliography. The bibliography will be of value to those who may wish to advance knowledge in the field of water pollution abatement and analysis of municipal fiscal affairs.

Glossary of Water Pollution Terminology

- Assimilative Capacity--the natural capability of the aquatic environment to dissipate measurable and limited amounts of contaminants over time through dilution, chemical and biological action, physical processes.
- Activated Sludge--a type of aerobic treatment process utilized in secondary treatment plants; organic pollutants are brought in contact with biologically active micro-organisms in the presence of mechanically introduced air.
- Biochemical Oxidation--the principal purification activity by micro-organisms within an aerobic treatment process transforming organic pollutants into settleable organic or inert mineral substances.

- Biochemical Oxygen Demand (BOD)--the amount of oxygen needed by any polluted water or sewage to allow micro-organisms to consume the suspended and dissolved biodegradable organic material found in the liquid under aerobic conditions. Measured in milligrams of oxygen per liter of liquid consumed during incubation for five days at 20 degrees centigrade.
- Biodegradable--material (usually organic) which can be reduced (digested, oxidized) by micro-organisms to form stable compounds such as carbon dioxide and water.
- Branch Sewer--a liquid waste conveyance receiving flows from house connections and laterals.
- Chemical Treatment--sewage treatment methods utilizing various chemical processes to assimilate pollutants. Includes coagulation, chemical precipitation, dialysis, ion exchange, neutralization, and others.
- Collection Network--a system of wastewater conveyances carrying sewage from points of origin to treatment and/or disposal facilities. This system consists of house connections, branch sewers, laterals, main sewers, trunk sewers, interceptors, outfall sewers, manholes, and other physical appurtenances.
- Combined Sewer--a single conduit intended for the removal of both sanitary sewage and storm water runoff.
- Design Flow--the hydraulic load for which a facility is designed.
- Design Period--the time span during which a proposed public works system and improvements are to provide adequate service.
- Design Population--the number of people to be served by a proposed public works system and improvements; usually, the maximum number anticipated to require use of the system during the design period.
- Dissolved Material--a substance separated into molecules and dispersed through a liquid medium.
- Dissolved Oxygen (DO)--the amount of oxygen found and available for biochemical activity within a given volume of water, measured in milligrams per liter (mg/l) or parts per million (ppm). The DO saturation point of a body of water is dependent upon the temperature, chemical characteristics of the water, and barometric pressure.

- Effluent--the liquid discharged by a collection network or various treatment units of a treatment plant. Or, more generally, the liquid, solid, or gaseous product discharged or emerging from a process.
- Flocculation--the artificial formation of flocs (loose mass of jelly-like or fibrous particles) through the addition of chemicals to sewage.
- Force Main--a sewer flowing under pressure. Usually used to bring sewage from a pumping station to a facility at a higher elevation.
- Interceptor--a major sewer collection flows from a number of of main and trunk sewers and carrying the discharge to treatment or disposal facilities.
- Lateral--a minor sewer receiving flows from house connections only.
- Main Sewer--a sewer serving as the collector and conveyance for a sizeable district.
- Outfall Sewer--a conveyance for (a) the movement of effluents from a treatment facility to a point of final discharge (receiving body of water) or (b) the transport of raw sewage to a point of final discharge if no treatment plant is available.
- Population Equivalent--the hypothetical number of people who would produce the same sewage load on treatment facilities as a given commercial or industrial activity.
- Sanitary Sewage--sewage which represents a direct health and pollution hazard, including both domestic sewage and liquid industrial wastes.
- Sanitary Sewer--a sewer intended for the removal of sanitary sewage only.
- Sewage--liquid or water-borne wastes generated within residences, business establishments, institutions, and industrial buildings, or as by-products of any residential, commercial, industrial, social, and municipal activity.
- Sewage Charge--a fee, fixed or variable, levied by a municipality for the collection and treatment of domestic and industrial wastes.

Sewer--a conduit used for the collection and transportation of sewage.

Sewer System--the linked, man-made physical improvements intended for the collection, removal, treatment, and disposal of sewage generated within an area; usually consisting of a collection network and a treatment facility.

Sewerage--the concept and general activity constituting the collection, removal, treatment, and disposal of liquid wastes.

Treatment--the artificial removal of pollutants from sewage and/or their transformation into an inert state and/or the altering of the objectionable constituents by controlled physical, chemical, and/or biological processes.

Treatment Plant--a contiguous system of processes and units designed and used for the removal of pollutants from sewage.

Water Pollution--a condition or state of the aquatic environment under which the usefulness of the water is impaired or eliminated for domestic, industrial and recreational purposes; aquatic biota suffers or is destroyed; and offensive and unnatural sights, smells, and tastes are present.

CHAPTER II

MAJOR FEDERAL AND TEXAS WATER POLLUTION CONTROL LAWS

The laws to be described in this chapter form the foundation for all local governmental actions relating to water pollution control. These legal foundations represent a transition from passive acceptance of water pollution as a symbol of national progress to active measures to prevent further pollution of the nation's waters and to return them to their former pristine quality.¹

Federal Laws

The Federal Water Pollution Control Act, as amended, and the Refuse Act of 1899 form the basis for federal water pollution control authority. The Federal Water Pollution Control Act (PL 84-660) was enacted on July 9, 1956. Public Law 84-660 has been amended by the following legislative actions: the Federal Water Pollution Act Amendment of 1961 (PL 87-88), the Water Quality Act of 1965 (PL 89-234), the Clean Water Restoration Act of 1966 (PL 89-753), the Water Quality Improvements Act of 1970 (PL 91-224), and the Federal Water Pollution Control Act Amendment of 1972 (PL 97-500). The major provisions of these acts and other significant water pollution laws will be described in subsections of this chapter.

¹"The Multibillion Dollar Fight Against Pollution," Dun's Review and Modern Industry, LXXXI (March, 1963), 5113.

The Refuse Act of 1899

The history of water pollution control legislation in the United States began with the enactment of the River and Harbors Act of 1899.² Section 407 of the Rivers and Harbors Act of 1899 is generally referred to as the Refuse Act of 1899, the first water pollution control legislation to be passed by Congress.³ The purpose of the River and Harbors Act of 1899 was to prevent the intentional obstruction of navigable interstate waters. This purpose is clearly evidenced by the following passage from Section 401:

It shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of the Army.⁴

Section 407 extended the applicability of the act to include manmade obstructions not associated with the construction of dams and similar structures. The Refuse Act of 1899 states, in part, that it is unlawful to

. . . throw, discharge, or deposit or cause, suffer, or procure to be thrown, discharged or deposited either from or out of any ship, barge, or floating craft of any

²33 U.S.C. 401 et. seq.

³Section 13 of the River and Harbors Act of 1899, 33 U.S.C. 407.

⁴33 U.S.C. 401.

kind or from the shore, wharf, manufacturing establishment, or mill of any kind, any refuse matter of any kind or description whatever. . . , into any navigable water of the United States, or into any tributary of any navigable water which the same shall float or be washed into such navigable water;⁵

Responsibility for enforcing the Act was delegated to the U. S. Army Corps of Engineers. The Corps interpreted the Act as applying to the following:

. . . all direct and indirect discharges or deposits (except those flowing from the streets and sewers in liquid form) by any person, firm or other entity, including discharges or deposits from municipal, state, or Federal facilities or installations into navigable waterway or tributary or into a waste treatment system from which the same will flow into a navigable waterway or tributary.⁶

Federal Water Pollution Control Act of 1948

Between the years 1899 and 1948 there were no water pollution laws passed by the Congress. This inaction may reflect the general belief at that time that the nation possessed a bountiful and almost limitless supply of fresh water. This inaction ended and the role of the federal government in water pollution control changed dramatically with the passage of the Federal Water Pollution Control Act, PL 80-845, in 1949. Under the Refuse Act of 1899, the federal government's role had been passive; that is, as long as an

⁵33 U.S.C. 407.

⁶U. S. Army Corps of Engineers, Permits for Work and Structure in and for Discharges or Deposits into Navigable Waters, (Washington, 1971), pp. 2-3.

industry or city possessed a permit from the Corps, it could discharge wastes into waters regardless of the pollution load created by the discharges. The Refuse Act also did not make provisions for the development of technology to depollute the waters of the nation. PL 80-845 placed the federal government in an active role of controlling water pollution. The Act established a national antipollution policy, pledged the federal assistance in advancing water pollution abatement technology, and offered federal financial assistance for municipalities. Section 1 of PL 80-845 stated the following as being national policy:

. . . to recognize, preserve, and protect the primary responsibilities and rights of the States in controlling water pollution, to support and aid technical research to devise and perfect methods of treatment of industrial wastes which are not susceptible to known effective methods of treatment, and to provide federal technical services to state and interstate agencies and to industries, and financial aid to state and interstate agencies and to municipalities, in the formulation and⁷ execution of their stream pollution abatement programs.

Administration of the Act was divided between the Public Health Service (USPHS) and the Federal Works Administration (FWA). The USPHS was responsible for providing technical assistance and final approval of municipal waste treatment projects. Once facilities were approved by the USPHS, the FWA could make loans to municipalities for design and

⁷Section 1, Federal Water Pollution Control Act, PL 80-845.

construction of treatment facilities.⁸ The loans carried an interest rate of 2 per cent and were limited to the smaller of \$250,000 or 33.3 per cent of the "estimated reasonable costs."⁹

Public Law 80-845 authorized construction loans of \$22.5 million for each fiscal year 1948 through 1953. In addition to these sums, the bill also authorized one million dollars for grants for preliminary design and planning of treatment works.¹⁰ The Act was extended to 1956 by the passage of Federal Water Pollution Control Act Extension, PL 82-579.¹¹ It should be noted that the philosophy of active federal participation was expounded by PL 80-845; this philosophy was only partially implemented since no funds were appropriated for the loan and grant programs authorized under the Act.¹²

Federal Water Pollution Control Act of 1956

In 1956 Congress passed the Federal Water Pollution Control Act, PL 84-660.¹³ The Act furthered the active

⁸Russell J. deLucia and others, Evaluation of Alternative Methods for Financing Municipal Waste Treatment Works, (Washington, 1975), p. 116.

⁹Section 5, PL 80-845. ¹⁰Section 7, PL 80-845.

¹¹66 STAT. 927.

¹²Hearings before the Senate Committee on Water and Air Pollution Control, 84th Congress, 1st Session, 1964, p. 52.

¹³33 U.S.C. 446 et. seq.

federal role in preventing and controlling water pollution. DeLucia notes that the enactment of PL 84-660 was in response to the recognition that "the extent and severity of pollution in this country [was] outstripping any provisions for its abatement and control."¹⁴ The purpose of the Act was to "enhance the quality and value of our water resources" and it established as national policy the "prevention, control, and abatement of water pollution."¹⁵ Major provisions of the Act established agencies to supervise federal interest in water pollution control; provided for development of comprehensive water pollution abatement control; encouraged interstate cooperation and uniform laws, research, investigation, training and information programs; and provided for enforcement for the prevention of pollution of interstate and navigable waters. The Act emphasized individual state action by recognizing "the primary responsibilities of the States in preventing and controlling water pollution."¹⁶

State initiative was encouraged through a matching grant program. The importance of the matching grant program was expounded by the testimony of Health, Education and Welfare Department (HEW) officials before the Senate Public Works Committee: ". . . experience with other health programs has

¹⁴deLucia, p. 117.

¹⁵33 U.S.C. 446.

¹⁶33 U.S.C. 518.

demonstrated the value of matching grants in stimulating states to provide their own resources to do an effective job."¹⁷ Federal support was designed to be limited to critical supportive activities in the construction of treatment work which could not be effectively performed by the states. These critical support activities included planning, research, consulting, and technical assistance.¹⁸ The federal contribution to the states was set at not more than 66.6 per cent or less than 33.3 per cent of the actual cost of a local project.¹⁹ For purposes of the grant program local costs included the following categories of costs: preliminary planning, engineering, feasibility studies, and improvement and extension of treatment works.²⁰

The 1956 Act authorized \$50 million for the grant program. Of this amount 50 per cent was to be allotted to municipalities with populations of less than or equal to

¹⁷Hearings before the Senate Public Works Committee, 84th Congress, 2nd Session, April, 1955.

¹⁸deLucia, p. 119.

¹⁹Ibid., pp. 119-120.

²⁰Section 6(e), PL 84-660

250,000 persons.²¹ Each state's share of the appropriated funds was based on the ratio of individual per capita income to the per capita income of the entire United States.²²

Federal Water Pollution Control Act
Amendments of 1961

The Federal Water Pollution Control Act Amendments of 1961, PL 87-88, amended the Federal Water Pollution Control Act, PL 84-660. The changes instituted by PL 87-88 were primarily administrative. Under PL 84-660, the Surgeon General was the primary administrative officer of federal water pollution control programs; Public Law 87-88 shifted this administrative responsibility to the Secretary of Health, Education, and Welfare.²³

The Amendments of 1961 also made minor alterations in the federal construction grant program. Construction grant

²¹Section 6(d), PL 84-660.

²²Section 6(c), PL 84-660. The following formula was designed as the means of calculating each state's share of appropriated federal funds.

Let x_i = per capita income for state i
 x = national average per capita income
 y_i = population of state i
 s_i = fraction of appropriated grant funds for state i

$$s_i = 50 \frac{y_i}{\sum y_i} + 50 \frac{(x/x_i)}{\sum_i (x/x_i)}$$

²³Section 5 Federal Water Pollution Control Act Amendment of 1965, PL 87-88.

authorizations were increased from \$50 million in fiscal year 1962 to \$90 million in 1963, and \$100 million for each fiscal year 1964 through 1967.²⁴ Maximum grant amounts were increased from the smaller of 30 per cent or \$250,000 to the smaller of 30 per cent or \$600,000. Fifty per cent of grant funds were earmarked for smaller municipalities, those with populations of 125,000 or few people.²⁵

The Water Quality Act of 1965

In 1965 Congress amended the Federal Water Pollution Control Act with the passage of the Water Quality Act of 1965, PL 89-234. The 1965 Act provided for the states to adopt specific water quality criteria for interstate water, or portions thereof, within their boundaries. State water quality standards became federal standards upon their approval by the Secretary of the Interior. Under the Act water quality criteria consisted of three elements:

1. classification of water as to use (e.g. swimming, industrial water supply, public water supply, etc.),
2. scientific determination of criteria (limits on pollution characteristics as color, turbidity, odor, taste, toxic substance, biochemical oxygen demand, chemical oxygen demand, etc.), and
3. procedures for meeting these criteria.²⁶

²⁴Ibid., Section 5(d).

²⁵Ibid., Section 5(a).

²⁶Section 10, Water Quality Act of 1965.

Approval by the Secretary of the Interior of state established criteria was predicated upon the following guidelines:

1. State water quality criteria were not to be a device to 'insure the lowest common demonimator of water quality, but to enhance the quality of our water resources.'
2. The criteria should be designed to prevent existing pollution from increasing in severity and 'in no case would standards providing for less than existing water quality be acceptable.'²⁷

The Act established a deadline of June 30, 1967, for states to submit a letter of intent to establish water quality criteria to the Secretary of the Interior. A state's failure to create water quality criteria would result in federal intervention in setting water quality standards for that state.

The Water Quality Act of 1965 made two primary changes in the Federal Water Pollution Control Act. First, the 1965 Act furthered the active role of the federal government in water pollution control by mandating the formation of enforceable water quality criteria. Second, the Act transferred primary administrative responsibilities from the Secretary of HEW to the Secretary of the Interior.

The Clean Water Restoration Act

On November 3, 1966, Congress approved the Clean Water Restoration Act, PL 89-753. The major emphasis of PL 89-753

²⁷Ibid.

was directed toward federal aid in financing local water pollution abatement facilities. Debate in the Senate centered on the inequities of the construction grant program as modified by the 1961 Amendments (PL 87-88). Testimony before the Senate Committee on Public Works indicated that the 30 per cent limit imposed by PL 87-88 discriminated against both the largest and smallest municipalities. A survey conducted by the Conference of Sanitary Engineers noted that eighteen proposed projects were so long that 30 per cent of their total cost exceeded \$2 million each--far in excess of the \$600,000 ceiling imposed by PL 87-88. In addition, the survey found that many small cities did not qualify for grants based on their populations. These small towns were further disadvantaged because they did not possess the ability to finance the needed treatment facilities.²⁸

Construction grant and loan provisions were substantially altered by the Clean Water Restoration Act. On a graduated scale, the Act authorized construction grant expenditures of \$150 million in 1967 up to \$1.25 billion in 1971.²⁹ The method of allocating funds to the states was established as follows:

1. For each fiscal year, the first \$100 million was to be allotted to the states based on population and per capita income weighted equally. (See footnote 22.)

²⁸Hearings before the Senate Committee on Public Works, May 19, 1965, p. 89.

²⁹Section 205, PL 89-753.

2. Any sums appropriated in excess of \$100 million for each fiscal year were to be apportioned on a 'straight population basis.'
3. Regional planning projects would receive a 10 per cent incentive.³⁰

Matching grant formulas were also altered by the Act. The federal contribution of 30 per cent could be received by states if the state contributed 25 per cent. If the state share increased to 30 per cent, the federal contribution would increase to 40 per cent. For states with federally approved enforceable water quality criteria, the federal government would increase its contribution to 50 per cent if the state provided 25 per cent of the total cost of a proposed project. Further, the ceiling on grants for individual grants was removed.³¹

Public Law 89-753 also contained evidence of congressional recognition of the need to provide industry with incentives to install pollution abatement equipment. The Act contained an investment tax credit of 7 per cent for industrial air and water pollution facilities with federal and state specifications.³² Attempts were made in the Senate to increase the investment tax credit to 14 per cent, but these efforts failed.³³

³⁰ deLucia, p. 124.

³¹ Section 205, PL 89-753.

³² Ibid.

³³ Congressional Record, October 17, 1966, p. 27247.

Water Quality Improvements Act of 1968

Public Law 90-2, the Water Quality Improvements Act, instituted further significant changes in the financing of water pollution control facilities. The major change offered by the 1968 Act was the institution of a federal contract program. The contracts allowed up to thirty years to pay the federal share of the municipal water pollution control facilities. The philosophy was that contracts could be issued more quickly than grants, making them a more effective incentive than grants. In addition, the Act for the first time provided one-time grants for improvements in the operation of municipal wastewater facilities.³⁴

Water Quality Improvements Act of 1970

There was considerable action in the Ninety-First Congress with regard to water pollution. For example, there were at least twelve bills introduced in the Senate to amend the Federal Water Pollution Control Act, PL 84-660. These bills included four introduced by Senator Scott--S. 3468, S. 3470, S. 3471, S. 3472; three introduced by Senator Nelson--S. 3484, S. 3500, S. 3507; two introduced by Senator Muskie--S. 3687, S. 3688; and one each introduced by Senators Proxmire, S. 3181; Cook, S. 3614; and Mondale, S. 3697.³⁵

³⁴deLucia, p. 125.

³⁵Hearings before the Senate Subcommittee on Air and Water Pollution, 91st Congress, 2d Session, April, 1970, pp. 2-5.

From these bills introduced and the ensuing debate emerged the Water Quality Improvements Act of 1970, PL 91-224.

Public Law 91-224 did not significantly alter existing federal water quality enforced programs, nor did it alter the existing grant program; however, the 1970 Act contained two major provisions.³⁶ First, the Act initiated a federal aid program for the training of students "to enter an occupation which involves the design, operation, and maintenance of treatment works and other facilities whose purpose is water quality control."³⁷ This training grant program was the result of the general feeling in the Congress that many municipal wastewater facilities were manned by technically incompetent personnel. This Congressional observation is supported by testimony before the Senate Subcommittee on Air and Water Pollution:

We have had a tremendous expansion in the waste treatment business mainly as a result of federal grants and the supply of well-trained professional personnel simply has not kept up, and therefore, the quality of people operating these things [waste treatment facilities] is not as good as it should be.

In some cases I am sure you have the mayor's brother-in-law operating the plant,³⁸

The second major provision of PL 91-224 was the replacement of the Federal Water Pollution Control Administration

³⁶ deLucia, p. 126.

³⁷ Section 16 of the Water Quality Improvements Act of 1970, PL 91-224.

³⁸ Senate Hearings, April, 1970, p. 376.

(FWPCA) with the Federal Water Quality Administration (FWQA).³⁹ The FWQA was short-lived because the President's Reorganization Plan Number three, adopted December 2, 1970, transferred all federal interest in water pollution control from the FWQA to the newly created Environmental Protection Agency (EPA).⁴⁰

Water Pollution Control Act Amendments of 1972

On October 18, 1972, Congress passed, over the veto of President Nixon, the Federal Water Pollution Control Act Amendments of 1972, PL 92-500. With this action Congress created what has been described as "the most comprehensive and expensive environmental legislation in the nation's history."⁴¹ Title I of the 1972 Amendments establishes a six-part purpose of the legislation:

1. It is the national goal that the discharge of pollutants into the navigable water be eliminated by 1985;
2. it is the national goal that whenever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;
3. it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;

³⁹Title II of the Water Quality Improvements Act of 1970, PL 91-224.

⁴⁰Reorganization Plan Number Three, December 2, 1970.

⁴¹"Congress Clears Major Water Pollution Control Bill," Congressional Quarterly Weekly Review, October 14, 1972, p. 2692.

4. it is the national policy that federal financial assistance be provided to construct publicly owned waste treatment works;
5. it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State; and
6. it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, water of the contiguous zones, and the oceans.⁴²

The comprehensiveness and expense of the 1972 Amendments are implicit in the eleven major provisions of the Act:

1. Industries and municipalities must employ the "best practicable" waste treatment technology by July 1, 1977, and the "best available" technology by July 1, 1983. The terms "best practicable" and "best available" technologies are to be defined by the Administrator of the EPA.⁴³

2. Establishes a new pollutant discharge permit program to be administered by the EPA. The EPA is authorized to sanction each state to issue permits if state requirements for permits are at least as stringent as the federal guidelines. This program abolishes the discharge permit program which had been administered by the U. S. Army Corps of Engineers under the authority of the Refuse Act of 1899.⁴⁴ The transfer of

⁴²Title I. Federal Water Pollution Control Act Amendments of 1972, PL 92-500.

⁴³Ibid., Section 301(1)(B) and 302 (2)(A).

⁴⁴Ibid., Sections 401 and 402.

the permit program from the Corps to the EPA furthered cooperative efforts between the Corps and the EPA.⁴⁵ Permits issued by the Corps prior to October 18, 1972, remain valid under the permit program instituted by the 1972 Amendments.⁴⁶

3. The Act authorized the creation of a ten-member "Water Pollution Control Advisory Board." The Board is charged with studying the costs and benefits of achieving the 1977 and 1983 wastewater treatment technology goals.⁴⁷

4. Citizens "having an interest which is or may be adversely affected" by actions of polluters, the federal government, or the EPA may bring suit against these parties in order to seek remedy to these adverse or potential adverse effects.⁴⁸

5. The EPA Administrator is required to prepare a list of toxic pollutants and take actions to prevent their discharge. Further, the Administrator must establish effluent limitations which will provide "an ample margin of safety."⁴⁹

6. The EPA is empowered to enter sources of pollution (industrial plants, municipal sewage works) and inspect records and monitoring equipment. With the exception of

⁴⁵Memorandum from Stanley R. Reason, Secretary of the Army, to William D. Ruckelshaus, Administrator of the Environmental Protection Agency, dated January 12, 1971, np.

⁴⁶Section 402, PL 92-500. ⁴⁷Ibid., Section 503.

⁴⁸Ibid., Section 505. ⁴⁹Ibid., Section 307.

trade secrets, the Administrator is to make the data so gathered available to the public.⁵⁰

7. Criminal penalties for discharging effluents without a permit are set at between \$2,500 and \$25,000 per day or one year in prison or both for first offenses, \$50,000 per day or two years in prison or both for second offenses, and civil penalties of up to \$10,000 per day for either first or second offenses.⁵¹

8. The 1972 Amendments establish a consolidated program of "Grants for Construction of Treatment Works." The federal contribution to municipalities is established at 75 per cent of the cost of construction of a waste treatment facility. Unlike previous grant programs, this new program does not require the states to make contributions to municipalities in order for the municipalities to be eligible for federal grants. The Act authorized Congress to appropriate sums not to exceed \$5 billion for fiscal year 1973, \$6 billion for fiscal year 1974, and \$7 billion for fiscal year 1975. The basis for apportioning appropriated funds was changed from a formula based on population and per capita income (see footnote 22) to the following basis:

⁵⁰Ibid., Section 308.

⁵¹Ibid., Section 309.

. . . in the ratio that the estimated cost of constructing all needed publicly owned treatment works in each state bears to the estimated cost of construction of all needed publicly owned treatment works in all the States.⁵²

In other words, the basis for apportioning funds has changed from being a function of population and income to being a function of need.⁵³

The formula for apportioning funds was further altered by an Amendment, PL 93-243, to the Federal Water Pollution Control Act. This amendment, which is currently operative, allots apportioned funds on the basis of needs and population and per capita income.⁵⁴

9. In order to implement the apportioning procedure outlined above, the Act ordered the EPA to make "a detailed estimate of the cost of construction of all needed publicly owned treatment works in all of the states and of the costs of construction . . . in each of the States."⁵⁵

10. The President is authorized under the 1972 Amendments to enter international agreements for the control of global water pollution.

For this purpose, the President shall negotiate multilateral treaties, conventions, resolutions, or other agreements, and formulate, present, or support proposals at the United Nations and other appropriate international forums.⁵⁶

⁵²Ibid., Section 205(a). ⁵³Ibid., Title II.

⁵⁴Public Law 93-243. ⁵⁵Ibid., Section 516(b).

⁵⁶Public Law 92-500, Section 7.

11. Public Law 92-500 amends Section 7 of the Small Business Act,⁵⁷ allowing the Small Business Administration to make loans to small businesses in order that they may modify manufacturing procedures to comply with the water quality provisions of the 1972 Amendments.⁵⁸

12. Section 12 of PL 92-500 is commonly referred to as the Environmental Financing Act of 1972. This section established the Environmental Financing Authority (EFA). The EFA is authorized to purchase state and local debt instruments and issue its own instruments to generate the necessary cash.⁵⁹ The purpose of the EFA is to:

. . . assume that inability to borrow necessary funds on reasonable terms does not prevent any state or local public body from carrying out any project for construction of waste treatment works determined eligible for [federal] assistance.⁶⁰

Summary of Major Federal Water Pollution Control Legislation

The role of the federal government in water pollution abatement has changed significantly in the seventy-six year history of such legislation. From a passive role under the Refuse Act of 1899, the federal government has assumed an active role through the Water Pollution Control Act, as amended. Major components of the active federal role are the establishment and enforcement of water quality criteria,

⁵⁷72 STAT., 387.

⁵⁸PL 92-500, Section 8.

⁵⁹Ibid., Section 12.

⁶⁰Ibid., Section 12(c).

an expanded effluent discharge permit program, the creation of actionable national water quality objectives, and the development and expansion of various fiscal assistance programs. Table II presents a summary of the provisions of the federal water pollution control legislation. Figure 2 presents a time scale of the major laws. It should be noted that the majority of the legislation was passed in the period 1966 through 1972. This sudden interest in anti-pollution legislation is, at least partially, the result of increased public awareness of the "environmental crisis."⁶¹

Texas Water Pollution Control Statutes

Chapter 21 of the Texas Water Code is cited as the Texas Water Quality Act.⁶² The legal parameters established by the Texas Water Quality Act (TWQA) parallel those established in federal law. This close relationship is clearly demonstrated by the state water quality policy as prescribed by the TWQA:

It is the policy of this state and the purpose of this chapter to maintain the quality of water in the state consistent with the public health and enjoyment, the propagation and terrestrial and aquatic life, the operation of existing industries, and the economic development of the state; to encourage and promote the development and use of regional and area-wide waste collection, treatment, and disposal systems to serve the

⁶¹Senate hearings, April, 1970, p. 187.

⁶²Vernon's Texas Civil Statutes (V.T.C.S.), Chapter 21.

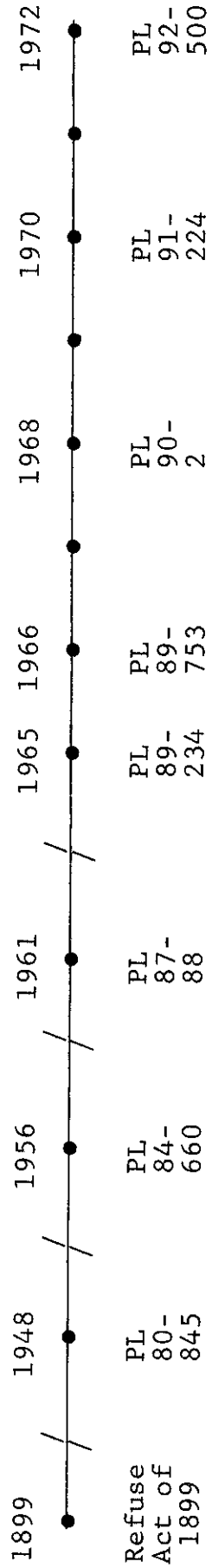


Fig. 2--Timing of major federal water pollution abatement legislation.

TABLE II

PROVISIONS OF MAJOR FEDERAL WATER POLLUTION CONTROL LEGISLATION

Title	Provisions		
	Administrative Agency	Water Quality	Financing Assistance
Refuse Act of 1899		None	None
Federal Water Pollution Control Act of 1948	Corps of Engineers Public Health Service, Federal Works Administration	General	Construction loans for up to 33.3 per cent of cost of construction. Construction grants some provisions. No funds appropriated.
Federal Water Pollution Control Act of 1956	Surgeon General, Federal Water Pollution Control Administration	General	Construction grants for up to 33.3 per cent of costs, apportioned on the basis of population and per capita income.
Federal Water Pollution Control Act Amendments of 1961	Secretary of HEW, FWPCA	General	Increased grant ceiling to the lesser of 30 per cent of cost of \$600,000.
The Water Quality Act of 1965	Secretary of the Interior, FWPCA	Stream classifications, specific limitations on pollutant characteristics	None
The Clean Water Restoration Act	Secretary of the Interior, FWPCA	Continued	Eliminated grant ceiling, provided for federal-state matching grants.
Water Quality Improvement Act	Secretary of the Interior, FWPCA	Continued	Instituted one-time grants for maintenance and improvement of waste treatment works.
Water Quality Improvement Act of 1970	Federal Water Quality Administration	Continued	Instituted training grants and scholarships.
The Water Pollution Control Act Amendments of 1972	Environmental Protection Agency	Continued	Consolidated construction grant programs, 75 per cent federal grants allocated on needs, instituted small business loans for pollution control, created Environmental Financing Authority.

waste disposal needs of the citizens of the state; and to require the use of all reasonable methods to implement this policy.⁶³

Major differences between federal and state water quality legislation is also emphasized by the TWQA policy statement. For example, federal water pollution control policy does not delimit a policy for preserving and promoting "existing industries and economic development" in conjunction with water pollution control. Further, the Texas policy encourages the development of regional waste treatment systems, recognizing that economies of scale may be achieved in the development of large treatment works. Federal policy prescribed technology rather than their grouping. Texas water quality policy is, therefore, not only complementary, but also supplementary to federal policies.

Various subchapters of the TWQA provide for the creation of and administration of the Texas Water Quality Board (TWQB), establishes the powers and duties of the TWQB, specifies enforcement procedures, and provides for state financial assistance to local governments for financing water pollution control facilities. The TWQB is composed of seven members, three of which are appointed by the governor, and the remaining four are the executive directors or chairman of: (1) the

⁶³V.T.C.S., 1972 Supplement, Section 21.002.

Executive Texas Water Development Board (TWDB), (2) Parks and Wildlife Department, (3) Texas Railroad Commission, and (4) the State Commissioner of Health.⁶⁴ Those members appointed by the governor serve staggered terms of six years.⁶⁵ The remaining provisions of the TWQA are summarized in Table III.

TABLE III
SUMMARY OF THE PROVISIONS OF THE TEXAS
WATER QUALITY ACT

Subchapter	Title	Section*	Major Provisions
C	Powers and duties (of the TWQB)	21.062	Requires the TWQB to establish a water quality plan for the state.
		21.064	Authorizes employees or agents of the TWQB to enter private property to inspect "conditions relating to the quality of water in the state."
		21.066	Authorizes the TWQB to initiate litigation to compel compliance with its directives.
		21.067	Authorizes the TWQB to seek the cooperative efforts of citizens, organizations, local governments, and the federal government in protecting the water quality of the state.

⁶⁴Ibid., Section 21.002.

⁶⁵Ibid., Section 21.023.

TABLE III--Continued

Subchapter	Title	Section*	Major Provisions
		21.072	Authorizes the board to hold public hearings regarding the creation and implementation of board procedure.
		21.075	Requires the TWQB to establish water quality standards for all intra-state waters.
		21.081	Provides for the issuance of effluent discharge permits by the TWQB and specifies the conditions under which such permits may be amended or suspended.
		21.082	Any permit to discharge effluents into waters classified for recreation must be issued after the board has considered possible odor problems created by the effluent.
		21.083	Gives the board the authority to require citizens to discontinue the use of private sewage systems such as septic tanks, cesspools, and chemical toilets.
		21.086	Establishes that the TWQB must approve all sewer systems before construction commences.
		21.088	Provides the board with the authority to "develop and prepare" comprehensive water quality management plans for areas of the state.

TABLE III--Continued

Subchapter	Title	Section*	Major Provisions
		21.094	The board may require that a discharge of effluents monitored report on waste collection, treatment, and disposal activities.
D	Regional and Area-Wide Systems	21.201	Declares as a policy of the state, the encouragement of the development of regional and area-wide wastewater treatment facilities.
		21.205	Empowers the TWQB to establish "reasonable" waste collection and treatment charges for regional treatment facilities.
E	Prohibition Against Pollution; Enforcement	21.251	Prohibits the discharge of effluents into waters of the state without a discharge permit or a rule of the board allowing these discharges.
		21.252	Establishes civil penalties for violation of Section 21.251. Civil penalties are set at not less than \$50 nor more than \$1,000 for each violation and each day of the violation.
		21.254	Empowers local governments and the Parks and Wildlife Department to seek litigation to enforce the civil penalties.

TABLE III--Continued

Subchapter	Title	Section*	Major Provisions
		21.258- 21.261	Outlines the enforcement responsibilities of the TWQB, Parks and Wildlife Department, and the Texas Railroad Commission.
F	Authority of Local Governments	21.351	Authorizes local governments to inspect public waters as to water quality and the discharge of unauthorized effluents.
		21.357	Requires cities with populations in excess of 5,000 to "establish water pollution control and abatement programs" for the city.
G	Judicial Review	21.451	A board action may be appealed by filing suit in a district court of Travis County.
H	Criminal Prosecution	21.552	Defines as a criminal offense the discharge of effluents to intrastate waters or without a permit from the TWQB or the discharge of effluents which violates the provisions of an issued permit.
		21.553	Violations of Section 21.552 are misdemeanors subject to fines of not more than \$1,000 for each violation.

TABLE III--Continued

Subchapter	Title	Section*	Major Provisions
I	Financial Assistance for Waste Treatment Construction	21.601	"The purpose of this subchapter is to provide for making loans of water quality enhancement funds . . . to political subdivisions of the state for use as state matching funds for obtaining maximum federal grants for the construction of treatment works."
		21.610	Authorizes the State to make direct loans to political subdivisions which "in the judgement of the board is unable to issue bonds or other obligations" Any local government receiving a loan must repay the loan at an interest rate and term established by the TWQB.

*Vernon's Texas Civil Statutes

CHAPTER III

MUNICIPAL WASTEWATER TREATMENT--TECHNOLOGY, INVENTORY, AND NEEDS

In the January 25, 1968, issue of Engineering News-Record, a headline proclaimed: "Clean Water Will Cost \$23 Billion."¹ While this headline may be alarming, it is not nearly so as a more recent article noting that "total [waste treatment facility] needs have grown to \$350 billion."² Some writers suggest that the cost of pollution abatement will have a significant impact on industrial and municipal decision making. Among the decisions affected are "what products to produce, what price to charge, whether to expand plants, where to locate facilities?"³ The costs of pollution control and decisions associated with these costs are functions of legal parameters, technology, and the differential between existing capability and future requirements.

An understanding of the state-of-the-art of municipal waste treatment is necessary for the development of an

¹"Clean Water Will Cost \$23 Billion," Engineering News-Record, CLXXXIX (September 21, 1972), 53.

²J. T. Sliter, "Needed \$350 Billion--And a New Needs Survey," Water Pollution Control Federation Journal, XLVI (October, 1974), 2254.

³Lynnwood J. Dixon and John M. Thornton, Jr., "The Costs of Cleaning Up Pollution," Management Accounting XLIV (November, 1972), 13.

understanding of the ramifications of the cost of achieving national water quality objectives. The following elements need to be examined: (1) wastewater treatment processes, (2) the costs of these processes, (3) waste treatment techniques utilized by municipalities in North Central Texas, and (4) an estimate of the future waste treatment needs of these municipalities.

Waste Treatment Technology

The state-of-the-art of waste treatment technology includes at least sixteen methods of treating wastewater. These processes can be grouped into four categories: (1) preliminary treatment, (2) primary treatment, (3) secondary treatment, and (4) tertiary treatment. The applicability and effectiveness of treatment techniques within these groups is determined by a number of factors including characteristics of wastes generated, waste assimilative capacity of water courses, and the uses to be made of waters into which wastes are discharged.⁴ The nature of water quality problems determine the mix of water pollution control technology applied in any locale. Figure 3 illustrates the interrelationships between wastewater, technology, and environmental conditions.

⁴Allen V. Kneese and Blair T. Bouer, Managing Water Quality: Economics, Technology, Institutions (Baltimore, 1968), pp. 13-15.

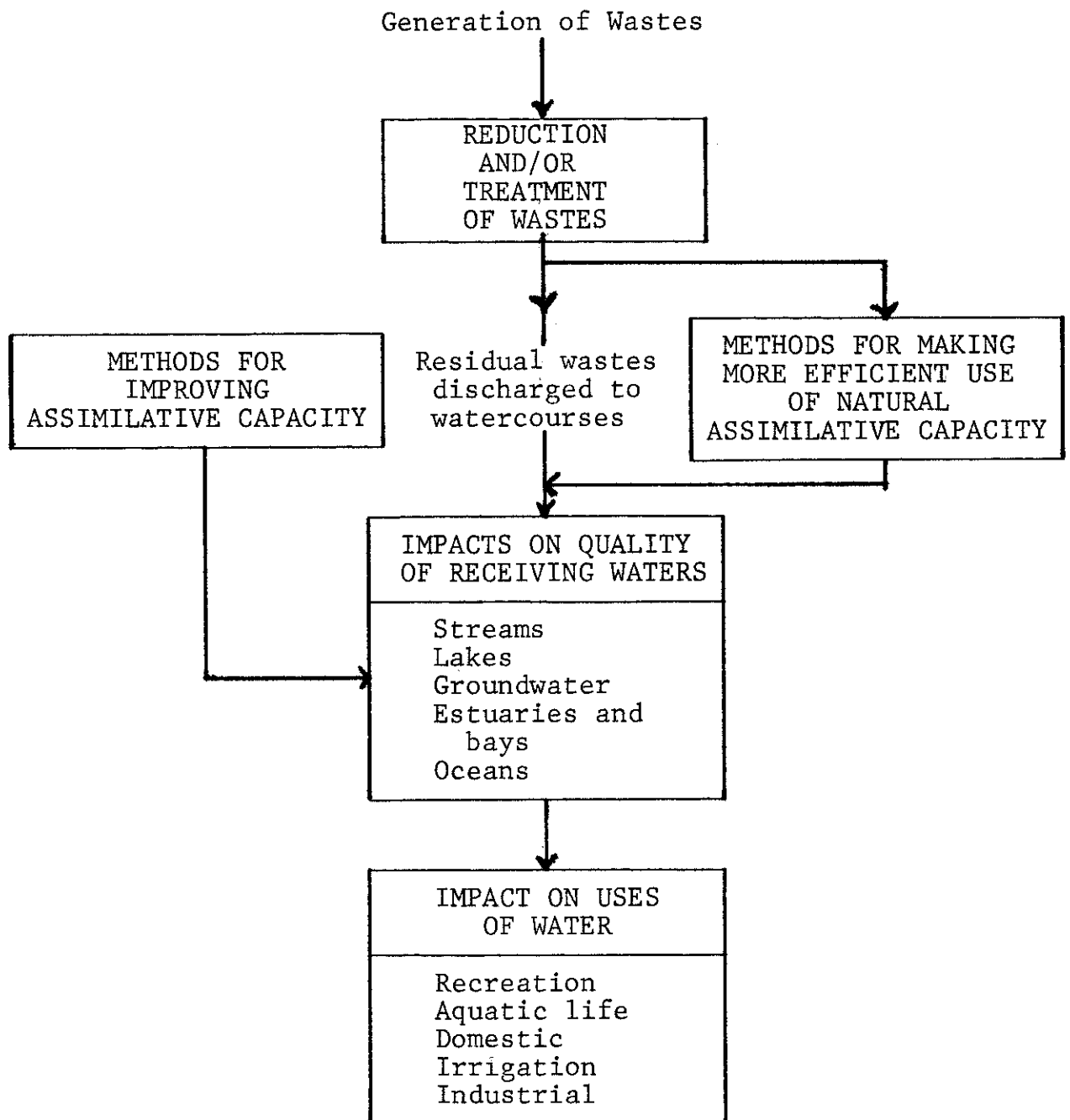


Fig. 3--The nature of water quality problems.

Source: Allen V. Kneese and Blair T. Bouer, Managing Water Quality: Economics, Technology, Institutions (Baltimore, 1968), pp. 13-15.

Pollutant Characteristics of Domestic Waste

The pollutant composition of domestic sewage is fairly homogenous throughout the United States.⁵ The most common

components of water pollution from domestic sewage are

(1) biochemical oxygen demand (BOD), (2) suspended solids, (3) dissolved solids, (4) detergents, (5) toxic materials, (6) phenols, (7) color, (8) pH, and (9) temperature.^{6,7}

While the constituents of domestic sewage are relatively constant, the composition of wastes entering a municipal waste treatment plant will vary as a function of the amount of industrial discharges treated by a municipal treatment facility.⁸ The change in waste concentration as the result of the introduction of industrial effluents into domestic sewage streams is indicated by BOD concentrations in municipal and industrial wastes as presented in Table IV.

Data in Table IV indicate that the BOD level of industrial wastes is almost six times the level in domestic sewage.

⁵U. S. Federal Water Pollution Control Administration, The Report, Vol. I of The Cost of Clean Water and its Economic Impact, 3 vols., (Washington, 1968), 93.

⁶Sigurd Grava, Urban Planning Aspects of Water Pollution Control (New York, 1969), p. 39.

⁷Definitions of terms describing pollution are presented in the glossary.

⁸Peter E. Robinson and Francis P. Coughlan, Jr., "Municipal-Industrial Waste Treatment Costs," TAPPI, LIV (December, 1971), 2005.

TABLE IV
RELATIVE CONCENTRATION OF BOD, DOMESTIC SEWAGE
AND ORGANIC INDUSTRIAL WASTES

Waste Source	Mean BOD Concentration, Mg/l
Domestic Sewage	200
Beet Sugar Refinery	620
Milk Processor	1000
Tannery	1100
Poultry Plant	480
Synthetic Fibre Producer	520
Brewery	610
Meat Packer	1100
Potato Processor	1340
Pulp Mill (Kraft)	290
(Sulfite)	1100
(Groundwood)	160

Source: U. S. Federal Water Pollution Control Administration, The Report, Vol. I of The Cost of Clean Water and its Economic Impact, 3 vols., (Washington, 1968), p. 96.

Municipalities that treat combined wastes must employ a higher level of treatment technology than would be necessary if domestic sewage alone was treated.⁹

⁹Ibid.

Preliminary Treatment

In this preparatory stage certain characteristics of the effluent are altered to make the waste stream compatible with the treatment capabilities of primary and secondary treatment processes. The three most widely used preliminary treatment methods are segregation, equalization, and neutralization. In segregation, waste streams with significantly different pollutant loads are separated in order that they may be channeled to primary and secondary treatment processes designed to assimilate specific classes of contaminants. Equalization is the reverse procedure of segregation in that wastes of differing strengths are mixed to eliminate waste load variations which could diminish the effectiveness of primary and secondary treatment processes.¹⁰ The purpose of neutralization is to maintain waste stream pH at a level that promotes optimal biological activity. (A pH range of 6.5 to 8.5 is optimal for biological activity in waste treatment.) The need for neutralization is primarily confined to industries which produce highly acidic or caustic effluents. The applicability of neutralization to municipal waste treatment is limited to those cities which treat such large volumes of pH imbalanced industrial wastes that equalization is ineffective in balancing the pH for combined treatment.¹¹

¹⁰Nelson L. Nemerow, Industrial Waste Treatment (Reading, Mass., 1963), pp. 16-18.

¹¹W. Wesley Eckenfelder, Jr., Water Quality Engineering for Practicing Engineers (New York, 1970), p. 128.

Primary Treatment

Primary treatment is designed to remove floating material or suspended solids from waste streams.¹² Primary treatment processes are classified as physical since chemical or biological means are not relied upon for preparation of wastewater for further treatment. The three most common primary treatment processes are screening, sedimentation, and flotation. Solids are removed in the screening process by allowing the waste stream to flow through woven wire, perforated plates, or evenly spaced rods. Sedimentation utilizes gravity to "pull" settleable solids to the bottom of a lagoon. In the flotation technique of primary treatment, air bubbles of less than 100 microns in diameter are forced into the effluent. Through surface interaction, the air bubbles attach to solids and float them to the surface. Once the solids have been "floated" they are removed by mechanical means. In summary, primary treatment removes floc (settleable solids) that would unduly "clog" devices used for secondary treatment.¹³

Secondary Treatment

Secondary treatment is a more advanced form of treatment than those discussed previously. Preliminary and primary treatment are designed to remove solids and oils from waste

¹²Ibid., p. 112.

¹³Nemerow, pp. 16-20.

streams, but have little effect of removing degradable organics which must be removed by secondary treatment.¹⁴ Secondary treatment may be subdivided into two classes: (1) chemical and (2) biological. Chemical treatment processes are predominately used for treating industrial wastes and, therefore, will not be discussed in this report.¹⁵

Biological waste treatment is simply "a duplication of nature's own self-purification processes under contained, concentrated, and controlled conditions."¹⁶ Biological waste treatment methods are classified according to process oxygen requirements. Anaerobic conversion of organic waste into "inoffensive end products" requires no oxygen, but requires facilities.¹⁷ Its complexity notwithstanding, anaerobic conversion has the advantage of generating methane gas (CH_4) which may be used as a fuel.¹⁸ Aerobic secondary treatment processes require oxygen and are the most common form of biological treatment utilized in the treatment of municipal wastes in Texas.¹⁹ The aerobic process generally employs

¹⁴W. Wesley Eckenfelder, Jr. and J. L. Barnard, "Treatment-Cost Relationships for Industrial Wastes," Chemical Engineering Process, LXVII (September, 1971), 76.

¹⁵Department of Textiles, Clemson University, State of the Art of Textile Waste Treatment (Washington, 1971), p. 75.

¹⁶"Water Pollution Control," Chemical Engineering Deskbook, LXXVIII (June 21, 1971), 66.

¹⁷Eckenfelder, p. 203 ¹⁸Ibid., p. 176.

¹⁹U. S. Environmental Protection Agency, 1968 Inventory Municipal Waste Facilities, Vol. VI (Washington, 1968), 79-138.

mechanical aerators to supply oxygen to microorganisms that digest organic material. Unlike anaerobic digestion, aerobic decomposition of waste does not produce methane gas, instead the by-products of aerobic digestion are carbon dioxide (CO_2) and water. A schematic of aerobic waste reduction is presented in Figure 4.

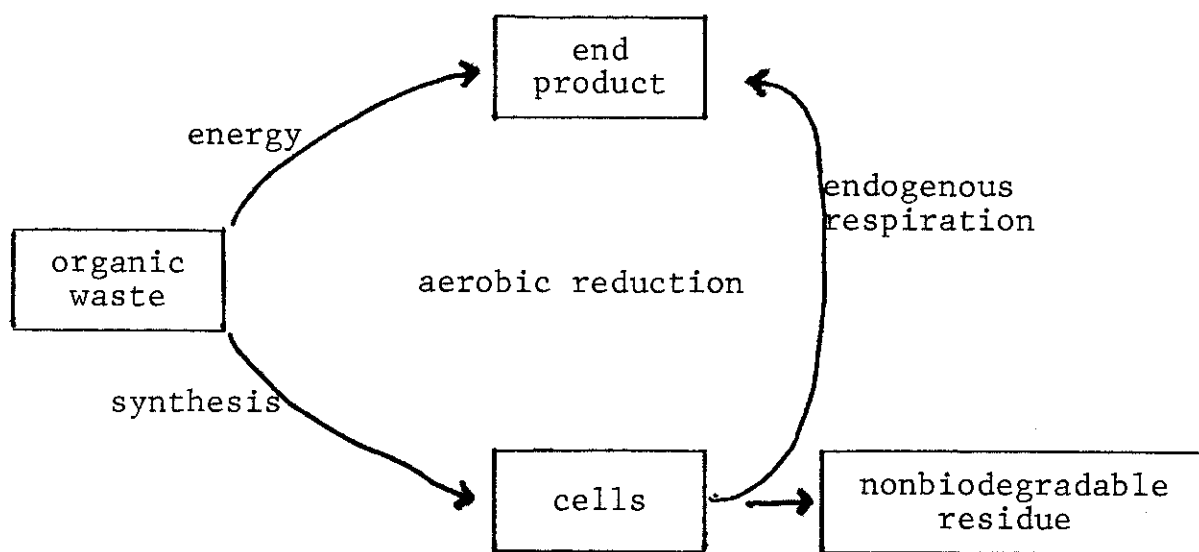


Fig. 4--Aeorbic reduction.

Source: W. Wesley Eckenfelder, Jr., Water Quality Engineering for Practicing Engineers (New York, 1970), p. 155.

While secondary treatment is effective in removing as much as 85 per cent of the organic waste load of effluents, it has little or no effect on inorganic materials.²⁰ These materials, many of which are highly toxic substances, can only be removed by tertiary or advanced wastewater treatment.

²⁰W. Wesley Eckenfelder, Jr., "Industrial-Waste Surveys," unpublished manuscript, Department of Civil Engineering, Vanderbilt University, March, 1972, pp. N-1 - N-7.

Tertiary Treatment

The importance of tertiary treatment is increasing because of the stringent water quality requirements of the Federal Water Pollution Control Act Amendments of 1972 and the need for increasing supplies of fresh water. Eckenfelder summarizes the importance of tertiary treatment in the following statement: "More stringent requirements relating to refractory organics and total inorganic solids will become necessary in more arid areas where extensive water reuse is necessary."²¹ The most common tertiary treatment processes are summarized in Table V.

TABLE V
TERTIARY TREATMENT PROCESSES AND THEIR
WASTE REDUCTION EFFICIENCIES

Treatment Process	Substance Removed	Treatment Efficiency*
anaerobic denitrification	nitrate-nitrogen	80-95
algae harvesting	nitrate-nitrogen	50-90
ammonia stripping	ammonia-nitrogen	80-95
ion exchange	nitrogen, phosphorous	80-92
electrodialysis	dissolved solids	10-40
carbon absorption	organics	90-98
reverse osmosis	dissolved solids	65-95
distillation	dissolved solids	90-98
foam separation	synthetic detergents	85

*Per cent of total volume of substance removed

Source: Nelson L. Nemerow, Industrial Waste Treatment (Reading, Mass, 1963), p. 60.

²¹Eckenfelder, pp. 214-215.

Summary of Waste Treatment Technology

The treatment of domestic sewage utilizes a combination of processes to transfer highly concentrated waste streams into environmental compatible flows of liquid substances. A summary of waste treatment technology is presented in Table VI. Figure 5 further summarizes waste treatment processes by indicating the sequence of wastewater treatment and the substitutability of the various treatment processes.

Factors Contributing to Cost of Municipal Waste Treatment

The capital requirements of municipal waste treatment are dependent upon many factors including: (1) need for new treatment facility construction, (2) increases in population served, (3) need for upgrading existing facilities, and (4) need to replace obsolete facilities. The relative proportion of capital outlays for each of these categories by municipalities is presented in Figure 6. Six additional factors contribute to the determination of the operating cost of waste treatment for specific municipal plants. These factors are

1. treatment capacity of treatment plant,
2. treatment method employed,
3. degree of treatment achieved,
4. topography and degree of development of land area,
5. pumping costs (pump stations and sewer lines), and
6. land cost.

TABLE VI
SUMMARY OF WASTEWATER TREATMENT TECHNOLOGY

Type of Treatment	Classification	Characteristics	Estimated Retention Time	Path of Effluent Following Processing
PRELIMINARY Segregation	Physical	System of holding tanks or ponds into which chemically different wastes are stored for mixing or further treatment	-----	to equalization
Equalization	Physical	System of controlled rate streams which meet at a point and mix varied wastes	-----	to neutralization or primary treatment
Neutralization	Chemical	Meter which dispenses acid or alkali to neutralize pH	-----	to primary treatment
Disinfection	Chemical	Meter which dispenses chemical agents to destroy harmful bacteria or algae	-----	to primary treatment

TABLE VI --Continued

Type of Treatment	Classification	Characteristics	Estimated Retention Time	Path of Effluent Following Processing
PRIMARY Screening	Physical	Screening media of wire, rods, or perforated plate removes large suspended solids	-----	to secondary treatment
Sedimentation	Physical	Gravitational forces remove settleable solids; performed in lagoon or enclosed tanks	1-14 days	to secondary treatment
Flotation, Flocculation	Chemical, Physical	Organic or inorganic chemicals are added to decrease density; gravity separates solids	1-7 days	to secondary treatment
Flotation, Dissolved-air	Physical	Tiny air bubbles are forced through effluent causing suspended solids to float to the surface where they are removed; lagoon or enclosed tank	1-7 days	to secondary treatment

TABLE VI--Continued

Type of Treatment	Classification	Characteristics	Estimated Retention Time	Path of Effluent Following Processing
SECONDARY Chemical Separation	Chemical	Chemical coagulants are added to the effluent, coagulating the wastes which are removed through flotation or sedimentation	-----	to receiving stream
Stabilization Ponds	Biological	Basin 3-5 feet deep. Oxygen required for biological digestion is taken from air. Large land area required to treat large volume of waste. Aerobic bacteria digest waste.	4-20 days	to receiving stream
Aerated Lagoons	Biological, Physical	Basin 15-18 feet deep. Oxygen supplied by mechanical aeration. Required 1/15 area required for stabilization ponds. Aerobic bacteria digest wastes.	3-10 days	to receiving stream

TABLE VI--Continued

Type of Treatment	Classification	Characteristics	Estimated Retention Time	Path of Effluent Following Processing
SECONDARY-- Continued Activated Sludge, Extended Aeration	Biological, Physical	Series of aerated lagoons into which contaminated wastes pumped. Biologically active sludge added, increasing aerobic aeration. Repeated as needed. Used for low BOD wastes.	1-15 days	to receiving stream
Conventional	Biological,	Similar to above, except sludge is recirculated at a higher rate. Used for medium strength BOD levels. Aerobic.	2 hours	to receiving stream
Activated Sludge, High-Rate	Biological, Physical	Employs same technique on other activated sludge processes. Uses higher rate of sludge recirculation and higher sludge concentration. Aerobic digestion.	2 hours	to receiving stream

TABLE VI--Continued

Type of Treatment	Classification	Characteristics	Estimated Retention Time	Path of Effluent Following Processing
SECONDARY-- Continued Trickling Filter, Rock Media	Biological	Stone or coke is used as filter media. Bacteria attract to the media and decompose waste as it passes over. Rock filters.	-----	to receiving stream
Synthetic Media	Biological	Lightweight material used as filter media. More efficient and requires less maintenance. Media can be stacked 30 feet high, eliminating underground piping.	-----	to receiving stream
TERTIARY	Biological, Physical, Chemical	Newly developed treatment technology. Utilizes microorganisms, chemical or physical means of removing waste. Highly efficient but currently too expensive. With legislation becoming more stringent, tertiary is the treatment of the future.	-----	to receiving stream

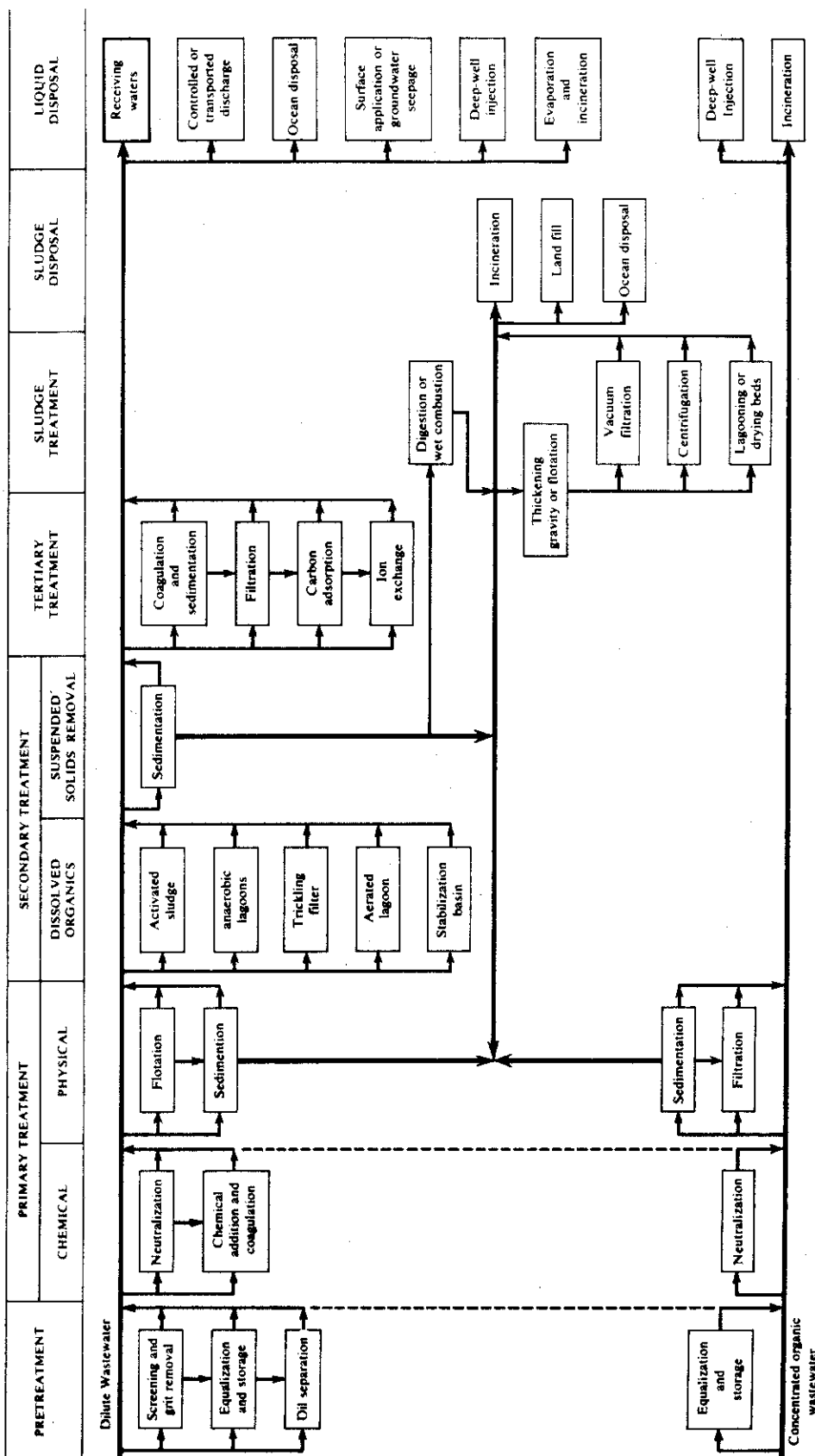


Fig. 5--Wastewater treatment sequence and substitution.

Source: W. Wesley Eckenfelder, Jr., Water Quality Engineering for Practicing Engineers (New York, 1970), p. 109. Reprinted with permission from the publisher: Cahners Books International, Inc., 221 Columbus Avenue, Boston, Mass. 02116.

Of the factors presented in the list above, the most important are (1) treatment plant capacity in terms of population served and quantity of waste treated and (2) the degree of treatment to be achieved.

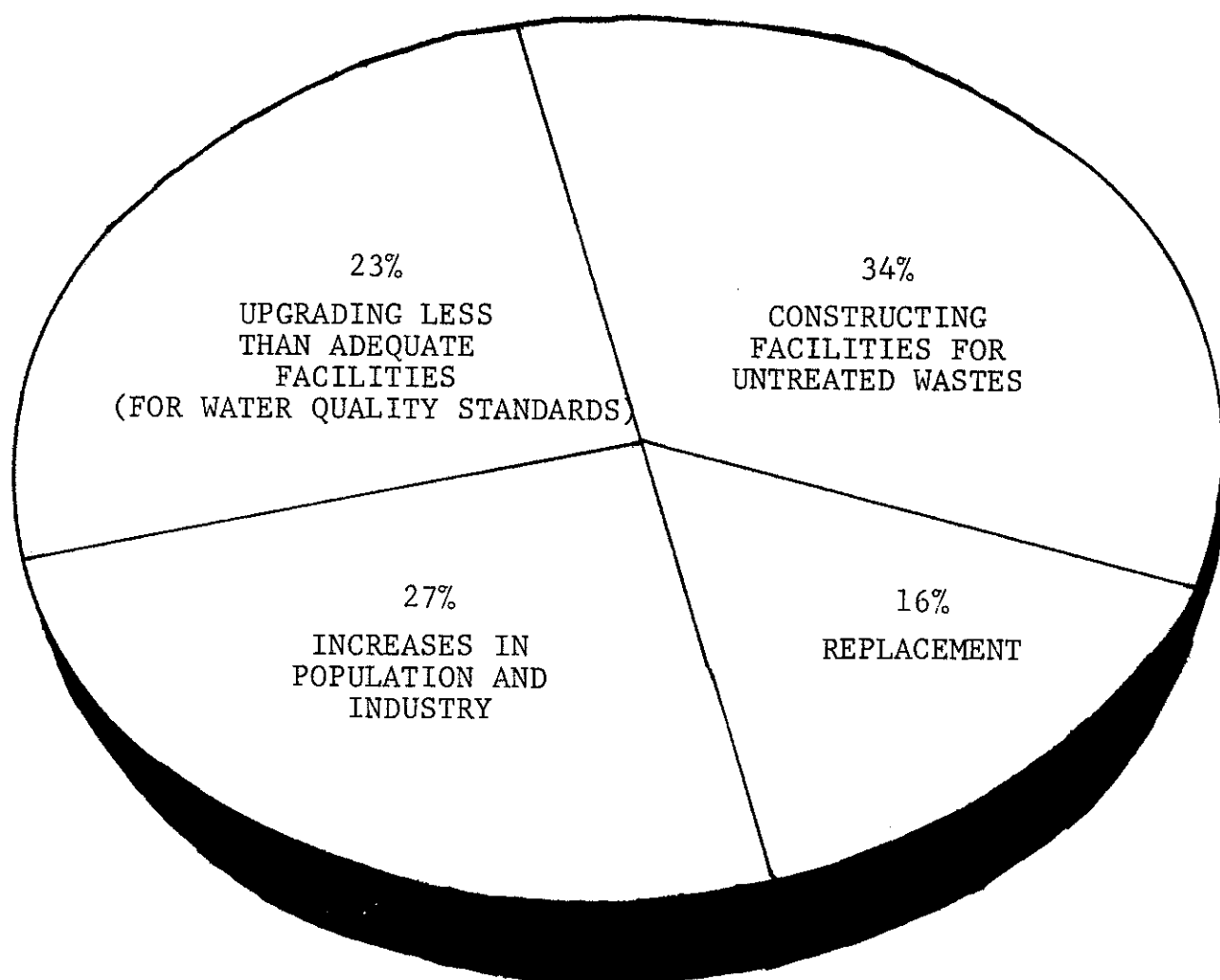


Fig. 6--Capital outlay proportions by municipalities for wastewater treatment.

Source: U. S. Federal Water Pollution Control Administration, Detailed Analyses, Vol. II of The Cost of Clean Water, 4 vols., (Washington, 1968), 7.

Waste treatment costs vary directly with the level of treatment achieved and inversely with plant capacity. In other words, if water quality criteria are such that tertiary treatment is required, then the cost of treating waste to attain this level of treatment is greater than the cost would be if secondary treatment would produce satisfactory water quality. The relationship between treatment level and treatment cost is presented by Figure 7. From the information

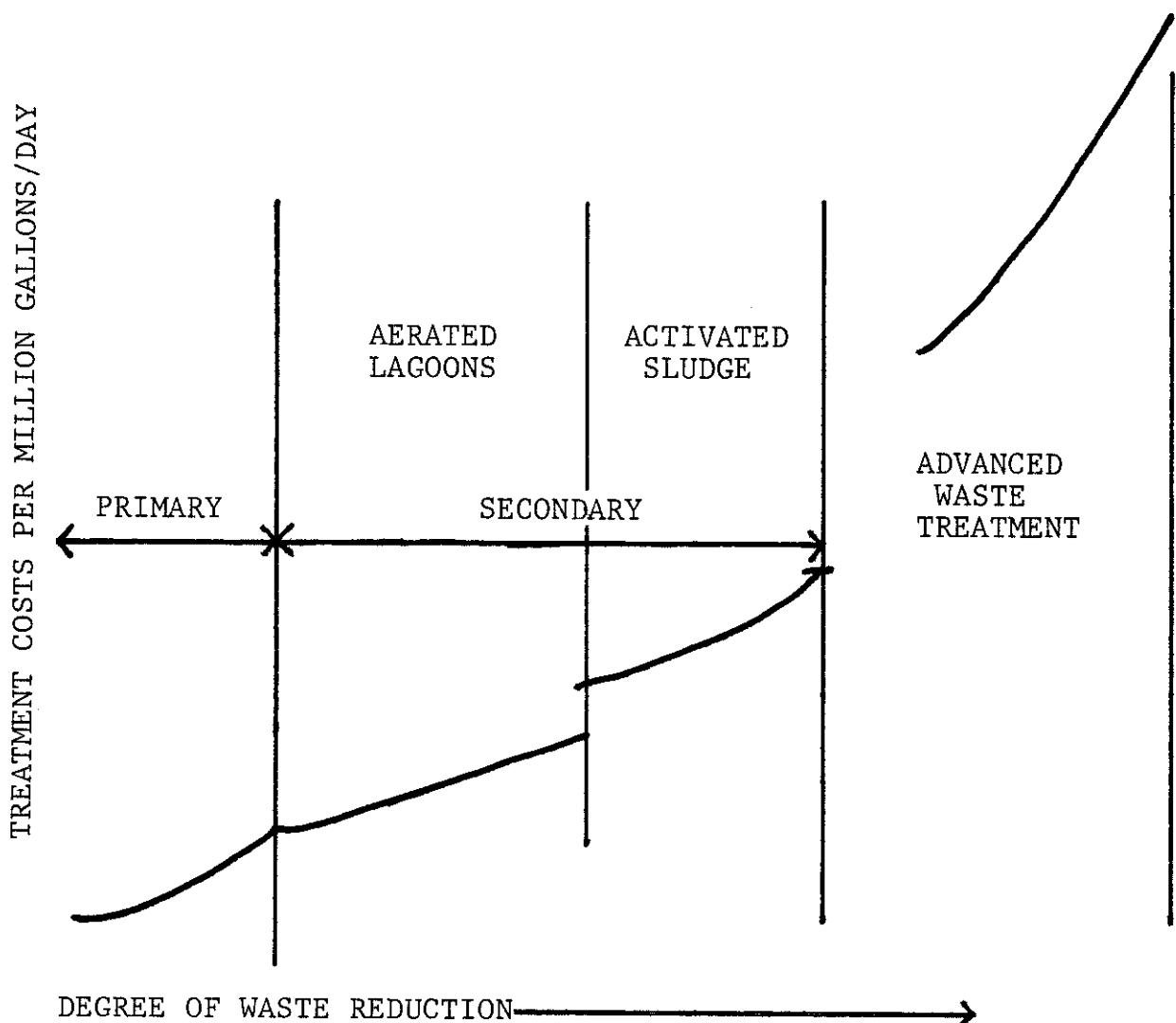


Fig. 7--Generalized relationship between waste treatment costs and intensity of treatment.

Source: U. S. Federal Water Pollution Control Administration, Detailed Analysis, Vol. III, Chap. 5, p. 5-21.

presented in Figure 7 it can be concluded that the more stringent water quality requirements of current water pollution control laws will make waste treatment increasingly expensive.

As previously stated, the cost of waste treatment varies inversely to treatment capacity. That is, waste treatment exhibits economies of scale. The concept of economies of scale is demonstrated by Figure 8. It should not be inferred from Figure 8 that unit construction and operating and maintenance costs decrease as the size of the plant increases. The relationship between plant size and total capital cost is presented in Figure 9.

Estimation of Municipal Water Pollution
Control Costs in North Central Texas
--1974 Needs Survey

During 1974 the EPA undertook a study of the cost of construction of publicly-owned treatment works needed to meet the water quality goals of the Federal Water Pollution Control Act Amendments of 1972.²² A "Needs Survey" was conducted pursuant to the requirements of Sections 205(a) and 516(b)(2) of PL 92-500 as amended by PL 93-243. The purpose of the needs survey was to obtain "a comprehensive estimate of the

²²U. S. Environmental Protection Agency, Cost Estimates for Construction of Publicly-Owned Waste Treatment Facilities --1974 "Needs Survey" (Washington, 1975), p. 1.

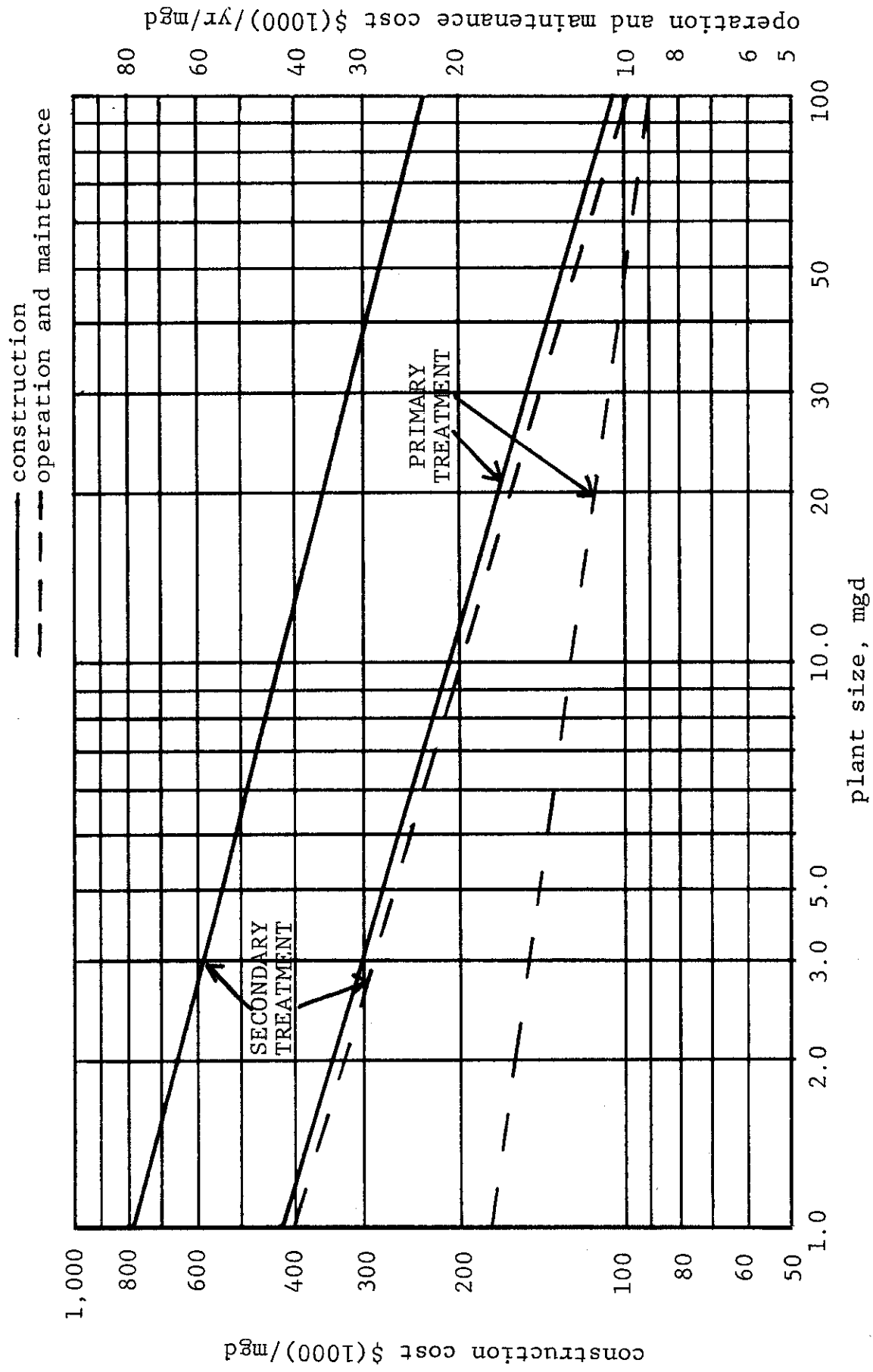


Fig. 8--Cost relationships for municipal sewage treatment.

Source: W. Wesley Eckenfelder, Jr., Water Quality Engineering for Practicing Engineers (New York, 1970), p. 293.

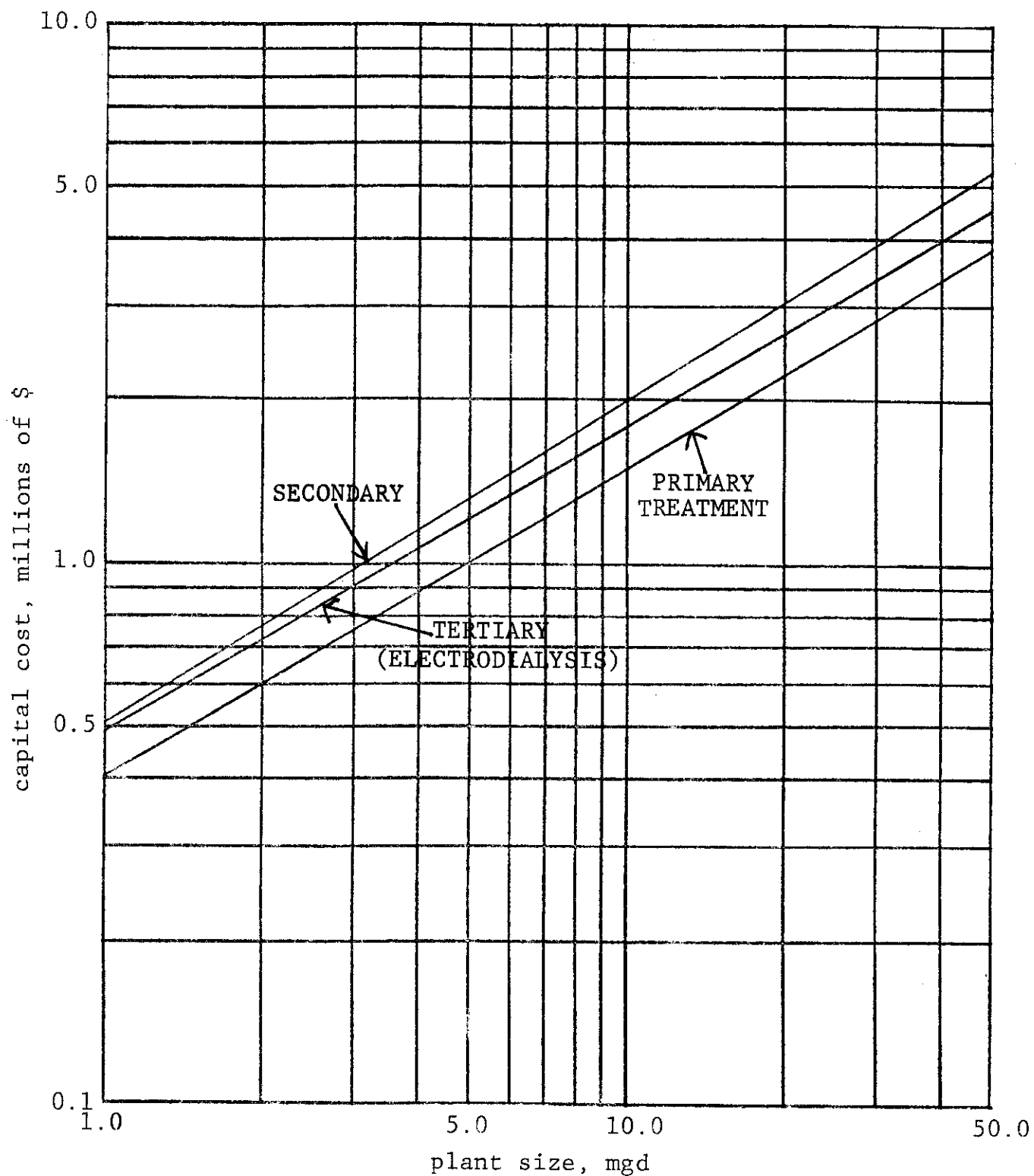


Fig. 9--Relationship between plant size and total capital cost.

Source: W. Wesley Eckenfelder, Jr., Water Quality Engineering for Practicing Engineers (New York, 1970), p. 296.

total cost of meeting the goals of the FWPCA (Federal Water Pollution Control Act), and of estimating these costs state-by-state as a possible basis for the allocation of construction grant funds authorized after Fiscal Year 1975."²³

The EPA utilized the following methodology in conducting the 1974 survey:

1. Questionnaires were distributed to state agencies (in Texas, the Water Quality Board) which would either complete the questionnaires themselves or forward them to individual sewerage authorities for completion.

2. State agencies administering the survey would review all estimates developed by local authorities. In cases where discrepancies occurred the state agency estimate would prevail.

3. All "places" within Standard Metropolitan Statistical Areas (SMSA's) and those outside SMSA's with populations exceeding 10,000 persons were surveyed.

4. Locations outside SMSA's with populations of less than 10,000 were surveyed in one of the following manners:

- a. A sample of the smaller cities may be used. If this alternative is selected, the state must use the "same sample percentage and same places used by the state in the 1973 Survey."

- b. States may elect to report needs based on a 100 per cent sample of these smaller locations.

²³Ibid.

c. If 1973 needs were reported on a 100 per cent basis, then the state must report 1974 needs on a 100 per cent basis.

5. The Survey defines "place" as including the following:

a. "All incorporated cities, boroughs, towns, or villages, . . . regardless of size, or inclusion in a SMSA or urbanized area."

b. "All unincorporated centers of population outside an urbanized area with a population of 1,000 or more."

c. "All unincorporated centers of population inside an urbanized area are designated separate places if they have a population of 5,000 or more and are recognized locally as a separate 'community' or 'area' even though there is no formal unit of government so designated for the area."

6. In order to increase the consistency of reported needs among the states, costs must be based on "cost curves" supplied by the EPA.²⁴ (A copy of the cost curves supplied by the EPA is included in Appendix A.)

The estimates were reported in June, 1973, dollars and based on 1990 population estimates.²⁵ Thus the estimates supply information regarding the cost of meeting the 1983 goal of "best practicable" waste treatment technology for the

²⁴Cost Estimates--1974 "Needs Survey", p. 3.

²⁵Ibid., pp. 2-3.

year 1990 in constant dollars. The cost reported by the states consisted of estimates in six categories of sewerage facilities. The categories are briefly described as

1. Category I costs were for facilities "which would provide a legally required level of treatment of 'secondary treatment' or 'best practicable wastewater treatment technology (BPWTT).'" The Survey considered secondary treatment and BPWTT to be synonymous.

2. Category II costs reported were for facilities required to achieve "more stringent levels of treatment." More stringent levels would include provisions for the removal of such pollutants as phosphorous, ammonia, nitrates, or organic substances.

3. Category III cost estimates were divided into two subcategories:

a. "Costs for correction of sewer system infiltration/inflow problems." Sewer infiltration and inflow problems are those associated with ground and urban runoff infiltrating sewer systems.

b. Costs associated with the "replacement and/or major rehabilitation of existing sewage collection systems."

4. Similar to Category III costs, Category IV estimates included two subdivisions:

a. "Costs for construction of collection sewer systems designed to correct violations caused by raw discharges, seepage to water from septic tanks and the like."

b. This category was composed of costs of new interceptor sewers and transmissive pumping stations needed for bulk transportation of wastewater.

5. Category V costs were for facilities necessary to prevent the violation of water quality standards by the "periodic bypassing of untreated wastes from combined sewers" to any water.

6. The sixth category of costs was termed "Treatment and/or Control of Stormwaters." "This includes the costs of abating pollution from stormwater runoff channeled through sewers and other conveyances used only for such runoff." Category VI was not included in the 1973 Survey, but was included in the 1974 Survey in order to provide an estimate of the cost of all facilities eligible for the computation of federal grant allocations.²⁶

Cost data supplied by the Texas Water Quality Board to the EPA for cities subject to this study are presented in Table VII. The amounts presented in Table VII indicate "the total national long range facility requirements of PL 92-500" ²⁷ The Survey information for North Central Texas cities will be used in this study as a primary ingredient in determining the financing needs of these cities in attaining waste treatment facilities consistent with the goals of PL 92-500.

²⁶Ibid., pp. 2-3.

²⁷Ibid., p. 9.

TABLE VII

TOTAL WASTE TREATMENT FACILITY REQUIREMENTS
FOR CITIES IN NORTH CENTRAL TEXAS WITH
POPULATIONS EXCEEDING 5,000 PERSONS

City	Total Needs (thousands of \$)
Arlington	4,581
Bedford	1,900
Carrollton	1,708
Cleburne	9,602
Dallas	117,166
Denton	14,552
DeSoto	3,050
Duncanville	6,389
Ennis	6,495
Farmers Branch	14,540
Forest Hill	585
Fort Worth	69,307
Garland	43,218
Grand Prairie	25,559
Grapevine	3,690
Haltom City	8,203
Highland Park	3,760
Irving	33,753
Lancaster	4,554
Lewisville	5,676
McKinney	5,901
Mesquite	17,815
North Richland Hills	2,884
Richardson	7,679
Richland Hills	2,018
Rockwall	6,503
Terrell	4,930
Waxahachie	39,720
White Settlement	3,660

While the 1974 Needs Survey represents a significant advance in determining the long term financial requirements of publicly-owned waste treatment facilities, it is not without criticism. Russell Train, former EPA Administrator, indentified weaknesses of the 1974 Needs Survey in testimony before the U. S. Senate Subcommittee on Environmental Pollution as follows:

1. The total need estimates reported by the states may "exaggerate the costs of meeting the requirements of Public Law 92-500."

2. Category VI cost estimates may be of limited applicability because of limitations in technology for treatment of stormwater runoff.

3. Even though the EPA specified that the states employ uniform criteria for cost estimation, experience indicated that "major variations" occurred in criteria employed by the states. Therefore, comparisons of cost among states is of limited usefulness.²⁸

Many Senators expressed particular concern over the first limitation as indicated in a statement made by Senator Domenici (New Mexico) regarding the possible overstatement of needs by the states: "Somebody gave me the word here that this needs survey that we had you get from the States, that

²⁸"The Environmental Protection Agency's 1974 Needs Survey," Hearings Before the Subcommittee on Environmental Protection, 93d Congress, 2d Session (September 11, 1974), pp. 12-13.

as a Westerner would be best described as turning loose the States as bounty hunters and that is what it looks like to me."²⁹ "Bounty hunting" is suspected because the allocation of federal grant funds to the states under PL 92-500 is based partially on the basis of reported needs.

Don Morris of the Texas Water Quality Board confirms that not all states employed uniform criteria in computing cost estimates.³⁰ Morris also expressed concern that the aggregate cost estimates for all states compiled in the Needs Survey did not reflect the cost of achieving "zero discharge," but rather reflected facility requirements needed to achieve between 40 and 60 per cent treatment.³¹ The TWQB, however, maintains that the Needs Survey for Texas accurately reflects the cost of achieving the zero discharge goal of PL 92-500.

²⁹Ibid., p. 28.

³⁰Personal interview with Don Morris, Construction Grants Division, Texas Water Quality Board, Austin, Texas, September 12, 1975.

³¹Telephone interview with Don Morris, November 11, 1975.

³²Telephone interview with Don Morris, December 4, 1975.

CHAPTER IV

RESEARCH DESIGN AND METHODOLOGY

The objective of this study is to determine the effect of water pollution control costs on municipal government operations in the North Central Texas region. Accomplishment of this objective was contingent upon the development and execution of a plan detailing (1) municipalities included in the study, (2) data requirements, (3) data collection procedures, and (4) data analysis methods. Planning was facilitated by the establishment of the following planning parameters which outlined the boundaries of the study: (1) the population consists of cities of 5,000 or more population in the Dallas and Fort Worth Standard Metropolitan Statistical Areas (SMSA's), (2) financial data consists solely of transaction within water and sewer funds, and (3) historical financial data regarding the operation of these "funds" is limited to the period 1960 through 1974.

The relationship between the research objective, methodology, and results is presented in Figure 10. Figure 10 presents the logical flow of activity from objective establishment, through data identification, collection, and analysis to produce the results of the study. The objective of the study has been amplified in Chapter I. The results of

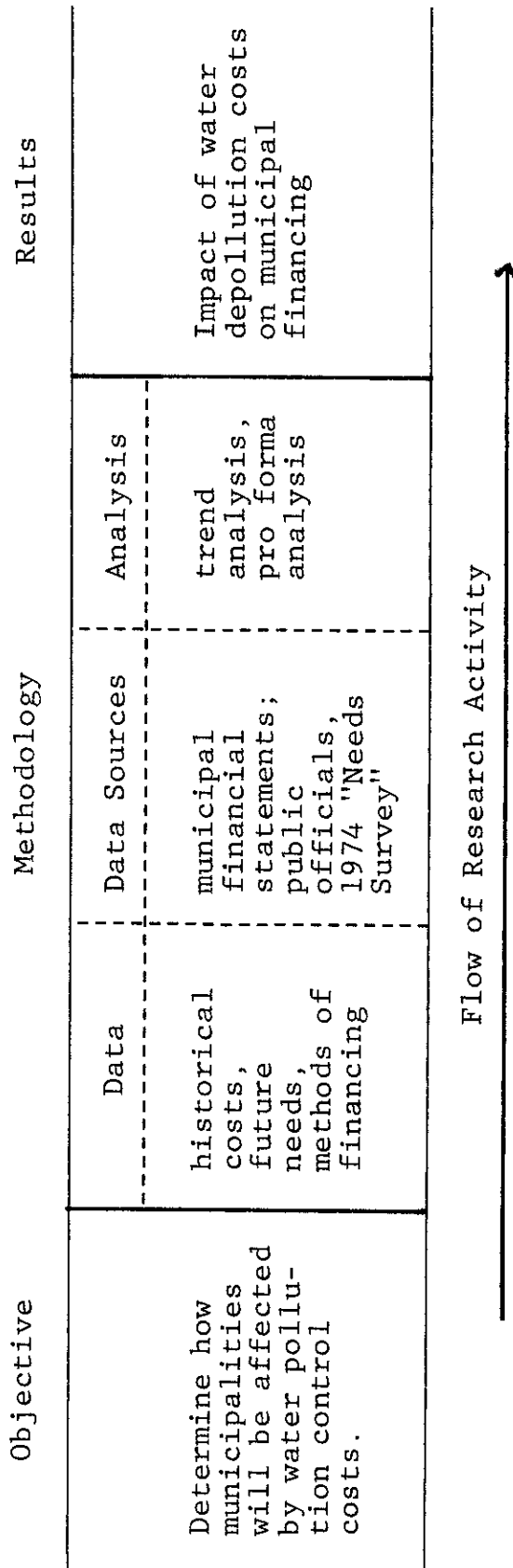


Fig. 10--A systems view of determining the impact of water depollution on municipal finances.

the study will be presented in Chapters V and VI. Research design and methodology are presented in this chapter. The methodology summarized in Figure 10 includes the identification of subject municipalities, data collection procedures, and data analysis techniques.

Subject Municipalities

Municipalities in the Dallas and Fort Worth SMSA's with population of 5,000 persons or more are presented in Table VIII. The cities are grouped into population classes consistent with those utilized by the Bureau of Census in the 1972 Census of Governments.¹ Cities with populations of fewer than 5,000 persons are excluded from the study for two reasons: (1) the administration of federal and state financial assistance programs for cities in Texas is segregated into small city (populations of less than 5,000) and large city categories² and (2) many small municipalities in the Dallas and Fort Worth SMSA's operate cooperative waste treatment under the auspices of municipal sewage treatment districts.³

¹U. S. Bureau of the Census, 1972 Census of Governments (Washington, 1973), p. 3.

²Personal interview with Don Morris, Construction Grants Program, Texas Water Quality Board, Austin, Texas, September 12, 1975.

³U. S. Environmental Protection Agency, 1968 Inventory of Municipal Waste Facilities (Washington, 1968), pp. 79-139.

TABLE VIII

MUNICIPALITIES OF 5,000 OR GREATER POPULATION IN THE DALLAS AND FORT WORTH STANDARD METROPOLITAN STATISTICAL AREAS

Municipal Population*			
5,000-9,999	10,000-24,999	25,000-49,999	50,000-99,999
Benbrook Burleson DeSoto Forest Hill Grapevine Lewisville Richard Hills River Oaks	Bedford Balch Springs Carrollton Cleburne Duncanville Ennis Eules Highland Park Lancaster McKinney North Richland Hills Plano Terrell University Park Waxahachie White Settlement	Denton Farmers Branch Haltom City Hurst Richardson	Arlington Garland Grand Prairie Irving Mesquite
			More than 300,000 Dallas Fort Worth

*The Dallas and Fort Worth SMSA's did not contain cities in population classes 100,000-199,999 and 200,000-299,999.

Source: U. S. Bureau of the Census, "Population of County Subdivisions: 1970 and 1960," 1970 Census of the Population, Vol. XLV (Washington, 1971), 31-43.

The twenty-two cities included in this study are presented in Table IX. These cities represent 72 per cent of the municipalities in the Dallas and Fort Worth SMSA's with populations of 5,000 persons or more and 85 per cent of the sewerred population in the North Central Texas Region.⁴ Excluded from the study were cities in the following categories: (1) cities which do not operate and maintain treatment facilities, (2) cities which declined to participate in the study, and (3) cities which could not provide data for a period of time sufficient to establish trends in the financing of water and sewer operations. The following cities, listed in Table VIII, were excluded: Balch Springs,⁵ Benbrook,⁶ Burleson,⁷ Farmers Branch,⁸ Garland,⁹ Hurst,¹⁰

⁴1968 Inventory, pp. 79-139.

⁵Personal interview with Ann J. Duke, City Secretary, October 15, 1975.

⁶Letter from Pat Rutherford, City Secretary, dated October 14, 1975.

⁷Telephone interview with Ronald W. Harmon, City Manager, October 9, 1975.

⁸Personal interview with J. W. Wade, Director of Finance, October 14, 1975.

⁹Personal interview with Aleta Watson, City Secretary, October 15, 1975.

¹⁰1968 Inventory, p. 139.

TABLE IX
MUNICIPALITIES INCLUDED IN THIS STUDY

Municipal Population				
5,000- 9,999	10,000- 24,999	25,000- 49,999	50,000- 99,999	More than 300,000
Forest Hill Grapevine Lewisville Richland Hills DeSoto	Bedford Carrollton Celburne Duncanville Ennis Highland Park McKinney Terrell Waxahachie	Denton Haltom City Richardson	Arlington Grand Prairie Mesquite	Dallas Fort Worth

Irving,¹¹ Lancaster,¹² North Richland Hills,¹³ Plano,¹⁴ River Oaks,¹⁵ University Park,¹⁶ and White Settlement.¹⁷

Data Collection Procedures

Data necessary to accomplish the objective of the study consist of two classes: (1) an estimation of the cost of compliance with the wastewater treatment requirements of the 1972 Federal Water Pollution Control Act Amendments for each city included in the study and (2) historical income, expense, and capital structure information for each city's water and sewer fund. The best available source of the first class of data was determined to be the 1974 "Needs Survey" conducted for the EPA by the Texas Water Quality Board. (A discussion of "Needs Survey" procedures, data applicability and limitations is presented in Chapter III.) Don Morris, Construction Grants Program of the TWQB, provided the data from the "Needs Survey" in a personal interview conducted in Austin, Texas, on September 12, 1975.

¹¹Telephone interview with Ralph Ellis, Assistant City Manager for Finance, October 9, 1975.

¹²Letter from Dane L. Tune, Director of Finance, n.d.

¹³Personal interview with Winnie Barclay, City Secretary, October 10, 1975.

¹⁴Letter from E. L. Edwards, Director of Finance, dated November 6, 1975.

¹⁵1968 Inventory, p. 139.

¹⁶Letter from James E. Brown, Finance Director, Oct. 29, 1975.

¹⁷Telephone interview with Fred Ducker, Director of Finance, November 5, 1975.

Water and sewer financial information for each city was obtained from the "Annual Financial Report" of each participating municipality. Information obtained from the financial reports consisted of income statement and balance sheet items for water and sewer funds for fiscal years 1960 through 1974. In order to obtain this financial information a letter of introduction was mailed to the City Secretary of each city listed in Table VIII with the exception of the cities of River Oaks and Hurst. (A copy of the letter of introduction is included in Appendix B.) Having allowed time for the letters to be received by the various municipal officials, arrangements were made for the collecting of data from each city. During the months of September and October, 1975, personal interviews were conducted with municipal financial directors. Financial reports or photo copies of water and sewer fund income statements and balance sheets were obtained during the interview. Several cities including Cleburne and Irving delivered the requested information through the mail, eliminating the need for a personal interview.

The volume of data collected was such that data processing could be effectively accomplished only with the aid of an electronic computer. To facilitate computer data processing, the collected data was encoded on punched cards and later stored on magnetic tape. Data codes and the punched card format were developed to ensure input consistency. The punched card

format is presented in Table X. Data element codes were grouped into two classes: (1) two digit codes for municipality and fiscal year identification and (2) three digit codes for water and sewer fund financial data. Municipality and year identification codes are contained in Appendix C; financial data codes are presented in Table XI.

TABLE X
PUNCHED CARD FORMAT

Card Columns	Contents
1-2	City Identification Code
7-8	Fiscal Year Identification Code*
10-12	Data Element Identification Code
21-30	Data (left justified)

*Fiscal years for the cities surveyed were for the twelve month period October 1 through September 30.

Data Analysis Procedures

The financial impact of the costs of implementing the provisions of the 1972 Act Amendments for each municipality included in the study was determined on the basis of four Alternative Wastewater Facility Financing Conditions. These Alternative Conditions, presented in Table XII, concern the method by which the municipalities will obtain the funds which the "Needs Survey" indicates are required to satisfy federal water pollution control mandates.

TABLE XI

FINANCIAL DATA ELEMENTS AND IDENTIFICATION CODES

Data Element Identification Code	Data Element
001	1990 Population Estimate*
002	Cost of Municipal Wastewater Treatment Facilities to be Incurred by 1990 to Satisfy 1972 Federal Water Pollution Control Act Amendment Requirements*
003	Water Sales Revenue**
004	Sewer Collections Revenue**
005	Taps to Main Revenue**
006	Miscellaneous Income from Water and Sewer Fund Operations**
007	Water and Sewer Fund Operating Expenses**
008	Depreciations**
009	Revenue Bond Interest Expense**
010	Special Charges**
011	Non-operating Income**
012	Total Value of Capital Structure**
013	Revenue Bonds***
014	Equity
015	Federal Grants***
016	Retained Earnings***
017	Reserve for Refunding of Revenue Bonds***
018	Non-operating Expenses**
019	General Obligation Bonds***
020	Contributions in Aid of Construction***
021	Refunding Contracts Payable***
022	Notes Payable***
023	Trinity River Authority Bonds***
024	Reserve for Authorized Expenditures**
025****	
026	Amounts Owed Other Municipal Funds***
027	Water and Sewer Contingency Reserves***
028	Sewage Construction Cost Index*****
029	Reserve for Depreciation**
030	Penalties and Reconnection Revenue**
031	Contribution from Revenue Sharing***
032	Garbage Collection Revenue**

*Obtained from 1974 "Needs Survey"

**Obtained from Water and Sewer Fund income statements

***Obtained from Water and Sewer Fund balance sheets

****Unused data element identification code

*****Obtained from Environmental Protection Agency Sewage
Construction Cost Index

TABLE XII

ALTERNATIVE MUNICIPAL WASTEWATER FACILITY
FINANCING CONDITIONS

- I. Municipality elects not to apply for federal or state construction grants or loans; financing wastewater treatment facility needs from the sale of water and sewer revenue bonds.
- II. Municipality receives a federal construction grant amounting to 35 per cent of the cost of wastewater treatment facilities. The remaining 65 per cent of "Needs" is financed through the sale of revenue bonds.
- III. Municipality receives a state grant in the amount of 100 per cent of the cost of water pollution control facility needs.
- IV. Municipality receives a federal grant in the amount of 75 per cent of wastewater treatment facility needs. The remaining 25 per cent is financed through the sale of revenue bonds.

The first condition is based on the voluntary nature of participation in federal and state water pollution control facility construction grant and loan programs. The TWQB indicates that at current and projected rates congressional funding of the Federal Construction Grants Program will be adequate, on the average, to satisfy 35 per cent of the wastewater facility construction needs as reported in the 1974 "Needs Survey;" Alternative Condition II is based on this TWQB analysis.¹⁸ The third financing condition is based on the Texas "Financial Assistance for Waste Treatment Construction" program authorized by the Texas Water Quality Act.¹⁹

¹⁸Personal interview with Don Morris.

¹⁹Vernon's Texas Civil Statutes, Section 21.601 et. seq.

This provision of the Texas Water Quality Act authorized the TWQB to make direct loans to political subdivisions which "in the judgement of the board [TWQB] is unable to issue bonds or other obligations. . . ." ²⁰ Alternative Condition IV considers the possibility that the U. S. Congress will appropriate sufficient funds to fully fund the Federal Treatment Works Grant Program. Thus, this fourth alternative condition is based on Section 205 of the Federal Water Pollution Control Act Amendments of 1972 which authorizes federal contributions to municipalities in the amount of 75 per cent of the cost of construction of waste treatment facilities. ²¹

The importance of the alternative conditions presented in Table XII cannot be overemphasized since they provide two important elements for this analysis. First, the Alternative Conditions establish a set of parameters which will be used in the determination of the water pollution abatement financial burden borne by each municipality studied. Second, the conditions provide interest rate information to be utilized in the preparation of pro forma financial statements for each city. Alternative Financing Conditions I, II, and III include the sale of municipal bonds; therefore, in order that this

²⁰Ibid., Section 21.610.

²¹Section 205, Federal Water Pollution Control Act Amendments of 1972, PL 92-500.

study will produce results comparable to those performed by the Federal Water Pollution Control Administration in The Cost of Clean Water series, all local bonds are assumed to bear a simple interest rate of 4.5 per cent.²²

Figure 11 is a schematic of the data analysis procedures utilized in this study. These procedures integrate the

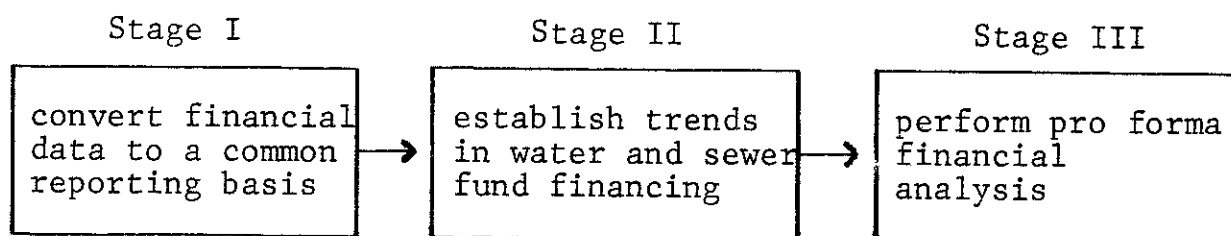


Fig. 11--Data analysis procedure.

municipal financing data base and the four alternative wastewater treatment facility financing conditions to generate information concerning the impact of water pollution control financing on municipal government operations in North Central Texas.

Stage I

A common reporting basis is developed through two data conversions:

1. Current dollars reported in water and sewer fund financial statements are converted to June, 1973, dollars. This base period was selected in order that the collected

²²U. S. Federal Water Pollution Control Administration, The Cost of Clean Water--Economic Impact on Affected Units of Government, The Cost of Clean Water Series (Washington, 1968), p. 74.

data would be represented on a basis consistent with that employed by the EPA in the preparation of the 1974 "Needs Survey."²³ Constant dollar adjustments²⁴ are based on the "Sewage Treatment Plant Construction Cost Index," published by the EPA²⁵ and the Engineering News-Record.²⁶ This process of adjustment is consistent with adjustments recommended in the 1974 "Needs Survey."²⁷ The Sewage Construction Cost Index for the period 1960 through 1974 is presented in Table XII.

2. In order to eliminate confusion which could result from the varying accounting terminology employed by different municipalities, financial statements are converted to a standard format. The statement format utilized in this study is

²³U. S. Environmental Protection Agency, Procedural Guidance 1974 Joint State-EPA Survey of Needs for Municipal Waste Water Treatment Facilities (Washington, 1974), p. 5-3.

²⁴The formula for adjusting the current dollars to constant dollars is as follows:

$$\begin{array}{l} \text{June, 1973} \\ \text{Constant Dollars} \end{array} = \frac{\text{Value in current dollars}}{\text{average index value for}} \times \begin{array}{l} \text{June, 1973} \\ \text{Index Value} \end{array} \\ \text{corresponding year}$$

²⁵U. S. Environmental Protection Agency, Sewage Treatment Plant and Sewer Construction Cost Index (Washington, October 14, 1975), np.

²⁶For example see: "Sewer Costs Up 6.4%, Treatment Plants 6.5%," Engineering News-Record, CLXXIV (June 18, 1970), 104-105. The ENR publishes the indexes quarterly.

²⁷Procedural Guidance, p. 5-6.

TABLE XIII
 AVERAGE ANNUAL SEWAGE TREATMENT PLANT
 CONSTRUCTION COST INDEX, 1960-1974
 (1957-1959 = 100)

Year	Average Annual Index
1960	105.0
1961	105.9
1962	107.0
1963	108.5
1964	110.1
1965	112.0
1966	116.1
1967	119.4
1968	123.6
1969	132.7
1970	143.6
1971	159.8
1972	172.0
1973	182.6
1974	217.2

Source: U. S. Environmental Protection Agency, Sewage Treatment Plant and Sewer Construction Cost Indexes (Washington, 1975), np.

consistent with that recommended by the Municipal Finance Officers Association.²⁸ Income statement format and data elements included in each entry are illustrated in Table XIII; the same information for capital structure elements is presented in Table XV. A glossary appended to this chapter provides definitions of terms presented in the standard income statement and capital structure statement.

²⁸ Municipal Finance Officers Association, Government Accounting, Auditing, and Financial Reporting (Chicago, 1968), pp. 50-69.

TABLE XIV
STANDARD INCOME STATEMENT FORMAT AND DATA CODES
OF STATEMENT ENTRIES

Statement Entry	Data Codes
Income from operations:	
Water and sewer collections	003, 004
Other operating income	005, 006, 030
Non-operating income	011
Total income	sum of above codes
Deduct expenses:	
Operating expenses	007
Depreciation	008
Bond interest and fees*	009
Special charges**	010
Non-operating expenses	018
Net water and sewer surplus (deficit)	sum of all entries

*For Alternative Condition III in pro forma analysis, includes repayment of principal and interest.

** () indicate a credit transaction.

TABLE XV
STANDARD CAPITAL STRUCTURE STATEMENT FORMAT AND
DATA CODES OF STATEMENT ENTRIES

Statement Entry	Data Codes
Equity	014
Long term debt:	
Revenue bonds	013
General obligation bonds	019
Other long term debt*	021, 022, 023
Reserves and contributions:	
Reserve for bond retirement	017
Reserve for authorized expenditures	024, 027
Contributions	020, 031
Federal grants	015
Retained earnings	016
Total Capital Structure	sum of all entries

*Includes: Trinity River Authority Bonds, Notes Payable, Long Term Contracts Payable, and Amounts Due Other Funds.

Stage II

Consistent with analyses performed by agencies of the federal government, simple regression is used in this study for trend analysis of water and sewer fund operating revenue and equity.²⁹ Weston and Brigham note that regression analysis is "superior for forecasting financial requirements, particularly for longer term forecasts."³⁰

The percent-of-sales method is used to analyze income statement and capital structure items other than operating revenue and equity. In the analysis of income statement items, the percentage that each entry is of operating revenue is computed. The relationship between each income statement entry and operating revenue is determined by averaging percentages for corresponding items for each year. The capital structure of each participating city is analyzed in the same manner, except that capital structure elements are computed as a per cent of equity. Christy and Roden have noted that the percent of sales method is a widely accepted approach to forecasting financial needs.³¹ Weston and Brigham indicate that while the percent-of-sales method is the "simplest approach to forecasting financial requirements," it is a useful method of determining financial needs.³²

²⁹Economic Impact on Affected Units of Government, p. 108.

³⁰J. Fred Weston and Eugene F. Brigham, Managerial Finance, 4th ed. (New York, 1972), p. 76.

³¹George A. Christy and Peyton Foster Roden, Finance: Environment and Decisions, 2d ed. (San Francisco, 1976), pp. 266-268.

³²Weston and Brigham, pp. 72-73.

Stage III

Stage III is subdivided into four parts, which combine to integrate the Alternative Financing Conditions with Stage II analysis. Subelements of Stage III are presented below and are summarized in Figure 12.

Part one.--Prepare pro forma capital structure statements by combining estimates of wastewater treatment needs, Alternative Financing Conditions, and Stage II analysis.

Part two.--Compute the expected debt service expense by applying the interest rate assumptions outlined in the Alternative Financing Conditions. These results are entered into pro forma income statements.

Part three.--Prepare pro forma income statements by combining interest rates calculated above with Stage II analysis of income statements.

Part four.--Determine the existence of an operating surplus or deficit for each of the Alternative Financing Conditions.

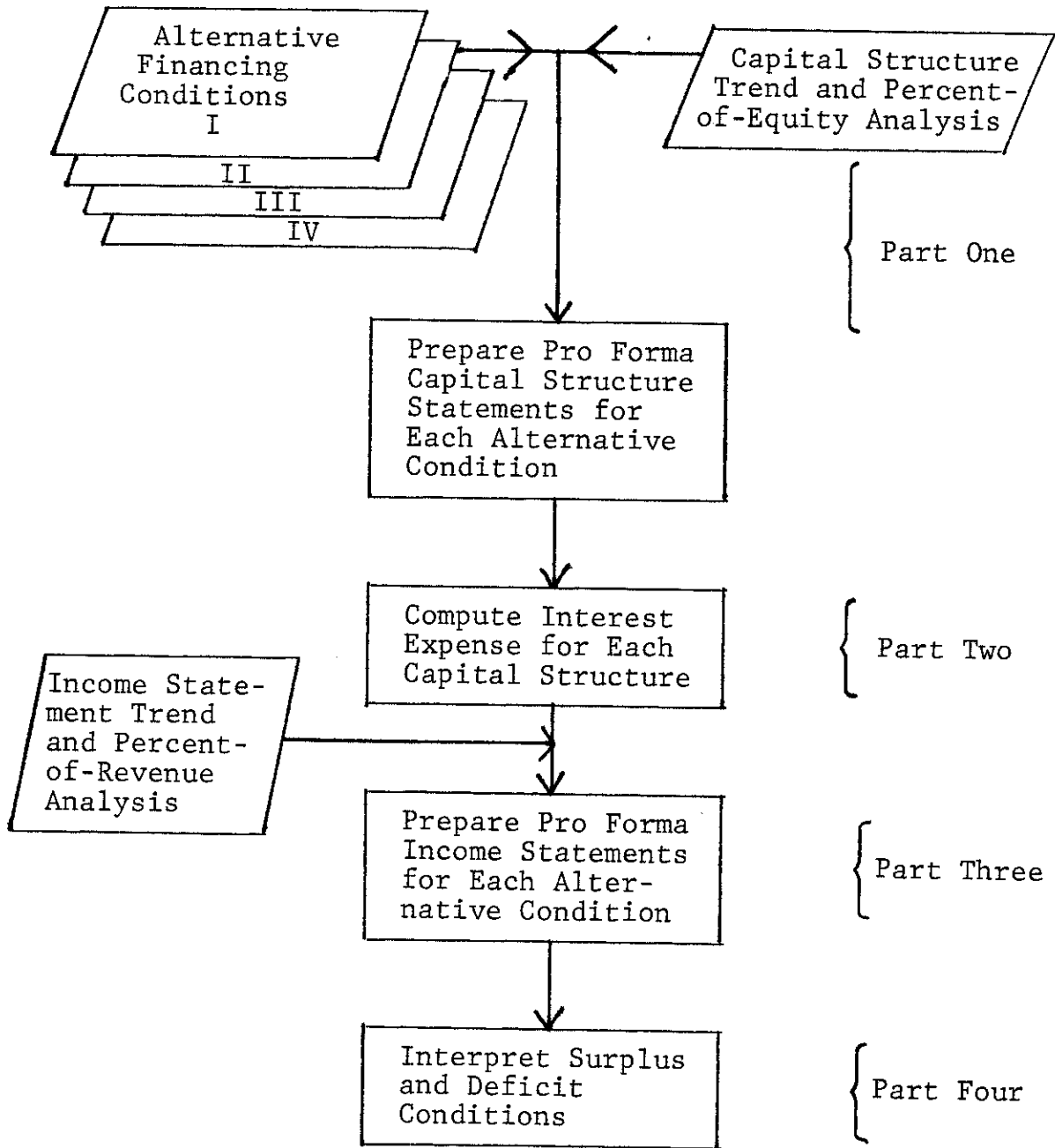


Fig. 12--Summary of Stage III analysis.

GLOSSARY OF TERMS USED IN STANDARD INCOME AND
CAPITAL STRUCTURE STATEMENTS

- Bond Interest and Fees--an expenditure account denoting amounts paid pursuant to agreements between the municipality, bond holders, and bond agents.
- Contributions--a capital account indicating the value of mains, connections, and other apparatus given to the utility by subdivision developers, builders, etc.
- Depreciation--an expense account indicating the proportion of fixed asset costs allocated to an accounting period.
- Equity--a capital account in the amount that the municipality has contributed assets to the water and sewer fund. (Often referred to as the "municipality's contribution.")
- Federal Grants--a capital account indicating non-repayable funds received by the water and sewer fund from federal agencies.
- General Obligations Bonds--a liability account showing the amount of debt payable from general revenues or taxation.
- Nonoperating Expenses--an expense account indicating payment of items incidental to the operation of the water and sewer fund, includes miscellaneous interest expense and amortization of premiums on investments.
- Operating Expenses--an expense account for the accounting of amounts paid for supplies, labor and logistics used in the production of the primary services of the water and sewer fund.
- Other Long Term Debt--in general, unconditional written promises to pay, signed by the maker, to pay a certain sum in money on demand or at a fixed or determinable future time either to the bearer or to the order of the person designated therein.
- Other Operating Income--a revenue account indicating revenue from sources other than the sale of water and sewer services. Includes the rental of water property, sale of material, fire service and hydrant rentals among others.
- Retained Earnings--a capital account in which is kept a record of that portion of net income which is not segregated for specific purposes. This account represents the accumulated difference between revenues and expenditures. (Often referred to as "unappropriated surplus.")

Reserve for Authorized Expenditures--a capital account representing bonds which have been legally authorized but have not been issued and which can be issued and sold without further authorization.

Reserve for Bond Retirement--a capital account representing the segregation of surplus to provide for unliquidated bonds.

Special Charges--a revenue or expense account indicating, respectively, a compulsory levy made by a local government against certain properties to defray part or all of the cost of a specific improvement or service which is presumed to be of general benefit to the owners or such property; or payment by a governmental unit of a special assessment levied against them.

Water and Sewer Collections--revenue resulting from customer payment of fixed or metered charges for water and sewer services rendered.

Source: Municipal Finance Officers Association, Government Accounting, Auditing and Financial Reporting (Chicago, 1968), pp. 50-69, 151-172.

CHAPTER V

DATA ANALYSIS

Data analysis procedures for this study are divided into three stages: Stage I is the conversion of raw data to June 1973 dollars and standard income and capital structure formats. In Stage II, simple regression analysis and the percent-of-sales method are used to establish financing trends in the Water and Sewer Fund (WSF) of each municipality included in the study. Pro forma financial analysis is performed in Stage III in order to determine the consequences of using each of four Alternative Conditions to satisfy waste treatment facility needs which have been established for each city in the 1974 Needs Survey.¹ The four Alternative Financing Conditions are: (1) municipality finances wastewater treatment construction requirements through the issuance of revenue bonds, (2) municipality receives a federal grant in the amount of 35 per cent of the cost of waste treatment facility needs, the remaining 65 per cent is financed by revenue bonds, (3) the city receives a state grant for the full amount of its needs, and (4) municipality receives a federal grant of 75 per cent of total needs and the remaining 25 per cent of needs is met through the sale of revenue bonds.

¹U. S. Environmental Protection Agency, Cost Estimates for Construction of Publicly-Owned Waste Treatment Facilities --1974 "Needs Survey" (Washington, 1975).

Due to their bulk, data analysis tables and figures are appended to this report. An appendix for each city surveyed is included and contains tables presenting the following information: (1) water and sewer fund income and capital structure statements converted to the standard format and constant dollars, (2) trend diagrams of total water and sewer fund operating income and a selected capital structure element, (3) average ratios of income statement elements to total operating income (income statement percent-of-sales information) and capital structure components to the element selected as the base for trend analysis (capital structure percent-of-sales information) and (4) pro forma capital structure and income statements for each of the Alternative Conditions.

The key results of this analysis are presented in pro forma financial statements for each municipality. The "bottom line" of each pro forma income statement for each Alternative Condition indicates either an operating surplus or deficit, in constant dollars. A surplus denotes that WSF revenues are adequate to satisfy the burden of expenses associated with waste treatment operations and debt service associated with the capital structure of each Alternative Condition. A deficit means that revenues are inadequate to meet the operating expenses and debt burden of the Alternative Condition. Deficits and surpluses are functions of established trends in WSF

operating revenue, expenses, capital structures, and total waste treatment facility construction needs.

For each city, pro forma income statement items, except "bond interest and fees", remain constant for each Alternative Condition. The value of these constant items is determined by trend analysis of "total operating income" and percent-of-sales information. "Bond interest and fees" are determined independently for each Alternative Condition, since this item is a function of the value of revenue bonds or state grants in the pro forma capital structure. Pro forma capital structures are based on trend analysis of a selected capital structure element, percent-of-sales information, and total needs. Thus, the total capital structure for each city remain constant among the Alternative Conditions. The distribution of the total is dependent upon the debt and federal grant proportions inherent in each Alternative Condition.

City of Forest Hill, Texas

The Water and Sewer Fund (WSF) of Forest Hill has operated at a surplus of revenue over expenses for fourteen of the fifteen years between 1959 and 1975, as indicated by Table XXV in Appendix D. The Fund was unprofitable in 1972 as the result of extraordinarily high expenditures for operating expenses. In terms of constant, June 1973, dollars, the Forest Hill Water and Sewer Fund has exhibited an average annual surplus of \$50,263 for 1960 through 1974, inclusive.

A review of Table XXVI reveals that the capital structure of the WSF has passed through three stages of composition during the period 1960 through 1974. During the first stage, 1960 through 1965, revenue bonds averaged 69 per cent of the total capital structure. The second stage, 1966 through 1968, is characterized by the city's injection of equity into the capital structure. During the second stage, equity averaged 13 per cent of the capital structure and revenue bonds constituted 55 per cent. In the third stage, 1969 through 1974, the value of equity remained fairly constant, but the proportion of revenue bonds declined as a result of significant increases in contributions in aid of construction. For 1969 through 1974, the capital structure was composed of an average of 8 per cent equity, 39 per cent revenue bonds, and 41 per cent contributions.

Figure 17, trend analysis of WSF total operating income, reveals that operating income increases at an average 3 per cent per year. Thus, in 1990 total operating income will be approximately 595,500 dollars in constant dollars. The average ratios of income and expense items to total operating income are presented in Table XXVII. These percentages and the projected operating income are the basis for pro forma income statements.

Pro forma capital structure generation is based on trend analysis of retained earnings (Figure 18). Retained earnings

were selected as the basis because they are common to the capital structure of each of the base years. Table XXVIII presents average ratios of the relationships between each capital structure element and retained earnings. These percentages are the basis for the generation of pro forma capital structures.

The 1974 Needs Survey (Table VII) indicated that Forest Hill has the lowest amount of total needs of all the cities included in this study. The total needs for Forest Hill are 585,000 dollars in 1973 dollars. This low level of total needs is indicative of the high level of waste treatment technology and waste treatment plant capacity in existence at the time of the Needs Survey.

Pro forma income statements and capital structure for each alternative condition are presented in Tables XXIX through XXXVI. The Forest Hill WSF exhibits a deficit operating position under each of the four Alternative Conditions. These deficits are not the result of debt financing of waste treatment facility needs but rather the result of the reliance of debt to finance the normal growth of facilities. This is evident when it is noted that under Alternative Condition IV, federal grant of 75 per cent of total needs, the deficit in the pro forma income statement (Table XXXV) exceeds 240,281 dollars in 1973 dollars. The large federal grant did not have a significant beneficial effect on operating deficits because of the high level of debt financing historically employed in

the operation of the Forest Hill WSF. The largest deficit is reported under Alternative Condition III (Table XXXIII)--100 per cent state grant to finance needs. Even though the capital structure (Table XXXIV) for this alternative shows the lowest level of revenue bonds as compared to the other alternative capital structures, the deficit is the greatest because the state grant program requires the repayment of principal as well as interest.

City of Grapevine, Texas

Water and Sewer Fund financing data for Grapevine were limited to the years 1966 through 1974.² Summary financial statements and other tables and figures are presented in Appendix E. The Grapevine WSF has operated at a surplus (Table XXXVII) in each of the nine years considered in this study. In terms of constant 1973 dollars, the surplus reached its maximum in 1972 when it was recorded at 101,366 dollars. During the period 1966 through 1974, the surplus averaged 63,727 dollars or 22.7 per cent of average income.

Two periods of capitalization of the Grapevine WSF are demonstrated by a summary capital structure statement (Table XXXVIII). For the years 1966 through 1972, the capital structure was composed of three elements: revenue bonds, other long term debt, and retained earnings. The latter component provided an average of 45 per cent of total capital for 1966 through 1972. Other long term debt, primarily

²Personal interview with Kenneth R. Pritt, Jr., Administrative Assistant, October 9, 1975.

refunding contracts and water supply contracts with the U. S. Army Corps of Engineers,³ contributed an average 3 per cent of the total and revenue bonds predominated, contributing 52 per cent. The second period of capitalization, 1973 and 1974, the capital structure expanded to seven elements. During these years total long term debt composed 65 per cent of the total capital structure.⁴ The City of Grapevine contributed equity averaging 292,864 dollars or 9 per cent of the total capital. Reserves for bond retirement were introduced in 1973 and maintained through 1974.

Trend analysis of Grapevine WSF total operating income is presented in Figure 19. Historically, operating income has increased at an average rate of approximately 2.5 per cent per year. At this rate of growth, total operating income for 1990 in constant 1973 dollars is approximately 465,700 dollars. The average ratios (in per cent) of income and expense items to total operating income are presented in Table XXXIX. These percentages and the projected operating income are the basis for pro forma income statements for each Alternative Financing Condition.

The pro forma capital structure for each Alternative Condition is based on trend analysis of retained earnings (Figure 20), average ratios of capital structure elements to

³City of Grapevine, Texas, Utility Fund Balance Sheet, (1966-1972), various pages.

⁴Total long term debt includes revenue and general obligation bonds and other long term debt.

retained earnings, and total needs from the 1974 Needs Survey. Retained earnings were selected as the basis for capital structure generation because it is common to the capital structure for each year of the base period. The average ratios (in per cent) of capital structure elements to retained earnings are presented in Table XL. The 1974 Needs Survey indicates that Grapevine needs 3,690,000 dollars, in 1973 dollars, worth of additional waste treatment facilities to satisfy the requirements of the 1972 Water Pollution Control Act Amendments.

Pro forma income and capital structure statements are presented in Tables XLI through SLVIII. Deficits are reported for Alternative Conditions I, II, and III and a surplus is reported for Alternative Condition IV. Deficits, in 1973 dollars, of 113,098 dollars and 277,611 dollars are reported for Alternative Conditions I and III, respectively. These are the largest deficits reported and reflect the burden caused by large amounts of debt financing employed in these two alternatives to finance the total needs. Of the deficits, that for Alternative Condition II (Table XLIII) is the smallest, indicating the reduction in revenue bond financing resulting from the receipt of a federal grant in the amount of 35 per cent of total needs. The beneficial effect of federal grants on operating position is further illustrated by Table XLVII in that a surplus of revenue over expenses is achieved because

the city is assumed to receive a 75 per cent federal grant under Alternative Condition IV.

City of Lewisville, Texas

The City of Lewisville provided Water and Sewage Fund operating data for the period 1965 through 1974.⁵ Lewisville's Water and Sewer Fund has shown consistent profitability during the period for which data was obtained, as demonstrated in the summary income statement (Table IL) in Appendix F. Profitability, as measured by the ratio of net income to total operating income, has ranged from 15.7 per cent to 40.8 per cent. Net income for the period 1965 through 1971 is lower than that reported in the City of Lewisville Audit Report for those years because the city's accountant did not calculate depreciation for the Water and Sewer Fund.⁶ In order to maintain consistency in statement presentation, depreciation was calculated for each year 1965 through 1971 by applying the simple average of the ratio of depreciation to total operating income for the period 1972 through 1974.

The capital structure (Table L) of the Lewisville WSF for the period 1965 through 1971 was primarily composed of long term debt in the form of revenue bonds. Revenue bonds averaged

⁵Letter from Gene Lewis, Administrative Assistant, dated November 7, 1975.

⁶City of Lewisville, Texas, Audit Report 1972, p. 11.

89.7 per cent of the capital structure for 1965 through 1973. In 1968 the capital structure consisted entirely of revenue bonds. In 1972 and 1973 the proportion of debt in the capital structure was 40.1 per cent and 57.9 per cent, respectively. This reduction in the proportion of debt was achieved by significant increases in retained earnings. The Lewisville WSF capital structure was expanded to include six accounts in 1974: equity, revenue bonds, general obligation bonds, reserve for bond retirement, contributions, and retained earnings. For 1974 total debt contributed 53.7 per cent of the capital structure with all other components contributing to the remaining 46.3 per cent. Trend analysis of Lewisville WSF total operating income (Figure 21) indicates that total operating income has historically increased at the rate of approximately 20 per cent per year. At this rate of growth, total operating income for 1990, in constant 1973 dollars, is approximately 2.03 million dollars. The average ratios of income and expense items to total operating income are presented in Table LI. These percentages in conjunction with projected operating income are the basis for the formation pro forma income statements for each Alternative Financing Condition.

The pro forma capital structure for each Alternative Condition is based on trend analysis of the historical value of revenue bonds in the capital structure (Figure 22), average ratios of capital structure items to revenue bonds, and total

needs from the 1974 Needs Survey. Revenue bonds were selected as the basis for pro forma capital structure generation because they are common to the capital structure of each of the base years. Average ratios of capital structure items to revenue bonds are presented in Table LII. The 1974 Needs Survey reports that Lewisville needs 5,676,300 dollars, in 1973 dollars, of additional waste treatment facilities to satisfy the requirements of the 1972 Water Pollution Control Act Amendments.

Pro forma analysis of income and capital structure for each Alternative Condition is presented in Tables LIII through LX. A surplus of revenue over expenses is indicated for each Alternative Condition. These surplus conditions result from the significant increase in operating income. The maximum surplus is achieved under Alternative Condition IV, 75 per cent federal grant. The minimum surplus is registered for Alternative Condition III, 100 per cent state grant.

City of Richland Hills, Texas

Financial statements for the Water and Sewer Fund of Richland Hills are presented in Appendix G. The base period for analysis of Richland Hills data is 1963 through 1974. During this period the Water and Sewer Fund has generated a surplus of revenue over expenses for ten of the twelve years studied. Operating deficits occurred in 1966 as the result of a 7.7 per cent decline in water and sewer collections, and

in 1974 because of a 21.7 per cent decline in collections. The capital structure of the Richland Hills Water and Sewer Fund is composed of three elements: revenue bonds, reserves and contributions, and retained earnings. From 1963 to 1971 the total capital structure declined in real value by approximately 33.6 per cent; however, the decline was temporarily abated in 1972 when the city sold a new issue of revenue bonds. Revenue bonds have been the predominate feature in the Richland Hills WSF capital structure contributing an average 77.5 per cent of the capital structure during the period studied.

Trend analysis of the Richland Hills WSF total operating income is presented in Figure 23. Operating income has increased at a historical average rate of approximately 1.5 per cent per year. Thus, total operating income for 1990, in 1973 dollars, is approximately 480,000 dollars. Pro forma income statements for each Alternative Condition are based on projected operating income and the average ratios of income and expense items to total operating income presented in Table LXIII.

Retained earnings which are common to the capital structure of each base year are the basis for trend analysis of the Richland Hills WSF capital structure. Pro forma capital structure statements for each Alternative Condition are based on trend analysis, average ratios of capital structure items to retained earnings (Table LXIV), and total needs from the

1974 Needs Survey. The EPA estimates that total waste treatment needs for Richland Hills are 2,018,000 dollars, in 1973 dollars.

Pro forma income and capital structure statements are presented in Tables LXV through LXXII. A surplus of revenue over expense is reported for Alternative Conditions I, II, and IV. The smallest of the three operating surpluses is reported for Alternative Condition I, local revenue bond financing, reflecting the burden of interest associated with the bonds used to finance needs. As the proportion of federal grants in the financing of needs increases, Alternative II (35 per cent federal grant) and Alternative IV (75 per cent federal grant), the surplus increases. These surplus increases are derived from reduced debt service expenditures. The only pro forma deficit occurs under Alternative Condition III, 100 per cent state grant. This deficit reflects increases in debt service expenditures consistent with principal and interest payments on the state loan.

City of DeSoto, Texas

Operating data for the DeSoto Water and Sewer Fund were limited to the five year period 1970 through 1974.⁷ A summary income statement and capital structure are presented in Tables LXXIII and LXXIV in Appendix H, respectively. Table LXXIII

⁷Personal interview with Dorothy Talley, City Secretary, October 19, 1975.

shows that in each year except 1974 the DeSoto WSF has operated at a surplus. In 1974 the Fund operated at a deficit of 26,546 dollars, in constant dollars. This deficit was the result of a 14 per cent decrease in total income.

Total capitalization (Table LXXIV) has averaged approximately 6.6 million dollars for the period 1970 through 1974. Long term debt has contributed an average 44.6 per cent of the total capital structure. This favorable debt standing in relation to other cities in its population class⁸ has been at least partially the result of federal grants received by the city during the period 1970 through 1974. Other factors contributing to a favorable debt position are growth in contributions in aid of construction and a high level of retained earnings, averaging approximately 178,000 dollars.

Trend analysis of operating income for the DeSoto WSF (Figure 25) indicates that operating income has historically increased at a rate of approximately 3 per cent per year. From this trend it is determined that total operating income is expected to reach approximately 725,900 dollars in 1990 in 1973 dollars. Pro forma income statements for each Alternative Condition are based on the projected operating income and the average ratios (in per cent) on income and expense items to total operating income presented in Table LXXV.

⁸ Average long term debt to total capital structure proportions for other cities in the population class 5,000-9,999: Forest Hill--55 per cent, Grapevine--55 per cent, Lewisville--80 per cent, and Richland Hills--47.5 per cent.

Trend analysis of the capital structure is based on retained earnings which are common to each base year. Pro forma capital structure statements for each Alternative Condition are based on trend analysis, average ratios of capital structure items to retained earnings (Table LXXVI), and total needs from the 1974 Needs Survey. According to the Needs Survey, DeSoto has waste treatment needs totaling 3,050,000 dollars in 1973 dollars.

From pro forma income statements representing each of the four Alternative Conditions, it is found that two of the alternatives produce operating deficits and two produce operating surpluses. Alternative Condition I, revenue bond financing to total needs (Table LXXVII), produces the smallest of the deficits. The other deficit is associated with Alternative Condition III, state grant financing (Table LXXXI), reflecting the principal and interest payment requirements of the state grant programs. Surpluses are reported for Alternative Conditions II and IV (Tables LXXIX and LXXXIII, respectively). These two alternatives produce surpluses relative to the other two Alternative Conditions because federal grants replace some debt financing in both Alternatives II and IV. Naturally, the largest surplus is reported by Alternative Condition IV, which provides for a federal grant in the amount of 75 per cent of total needs.

City of Bedford, Texas

Bedford began operating a Water and Sewer Department in January of 1969, thus its first full fiscal year of operation was 1970.⁹ Since its inception the Water and Sewer Fund has operated at a surplus of revenue over expenses, as illustrated in Table LXXXV in Appendix I. The ratio of net income to total operating revenue has ranged from a low of 2.5 per cent (1970) to a high of 18.5 per cent (1971). The simple average ratio of net income to operating revenue for the period 1970 through 1974 is 12.4 per cent. Revenue bonds are the predominant form of WSF financing (Table LXXXVI) composing as much as 77.8 per cent of the total capital structure. Equity in the capital structure has increased from 10,458 in 1970 to 136,407 dollars in 1974.

Trend analysis of Bedford total operating income is presented in Figure 27. Historically, operating income of the Bedford WSF has increased at an approximate average annual rate of 3 per cent. At this rate of growth 1990 operating income in 1973 dollars is expected to reach approximately 800,000 dollars. This projected income in conjunction with the average ratios of income and expense items to total operating income (Table LXXXVII) are the basis for development of pro forma income statements for each of the Alternative Financing Conditions.

⁹City of Bedford, Texas, Audit Report 1971, p. 25.

Since equity is present in the capital structure of each base year, it is the basis for projecting the pro forma capital structures. Equity trend analysis is presented in Figure 28. Table LXXXVIII presents the average ratio of capital structure elements to equity. These ratios, projected equity and total needs, are employed to develop pro forma capital structures. Total waste treatment needs for Bedford are 1,900,000 dollars in 1973 dollars.

Deficits are reported in the pro forma income statements (Tables LXXXIX, XCI, XCIII, and XCV) for each Alternative Condition. An examination of these income statements reveals that the major reason for the deficits is the level of bond interest and fees resulting from the high level of revenue bonds employed in financing the long term assets of the Bedford WSF. As Table LXXXVI indicates Bedford has historically relied heavily on revenue bonds for providing capital. As this financial policy is projected into the future it places the Bedford WSF in a very poor operating position. Thus, operating deficits for the Bedford WSF are not as much the result of financing the requirements of the 1972 Water Pollution Control Act Amendments as they are the result of a financial policy which has favored debt financing rather than paid-in-capital. While waste treatment needs reported in the 1974 Needs Survey add marginally to the deficits, it is the financing of growth in existing treatment technology which causes the majority of the deficits.

City of Carrollton, Texas

Water and Sewer Fund summary income statements (Table XCVII in Appendix J) indicate that the WSF has operated at a surplus for each year 1964 through 1974 with the exception of 1964 and 1965.¹⁰ Since the deficits of 1964 and 1965, the fund has operated at a surplus averaging 337,950 dollars in 1973 dollars. These substantial surpluses may be in jeopardy in the future because while total revenue for 1966 through 1974 increased 117 per cent, operating expenses increased 147 per cent for the same period.

Table XCVIII indicates that revenue bonds are the predominant feature in the Carrollton WSF capital structure for 1964 through 1974. Revenue bonds have contributed an average of 52.7 per cent of total capital. The proportion of revenue bonds was reduced to 36 per cent in 1974, however, the combination of general obligation bonds and other long term debt increased the debt proportion of the capital structure to 69 per cent.

Trend analysis of total operating income for the Carrollton WSF (Figure 29) indicates that the expected value of operating income in 1990 is approximately two million dollars in 1973 dollars. The combination of the projected operating income and the average ratios of income and expense items to total

¹⁰Complete financial statements for 1960 through 1963 were not available. Letter from Deway Jones, Director of Finance, dated October 16, 1975.

operating income (Table IC) provide inputs for the pro forma income statements for each Alternative Financing Condition.

The basis for pro forma capital structure statements for each Alternative Condition is trend analysis of reserves for bond retirement (Figure 30). This element was selected as the base because it is common to the capital structure of each base year (Table XCVIII). The ratio of capital structure items to reserve for bond retirement is presented in Table C. These ratios and the projected level of reserves for bond retirement in 1990 are combined with waste treatment facility needs reported by the EPA in the 1974 Needs Survey to generate pro forma capital structures. Total needs for the City of Carrollton are 1,708,000 dollars in 1973 dollars.

An operating surplus is reported for each of the Alternative Conditions. The maximum surplus is reported for Alternative Condition IV (Table CVII), 75 per cent federal grant. The minimum surplus is associated with 100 per cent state grant financing of total needs, Alternative Condition III (Table CV). The surplus for Alternative Condition I, local debt financing, is presented in Table CI, and is the smallest, reflecting the burden of interest expenses associated with revenue bonds. Table CIII presents the pro forma income statement for Alternative Condition II which is the second highest. A review of the pro forma capital structure statements for each Alternative Condition (Tables CII, CIV, CVI, and CVIII) reveals that a major factor contributing to

the surplus positions is that in each capital structure approximately one-half of total capital is provided from sources other than debt. However, the relatively low proportion of debt financing is not the only favorable factor since approximately one-half of each surplus can be attributed to non-operating income which is not offset by non-operating expenses.

City of Cleburne, Texas

Table CIX in Appendix K presents summary income statements from the Cleburne Water and Sewer Fund. For the period 1960 through 1973 the Fund operated at a surplus averaging 86,630 dollars in constant dollars. The only deficit recorded for the period studied occurred in 1974 when the system operated at a deficit of 994,994 dollars. This deficit was the result of operating income declining 18.8 per cent from the 1973 level and operating expenses increasing 28.4 per cent from the previous year.

The capital structure (Table CX) of the Cleburne WSF has exhibited two stages of composition. In the first stage, 1960 through 1963, the predominate component was retained earnings contributing 56.8 per cent, the remainder was composed primarily of revenue bonds. The second stage was inaugurated in 1963 when the city issued over five million dollars of revenue bonds. For the period 1963 through 1974 the proportion of revenue bonds in the capital structure averaged 65.3 per cent.

Time series analysis of Cleburne WSF total operating income (Figure 31) indicates that total operating income for 1990 in constant dollars is approximately 825,000 dollars. The pattern of the historical relationships between income and expense elements and total operating income is presented in Table CXI. By applying the percent-of-sales technique to the projected total operating income projection, pro forma income statements for each Alternative Condition are presented in Tables CXIII, CXV, CXVII, and CXIX.

Retained earnings which are common to the capital structure of each base year are the basis for estimating the size and composition of the Cleburne WSF capital structure. Table CXII contains percent-of-sales information for the generation of pro forma capital structures via the historical relationship between capital structure components and retained earnings. In order to generate the pro forma capital structures for each Alternative Condition, the retained earnings projection is combined with the percent-of-sales information in Table CXII and the waste treatment needs which have been estimated by the EPA in the 1974 Needs Survey. The EPA reports that total waste treatment needs for Cleburne are 9.602 million dollars in constant dollars.

Pro forma income statements for the Cleburne WSF indicate deficit operating position for each of the Alternative Financing Conditions. Alternative Conditions I and III (Tables CXIII and CXVII, respectively), which do not include federal grants,

generate the maximum deficits. These deficits are a result of the combination of the level of needs required and a financial policy which has favored debt financing. Alternative Conditions II and IV (Tables CXV and CXVII) afford lower deficits than the other Alternative Conditions because some of the burden of financing wastewater treatment needs is satisfied by non-debt sources--federal grants.

City of Duncanville, Texas

Financial information concerning the operation of the Duncanville Water and Sewer Fund is limited to the years 1968 through 1972. The city of Duncanville was unable to provide information for 1960 through 1967 and 1973 through 1974.¹¹ For the period 1968 through 1972, the Duncanville WSF operated at a surplus averaging approximately 274,000 dollars per year in 1973 dollars as indicated in Table CXXI of Appendix L. The surplus reached its maximum in 1971 when it measured 353,402 dollars and its minimum in 1972 of 185,674 dollars.

The capital structure of the WSF (Table CXXII) is composed of long term debt, reserves, federal grants, and retained earnings. Total long term debt provided an average 70.5 per cent of total capital during the period studied. Federal grants to the Duncanville WSF averaged approximately 138,000 dollars per year. However, these grants contributed an average

¹¹Personal interview with Ann Durrwachter, City Secretary, October 24, 1975.

of less than 1 per cent of the total capital employed by the WSF. The majority of non-debt capital was provided by retained earnings which contributed an average 21 per cent of total capital.

Trend analysis of the Duncanville WSF operating income (Figure 33) indicates that total operating income for 1990 in constant dollars is approximately two million dollars. The average ratios of income and expense elements to total operating income over the period studied are presented in Table CXXIII. Pro forma income statements (Tables CXXV, CXXVII, CXXIX, and CXXXI) are generated by applying the percent-of-sales method to the projected operating income.

Pro forma income statements for each Alternative Condition indicate that a surplus is registered for each of the conditions. The pro forma income statements are predicated on capital structures which indicate the expected composition of capital for each Alternative Condition (Tables CXXVI, CXXVIII, CXXX, and CXXXII). These capital structures are based on trend analysis of retained earnings (Figure 34), percent-of-sales forecasting based on the historical relationship between capital structure elements and retained earnings (Table CXXIV), and waste treatment needs of 6.389 million dollars in constant dollars, as reported in the 1974 Needs Survey. The largest operating surpluses are reported for Alternative Conditions II and IV (Tables CXXVIII and CXXX, respectively). The surpluses reflect the increased proportion

of total capital provided by non-debt sources. While the pro forma income statements for Alternative Conditions I and II (Tables CXXV and CXXIX) indicate surpluses, these surpluses are lower than those for the other Alternatives because of a high proportion of debt. The repayment of principal provisions of the state grant program (Alternative III) creates the smallest surplus. The dominant reason for the projected surplus conditions is the projection into the future of the rapid growth in operating income which occurred during the base period. Operating income increases for the base period averaged an annual rate of approximately 11 per cent. This rapid rate of growth is demonstrated by the pro forma analysis to be more than adequate to cover the increased debt burden associated with financing waste treatment needs.

City of Ennis, Texas

Water and Sewer Fund financial data for Ennis was limited to the period 1967 through 1974. During this period the Fund has operated at a surplus of revenue over expenses only once-- in 1972. In other years the Fund operated at a deficit ranging from 7,099 dollars in 1971 to 76,988 dollars in 1968 and 76,933 dollars in 1974. The summary income statement in Table CXXXIII of Appendix M indicates that the primary reason for WSF deficits is high operating costs relative to operating revenue. While operating expenses have declined over the periods studied, so have operating revenues and at a more rapid rate. The Water

and Sewer Fund capital structure (Table CXXXIV) is largely composed of revenue bonds and retained earnings. Revenue bonds have averaged 32.8 per cent of the total capital structure. While the proportions of the major components in the capital structure have remained relatively constant for the period studied, the total value of the capital structure declined 47.1 per cent during the period of 1967 through 1974.

The projected operating income for 1990 of approximately 93,000 dollars in constant dollars (Figure 35) reflects the declining operating income which occurred during the base period. Since operating expenses and depreciation have historically exceeded total operating income, as demonstrated by Table CXXXV, operating deficits should be expected in the future without the interest expenses associated with the Alternative Conditions of financing 1990 waste treatment needs. Pro forma capital structures for financing waste treatment needs of 6.495 million dollars under each Alternative Condition are presented in Tables CXXXVIII, CXL, CXLII, and CXLIV. Bond interest and fees associated with even the smallest amount of debt financing required by the Alternative Conditions generate substantial operating deficits in the pro forma analysis (Tables CXXXVII, CXXXIX, CXLI, and CXLIII). For example, even though Alternative Condition IV provides for a federal grant of 75 per cent of expected needs, the debt financing of the remaining 25 per cent generate interest expenses which far outstrip the means of operating revenues.

City of Highland Park, Texas

The Highland Park WSF has operated at a surplus each year for the period 1960 through 1974 as shown in Table CXLV of Appendix N.¹² In fact, the surplus has been less than 100,000 dollars in only four of the fiscal years studied. In terms of the ratio of net surplus to total income, the Highland Park WSF has averaged 21 per cent return on total revenue for the period 1960 through 1974. This sustained profitability of the WSF has allowed the City of Highland Park to finance its Water and Sewer system entirely from retained earnings, as illustrated in Table CXLVI.

The 1974 Needs Survey indicates that Highland Park has total wastewater treatment needs of 3.760 million dollars in 1973 dollars. As Figure 38 indicates, retained earnings are not expected to grow at a sufficient rate to finance the facility needs indicated in the EPA survey. This conclusion is supported by trend analysis of WSF total operating income (Figure 37) which indicates that operating income is declining

¹²The City of Highland Park reported a deficit in its Waterworks Fund for 1973. This deficit was the result of a transfer of 125,000 dollars to the General Fund and not the result of actions directly related to the operating of the Waterworks Fund. A similar transfer of 100,000 dollars occurred in 1974, but did not produce a Waterworks Fund deficit. Since these transfers produce income statement effects which are not the direct result of water and sewer works operations, they have not been included in this analysis. Source: City of Highland Park, Waterworks Fund, Statement of Earnings, for fiscal years ending September 30, 1973, and September 30, 1974.

rather than growing. Therefore, it is reasonable to apply the four Alternative Conditions to Highland Park, since the city's WSF will be forced to seek external sources of financing to satisfy its 1990 facility needs.

As the pro forma income statements (Tables CIL, CLI, CLIII, and CLV) indicate, the combination of declining revenues and debt in the capital structure produce operating deficits for three of the four Alternative Conditions. The surplus reported for Alternative Condition IV (Table CLV), 75 per cent federal grant, is the result of a favorable ratio of total expenses to operating income. Table CXLVII indicates that during the period studied, the ratio of total expenses to operating income averaged 81.2 per cent. This favorable ratio was not sufficient to overcome the debt burden inherent in Alternative Conditions I, II, and III. The minimum deficit is associated with Alternative Condition II (Table CLI). The deficit is minimized because 35 per cent of total needs are financed from a non-debt source. Alternative III (Table CLIII), 100 per cent state grant, produces the largest deficit as a result of the financial strain caused by the principal and interest repayment provision of the grant program. While the local debt financing condition (Tables CIL and CL) produces a deficit created by the debt service burden, this deficit is not as large as that generated for the state grant condition.

City of McKinney, Texas

Table CLVII in Appendix O indicates that the McKinney Water and Sewer Fund has operated at a surplus of revenue over expenses in each fiscal year 1964 through 1974.¹³ The surpluses have ranged from 35,575 dollars to 225,551 dollars. In seven of the eleven fiscal years included in this study, the surplus has exceeded 100,000 dollars. As a result of this profitability, retained earnings have provided a significant portion of the total capital structure as demonstrated in Table CLVIII. For fiscal years 1964 through 1974, the proportion of retained earnings in the capital structure ranged from 43 per cent to 64 per cent. Revenue bonds have been the only form of long term debt employed by McKinney in financing its Water and Sewer Fund. During the base period, revenue bonds provided from 29 per cent to 42 per cent of the total capital structure. In each year, 1968 through 1974, the city has received a federal grant. These federal grants have ranged from 61,000 to 90,000 dollars in 1973 dollars.

Trend analysis of total operating income (Figure 39) indicates that the trend has a negative slope. As a result of declining revenue, surplus conditions of the period 1964 through 1974 are transformed into a deficit for each of the Alternative Conditions as presented in the pro forma income

¹³Financial data were not available for fiscal years 1960 through 1963. Personal interview with Robert M. Safford, October 10, 1975.

statements (Tables CLXI, CLXIII, CLXV, and CLXVII).¹⁴ Examination of the pro forma capital structures (Tables CLXII, CLXIV, CLXVI, and CLXVIII) reveals that the analysis indicates significant growth in the total capital value of McKinney.¹⁵

While facility needs of 5.9 million dollars, in constant dollars, contribute to the aggregate capital structure, the magnitude of debt associated with the expected growth of the capital structure produces debt service expenses of a magnitude sufficient to produce substantial operating deficits. In summary, the deficits for the McKinney WSF are the result of declining revenue and growth in debt commensurate with expected growth in the capital structure.

City of Terrell, Texas

Table CLXIX in Appendix P, summary income statement, indicates that for fiscal years 1961 through 1974 the Terrell Water and Sewer Fund has operated at a surplus for twelve of the fourteen years included in this study.¹⁶ The deficits

¹⁴Pro forma income statements for each Alternative Condition is based on trend analysis of total operating income (Figure 39), the historical relationship between income statement elements, and total operating income (Table CLIX), and the proportion and type of debt in each pro forma capital structure (Tables CLXII, CLXIV, CLXVI, and CLXVIII).

¹⁵Pro forma capital structures are based on trend analysis of reserve for bond retirement, the historical relationship between capital structure elements and reserve for bond retirement, and facility construction needs reported in the 1974 Needs Survey.

¹⁶The City of Terrell was unable to provide complete financial data for the fiscal year ending March 31, 1960. Letter from King M. Riley, Jr., Administrative Assistant, October 13, 1975.

occurred in 1973 and 1974 as a result of declining revenues. In terms of 1973 dollars, revenues for fiscal 1973 declined 1.1 per cent from 1972 levels and 18.1 per cent in 1974 from the 1973 level. The deficit in fiscal 1973 was accentuated because operating expenses increased 7 per cent from fiscal 1972. In fiscal years 1961 through 1972, the surplus had exceeded 75,000 dollars for nine of the fiscal years. The average surplus for the period 1961 through 1972 was 147,306 dollars in 1973 dollars.

The capital structure (Table CLXX) of the Terrell WSF has shown two phases of operation. The first phase, fiscal years 1961 through 1967, is characterized by a low level of debt financing. During this period non-debt sources provided an average of 74 per cent of the total capital structure.¹⁷ The second phase, fiscal 1968 through 1974, is characterized by a greater proportion, 40 per cent, of total capital being provided by revenue bonds.

Trend analysis of total operating income and equity are presented in Figures 41 and 42, respectively. The trends are an input to the generation of pro forma income and capital structure statements for each Alternative Condition. The other inputs to pro forma analysis are percent-of-sales information for income (Table CLXXI) and capital structure

¹⁷ Non-debt sources are: retained earnings, equity, federal grants, and reserves for bond retirement.

(Table CLXXII). The pro forma capital structure is also based on total wastewater treatment needs as reported in the 1974 Needs Survey. Thus, the pro forma capital structure presented in Tables CLXXIV, CLXXVI, CLXXVIII, and CLXXX represent distribution of financial means employed to finance normal growth in waste treatment capacity, plus the needs established by the EPA.

Pro forma analysis indicates that the Terrell WSF is expected to operate at a deficit under the Alternative Conditions which require debt financing and a surplus under the federal grant conditions. Deficits are generated for Alternative Conditions I and III (Tables CLXXIII and CLXXVII). Alternative I employs revenue bonds to finance the total needs of 4.930 million dollars in constant dollars. Since it is assumed that revenue bonds do not have a sinking fund requirement, Alternative I produces a smaller deficit than Alternative Condition III, state grants, which require sinking fund payments. Surplus conditions are present when a portion of total needs are financed by federal grants (Tables CLXXV and CLXXIX). Naturally, the largest surplus is associated with Alternative IV, 75 per cent federal grant.

City of Waxahachie, Texas

The City of Waxahachie was able to provide Water and Sewer Fund operating data for the period 1972 through 1974.¹⁸

¹⁸Complete financial statements for the WSF were not available for fiscal years 1960 through 1971. Personal interview with Ed Seegmiller, City Manager and Director of Finance, October 17, 1975.

Trend analysis of total operating income (Figure 43 in Appendix Q) indicates "negative" income for the target year of 1990. Since this negative forecast would produce misleading results in pro forma analysis, the City of Waxahachie is excluded from further analysis.

City of Denton, Texas

Income statements for the Denton Water and Sewer Fund (Table CLXXXI in Appendix R) indicate that the Fund has operated at a surplus, in 1975 dollars, for thirteen of the fifteen fiscal years studied. The deficits occurred in fiscal years 1966 and 1967. The deficits were the result of income increasing less rapidly than expenses. In each of the years that the WSF reported a surplus, this surplus exceeded 100,000 dollars. In the capital structure (Table CLXXXII) the most notable feature has been the relatively high proportion of equity in the capital structure. For the period 1960 through 1965, non-debt sources accounted for more than 50 per cent of the total capital structure. This balance changed in 1966, and for the period 1966 through 1974, revenue bonds averaged 56.7 per cent of the total capital structure. In fiscal 1974 revenue bonds contributed 64 per cent of total capital.

The 1974 Needs Survey shows that Denton has constant dollar waste treatment needs in 1990 of approximately 14.54 million dollars. This level of needs is more than two times as great as the value of the total capital structure in 1974.

As mentioned previously, the Denton WSF has relied heavily on non-debt sources in financing WSF operations. This policy has allowed the city to, at least partially, avoid some of the burden associated with debt financing. Pro forma analysis of financing requirements required by 1990 indicate that if debt is employed to finance facility needs then operating deficits can be expected. Pro forma income statements for Alternative Conditions I (Table CLXXXV) and Alternative Condition III (Table CLXXXVII) indicate deficits for these two conditions, both of which have debt or a proportion of total capital, in excess of 80 per cent (Tables CLXXXVI and CXC).¹⁹ Since facility needs a large proportion of the total capital structure, the financing of portions of the needs from non-debt sources allows the WSF to show an operating surplus. The capital structure for Alternative Condition II (Table CLXXXVIII), 35 per cent federal grant, consists of approximately 39 per cent non-debt sources. Since this proportion of non-debt financing tends more toward the historical relationship established in the base period, the WSF produces a smaller deficit (Table CLXXXVII) than for Alternative Conditions I and III. Alternative Condition IV produces an operating surplus (Table CXCI). This surplus can be attributed

¹⁹ Pro forma capital structures are based on trend analysis of equity (Figure 45), percent-of-sales information (Table CLXXXIV) and total facility needs. Pro forma income statements are based on trend analysis of total operating income (Figure 44), percent-of-sales information (Table CLXXXIII), and the proportion of debt in each pro forma capital structure statement.

to reduced bond interest payment associated with a capital structure (Table CXCII) which contains more than 65 per cent non-debt financing.

City of Haltom City, Texas

Table CXCIII in Appendix S presents summary income statements for the Haltom City Water and Sewer Fund for fiscal years 1965 through 1974.²⁰ Table CXCIII indicates that the profitability of the Fund has been highly variable over the ten years studied. For example, during each fiscal year 1965 through 1968, the Fund reported surpluses in excess of 100,000 dollars with the 1966 surplus totaling 328,796 dollars. Following this period of excellent profitability, the surplus dropped to two dollars in 1969, then increased to an amount in excess of 69,000 dollars in 1970. The variability is the result of highly fluctuating operating expenses. For example, operating expenses increased 75,282 dollars in fiscal 1969 over fiscal 1968 and then decreased 52,990 dollars in fiscal 1970.

The capital structure of the Haltom City WSF (Table CXCIV) is dominated by revenue bonds and retained earnings. For the period fiscal year 1965 through 1974, revenue bonds have provided over 50 per cent of total capital. The combination of retained earnings and revenue bonds have contributed more than 75 per cent of the total capital structure for the period studied.

²⁰Financial data for fiscal years 1960 through 1964 were not available. Personal interview with June Huff, Director of Finance, October 17, 1975.

The 1974 Needs Survey shows that Haltom City has constant dollar waste treatment facility needs for 1990 of 8.203 million dollars. This level of needs is approximately 1.15 times the unadjusted capital structure for 1990.²¹ The financing of needs with debt funds, as in Alternative Conditions I and III, significantly increases the proportion and magnitude of debt employed in the capital structure. Table CXCVIII, capital structure for Alternative Condition I, indicates that revenue bonds constitute approximately 83 per cent of the total capital structure. The proportion of debt for Alternative III (Table CCII) is also 83 per cent; however, the majority of this debt is in the form of a state grant. These high debt levels produce deficits in the pro forma income statements for Alternatives I and III (Tables CXCVII and CCI).²² The deficit for Alternative Condition III is greater than that for Alternative I because of the sinking fund requirement of state grants.

The proportion of debt financing is sufficiently reduced in Alternative Conditions II and IV (Tables CC and CCIV)

²¹The unadjusted capital structure is that capital structure which would exist in 1990 without the addition of facility needs. The unadjusted capital structure is based on trend analysis of revenue bonds (Figure 47) and the relationship between capital structure elements and revenue bonds as reported in Table CXCVI.

²²Pro forma income statements for each Alternative Condition are based on trend analysis of total operating income (Figure 46), percent-of-sales information (Table CXCIV), and the proportion of debt in each capital structure.

generating operating surplus (Tables CIC and CCIII). The 35 per cent federal grant associated with Alternative Condition II produces a debt to total capital ratio of approximately 65 per cent. The surplus for Alternative Condition IV (Table CCIV) is greater than that for Alternative Condition II because the 75 per cent federal grant provision reduces the debt ratio to approximately 44 per cent.

City of Richardson, Texas

The availability of limited financial data for the Richardson Water and Sewer Fund has resulted in two base periods being utilized for this study.²³ The first base period for analysis is fiscal 1965 through 1967. In each of these fiscal years, the Richardson WSF operated at a deficit of expenses over revenues, as indicated in Table CCV in Appendix T. The deficits for this period average 93,246 dollars and ranged from 36,587 dollars to 137,000 dollars. Three items are prominent in the capital structure (Table CCVI) for the first base period: revenue bonds, contributions, and retained earnings. These elements contributed to the total capital structure in the following average proportions: revenue bonds--52 per cent, contributions--25 per cent, and retained earnings--17 per cent.

²³Financial data were not available for fiscal years 1960 through 1964 and 1968 through 1971. Personal interview with Mrs. Faye Stephens, Director of Finance and Accounting, October 15, 1975.

In the second base period, fiscal 1972 through fiscal 1974, the Fund was operated at a surplus in 1972 and 1974 and at a deficit in 1973. Table CCV indicates that the deficit in 1973 was the result of revenues decreasing from the previous period and total expenses increasing. The capital structure for the second base period (Table CCVI) is significantly different from that of the first base period. In the first base period, the predominant position of the capital structure was debt, contributions, and retained earnings; in the second base period, the predominant elements are equity and revenue bonds. Equity provided an average of 5,904,000 dollars or 43 per cent of the average capital structure of 13,518,000 dollars. Revenue bonds provided an average 5,665,000 dollars or 42 per cent of the average total capital structure.

Trend analysis of operating income for the second period (Figure 48) indicates that the projected operating income for 1990 is negative. Since this negative value would produce misleading results in pro forma analysis, the second base period has been excluded from consideration in the determination of findings for this study.

Trend analysis for the period 1965 through 1967 (Figure 49) indicates that 1990 operating income is expected to exceed 7.1 million dollars in constant dollars. Applying this trend and the percent-of-sales information in Tables CCVII and CCVIII to the financing of the Richardson waste treatment needs of 7.769 million dollars, operating deficits are produced for

Alternative Conditions I and II (Tables CCIX and CCXIII). These deficits are the result of the incremental debt service burdens associated with local revenue bonds and state grant financing. In Alternative Conditions II and IV, the proportion of debt in the capital structures (Tables CCXII and CCXVI) is reduced by federal grants to a level sufficient for operating revenues to overcome the debt burden. Thus, pro forma income statements for Alternative Conditions II and IV (Tables CCXI and CCXV) indicate operating surpluses.²⁴

City of Arlington, Texas

Summary income statements (Table CCXVII in Appendix U) for the Arlington Water and Sewer Fund indicate that the Fund has operated at a substantial surplus for the fifteen years 1960 through 1974. The surplus has ranged from 183,391 dollars recorded in 1962 to 1,119,954 dollars in 1974. The capital structure (Table CCXVIII) has increased from 20.75 million dollars in 1960 to 34.73 million dollars in 1974. A significant portion of this capital structure has been in the form of equity contributed by the City of Arlington. At no time during the fifteen years studies has the equity portion been below 5.7 million dollars. As a result of a high level of equity and other non-debt sources, the long term debt portion of the capital structure has averaged less than 45 per cent of the total capital structure.

²⁴Pro forma capital structures are based on trend analysis of total contributions (Figure 50). Pro forma capital structures are presented in Tables CCX, CCXII, CCXIV, and CCXVI.

Pro forma income analysis indicates that the profitability of the Arlington WSF will be maintained for each of the four Alternative Conditions (Tables CCXXI, CCXXIII, CCXXV, and CCXXVII).²⁵ This expected profitability is the result of the combination of three factors: (1) Small level of needs (4.581 million dollars in constant dollars) relative to population served of 60,000 persons.²⁶ (2) This relatively small amount of needs allows the City of Arlington to continue a financial policy which has favored non-debt sources of financing, thus minimizing debt service expenses. (3) Growth in operating revenue and low level of needs allow the WSF to accumulate sufficient resources to generate a surplus under even the most demanding needs financing scheme, Alternative Condition III--100 per cent state grant.²⁷

City of Grand Prairie, Texas

Table CCXXIX in Appendix V, summary income statement for Grand Prairie, indicates that, similar to Arlington, the

²⁵Pro forma income statements are based on trend analysis of total operating income (Figure 51), percent-of-sales information in Table CCXIX, and debt in the pro forma capital structures for each Alternative Condition (Tables CCXXII, CCXXIV, CCXXVI, and CCXXVIII).

²⁶U. S. Environmental Protection Agency, 1968 Inventory Municipal Waste Facilities, Vol. 6 (Washington, 1968), 10 vol., p. 82.

²⁷Pro forma capital structure statements (Tables CCXXII, CCXXIV, CCXXVI, and CCXXVIII) are based on trend analysis of equity (Figure 52), percent-of-sales information (Table CCXX), and facility construction needs reported by the EPA in the 1974 Needs Survey.

Grand Prairie Water and Sewer Fund has operated at a significant surplus for the period 1966 through 1974.²⁸ The ratio of surplus to total income has averaged over 25 per cent for the period studied. The capital structure (Table CCXXX) is dominated by two elements--equity and revenue bonds. For the period 1966 through 1970 equity provided more than 50 per cent of the total capital structure. During this same period, revenue bonds provided an average of approximately 30 per cent of the total capital structure. For the period 1971 through 1974, revenue bonds and equity were approximately equal in amount; however, non-debt sources provided more than 60 per cent of the total capital structure.

Unlike Arlington, Grand Prairie has a high level of needs (25.559 million dollars) reported in the 1974 Needs Survey. If the majority of these facility construction needs are financed by debt, as in Alternative Conditions I, II, and III, the heretofore surplus conditions are replaced by deficits in the pro forma income analysis (Tables CCXXXIII, CCXXXV, and CCXXXVII).²⁹ Alternatives I and III provide for financing

²⁸Financial data were not available for fiscal years 1960 through 1965. Personal interview with Glenn Harriss, Director of Finance, October 23, 1975.

²⁹Pro forma income statements for each Alternative Condition are based on trend analysis of total operating income (Figure 53), percent-of-sales information (Table CCXXXI), and the proportion of debt financing in each pro forma capital structure (Tables CCXXXIV, CCXXXVI, CCXXXVIII, and CCXL).

total needs entirely from debt sources, revenue bonds, and state grants, respectively. These conditions place the proportion of debt in the pro forma capital structure at more than 55 per cent.³⁰ These levels of debt financing create a significant financial burden in the form of debt service expenses, consequently creating operating deficits. The problem of debt service caused deficits is accentuated in Alternative Condition III (Table CCXXXVII) since the state grant includes sinking fund requirements. Even though Alternative Condition II provides for 35 per cent of needs to be financed from a federal grant (Table CCXXXVI), the level of local debt needed to finance the remaining 65 per cent of needs to create a deficit, as illustrated in Table CCXXXV. When 75 per cent of total needs are financed by a federal grant, Alternative Condition IV, the proportion of debt in the capital structure (Table CCXL) is reduced enough to allow the Grand Prairie WSF to operate at a surplus as Table CCXXXIX demonstrates.

City of Mesquite, Texas

Following the pattern established by other cities in its population class, Mesquite has operated its Water and Sewer

³⁰Pro forma capital structure for each Alternative Condition are based on trend analysis of retained earnings (Figure 54), percent-of-sales information in Table CCXXXII, and total facilities construction needs.

Fund at a surplus in each fiscal year 1960 through 1974.³¹ Table CCXLI in Appendix W indicates that the Mesquite WSF has operated at a surplus averaging 296,000 dollars. Even though the Fund operated at a surplus in each year studied, the capital structure (Table CCXLII) indicates that retained earnings were negative for each year 1960 through 1962. Long term debt, primarily revenue bonds, has been the principal source of capital for the Mesquite WSF. The proportion of long term debt in the capital structure has declined from 96 per cent in 1960 to 47 per cent in 1974. Increases in contributions, federal grants, and retained earnings account for the declining proportion of debt in the capital structure.

Mesquite will not fare as well as other cities in its population class in as much as pro forma analysis indicates that the Mesquite WSF operates at a deficit under each of the Alternative Conditions. These operating deficits reported in Tables CCXLV, CCXLVII, CCIL, and CCLI are produced by the following factors: (1) The construction needs reported in the 1974 Needs Survey are relatively high--17.815 million dollars in constant dollars. (2) A high proportion of debt in the capital structure.³² For example, based on capital

³¹Mesquite, Arlington, and Grand Prairie are in the population class 50,000 to 99,999. See Table IX for city groupings according to population class.

³²Pro forma income statements for each Alternative Condition are based on trend analysis of total operating income (Figure 55), the average ratios of income statement elements to total operating income (Table CCXLIII), and the proportion of debt in each pro forma capital structure (Tables CCXLVI, CCXLVIII, CCL, and CCLII).

structure forecasts for the WSF, the Fund will have over 77 million dollars, in constant dollars, of revenue bonds outstanding, not including those required to finance facility needs.³³ This financial policy which has favored debt over non-debt sources produces a capital structure which contains debt of such magnitude that financing 75 per cent of total needs (Alternative Condition IV) with a federal grant is not sufficient to reduce debt to a level which produces an operating surplus.

City of Dallas, Texas

The Dallas Water and Sewer Fund serves the largest sewerred population included in this study--serving over one million persons.³⁴ During the period 1962 through 1974, the Dallas WSF sustained a high level of profitability with surplus to total operating income ratios ranging from 26.3 per cent to 46.4 per cent as indicated in Table CCLIII in Appendix X. In four of the thirteen years, the ratio exceeded 40 per cent and was below 30 per cent only twice.

The capital structure (Table CCLIV) of the Dallas WSF reflects the large population served by the system. The

³³Pro forma capital structures for each Alternative Condition are based on trend analysis of total contributions (Figure 56), percent-of-sales information (Table CCXLIV), and total needs. Pro forma capital structures are presented in Tables CCXLVI, CCXLVIII, CCL, and CCLII.

³⁴U. S. Environmental Protection Agency, 1968 Inventory Municipal Waste Facilities, Vol. 6 (Washington, 1968), 10 vols., pp. 93-94.

average value of the capital structure for the Dallas WSF exceeded 350 million dollars during the period studied. On the average, long term debt has provided less than 45 per cent of the total capital structure. The remainder of the capital structure has been composed principally of equity, reserves for bond retirement, and retained earnings.

In as much as the Dallas Water Utility is the largest included in this study, it has the largest level of needs of the cities studied--117.166 million dollars in constant dollars. The Dallas WSF has historically had a large and well balanced capital structure as Table CCLIV illustrates. This balance has traditionally kept debt service expenses at a manageable level. The incremental capital represented by the needs is not sufficiently large to force debt to a level that generates debt service expenses that produces deficits in pro forma analysis. In the pro forma capital structures (Tables CCLVIII, CCLX, CCLXII, and CCLXIV) only those associated with Alternative Conditions I and III (Tables CCLVIII and CCLXII, respectively) exhibit debt proportions in excess of 50 per cent. The inclusion of federal grants in Alternative Conditions II and IV (Tables CCLX and CCLXIV, respectively) produce debt proportions which are similar to the historical relationship of approximately 45 per cent.³⁵

³⁵Pro forma capital structures for each Alternative Condition are based on trend analysis of retained earnings (Figure 58), ratio analysis of the relationship between capital structure elements and retained earnings (Table CCLVI), and total facility needs.

These well balanced capital structures contribute to the generation of an operating surplus in the pro forma income statements for each Alternative Condition (Tables CCLVII, CCLIX, CCLXI, and CCLXIII).³⁶

City of Fort Worth, Texas

The summary income statement (Table CCLXV in Appendix Y) indicates that the Fort Worth WSF has operated at a surplus for fiscal years 1960 through 1974. The ratio of surplus to total income has exceeded 30 per cent on the average during the period studied. The predominate feature in the Fort Worth WSF capital structure (Table CCLXVI) is long term debt. Since 1960 long term debt has contributed approximately 50 per cent of total capital.

According to the pro forma income statements (Tables CCLXIX, CCLXXI, CCLXXIII, and CCLXXV), the long-lived operating surpluses will be eliminated by the financing requirement of facility needs totaling 69.307 million dollars in constant dollars.³⁷ While the size of the deficits are influenced by the needs, the deficits are primarily the result of the

³⁶Pro forma income statements are based on trend analysis of total operating income (Figure 57), percent-of-sales information (Table CCLV), and the proportion and type of debt in each pro forma capital structure.

³⁷Pro forma income statements for each Alternative Condition are based on trend analysis of total operating income (Figure 59), percent-of-sales information (Table CCLXVII), and the proportion and type of debt in the pro forma capital structures (Tables CCLXX, CCLXXII, CCLXXIV, and CCLXXVI).

expectation of slow growth in operating revenues. Pro forma income statements indicate that operating revenue has increased insufficiently to compensate for the level of debt in the expected capital structures. Pro forma capital structure for each Alternative Condition (Tables CCLXX, CCLXXII, CCLXXIV, and CCLXXVI) reveal that the constant dollar value of the WSF capital structure exceeds 990 million dollars.³⁸ Even though the proportion of debt in the pro forma capital structure is no greater than the proportion in the summary (Table CCLXVI), the magnitude of debt creates debt service expenses which are not adequately compensated for in the growth of operating revenue. Consequently, operating deficits are reported for each of the Alternative Conditions.

³⁸Pro forma capital structure for each Alternative Condition is based on trend analysis of equity (Figure 60), the historical relationship between capital structure elements and equity (Table CCLXVIII), and the total facility construction needs.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The financial problems of municipalities are receiving increased public attention, as recent media coverage of New York's fiscal problems demonstrates. These financial problems are the result of many factors including: (1) increasing service demands by urban dwellers, (2) increasing taxpayer resistance to paying for services rendered by local governments, and (3) increasing federal regulation of municipal services. The maintenance of adequate and safe supplies of clean water is identified as a necessary local government service. An integral element in providing this service is the operation of wastewater treatment facilities.

Many municipal officials report that widening gap is developing between operating revenues and costs of providing water and sewer services. Contributing to the widening of this gap is consumer resistance to increases in service charges, special assessments, and taxes which have traditionally provided Water and Sewer Fund operating revenues. The differential between water and sewer revenues and costs is also influenced by federal legislation which has placed stringent and costly sewage treatment requirements on municipalities.

In the seventy-six years since the passage of the first water pollution control legislation, the Refuse Act of 1899, the role of the federal government in water pollution abatement has changed from passive to active. Major elements of this active federal role which contribute to the costliness of wastewater treatment are: (1) the establishment and enforcement of water quality criteria, (2) effluent discharge permit programs, and (3) actionable national water quality objectives.

The cost of providing municipal sewage treatment is greatly influenced by the waste treatment technology, implicitly required by law, which is employed by a municipality. The "zero discharge" requirement of the Water Pollution Control Act Amendments of 1972 (PL 92-500) forces cities to utilize tertiary or advanced waste treatment technology which is the most expensive technology. For example, some experts have estimated it will cost over 4.5 times as much to achieve "zero discharge" as it did to achieve the level of treatment required before the passage of PL 92-500.¹

To aid municipalities in providing the level of treatment required by the 1972 Act Amendments, the federal government has established a financial assistance program. The construction grants program established by PL 92-500 is designed to provide municipalities with grants amounting to 75 per cent

¹Secondary treatment, removing approximately 50 per cent of pollution load, is generally accepted as being the degree of treatment required prior to the passage of PL 92-500.

of the cost of constructing waste treatment plants. However, many municipal leaders have complained of a "funding gap" in that the Congress does not appropriate sufficient amounts of money to fully fund the construction grants program. Thus, many municipalities find that they are parties to a conundrum-- the implementation of wastewater treatment requirements for which they do not have available sufficient local, state, or federal financial resources.

The purpose of this study is to determine the effects of water pollution control on financing municipal water pollution control facilities in selected cities in North Central Texas. This objective is accomplished by addressing the following topics: (1) the cost to municipalities of meeting federally mandated water pollution control, (2) the sources of funds for financing sewage treatment, and (3) the financial implications of employing these financing tools to satisfy water quality regulations. For the purposes of this study the cost of wastewater treatment is limited to those identified in the 1974 Needs Survey which was conducted jointly by the Texas Water Quality Board (TWQB) and the U. S. Environmental Protection Agency (EPA).² The sources of funds for financing water pollution control is limited to four Alternative Wastewater Facility Financing Conditions:

²U. S. Environmental Protection Agency, Cost Estimates for Construction of Publicly-Owned Waste Treatment Facilities--1974 "Needs Survey" (Washington, 1975).

1. The total waste treatment needs of a city are financed through the sale of water and sewer revenue bonds.

2. Treatment needs are financed from a federal construction grant amounting to 35 per cent of the cost of needs; the remaining 65 per cent of needs are generated through the sale of revenue bonds.

3. The municipality finances its needs by receiving a state grant in the amount of 100 per cent of total waste treatment needs.³

4. Seventy-five per cent of a municipality's needs are provided from a federal grant; the remaining 25 per cent is financed through the sale of revenue bonds.⁴

The implications of employing these financing alternatives were determined by the analysis of data collected from a survey of twenty-six cities in the Dallas and Fort Worth Standard Metropolitan Statistical Areas (SMSA's). The data collected consisted of income, expenses, and capital structure information for the Water and Sewer Fund of each city. Analysis of the collected data was undertaken in three stages. Stage I involved the conversion of financial data to standard income and capital structure statement formats and the conversion of all dollar values to June 1973 dollars. Constant dollar

³State grants are loans which currently bear 5.625 per cent simple interest and are repaid over a thirty-year period.

⁴Interest expense for revenue bonds is computed as 4.5 per cent of value of bonds outstanding.

conversion was based on the EPA's Sewage Construction Cost Index. In Stage II, trends were established for forecasting water and sewer operating income and capital structure for the year 1990. Stage III consisted of developing pro forma income and capital structure statements for each city and each Alternative Financing Condition based on the trend analysis of income and capital structure and the needs reported by the 1974 Needs Survey. A summary of the pro forma analysis is presented in Table XVI, indicating operating surplus or deficit positions for each city under each of the four Alternative Financing Conditions.

TABLE XVI

WATER AND SEWER OPERATING POSITIONS FOR SELECTED
CITIES IN NORTH CENTRAL TEXAS UNDER FOUR
ALTERNATIVE FINANCING CONDITIONS

City	Alternative Financing Condition*			
	I	II	III	IV
Arlington	S**	S	S	S
Bedford	D***	D	D	D
Carrollton	S	S	S	S
Cleburne	D	D	D	D
Dallas	S	S	S	S
Denton	D	S	D	S
DeSoto	D	S	D	S
Duncanville	S	S	S	S
Ennis	D	D	D	D

TABLE XVI--Continued

City	Alternative Financing Condition*			
	I	II	III	IV
Forest Hill	D	D	D	D
Fort Worth	D	D	D	D
Grand Prairie	D	D	D	S
Grapevine	D	D	D	S
Haltom City	D	S	D	S
Highland Park	D	D	D	S
Lewisville	S	S	S	S
McKinney	D	D	D	D
Mesquite	D	D	D	D
Richardson	D	S	D	S
Richland Hills	S	S	D	S
Terrell	D	S	D	S

*I = 100 per cent revenue bonds; II = 35 per cent federal grant, 65 per cent revenue bonds; III = 100 per cent state grant; IV = 75 per cent federal grant, 25 per cent revenue bonds.

**S = operating surplus

***D = operating deficit

Operating position by population class is presented in Table XVII. From this table the relative effect of the federal grant program can be determined. Five of the cities for which a deficit is reported when financing is accomplished with revenue bonds (Alternative Condition I) show surplus conditions for the 35 per cent federal grant condition (Alternative

Condition II), and three more changes to surplus positions under the 75 per cent federal grant condition (Alternative Condition IV). As Table XVII indicates, the Alternative

TABLE XVII

WATER AND SEWER FUND OPERATING POSITIONS FOR SELECTED
CITIES IN NORTH CENTRAL TEXAS BY ALTERNATIVE
FINANCING CONDITIONS AND POPULATION CLASS

Population Class	Alternative Condition*							
	I		II		III		IV	
	D**	S***	D	S	D	S	D	S
5,000-9,999	3	2	2	3	4	1	1	4
10,000-24,999	6	2	5	3	6	2	4	4
25,000-49,999	3	0	0	3	3	0	0	3
50,000-99,999	2	1	2	1	2	1	1	2
More than 300,000	1	1	1	1	1	1	1	1
Total	15	6	10	11	16	5	7	14

*I = 100 per cent revenue bonds; II = 35 per cent federal grant, 65 per cent revenue bonds; III = 100 per cent state grant; IV = 75 per cent federal grant, 25 per cent revenue bonds.

**S = operating surplus

***D = operating deficit

Financing Condition with the most adverse effect on municipal operating position is Alternative Condition III, state grant financing of needs. Compared to Alternative Condition III, Alternative II produces six fewer deficit positions and Alternative IV produces nine fewer.

The impact of the magnitude of waste treatment needs on Water and Sewer Fund operating position is presented in Table XVIII. The median level of needs is 5.091 million dollars in

TABLE XVIII

WATER AND SEWER FUND OPERATING POSITIONS FOR SELECTED
CITIES IN NORTH CENTRAL TEXAS BY ASCENDING
ORDER OF WASTE TREATMENT NEEDS

City	Total Needs	Alternative Condition*			
		I	II	III	IV
Forest Hill	585	D**	D	D	D
Carrollton	1,708	S***	S	S	S
Bedford	1,900	D	D	D	D
Richland Hills	2,018	S	S	D	S
DeSoto	3,040	D	S	D	S
Grapevine	3,690	D	D	D	S
Highland Park	3,760	D	D	D	S
Arlington	4,581	S	S	S	S
Terrell	4,930	D	S	D	S
Lewisville	5,676	S	S	S	S
McKinney	5,901	D	D	D	D
Duncanville	6,389	S	S	S	S
Ennis	6,495	D	D	D	D
Richardson	7,679	D	S	D	S
Haltom City	8,203	D	S	D	S
Cleburne	9,602	D	D	D	D
Denton	14,552	D	S	D	S
Mesquite	17,815	D	D	D	D
Grand Prairie	25,559	D	D	D	S
Fort Worth	69,307	D	D	D	D
Dallas	117,166	S	S	S	S

*I = 100 per cent revenue bonds; II = 35 per cent federal grant, 65 per cent revenue bonds; III = 100 per cent state grant; IV = 75 per cent federal grant, 25 per cent revenue bonds.

**S = operating surplus

***D = operating deficit

1973 dollars for the City of McKinney. For Alternative Condition I six cities with needs less than the median operate at deficits while eight above the median level show operating deficits. Four cities below and five above the median needs level demonstrate operating deficits for Alternative Condition II. Alternative Condition III shows seven deficits for cities with need levels less than the median and eight deficits for cities with needs above the median value. For Alternative IV, 75 per cent federal grant financing of needs, two of the ten cities with needs below the median operate at a deficit, and four of the ten above the median operate at a deficit. Not only is the magnitude of needs important, but also the relationship of needs to total capitalization is important for decision making. Table XIX presents the relationship between waste treatment facility needs and expected Water and Sewer Fund capitalization in 1990. Table XX summarizes operating positions relative to the needs proportion in the capital structure of each city. This table indicates that deficits are present even for municipalities with small proportions of needs in their capital structures. Implicit in this finding is that debt other than that incurred to finance needs contributes to operating deficits. This finding is reinforced by noting that the five cities with needs proportions of less than 20 per cent show operating deficits for all four Alternative Conditions.

TABLE XIX

WASTE TREATMENT FACILITY NEEDS AS A PER CENT OF
1990 WATER AND SEWER FUND CAPITAL STRUCTURE

Popu- lation Class	City	Total Needs*	Needs as a Per Cent of Capital Structure
5,000- 9,999	Forest Hill	585	3.6
	Richland Hills	2,018	78.8
	DeSoto	3,050	29.4
	Grapevine	3,690	46.1
	Lewisville	5,676	37.7
10,000- 24,999	Carrollton	1,708	40.6
	Bedford	1,900	1.5
	Highland Park	3,760	91.0
	Terrell	4,930	29.1
	McKinney	5,901	19.0
	Duncanville	6,389	40.6
	Ennis	6,495	61.9
Cleburne	9,602	61.9	
25,000- 49,999	Richardson	7,679	27.8
	Haltom City	8,203	53.4
	Denton	14,552	67.6
50,000- 99,999	Arlington	4,581	34.0
	Mesquite	17,815	12.5
	Grand Prairie	25,559	33.3
More than 300,000	Fort Worth	69,307	7.0
	Dallas	117,166	26.5

*Thousands of 1973 dollars

TABLE XX
RELATIONSHIP BETWEEN RATIO OF NEEDS TO TOTAL CAPITAL
STRUCTURE AND EXPECTED OPERATING POSITION

Needs as a Per Cent of Total Capital Structure	Alternative Financing Condition*							
	I		II		III		IV	
	D**	S***	D	S	D	S	D	S
0.0 - 9.99	3	0	3	0	3	0	3	0
10.0 - 19.99	2	0	2	0	2	0	2	0
20.0 - 29.99	3	1	0	4	3	1	0	4
30.0 - 39.99	1	2	1	2	1	2	0	3
40.0 - 49.99	1	2	1	2	1	2	0	3
50.0 - 59.99	1	0	0	1	1	0	0	1
60.0 - 69.99	3	0	3	0	3	0	2	1
70.0 - 79.99	1	0	1	0	1	0	1	0
80.0 - 89.99	0	0	0	0	0	0	0	0
90.0 - 99.99	1	0	1	0	1	0	0	1

*I = 100 per cent revenue bonds; II = 35 per cent federal grant, 65 per cent revenue bonds; III = 100 per cent state grant; IV = 75 per cent federal grant, 25 per cent revenue bonds.

**S = operating surplus

***D = operating deficit

Since municipalities are required by law to provide sewage treatment, those cities with expected Water and Sewer Fund operating deficits can not simply eliminate sewage treatment because it is not a profitable operation. Continued deficits could result in bankruptcy and subsequent financial difficulties for all city departments. Thus, municipalities

with deficits must undertake efforts to eliminate these deficits. An obvious means of accomplishing this end is to increase operating revenues. Tables XXI through XXIV present the ratio of deficits to total operating income for cities

TABLE XXI

EXPECTED OPERATING DEFICITS AS A PER CENT OF INCOME
FROM OPERATIONS FOR CITIES REPORTING DEFICITS UNDER
ALTERNATIVE CONDITION I, REVENUE BOND FINANCING

Popu- lation Class	City	Total Needs*	Deficit as a Per Cent of Operating Income
5,000- 9,999	Forest Hill	585	43.7
	DeSoto	3,050	6.2
	Grapevine	3,690	24.3
10,000- 24,999	Bedford	1,900	560.1
	Highland Park	3,760	20.4
	Terrell	4,930	3.6
	McKinney	5,901	84.5
	Ennis	6,495	393.9
	Cleburne	9,602	39.6
25,000- 49,999	Richardson	7,679	0.3
	Haltom City	8,203	4.9
	Denton	14,552	13.2
50,000- 99,999	Mesquite	17,815	100.4
	Grand Prairie	25,559	28.5
More than 300,000	Fort Worth	69,307	39.3

*Thousands of 1973 dollars

with operating deficits under each Alternative Condition. This ratio indicates the amount by which 1990 operating revenues would need to increase in order to eliminate the

deficits. It should be noted that these percentage increases are in terms of constant dollars and do not reflect increases that may be required to eliminate the effects of inflation.

TABLE XXII

EXPECTED OPERATING DEFICITS AS A PER CENT OF INCOME FROM OPERATIONS FOR CITIES REPORTING DEFICITS UNDER ALTERNATIVE CONDITION II, 35 PER CENT FEDERAL GRANT

Population Class	City	Total Needs*	Deficit as a Per Cent of Operating Income
5,000-9,999	Forest Hill	585	42.1
	Grapevine	3,690	11.8
10,000-24,999	Bedford	1,900	557.2
	Highland Park	3,760	4.8
	McKinney	5,901	68.6
	Ennis	6,495	283.5
	Cleburne	9,602	21.5
25,000-49,999	Denton	14,552	2.4
50,000-99,999	Mesquite	17,815	91.7
	Grand Prairie	25,559	12.9
More than 300,000	Fort Worth	69,307	34.0

*Thousands of 1973 dollars

The ratios of expected deficit to operating income exhibited a wide range of values. For some cities the ratio was quite small, for example, 0.3 per cent for Richardson under Alternative Condition I. However, for some other cities the ratio was substantial; for example, 571.6 per cent for Bedford under Alternative Condition III. The ratio for Bedford

exceeded 550 per cent for each of the Alternative Conditions and is primarily responsible for cities in the population class 10,000 through 24,999 exhibiting above average deficit

TABLE XXIII

EXPECTED OPERATING DEFICITS AS A PER CENT OF INCOME FROM OPERATIONS FOR CITIES REPORTING DEFICITS UNDER ALTERNATIVE CONDITION III, STATE GRANT FINANCING

Population Class	City	Total Needs*	Deficit as a Per Cent of Operating Income
5,000-9,999	Forest Hill	585	48.0
	Richland Hills	2,018	16.4
	DeSoto	3,050	24.9
	Grapevine	3,690	59.6
10,000-24,999	Bedford	1,900	571.6
	Highland Park	3,760	64.4
	Terrell	4,930	23.3
	McKinney	5,901	129.4
	Ennis	6,495	706.3
	Cleburne	9,602	90.9
25,000-49,999	Richardson	7,679	5.1
	Haltom City	8,203	28.0
	Denton	14,552	43.7
50,000-99,999	Mesquite	17,815	125.2
	Grand Prairie	25,559	72.4
More than 300,000	Fort Worth	69,307	54.3

*Thousands of 1973 dollars

to income ratios. Ratios reported for cities in the 25,000 through 49,999 population group were consistently smaller than those for cities in other population classes. The deficit

to income ratios for Alternative Condition III were generally larger than those for the other Alternative Conditions. This

TABLE XXIV

EXPECTED OPERATING DEFICITS AS A PER CENT OF INCOME FROM OPERATIONS FOR CITIES REPORTING DEFICITS UNDER ALTERNATIVE CONDITION IV, 75 PER CENT FEDERAL GRANT

Popu- lation Class	City	Total Needs*	Deficit as a Per Cent of Operating Income
5,000- 9,999	Forest Hill	585	40.3
10,000- 24,999	Bedford	1,900	552.9
	McKinney	5,901	----
	Ennis	6,495	157.4
	Cleburne	9,602	0.7
25,000- 49,999	none	-----	----
50,000- 99,999	Mesquite	17,815	81.7
More than 300,000	Fort Worth	69,307	28.0

*Thousands of 1973 dollars

differential was caused by the principle repayment requirements of the state grant program. State grant principle repayments resulted in a ballooning of "bond interest and fee" payments and a commensurate expansion of operating deficits.

Conclusions

The conclusions presented in this report are developed from the analysis of data collected from a survey of twenty-one municipalities with populations of 5,000 or more persons in the Dallas and Fort Worth Standard Metropolitan Statistical Areas. While similarities may exist between the cities surveyed and cities in other geographical areas, the following conclusions pertain only to cities in the Dallas and Fort Worth SMSA's.

1. The financing of the wastewater treatment requirements of the Water Pollution Control Act Amendments of 1972 will cause many municipal Water and Sewer Funds to report operating deficits in 1990. Table XVII indicates that no fewer than seven of the municipalities surveyed will have operating deficits in 1990 as a result of financing wastewater treatment needs. However, this lower bound of seven will be reached only if the federal construction grant program is funded at the rate of 75 per cent of total needs for each city. Local debt financing of needs will cause fifteen cities to report Water and Sewer Fund deficits. Since the sale of revenue bonds is not a viable alternative to some cities and the receipt of federal grants is uncertain, the only financing option available to many cities is the state grant program. Participation in the state grant program by all cities will result in sixteen or 76 per cent of the cities operating in a deficit position. A federal grant program funded at its

historical average rate of 35 per cent of municipal waste treatment needs will result in ten or approximately one-half of the cities showing operating deficits in their Water and Sewer Fund.

2. A federal grant program funded at the rate of 75 per cent of waste treatment needs will prevent operating deficits in the majority of cities in which 1990 waste treatment needs constitute 20 per cent or more of the expected Water and Sewer Fund capital structure. Table XX indicates that of the sixteen cities with needs to total capital ratios of 20 per cent or more, thirteen will have operating surpluses if they receive a 75 per cent federal grant. If these cities finance needs through the sale of revenue bonds, eleven of the sixteen would show operating deficits.

3. A federal grant program funded at the average rate of 35 per cent of needs will benefit only a small number of cities. Table XX indicates that of the sixteen cities which will report deficits under local revenue bond financing only four would change to an operating surplus utilizing a 35 per cent federal grant.

4. The federal construction grant program does not improve the operating position of cities in which needs are less than 20 per cent of the total expected capital structure. All five cities with less than 20 per cent of needs in their capital structure will report operating deficits even in the

event that they receive a federal grant in the amount of 75 per cent of total needs.

5. The state grant program shows the greatest incidence of producing municipal Water and Sewer Fund operating deficits. Sixteen of the twenty-one cities will show deficits for the Alternative Condition of financing waste treatment needs from a state grant. The majority of the adverse effects of the program fall on cities with populations of fewer than 50,000 persons. Of the sixteen cities with populations of fewer than 50,000, thirteen indicate operating deficits as Table XVII shows. This proportion of 81 per cent deficits is much higher than for those cities with populations in excess of 49,999 persons. The proportion of deficit cities in the latter population class is 60 per cent. However, under the existing priority system for awarding federal grants, cities with large populations receive preference for federal grants and would not be as likely to seek funds from the state grant program as smaller cities.

6. In order to eliminate operating deficits cities will need to increase Water and Sewer Fund income by varying amounts. As Tables XXI through XXIV indicate, the amount of increase varies from a low of 0.3 per cent to a high of 571.6 per cent. Smaller cities (fewer than 25,000 persons) seem to show requirements for higher rates of income increase than larger cities. For example, Table XXI shows that the average deficit

to income ratio for cities with fewer than 25,000 persons is 130.7 per cent, while the ratio is 31.1 per cent for cities with populations above this level.

Recommendations

This study makes the following recommendations regarding water pollution control legislation, financial assistance programs, municipal Water and Sewer Fund financial policies, and further research.

Policy Recommendations

1. The Federal Water Pollution Control Act should be amended to allow the Administrator of the Environmental Protection Agency to grant municipalities flexibility in satisfying the waste treatment requirements of the Act. Such flexibility should be provided on a case-by-case basis and be dependent upon the financing capacity of a municipality's sewer utility.

2. The formula for determining the priority of awarding federal grants to municipalities should be modified to include municipal financial capacity as well as total needs and population.

3. The state grant system for the State of Texas should be, at the minimum, modified such that repayment requirements are similar to those of revenue bonds. This would provide short term relief to the financial burden generated by strict water quality regulations.

4. Municipalities should strive to achieve a balance of debt and non-debt sources in financing Water and Sewer Fund operations.

5. Municipalities should periodically review water and sewer rate structure and make adjustments that compensate for the effects of inflation and future long term financing requirements.

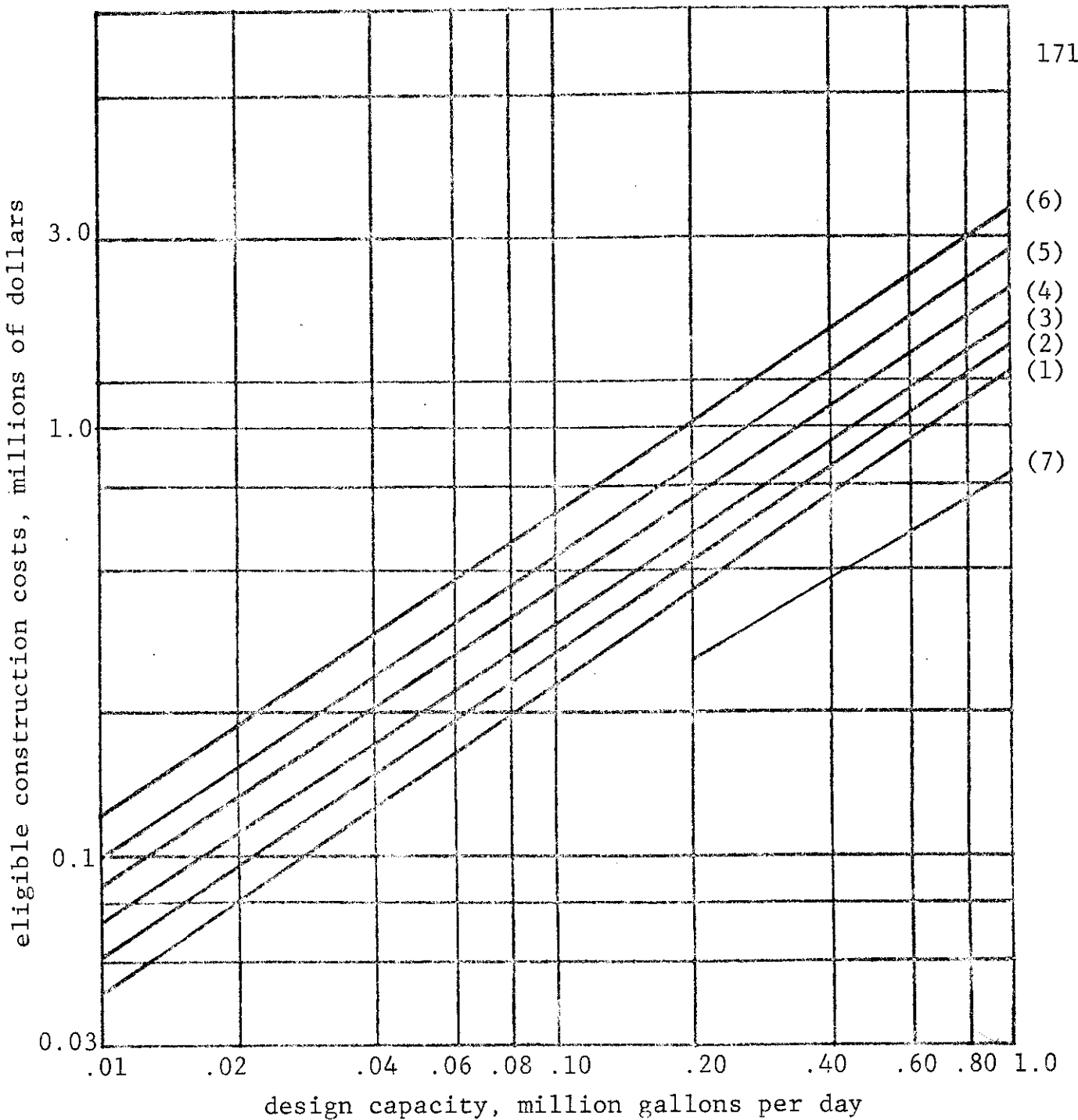
Research Recommendations

1. An investigation is needed to determine the impact of financial leverage on surplus and deficit conditions in municipal government operating funds.

2. Further study is needed to determine the adequacy of depreciation charges in municipal operating funds in an effort to determine a more precise understanding of the effects of inflation on the operating position of municipal operating funds.

3. A study of the financial impact of water pollution control programs on municipalities throughout the nation is needed in order that financial assistance programs capable of solving the major problems which will be uncovered can be developed.

APPENDIX A
COST CURVES SUPPLIED BY THE EPA
FOR USE IN THE 1974 NEEDS SURVEY

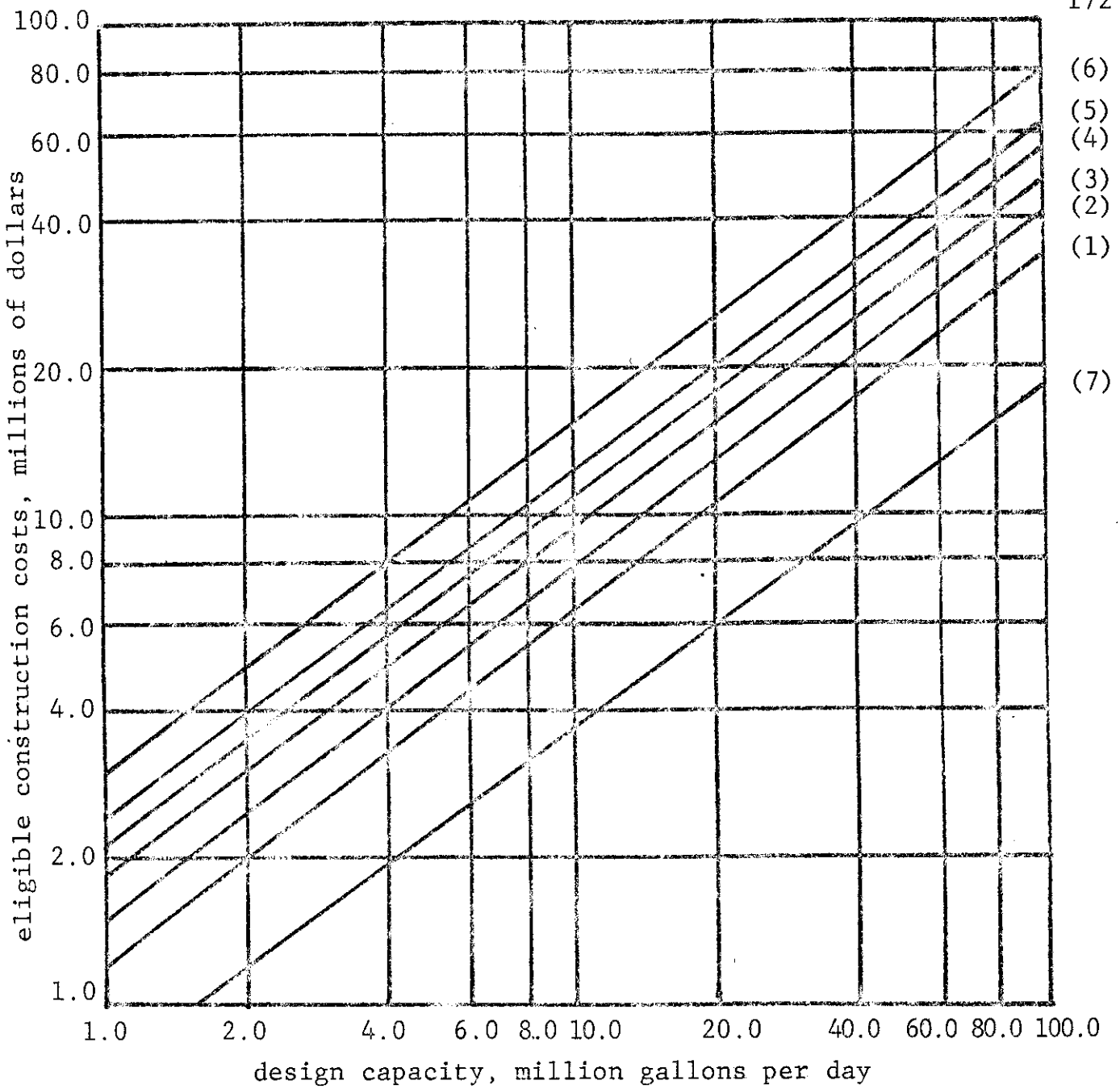


Curve	Effluent Limitations				
	BOD - mg/l	SS - mg/l	Phosphorus	NH ₃ -N	NO ₃ -N
(1)	30	30	-	-	-
(2)	5-29	5-29	-	-	-
(3)	5-29	5-29	R	-	-
(4)	5-29	5-29	R	R	-
(5)	5-29	5-29	R	R	R
(6)	< 5	< 5	R	R	R

R = Removal Required

Curve (7) = deductive for existing primary treatment

Fig. 13--Category I and II costs: .01 - 1 MGD



Curve	Effluent Limitations				
	BOD - mg/l	SS - mg/l	Phosphorus	NH ₃ -N	NO ₃ -N
(1)	30	30	-	-	-
(2)	5-29	5-29	-	-	-
(3)	5-29	5-29	R	-	-
(4)	5-29	5-29	R	R	-
(5)	5-29	5-29	R	R	R
(6)	< 5	< 5	R	R	R

R = Removal Required

Curve (7) = deductive for existing primary treatment

Fig. 14.--Category I and II costs: 1 - 100 MGD

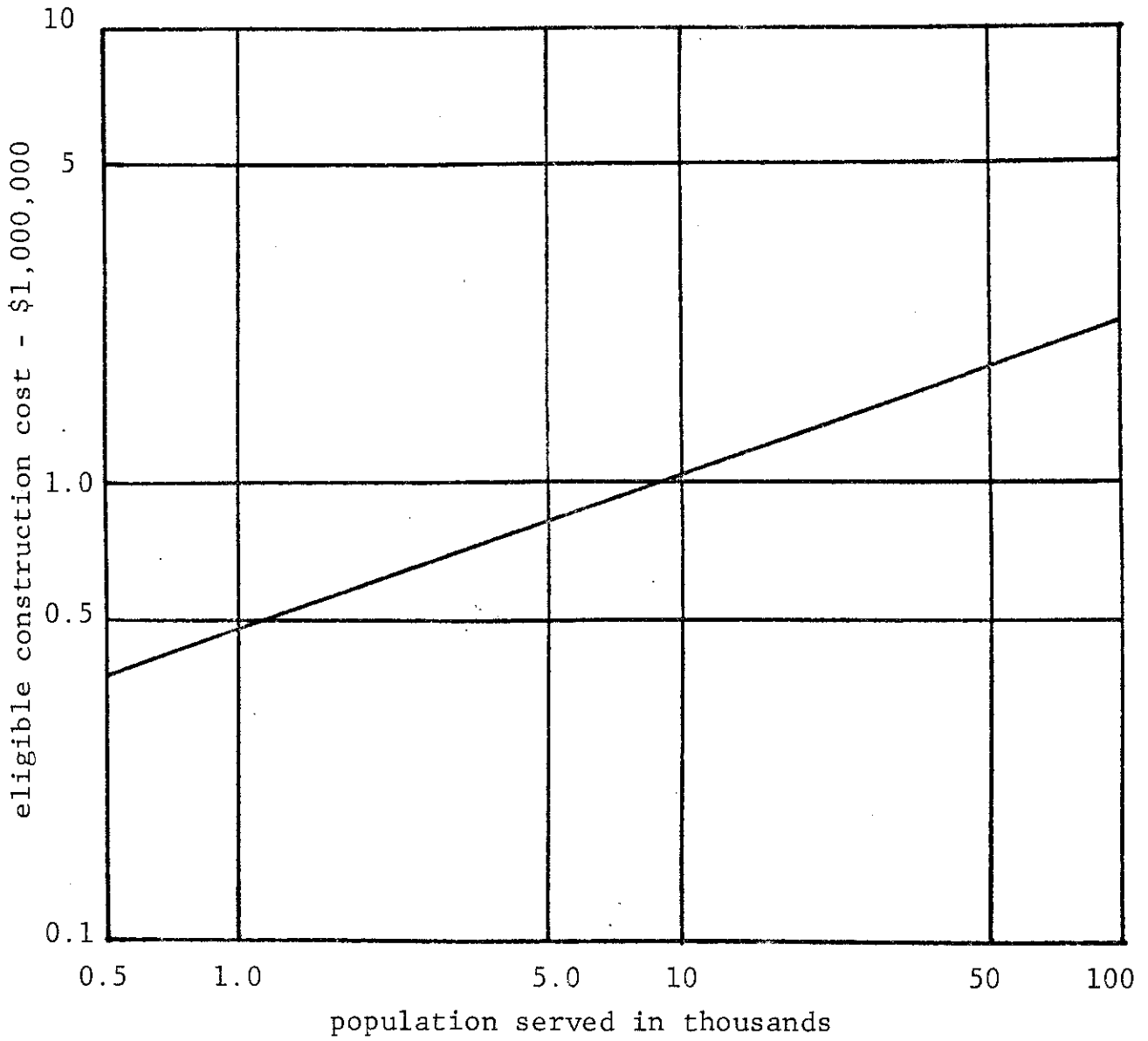


Fig. 15--Cost of collector sewers by population served.

APPENDIX B

October 2, 1975

Dear _____:

I need your help!

My name is Andy Rucks and I am a doctoral candidate in the College of Business Administration at NTSU. Currently I am engaged in collecting data for my dissertation--this is where you can help.

The topic of my dissertation is "The Impact of Water Pollution Control Costs on Municipal Financing." A very important input for this study is historical financial information regarding the operation of municipal water and sewer accounts. This historical data base cannot be developed without your cooperation.

Since the data are readily available in municipal financial statements, all that I am asking is that you allow me to obtain copies of these financial statements. I will be pleased to pay for the copying. My data needs are restricted to water and sewer account entries, such as income, operating expenses, and capital structure, for the period 1960 through 1974.

I will contact you by phone in the near future in order that we may further discuss these matters and establish an appointment when the data may be acquired. Your cooperation is greatly appreciated by not only me but also the College of Business Administration. If you have any questions regarding this matter, please contact either me or my major professor, Dr. Fredrik P. Williams, at the following number: (817) 788-2311, extension 43. You may call collect.

Thank you for your time and cooperation.

Sincerely,

Andrew C. Rucks

ACR/lw

APPENDIX C
MUNICIPALITY AND YEAR IDENTIFICATION CODES

<u>Municipality</u>	<u>Data Element Identifi- cation Code</u>	<u>Municipality</u>	<u>Data Element Identifi- cation Code</u>
Benbrook	01	Terrell	18
Burleson	02	University Park	19
DeSoto	03	Waxahachie	20
Forest Hill	04	White Settlement	21
Grapevine	05	Denton	22
Lewisville	06	Farmers Branch	23
Richland Hills	07	Haltom City	24
Bedford	08	Richardson	25
Balch Springs	09	Arlington	26
Carrollton	10	Garland	27
Cleburne	11	Grand Prairie	28
Duncanvill	12	Irving	29
Ennis	13	Mesquite	30
Euless	14	Dallas	31
Highland Park	15	Fort Worth	32
North Richland Hills	16	McKinney	33
Plano	17	Lancaster	34

<u>Fiscal Year</u>	<u>Data Element Identifi- cation Code</u>	<u>Fiscal Year</u>	<u>Data Element Identifi- cation Code</u>
1960	60	1968	68
1961	61	1969	69
1962	62	1970	70
1963	63	1971	71
1964	64	1972	72
1965	65	1973	73
1966	66	1974	74
1967	67	1990	90

Fig. 16--Municipality and year identification codes.

APPENDIX D
CITY OF FOREST HILL, TEXAS
DATA ANALYSIS TABLES

TABLE XXV

SUMMARY INCOME STATEMENT FOR CITY OF FOREST HILL, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Income from operations:					
Water and sewer collections	\$125,935	\$145,713	\$243,453	\$210,433	\$265,741
Other operating income	16,514	13,675	22,474	4,181	18,746
Nonoperating income					
Total income	\$142,448	\$159,388	\$265,928	\$214,614	\$284,487
Deduct expenses:					
Operating expenses	48,803	57,486	100,793	83,703	136,720
Depreciation	28,043	29,461	45,458	35,850	41,842
Bond interest and fees	45,144	44,219	43,482	41,537	40,885
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 20,858	\$ 28,223	\$ 76,195	\$ 53,524	\$ 65,040

TABLE XXV--Continued

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$275,611	\$288,442	\$348,234	\$324,207	\$374,403
Other operating income	888	19,790	6,126	4,674	4,648
Nonoperating income					14,184
Total income	\$276,499	\$308,233	\$354,560	\$328,881	\$393,235
Deduct expenses:					
Operating expenses	173,356	130,492	121,264	147,501	151,736
Depreciation	45,580	49,569	53,751	53,447	58,682
Bond interest and fees	39,811	43,014	99,617	83,303	101,942
Special charges					
Nonoperating expenses		505			
Net water and sewer surplus (deficit)	\$ 17,753	\$ 84,652	\$ 79,728	\$ 44,630	\$ 80,875

TABLE XXV--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$348,448	\$339,239	\$334,119	\$334,743	\$298,725
Other operating income	6,802	13,575	15,511	12,515	4,398
Nonoperating income	6,399	7,573	7,859	88,403	16,279
Total income	\$361,649	\$360,387	\$357,489	\$435,661	\$319,402
Deduct expenses:					
Operating expenses	169,334	151,275	226,956	190,886	187,676
Depreciation	65,541	67,939	70,670	71,502	51,837
Bond interest and fees	101,453	93,770	68,252	68,070	46,960
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 25,321	\$ 47,403	(\$ 18,389)	\$105,203	\$ 32,928

TABLE XXVI

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF FOREST HILL, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Equity					
Long term debt:					
Revenue bonds	\$1,028,836	\$1,005,805	\$ 979,520	\$ 939,447	\$ 906,878
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	54,649	129,446	261,986	335,125	429,536
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	88,393	95,078	103,038	190,643	229,109
Total Capital Structure	\$1,172,460	\$1,230,712	\$1,344,733	\$1,465,216	\$1,565,523

TABLE XXVI--Continued

	1965	1966	1967	1968	1969
Equity					
Long term debt:					
Revenue bonds	\$ 879,712	\$ 309,868	\$ 306,564	\$ 299,941	\$ 293,705
General obligation bonds		847,242	1,711,153	1,656,456	1,604,651
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement		131,231	84,579	97,759	107,999
Reserve for authorized expenditures					
Contributions	469,509	507,417	516,445	515,735	1,094,803
Federal grants					
Retained earnings	397,839	89,667	206,707	128,762	194,688
Total Capital Structure	\$1,747,060	\$1,885,424	\$2,825,447	\$2,698,653	\$3,295,847

TABLE XXVI--Continued

	1970	1971	1972	1973	1974
Equity	\$ 254,421	\$ 235,962	\$ 211,301	\$ 202,984	\$ 149,584
Long term debt:					
Revenue bonds	1,357,439	1,242,677	1,091,981	1,029,000	739,135
General obligation bonds			114,507		405,308
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	103,704	108,880	80,480	88,566	54,384
Reserve for authorized expenditures					
Contributions	948,372	1,350,616	1,483,296	1,478,172	1,089,301
Federal grants					
Retained earnings	183,820	127,255	122,587	211,711	199,826
Total Capital Structure	\$2,847,756	\$3,065,390	\$3,104,151	\$3,010,433	\$2,637,539

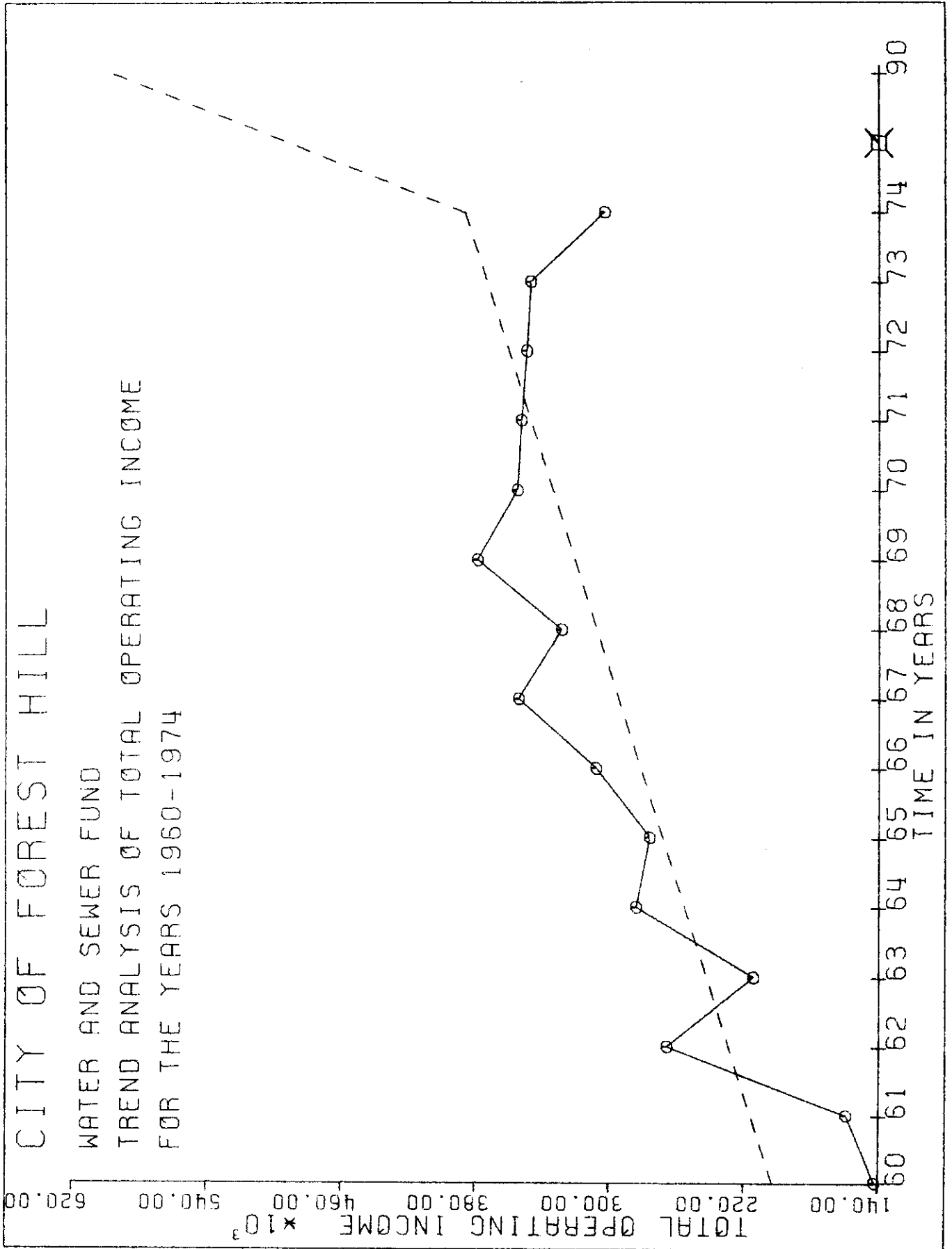


Fig. 17

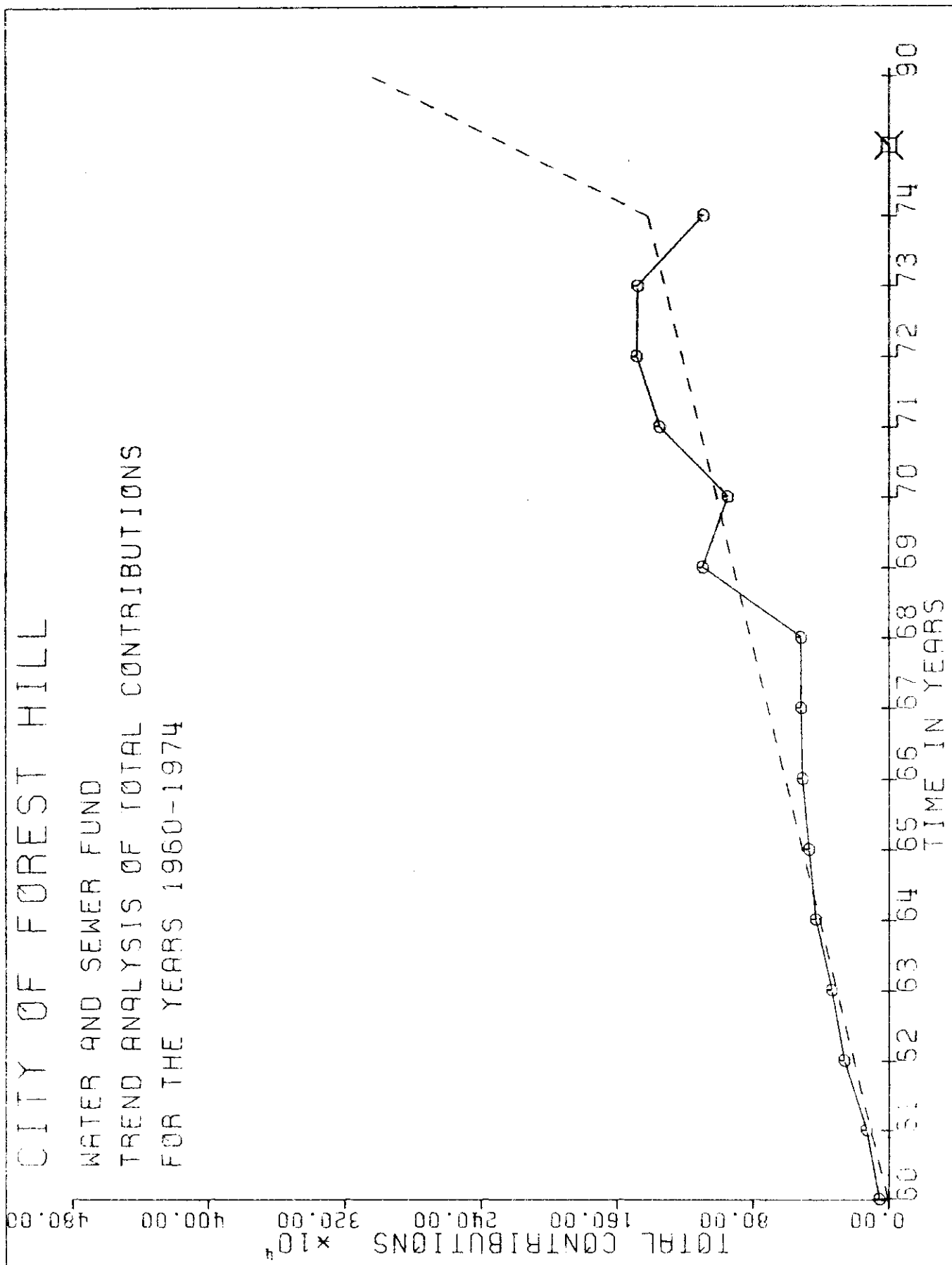


Fig. 18

TABLE XXVII

CITY OF FOREST HILL, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1960 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	95.76
Other Operating Income	4.24
Nonoperating Income	2.72
Expenses:	
Operating Expenses	46.10
Depreciation	17.45
Bond Interest and Fees	21.86
Special Charges	0.00
Nonoperating Expenses	0.01

TABLE XXVIII

CITY OF FOREST HILL, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO TOTAL CONTRIBUTIONS, 1960 - 1974

Capital Structure Element	Percent
Equity	19.43
Long Term Debt:	
Revenue Bonds	341.64
General Obligation Bonds	0.00
Other Long Term Debt*	3.09
Reserves and Contributions:	
Reserve for Bond Retirement	7.10
Reserve for Authorized Expenditures	0.00
Contributions	100.00
Federal Grants	0.00
Retained Earnings	42.64

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE XXIX

CITY OF FOREST HILL
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990

ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$570,298.68	
OTHER OPERATING INCOME.....	\$25,251.33	
NONOPERATING INCOME.....	\$16,198.96	
	-----	\$611,748.97
TOTAL INCOME.....		
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$274,548.55	
DEPRECIATION.....	\$103,923.48	
BOND INTEREST AND FEES.....	\$493,242.68	
NONOPERATING EXPENSES.....	\$59.56	
NET WATER AND SEWER SURPLUS (DEFICIT).....		-----
		\$260,025.30DB

TABLE XXX

CITY OF FOREST HILL
WATER AND SEWER FUND
PRO FORMA CAPITAL STRUCTURE
1990
ALTERNATIVE CCNDITION 1

EQUITY.....	\$590,108.53
LONG TERM DEBT:	
REVENUE BONDS.....	\$10,560,948.44
OTHER LONG TERM DEBT.....	\$93,846.39

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$215,634.10
CONTRIBUTIONS.....	\$3,037,100.00

RETAINED EARNINGS.....	\$1,295,019.44

TOTAL CAPITAL STRUCTURE.....	\$16,192,656.90

TABLE XXXI

CITY OF FCREST HILL
 WATER AND SEWER FUND
 PRO FCMA INCOME STATEMENT
 1950
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$570,298.68
OTHER OPERATING INCOME.....	\$25,251.33
NONOPERATING INCOME.....	\$16,198.96

TOTAL INCOME.....	\$611,748.97
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$274,548.55
DEPRECIATION.....	\$103,923.48
BOND INTEREST AND FEES.....	\$484,028.93
NONOPERATING EXPENSES.....	\$59.56

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$250,811.5508

TABLE XXXII

CITY OF FOREST HILL
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....	\$590,108.53
LONG TERM DEBT:	
REVENUE BONDS.....	\$10,756,198.44
OTHER LONG TERM DEBT.....	\$93,846.39

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$215,634.10
CONTRIBUTIONS.....	\$3,037,100.00

FEDERAL GRANTS.....	\$204,750.00
RETAINED EARNINGS.....	\$1,295,019.44

TOTAL CAPITAL STRUCTURE.....	\$16,192,656.90

TABLE XXXIII

CITY OF FOREST HILL
 WATER AND SEWER FUND
 PRO FCMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$570,298.68	
OTHER OPERATING INCOME.....	\$25,251.33	
NONOPERATING INCOME.....	\$16,198.96	
TOTAL INCOME.....		\$611,748.97
DEDUCT EXPENSES:		
OPERATING EXPENSES.....		
DEPRECIATION.....	\$274,548.55	
BOND INTEREST AND FEES.....	\$103,923.48	
NONOPERATING EXPENSES.....	\$519,323.93	
		\$59.56
NET WATER AND SEWER SURPLUS (DEFICIT).....		\$286,106.55DB

TABLE XXXIV

CITY OF FCREST HILL
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....	\$590,108.53
LONG TERM DEBT:	
REVENUE BONDS.....	\$10,375,948.44
OTHER LONG TERM DEBT.....	\$93,846.39
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$215,634.10
CONTRIBUTIONS.....	\$3,037,109.00
RETAINED EARNINGS.....	\$1,295,019.44
STATE GRANTS.....	\$585,000.00
TOTAL CAPITAL STRUCTURE.....	\$16,192,656.90

TABLE XXXV

CITY OF FOREST HILL
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CCNDITION 4

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$570,298.68	
OTHER OPERATING INCOME.....	\$25,251.33	
NONOPERATING INCOME.....	\$16,198.96	

TOTAL INCOME.....		\$611,748.97
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$274,548.55	
DEPRECIATION.....	\$103,923.48	
BOND INTEREST AND FEES.....	\$473,498.93	
NONOPERATING EXPENSES.....	\$59.56	

NET WATER AND SEWER SURPLUS (DEFICIT).....		\$240,281.55DB

TABLE XXXVI

CITY OF FOREST HILL
 WATER AND SEWER FUND
 PRC FCMA CAPITAL STRUCTURE
 1950
 ALTERNATIVE CONDITION 4

EQUITY.....		\$590,108.53
LONG TERM DEBT:		
REVENUE BONDS.....	\$10,522,198.44	
OTHER LONG TERM DEBT.....	\$93,846.39	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$215,634.10	
CONTRIBUTIONS.....	\$3,037,100.00	

FEDERAL GRANTS.....		\$438,750.00
RETAINED EARNINGS.....		\$1,295,019.44

TOTAL CAPITAL STRUCTURE.....		\$16,192,656.90

APPENDIX E
CITY OF GRAPEVINE, TEXAS
DATA ANALYSIS TABLES

TABLE XXXVII

SUMMARY INCOME STATEMENT FOR CITY OF GRAPEVINE, TEXAS,
WATER AND SEWER FUND, 1966-1974, IN CONSTANT DOLLARS

	1966	1967	1968	1969	1970
Income from operations:					
Water and sewer collections	\$205,017	\$221,877	\$234,866	\$263,365	\$249,234
Other operating income	12,144	9,016	13,077	15,126	11,495
Nonoperating income	240	1,364	909	1,464	3,665
Total income	\$217,401	\$232,257	\$248,853	\$279,955	\$264,394
Deduct expenses:					
Operating expenses	106,742	111,787	125,146	138,365	143,930
Depreciation	46,191	47,580	46,862	54,538	51,301
Bond interest and fees					
Special charges					
Nonoperating expenses	579	1,087		1,265	2,472
Net water and sewer surplus (deficit)	\$ 63,890	\$ 71,803	\$ 76,942	\$ 85,429	\$ 66,691

TABLE XXXVII--Continued

	1971	1972	1973	1974
Income from operations:				
Water and sewer collections	\$256,534	\$303,894	\$293,867	\$234,083
Other operating income	8,867	9,166	23,498	37,979
Nonoperating income	997	2,522	32,311	73,352
Total income	\$266,399	\$315,582	\$349,676	\$345,413
Deduct expenses:				
Operating expenses	162,634	144,822	126,123	145,368
Depreciation	62,636	69,394	84,382	74,852
Bond interest and fees			101,000	97,046
Special charges				
Nonoperating expenses	23			
Net water and sewer surplus (deficit)	\$ 41,106	\$101,366	\$ 38,171	\$ 28,146

TABLE XXXVIII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF GRAPEVINE, TEXAS,
WATER AND SEWER FUND, 1966-1974, IN CONSTANT DOLLARS

	1966	1967	1968	1969	1970
Equity					
Long term debt:					
Revenue bonds	\$958,681	\$915,233	\$861,476	\$1,098,224	\$1,007,739
General obligation bonds					
Other long term debt	16,649	79,557	79,508	88,183	5,858
Reserves and contributions:					
Reserve for bond retirement					
Reserve for authorized expenditures					
Contributions					
Federal grants	646,209	649,063	688,614	710,810	608,766
Retained earnings					
Total Capital Structure	\$1,621,538	\$1,643,853	\$1,620,597	\$1,897,217	\$1,622,363

TABLE XXXVIII -- Continued

	1971	1972	1973	1974
Equity				
Long term debt:				
Revenue bonds	\$1,038,083	\$ 891,073	\$ 285,654	\$ 300,075
General obligation bonds			1,513,000	1,093,596
Other long term debt	57,604	49,384	785,000	555,180
			104,735	46,764
Reserves and contributions:				
Reserve for bond retirement			211,176	167,887
Reserve for authorized expenditures				
Contributions			35,338	26,041
Federal grants				
Retained earnings	1,382,525	1,462,528	708,025	534,200
Total Capital Structure	\$2,478,211	\$2,402,985	\$3,642,928	\$2,723,745

CITY OF GRAPEVINE
WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL OPERATING INCOME
FOR THE YEARS 1960-1974

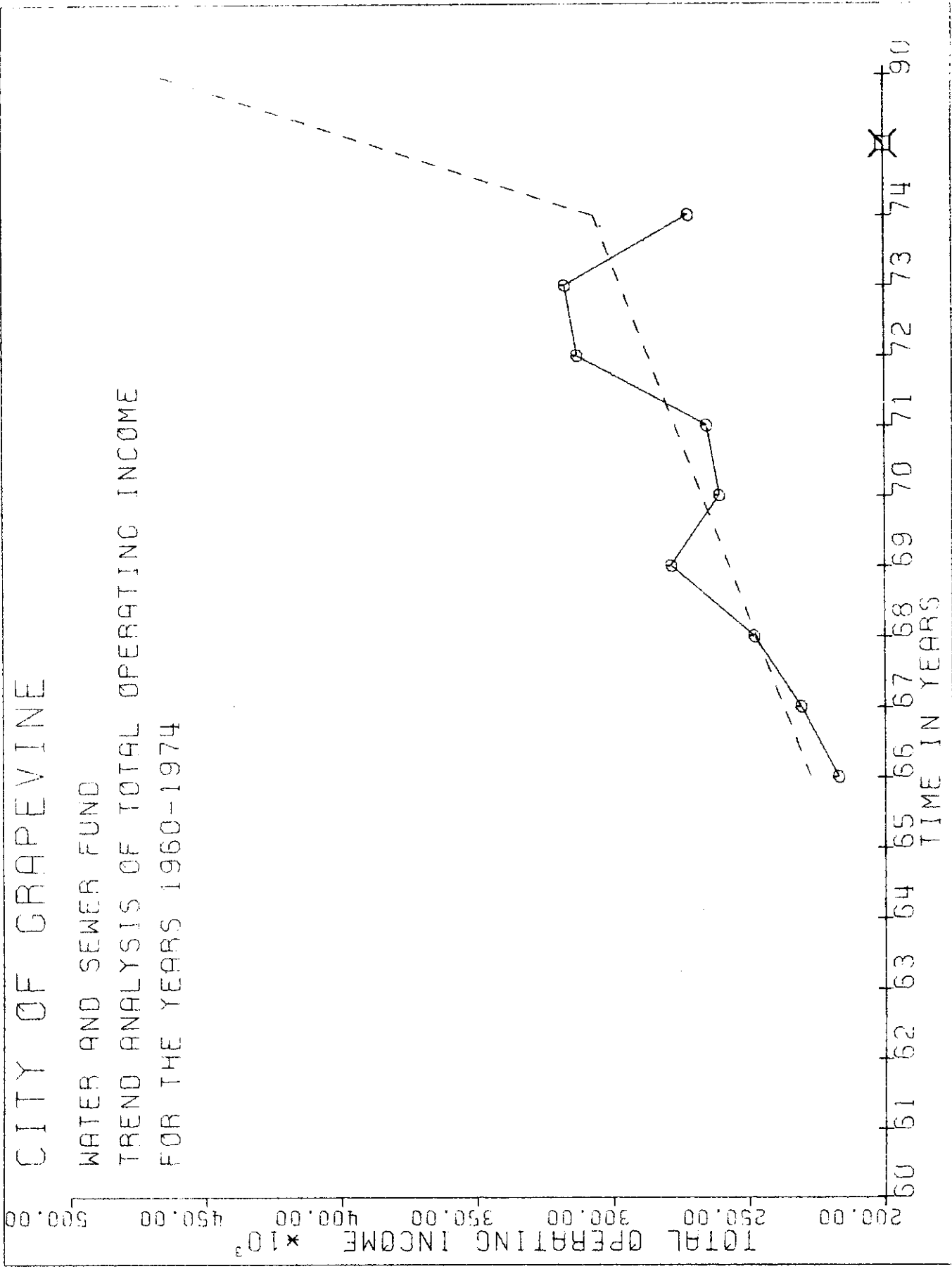


Fig. 19

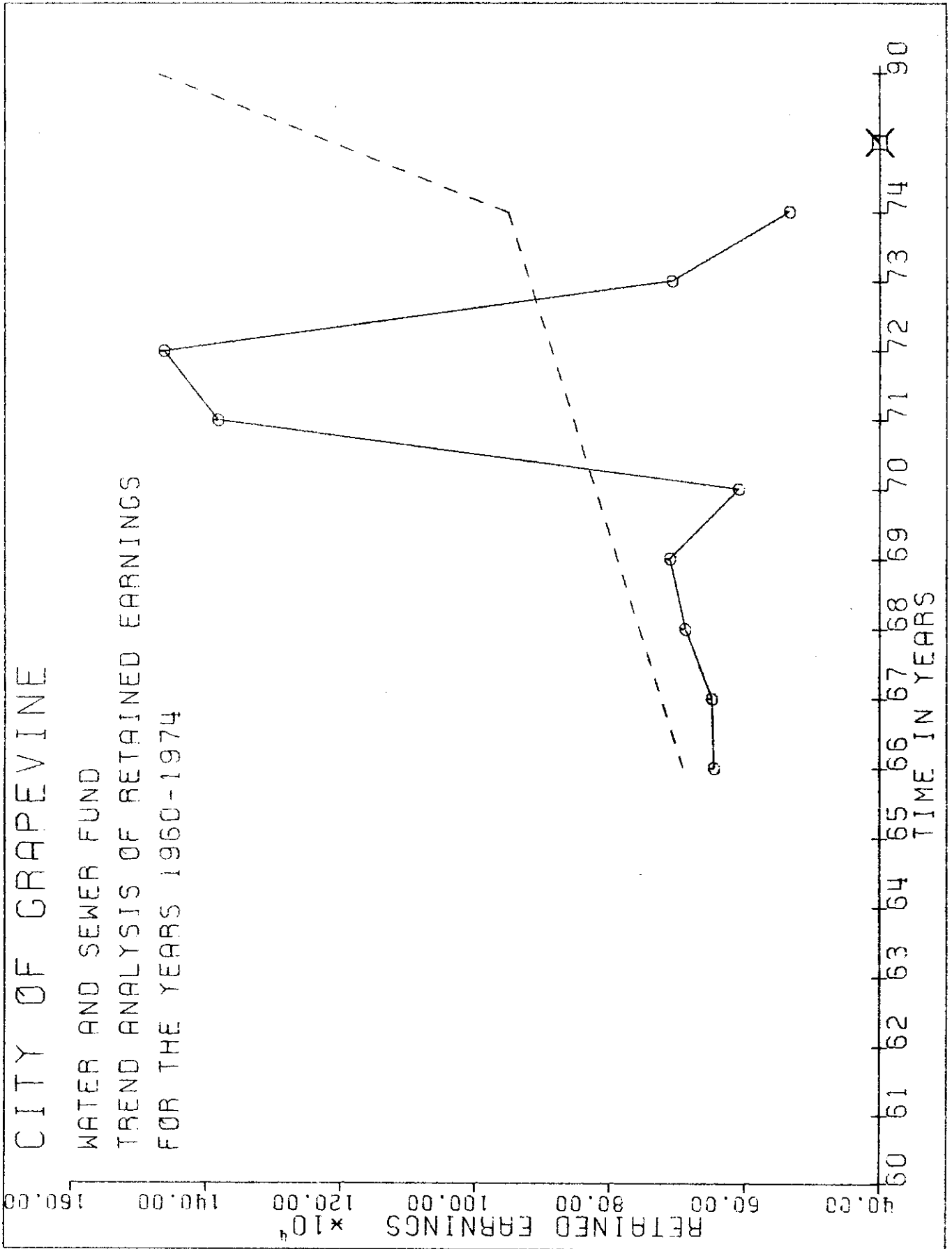


Fig. 20

TABLE XXXIX

CITY OF GRAPEVINE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1966 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	94.19
Other Operating Income	5.80
Nonoperating Income	4.59
Expenses:	
Operating Expenses	50.40
Depreciation	22.21
Bond Interest and Fees	26.21
Special Charges	0.00
Nonoperating Expenses	0.25

TABLE XL

CITY OF GRAPEVINE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RETAINED EARNINGS, 1966 - 1974

Capital Structure Element	Percent
Equity	10.72
Long Term Debt:	
Revenue Bonds	143.21
General Obligation Bonds	23.87
Other Long Term Debt*	7.73
Reserves and Contributions:	
Reserve for Bond Retirement	6.81
Reserve for Authorized Expenditures	0.00
Contributions	1.10
Federal Grants	0.00
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE XLI

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$438,671.09
OTHER OPERATING INCOME.....	\$27,012.34
NONOPERATING INCOME.....	\$21,377.01

TOTAL INCOME.....	\$487,060.44
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$234,727.92
DEPRECIATION.....	\$103,438.63
BOND INTEREST AND FEES.....	\$260,828.53
NONOPERATING EXPENSES.....	\$1,164.33

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$113,098.97DR

TABLE XLII

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....		
LONG TERM DEBT:		\$157,659.04
REVENUE BONDS.....	\$5,796,189.47	
GENERAL OBLIGATION BONDS.....	\$351,056.09	
OTHER LONG TERM DEBT.....	\$113,685.11	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$100,154.67	
CONTRIBUTIONS.....	\$16,177.70	

RETAINED EARNINGS.....		\$1,470,700.00

TOTAL CAPITAL STRUCTURE.....		\$8,005,622.08

TABLE XLIII

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRG FCRWA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....		\$438,671.09
OTHER OPERATING INCOME.....		\$27,012.34
NONOPERATING INCOME.....		\$21,377.01

TOTAL INCOME.....		\$487,060.44
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$234,727.92	
DEPRECIATION.....	\$103,438.63	
BOND INTEREST AND FEES.....	\$202,711.03	
NONOPERATING EXPENSES.....	\$1,164.33	
NET WATER AND SEWER SURPLUS (DEFICIT).....		-----
		\$54,981.47DB

TABLE XLIV

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....		\$157,659.04
LONG TERM DEBT:		
REVENUE BONDS.....	\$4,504,689.47	
GENERAL OBLIGATION BONDS.....	\$351,056.09	
OTHER LONG TERM DEBT.....	\$113,685.11	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$100,154.67	
CONTRIBUTIONS.....	\$16,177.70	

FEDERAL GRANTS.....		\$1,291,500.00
RETAINED EARNINGS.....		\$1,470,700.00

TOTAL CAPITAL STRUCTURE.....		\$8,005,622.08

TABLE XLV

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$438,671.09
OTHER OPERATING INCOME.....	\$27,012.34
NONOPERATING INCOME.....	\$21,377.01

TOTAL INCOME.....	\$487,060.44
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$234,727.92
DEPRECIATION.....	\$103,438.63
BOND INTEREST AND FEES.....	\$425,341.03
NONOPERATING EXPENSES.....	\$1,164.33

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$277,611.4708

TABLE XLVI

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRC FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONCITION 3

EQUITY.....		\$157,659.04
LONG TERM DEBT:		
REVENUE BONDS.....	\$2,106,189.47	
GENERAL OBLIGATION BONDS.....	\$351,056.09	
OTHER LONG TERM DEBT.....	\$113,685.11	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$100,154.67	
CONTRIBUTIONS.....	\$16,177.70	

RETAINED EARNINGS.....		\$1,470,700.00
STATE GRANTS.....		\$3,690,000.00

TOTAL CAPITAL STRUCTURE.....		\$8,005,622.08

TABLE XLVII

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRG FCRMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$438,671.09	
OTHER OPERATING INCOME.....	\$27,012.34	
NONOPERATING INCOME.....	\$21,377.01	

TOTAL INCOME.....	\$487,060.44	
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$234,727.92	
DEPRECIATION.....	\$103,438.63	
BOND INTEREST AND FEES.....	\$136,291.03	
NONOPERATING EXPENSES.....	\$1,164.33	
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----	\$11,438.53

TABLE XLVIII

CITY OF GRAPEVINE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

EQUITY.....	\$157,659.04
LONG TERM DEBT:	
REVENUE BONDS.....	\$3,028,689.47
GENERAL OBLIGATION BONDS.....	\$351,056.09
OTHER LONG TERM DEBT.....	\$113,685.11

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$100,154.67
CONTRIBUTIONS.....	\$16,177.70

FEDERAL GRANTS.....	\$2,767,500.00
RETAINED EARNINGS.....	\$1,470,700.00

TOTAL CAPITAL STRUCTURE.....	\$8,005,622.08

APPENDIX F
CITY OF LEWISVILLE, TEXAS
DATA ANALYSIS TABLES

TABLE II

SUMMARY INCOME STATEMENT FOR CITY OF LEWISVILLE, TEXAS,
WATER AND SEWER FUND, 1965-1974, IN CONSTANT DOLLARS

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$203,886	\$268,350	\$286,179	\$292,095	\$324,451
Other operating income	15,626	9,468	18,122	26,075	29,587
Nonoperating income	625	1,974	6,034	7,316	5,528
Total income	\$220,137	\$279,792	\$301,336	\$325,486	\$335,566
Deduct expenses:					
Operating expenses	43,489	48,766	57,740	63,892	106,554
Depreciation	32,707*	41,395*	45,341*	47,407*	52,751*
Bond interest and fees	100,915	117,877	114,896	123,281	144,792
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 43,026	\$ 71,754	\$83,359	\$90,906	\$55,469

*Computes as 14.9 per cent of Total Operating Income.

TABLE IL--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$318,310	\$455,211	\$712,140	\$795,718	\$649,104
Other operating income	69,352	159,684	156,311	82,606	53,516
Nonoperating income	3,794	5,839	15,860	33,815	32,458
Total income	\$391,456	\$620,734	\$884,311	\$844,509	\$735,078
Deduct expenses:					
Operating expenses	110,250	135,396	216,692	298,750	331,943
Depreciation	57,762*	91,619*	115,867	129,912	117,480
Bond interest and fees	136,433	168,128	197,580	181,395**	160,310
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 87,011	\$225,591	\$354,172	\$302,082	\$125,345

*Computed as 14.9 per cent of Total Operating Income.

**Computed as 4.5 per cent of Revenue Bonds Outstanding.

TABLE L

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF LEWISVILLE, TEXAS,
WATER AND SEWER FUND, 1965-1974, IN CONSTANT DOLLARS

	1965	1966	1967	1968	1969
Equity					
Long term debt:					
Revenue bonds	\$1,437,655	\$1,357,113	\$1,312,437	\$2,149,993	\$2,072,011
General obligation bonds					
Other long term debt	1,501				
Reserves and contributions:					
Reserve for bond retirement					
Reserve for authorized expenditures					
Contributions					
Federal grants	97,326	208,822	306,184	118,831	6,751
Retained earnings					
Total Capital Structure	\$1,536,482	\$1,565,936	\$1,618,622	\$2,031,161	\$2,078,762

TABLE L--Continued

	1970	1971	1972	1973	1974
Equity					\$ 37,373
Long term debt:					
Revenue bonds	\$1,753,515	\$2,459,778	\$2,473,351	\$4,031,000	2,862,951
General obligation bonds					
Other long term debt					101,368
Reserves and contributions:					
Reserve for bond retirement					215,660
Reserve for authorized expenditures					
Contributions					37,373
Federal grants					
Retained earnings	522,505	248,433	3,688,198	2,926,390	2,261,798
Total Capital Structure	\$2,276,020	\$2,708,211	\$6,161,550	\$6,957,390	\$5,516,526

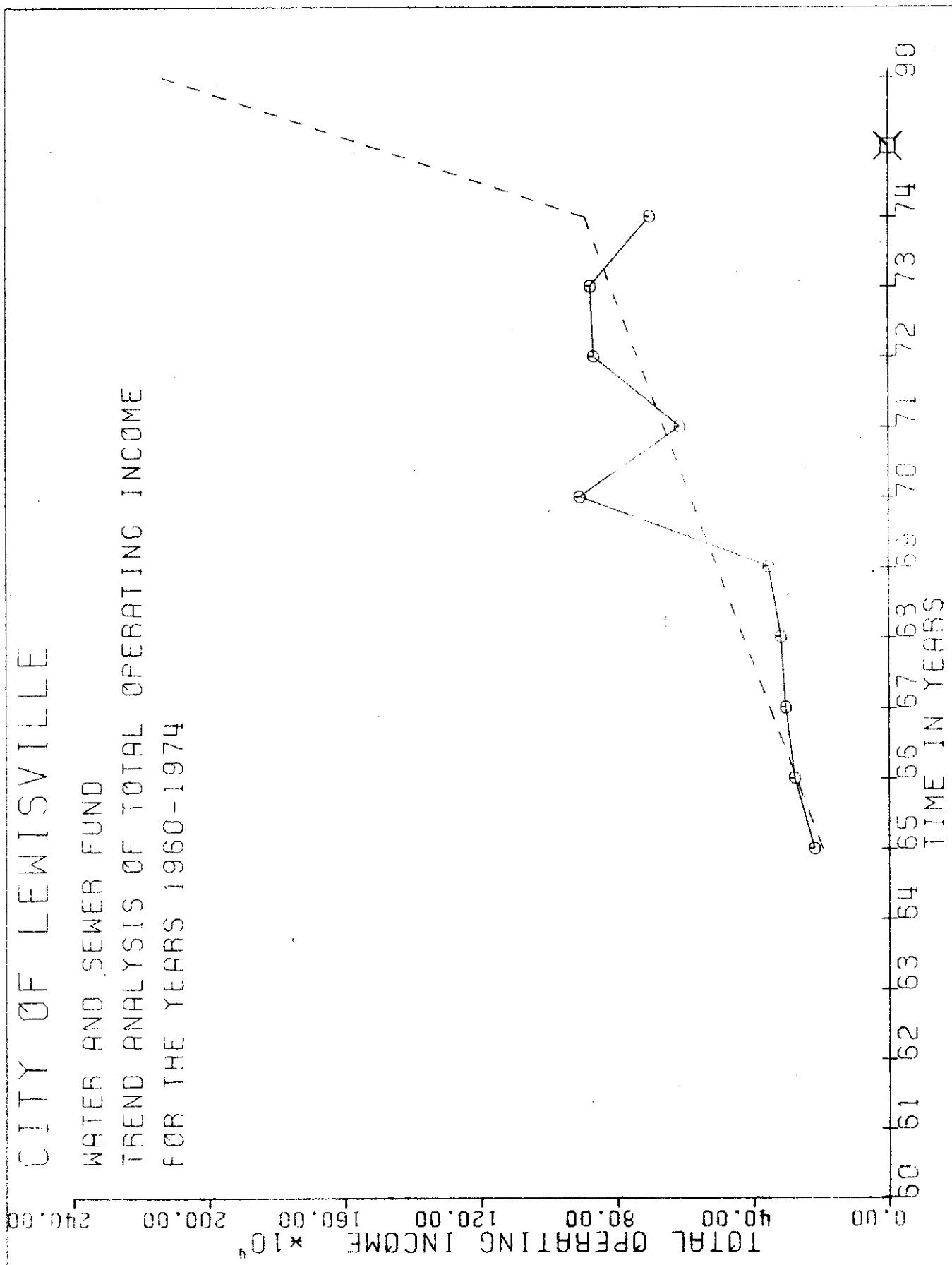


Fig. 21

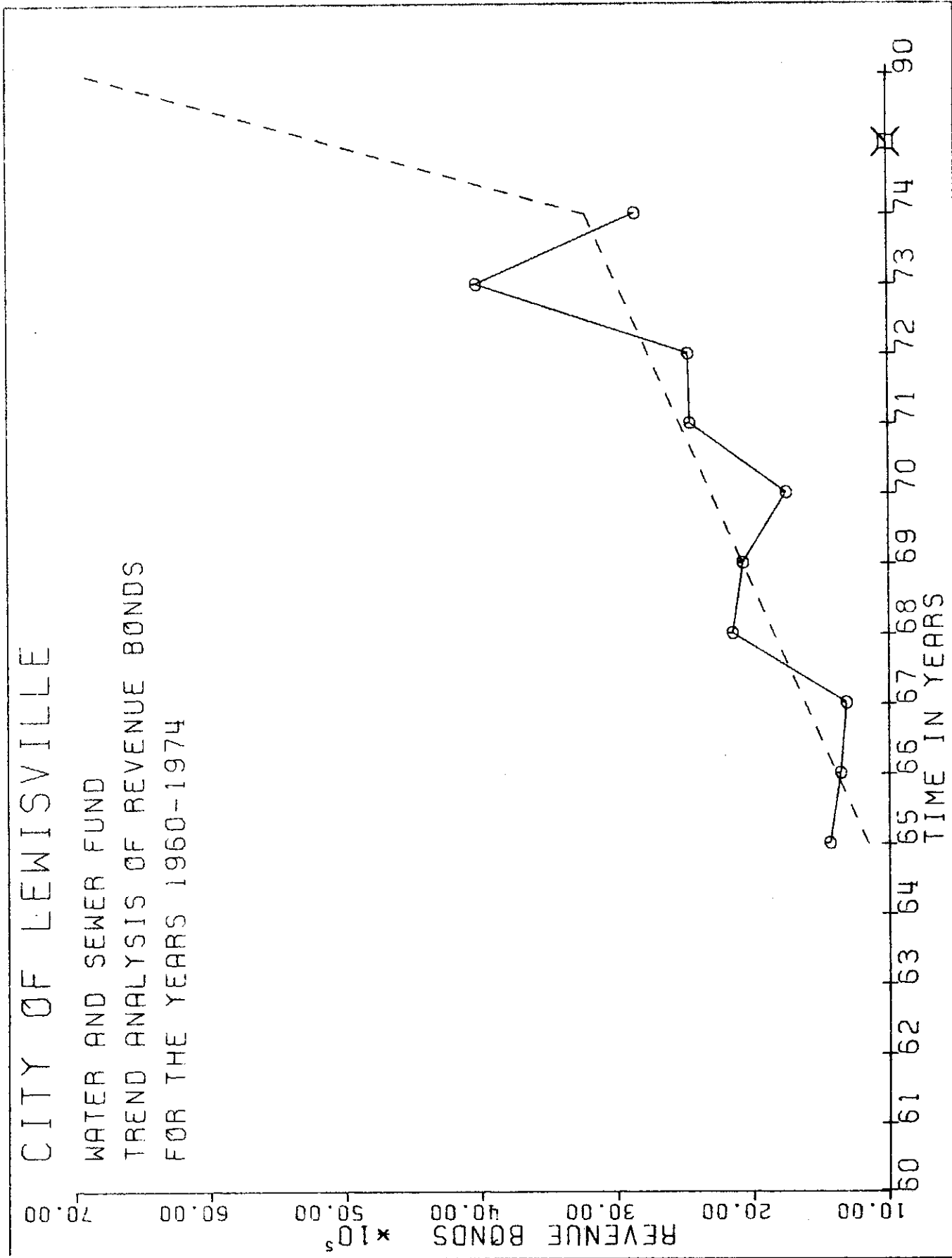


Fig. 22

TABLE LI

CITY OF LEWISVILLE, TEXAS, WATER AND SEWER FUND
 AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
 TO TOTAL OPERATING INCOME, 1965 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	84.09
Other Operating Income	15.91
Nonoperating Income	1.85
Expenses:	
Operating Expenses	24.68
Depreciation	14.82
Bond Interest and Fees	31.44
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE LII

CITY OF LEWISVILLE, TEXAS WATER AND SEWER FUND
 AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
 TO REVENUE BONDS, 1965 - 1974

Capital Structure Element	Percent
Equity	0.13
Long Term Debt:	
Revenue Bonds	100.00
General Obligation Bonds	0.00
Other Long Term Debt*	0.36
Reserves and Contributions:	
Reserve for Bond Retirement	0.75
Reserve for Authorized Expenditures	0.00
Contributions	0.13
Federal Grants	0.00
Retained Earnings	38.09

*Includes: Trinity River Bonds, Notes Payable, and
 Amounts Due Other Municipal Funds

TABLE LIII

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,797,339.66
OTHER OPERATING INCOME.....	\$340,060.34
NONOPERATING INCOME.....	\$39,541.90

TOTAL INCOME.....	\$2,176,941.90
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$527,510.32
DEPRECIATION.....	\$316,762.68
BOND INTEREST AND FEES.....	\$566,262.00

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$766,406.90

TABLE LIV

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....	
LONG TERM DEBT:	
REVENUE BONDS.....	\$12,583,600.00
OTHER LONG TERM DEBT.....	\$24,866.28

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$51,804.75
CONTRIBUTIONS.....	\$8,979.49

RETAINED EARNINGS.....	\$2,630,990.57

TOTAL CAPITAL STRUCTURE.....	\$15,309,220.58

TABLE LV

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCNDITION 2

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$1,797,339.66	
OTHER OPERATING INCOME.....	\$340,060.34	
NONOPERATING INCOME.....	\$39,541.90	

TOTAL INCOME.....	\$2,176,941.90	
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$527,510.32	
DEPRECIATION.....	\$316,762.68	
BOND INTEREST AND FEES.....	\$476,860.28	

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$855,808.62	

TABLE LVI

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNDITION 2

EQUITY.....		\$8,979.49
LONG TERM DEBT:		
REVENUE BONDS.....	\$10,596,895.00	
OTHER LONG TERM DEBT.....	\$24,866.28	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$51,804.75	
CONTRIBUTIONS.....	\$8,979.49	

FEDERAL GRANTS.....	\$1,986,705.00	
RETAINED EARNINGS.....	\$2,630,990.57	

TOTAL CAPITAL STRUCTURE.....	\$15,309,220.58	

TABLE LVII

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,797,339.66
OTHER OPERATING INCOME.....	\$340,060.34
NONOPERATING INCOME.....	\$39,541.90

TOTAL INCOME.....	\$2,176,941.90
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$527,510.32
DEPRECIATION.....	\$316,762.68
BOND INTEREST AND FEES.....	\$819,330.38

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$513,338.52

TABLE LVIII

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....		\$8,979.49
LONG TERM DEBT:		
REVENUE BONDS.....	\$6,907,300.00	
OTHER LONG TERM DEBT.....	\$24,866.28	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$51,804.75	
CONTRIBUTIONS.....	\$8,979.49	

RETAINED EARNINGS.....	\$2,630,990.57	
STATE GRANTS.....	\$5,676,300.00	

TOTAL CAPITAL STRUCTURE.....	\$15,309,220.58	

TABLE LIX

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCNDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,797,339.66
OTHER OPERATING INCOME.....	\$340,060.34
NONOPERATING INCOME.....	\$39,541.90
TOTAL INCOME.....	\$2,176,941.90
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$527,510.32
DEPRECIATION.....	\$316,762.68
BOND INTEREST AND FEES.....	\$374,686.88
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$957,982.02

TABLE LX

CITY OF LEWISVILLE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

EQUITY.....	\$8,979.49
LONG TERM DEBT:	
REVENUE BONDS.....	\$8,326,375.00
OTHER LONG TERM DEBT.....	\$24,866.28
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$51,804.75
CONTRIBUTIONS.....	\$8,979.49
FEDERAL GRANTS.....	\$4,257,225.00
RETAINED EARNINGS.....	\$2,630,990.57
TOTAL CAPITAL STRUCTURE.....	\$15,309,220.58

APPENDIX G
CITY OF RICHLAND HILLS, TEXAS
DATA ANALYSIS TABLES

TABLE LXI

SUMMARY INCOME STATEMENT FOR CITY OF RICHLAND HILLS, TEXAS,
WATER AND SEWER FUND, 1963-1974, IN CONSTANT DOLLARS

	1963	1964	1965	1966	1967
Income from operations:					
Water and sewer collections	\$307,363	\$338,437	\$305,111	\$281,663	\$310,438
Other operating income	13,949	11,208	11,899	12,725	17,906
Nonoperating income	8,894	11,269	11,218	13,808	14,147
Total income	\$330,206	\$360,915	\$328,228	\$308,196	\$342,491
Deduct expenses:					
Operating expenses	140,896	162,471	124,906	177,773	192,224
Depreciation	72,574	81,807	78,161	75,806	74,123
Bond interest and fees	68,958	68,226	66,693	62,939	60,937
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 47,778	\$ 48,411	\$ 8,468	(\$ 8,322)	\$ 15,207

TABLE LXI--Continued

	1968	1969	1970	1971	1972
Income from operations:					
Water and sewer collections	\$299,211	\$351,746	\$332,357	\$342,325	\$424,995
Other operating income	15,938	23,925	17,101	17,838	45,758
Nonoperating income	15,322	16,988	23,004	18,032	22,921
Total income	\$330,471	\$392,659	\$372,462	\$378,185	\$473,674
Deduct expenses:					
Operating expenses	193,238	235,068	237,284	251,690	273,220
Depreciation	71,535	71,907	55,025	48,061	65,185
Bond interest and fees	58,263	55,674	46,988	42,386	92,027
Special charges					
Nonoperating expenses					3,477
Net water and sewer surplus (deficit)	\$ 7,435	\$ 30,010	\$ 33,165	\$ 36,048	\$ 59,785

TABLE LXI--Continued

	1973	1974		
Income from operations:				
Water and sewer collections	\$367,148	\$287,713		
Other operating income	27,858	17,089		
Nonoperating income	81,448	36,896		
Total income	\$476,454	\$341,698		
Deduct expenses:				
Operating expenses	291,878	247,694		
Depreciation	61,503	48,012		
Bond interest and fees	113,623	61,543		
Special charges				
Nonoperating expenses				
Net water and sewer surplus (deficit)	\$ 9,450	(\$ 15,551)		

TABLE LXII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF RICHLAND HILLS, TEXAS,
WATER AND SEWER FUND, 1963-1974, IN CONSTANT DOLLARS

	1963	1964	1965	1966	1967
Equity					
Long term debt:					
Revenue bonds	\$1,647,250	\$1,605,094	\$1,545,439	\$1,448,707	\$1,392,482
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement			29,498	30,712	32,539
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	365,149	412,754	390,693	355,569	364,822
Total Capital Structure	\$2,012,399	\$2,017,849	\$1,965,631	\$1,834,989	\$1,789,844

TABLE LXII--Continued

	1968	1969	1970	1971	1972
Equity					
Long term debt:					
Revenue bonds	\$1,321,026	\$1,251,599	\$1,045,340	\$ 932,298	\$1,685,335
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	34,088	35,027	32,235	31,264	77,981
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	358,939	374,986	356,106	373,158	361,515
Total Capital Structure	\$1,714,054	\$1,661,612	\$1,433,682	\$1,336,721	\$2,124,831

TABLE LXII--Continued

	1973	1974		
Equity				
Long term debt:				
Revenue bonds	\$1,544,000	\$1,096,543		
General obligation bonds				
Other long term debt				
Reserves and contributions:				
Reserve for bond retirement	138,522	113,145		
Reserve for authorized expenditures				
Contributions				
Federal grants				
Retained earnings	277,128	192,015		
Total Capital Structure	\$1,959,650	\$1,401,704		

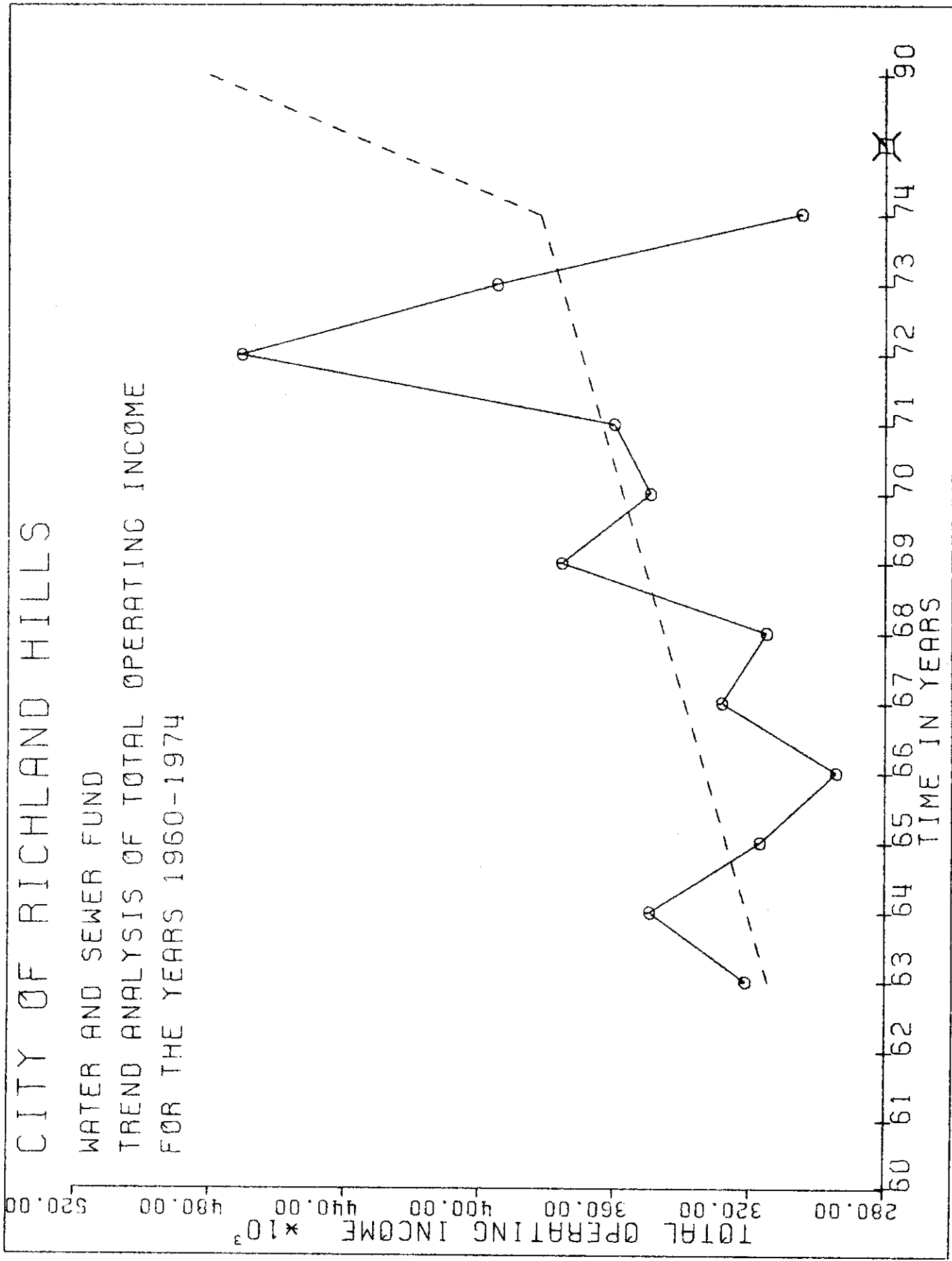


Fig. 23

CITY OF RICHLAND HILLS

WATER AND SEWER FUND
TREND ANALYSIS OF RETAINED EARNINGS
FOR THE YEARS 1960-1974

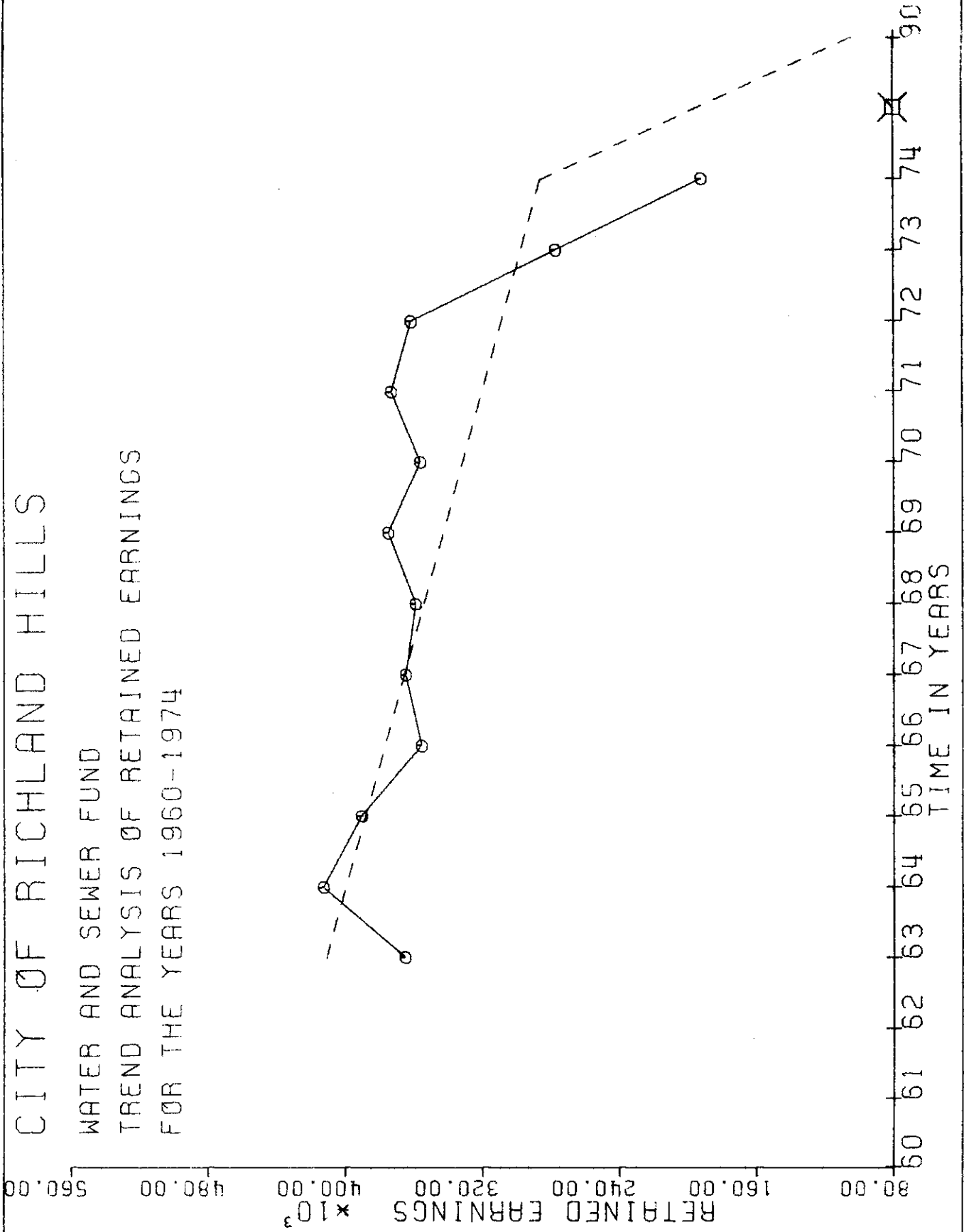


Fig. 24

TABLE LXIII

CITY OF RICHLAND HILLS, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1963 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	94.61
Other Operating Income	5.39
Nonoperating Income	6.43
Expenses:	
Operating Expenses	61.61
Depreciation	19.59
Bond Interest and Fees	19.09
Special Charges	0.00
Nonoperating Expenses	0.06

TABLE LXIV

CITY OF RICHLAND HILLS, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RETAINED EARNINGS, 1963 - 1974

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	405.36
General Obligation Bonds	0.00
Other Long Term Debt*	0.00
Reserves and Contributions:	
Reserve for Bond Retirement	15.99
Reserve for Authorized Expenditures	0.00
Contributions	0.00
Federal Grants	0.00
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE LXV

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CCNCITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$454,553.75
OTHER OPERATING INCOME.....	\$25,896.26
NONOPERATING INCOME.....	\$30,892.94

TOTAL INCOME.....	\$511,342.95
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$296,005.25
DEPRECIATION.....	\$94,120.16
BOND INTEREST AND FEES.....	\$109,806.39
NONOPERATING EXPENSES.....	\$288.27

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$11,122.88

TABLE LXVI

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$2,440,141.90
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$16,651.99
RETAINED EARNINGS.....	\$104,140.00

TOTAL CAPITAL STRUCTURE.....	\$2,560,933.89

TABLE LXVII

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$454,553.75
OTHER OPERATING INCOME.....	\$25,896.26
NONOPERATING INCOME.....	\$30,892.94
TOTAL INCOME.....	-----
DEDUCT EXPENSES:	\$511,342.95
OPERATING EXPENSES.....	\$296,005.25
DEPRECIATION.....	\$94,120.16
BOND INTEREST AND FEES.....	\$78,022.89
NONOPERATING EXPENSES.....	\$28.27
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----
	\$42,906.38

TABLE LXVIII

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$1,733,841.90
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$16,651.99
FEDERAL GRANTS.....	\$706,300.00
RETAINED EARNINGS.....	\$104,140.00
TOTAL CAPITAL STRUCTURE.....	-----
	\$2,560,933.89

TABLE LXIX

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FCMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$454,553.75
OTHER OPERATING INCOME.....	\$25,896.26
NONOPERATING INCOME.....	\$30,892.94
TOTAL INCOME.....	-----
DEDUCT EXPENSES:	\$511,342.95
OPERATING EXPENSES.....	\$296,005.25
DEPRECIATION.....	\$94,120.16
BOND INTEREST AND FEES.....	\$199,775.56
NONOPERATING EXPENSES.....	\$288.27
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----
	\$78,846.2908

TABLE LXX

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

LONG TERM DEBT:	
REVENUE BONDS.....	\$422,141.90
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$16,651.99
RETAINED EARNINGS.....	\$104,140.00
STATE GRANTS.....	\$2,018,000.00
TOTAL CAPITAL STRUCTURE.....	-----
	\$2,560,933.89

TABLE LXXI

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$454,553.75
OTHER OPERATING INCOME.....	\$25,896.26
NONOPERATING INCOME.....	\$30,892.94
TOTAL INCOME.....	\$511,342.95
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$296,005.25
DEPRECIATION.....	\$94,120.16
BOND INTEREST AND FEES.....	\$41,698.89
NONOPERATING EXPENSES.....	\$288.27
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$79,230.38

TABLE LXXII

CITY OF RICHLAND HILLS
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$926,641.90
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$16,651.99
FEDERAL GRANTS.....	\$1,513,500.00
RETAINED EARNINGS.....	\$104,140.00
TOTAL CAPITAL STRUCTURE.....	\$2,560,933.89

APPENDIX H
CITY OF DE SOTO, TEXAS
DATA ANALYSIS TABLES

TABLE LXXIII

SUMMARY INCOME STATEMENT FOR CITY OF DE SOTO, TEXAS,
WATER AND SEWER FUND, 1970-1974, IN CONSTANT DOLLARS

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$364,467	\$374,835	\$431,401	\$471,253	\$404,211
Other operating income					
Nonoperating income	31,359	18,601	27,874	32,335	29,208
Total income	\$395,826	\$392,436	\$459,275	\$503,588	\$433,419
Deduct expenses:					
Operating expenses	106,934	137,401	245,935	302,571	244,518
Depreciation	39,584	45,740	51,837	60,390	78,704
Bond interest and fees	49,582	63,757	47,880	74,474	50,818
Special charges					
Nonoperating expenses	167,054	145,308		38,000	85,924
Net water and sewer surplus (deficit)	\$ 32,667	\$ 1,411	\$113,623	\$ 28,153	(\$ 26,545)

TABLE LXXIV

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF DE SOTO, TEXAS,
WATER AND SEWER FUND, 1970-1974, IN CONSTANT DOLLARS

	1970	1971	1972	1973	1974
Equity					
Long term debt:					
Revenue bonds	\$1,217,057	\$1,113,642	\$1,560,418	\$1,475,000	\$1,068,540
General obligation bonds	754,550	949,735	1,369,476	1,808,174	2,061,149
Other long term debt	3,754,459	3,467,916	3,027,536	2,839,774	2,019,449
Reserves and contributions:					
Reserve for bond retirement	88,900	94,602	121,231	148,378	120,028
Reserve for authorized expenditures					
Contributions	354,962	482,860	754,764	1,230,761	1,202,405
Federal grants	79,938	74,138	66,390	63,777	46,998
Retained earnings	184,831	160,678	220,992	208,529	116,439
Total Capital Structure	\$6,434,700	\$6,343,574	\$7,120,810	\$7,774,393	\$6,635,011

CITY OF DE SOTO
WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL OPERATING INCOME
FOR THE YEARS 1960-1974

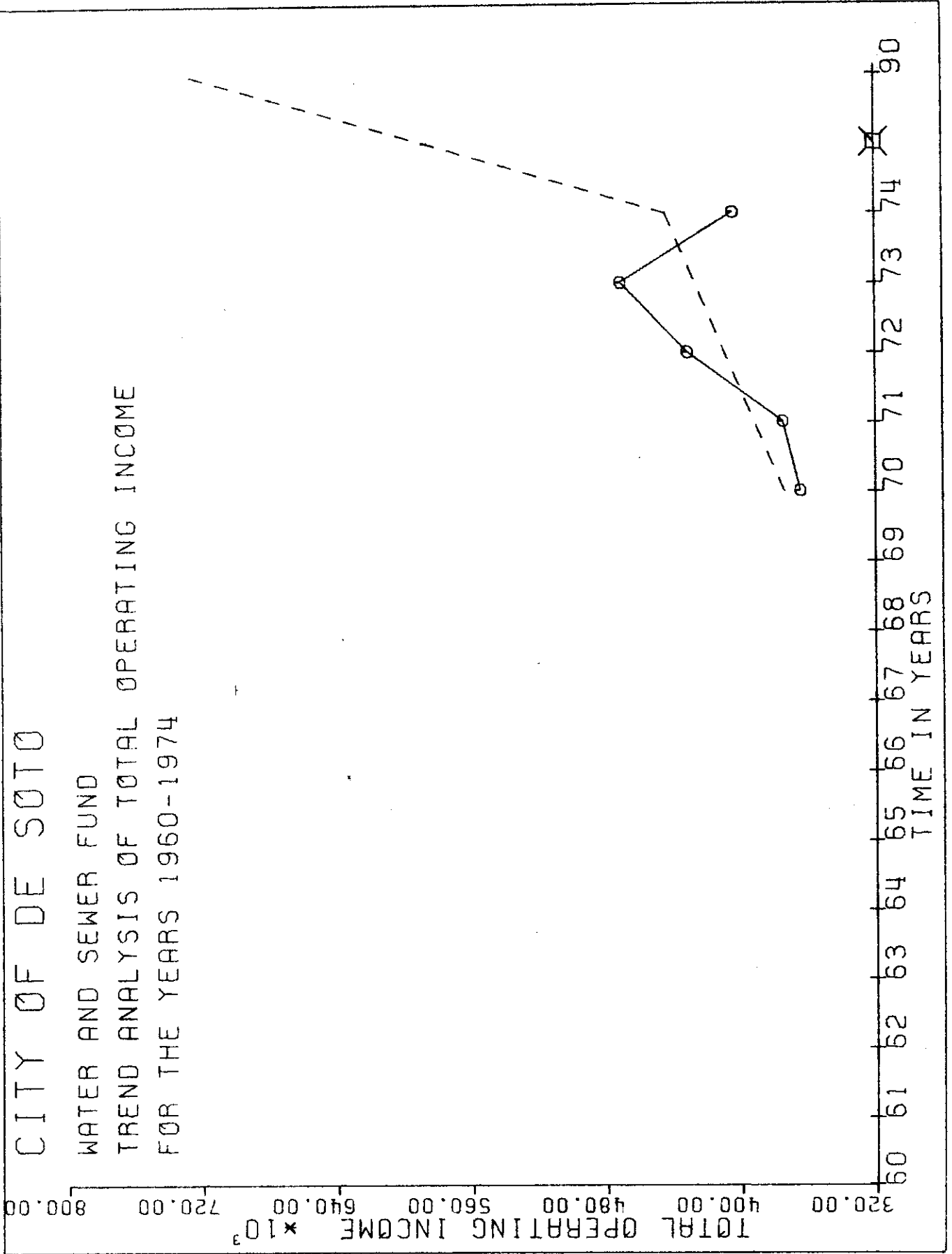


Fig. 25

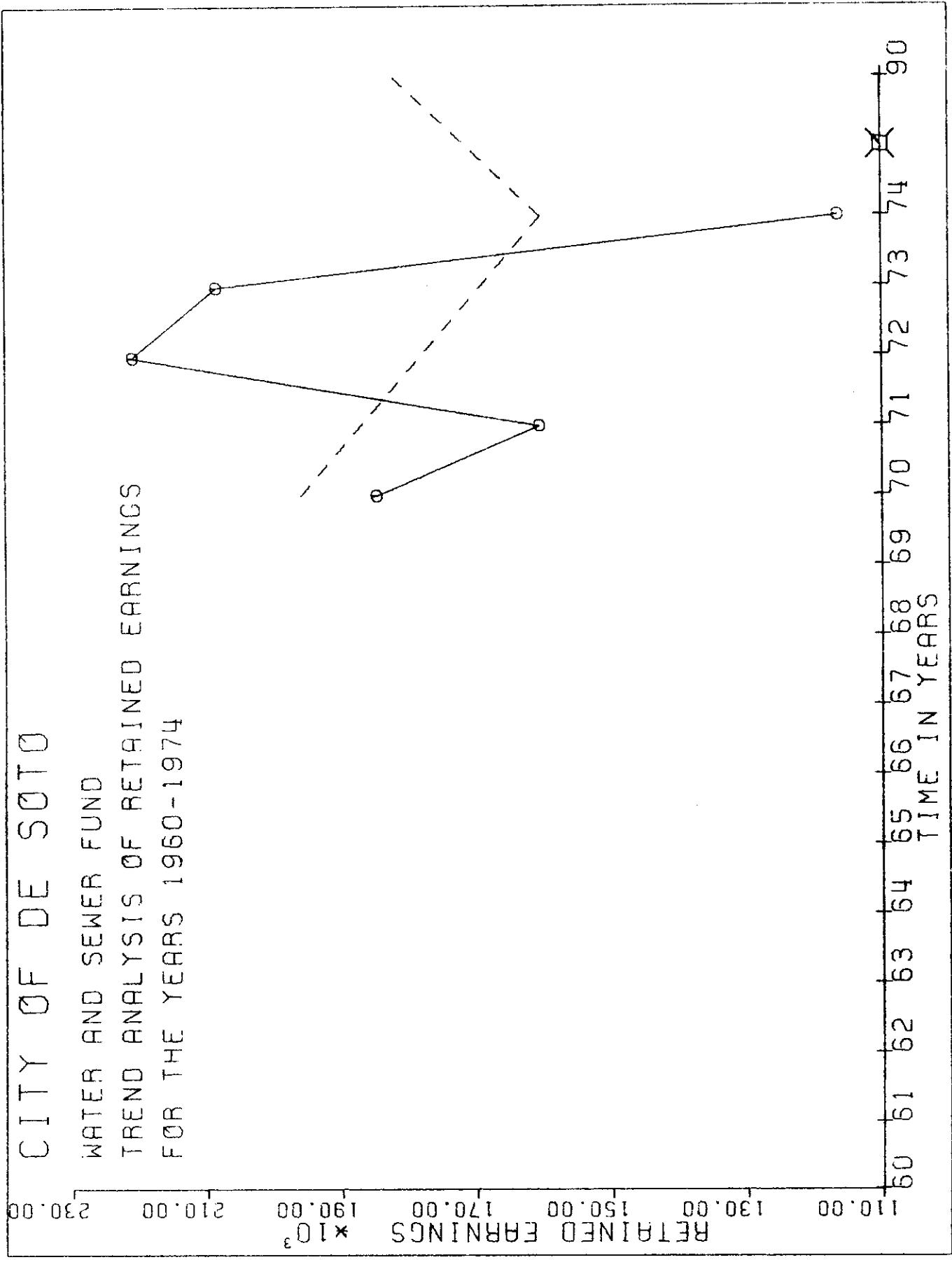


Fig. 26

TABLE LXXV

CITY OF DeSOTO, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1970 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	100.00
Other Operating Income	0.00
Nonoperating Income	6.82
Expenses:	
Operating Expenses	49.54
Depreciation	13.47
Bond Interest and Fees	14.01
Special Charges	0.00
Nonoperating Expenses	22.79

TABLE LXXVI

CITY OF DeSOTO, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RETAINED EARNINGS, 1970 - 1974

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	736.51
General Obligation Bonds	851.25
Other Long Term Debt*	1,731.14
Reserves and Contributions:	
Reserve for Bond Retirement	67.21
Reserve for Authorized Expenditures	0.00
Contributions	491.39
Federal Grants	38.07
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE LXXVII

CITY OF DE SOTO
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$725,870.00
NONOPERATING INCOME.....	\$49,504.33

TOTAL INCOME.....	\$775,374.33
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$359,596.00
DEPRECIATION.....	\$97,774.69
BOND INTEREST AND FEES.....	\$197,628.97
NONOPERATING EXPENSES.....	\$165,425.77

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$45,051.00B

TABLE LXXVIII

CITY OF DE SOTO
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$4,391,754.92
GENERAL OBLIGATION BONDS.....	\$1,550,722.13
OTHER LONG TERM DEBT.....	\$3,153,617.74

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$122,436.46
CONTRIBUTIONS.....	\$895,165.16

FEDERAL GRANTS.....	\$69,352.12
RETAINED EARNINGS.....	\$182,170.00

TOTAL CAPITAL STRUCTURE.....	\$10,365,218.53

TABLE LXXIX

CITY OF DE SOTO
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$725,870.00
NONOPERATING INCOME.....	\$49,504.33
	<hr/>
TOTAL INCOME.....	\$775,374.33
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$359,596.00
DEPRECIATION.....	\$97,774.69
BOND INTEREST AND FEES.....	\$149,591.47
NONOPERATING EXPENSES.....	\$165,425.77
	<hr/>
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$2,986.40
	<hr/>

TABLE LXXX

CITY OF DE SOTO
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$3,324,254.92
GENERAL OBLIGATION BONDS.....	\$1,550,722.13
OTHER LONG TERM DEBT.....	\$3,153,617.74
	<hr/>
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$122,436.46
CONTRIBUTIONS.....	\$895,165.16
	<hr/>
FEDERAL GRANTS.....	\$1,136,852.12
RETAINED EARNINGS.....	\$182,170.00
	<hr/>
TOTAL CAPITAL STRUCTURE.....	\$10,365,218.53
	<hr/>

TABLE LXXXI

CITY OF DE SOTO
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CCNDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$725,870.00
NONOPERATING INCOME.....	\$49,504.33

TOTAL INCOME.....	\$775,374.33
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$359,596.00
DEPRECIATION.....	\$97,774.69
BOND INTEREST AND FEES.....	\$333,608.14
NONOPERATING EXPENSES.....	\$165,425.77

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$181,030.27DR

TABLE LXXXII

CITY CF DE SCTC
 WATER AND SEWER FUND
 PRG FCRMA CAPITAL STRUTURE
 1990
 ALTERNATIVE CCNDITION 3

LONG TERM DEBT:	
REVENUE BONDS.....	\$1,341,754.92
GENERAL OBLIGATION BONDS.....	\$1,550,722.13
OTHER LONG TERM DEBT.....	\$3,153,617.74

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$122,436.46
CONTRIBUTIONS.....	\$895,165.16

FEDERAL GRANTS.....	\$69,352.12
RETAINED EARNINGS.....	\$182,170.00
STATE GRANTS.....	\$3,050,000.00

TOTAL CAPITAL STRUCTURE.....	\$10,365,218.53

TABLE LXXXIII

CITY OF DE SCTC
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$725,870.00
NONOPERATING INCOME.....	\$49,504.33

TOTAL INCOME.....	\$775,374.33
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$359,596.00
DEPRECIATION.....	\$97,774.69
BOND INTEREST AND FEES.....	\$94,691.47
NONOPERATING EXPENSES.....	\$165,425.77

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$57,886.40

TABLE LXXXIV

CITY OF DE SOTC
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$2,104,254.92
GENERAL OBLIGATION BONDS.....	\$1,550,722.13
OTHER LONG TERM DEBT.....	\$3,153,617.74

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$122,436.46
CONTRIBUTIONS.....	\$895,165.16

FEDERAL GRANTS.....	\$2,356,852.12
RETAINED EARNINGS.....	\$182,170.00

TOTAL CAPITAL STRUCTURE.....	\$10,365,218.53

APPENDIX I
CITY OF BEDFORD, TEXAS
DATA ANALYSIS TABLES

TABLE LXXXV
SUMMARY INCOME STATEMENT FOR CITY OF BEDFORD, TEXAS,
WATER AND SEWER FUND, 1970-1974, IN CONSTANT DOLLARS

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$352,878	\$450,951	\$476,884	\$467,551	\$431,578
Other operating income	16,883	34,008	32,880	24,919	26,106
Nonoperating income	23,841	11,618	14,379	13,710	18,691
Total income	\$393,602	\$496,577	\$509,764	\$492,470	\$457,684
Deduct expenses:					
Operating expenses	156,038	155,379	164,374	156,480	260,975
Depreciation	78,759*	68,799	84,736	95,299	62,643
Bond interest and fees	149,618	182,558	184,789	191,598	103,940
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 9,187	\$ 89,841	\$ 90,244	\$ 62,803	\$ 48,817

*Computed as 21.3 per cent of Total Operating Income

TABLE LXXXVI

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF BEDFORD, TEXAS,
WATER AND SEWER FUNDS, 1970-1974, IN CONSTANT DOLLARS

	1970	1971	1972	1973	1974
Equity	\$ 10,458	\$ 19,374	\$ 26,024	\$ 179,594	\$ 136,407
Long term debt:					
Revenue bonds	3,436,421	3,177,407	3,044,845	2,955,000	2,151,819
General obligation bonds					
Other long term debt	130,727	1,000,680	980,192	931,331	217,721
Reserves and contributions:					
Reserve for bond retirement					
Reserve for authorized expenditures					
Contributions					
Federal grants	55,495	141,309	216,783	282,262	256,810
Retained earnings					
Total Capital Structure	\$3,633,103	\$4,338,772	\$4,267,846	\$4,348,187	\$2,762,758

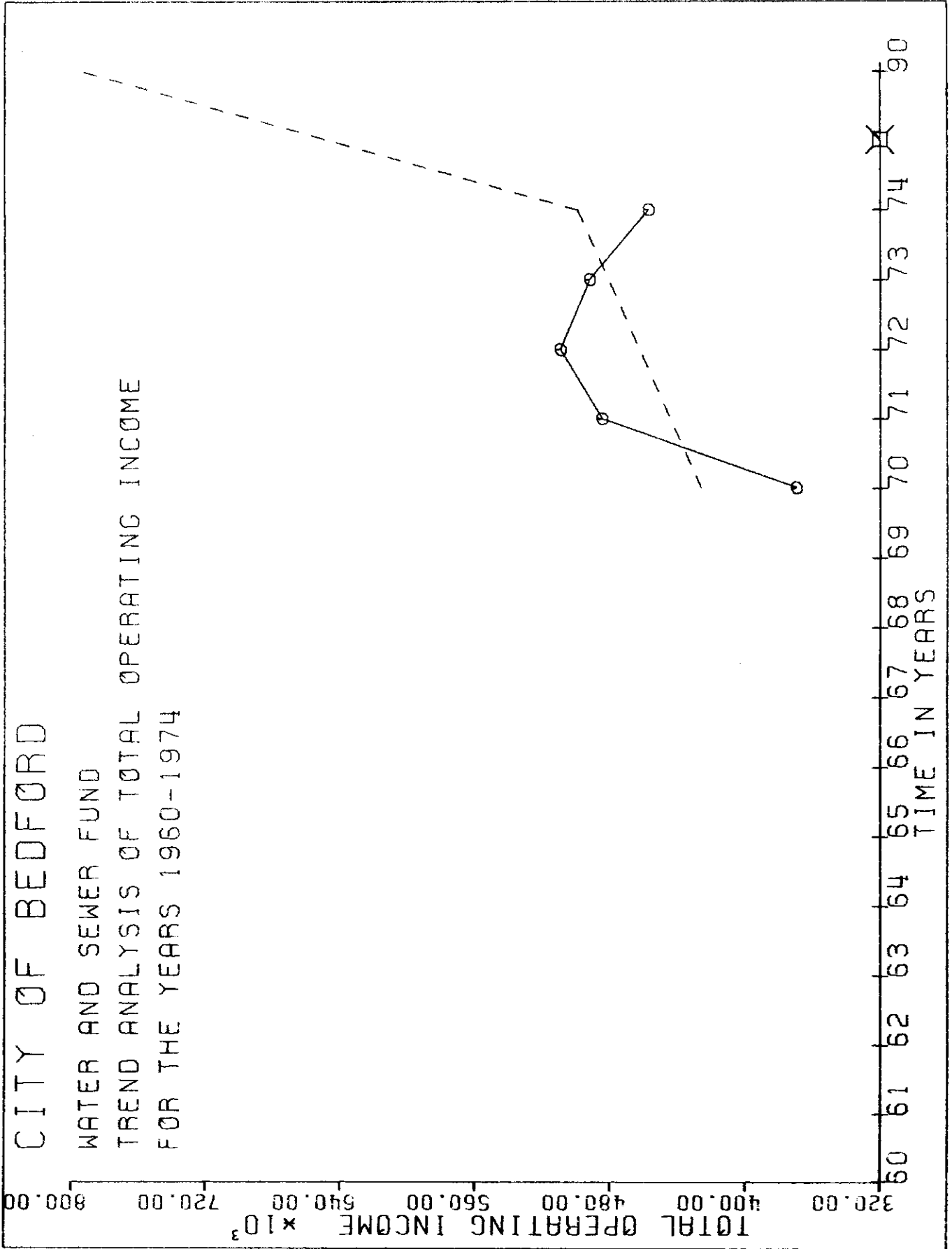


Fig. 27

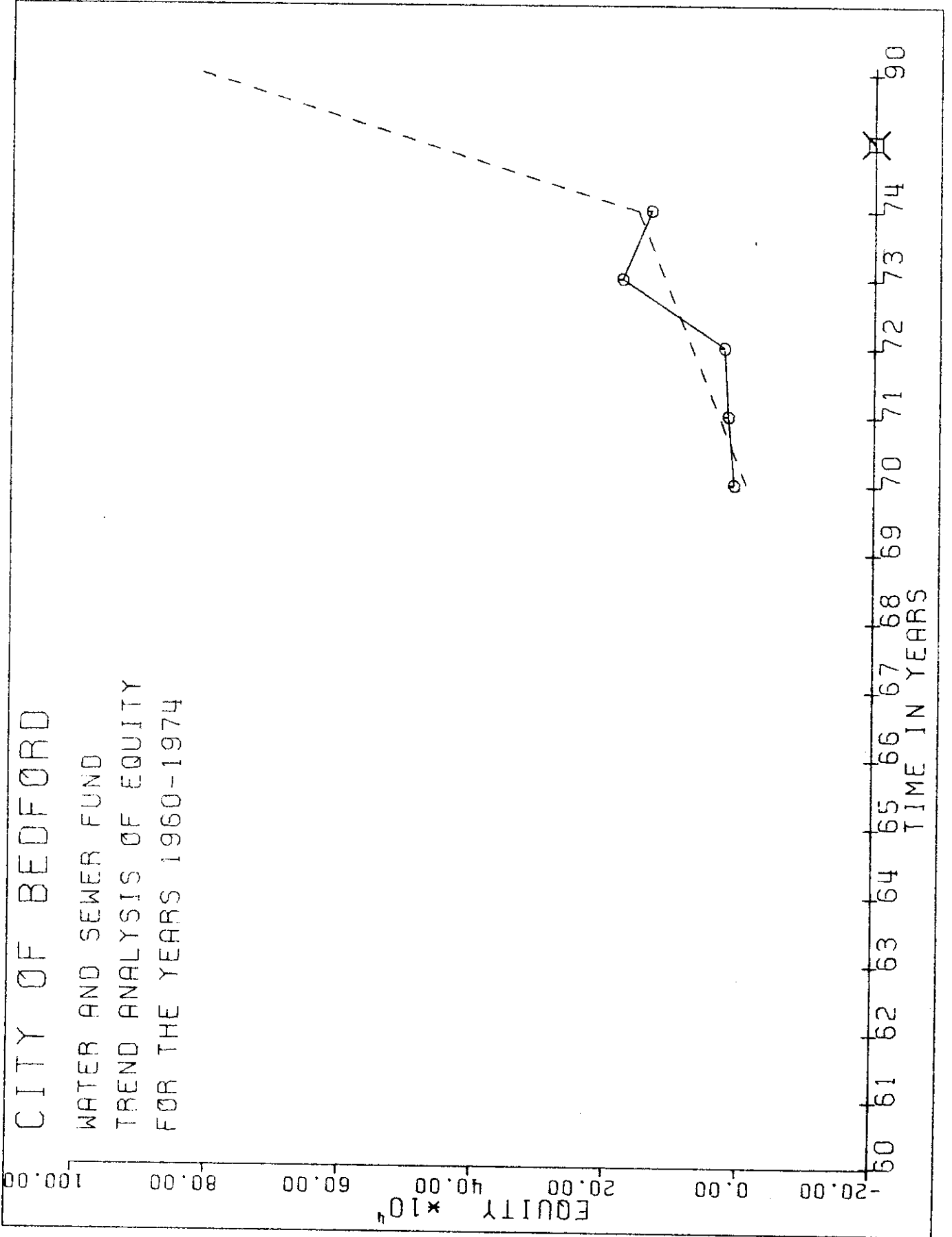


Fig. 28

TABLE LXXXVII

CITY OF BEDFORD, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1970 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	94.24
Other Operating Income	5.76
Nonoperating Income	3.71
Expenses:	
Operating Expenses	39.06
Depreciation	12.77
Bond Interest and Fees	27.67
Special Charges	0.00
Nonoperating Expenses	7.53

TABLE LXXXVIII

CITY OF BEDFORD, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO EQUITY, 1970 - 1974

Capital Structure Element	Percent
Equity	100.00
Long Term Debt:	
Revenue Bonds	12836.10
General Obligation Bonds	0.00
Other Long Term Debt*	2171.90
Reserves and Contributions:	
Reserve for Bond Retirement	0.00
Reserve for Authorized Expenditures	0.00
Contributions	0.00
Federal Grants	0.00
Retained Earnings	487.68

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE LXXXIX

CITY OF BEDFORD
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$ 747,294.93
OTHER OPERATING INCOME.....	\$45,675.07
NONOPERATING INCOME.....	\$29,419.19
TOTAL INCOME.....	<u>\$822,389.19</u>
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$309,734.08
DEPRECIATION.....	\$101,262.27
BOND INTEREST AND FEES.....	\$4,799,955.64
NONOPERATING EXPENSES.....	\$59,710.64
NET WATER AND SEWER SURPLUS (DEFICIT).....	<u><u>\$4,448,273.44DB</u></u>

TABLE XC

CITY OF BEDFORD
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....	\$816,180.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$106,665,680.98
OTHER LONG TERM DEBT.....	\$17,726,613.42
RETAINED EARNINGS.....	<u>\$3,980,346.62</u>
TOTAL CAPITAL STRUCTURE.....	<u><u>\$129,188,821.02</u></u>

TABLE XCI

CITY OF BEDFORD
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$747,294.93
OTHER OPERATING INCOME.....	\$45,675.07
NONOPERATING INCOME.....	\$29,419.19

TOTAL INCOME.....	\$822,389.19
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$309,734.08
DEPRECIATION.....	\$101,262.27
BOND INTEREST AND FEES.....	\$4,770,030.64
NONOPERATING EXPENSES.....	\$55,710.64

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$4,418,348.44DB

TABLE XCII

CITY OF BEDFORD
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....	\$816,180.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$106,000.98
OTHER LONG TERM DEBT.....	\$17,726,613.42

FEDERAL GRANTS.....	\$665,000.00
RETAINED EARNINGS.....	\$3,980,346.62

TOTAL CAPITAL STRUCTURE.....	\$129,188,821.02

TABLE XCIII

CITY OF BEDFORD
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$747,294.93	
OTHER OPERATING INCOME.....	\$45,675.07	
NONOPERATING INCOME.....	\$29,419.19	
TOTAL INCOME.....		\$822,389.19
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$309,734.08	
DEPRECIATION.....	\$101,262.27	
BOND INTEREST AND FEES.....	\$4,884,663.97	
NONOPERATING EXPENSES.....	\$59,710.64	
NET WATER AND SEWER SURPLUS (DEFICIT).....		\$4,532,981.77DB

TABLE XCIV

CITY OF BEDFORD
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....	\$816,180.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$104,765,680.98
OTHER LONG TERM DEBT.....	\$17,726,613.42
RETAINED EARNINGS.....	\$3,980,346.62
STATE GRANTS.....	\$1,900,000.00
TOTAL CAPITAL STRUCTURE.....	\$129,188,821.02

TABLE XCV

CITY OF BEDFORD
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCADITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$747,294.93
OTHER OPERATING INCOME.....	\$45,675.07
NONOPERATING INCOME.....	\$29,419.19
TOTAL INCOME.....	<u>\$822,389.19</u>
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$309,734.08
DEPRECIATION.....	\$101,262.27
BOND INTEREST AND FEES.....	\$4,735,830.64
NONOPERATING EXPENSES.....	\$59,710.64
NET WATER AND SEWER SURPLUS (DEFICIT).....	<u>\$4,384,148.44DB</u>

TABLE XCVI

CITY OF BEDFCRD
 WATER AND SEWER FUND
 PRO FCрма CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCADITION 4

EQUITY.....	\$816,180.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$105,240.98
OTHER LONG TERM DEBT.....	\$17,726,613.42
FEDERAL GRANTS.....	\$1,425,000.00
RETAINED EARNINGS.....	\$3,980,346.62
TOTAL CAPITAL STRUCTURE.....	<u>\$129,188,821.02</u>

APPENDIX J
CITY OF CARROLLTON, TEXAS
DATA ANALYSIS TABLES

TABLE XCVII

SUMMARY INCOME STATEMENT FOR CITY OF CARROLLTON, TEXAS,
WATER AND SEWER FUND, 1964-1974, IN CONSTANT DOLLARS

	1964	1965	1966	1967	1968
Income from operations:					
Water and sewer collections	\$361,329	\$384,312	\$441,726	\$543,740	\$574,910
Other operating income	36,633	25,448	27,009	42,581	42,472
Nonoperating income				58,826	340,498
Total income	\$397,962	\$409,760	\$468,735	\$645,147	\$977,880
Deduct expenses:					
Operating expenses	392,401	417,009	258,090	323,183	324,721
Depreciation	55,130	50,427	47,132	60,272	62,734
Bond interest and fees					
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	(\$ 49,569)	(\$ 57,676)	\$163,513	\$261,692	\$590,425

TABLE XCVII-Continued

	1969	1970	1971	1972	1973
Income from operations:					
Water and sewer collections	\$ 679,501	\$647,473	\$694,820	\$786,129	\$ 966,184
Other operating income	69,208	46,066	76,619	100,081	111,949
Nonoperating income	450,369	299,847			
Total income	\$1,199,078	\$993,387	\$771,439	\$886,210	\$1,078,133
Deduct expenses:					
Operating expenses	439,010	391,378	576,773	590,373	693,961
Depreciation	61,208	62,747	71,408	69,121	72,381
Bond interest and fees					
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 698,860	\$439,262	\$123,259	\$226,717	\$311,791

TABLE XCVII -- Continued

	1974				
Income from operations:					
Water and sewer collections	\$ 931,767				
Other operating income	53,405				
Nonoperating income	33,103				
Total income	\$1,018,276				
Deduct expenses:					
Operating expenses	637,883				
Depreciation	67,477				
Bond interest and fees	86,881				
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 226,034				

TABLE XCVIII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF CARROLLTON, TEXAS,
WATER AND SEWER FUND, 1964-1974, IN CONSTANT DOLLARS

	1964	1965	1966	1967	1968
Equity					
Long term debt:					
Revenue bonds	\$1,390,617	\$1,352,062	\$1,302,157	\$1,264,109	\$1,920,956
General obligation bonds			341,111	820,677	786,597
Other long term debt			4,282	50,989	4,906
Reserves and contributions:					
Reserve for bond retirement	325,051	171,612	106,148	113,228	113,703
Reserve for authorized expenditures			66,943		
Contributions					
Federal grants					
Retained earnings	791,541	802,812	665,864	219,626	288,176
Total Capital Structure	\$2,508,209	\$2,326,486	\$2,486,505	\$2,468,629	\$3,134,238

TABLE XCVIII--Continued

	1969	1970	1971	1972	1973
Equity					
Long term debt:					
Revenue bonds	\$1,831,820	\$1,787,358	\$1,603,041	\$1,386,576	\$1,283,000
General obligation bonds	754,036	640,983	583,628	509,792	477,393
Other long term debt	34,564	80,930	80,784	219,716	164,552
Reserves and contributions:					
Reserve for bond retirement	148,210	158,578	164,484	167,950	179,968
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	483,366	531,681	626,496	751,310	974,604
Total Capital Structure	\$3,251,996	\$3,199,530	\$3,058,434	\$3,035,343	\$3,079,517

TABLE XCVIII--Continued

	1974			
Equity				
Long term debt:				
Revenue bonds	\$1,531,329			
General obligation bonds	835,348			
Other long term debt	554,437			
Reserves and contributions:				
Reserve for bond retirement	162,434			
Reserve for authorized expenditures				
Contributions				
Federal grants				
Retained earnings	1,150,230			
Total Capital Structure	\$4,223,778			

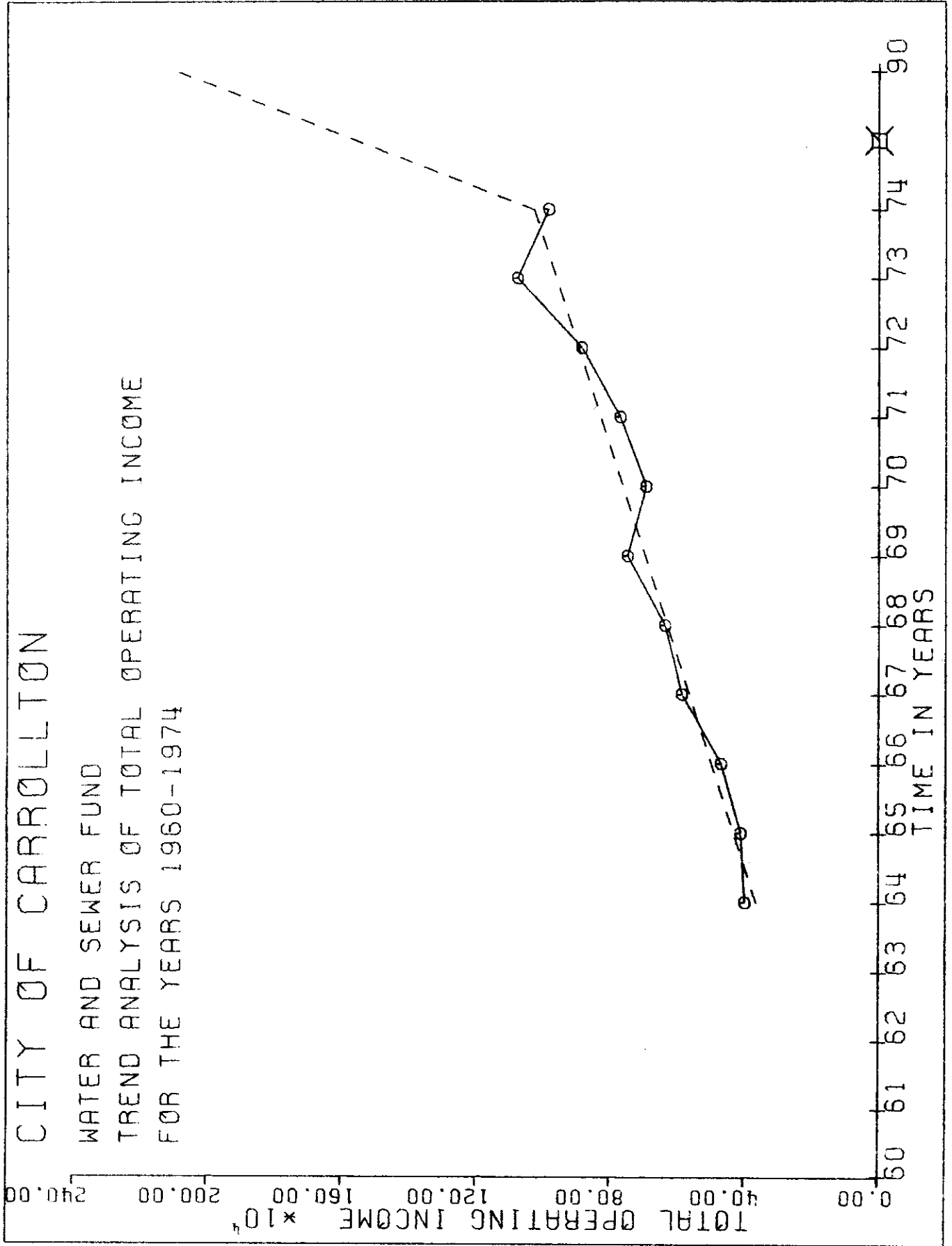


Fig. 29

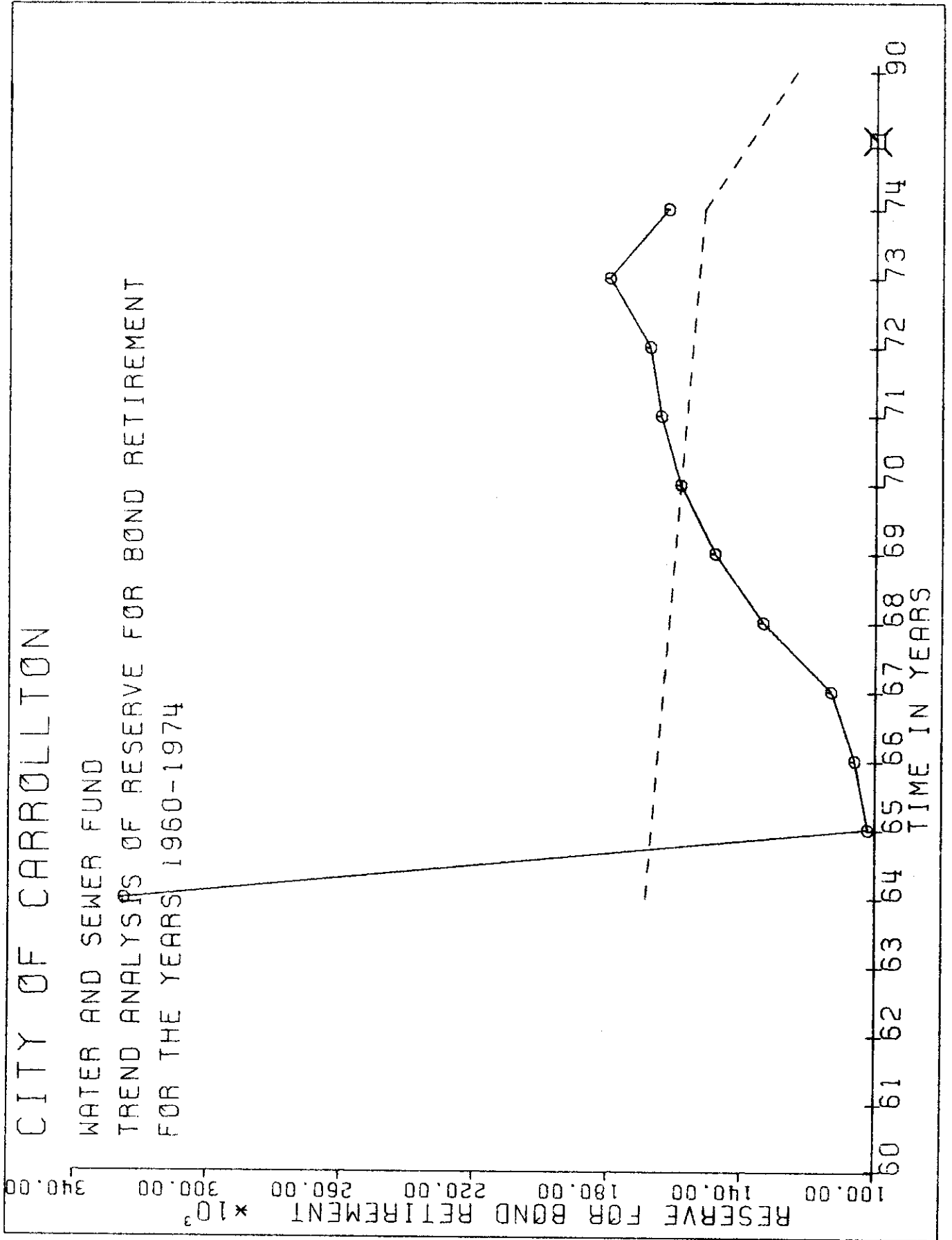


Fig. 30

TABLE IC

CITY OF CARROLLTON, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1964 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	91.99
Other Operating Income	8.00
Nonoperating Income	15.47
Expenses:	
Operating Expenses	69.23
Depreciation	9.48
Bond Interest and Fees	0.80
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE C

CITY OF CARROLLTON, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RESERVE FOR BOND RETIREMENT, 1964 - 1974

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	1,031.91
General Obligation Bonds	336.60
Other Long Term Debt*	66.69
Reserves and Contributions:	
Reserve for Bond Retirement	100.00
Reserve for Authorized Expenditures	11.92
Contributions	0.00
Federal Grants	0.00
Retained Earnings	436.04

*Includes: Trinity River Bonds, Notes Payable, and Amounts Due Other Municipal Funds

TABLE CI

CITY OF CARROLLTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990

ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,920,843.19
OTHER OPERATING INCOME.....	\$167,048.00
NONOPERATING INCOME.....	\$323,029.07
TOTAL INCOME.....	\$2,410,920.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,445,591.63
DEPRECIATION.....	\$197,951.88
BOND INTEREST AND FEES.....	\$134,496.86
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$632,879.89

TABLE CII

CITY OF CARROLLTON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990

ALTERNATIVE CONDITION 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$2,988,819.10
GENERAL OBLIGATION BONDS.....	\$451,300.32
OTHER LONG TERM DEBT.....	\$82,775.63
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$124,120.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$14,795.10
RETAINED EARNINGS.....	\$541,212.85
TOTAL CAPITAL STRUCTURE.....	\$4,203,023.00

TABLE CIII

CITY OF CARROLLTON
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCNDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,920,843.19
OTHER OPERATING INCOME.....	\$167,048.00
NONOPERATING INCOME.....	\$323,029.07

TOTAL INCOME.....	\$2,410,920.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,445,591.63
DEPRECIATION.....	\$197,951.88
BOND INTEREST AND FEES.....	\$107,595.86

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$659,780.89

TABLE CIV

CITY OF CARROLLTON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$2,391,019.10
GENERAL OBLIGATION BONDS.....	\$451,300.32
OTHER LONG TERM DEBT.....	\$82,775.63

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$124,120.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$14,795.10
FEDERAL GRANTS.....	\$597,800.00
RETAINED EARNINGS.....	\$541,212.85

TOTAL CAPITAL STRUCTURE.....	\$4,203,023.00

TABLE CV

CITY OF CARROLLTON
 WATER AND SEWER FUND
 PRO FCRMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,920,843.19
OTHER OPERATING INCOME.....	\$167,048.00
NONOPERATING INCOME.....	\$323,029.07
TOTAL INCOME.....	\$2,410,920.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,445,551.63
DEPRECIATION.....	\$197,951.88
BOND INTEREST AND FEES.....	\$210,645.19
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$556,731.56

TABLE CVI

CITY OF CARROLLTON
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

LONG TERM DEBT:	
REVENUE BONDS.....	\$1,280,819.10
GENERAL OBLIGATION BONDS.....	\$451,300.32
OTHER LONG TERM DEBT.....	\$82,775.63
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$124,120.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$14,795.10
RETAINED EARNINGS.....	\$541,212.85
STATE GRANTS.....	\$1,708,000.00
TOTAL CAPITAL STRUCTURE.....	\$4,203,023.00

TABLE CVII

CITY OF CARROLLTON
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITICN 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,920,843.19
OTHER OPERATING INCOME.....	\$167,048.00
NONOPERATING INCOME.....	\$323,029.07
TOTAL INCOME.....	\$2,410,920.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,445,591.63
DEPRECIATION.....	\$197,551.88
BOND INTEREST AND FEES.....	\$76,851.86
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$690,524.89

TABLE CVIII

CITY CF CARROLLTON
 WATER AND SEWER FLND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITICN 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$1,707,819.10
GENERAL OBLIGATION BONDS.....	\$451,200.32
OTHER LONG TERM DEBT.....	\$82,775.63
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$124,120.00
RESERVE FOR AUTHORIZED EXPENDITURES...	\$14,795.10
FEDERAL GRANTS.....	\$1,281,000.00
RETAINED EARNINGS.....	\$541,212.85
TOTAL CAPITAL STRUCTURE.....	\$4,203,023.00

APPENDIX K
CITY OF CLEBURNE, TEXAS
DATA ANALYSIS TABLES

TABLE CIX

SUMMARY INCOME STATEMENT FOR CITY OF CLEBURNE, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Income from operations:					
Water and sewer collections	\$444,183	\$509,188	\$490,925	\$670,492	\$717,877
Other operating income	29,266	26,649	28,401	31,394	47,060
Nonoperating income				48,240	59,618
Total income	\$473,449	\$535,837	\$519,326	\$750,126	\$824,555
Deduct expenses:					
Operating expenses	277,079	290,985	295,561	315,009	364,875
Depreciation	110,760	112,480	114,262	113,849	115,600
Bond interest and fees	53,046	51,649	50,263	110,353	238,775
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 32,564	\$ 80,723	\$ 59,240	\$210,915	\$105,305

TABLE CIX--Continued

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$703,067	\$696,883	\$708,632	\$781,645	\$767,575
Other operating income	52,369	44,795	37,772	41,042	46,088
Nonoperating income	6,971	11,837	13,644	16,250	17,307
Total income	\$762,407	\$753,515	\$760,048	\$838,937	\$830,970
Deduct expenses:					
Operating expenses	329,440	276,245	321,408	390,755	312,916
Depreciation	194,537	190,512	187,219	187,740	186,109
Bond interest and fees	233,455	222,554	218,020	210,411	203,088
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 4,975	\$ 64,204	\$ 33,399	\$ 50,031	\$128,857

TABLE CIX--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$668,241	\$638,894	\$624,885	\$580,327	\$483,890
Other operating income	42,808	42,156	67,520	72,689	46,261
Nonoperating income	14,877	13,612	2,017	1,591	5,743
Total income	\$725,926	\$694,662	\$694,422	\$654,607	\$535,894
Deduct expenses:					
Operating expenses	328,687	226,665	241,721	323,314	415,324
Depreciation	166,320	156,740	141,178	135,518	109,649
Bond interest and fees	172,505	156,955	144,147	133,250	105,917
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 58,414	\$154,302	\$167,376	\$ 62,525	(\$ 94,994)

TABLE CX

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF CLEBURNE, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Equity					
Long term debt:					
Revenue bonds	\$1,563,494	\$1,518,732	\$1,473,410	\$6,560,047	\$6,482,975
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	124,065	130,278	136,442	183,354	279,411
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	2,120,197	2,187,092	2,199,604	2,276,781	2,243,334
Total Capital Structure	\$3,807,758	\$3,836,103	\$3,809,457	\$9,020,183	\$9,005,721

TABLE CX--Continued

	1965	1966	1967	1968	1969
Equity					
Long term debt:					
Revenue bonds	\$6,340,265	\$6,046,711	\$5,923,337	\$5,721,494	\$5,524,399
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	336,390	386,913	459,034	515,475	475,452
Reserve for authorized expenditures				8,860	
Contributions					
Federal grants					
Retained earnings	2,145,501	2,125,535	2,178,735	2,232,996	2,323,584
Total Capital Structure	\$8,822,157	\$8,559,160	\$8,561,107	\$8,478,826	\$8,323,436

TABLE CX--Continued

	1970	1971	1972	1973	1974
Equity					
Long term debt:					
Revenue bonds	\$4,701,527	\$4,276,713	\$3,909,894	\$3,827,000	\$2,750,202
General obligation bonds			312,291	290,000	206,338
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	430,459	402,373	366,090	361,734	272,313
Reserve for authorized expenditures				75,000	109,138
Contributions				343,100	
Federal grants					
Retained earnings	2,150,018	2,023,883	1,972,125	2,378,576	1,659,699
Total Capital Structure	\$7,282,005	\$6,702,970	\$6,560,402	\$7,275,401	\$4,997,692

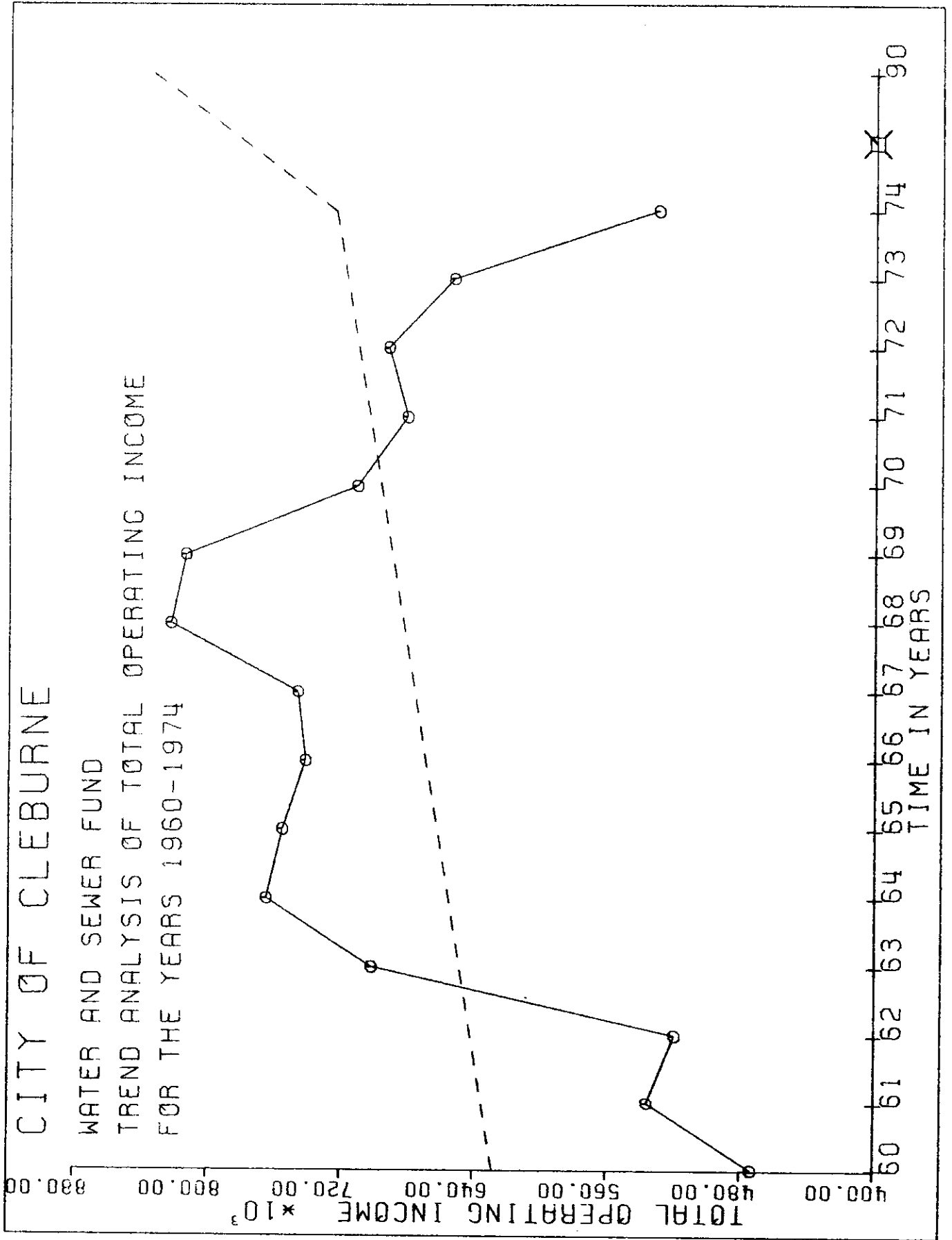


Fig. 31

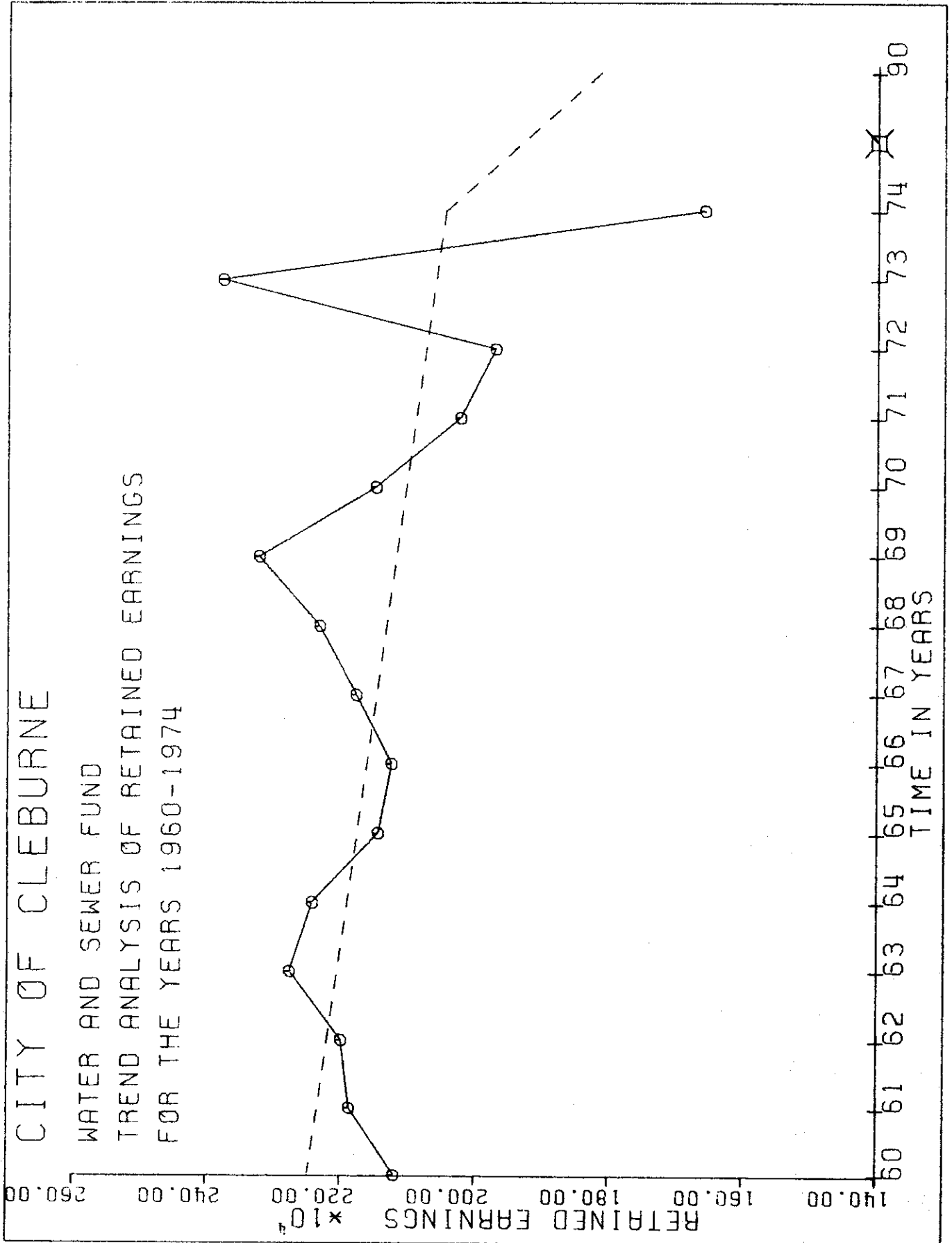


Fig. 32

TABLE CXI

CITY OF CLEBURNE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1960 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	93.48
Other Operating Income	6.52
Nonoperating Income	1.92
Expenses:	
Operating Expenses	47.63
Depreciation	21.88
Bond Interest and Fees	21.78
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE CXII

CITY OF CLEBURNE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RETAINED EARNINGS, 1960 - 1974

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	205.86
General Obligation Bonds	0.00
Other Long Term Debt*	2.70
Reserves and Contributions:	
Reserve for Bond Retirement	15.14
Reserve for Authorized Expenditures	0.03
Contributions	0.65
Federal Grants	0.96
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CXIII

CITY OF CLEBURNE
 WATER AND SEWER FUND
 PRC FCRMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$779,370.80
OTHER OPERATING INCOME.....	\$54,359.19
NONOPERATING INCOME.....	\$16,007.62
TOTAL INCOME.....	\$849,737.61
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$397,105.60
DEPRECIATION.....	\$182,420.12
BOND INTEREST AND FEES.....	\$600,318.79
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$330,106.90DB

TABLE CXIV

CITY OF CLEBURNE
 WATER AND SEWER FUND
 PRC FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$13,340,417.60
OTHER LONG TERM DEBT.....	\$49,032.00
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$274,942.40
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$544.80
CONTRIBUTIONS.....	\$11,804.00
FEDERAL GRANTS.....	\$17,433.60
RETAINED EARNINGS.....	\$1,816,000.00
TOTAL CAPITAL STRUCTURE.....	\$15,510,174.40

TABLE CXV

CITY OF CLEBURNE
 WATER AND SEWER FUND
 PRO FCMA INCCME STATEMENT
 1950
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$779,370.80
OTHER OPERATING INCCME.....	\$54,359.19
NONOPERATING INCOME.....	\$16,007.62
TOTAL INCOME.....	\$849,737.61
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$357,105.60
DEPRECIATION.....	\$182,420.12
BOND INTEREST AND FEES.....	\$449,087.29
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$178,875.40DB

TABLE CXVI

CITY OF CLEBURNE
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1950
 ALTERNATIVE CONDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$9,979,717.60
OTHER LONG TERM DEBT.....	\$49,032.00
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$274,942.40
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$544.80
CONTRIBUTIONS.....	\$11,804.00
FEDERAL GRANTS.....	\$3,378,133.60
RETAINED EARNINGS.....	\$1,816,000.00
TOTAL CAPITAL STRUCTURE.....	\$15,510,174.40

TABLE CXVII

CITY OF CLEBURNE
 WATER AND SEWER FUND
 PRO FCRMA INCCME STATEMENT
 1950
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$779,370.80
OTHER OPERATING INCOME.....	\$54,359.19
NONOPERATING INCOME.....	\$16,007.62
TOTAL INCOME.....	-----
DEDUCT EXPENSES:	\$849,737.61
OPERATING EXPENSES.....	\$397,105.60
DEPRECIATION.....	\$182,420.12
BOND INTEREST AND FEES.....	\$1,028,407.96
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----
	\$758,196.07DB

TABLE CXVIII

CITY OF CLEBURNE
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 1950
 ALTERNATIVE CONDITION 3

LONG TERM DEBT:	
REVENUE BONDS.....	\$2,738,417.60
OTHER LONG TERM DEBT.....	\$49,032.00
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$274,942.40
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$544.80
CONTRIBUTIONS.....	\$11,804.00
FEDERAL GRANTS.....	-----
RETAINED EARNINGS.....	\$17,433.60
STATE GRANTS.....	\$1,816,000.00
TOTAL CAPITAL STRUCTURE.....	\$9,602,000.00

	\$15,510,174.40

TABLE CXIX

CITY OF CLEBURNE
 WATER AND SEWER FUND
 PRO FCMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITICN 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$779,370.80
OTHER OPERATING INCOME.....	\$54,359.19
NONOPERATING INCOME.....	\$16,007.62

TOTAL INCOME.....	\$849,737.61
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$397,105.60
DEPRECIATION.....	\$182,420.12
BOND INTEREST AND FEES.....	\$276,251.29

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$6,039.40DB

TABLE CXX

CITY CF CLEBURNE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUTURE
 1990
 ALTERNATIVE CONDITICN 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$6,138,917.60
OTHER LONG TERM DEBT.....	\$45,032.00

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$274,942.40
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$544.80
CONTRIBUTIONS.....	\$11,804.00

FEDERAL GRANTS.....	\$7,218,933.60
RETAINED EARNINGS.....	\$1,816,000.00

TOTAL CAPITAL STRUTURE.....	\$15,510,174.40

APPENDIX L
CITY OF DUNCANVILLE, TEXAS
DATA ANALYSIS TABLES

TABLE CXXI

SUMMARY INCOME STATEMENT FOR CITY OF DUNCANVILLE, TEXAS,
WATER AND SEWER FUND, 1968-1972, IN CONSTANT DOLLARS

	1968	1969	1970	1971	1972
Income from operations:					
Water and sewer collections	\$491,205	\$640,978	\$629,684	\$713,452	\$766,020
Other operating income					
Nonoperating income	49,660	58,220	26,701	63,206	56,904
Total income	\$540,865	\$699,198	\$656,385	\$776,658	\$822,924
Deduct expenses:					
Operating expenses	235,752	286,992	268,752	336,104	554,122
Depreciation	80,011	91,917	83,869	87,152	83,128
Bond interest and fees					
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$225,102	\$320,289	\$303,764	\$353,402	\$185,674

TABLE CXXII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF DUNCANVILLE, TEXAS,
WATER AND SEWER FUND, 1968-1972, IN CONSTANT DOLLARS

	1968	1969	1970	1971	1972
Equity					
Long term debt:					
Revenue bonds	\$2,732,191	\$2,922,809	\$2,482,998	\$2,605,087	\$2,690,915
General obligation bonds	562,840	524,114	430,605	377,652	316,659
Other long term debt	221,648	217,040	188,010	174,369	156,145
Reserves and contributions:					
Reserve for bond retirement	205,746	230,996	217,419	244,791	258,833
Reserve for authorized expenditures					
Contributions					
Federal grants	75,360	167,858	161,413	149,702	134,056
Retained earnings	847,889	972,382	1,000,900	1,119,317	1,016,813
Total Capital Structure	\$4,645,676	\$5,035,202	\$4,481,347	\$4,670,921	\$4,573,424

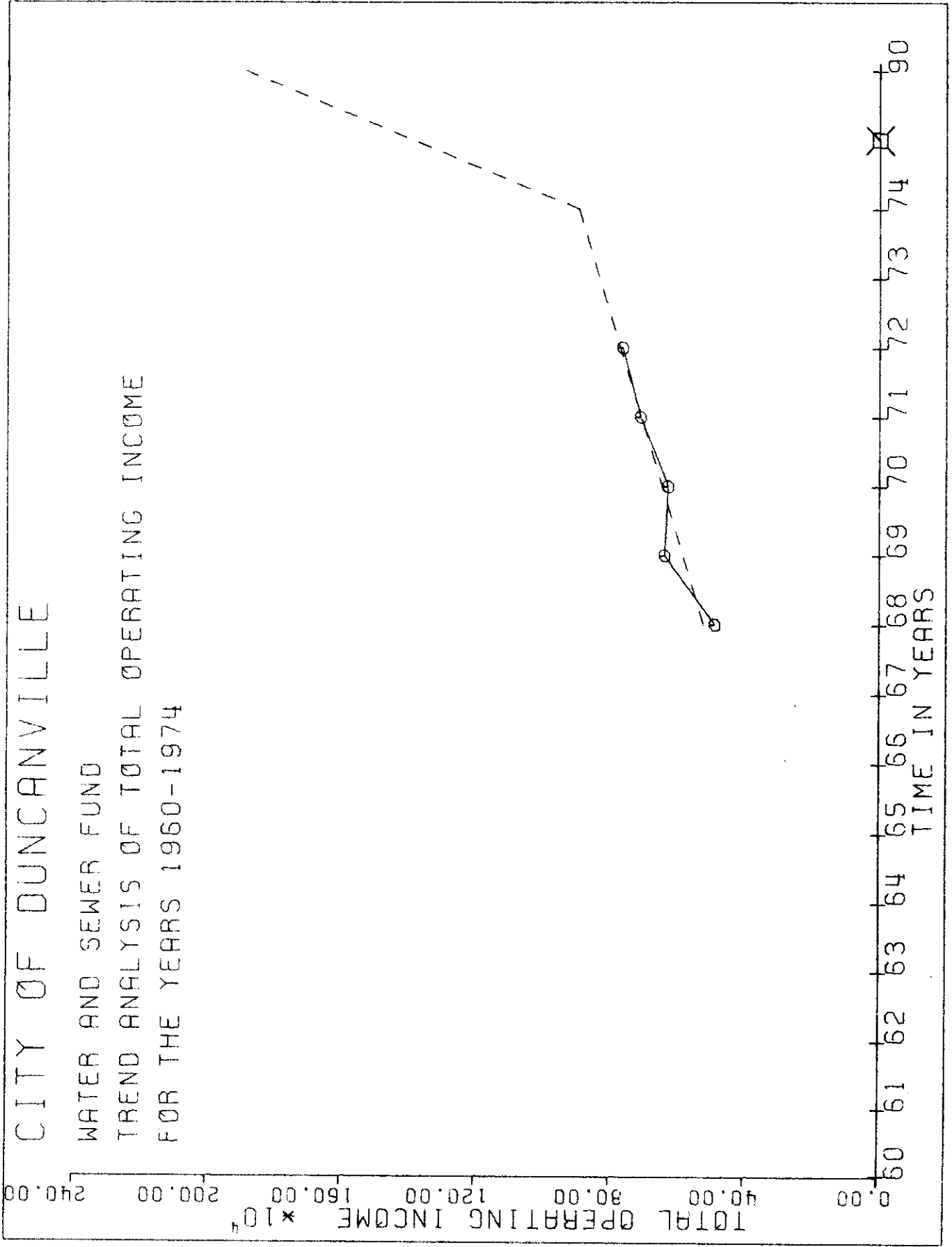


Fig. 33

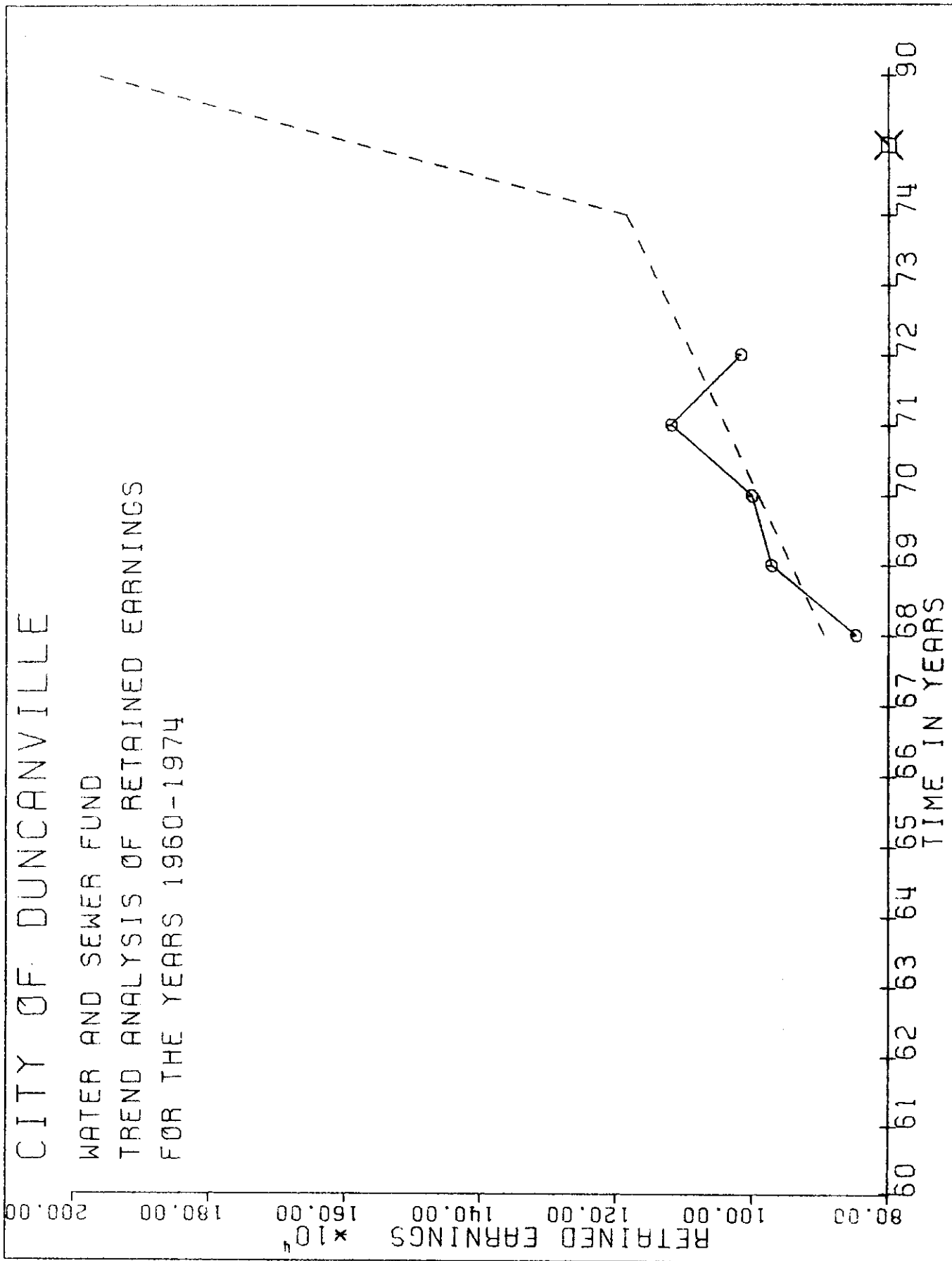


Fig. 34

TABLE CXXIII

CITY OF DUNCANVILLE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1968 - 1972

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	100.00
Other Operating Income	0.00
Nonoperating Income	7.94
Expenses:	
Operating Expenses	50.98
Depreciation	13.40
Bond Interest and Fees	0.00
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE CXXIV

CITY OF DUNCANVILLE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RETAINED EARNINGS, 1968 - 1972

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	273.65
General Obligation Bonds	45.64
Other Long Term Debt*	19.64
Reserves and Contributions:	
Reserve for Bond Retirement	23.42
Reserve for Authorized Expenditures	0.00
Contributions	0.00
Federal Grants	13.77
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CXXV

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FCRMA INCCME STATEMENT
 199C
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,892,500.00
NONOPERATING INCOME.....	\$150,264.50

TOTAL INCOME.....	\$2,042,764.50
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$564,756.50
DEPRECIATION.....	\$253,595.00
BOND INTEREST AND FEES.....	\$528,987.44

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$295,385.56

TABLE CXXVI

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 199C
 ALTERNATIVE CONDITION 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$11,755,276.50
GENERAL OBLIGATION BONDS.....	\$895,000.40
OTHER LONG TERM DEBT.....	\$385,140.40

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$459,266.20
FEDERAL GRANTS.....	\$270,029.70
RETAINED EARNINGS.....	\$1,961,000.00

TOTAL CAPITAL STRUCTURE.....	\$15,725,713.20

TABLE CXXVII

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FCMA INCCME STATEMENT
 195C
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,892,500.00
NONOPERATING INCOME.....	\$150,264.50
TOTAL INCOME.....	-----
DEDUCT EXPENSES:	\$2,042,764.50
OPERATING EXPENSES.....	\$964,796.50
DEPRECIATION.....	\$253,595.00
BOND INTEREST AND FEES.....	\$428,360.69
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----
	\$396,012.31

TABLE CXXVIII

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 195C
 ALTERNATIVE CONDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$9,519,126.50
GENERAL OBLIGATION BONDS.....	\$895,000.40
OTHER LONG TERM DEBT.....	\$385,140.40
RESERVES AND CONTRIBUTIONS:	-----
RESERVE FOR BOND RETIREMENT.....	\$459,266.20
FEDERAL GRANTS.....	\$2,506,179.70
RETAINED EARNINGS.....	\$1,961,000.00
TOTAL CAPITAL STRUCTURE.....	-----
	\$15,725,713.20

TABLE CXXIX

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FCRMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,892,500.00
NONOPERATING INCOME.....	\$150,264.50

TOTAL INCOME.....	\$2,042,764.50
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$564,756.50
DEPRECIATION.....	\$253,595.00
BOND INTEREST AND FEES.....	\$813,830.36

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$10,542.64

TABLE CXXX

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

LONG TERM DEBT:	
REVENUE BONDS.....	\$5,366,276.50
GENERAL OBLIGATION BONDS.....	\$895,000.40
OTHER LONG TERM DEBT.....	\$385,140.40

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$455,266.20
FEDERAL GRANTS.....	\$270,029.70
RETAINED EARNINGS.....	\$1,961,000.00
STATE GRANTS.....	\$6,389,000.00

TOTAL CAPITAL STRUCTURE.....	\$15,725,713.20

TABLE CXXXI

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCADITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,892,500.00
NONOPERATING INCOME.....	\$150,264.50

TOTAL INCOME.....	\$2,042,764.50
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$964,796.50
DEPRECIATION.....	\$253,595.00
BOND INTEREST AND FEES.....	\$313,358.69

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$511,014.31

TABLE CXXXII

CITY OF DUNCANVILLE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCADITION 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$6,963,526.50
GENERAL OBLIGATION BONDS.....	\$895,000.40
OTHER LONG TERM DEBT.....	\$385,140.40

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$459,266.20
FEDERAL GRANTS.....	\$5,061,779.70
RETAINED EARNINGS.....	\$1,961,000.00

TOTAL CAPITAL STRUCTURE.....	\$15,725,713.20

APPENDIX M
CITY OF ENNIS, TEXAS
DATA ANALYSIS TABLES

TABLE CXXXIII

SUMMARY INCOME STATEMENT FOR CITY OF ENNIS, TEXAS,
WATER AND SEWER FUND, 1967-1974, IN CONSTANT DOLLARS

	1967	1968	1969	1970	1971
Income from operations:					
Water and sewer collections	\$537,017	\$536,359	\$530,782	\$537,443	\$497,260
Other operating income					
Nonoperating income	17,522	14,973	20,355	12,692	10,334
Total income	\$554,539	\$551,332	\$551,137	\$550,135	\$507,594
Deduct expenses:					
Operating expenses	421,258	427,853	419,595	399,467	372,102
Depreciation	118,388	121,916	119,842	106,152	89,268
Bond interest and fees	81,723	78,551	73,177	56,916	53,323
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	(\$ 66,830)	(\$ 76,988)	(\$ 61,477)	(\$ 12,400)	(\$ 7,099)

TABLE CXXXIII--Continued

	1972	1973	1974
Income from operations:			
Water and sewer collections	\$473,851	\$452,416	\$380,638
Other operating income	8,653	9,841	12,475
Nonoperating income			
Total income	\$482,504	\$462,257	\$339,113
Deduct expenses:			
Operating expenses	338,559	371,195	432,932
Depreciation	80,760	75,939	69,468
Bond interest and fees	46,384	38,204	23,646
Special charges			
Nonoperating expenses			
Net water and sewer surplus (deficit)	\$ 16,801	(\$ 23,081)	(\$ 76,933)

TABLE CXXXIV

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF ENNIS, TEXAS,
WATER AND SEWER FUND, 1967-1974, IN CONSTANT DOLLARS

	1967	1968	1969	1970	1971
Equity		\$ 112,897	\$ 98,280	\$ 56,403	\$ 34,873
Long term debt:					
Revenue bonds	\$1,442,322	1,381,610	1,316,711	1,071,662	959,034
General obligation bonds	130,467				
Other long term debt	19,509	15,344	10,302	8,723	17,688
Reserves and contributions:					
Reserve for bond retirement	174,081	173,101	174,539	131,795	128,655
Reserve for authorized expenditures					
Contributions	216,491	211,815	207,410	200,867	188,464
Federal grants	208,192	203,695	199,460	172,782	160,245
Retained earnings	1,130,341	1,003,961	899,904	820,598	764,974
Total Capital Structure	\$3,321,406	\$3,102,425	\$2,906,608	\$2,462,833	\$2,253,938

TABLE CXXXIV--Continued

	1972	1973	1974
Equity	\$ 15,614		
Long term debt:			
Revenue bonds	822,368	\$ 760,000	\$ 722,186
General obligation bonds			
Other long term debt	15,722	15,104	11,130
Reserves and contributions:			
Reserve for bond retirement	108,745	100,566	84,173
Reserve for authorized expenditures			
Contributions	168,767	162,125	119,473
Federal grants	143,498	137,850	344,961
Retained earnings	724,323	671,626	474,499
Total Capital Structure	\$1,999,040	\$1,847,271	\$1,756,425

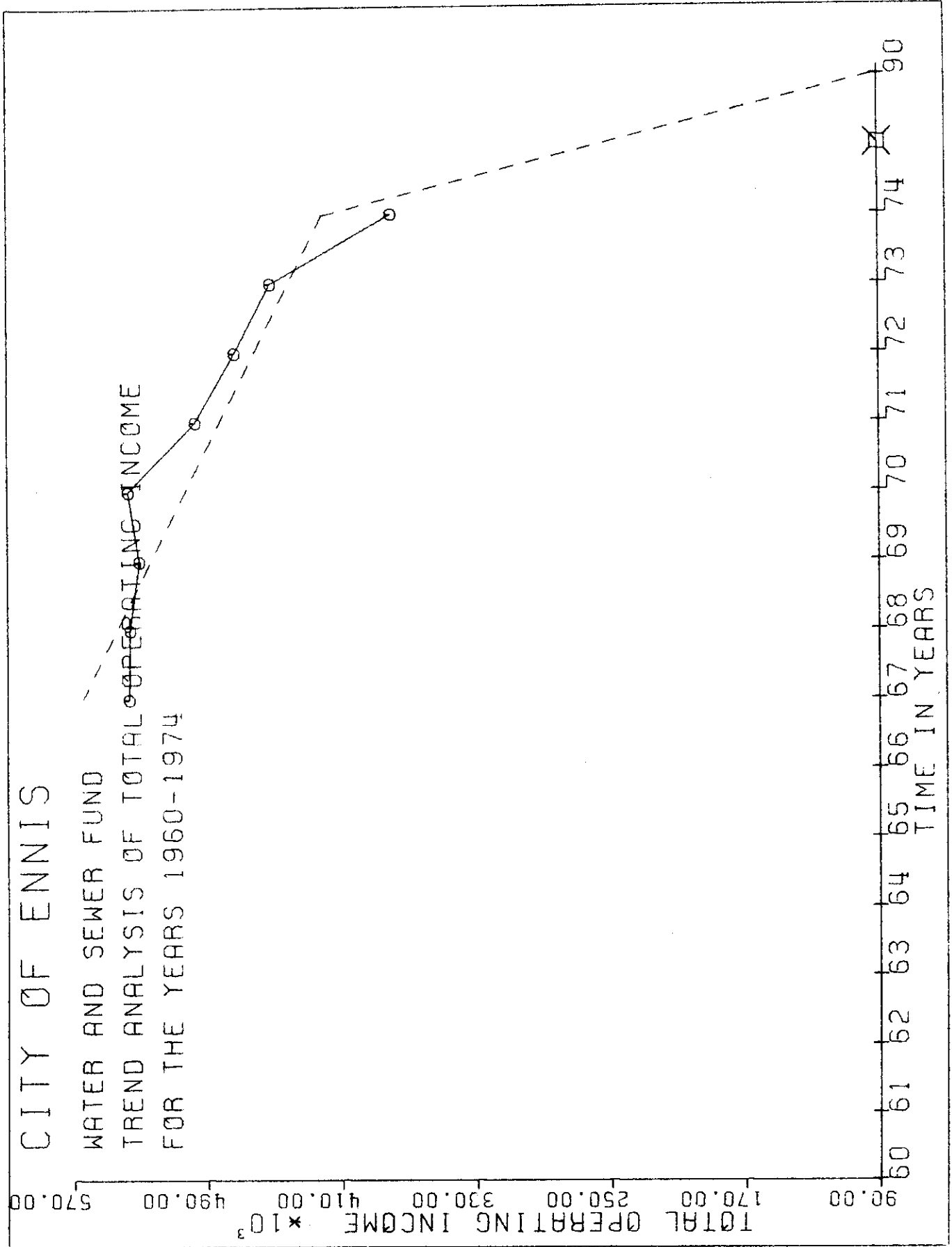


Fig. 35

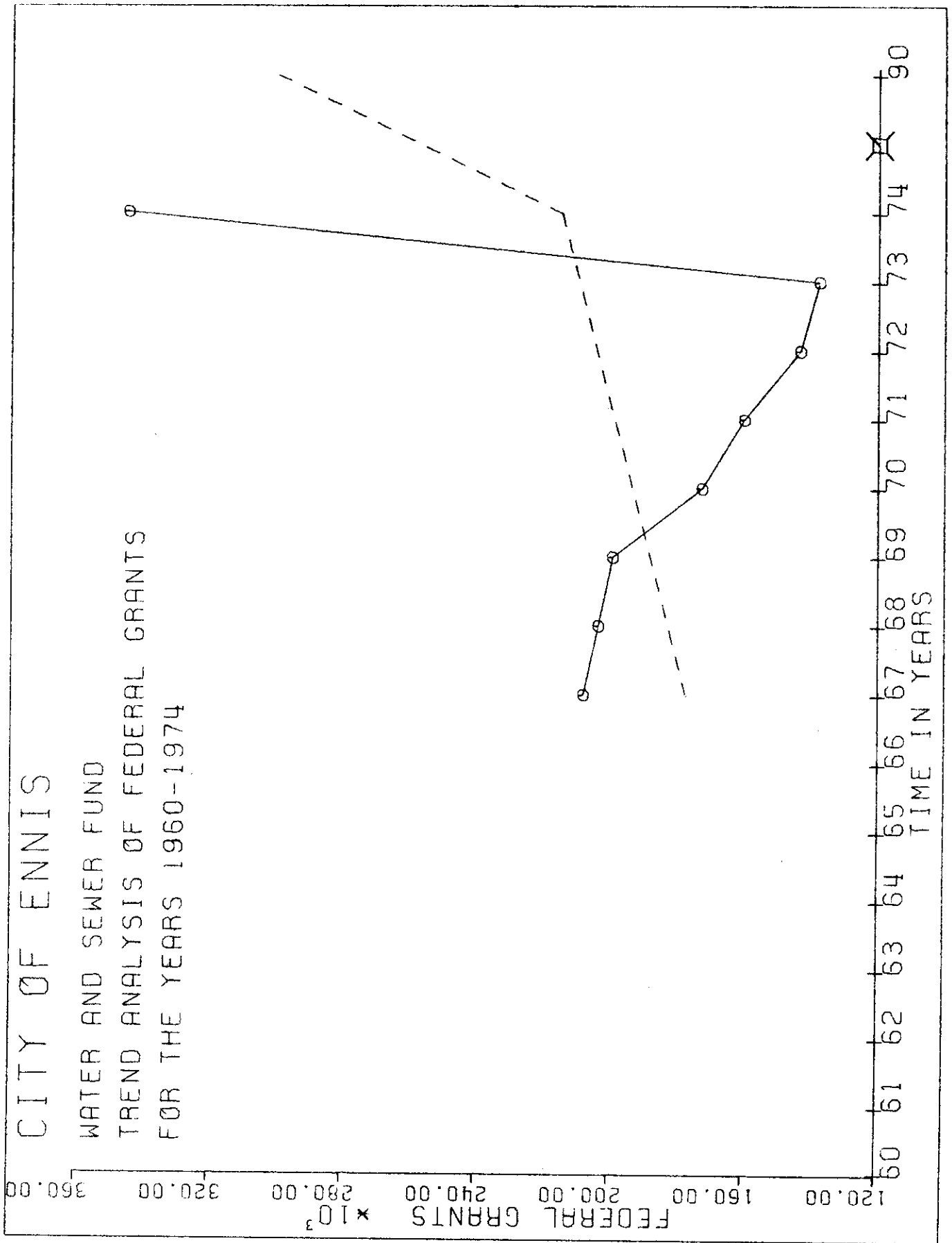


Fig. 36

TABLE CXXXV

CITY OF ENNIS, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1967 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	100.00
Other Operating Income	0.00
Nonoperating Income	2.70
Expenses:	
Operating Expenses	78.10
Depreciation	19.64
Bond Interest and Fees	11.18
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE CXXXVI

CITY OF ENNIS, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO FEDERAL GRANTS, 1967 - 1974

Capital Structure Element	Percent
Equity	21.25
Long Term Debt:	
Revenue Bonds	572.96
General Obligation Bonds	7.83
Other Long Term Debt*	7.91
Reserves and Contributions:	
Reserve for Bond Retirement	73.23
Reserve for Authorized Expenditures	0.00
Contributions	101.96
Federal Grants	100.00
Retained Earnings	446.10

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CXXXVII

CITY OF ENNIS
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCNDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$92,694.00
NONOPERATING INCOME.....	\$2,502.74

TOTAL INCOME.....	\$95,196.74
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$72,394.01
DEPRECIATION.....	\$18,205.10
BOND INTEREST AND FEES.....	\$369,694.21

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$365,096.58DB

TABLE CXXXVIII

CITY OF ENNIS
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNDITION 1

EQUITY.....		\$63,807.38
LONG TERM DEBT:		
REVENUE BONDS.....	\$8,215,426.99	
GENERAL OBLIGATION BONDS.....	\$23,511.14	
OTHER LONG TERM DEBT.....	\$23,751.36	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$219,887.72	
CONTRIBUTIONS.....	\$306,155.29	

FEDERAL GRANTS.....		\$300,270.00
RETAINED EARNINGS.....		\$1,339,504.47

TOTAL CAPITAL STRUCTURE.....		\$10,492,314.35

TABLE CXXXIX

CITY OF ENNIS
 WATER AND SEWER FUND
 PRO FCRMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$92,694.00
NONOPERATING INCOME.....	\$2,502.74

TOTAL INCOME.....	\$95,196.74
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$72,354.01
DEPRECIATION.....	\$18,205.10
BOND INTEREST AND FEES.....	\$267,397.96

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$262,800.33DB

TABLE CXL

CITY OF ENNIS
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....		\$63,807.38
LONG TERM DEBT:		
REVENUE BONDS.....	\$5,942,176.99	
GENERAL OBLIGATION BONDS.....	\$23,511.14	
OTHER LONG TERM DEBT.....	\$23,751.36	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$219,887.72	
CONTRIBUTIONS.....	\$306,155.29	

FEDERAL GRANTS.....		\$2,573,520.00
RETAINED EARNINGS.....		\$1,339,504.47

TOTAL CAPITAL STRUCTURE.....		\$10,492,314.35

TABLE CXLI

CITY OF ENNIS
 WATER AND SEWER FUND
 PRC FCMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$ 92,694.00
NONOPERATING INCOME.....	\$2,502.74

TOTAL INCOME.....	\$95,196.74
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$72,394.01
DEPRECIATION.....	\$18,205.10
BOND INTEREST AND FEES.....	\$659,262.96
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----
	\$654,665.33DB

TABLE CXLII

CITY OF ENNIS
 WATER AND SEWER FUND
 PRG FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....		\$63,807.38
LONG TERM DEBT:		
REVENUE BONDS.....	\$1,720,426.99	
GENERAL OBLIGATION BONDS.....	\$23,511.14	
OTHER LONG TERM DEBT.....	\$23,751.36	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$219,887.72	
CONTRIBUTIONS.....	\$306,155.29	

FEDERAL GRANTS.....		\$300,270.00
RETAINED EARNINGS.....		\$1,339,504.47
STATE GRANTS.....		\$6,495,000.00

TOTAL CAPITAL STRUCTURE.....		\$10,492,314.35

TABLE CXLIII

CITY OF ENNIS
 WATER AND SEWER FUND
 PRC FCRMA INCCME STATEMENT
 159C
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$92,694.00
NONOPERATING INCOME.....	\$2,502.74
TOTAL INCOME.....	<u>\$95,196.74</u>
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$72,394.01
DEPRECIATION.....	\$18,205.10
BOND INTEREST AND FEES.....	\$150,487.96
NET WATER AND SEWER SURPLUS (DEFICIT).....	<u>\$145,890.33DB</u>

TABLE CXLIV

CITY OF ENNIS
 WATER AND SEWER FUND
 PRC FCRMA CAPITAL STRUCTURE
 159C
 ALTERNATIVE CONDITION 4

EQUITY.....		\$63,807.38
LONG TERM DEBT:		
REVENUE BONDS.....	\$3,344,176.99	
GENERAL OBLIGATION BONDS.....	\$23,511.14	
OTHER LONG TERM DEBT.....	\$23,751.36	
RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$219,887.72	
CONTRIBUTIONS.....	\$306,155.29	
FEDERAL GRANTS.....	\$5,171,520.00	
RETAINED EARNINGS.....	\$1,339,504.47	
TOTAL CAPITAL STRUCTURE.....	<u>\$10,492,314.35</u>	

APPENDIX N
CITY OF HIGHLAND PARK, TEXAS
DATA ANALYSIS TABLES

TABLE CXLV

SUMMARY INCOME STATEMENT FOR CITY OF HIGHLAND PARK, TEXAS
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Income from operations:					
Water and sewer collections	\$581,448	\$606,693	\$576,237	\$688,956	\$763,778
Other operating income	16,084	12,101	10,846	15,490	17,008
Nonoperating income	12,729	5,510	7,638	6,570	6,812
Total income	\$610,260	\$624,304	\$594,721	\$711,016	\$787,548
Deduct expenses:					
Operating expenses	430,889	461,310	439,930	503,312	542,446
Depreciation	30,244	31,036	28,026	20,372	20,919
Bond interest and fees					
Special charges					
Nonoperating expenses	855	849	826		1,124
Net water and sewer surplus (deficit)	\$148,272	\$131,109	\$125,939	\$187,332	\$223,109

TABLE CXLV--Continued

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$616,044	\$537,188	\$597,525	\$499,605	\$662,672
Other operating income	18,224	15,847	14,772	12,866	17,913
Nonoperating income	7,033	7,766	8,236	7,973	8,656
Total income	\$641,301	\$560,801	\$620,533	\$520,444	\$689,241
Deduct expenses:					
Operating expenses	491,393	443,884	469,307	432,738	483,586
Depreciation	27,086	26,697	15,864	4,101	4,784
Bond interest and fees					
Special charges					
Nonoperating expenses	1,110	1,069	1,057	1,034	868
Net water and sewer surplus (deficit)	\$121,712	\$ 89,151	\$134,305	\$ 82,571	\$200,003

TABLE CXLV--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$618,535	\$589,310	\$560,308	\$429,123	\$444,654
Other operating income	14,860	14,646	15,361	6,994	3,368
Nonoperating income	9,355	9,647	7,340	8,566	10,901
Total income	\$642,750	\$613,603	\$583,008	\$494,683	\$458,923
Deduct expenses:					
Operating expenses	455,593	450,416	417,866	382,071	347,926
Depreciation	8,745	7,444	4,349	25,552	20,383
Bond interest and fees					
Special charges					
Nonoperating expenses	752	697	625		
Net water and sewer surplus (deficit)	\$177,660	\$155,046	\$155,168	\$ 82,060	\$ 90,614

TABLE CXLVI

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF HIGHLAND PARK, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Equity					
Long term debt:					
Revenue bonds					
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement					
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	\$379,108	\$339,578	\$288,222	\$354,612	\$454,858
Total Capital Structure	\$379,108	\$339,578	\$288,222	\$354,612	\$454,858

TABLE CXLVI--Continued

	1965	1966	1967	1968	1969
Equity					
Long term debt:					
Revenue bonds					
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement					
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	\$333,137	\$295,500	\$275,625	\$270,972	\$356,822
Total Capital Structure	\$333,137	\$295,500	\$275,625	\$270,972	\$356,822

TABLE CXLVI -- Continued

	1970	1971	1972	1973	1974
Equity					
Long term debt:					
Revenue bonds					
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement					
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	\$392,749	\$373,988	\$438,022	\$377,841	\$295,362
Total Capital Structure	\$392,749	\$373,988	\$438,022	\$377,841	\$295,362

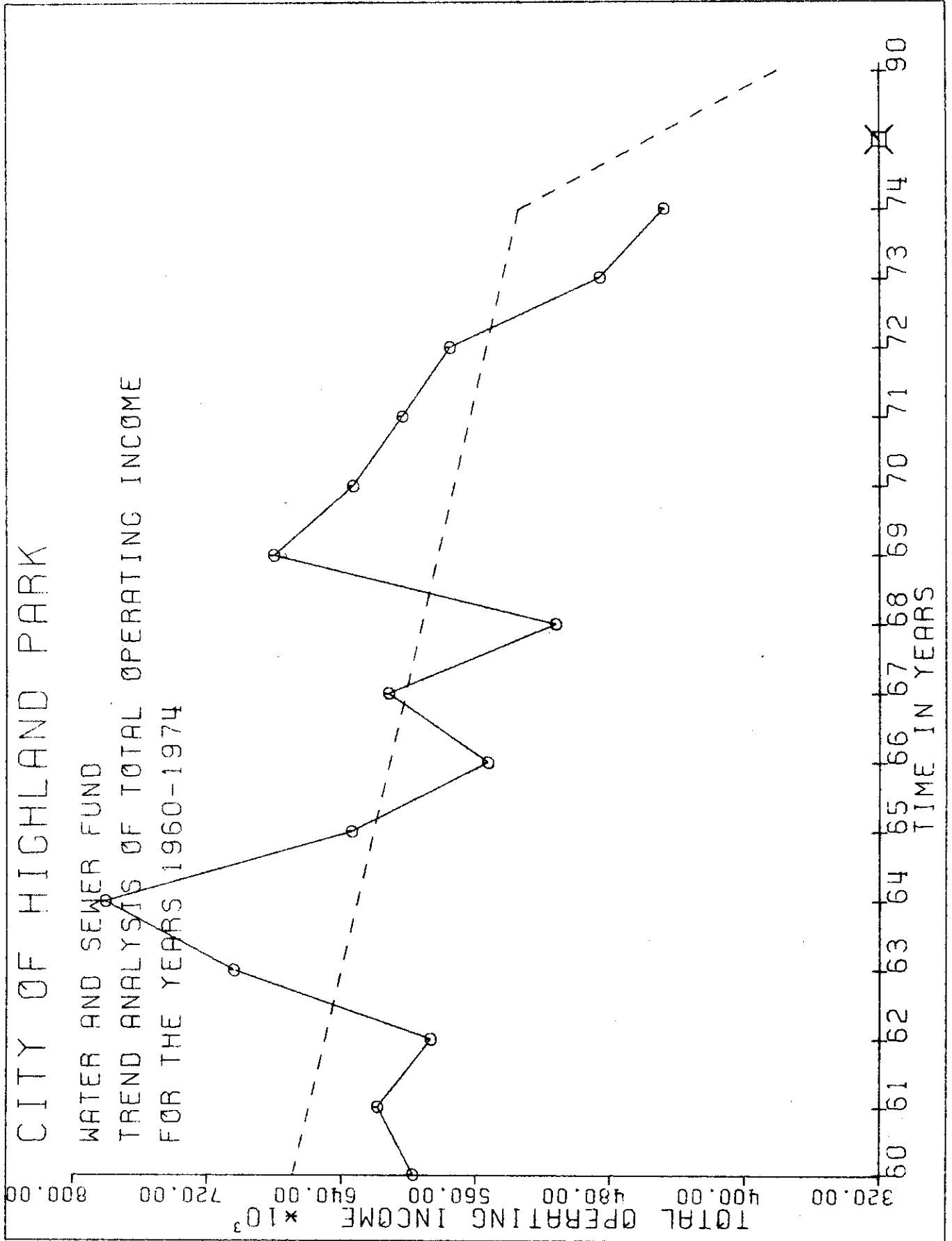


Fig. 37

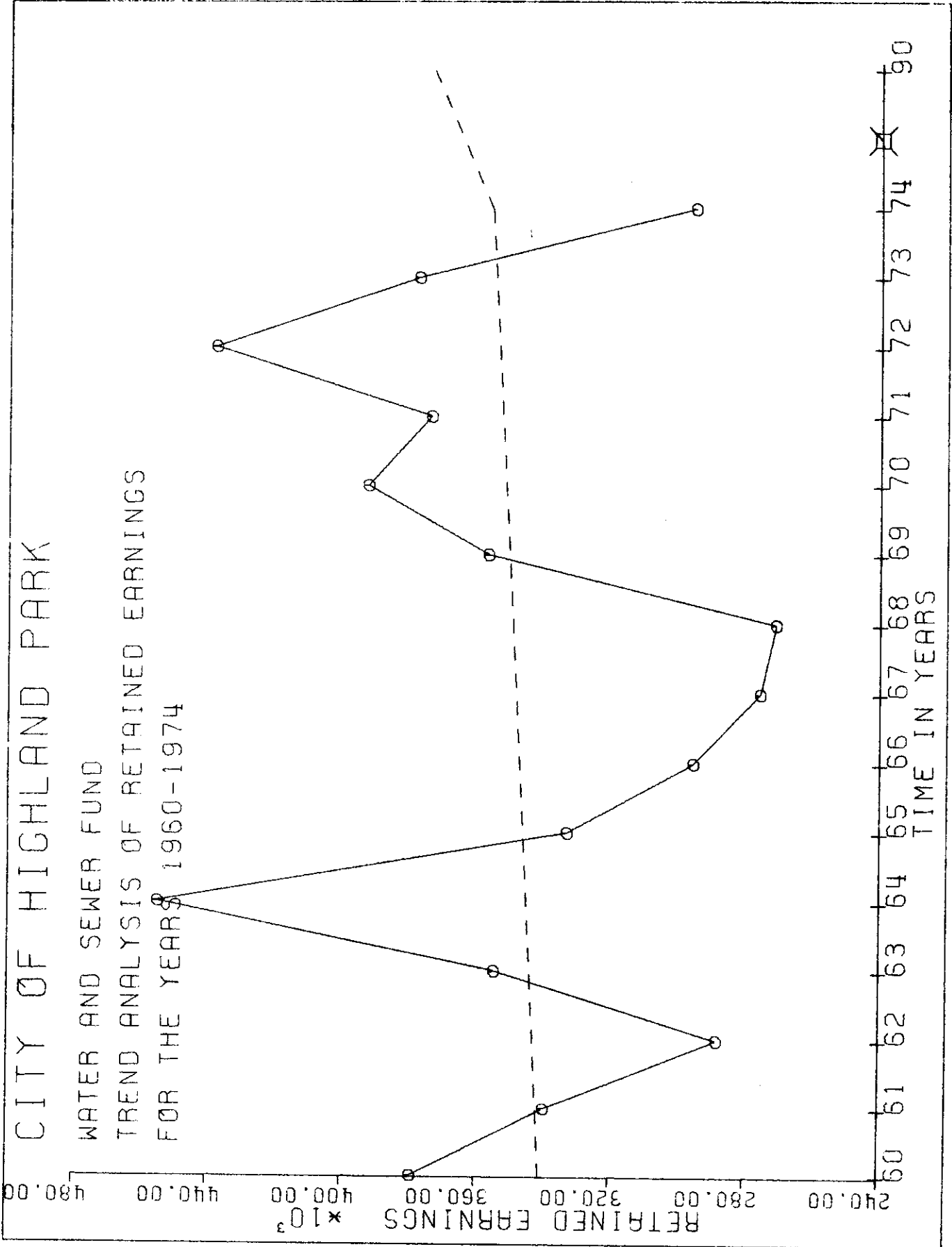


Fig. 38

TABLE CXLVII

CITY OF HIGHLAND PARK, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1960 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	97.75
Other Operating Income	2.25
Nonoperating Income	2.64
Expenses:	
Operating Expenses	75.25
Depreciation	3.18
Bond Interest and Fees	0.00
Special Charges	0.00
Nonoperating Expenses	0.13

TABLE CXLVIII

CITY OF HIGHLAND PARK, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RETAINED EARNINGS, 1960 - 1974

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	0.00
General Obligation Bonds	0.00
Other Long Term Debt*	0.00
Reserves and Contributions:	
Reserve for Bond Retirement	0.00
Reserve for Authorized Expenditures	0.00
Contributions	0.00
Federal Grants	0.00
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CIL

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRO FCMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$372,222.23
OTHER OPERATING INCOME.....	\$8,567.78
NONOPERATING INCOME.....	\$10,052.86

TOTAL INCOME.....	\$390,842.87
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$286,544.48
DEPRECIATION.....	\$12,109.12
BOND INTEREST AND FEES.....	\$169,200.00
NONOPERATING EXPENSES.....	\$495.03

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$77,505.76DB

TABLE CL

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNDITICN 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$3,760,000.00
RETAINED EARNINGS.....	\$373,590.00

TOTAL CAPITAL STRUCTURE.....	\$4,133,590.00

TABLE CLI

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CCNDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$372,222.23
OTHER OPERATING INCOME.....	\$8,567.78
NONOPERATING INCOME.....	\$10,052.86

TOTAL INCOME.....	\$390,842.87
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$286,544.48
DEPRECIATION.....	\$12,109.12
BOND INTEREST AND FEES.....	\$109,980.00
NONOPERATING EXPENSES.....	\$495.03

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$18,285,76DR

TABLE CLII

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$2,444,000.00
FEDERAL GRANTS.....	\$1,316,000.00
RETAINED EARNINGS.....	\$373,590.00

TOTAL CAPITAL STRUCTURE.....	\$4,133,590.00

TABLE CLIII

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$372,222.23
OTHER OPERATING INCOME.....	\$8,567.78
NONOPERATING INCOME.....	\$10,052.86

TOTAL INCOME.....	\$390,842.87
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$286,544.48
DEPRECIATION.....	\$12,109.12
BOND INTEREST AND FEES.....	\$336,833.33
NONOPERATING EXPENSES.....	\$495.03

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$245,139.09DR

TABLE CLIV

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

RETAINED EARNINGS.....	\$373,590.00
STATE GRANTS.....	\$3,760,000.00

TOTAL CAPITAL STRUCTURE.....	\$4,133,590.00

TABLE CLV

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCNDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$372,222.23
OTHER OPERATING INCOME.....	\$8,567.78
NONOPERATING INCOME.....	\$10,052.86

TOTAL INCOME.....	\$390,842.87
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$286,544.48
DEPRECIATION.....	\$12,109.12
BOND INTEREST AND FEES.....	\$42,300.00
NONOPERATING EXPENSES.....	\$495.03

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$49,394.24

TABLE CLVI

CITY OF HIGHLAND PARK
 WATER AND SEWER FUND
 PRC FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNDITION 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$540,000.00
FEDERAL GRANTS.....	\$2,820,000.00
RETAINED EARNINGS.....	\$373,590.00

TOTAL CAPITAL STRUCTURE.....	\$4,133,590.00

APPENDIX O
CITY OF MCKINNEY, TEXAS
DATA ANALYSIS TABLES

TABLE CLVII

SUMMARY INCOME STATEMENT FOR CITY OF MCKINNEY, TEXAS
WATER AND SEWER FUND, 1964-1974, IN CONSTANT DOLLARS

	1964	1965	1966	1967	1968
Income from operations:					
Water and sewer collections	\$660,551	\$702,291	\$675,371	\$729,090	\$684,010
Other operating income	34,152	30,011	34,396	31,082	35,779
Nonoperating income	2,950	1,861	1,008	3,005	14,927
Total income	\$697,653	\$734,163	\$710,775	\$762,177	\$734,716
Deduct expenses:					
Operating expenses	387,297	455,559	445,237	458,920	493,084
Depreciation	84,505	126,316	125,406	128,210	129,319
Bond interest and fees					76,738
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$225,351	\$152,288	\$140,132	\$175,047	\$ 35,757

TABLE CLVII -- Continued

	1969	1970	1971	1972	1973
Income from operations:					
Water and sewer collections	\$721,769	\$687,639	\$712,334	\$686,420	\$651,922
Other operating income	62,126	41,641	51,858	59,454	74,675
Nonoperating income	15,081	12,341	14,932	15,793	13,233
Total income	\$798,976	\$741,621	\$779,124	\$761,667	\$739,830
Deduct expenses:					
Operating expenses	491,844	491,511	511,099	478,700	538,801
Depreciation	127,682	114,472	107,163	97,251	93,423
Bond interest and fees	69,372	58,253	56,133	44,947	40,772
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$110,078	\$ 77,385	\$104,728	\$140,769	\$ 66,834

TABLE CLVII -- Continued

	1974				
Income from operations:					
Water and sewer collections	\$495,882				
Other operating income	56,163				
Nonoperating income	41,504				
Total income	\$593,549				
Deduct expenses:					
Operating expenses	416,116				
Depreciation	71,841				
Bond interest and fees	53,443				
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 52,149				

TABLE CLVIII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF MCKINNEY, TEXAS,
WATER AND SEWER FUND, 1964-1974, IN CONSTANT DOLLARS

	1964	1965	1966	1967	1968
Equity					\$ 204,655
Long term debt:					
Revenue bonds	\$2,062,054	\$2,518,510	\$2,343,589	\$2,231,446	2,053,945
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	35,312	64,004	93,517	124,054	238,938
Reserve for authorized expenditures	1,376,442	458,355	366,171	253,007	108,755
Contributions					
Federal grants					90,589
Retained earnings	3,658,537	5,051,176	4,901,979	4,883,888	\$2,309,659
Total Capital Structure	\$7,132,347	\$8,092,047	\$7,705,257	\$7,492,396	\$5,006,544

TABLE CLVIII--Continued

	1969	1970	1971	1972	1973
Equity	\$ 332,683	\$ 288,186	\$ 267,277	\$ 239,343	\$ 229,923
Long term debt:					
Revenue bonds	1,924,424	1,585,559	1,389,147	1,165,889	1,045,000
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	245,928	223,012	215,152	191,243	185,566
Reserve for authorized expenditures	71,600	29,423	198	30,742	29,532
Contributions					
Federal grants	88,705	76,841	71,266	63,817	61,306
Retained earnings	2,352,845	2,071,266	1,979,087	1,770,043	1,756,395
Total Capital Structure	\$5,016,188	\$4,274,290	\$3,922,130	\$3,461,079	\$3,307,722

TABLE CLVIII--Continued

	1974			
Equity	\$ 194,374			
Long term debt:				
Revenue bonds				
General obligation bonds	1,274,879			
Other long term debt				
Reserves and contributions:				
Reserve for bond retirement	156,848			
Reserve for authorized expenditures	19,304			
Contributions				
Federal grants	84,963			
Retained earnings	1,295,170			
Total Capital Structure	\$3,025,541			

CITY OF MCKINNEY

WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL OPERATING INCOME
FOR THE YEARS 1960-1974

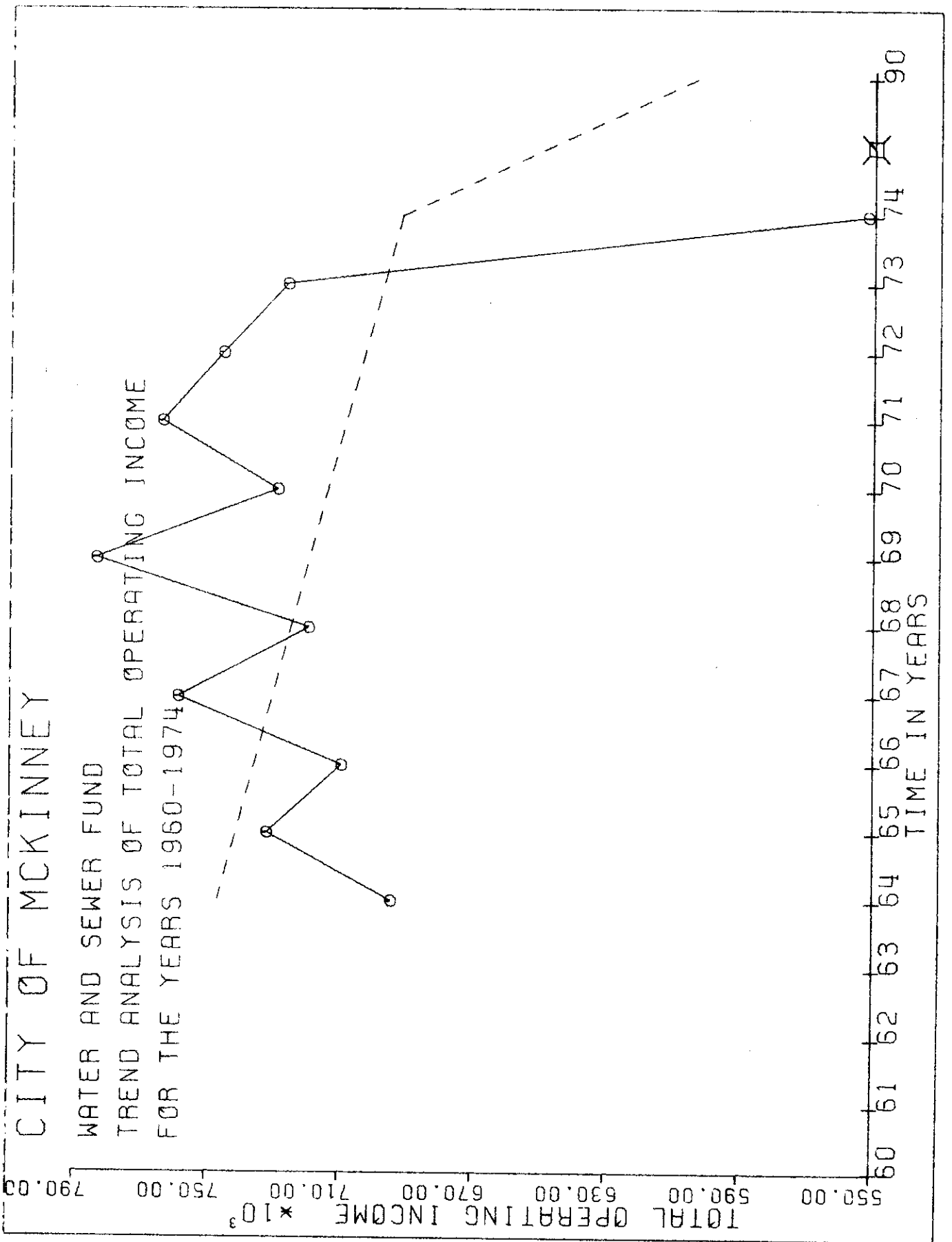


Fig. 39

CITY OF MCKINNEY

WATER AND SEWER FUND
TREND ANALYSIS OF RESERVE FOR BOND RETIREMENT
FOR THE YEARS 1960-1974

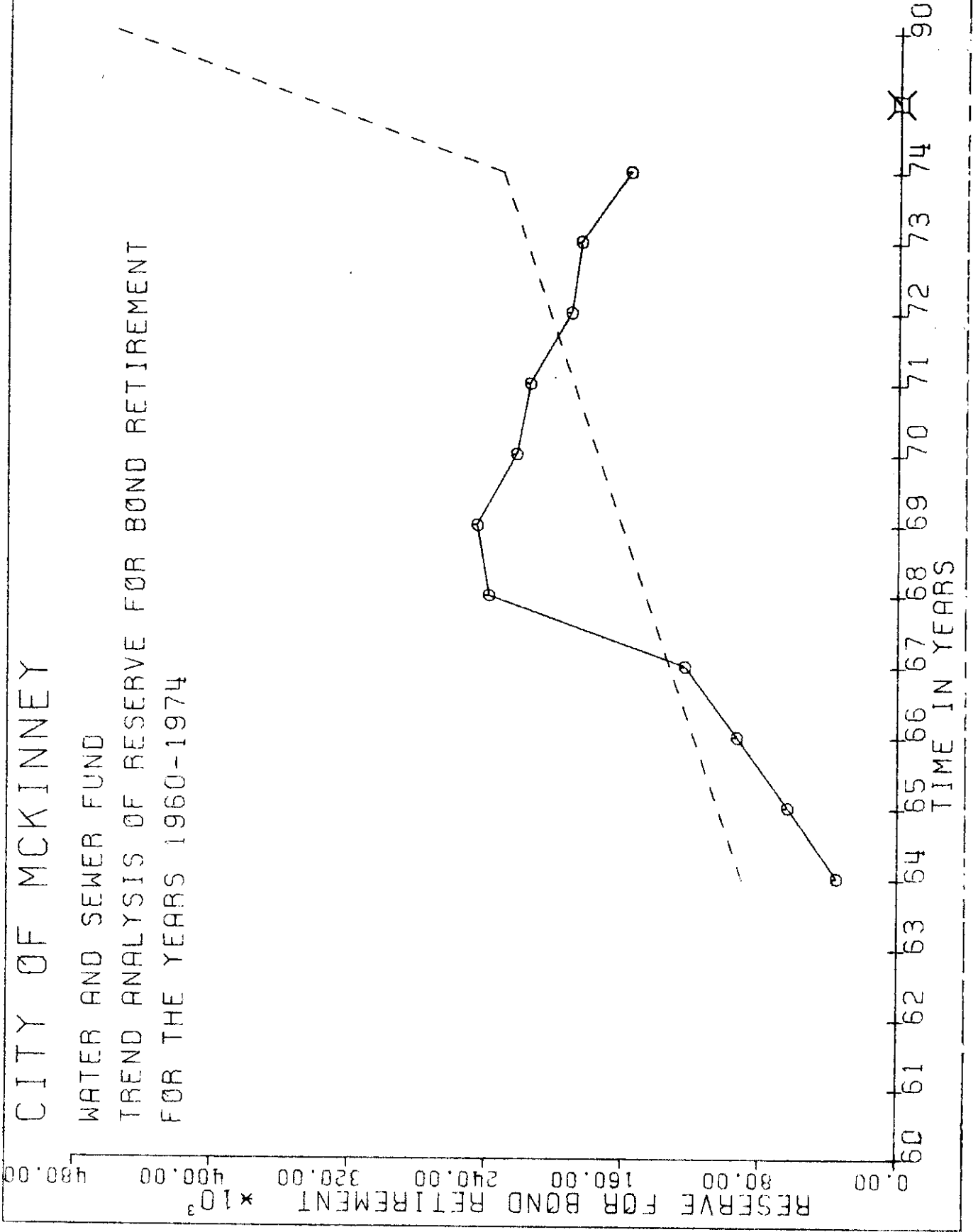


Fig. 40

TABLE CLIX

CITY OF MCKINNEY, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1964 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	93.48
Other Operating Income	6.52
Nonoperating Income	1.85
Expenses:	
Operating Expenses	65.49
Depreciation	15.17
Bond Interest and Fees	5.11
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE CLX

CITY OF MCKINNEY, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RESERVE FOR BOND RETIREMENT, 1964 - 1974

Capital Structure Element	Percent
Equity	77.03
Long Term Debt:	
Revenue Bonds	1,733.05
General Obligation Bonds	0.00
Other Long Term Debt*	0.00
Reserves and Contributions:	
Reserve for Bond Retirement	100.00
Reserve for Authorized Expenditures	485.62
Contributions	0.00
Federal Grants	23.83
Retained Earnings	3,081.90

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CLXI

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$564,301.37
OTHER OPERATING INCOME.....	\$39,358.64
NONOPERATING INCOME.....	\$11,167.71

TOTAL INCOME.....	\$614,827.72
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$395,336.93
DEPRECIATION.....	\$91,575.22
BOND INTEREST AND FEES.....	\$622,562.83

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$494,647.2608

TABLE CLXII

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....	\$352,635.64
LONG TERM DEBT:	
REVENUE BONDS.....	\$13,834,729.60
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$457,790.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,223,119.80
FEDERAL GRANTS.....	\$109,091.36
RETAINED EARNINGS.....	\$14,108,630.01

TOTAL CAPITAL STRUCTURE.....	\$31,085,996.41

TABLE CLXIII

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CCNDITION 2

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$564,301.37	
OTHER OPERATING INCOME.....	\$39,358.64	
NONOPERATING INCOME.....	\$11,167.71	
TOTAL INCOME.....		\$614,827.72
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$395,336.93	
DEPRECIATION.....	\$91,575.22	
BOND INTEREST AND FEES.....	\$529,622.08	
NET WATER AND SEWER SURPLUS (DEFICIT).....		\$401,706.51DB

TABLE CLXIV

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRC FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNDITION 2

EQUITY.....		\$352,635.64
LONG TERM DEBT:		
REVENUE BONDS.....	\$11,769,379.60	
RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$457,790.00	
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,223,119.80	
FEDERAL GRANTS.....	\$2,174,441.36	
RETAINED EARNINGS.....	\$14,108,630.01	
TOTAL CAPITAL STRUCTURE.....		\$31,085,996.41

TABLE CLXV

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....	\$352,635.64
LONG TERM DEBT:	
REVENUE BONDS.....	
RESERVES AND CONTRIBUTIONS:	\$7,933,729.60
RESERVE FOR BOND RETIREMENT.....	\$457,790.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,223,119.80
FEDERAL GRANTS.....	\$109,091.36
RETAINED EARNINGS.....	\$14,108,630.01
STATE GRANTS.....	\$5,901,000.00
TOTAL CAPITAL STRUCTURE.....	\$31,085,996.41

TABLE CLXVI

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$564,301.37
OTHER OPERATING INCOME.....	\$39,358.64
NONOPERATING INCOME.....	\$11,167.71
TOTAL INCOME.....	\$614,827.72
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$395,336.93
DEPRECIATION.....	\$91,575.22
BOND INTEREST AND FEES.....	\$885,649.08
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$757,733.5108

TABLE CLXVII

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRO FCRMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$564,301.37
OTHER OPERATING INCOME.....	\$39,358.64
NONOPERATING INCOME.....	\$11,167.71

TOTAL INCOME.....	\$614,827.72
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$355,336.93
DEPRECIATION.....	\$91,575.22
BOND INTEREST AND FEES.....	\$423,404.08

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$295,488.51DB

TABLE CLXVIII

CITY OF MCKINNEY
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

EQUITY.....	\$352,635.64
LONG TERM DEBT:	
REVENUE BONDS.....	\$9,408,979.60
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$457,790.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,223,119.80
FEDERAL GRANTS.....	\$4,534,841.36
RETAINED EARNINGS.....	\$14,108,630.01

TOTAL CAPITAL STRUCTURE.....	\$31,085,996.41

APPENDIX P
CITY OF TERRELL, TEXAS
DATA ANALYSIS TABLES

TABLE CLXIX

SUMMARY INCOME STATEMENT FOR CITY OF TERRELL, TEXAS,
WATER AND SEWER FUND, 1961-1974, IN CONSTANT DOLLARS

	1961	1962	1963	1964	1965
Income from operations:					
Water and sewer collections	\$381,160	\$396,632	\$427,582	\$501,968	\$498,606
Other operating income	80	13	222	286	108
Nonoperating income	8,354	5,055	2,543	2,228	2,200
Total income	\$389,594	\$401,700	\$430,347	\$504,482	\$500,914
Deduct expenses:					
Operating expenses	220,615	221,686	204,348	258,598	267,995
Depreciation	86,785	77,093	92,809	109,329	111,270
Bond interest and fees	29,646	36,204	32,778	58,775	49,039
Special charges					
Nonoperating expenses		837	854		
Net water and sewer surplus (deficit)	\$ 52,548	\$ 65,880	\$ 99,558	\$ 77,778	\$ 72,610

TABLE CLXIX--Continued

	1966	1967	1968	1969	1970
Income from operations:					
Water and sewer collections	\$491,715	\$519,372	\$745,102	\$744,246	\$715,112
Other operating income	272	550	273	485	376
Nonoperating income	1,853	1,926	7,707	25,997	4,140
Total income	\$493,840	\$521,848	\$753,082	\$770,728	\$719,628
Deduct expenses:					
Operating expenses	253,225	249,378	273,167	295,930	271,154
Depreciation	109,398	109,011	111,379	118,814	115,288
Bond interest and fees	45,572	43,070	40,167	80,753	65,054
Special charges				20	
Nonoperating expenses	50	51	47		
Net water and sewer surplus (deficit)	\$ 85,595	\$120,338	\$328,322	\$275,211	\$268,132

TABLE CLXIX--Continued

	1971	1972	1973	1974
Income from operations:				
Water and sewer collections	\$715,615	\$678,412	\$601,406	\$529,761
Other operating income	331		37,796	37,177
Nonoperating income	55,266	36,390	67,544	12,112
Total income	\$771,212	\$714,802	\$706,746	\$579,050
Deduct expenses:				
Operating expenses	279,465	359,181	384,208	321,139
Depreciation	114,190	147,358	186,193	147,386
Bond interest and fees	95,673	168,446	235,811	159,334
Special charges				
Nonoperating expenses				
Net water and sewer surplus (deficit)	\$281,884	\$ 39,817	(\$ 99,466)	(\$ 48,811)

TABLE CLXX

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF TERRELL, TEXAS,
WATER AND SEWER FUND, 1961-1974, IN CONSTANT DOLLARS

	1961	1962	1963	1964	1965
Equity	\$ 835,386	\$ 825,902	\$ 822,732	\$1,141,936	\$1,127,687
Long term debt:					
Revenue bonds	710,078	660,722	1,407,562	1,364,330	1,307,679
General obligation bonds					
Other long term debt	335,741	331,315			
Reserves and contributions:					
Reserve for bond retirement	111,006	116,848	123,527	135,386	146,208
Reserve for authorized expenditures					
Contributions					
Federal grants				103,528	116,342
Retained earnings	2,373,215	2,347,513	2,314,868	2,312,971	2,287,101
Total Capital Structure	\$4,365,427	\$4,282,303	\$4,668,691	\$5,058,152	\$4,985,019

TABLE CLXX--Continued

	1966	1967	1968	1969	1970
Equity	\$1,086,064	\$1,074,484	\$1,051,272	\$1,029,414	\$ 891,729
Long term debt:					
Revenue bonds					
General obligation bonds	1,213,616	1,155,367	2,194,323	2,090,821	1,754,768
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	151,625	160,747	190,122	186,913	170,774
Reserve for authorized expenditures					
Contributions					
Federal grants	112,048	110,853	108,458	106,203	91,998
Retained earnings	2,222,509	2,254,041	2,447,626	2,656,833	2,521,575
Total Capital Structure	\$4,785,864	\$4,755,494	\$5,991,804	\$6,070,187	\$5,430,847

TABLE CLXX--Continued

	1971	1972	1973	1974
Equity	\$ 827,030	\$ 740,595	\$2,177,944	\$1,655,312
Long term debt:				
Revenue bonds	3,156,096	3,450,825	4,180,000	3,025,075
General obligation bonds				
Other long term debt				
Reserves and contributions:				
Reserve for bond retirement	196,183	229,818	258,707	217,355
Reserve for authorized expenditures				
Contributions				
Federal grants	85,323	1,277,793		
Retained earnings	2,568,754	2,355,164	2,125,066	1,490,496
Total Capital Structure	\$6,833,389	\$8,054,197	\$8,741,717	\$6,388,239

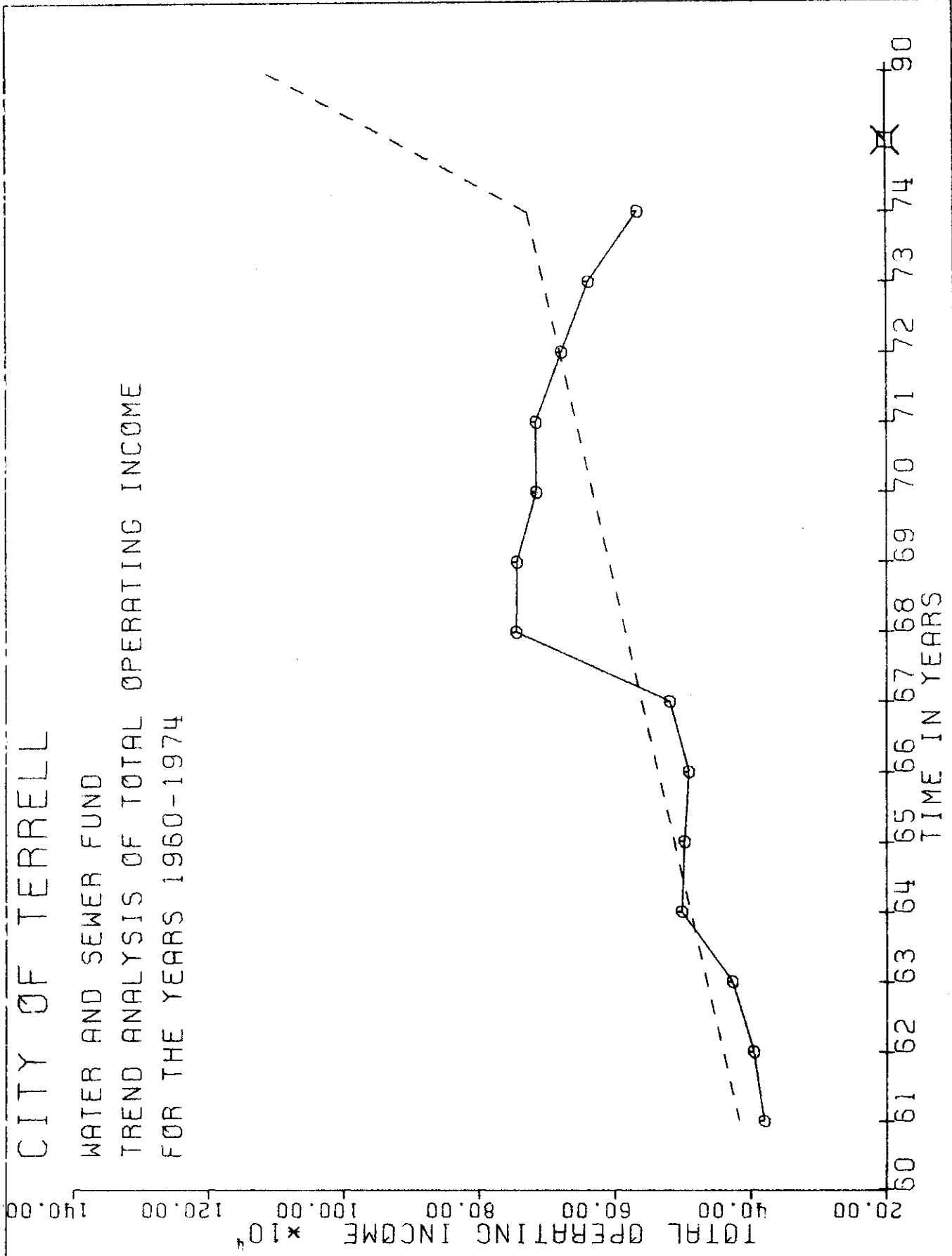


Fig. 41

CITY OF TERRELL
WATER AND SEWER FUND
TREND ANALYSIS OF EQUITY
FOR THE YEARS 1960-1974

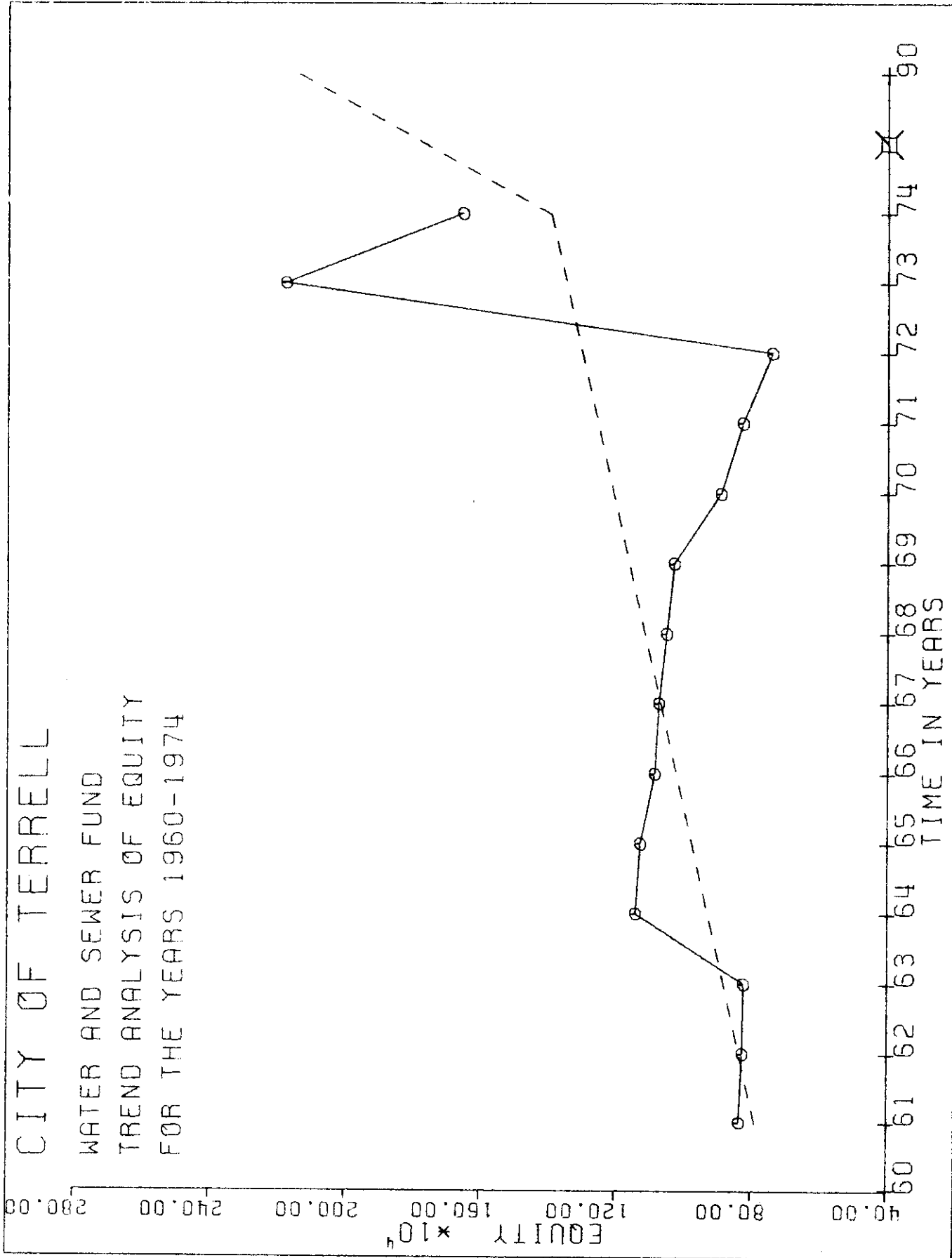


Fig. 42

TABLE CLXXI

CITY OF TERRELL, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1961 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	99.08
Other Operating Income	0.93
Nonoperating Income	2.61
Expenses:	
Operating Expenses	49.23
Depreciation	20.78
Bond Interest and Fees	13.72
Special Charges	0.00
Nonoperating Expenses	0.03

TABLE CLXXII

CITY OF TERRELL, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO EQUITY, 1961 - 1974

Capital Structure Element	Percent
Equity	100.00
Long Term Debt:	
Revenue Bonds	187.26
General Obligation Bonds	0.00
Other Long Term Debt*	5.74
Reserves and Contributions:	
Reserve for Bond Retirement	16.53
Reserve for Authorized Expenditures	0.00
Contributions	0.00
Federal Grants	18.13
Retained Earnings	232.81

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CLXXIII

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,102,066.84
OTHER OPERATING INCOME.....	\$10,344.39
NONOPERATING INCOME.....	\$29,031.03

TOTAL INCOME.....	\$1,141,442.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$547,585.29
DEPRECIATION.....	\$231,135.94
BOND INTEREST AND FEES.....	\$402,274.07
NONOPERATING EXPENSES.....	\$333.69

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$39,886.73DB

TABLE CLXXIV

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....	\$2,141,100.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$8,935,423.86
OTHER LONG TERM DEBT.....	\$122,899.14

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$353,923.83
FEDERAL GRANTS.....	\$388,181.43
RETAINED EARNINGS.....	\$4,984,694.91

TOTAL CAPITAL STRUCTURE.....	\$16,930,223.17

TABLE CLXXV

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,102,066.84
OTHER OPERATING INCOME.....	\$10,344.39
NONOPERATING INCOME.....	\$29,031.03

TOTAL INCOME.....	\$1,141,442.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$547,585.29
DEPRECIATION.....	\$231,135.94
BOND INTEREST AND FEES.....	\$324,626.57
NONOPERATING EXPENSES.....	\$333.69

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$37,760.77

TABLE CLXXVI

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....	\$2,141,100.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$7,213,923.86
OTHER LONG TERM DEBT.....	\$122,899.14

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$353,923.83
FEDERAL GRANTS.....	\$2,113,681.43
RETAINED EARNINGS.....	\$4,984,694.91

TOTAL CAPITAL STRUCTURE.....	\$16,930,223.17

TABLE CLXXVII

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,102,066.84
OTHER OPERATING INCOME.....	\$10,344.39
NONOPERATING INCOME.....	\$29,031.03
TOTAL INCOME.....	\$1,141,442.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$547,585.29
DEPRECIATION.....	\$231,135.94
BOND INTEREST AND FEES.....	\$622,069.90
NONOPERATING EXPENSES.....	\$333.69
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$259,682.56DB

TABLE CLXXVIII

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....	\$2,141,100.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$4,005,423.86
OTHER LONG TERM DEBT.....	\$122,899.14
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$353,923.83
FEDERAL GRANTS.....	\$388,181.43
RETAINED EARNINGS.....	\$4,984,694.91
STATE GRANTS.....	\$4,930,000.00
TOTAL CAPITAL STRUCTURE.....	\$16,930,223.17

TABLE CLXXIX

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990

ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,102,066.84
OTHER OPERATING INCOME.....	\$10,344.39
NONOPERATING INCOME.....	\$29,031.03

TOTAL INCOME.....	\$1,141,442.26
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$547,585.29
DEPRECIATION.....	\$231,135.94
BOND INTEREST AND FEES.....	\$235,886.57
NONOPERATING EXPENSES.....	\$333.69

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$126,500.77

TABLE CLXXX

CITY OF TERRELL
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990

ALTERNATIVE CCNDITICN 4

EQUITY.....	\$2,141,100.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$5,241,523.86
OTHER LONG TERM DEBT.....	\$122,899.14

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$353,923.83
FEDERAL GRANTS.....	\$4,085,681.43
RETAINED EARNINGS.....	\$4,984,694.91

TOTAL CAPITAL STRUCTURE.....	\$16,930,223.17

APPENDIX Q
CITY OF WAXAHACHIE, TEXAS
DATA ANALYSIS TABLES

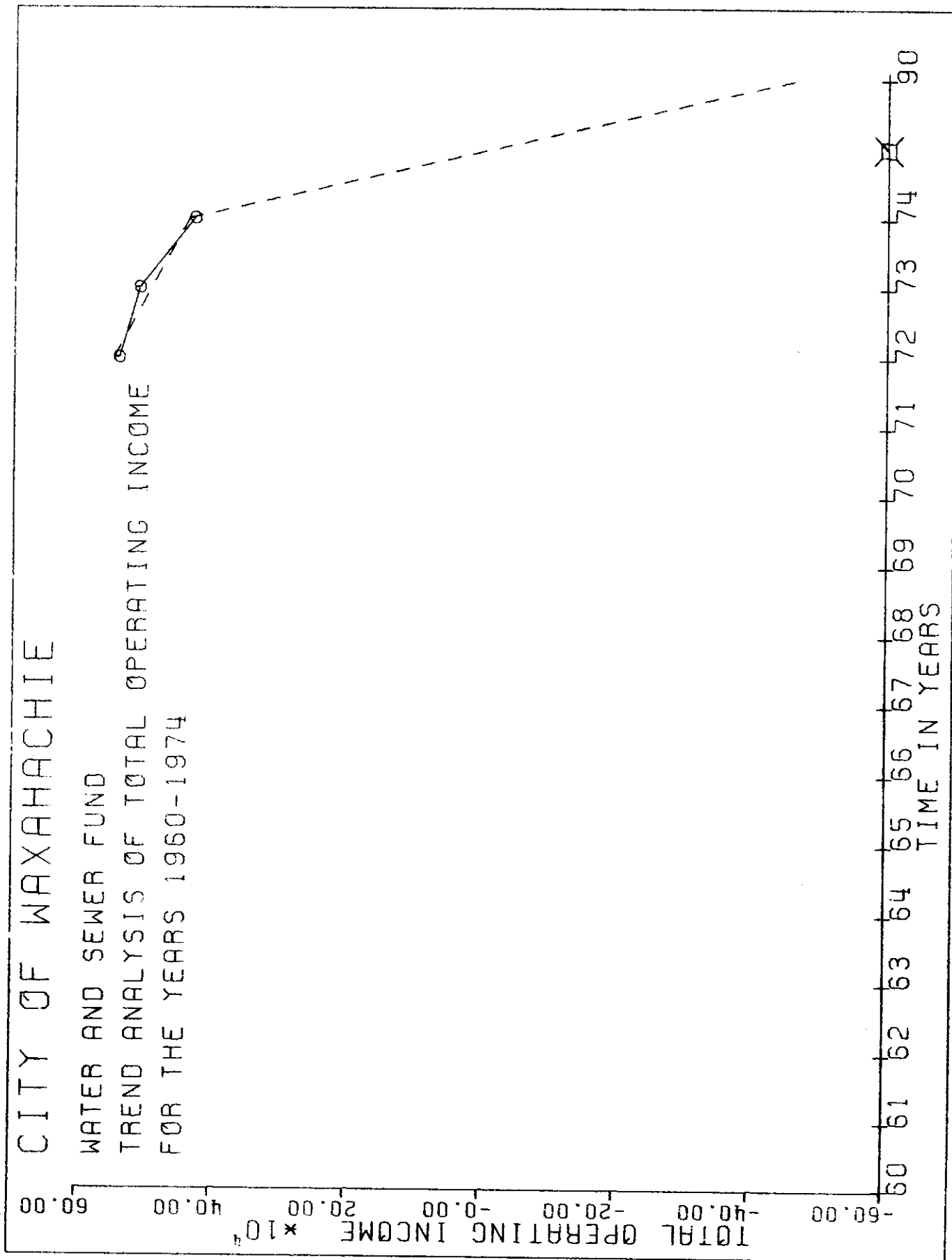


Fig. 43

APPENDIX R
CITY OF DENTON, TEXAS
DATA ANALYSIS TABLES

TABLE CLXXXI

SUMMARY INCOME STATEMENT FOR CITY OF DENTON, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Income from operations:					
Water and sewer collections	\$1,103,097	\$1,125,247	\$1,182,744	\$1,297,766	\$1,403,422
Other operating income	51,545	48,509	39,529	62,110	44,676
Nonoperating income	10,737	37,079	63,132	56,299	35,954
Total income	\$1,165,379	\$1,210,835	\$1,285,405	\$1,416,175	\$1,484,052
Deduct expenses:					
Operating expenses	541,922	516,855	557,047	601,195	642,319
Depreciation	363,633	360,924	378,533	497,798	519,370
Bond interest and fees	38,904	105,135	153,349	164,519	165,105
Special charges *	(141,204)	(55,025)	53,509	(52,160)	(53,178)
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 362,134	\$ 282,947	\$ 142,969	\$ 204,824	\$ 210,437

*() indicate additions to revenue

TABLE CLXXXI -- Continued

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$1,360,646	\$1,440,422	\$1,548,426	\$1,478,899	\$1,690,776
Other operating income	65,504	36,099	28,985	63,496	56,108
Nonoperating income	47,095	78,746	92,870	70,249	50,863
Total income	\$1,473,246	\$1,555,267	\$1,670,281	\$1,612,644	\$1,797,746
Deduct expenses:					
Operating expenses	625,137	731,196	775,950	841,906	908,288
Depreciation	587,351	638,504	669,197	436,701	427,826
Bond interest and fees	122,200	202,144	210,301	201,011	219,891
Special charges*	(23,106)	26,185	47,443	(34,289)	(52,828)
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 111,663	(\$ 42,762)	(\$ 32,609)	\$ 167,314	\$ 294, 570

* () indicate additions to revenue

TABLE CLXXXI -- Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$1,595,611	\$1,517,391	\$1,604,651	\$1,659,169	\$1,343,996
Other operating income	30,835	8,069	5,019	768	6,733
Nonoperating income	34,381	39,728	32,258	81,510	59,207
Total income	\$1,660,827	\$1,565,188	\$1,641,928	\$1,741,447	\$1,409,936
Deduct expenses:					
Operating expenses	782,729	846,674	776,147	859,909	746,222
Depreciation	397,487	367,300	379,153	387,515	320,855
Bond interest and fees	227,283	201,825	167,426	203,051	157,364
Special charges*	(86,070)				
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 339,398	\$ 149,389	\$ 319,202	\$ 290,972	\$ 185,494

* () indicate additions to revenue

TABLE CLXXXII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF DENTON, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Equity	\$2,898,583	\$2,791,859	\$2,976,683	\$2,765,301	\$2,759,200
Long term debt:					
Revenue bonds	2,867,249	2,840,313	4,443,358	4,278,990	4,622,671
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	388,849	79,492	153,352	203,776	275,294
Reserve for authorized expenditures					
Contributions					
Federal grants			137,925	126,100	149,273
Retained earnings	1,470,561	1,475,815	1,404,347	1,518,292	1,510,681
Total Capital Structure	\$7,625,244	\$7,187,479	\$9,115,666	\$29,051,351	\$9,317,121

TABLE CLXXXII--Continued

	1965	1966	1967	1968	1969
Equity	\$2,724,771	\$2,624,200	\$3,086,669	\$3,039,561	\$2,976,363
Long term debt:					
Revenue bonds	4,493,663	5,739,872	5,285,997	5,079,756	6,151,165
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	324,545	374,331	377,189	398,613	512,148
Reserve for authorized expenditures					
Contributions					
Federal grants	136,157	15,708			
Retained earnings	1,613,836	1,343,272	1,188,536	1,085,703	910,821
Total Capital Structure	\$9,292,974	\$10,097,384	\$9,938,392	\$9,603,635	\$10,550,499

TABLE CLXXXII -- Continued

	1970	1971	1972	1973	1974
Equity					
Long term debt:					
Revenue bonds	\$3,088,659	\$2,864,563	\$2,562,794	\$2,461,922	\$2,013,220
General obligation bonds	5,113,898	4,516,182	5,402,649	4,955,000	4,944,763
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	464,494	430,793	390,364	375,000	298,707
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	770,263	621,936	636,048	640,053	435,357
Total Capital Structure	\$9,437,315	\$8,433,476	\$8,991,856	\$8,431,957	\$7,692,048

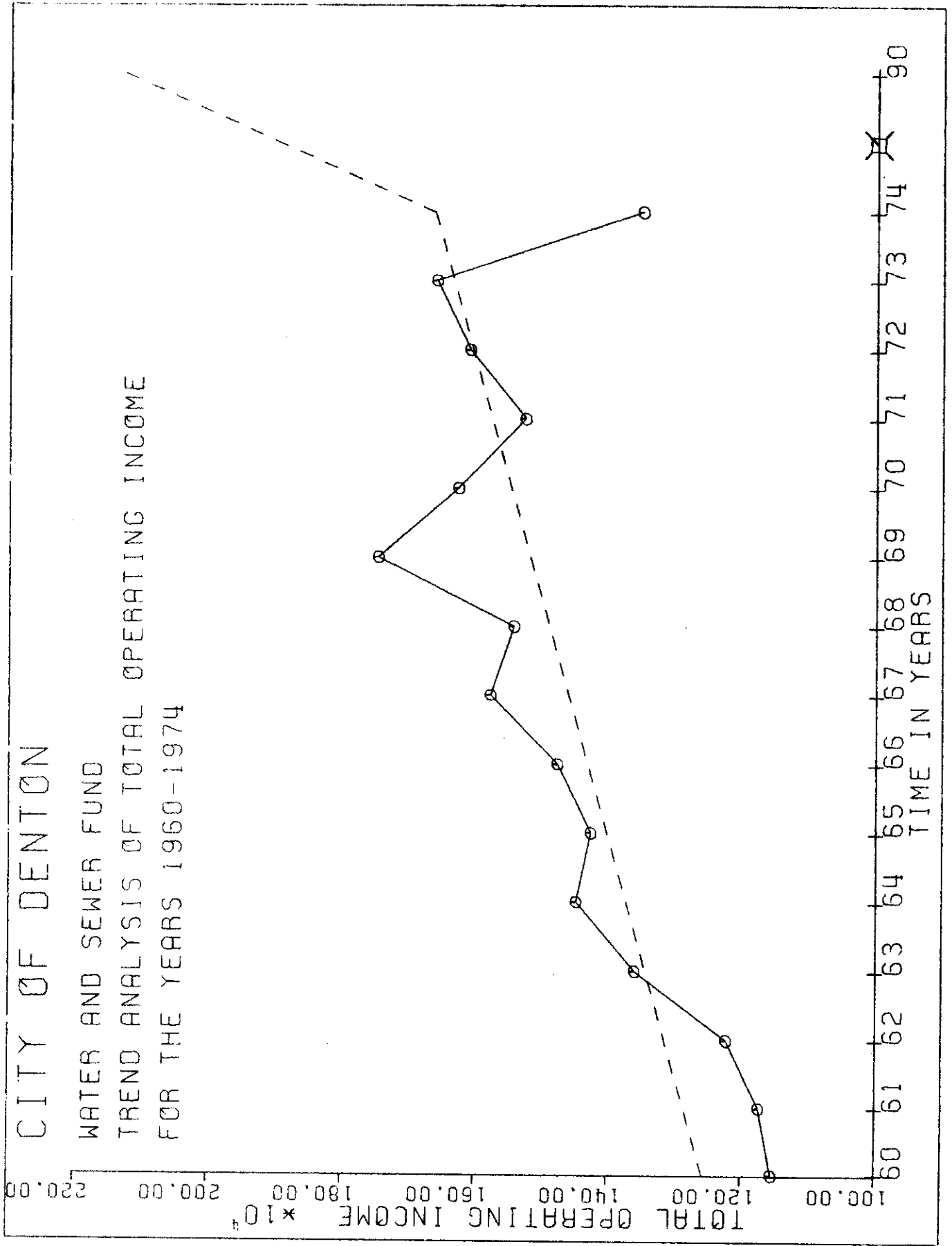


Fig. 44

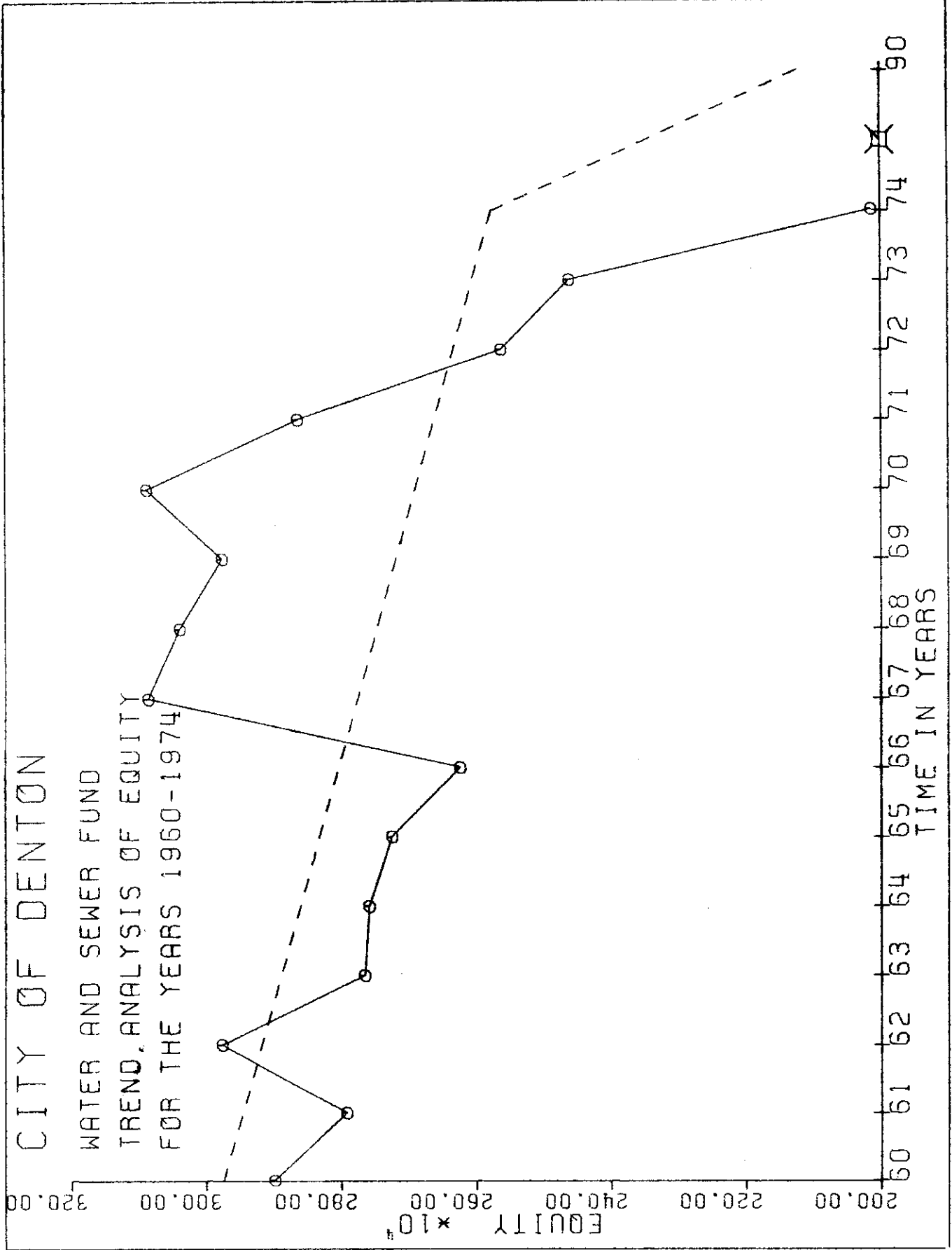


Fig. 45

TABLE CLXXXIII

CITY OF DENTON, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1960 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	97.40
Other Operating Income	2.60
Nonoperating Income	3.59
Expenses:	
Operating Expenses	48.87
Depreciation	30.97
Bond Interest and Fees	11.64
Special Charges	1.58
Nonoperating Expenses	0.00

TABLE CLXXXIV

CITY OF DENTON, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO EQUITY, 1960 - 1974

Capital Structure Element	Percent
Equity	100.00
Long Term Debt:	
Revenue Bonds	172.12
General Obligation Bonds	0.00
Other Long Term Debt*	0.00
Reserves and Contributions:	
Reserve for Bond Retirement	11.39
Reserve for Authorized Expenditures	0.00
Contributions	0.00
Federal Grants	5.93
Retained Earnings	39.65

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CLXXXV

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,072,672.00
OTHER OPERATING INCOME.....	\$55,328.00
NONOPERATING INCOME.....	\$76,395.20
TOTAL INCOME.....	\$2,204,395.20
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,039,953.60
DEPRECIATION.....	\$659,041.60
BOND INTEREST AND FEES.....	\$815,290.33
SPECIAL CHARGES.....	\$33,622.40CR
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$280,267.93DB

TABLE CLXXXVI

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....	\$2,123,200.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$18,206,451.84
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$241,832.48
FEDERAL GRANTS.....	\$125,905.76
RETAINED EARNINGS.....	\$841,848.80
TOTAL CAPITAL STRUCTURE.....	\$21,539,238.88

TABLE CLXXXVII

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,072,672.00
OTHER OPERATING INCOME.....	\$55,328.00
NONOPERATING INCOME.....	\$76,395.20

TOTAL INCOME.....	\$2,204,395.20
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,039,953.60
DEPRECIATION.....	\$659,041.60
BOND INTEREST AND FEES.....	\$590,096.33
SPECIAL CHARGES.....	\$33,622.40CR

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$51,073.93DB

TABLE CLXXXVIII

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....	\$2,123,200.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$13,113,251.84
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$241,832.48
FEDERAL GRANTS.....	\$5,219,105.76
RETAINED EARNINGS.....	\$841,848.80

TOTAL CAPITAL STRUCTURE.....	\$21,539,238.88

TABLE CLXXXIX

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CCNDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,072,672.00
OTHER OPERATING INCOME.....	\$55,328.00
NONOPERATING INCOME.....	\$76,395.20

TOTAL INCOME.....	\$2,204,395.20
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,039,953.60
DEPRECIATION.....	\$659,041.60
BOND INTEREST AND FEES.....	\$1,468,067.00
SPECIAL CHARGES.....	\$33,622.40CR

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$929,044.60DB

TABLE CXC

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....		\$2,123,200.00
LONG TERM DEBT:		
REVENUE BONDS.....	\$3,654,451.84	
RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$241,832.48	
FEDERAL GRANTS.....		\$125,905.76
RETAINED EARNINGS.....		\$841,848.80
STATE GRANTS.....		\$14,552,000.00

TOTAL CAPITAL STRUCTURE.....		\$21,539,238.88

TABLE CXCI

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,072,672.00
OTHER OPERATING INCOME.....	\$55,328.00
NONOPERATING INCOME.....	\$76,395.20
TOTAL INCOME.....	\$2,204,395.20
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,035,953.60
DEPRECIATION.....	\$659,041.60
BOND INTEREST AND FEES.....	\$328,160.33
SPECIAL CHARGES.....	\$33,622.40CR
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$210,862.07

TABLE CXCI

CITY OF DENTON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

EQUITY.....	\$2,123,200.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$7,292,451.84
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$241,832.48
FEDERAL GRANTS.....	\$11,039,905.76
RETAINED EARNINGS.....	\$841,848.80
TOTAL CAPITAL STRUCTURE.....	\$21,539,238.88

APPENDIX S
CITY OF HALTOM CITY, TEXAS
DATA ANALYSIS TABLES

TABLE CXCIII

SUMMARY INCOME STATEMENT FOR CITY OF HALTOM CITY, TEXAS,
WATER AND SEWER FUND, 1965-1974, IN CONSTANT DOLLARS

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$ 596,665	\$1,084,686	\$1,051,942	\$1,045,918	\$1,078,810
Other operating income	15,705	24,944	20,954	22,818	43,874
Nonoperating income	10,406	52,897	55,038	35,099	13,739
Total income	\$ 622,776	\$1,162,509	\$1,127,934	\$1,103,835	\$1,136,423
Deduct expenses:					
Operating expenses	285,058	497,685	535,459	576,643	651,925
Depreciation	74,523	152,300	176,871	199,531	273,342
Bond interest and fees	114,359	183,728	215,385	225,537	211,154
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 148,836	\$ 328,796	\$ 200,219	\$ 102,124	\$ 2

TABLE CXCIII--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$ 985,130	\$1,250,724	\$1,194,357	\$1,091,077	\$ 908,124
Other operating income	24,012	29,851	25,071	32,912	26,787
Nonoperating income	49,911	32,357	34,922	60,752	37,851
Total income	\$1,059,053	\$1,312,932	\$1,254,350	\$1,184,741	\$ 972,862
Deduct expenses:					
Operating expenses	598,935	831,602	826,520	593,821	527,401
Depreciation	182,937	182,057	180,008	185,970	155,963
Bond interest and fees	208,136	228,894	209,754	244,406	200,631
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 69,045	\$ 70,879	\$ 38,068	\$ 160,544	\$ 88,867

TABLE CXCIV

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF HALTOM CITY, TEXAS,
WATER AND SEWER FUND, 1965-1974, IN CONSTANT DOLLARS

	1965	1966	1967	1968	1969
Equity					
Long term debt:					
Revenue bonds	\$3,702,714	\$4,194,991	\$4,458,265	\$4,713,731	\$4,478,265
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	429,668	445,002	461,216	429,706	426,630
Reserve for authorized expenditures	149,162	713,944	657,591	119,997	10,500
Contributions					
Federal grants					
Retained earnings	2,134,867	1,674,055	1,579,576	1,889,739	1,936,695
Total Capital Structure	\$6,416,413	\$7,027,992	\$7,656,650	\$7,153,174	\$6,852,091

TABLE CXCIV--Continued

	1970	1971	1972	1973	1974
Equity					
Long term debt:					
Revenue bonds	\$4,383,162	\$4,348,786	\$4,634,411	\$5,000,000	\$3,592,506
General obligation bonds			17,567	12,621	5,477
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	386,862	374,008	344,061	355,777	278,265
Reserve for authorized expenditures	314,462	181,090	923,236	1,361,053	1,236,526
Contributions					
Federal grants					
Retained earnings	1,353,361	1,356,320	423,601	1,192,400	760,242
Total Capital Structure	\$6,437,848	\$6,260,205	\$6,342,878	\$7,921,851	\$5,873,018

CITY OF HALTOM CITY
WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL OPERATING INCOME
FOR THE YEARS 1960-1974

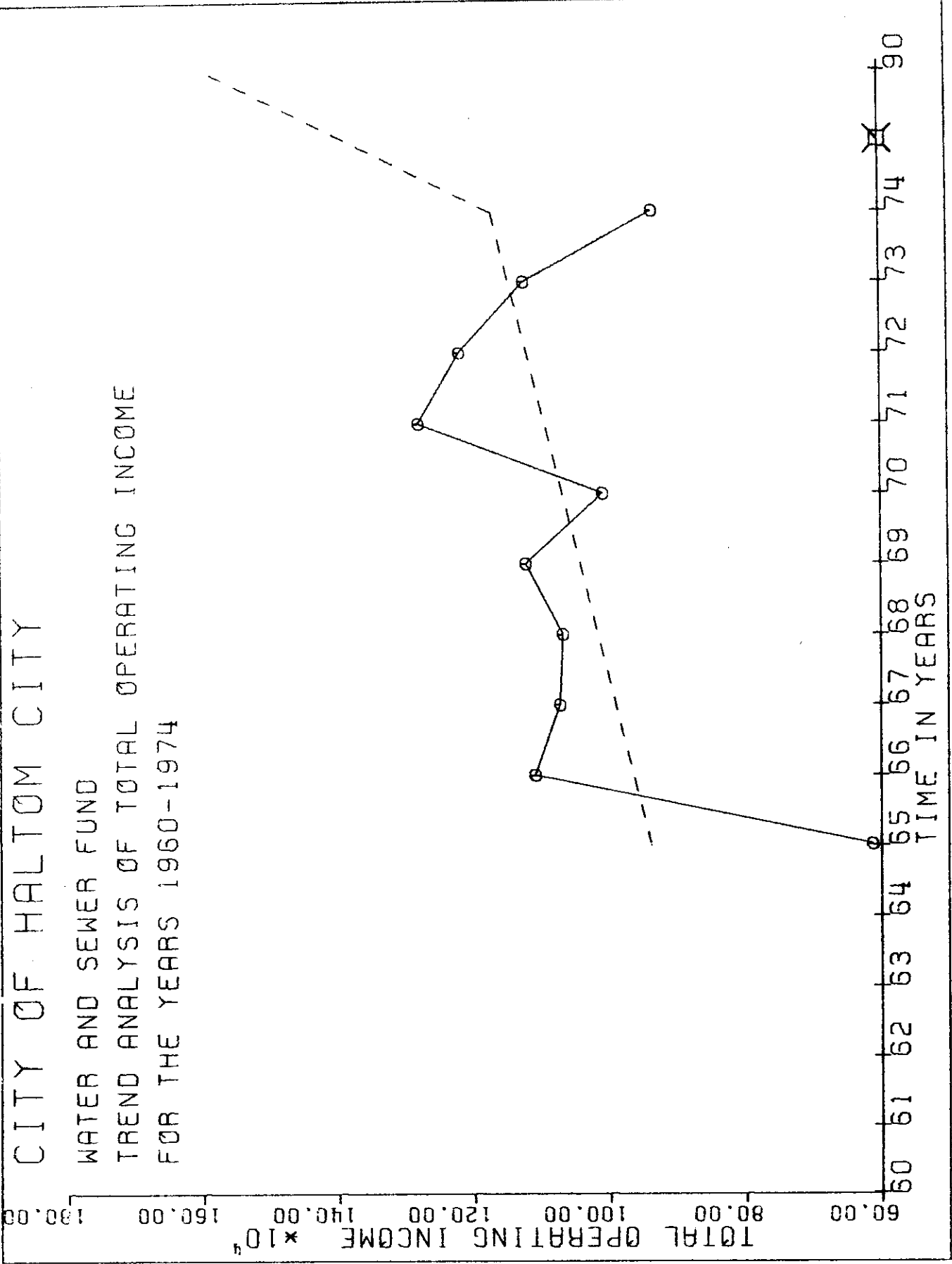


Fig. 46

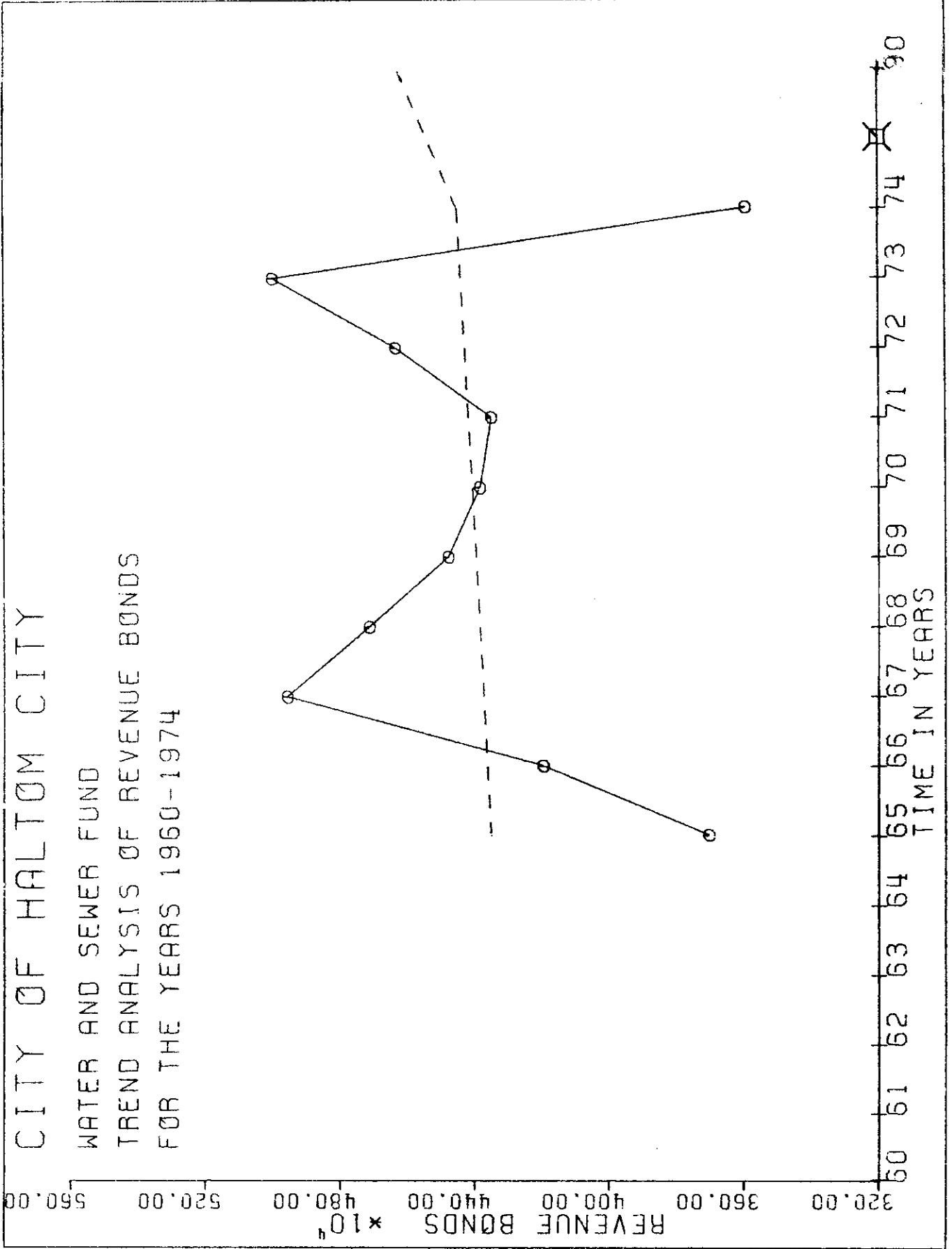


Fig. 47

TABLE CXCV

CITY OF HALTOM CITY, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1965 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	97.34
Other Operating Income	2.54
Nonoperating Income	3.59
Expenses:	
Operating Expenses	55.47
Depreciation	16.58
Bond Interest and Fees	19.41
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE CXCVI

CITY OF HALTOM CITY, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO REVENUE BONDS, 1965 - 1974

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	100.00
General Obligation Bonds	0.00
Other Long Term Debt*	0.08
Reserves and Contributions:	
Reserve for Bond Retirement	8.99
Reserve for Authorized Expenditures	6.83
Contributions	6.16
Federal Grants	0.00
Retained Earnings	32.90

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CXCVII

CITY OF HALTCM CITY
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,544,351.16
OTHER OPERATING INCOME.....	\$40,248.84
NONOPERATING INCOME.....	\$56,887.14
TOTAL INCOME.....	<u>\$1,641,487.14</u>
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$878,977.62
DEPRECIATION.....	\$262,726.68
BOND INTEREST AND FEES.....	\$577,417.50
NET WATER AND SEWER SURPLUS (DEFICIT).....	<u><u>\$77,634.66DB</u></u>

TABLE CXCVIII

CITY OF HALTCM CITY
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$12,831,500.00
OTHER LONG TERM DEBT.....	\$3,702.80
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$416,102.15
RESERVE FOR AUTHORIZED EXPENDITURES...	\$316,126.55
CONTRIBUTIONS.....	\$285,115.60
RETAINED EARNINGS.....	<u>\$1,522,776.50</u>
TOTAL CAPITAL STRUCTURE.....	<u><u>\$15,375,323.60</u></u>

TABLE CIC

CITY OF FALTON CITY
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,544,351.16
OTHER OPERATING INCOME.....	\$40,248.84
NONOPERATING INCOME.....	\$56,887.14

TOTAL INCOME.....	\$1,641,487.14
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$878,977.62
DEPRECIATION.....	\$262,726.68
BOND INTEREST AND FEES.....	\$448,220.25

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$51,562.59

TABLE CC

CITY OF FALTON CITY
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$9,960,450.00
OTHER LONG TERM DEBT.....	\$3,702.80

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$416,102.15
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$316,126.55
CONTRIBUTIONS.....	\$285,115.60

FEDERAL GRANTS.....	\$2,871,050.00
RETAINED EARNINGS.....	\$1,522,776.50

TOTAL CAPITAL STRUCTURE.....	\$15,375,323.60

TABLE CCI

CITY OF HALTOM CITY
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,544,351.16
OTHER OPERATING INCOME.....	\$40,248.84
NONOPERATING INCOME.....	\$56,887.14

TOTAL INCOME.....	\$1,641,487.14
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$878,977.62
DEPRECIATION.....	\$262,726.68
BOND INTEREST AND FEES.....	\$943,134.58

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$443,351.74DB

TABLE CCII

CITY OF HALTOM CITY
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

LONG TERM DEBT:	
REVENUE BONDS.....	\$4,628,500.00
OTHER LONG TERM DEBT.....	\$3,702.80

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$416,102.15
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$316,126.55
CONTRIBUTIONS.....	\$285,115.60

RETAINED EARNINGS.....	\$1,522,776.50
STATE GRANTS.....	\$8,203,000.00

TOTAL CAPITAL STRUCTURE.....	\$15,375,323.60

TABLE CCIII
 CITY OF FALTCM CITY
 WATER AND SEWER FUND
 PRO FORMA INCCME STATEMENT
 1990
 ALTERNATIVE CCADITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$1,544,351.16
OTHER OPERATING INCOME.....	\$40,248.84
NONOPERATING INCOME.....	\$56,887.14
TOTAL INCOME.....	\$1,641,487.14
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$878,977.62
DEPRECIATION.....	\$262,726.68
BOND INTEREST AND FEES.....	\$300,566.25
NET WATER AND SEWER SURPLUS (DEFICIT).....	\$199,216.59

TABLE CCIV
 CITY CF FALTCM CITY
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCADITION 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$6,679,250.00
OTHER LONG TERM DEBT.....	\$3,702.80
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$416,102.15
RESERVE FOR AUTHORIZED EXPENDITURES...	\$316,126.55
CONTRIBUTIONS.....	\$285,115.60
FEDERAL GRANTS.....	\$6,152,250.00
RETAINED EARNINGS.....	\$1,522,776.50
TOTAL CAPITAL STRUCTURE.....	\$15,375,323.60

APPENDIX T
CITY OF RICHARDSON, TEXAS
DATA ANALYSIS TABLES

TABLE CCV

SUMMARY INCOME STATEMENT FOR CITY OF RICHARDSON, TEXAS,
WATER AND SEWER FUND, 1965-1967 and 1972-1974, IN CONSTANT DOLLARS*

	1965	1966	1967
Income from operations:			
Water and sewer collections	\$1,553,763	\$1,579,790	\$1,983,951
Other operating income	117,095	137,734	133,790
Nonoperating income	48,378	38,127	32,320
Total income	\$1,719,236	\$1,755,659	\$2,150,061
Deduct expenses:			
Operating expenses	1,184,129	1,238,078	1,506,811
Depreciation	344,858	357,321	384,275
Bond interest and fees	296,395	297,267	295,561
Special charges			
Nonoperating expenses			
Net water and sewer surplus (deficit)	(\$ 106,146)	(\$ 137,007)	(\$ 36,587)

*Data was unavailable for the period 1960-1964 and 1968-1971.

TABLE CCV--Continued

	1972	1973	1974	
Income from operations:				
Water and sewer collections	\$2,501,908	\$2,223,000	\$1,841,155	
Other operating income	167,274	182,060	267,585	
Nonoperating income	99,764	94,235	111,268	
Total income	\$2,768,946	\$2,509,295	\$2,220,008	
Deduct expenses:				
Operating expenses	1,947,727	1,868,464	1,476,449	
Depreciation	378,545	406,004	341,667	
Bond interest and fees	257,036	325,601	262,616	
Special charges				
Nonoperating expenses				
Net water and sewer surplus (deficit)	\$ 185,637	(\$ 90,774)	\$ 139,276	

*Data was unavailable for the period 1960-1964 and 1968-1971.

TABLE CCVI

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF RICHARDSON, TEXAS,
WATER AND SEWER FUND, 1965-1967 and 1972-1974, IN CONSTANT DOLLARS*

	1965	1966	1967
Equity			
Long term debt:			
Revenue bonds	\$7,021,843	\$6,950,435	\$6,764,566
General obligation bonds	407,000	360,723	338,838
Other long term debt			
Reserves and contributions:			
Reserve for bond retirement		271,112	296,502
Reserve for authorized expenditures		543,889	30,997
Contributions	3,273,689	3,315,550	3,414,878
Federal grants			
Retained earnings	2,794,744	1,739,581	2,163,259
Total Capital Structure	\$13,497,279	\$13,181,292	\$13,009,041

*Data was unavailable for the period 1960-1964 and 1968-1971.

TABLE CCVI--Continued

	1972	1973	1974	1974
Equity	\$5,833,016	\$6,157,353	\$5,722,666	
Long term debt:				
Revenue bonds	5,747,211	6,550,000	4,697,156	
General obligation bonds	145,761	125,432	81,123	
Other long term debt			584,457	
Reserves and contributions:				
Reserve for bond retirement	254,316	245,810		
Reserve for authorized expenditures	720,375	1,376,070	348,518	
Contributions				
Federal grants				
Retained earnings	985,883	170,753	988,183	
Total Capital Structure	\$13,686,565	\$14,625,418	\$12,422,105	

CITY OF RICHARDSON

WATER AND SEWER FUND

TREND ANALYSIS OF TOTAL OPERATING INCOME

FOR THE YEARS 1972-1974

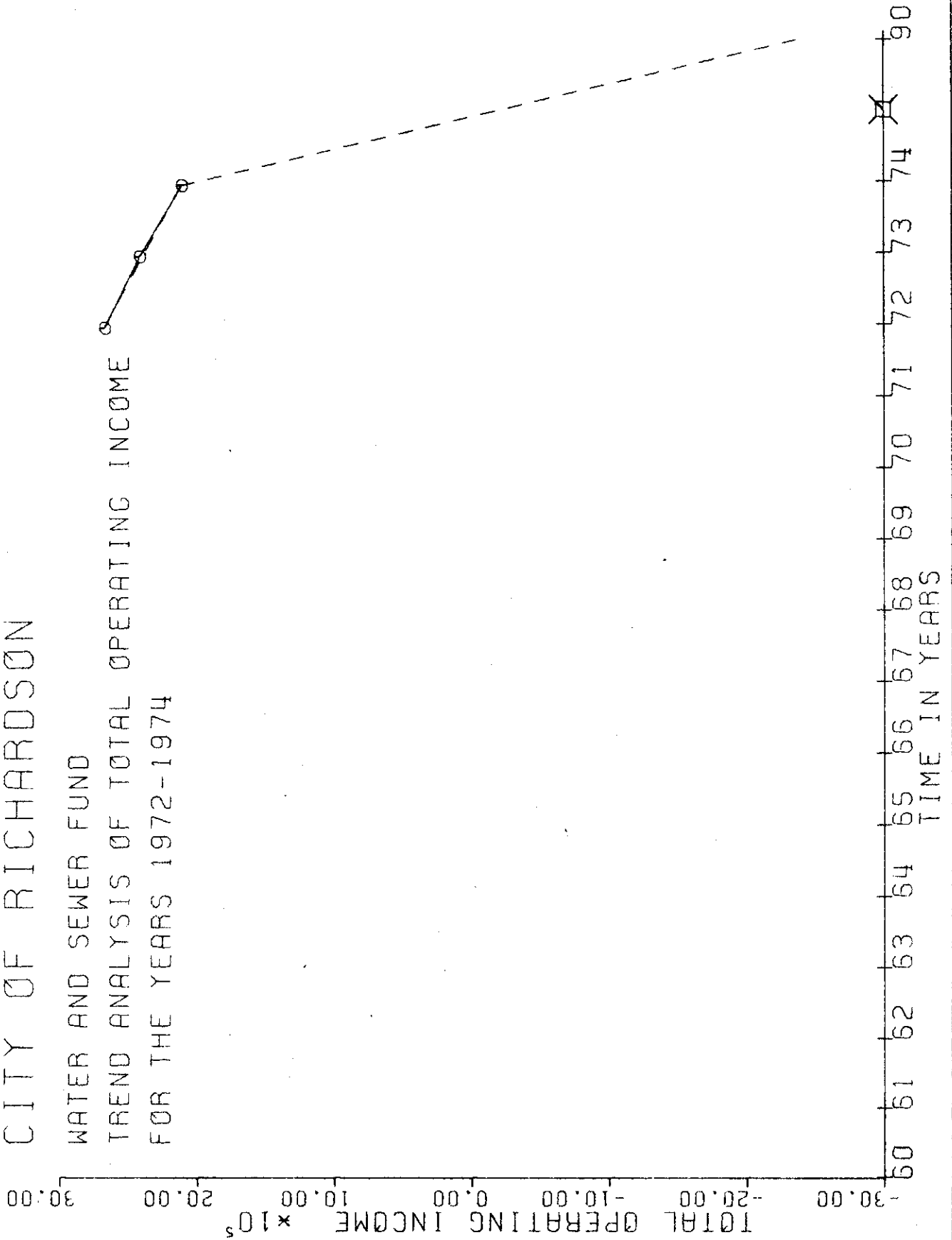


Fig. 48

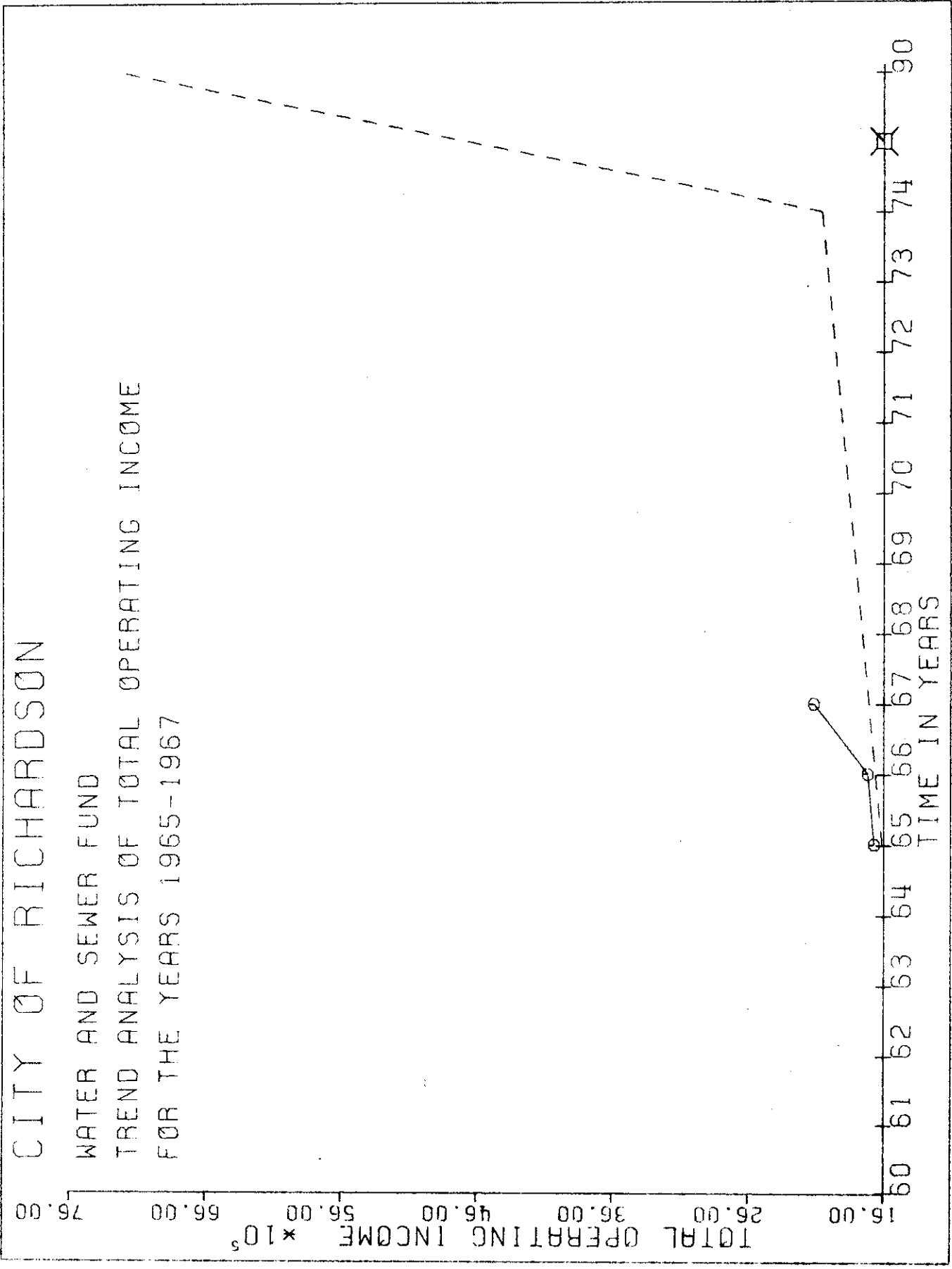


Fig. 49

CITY OF RICHARDSON
WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL CONTRIBUTIONS
FOR THE YEARS 1965-1967

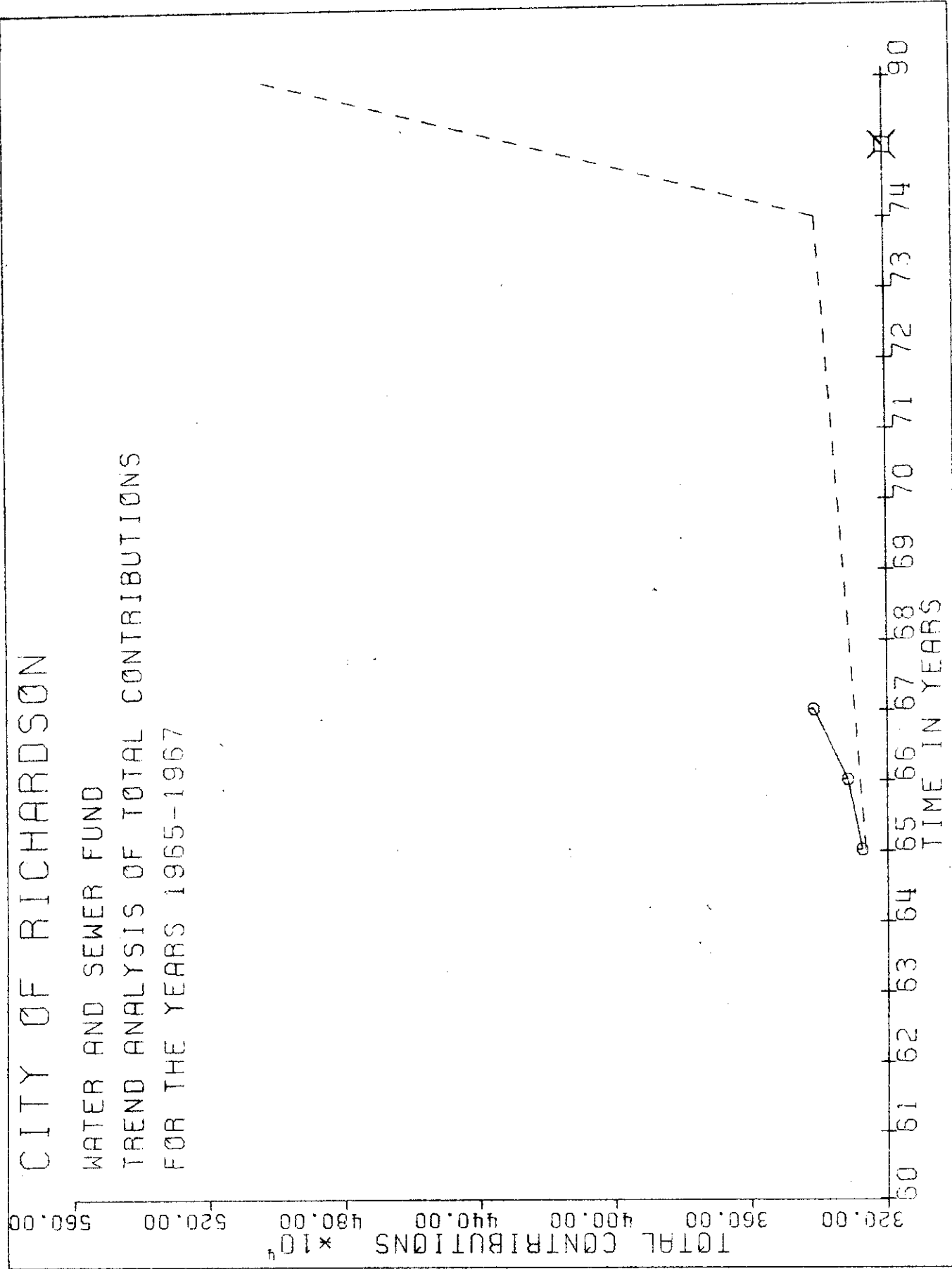


Fig. 50

TABLE CCVII

CITY OF RICHARDSON, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1965 - 1967

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	92.88
Other Operating Income	7.12
Nonoperating Income	2.22
Expenses:	
Operating Expenses	71.37
Depreciation	19.66
Bond Interest and Fees	16.34
Special Charges	0.00
Nonoperating Expenses	0.00

TABLE CCVIII

CITY OF RICHARDSON, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO CONTRIBUTIONS, 1965 - 1967

Capital Structure Element	Percent
Equity	0.00
Long Term Debt:	
Revenue Bonds	207.41
General Obligation Bonds	6.93
Other Long Term Debt*	0.00
Reserves and Contributions:	
Reserve for Bond Retirement	2.88
Reserve for Authorized Expenditures	5.77
Contributions	1.00
Federal Grants	0.00
Retained Earnings	67.06

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CCIX

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$6,685,502.40
OTHER OPERATING INCOME.....	\$512,497.60
NONOPERATING INCOME.....	\$159,795.60

TOTAL INCOME.....	\$7,357,795.60
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$5,137,212.60
DEPRECIATION.....	\$1,429,522.80
BOND INTEREST AND FEES.....	\$814,911.57

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$23,851.37DB

TABLE CCX

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

LONG TERM DEBT:	
REVENUE BONDS.....	\$18,109,146.00
GENERAL OBLIGATION BONDS.....	\$557,213.20
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$282,629.80
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$290,173.30
CONTRIBUTIONS.....	\$5,029,000.00

RETAINED EARNINGS.....	\$3,372,447.40

TOTAL CAPITAL STRUCTURE.....	\$27,640,609.70

TABLE CCXI

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$6,685,502.40
OTHER OPERATING INCOME.....	\$512,497.60
NONOPERATING INCOME.....	\$159,795.60

TOTAL INCOME.....	\$7,357,795.60
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$5,137,212.60
DEPRECIATION.....	\$1,429,522.80
BOND INTEREST AND FEES.....	\$693,967.32

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$97,092.88

TABLE CCXII

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

LONG TERM DEBT:	
REVENUE BONDS.....	\$15,421,496.00
GENERAL OBLIGATION BONDS.....	\$557,213.20
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$282,629.80
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$290,173.30
CONTRIBUTIONS.....	\$5,029,000.00

FEDERAL GRANTS.....	\$2,687,650.00
RETAINED EARNINGS.....	\$3,372,447.40

TOTAL CAPITAL STRUCTURE.....	\$27,640,600.70

TABLE CCXIII

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$6,685,502.40
OTHER OPERATING INCOME.....	\$512,497.60
NONOPERATING INCOME.....	\$159,795.60

TOTAL INCOME.....	\$7,357,795.60
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$5,137,212.60
DEPRECIATION.....	\$1,429,522.80
BOND INTEREST AND FEES.....	\$1,157,266.99

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$366,206.79DB

TABLE CCXIV

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

LONG TERM DEBT:	
REVENUE BONDS.....	\$10,430,146.00
GENERAL OBLIGATION BONDS.....	\$557,213.20
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$282,629.80
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$290,173.30
CONTRIBUTIONS.....	\$5,029,000.00

RETAINED EARNINGS.....	\$3,372,447.40
STATE GRANTS.....	\$7,679,000.00

TOTAL CAPITAL STRUCTURE.....	\$27,640,609.70

TABLE CCXV

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$6,685,502.40
OTHER OPERATING INCOME.....	\$512,497.60
NONOPERATING INCOME.....	\$159,795.60

TOTAL INCOME.....	\$7,357,795.60
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$5,137,212.60
DEPRECIATION.....	\$1,429,522.80
BOND INTEREST AND FEES.....	\$555,745.32

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$235,314.88

TABLE CCXVI

CITY OF RICHARDSON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

LONG TERM DEBT:	
REVENUE BONDS.....	\$12,349,896.00
GENERAL OBLIGATION BONDS.....	\$557,213.20
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$282,629.80
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$290,173.30
CONTRIBUTIONS.....	\$5,029,000.00

FEDERAL GRANTS.....	\$5,759,250.00
RETAINED EARNINGS.....	\$3,372,447.40

TOTAL CAPITAL STRUCTURE.....	\$27,640,609.70

APPENDIX U
CITY OF ARLINGTON, TEXAS
DATA ANALYSIS TABLES

TABLE CCXVII

SUMMARY INCOME STATEMENT FOR CITY OF ARLINGTON, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Income from operations:					
Water and sewer collections	\$1,187,934	\$1,260,818	\$1,296,717	\$1,392,496	\$1,677,641
Other operating income	63,184	117,348	119,295	121,467	177,782
Nonoperating income	22,882	21,740	27,146	34,475	28,588
Total income	\$1,274,000	\$1,399,906	\$1,443,158	\$1,548,439	\$1,884,011
Deduct expenses:					
Operating expenses	562,657	604,834	728,929	729,917	821,076
Depreciation	362,621	381,738	389,511	885,553	402,007
Bond interest and fees	151,983	148,523	141,327	140,259	159,103
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 196,739	\$ 264,811	\$ 183,391	\$ 191,710	\$ 501,825

TABLE CCXVII -- Continued

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$1,762,724	\$1,797,687	\$1,845,351	\$2,044,738	\$2,645,640
Other operating income	137,441	161,210	149,135	59,621	61,000
Nonoperating income	28,710	41,341	55,500	49,236	71,586
Total income	\$1,928,875	\$2,000,238	\$2,049,986	\$2,153,645	\$2,778,226
Deduct expenses:					
Operating expenses	926,577	954,066	962,020	1,067,519	1,271,335
Depreciation	433,452	459,071	478,342	499,828	541,404
Bond interest and fees	200,939	215,966	246,540	224,143	271,143
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 367,907	\$ 371,135	\$ 363,084	\$ 362,055	\$ 694,344

TABLE CCXVII--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$2,847,633	\$2,916,814	\$3,812,683	\$4,101,723	\$3,685,038
Other operating income	38,239	32,651	50,731	45,669	303,573
Nonoperating income	85,705	170,992	202,751	211,323	220,391
Total income	\$2,971,577	\$3,120,457	\$4,066,165	\$4,358,715	\$4,209,002
Deduct expenses:					
Operating expenses	1,402,419	1,588,005	1,978,261	2,044,363	1,762,966
Depreciation	572,646	631,757	665,902	719,840	612,117
Bond interest and fees	399,216	564,718	620,145	723,510	713,965
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 597,296	\$ 335,977	\$ 801,858	\$ 871,002	\$1,119,954

TABLE CCXVIII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF ARLINGTON, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Equity	\$ 9,020,710	\$ 8,943,974	\$ 8,842,442	\$ 8,611,384	\$ 8,592,385
Long term debt:					
Revenue bonds	4,186,184	4,011,524	3,830,438	4,391,595	5,542,390
General obligation bonds					
Other long term debt	3,063,292	3,039,270	3,090,714	3,128,833	3,241,744
Reserves and contributions:					
Reserve for bond retirement	384,830	427,077	452,429	491,014	551,547
Reserve for authorized expenditures					
Contributions	2,771,031	2,770,040	2,770,159	2,790,363	2,830,033
Federal grants					
Retained earnings	1,326,452	1,354,465	1,267,899	1,325,246	1,596,669
Total Capital Structure	\$20,752,500	\$20,546,352	\$20,254,184	\$20,738,438	\$22,354,770

TABLE CCXVIII--Continued

	1965	1966	1967	1968	1969
Equity	\$ 8,485,172	\$ 8,171,985	\$ 8,084,852	\$ 8,033,583	\$ 7,872,239
Long term debt:					
Revenue bonds					
General obligation bonds	6,570,100	6,367,289	6,344,707	7,951,281	9,434,019
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	621,994	629,344	722,558	746,219	522,858
Reserve for authorized expenditures					
Contributions	2,843,607	2,753,228	2,772,132	3,322,492	4,501,909
Federal grants					
Retained earnings	1,601,549	1,726,686	1,804,036	1,887,738	2,042,916
Total Capital Structure	\$23,539,975	\$23,254,304	\$23,333,934	\$25,421,616	\$27,603,613

TABLE CCXVIII--Continued

	1970	1971	1972	1973	1974
Equity	\$ 7,166,875	\$ 6,646,887	\$ 6,088,357	\$ 6,660,863	\$ 5,713,643
Long term debt:					
Revenue bonds	11,203,573	12,336,093	12,360,512	14,093,000	14,510,780
General obligation bonds					
Other long term debt	2,202,942	2,896,153	2,397,014	2,096,511	3,278,895
Reserves and contributions:					
Reserve for bond retirement	540,050	501,492	689,802	774,826	856,405
Reserve for authorized expenditures					
Contributions	6,378,255	8,590,315	9,737,297	10,837,851	9,411,379
Federal grants					
Retained earnings	1,768,468	1,223,828	1,108,488	1,101,142	958,603
Total Capital Structure	\$29,260,165	\$32,294,771	\$32,381,472	\$35,564,193	\$34,729,707

CITY OF ARLINGTON

WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL OPERATING INCOME
FOR THE YEARS 1960-1974

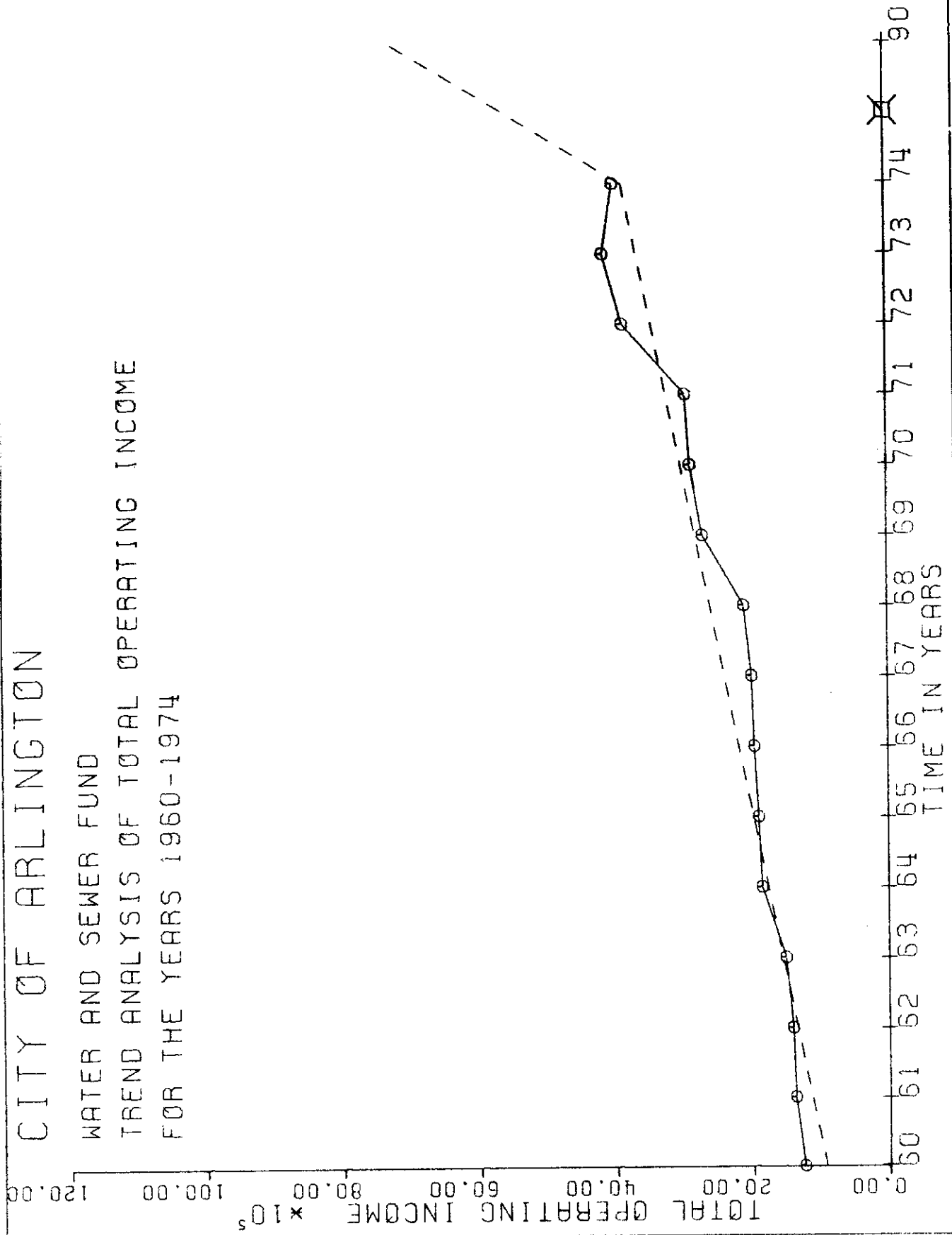


Fig. 51

CITY OF ARLINGTON
WATER AND SEWER FUND
TREND ANALYSIS OF EQUITY
FOR THE YEARS 1960-1974

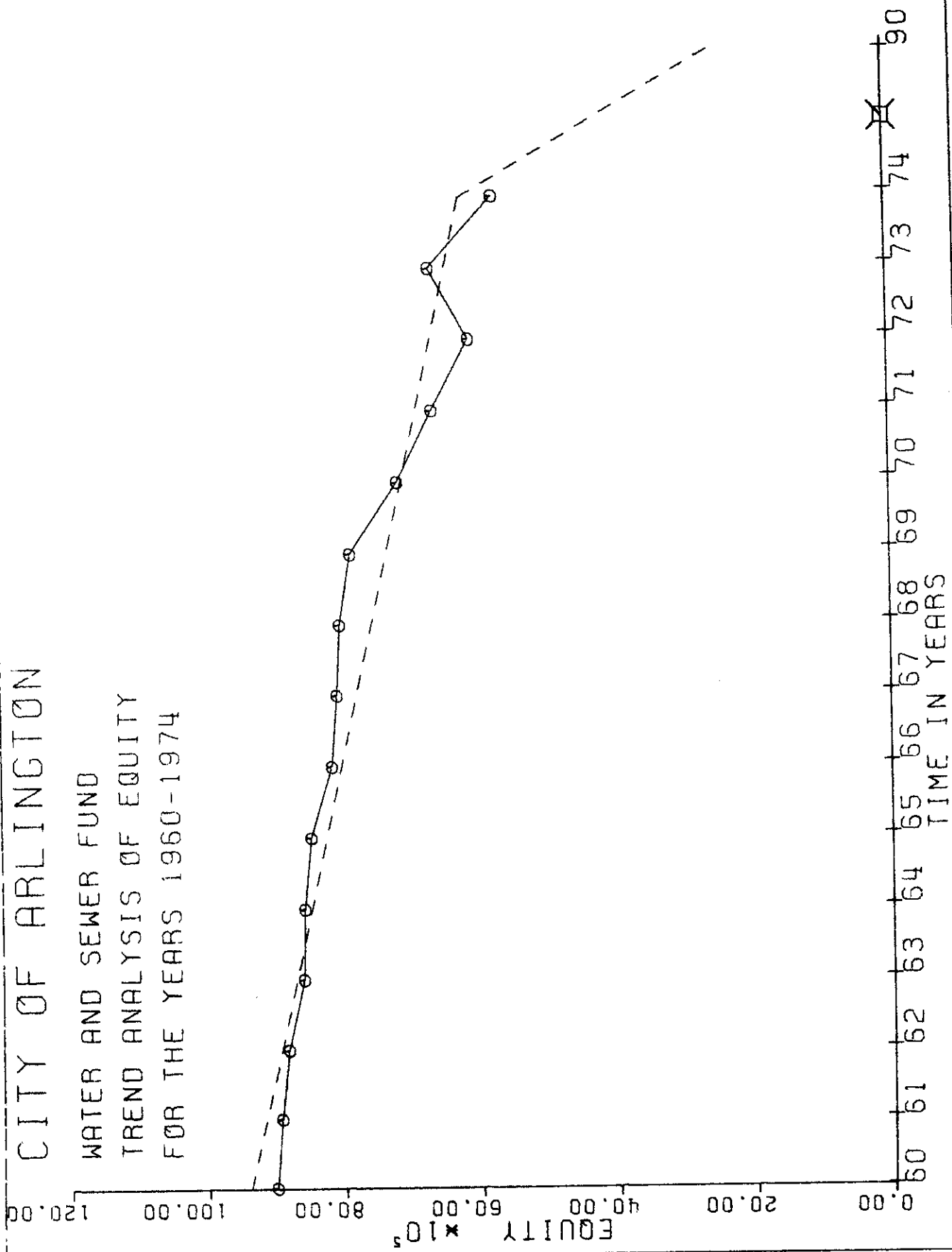


Fig. 52

TABLE CCXIX

CITY OF ARLINGTON, TEXAS, WATER AND SEWER FUND
 AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
 TO TOTAL OPERATING INCOME, 1960 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	94.66
Other Operating Income	5.34
Nonoperating Income	3.01
Expenses:	
Operating Expenses	48.22
Depreciation	22.43
Bond Interest and Fees	12.65
Special Charges	0.14
Nonoperating Expenses	0.00

TABLE CCXX

CITY OF ARLINGTON, TEXAS, WATER AND SEWER FUND
 AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
 TO EQUITY, 1960 - 1974

Capital Structure Element	Percent
Equity	100.00
Long Term Debt:	
Revenue Bonds	114.21
General Obligation Bonds	0.00
Other Long Term Debt*	39.52
Reserves and Contributions:	
Reserve for Bond Retirement	8.05
Reserve for Authorized Expenditures	0.00
Contributions	70.93
Federal Grants	0.00
Retained Earnings	18.97

*Includes: Trinity River Bonds, Notes Payable, and
 Amounts Due Other Municipal Funds

TABLE CCXXI
 CITY OF ARLINGTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....		\$6,823,092.80
OTHER OPERATING INCOME.....		\$384,907.20
NONOPERATING INCOME.....		\$216,960.80

TOTAL INCOME.....		\$7,424,960.80
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$3,475,697.60	
DEPRECIATION.....	\$1,616,754.40	
BOND INTEREST AND FEES.....	\$336,116.55	
SPECIAL CHARGES.....	\$10,091.20	

NET WATER AND SEWER SURPLUS (DEFICIT).....		\$1,986,301.05

TABLE CCXXII

CITY OF ARLINGTON
WATER AND SEWER FUND
PRC FCMA CAPITAL STRUCTURE
1990
ALTERNATIVE CONDITION 1

EQUITY.....	\$2,528,900.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$7,469,256.69
OTHER LONG TERM DEBT.....	\$999,421.28

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$203,576.45
CONTRIBUTIONS.....	\$1,793,748.77

RETAINED EARNINGS.....	\$479,732.33

TOTAL CAPITAL STRUCTURE.....	\$13,474,635.52

TABLE CCXXIII

CITY OF ARLINGTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$6,823,092.80	
OTHER OPERATING INCOME.....	\$384,907.20	
NONOPERATING INCOME.....	\$216,960.80	
	-----	\$7,424,960.80
TOTAL INCOME.....		
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$3,475,697.60	
DEPRECIATION.....	\$1,616,754.40	
BOND INTEREST AND FEES.....	\$263,965.80	
SPECIAL CHARGES.....	\$10,091.20	
	-----	\$2,058,451.80
NET WATER AND SEWER SURPLUS (DEFICIT).....		

TABLE CCXXIV

CITY OF ARLINGTON
 WATER AND SEWER FUND
 PRC FCRMA CAPITAL STRUCTURE
 1950
 ALTERNATIVE CONDITION 2

EQUITY.....		\$2,528,900.00
LONG TERM DEBT:		
REVENUE BONDS.....	\$5,865,906.69	
OTHER LONG TERM DEBT.....	\$999,421.28	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$203,576.45	
CONTRIBUTIONS.....	\$1,793,748.77	

FEDERAL GRANTS.....		\$1,603,350.00
RETAINED EARNINGS.....		\$479,732.33

TOTAL CAPITAL STRUCTURE.....		\$13,474,635.52

TABLE CCXXV

CITY OF ARLINGTON
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$6,823,092.80
OTHER OPERATING INCOME.....	\$384,907.20
NONOPERATING INCOME.....	\$216,960.80

TOTAL INCOME.....	\$7,424,960.80
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$3,475,697.60
DEPRECIATION.....	\$1,616,754.40
BOND INTEREST AND FEES.....	\$540,352.80
SPECIAL CHARGES.....	\$10,091.20
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----
	\$1,782,064.80

TABLE CCXXVI

CITY OF ARLINGTON
 WATER AND SEWER FUND
 PRC FCRPA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....	\$2,528,900.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$2,888,256.69
OTHER LONG TERM DEBT.....	\$999,421.28

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$203,576.45
CONTRIBUTIONS.....	\$1,793,748.77

RETAINED EARNINGS.....	\$479,732.33
STATE GRANTS.....	\$4,581,000.00

TOTAL CAPITAL STRUCTURE.....	\$13,474,635.52

TABLE CCXXVII
 CITY OF ARLINGTON
 WATER AND SEWER FUND
 PRG FCRMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$6,823,092.80	
OTHER OPERATING INCOME.....	\$384,907.20	
NONOPERATING INCOME.....	\$216,960.80	

TOTAL INCOME.....	\$7,424,960.80	
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$3,475,657.60	
DEPRECIATION.....	\$1,616,754.40	
BOND INTEREST AND FEES.....	\$181,507.80	
SPECIAL CHARGES.....	\$10,091.20	

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$2,140,909.80	-----

TABLE CCXXVIII

CITY OF ARLINGTON
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE

1990

ALTERNATIVE CONDITION 4

EQUITY.....	\$2,528,900.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$4,033,506.69
OTHER LONG TERM DEBT.....	\$999,421.28

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$202,576.45
CONTRIBUTIONS.....	\$1,793,748.77

FEDERAL GRANTS.....	\$3,435,750.00
RETAINED EARNINGS.....	\$479,732.33

TOTAL CAPITAL STRUCTURE.....	\$13,474,635.52

APPENDIX V
CITY OF GRAND PRAIRIE, TEXAS
DATA ANALYSIS TABLES

TABLE CCXXIX

SUMMARY INCOME STATEMENT FOR CITY OF GRAND PRAIRIE, TEXAS,
WATER AND SEWER FUND, 1966-1974, IN CONSTANT DOLLARS

	1966	1967	1968	1969	1970
Income from operations:					
Water and sewer collections	\$1,609,935	\$1,710,612	\$1,876,046	\$2,265,389	\$2,154,146
Other operating income	38,842	38,499	56,605	67,831	89,500
Nonoperating income					
Total income	\$1,648,777	\$1,749,111	\$1,932,651	\$2,333,220	\$2,243,646
Deduct expenses:					
Operating expenses	852,911	903,821	929,608	1,115,347	1,117,177
Depreciation	52,792	65,658	87,526	84,080	67,397
Bond interest and fees	175,787	204,197	225,646	253,764	298,566
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 567,287	\$ 575,435	\$ 689,871	\$ 880,029	\$760,506

TABLE CCXXIX--Continued

	1971	1972	1973	1974
Income from operations:				
Water and sewer collections	\$2,151,344	\$2,069,686	\$1,910,443	\$1,719,114
Other operating income	13,669	78,568	117,687	95,348
Nonoperating income	15,346	52,179	47,772	187,828
Total income	\$2,180,359	\$2,200,433	\$2,075,902	\$2,002,290
Deduct expenses:				
Operating expenses	1,274,682	1,248,762	1,241,815	1,036,552
Depreciation	70,762	61,107	64,525	50,034
Bond interest and fees	274,720	259,525	287,822	257,290
Special charges				(156,467)
Nonoperating expenses				
Net water and sewer surplus (deficit)	\$ 560,195	\$ 631,039	\$ 481,740	\$ 814,882

TABLE CCXXX

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF GRAND PRAIRIE, TEXAS,
WATER AND SEWER FUND, 1966-1974, IN CONSTANT DOLLARS

	1966	1967	1968	1969	1970
Equity	\$11,390,619	\$11,301,710	\$11,323,789	\$11,103,216	\$ 9,689,192
Long term debt:					
Revenue bonds	5,509,361	6,107,592	6,714,481	7,173,905	6,683,163
General obligation bonds					
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	488,188	542,417	513,981	607,805	577,542
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	879,420	992,393	1,123,422	1,546,012	1,841,232
Total Capital Structure	\$18,267,589	\$18,944,112	\$19,675,675	\$20,430,941	\$18,791,130

TABLE CCXXX--Continued

	1971	1972	1973	1974
Equity	\$ 8,676,342	\$ 7,853,644	\$ 7,515,026	\$ 5,468,978
Long term debt:				
Revenue bonds	6,249,419	6,104,265	6,622,000	5,728,850
General obligation bonds				
Other long term debt				
Reserves and contributions:				
Reserve for bond retirement	620,672	616,902	666,751	575,612
Reserve for authorized expenditures				
Contributions	193,231	207,761	3,346,539	2,510,179
Federal grants	548,376	468,381	449,945	586,595
Retained earnings	1,717,821	1,795,935	1,832,857	1,582,694
Total Capital Structure	\$17,995,861	\$17,046,888	\$20,433,118	\$16,452,908

CITY OF GRAND PRAIRIE

WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL OPERATING INCOME
FOR THE YEARS 1960-1974

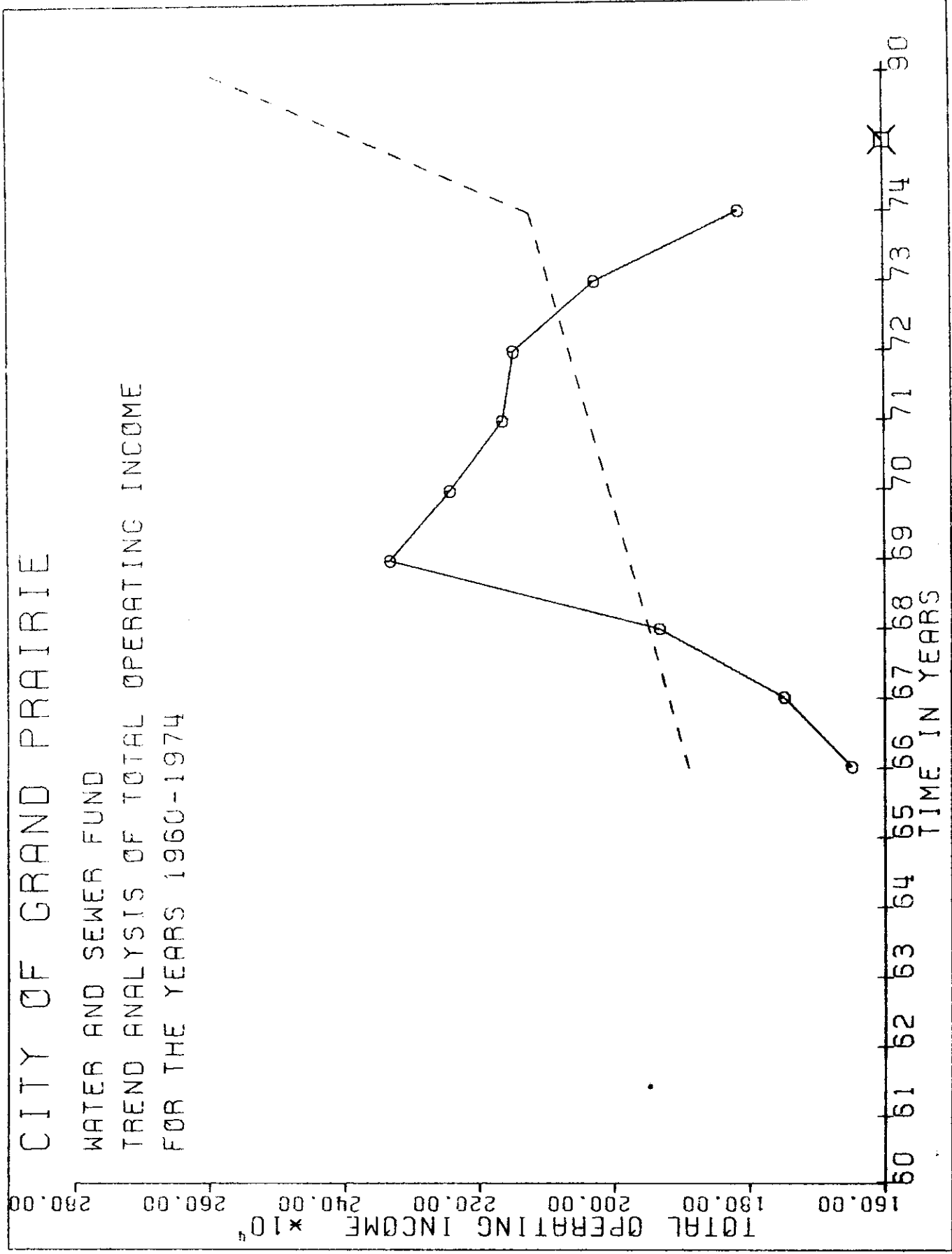


Fig. 53

CITY OF GRAND PRAIRIE

WATER AND SEWER FUND
TREND ANALYSIS OF RETAINED EARNINGS
FOR THE YEARS 1960-1974

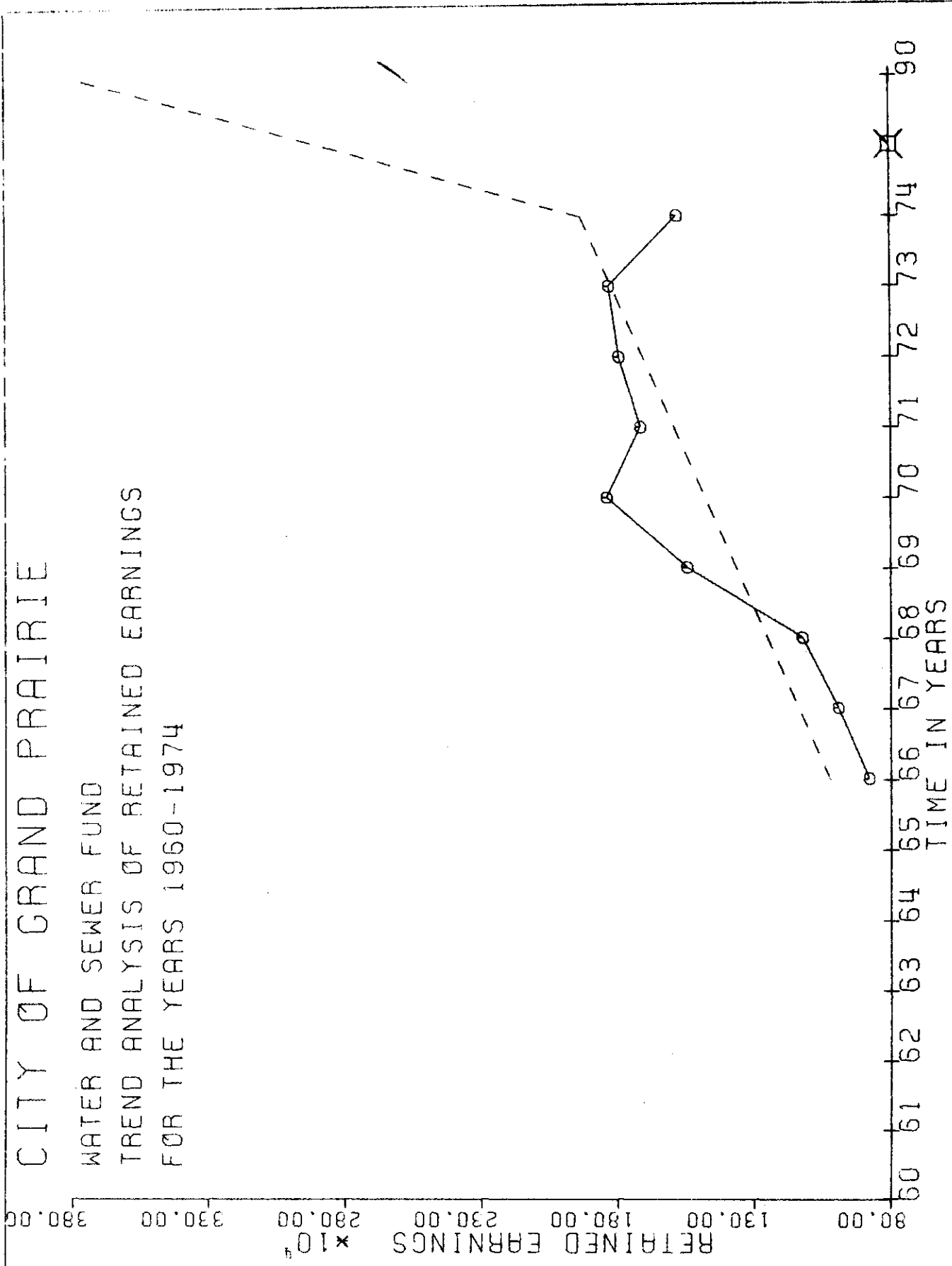


Fig. 54

TABLE CCXXXI

CITY OF GRAND PRAIRIE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1966 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	96.70
Other Operating Income	3.31
Nonoperating Income	1.76
Expenses:	
Operating Expenses	53.83
Depreciation	3.35
Bond Interest and Fees	12.37
Special Charges	0.96
Nonoperating Expenses	0.00

TABLE CCXXXII

CITY OF GRAND PRAIRIE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO RETAINED EARNINGS, 1966 - 1974

Capital Structure Element	Percent
Equity	709.38
Long Term Debt:	
Revenue Bonds	454.84
General Obligation Bonds	0.00
Other Long Term Debt*	0.00
Reserves and Contributions:	
Reserve for Bond Retirement	41.09
Reserve for Authorized Expenditures	0.00
Contributions	40.38
Federal Grants	13.29
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CCXXXIII

CITY OF GRAND PRAIRIE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990

ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,508,978.20
OTHER OPERATING INCOME.....	\$85,881.26
NONOPERATING INCOME.....	\$45,664.96

TOTAL INCOME.....	\$2,640,524.42
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,396,673.18
DEPRECIATION.....	\$86,919.10
BOND INTEREST AND FEES.....	\$1,520,337.85
SPECIAL CHARGES.....	\$24,908.16CR

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$738,497.55DB

TABLE CCXXXIV

CITY OF GRAND PRAIRIE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990

ALTERNATIVE CONDITION 1

EQUITY.....	\$26,693,260.02
LONG TERM DEBT:	
REVENUE BONDS.....	\$42,674,174.36
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$1,546,175.61
CONTRIBUTIONS.....	\$1,519,459.02

FEDERAL GRANTS.....	\$500,089.41
RETAINED EARNINGS.....	\$3,762,900.00

TOTAL CAPITAL STRUCTURE.....	\$76,696,058.42

TABLE CCXXXV

CITY OF GRAND PRAIRIE
WATER AND SEWER FUND
PRO FORMA INCOME STATEMENT

1990

ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,508,978.20
OTHER OPERATING INCOME.....	\$85,881.26
NONOPERATING INCOME.....	\$45,664.96

TOTAL INCOME.....	\$2,640,524.42
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,396,673.18
DEPRECIATION.....	\$86,919.10
BOND INTEREST AND FEES.....	\$1,517,783.60
SPECIAL CHARGES.....	\$24,908.16CR

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$335,943.30DB

TABLE CCXXXVI

CITY OF GRAND PRAIRIE
WATER AND SEWER FUND
PRO FORMA CAPITAL STRUCTURE

1990

ALTERNATIVE CONDITION 2

EQUITY.....	\$26,693,260.02
LONG TERM DEBT:	
REVENUE BONDS.....	\$33,728,524.36
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$1,546,175.61
CONTRIBUTIONS.....	\$1,519,459.02

FEDERAL GRANTS.....	\$9,445,739.41
RETAINED EARNINGS.....	\$3,762,900.00

TOTAL CAPITAL STRUCTURE.....	\$76,696,058.42

TABLE CCXXXVII

CITY OF GRAND PRAIRIE
 WATER AND SEWER FUND
 PRO FCMA INCCME STATEMENT
 155C
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,508,978.20
OTHER OPERATING INCOME.....	\$85,881.26
NONOPERATING INCOME.....	\$45,664.96

TOTAL INCOME.....	\$2,640,524.42
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,396,673.18
DEPRECIATION.....	\$86,919.10
BOND INTEREST AND FEES.....	\$3,059,843.27
SPECIAL CHARGES.....	\$24,908.16CR

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$1,878,002.97DB

TABLE CCXXXVIII

CITY CF GRAND PRAIRIE
 WATER AND SEWER FUND
 PRO FCMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....	\$26,693,260.02
LONG TERM DEBT:	
REVENUE BONDS.....	\$17,115,174.26
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$1,546,175.61
CONTRIBUTIONS.....	\$1,519,459.02

FEDERAL GRANTS.....	\$500,089.41
RETAINED EARNINGS.....	\$3,762,900.00
STATE GRANTS.....	\$25,559,000.00

TOTAL CAPITAL STRUCTURE.....	\$76,696,058.42

TABLE CCXXXIX

CITY OF GRAND PRAIRIE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$2,508,978.20
OTHER OPERATING INCOME.....	\$85,881.26
NONOPERATING INCOME.....	\$45,664.96

TOTAL INCOME.....	\$2,640,524.42
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,396,673.18
DEPRECIATION.....	\$86,919.10
BOND INTEREST AND FEES.....	\$1,057,721.60
SPECIAL CHARGES.....	\$24,908.16CR

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$124,118.70

TABLE CCXL

CITY OF GRAND PRAIRIE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

EQUITY.....	\$26,693,260.02
LONG TERM DEBT:	
REVENUE BONDS.....	\$23,504,924.36
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$1,546,175.61
CONTRIBUTIONS.....	\$1,519,459.02

FEDERAL GRANTS.....	\$19,669,339.41
RETAINED EARNINGS.....	\$3,762,900.00

TOTAL CAPITAL STRUCTURE.....	\$76,696,058.42

APPENDIX W
CITY OF MESQUITE, TEXAS
DATA ANALYSIS TABLES

TABLE CCXLI

SUMMARY INCOME STATEMENT FOR CITY OF MESQUITE, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Income from operations:					
Water and sewer collections	\$ 990,038	\$1,143,665	\$1,360,465	\$1,512,532	\$1,763,735
Other operating income					
Nonoperating income	31,368	34,548	70,686	60,297	79,900
Total income	\$1,021,406	\$1,178,213	\$1,431,151	\$1,572,829	\$1,843,635
Deduct expenses:					
Operating expenses	443,154	586,160	578,885	584,814	707,412
Depreciation	194,162	240,752	264,766	287,744	349,498
Bond interest and fees		277,998	322,219	357,572	391,072
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 384,090	\$ 73,303	\$ 265,281	\$ 332,697	\$ 395,653

TABLE CCXLI--Continued

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$1,720,978	\$1,703,988	\$1,797,864	\$1,278,821	\$2,008,791
Other operating income	40,885	73,834	51,380	60,569	71,435
Nonoperating income					
Total income	\$1,761,863	\$1,777,822	\$1,849,244	\$1,339,390	\$2,080,226
Deduct expenses:					
Operating expenses	697,077	855,754	882,091	867,306	942,459
Depreciation	334,156	341,767	356,109	352,238	358,656
Bond interest and fees	392,111	483,136	416,437	399,911	383,853
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 338,519	\$ 177,165	\$ 194,607	\$ 280,065	\$ 395,258

TABLE CCXLI--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$2,053,716	\$2,134,920	\$2,165,734	\$2,086,550	\$1,615,520
Other operating income					
Nonoperating income	109,318	99,290	96,401	149,366	96,285
Total income	\$2,163,035	\$2,234,210	\$2,262,135	\$2,234,916	\$1,711,805
Deduct expenses:					
Operating expenses	1,114,135	1,212,024	1,210,515	1,345,211	1,093,432
Depreciation	333,262	329,753	321,036	319,643	250,150
Bond interest and fees	324,280	315,438	350,001	257,938	226,172
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 391,357	\$ 376,995	\$ 380,583	\$ 313,124	\$ 142,051

TABLE CCXLII

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF MESQUITE, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Equity					
Long term debt:					
Revenue bonds	\$5,345,312	\$4,023,220	\$5,918,420	\$7,402,976	\$7,600,121
General obligation bonds				1,179,598	1,145,758
Other long term debt	97,152	1,199,614	1,241,745	3,960	34,122
Reserves and contributions:					
Reserve for bond retirement				507,583	513,429
Reserve for authorized expenditures	90,050	269,889	446,308		
Contributions	47,024	4,750,931	5,420,416	4,950,512	5,216,267
Federal grants	155,863	417,379	412,640	555,162	802,245
Retained earnings	(56,132)	(75,664)	(205,598)	344,531	560,882
Total Capital Structure	\$5,679,271	\$10,585,370	\$13,233,932	\$14,944,324	\$15,872,826

TABLE CCXLII--Continued

	1965	1966	1967	1968	1969
Equity					
Long term debt:					
Revenue bonds	\$8,180,527	\$8,504,475	\$8,246,155	\$7,902,519	\$7,566,025
General obligation bonds	1,100,613	1,030,279	985,181	929,045	874,153
Other long term debt	39,388	11,081	2,926	2,863	384
Reserves and contributions:					
Reserve for bond retirement	615,406	596,974	596,619	586,085	582,743
Reserve for authorized expenditures	5,299,647	5,287,567	5,286,121	5,066,256	5,287,740
Contributions	792,235	762,993	754,858	738,551	723,195
Federal grants	580,368	244,697	238,883	277,622	535,238
Retained earnings					
Total Capital Structure	\$16,608,187	\$16,438,068	\$16,110,747	\$15,502,939	\$15,569,481

TABLE CCXLII--Continued

	1970	1971	1972	1973	1974
Equity					
Long term debt:					
Revenue bonds	\$6,403,653	\$6,948,061	\$6,025,151	\$6,597,000	\$5,452,504
General obligation bonds	726,416	641,497	545,605	501,331	346,654
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	555,448	517,895	509,564	556,809	473,828
Reserve for authorized expenditures	4,987,113	4,989,698	5,147,317	5,537,444	127,690
Contributions	626,467	581,013	520,290	499,812	4,378,034
Federal grants	676,622	809,531	793,336	742,362	1,024,112
Retained earnings					660,212
Total Capital Structure	\$13,975,722	\$14,487,697	\$13,541,266	\$14,434,758	\$12,463,037

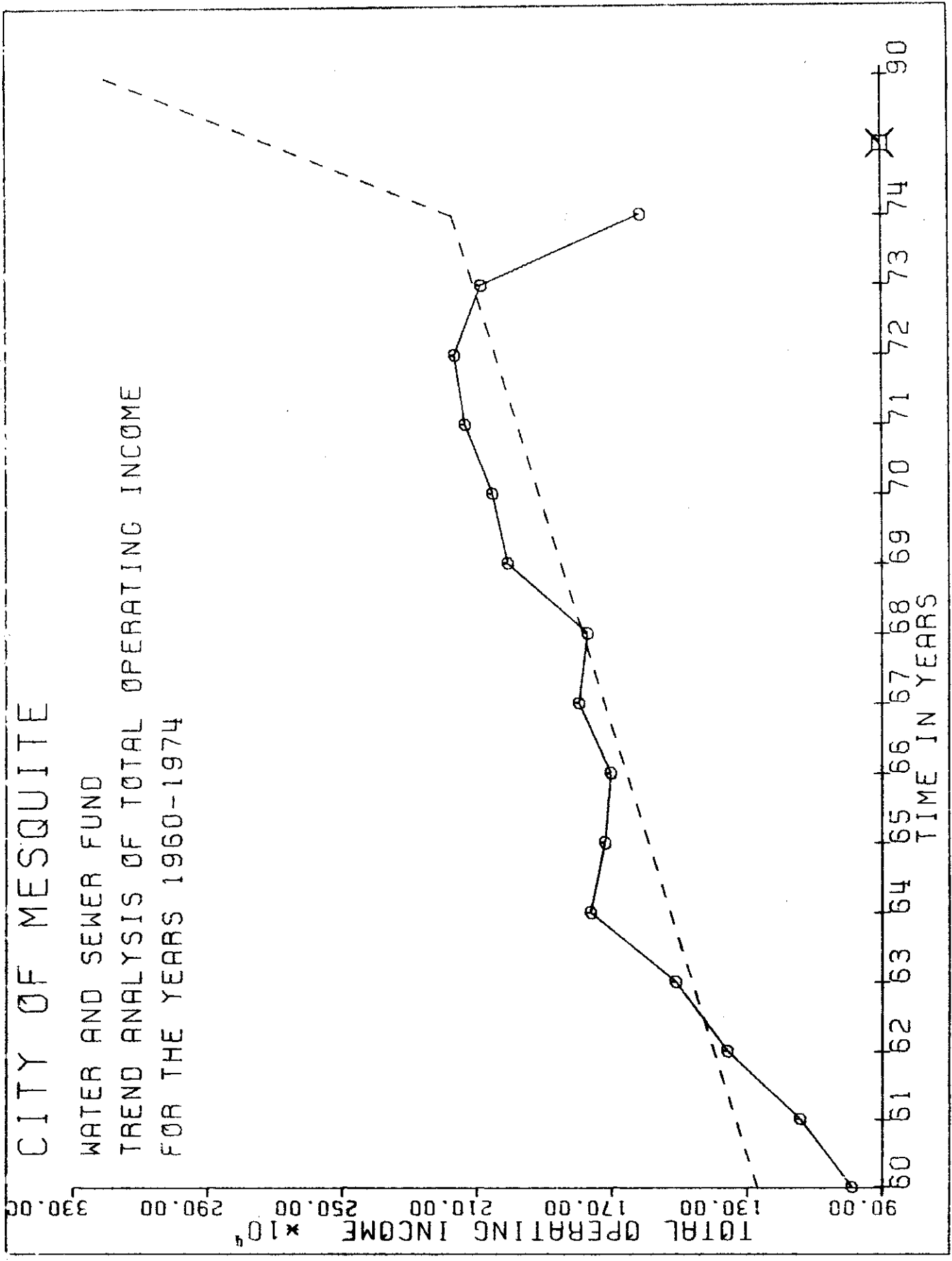


Fig. 55

CITY OF MESQUITE

WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL CONTRIBUTIONS
FOR THE YEARS 1960-1974

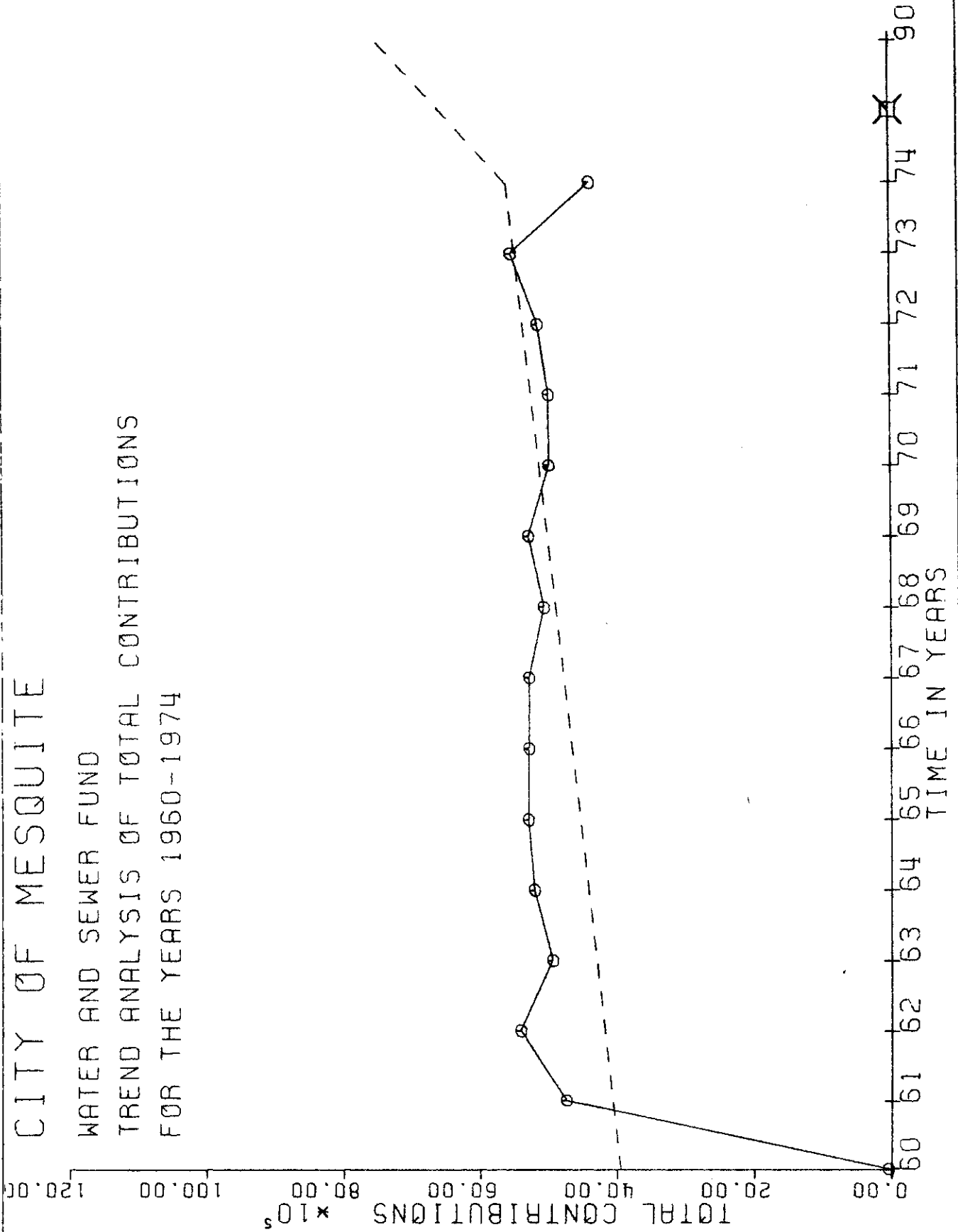


Fig. 56

TABLE CCXLIII

CITY OF MESQUITE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1960 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	100.00
Other Operating Income	0.00
Nonoperating Income	4.27
Expenses:	
Operating Expenses	50.18
Depreciation	18.22
Bond Interest and Fees	0.00
Special Charges	0.00
Nonoperating Expenses	18.54

TABLE CCXLIV

CITY OF MESQUITE, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO TOTAL CONTRIBUTIONS, 1960 - 1974

Capital Structure Element	Percent
Equity	594.46
Long Term Debt:	
Revenue Bonds	883.65
General Obligation Bonds	16.18
Other Long Term Debt*	13.90
Reserves and Contributions:	
Reserve for Bond Retirement	9.54
Reserve for Authorized Expenditures	12.96
Contributions	100.00
Federal Grants	0.00
Retained Earnings	34.21

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CCXLV
 CITY OF MESQUITE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$3,206,100.00
NONOPERATING INCOME.....	\$136,900.47

TOTAL INCOME.....	\$3,343,000.47
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,608,820.98
DEPRECIATION.....	\$584,151.42
BCND INTEREST AND FEES.....	\$3,775,603.49
NONOPERATING EXPENSES.....	\$594,410.94

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$3,219,986.36DB

TABLE CCXLVI
 CITY OF MESQUITE
 WATER AND SEWER FUND
 PRG FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....		\$44,459,068.94
LONG TERM DEBT:		
REVENUE BONDS.....	\$83,902,299.85	
GENERAL OBLIGATION BONDS.....	\$1,210,086.02	
OTHER LONG TERM DEBT.....	\$1,039,567.10	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$713,487.06	
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$14,209.91	
WATER AND SEWER CONTINGENCY FUND.....	\$955,055.53	
CONTRIBUTIONS.....	\$7,478,900.00	

FEDERAL GRANTS.....		\$2,558,531.69
RETAINED EARNINGS.....		\$11,966.24

TOTAL CAPITAL STRUCTURE.....		\$142,343,172.34

TABLE CCXLVII

CITY OF MESQUITE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$3,206,100.00
NONOPERATING INCOME.....	\$136,900.47

	\$3,343,000.47
TOTAL INCOME.....	
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,608,820.98
DEPRECIATION.....	\$584,151.42
BOND INTEREST AND FEES.....	\$3,495,017.24
NONOPERATING EXPENSES.....	\$594,413.94

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$2,939,400.11DB

TABLE CCXLVIII
 CITY OF MESQUITE
 WATER AND SEWER FUND
 PRC FCRA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....		\$44,459,068.94
LONG TERM DEBT:		
REVENUE BONDS.....	\$77,667,049.85	
GENERAL OBLIGATION BONDS.....	\$1,210,686.02	
OTHER LONG TERM DEBT.....	\$1,039,567.10	
RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$713,487.06	
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$14,209.91	
WATER AND SEWER CONTINGENCY FUND.....	\$955,055.53	
CONTRIBUTIONS.....	\$7,478,900.00	
FEDERAL GRANTS.....	\$8,793,781.69	
RETAINED EARNINGS.....	\$11,966.24	
TOTAL CAPITAL STRUCTURE.....	\$142,343,172.34	

TABLE CCIL
 CITY OF MESQUITE
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$3,206,100.00
NONOPERATING INCOME.....	\$136,900.47

TOTAL INCOME.....	\$3,343,000.47
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,608,820.98
DEPRECIATION.....	\$584,151.42
BOND INTEREST AND FEES.....	\$4,565,855.57
NONOPERATING EXPENSES.....	\$594,410.94

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$4,014,238.44DB

TABLE CCL

CITY OF MESQUITE
 WATER AND SEWER FUND
 PRG FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONCITION 3

EQUITY.....		\$44,459,068.94
LONG TERM DEBT:		
REVENUE BONDS.....	\$66,087,299.85	
GENERAL OBLIGATION BONDS.....	\$1,210,086.02	
OTHER LONG TERM DEBT.....	\$1,039,567.10	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$713,487.06	
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$14,209.91	
WATER AND SEWER CONTINGENCY FUND.....	\$955,055.53	
CONTRIBUTIONS.....	\$7,478,900.00	

FEDERAL GRANTS.....	\$2,558,531.69	
RETAINED EARNINGS.....	\$11,966.24	
STATE GRANTS.....	\$17,815,000.00	

TOTAL CAPITAL STRUCTURE.....	\$142,343,172.34	

TABLE CCLI
 CITY OF MESQUITE
 WATER AND SEWER FUND
 PRC FCMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$3,206,100.00
NONOPERATING INCOME.....	\$136,900.47
	\$3,343,000.47
TOTAL INCOME.....	
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$1,608,820.98
DEPRECIATION.....	\$584,151.42
BOND INTEREST AND FEES.....	\$3,174,347.24
NONOPERATING EXPENSES.....	\$594,410.94
	\$2,618,730.1108
NET WATER AND SEWER SURPLUS (DEFICIT).....	

TABLE CCLII

CITY OF MESQUITE
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

EQUITY.....		\$44,459,068.94
LONG TERM DEBT:		
REVENUE BONDS.....	\$70,541,049.85	
GENERAL OBLIGATION BONDS.....	\$1,210,086.02	
OTHER LONG TERM DEBT.....	\$1,039,567.10	

RESERVES AND CONTRIBUTIONS:		
RESERVE FOR BOND RETIREMENT.....	\$713,487.06	
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$14,209.91	
WATER AND SEWER CONTINGENCY FUND.....	\$955,055.53	
CONTRIBUTIONS.....	\$7,478,500.00	

FEDERAL GRANTS.....	\$15,919,781.69	
RETAINED EARNINGS.....	\$11,966.24	

TOTAL CAPITAL STRUCTURE.....	\$142,343,172.34	

APPENDIX X
CITY OF DALLAS, TEXAS
DATA ANALYSIS TABLES

TABLE CCLIII

SUMMARY INCOME STATEMENT FOR CITY OF DALLAS, TEXAS,
WATER AND SEWER FUND, 1962-1974, IN CONSTANT DOLLARS

	1962	1963	1964	1965	1966
Income from operations:					
Water and sewer collections	\$31,863,461	\$35,265,381	\$38,851,891	\$35,764,933	\$34,486,280
Other operating income	5,740,896	4,915,348	4,828,937	3,503,148	4,182,248
Nonoperating income	6,891,686	6,394,606	7,222,979	6,458,781	6,607,638
Total income	\$44,496,043	\$46,575,335	\$50,903,807	\$45,726,862	\$45,276,166
Deduct expenses:					
Operating expenses	13,138,032	13,030,539	13,808,506	14,054,560	14,276,045
Depreciation	6,016,051	6,303,525	6,647,951	6,988,982	7,176,123
Bond interest and fees	4,013,994	10,098,921	4,439,711	4,505,310	4,429,136
Special charges					
Nonoperating expenses	6,128,754	5,834,908	5,746,806	5,522,878	5,143,535
Net water and sewer surplus (deficit)	\$15,199,212	\$17,007,442	\$20,260,833	\$14,655,132	\$14,251,327

TABLE CCLIII -- Continued

	1967	1968	1969	1970	1971
Income from operations:					
Water and sewer collections	\$36,664,480	\$35,644,744	\$45,849,116	\$43,785,659	\$41,495,670
Other operating income	2,574,367	1,228,023	1,645,079	1,408,768	1,359,828
Nonoperating income	5,745,641	6,686,699	5,457,158	5,193,211	4,333,410
Total income	\$44,984,988	\$43,559,466	\$52,951,353	\$50,387,656	\$47,188,907
Deduct expenses:					
Operating expenses	14,859,473	15,459,928	17,052,942	17,002,741	17,669,611
Depreciation	7,464,703	7,042,041	7,898,339	7,077,610	6,858,054
Bond interest and fees	4,667,918	4,911,988	4,703,976	3,866,682	3,773,029
Special charges					
Nonoperating expenses	4,682,753	4,012,758	3,943,411	3,340,397	2,055,352
Net water and sewer surplus (deficit)	\$13,309,641	\$12,132,751	\$19,352,685	\$19,100,226	\$16,832,861

TABLE CCLIII--Continued

	1972	1973	1974
Income from operations:			
Water and sewer collections	\$39,431,688	\$36,370,358	\$31,560,039
Other operating income	1,356,487	1,239,831	929,084
Nonoperating income	3,492,454	4,200,809	4,152,915
Total income	\$44,280,628	\$41,810,998	\$36,642,038
Deduct expenses:			
Operating expenses	17,613,035	19,159,798	14,626,358
Depreciation	6,790,289	7,033,541	5,601,384
Bond interest and fees	3,865,354	5,068,929	4,525,279
Special charges			
Nonoperating expenses	5,126,269	669,552	844,747
Net water and sewer surplus (deficit)	\$10,885,681	\$ 9,879,178	\$11,044,270

TABLE CCLIV

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF DALLAS, TEXAS,
WATER AND SEWER FUND, 1962-1974, IN CONSTANT DOLLARS

	1962	1963	1964	1965	1966
Equity					
Long term debt:					
Revenue bonds	\$110,094,796	\$122,752,077	\$115,242,290	\$129,639,141	\$129,433,863
General obligation bonds	39,555,247	33,561,927	28,426,887	23,623,717	18,563,818
Other long term debt	7,904,304	6,614,382		308,357	631,763
Reserves and contributions:					
Reserve for bond retirement	4,155,596	5,452,928	6,838,491	8,059,368	8,920,654
Reserve for authorized expenditures	15,737,814	18,347,375	5,373,825	1,275,415	1,272,830
Contributions					
Federal grants					
Retained earnings	140,237,454	150,484,408	192,452,605	203,586,074	209,105,452
Total Capital Structure	\$317,685,214	\$337,213,100	\$357,481,948	\$366,492,075	\$367,928,381

TABLE CCLIV--Continued

	1967	1968	1969	1970	1971
Equity					
Long term debt:					
Revenue bonds	\$138,323,726	140,342,367	127,563,518	108,070,999	106,749,484
General obligation bonds	14,550,148	10,689,094	7,292,052	3,982,158	2,267,503
Other long term debt	391,085	1,234,071	1,187,738	1,914,430	1,721,172
Reserves and contributions:					
Reserve for bond retirement	9,914,588	19,873,526	13,504,428	13,770,311	13,225,891
Reserve for authorized expenditures	1,313,926	1,347,586	422,956	390,560	384,921
Contributions					
Federal grants				1,609,387	2,541,623
Retained earnings	219,030,011	158,968,426	181,960,833	174,686,797	178,358,188
Total Capital Structure	\$383,523,487	\$390,627,155	\$396,093,519	\$364,440,733	\$360,115,191

TABLE CCLIV--Continued

	1972	1973	1974
Equity	\$ 58,995,093	\$ 52,266,868	\$ 39,541,898
Long term debt:			
Revenue bonds	113,694,024	145,450,000	94,683,743
General obligation bonds	947,126	494,125	
Other long term debt	1,988,208	2,635,015	2,164,460
Reserves and contributions:			
Reserve for bond retirement	11,042,093	12,443,776	382,857
Reserve for authorized expenditures	477,392	472,679	
Contributions			
Federal grants	4,466,979	6,327,756	10,624,490
Retained earnings	171,371,666	172,725,509	140,075,544
Total Capital Structure	\$362,982,583	\$392,815,728	\$287,472,994

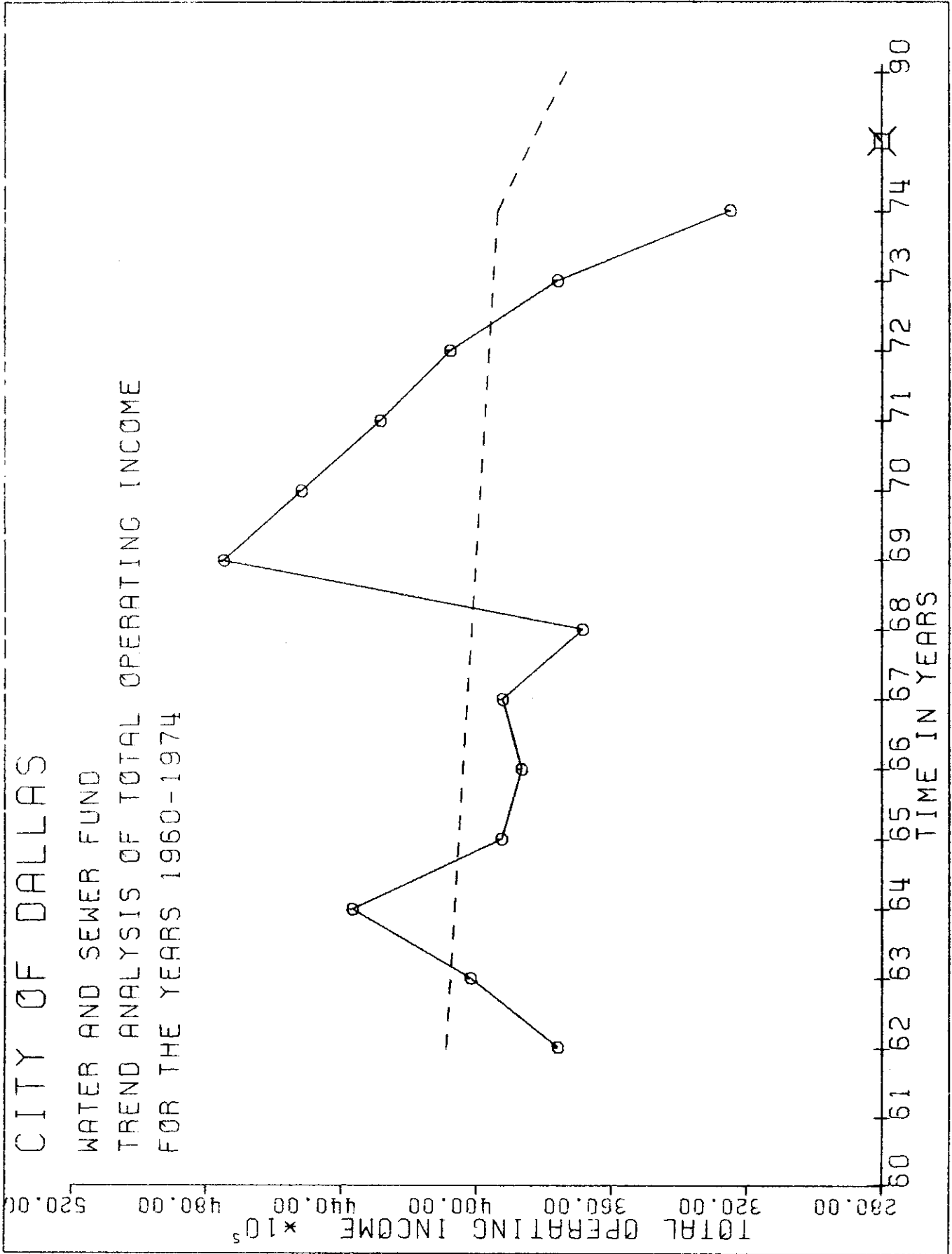


Fig. 57

CITY OF DALLAS
WATER AND SEWER FUND
TREND ANALYSIS OF RETAINED EARNINGS
FOR THE YEARS 1960-1974

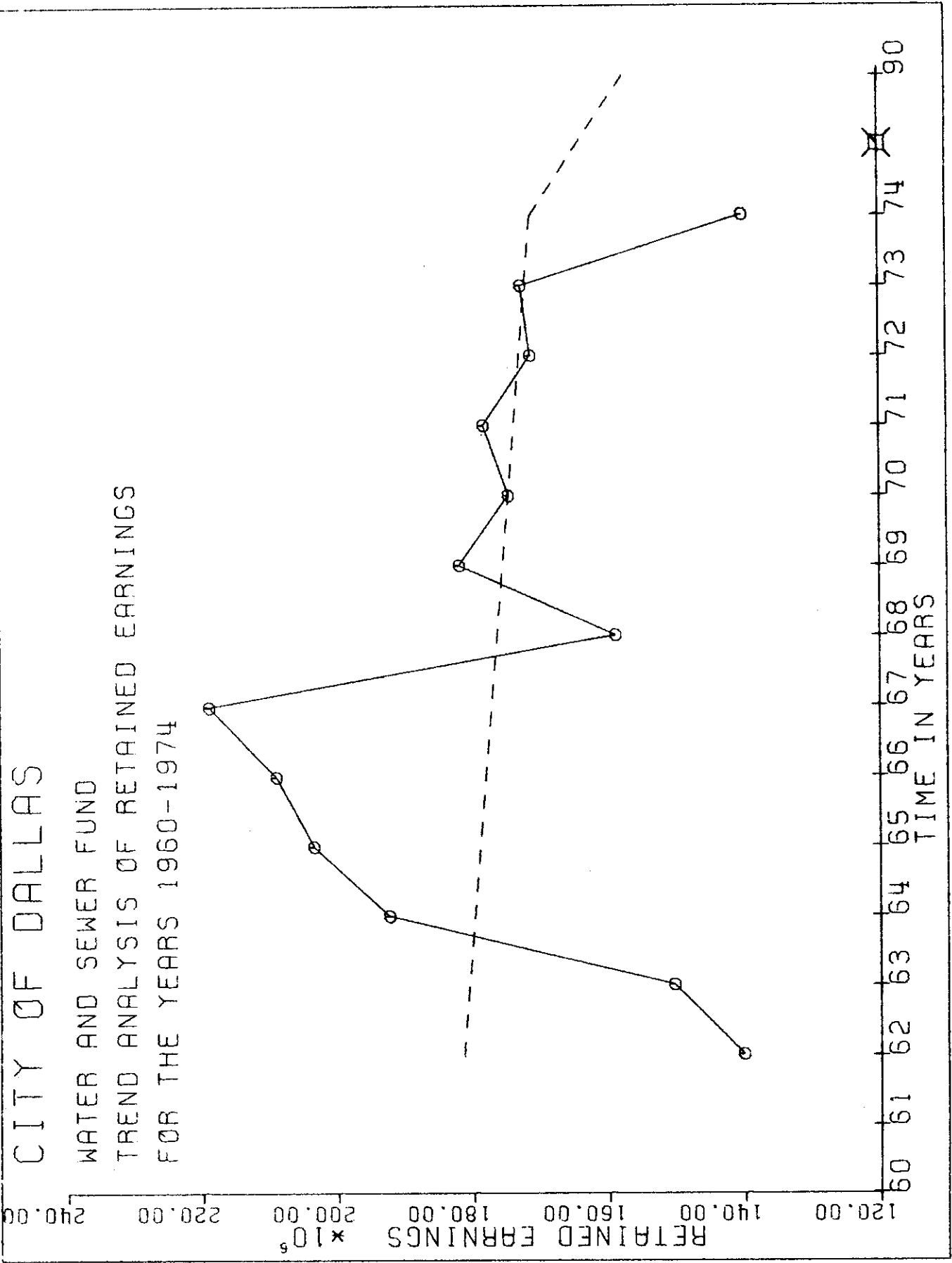


Fig. 58

TABLE CCLV

CITY OF DALLAS, TEXAS, WATER AND SEWER FUND
 AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
 TO TOTAL OPERATING INCOME, 1962 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	93.28
Other Operating Income	6.73
Nonoperating Income	14.05
Expenses:	
Operating Expenses	38.88
Depreciation	17.22
Bond Interest and Fees	12.17
Special Charges	0.00
Nonoperating Expenses	10.14

TABLE CCLVI

CITY OF DALLAS, TEXAS, WATER AND SEWER FUND
 AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
 TO RETAINED EARNINGS, 1962 - 1974

Capital Structure Element	Percent
Equity	17.68
Long Term Debt:	
Revenue Bonds	69.76
General Obligation Bonds	8.27
Other Long Term Debt*	1.78
Reserves and Contributions:	
Reserve for Bond Retirement	5.52
Reserve for Authorized Expenditures	2.34
Contributions	0.00
Federal Grants	1.25
Retained Earnings	100.00

*Includes: Trinity River Bonds, Notes Payable, and
 Amounts Due Other Municipal Funds

TABLE CCLVII

CITY OF DALLAS
 WATER AND SEWER FUND
 PRO FCRMA INCCME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$34,853,139.20
OTHER OPERATING INCOME.....	\$2,514,597.20
NONOPERATING INCOME.....	\$5,249,642.00

TOTAL INCOME.....	\$42,617,378.40
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$14,527,123.20
DEPRECIATION.....	\$6,434,080.80
BOND INTEREST AND FEES.....	\$10,218,907.44
NONOPERATING EXPENSES.....	\$3,788,709.60

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$7,648,557.36

TABLE CCLVIII

CITY OF DALLAS
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....	\$27,858,376.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$227,086,832.00
GENERAL OBLIGATION BONDS.....	\$13,031,039.00
OTHER LONG TERM DEBT.....	\$2,804,746.00

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,657,864.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,915,045.00
WATER AND SEWER CONTINGENCY FUND.....	\$772,093.00
FEDERAL GRANTS.....	\$1,969,625.00
RETAINED EARNINGS.....	\$157,570,000.00

TOTAL CAPITAL STRUCTURE.....	\$442,705,620.00

TABLE CCLIX

CITY OF CALLAS
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....		\$34,853,139.20
OTHER OPERATING INCOME.....		\$2,514,597.20
NONOPERATING INCOME.....		\$5,249,642.00

TOTAL INCOME.....		\$42,617,378.40
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$14,527,123.20	
DEPRECIATION.....	\$6,434,080.80	
BOND INTEREST AND FEES.....	\$8,373,542.94	
NONOPERATING EXPENSES.....	\$3,788,709.60	

NET WATER AND SEWER SURPLUS (DEFICIT).....		\$9,493,921.86

TABLE CCLX

CITY OF DALLAS
 WATER AND SEWER FUND
 PRC FCRMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....	\$27,858,376.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$186,078,732.00
GENERAL OBLIGATION BONDS.....	\$13,031,039.00
OTHER LONG TERM DEBT.....	\$2,804,746.00

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,697,864.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,515,045.00
WATER AND SEWER CONTINGENCY FUNC.....	\$772,093.00
FEDERAL GRANTS.....	\$42,977,725.00
RETAINED EARNINGS.....	\$157,570,000.00
TOTAL CAPITAL STRUCTURE.....	\$442,705,620.00

TABLE CCLXI

CITY OF DALLAS
WATER AND SEWER FUND
PRC FCRA INCCME STATEMENT
1990
ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:		
WATER AND SEWER COLLECTIONS.....	\$34,853,139.20	
OTHER OPERATING INCOME.....	\$2,514,597.20	
NONOPERATING INCOME.....	\$5,249,642.00	

TOTAL INCOME.....	\$42,617,378.40	
DEDUCT EXPENSES:		
OPERATING EXPENSES.....	\$14,527,123.20	
DEPRECIATION.....	\$6,434,080.80	
BOND INTEREST AND FEES.....	\$15,442,558.27	
NONOPERATING EXPENSES.....	\$3,788,709.60	

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$2,424,906.53	

TABLE CCLXII

CITY OF CALLAS
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990

ALTERNATIVE CONDITION 3

EQUITY.....	\$27,858,376.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$109,920,832.00
GENERAL OBLIGATION BONDS.....	\$13,031,039.00
OTHER LONG TERM DEBT.....	\$2,804,746.00

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,697,864.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,915,045.00
WATER AND SEWER CONTINGENCY FUND.....	\$772,093.00
FEDERAL GRANTS.....	\$1,969,625.00
RETAINED EARNINGS.....	\$157,570,000.00
STATE GRANTS.....	\$117,166,900.00
TOTAL CAPITAL STRUCTURE.....	\$442,705,620.00

TABLE CCLXIII
 CITY OF DALLAS
 WATER AND SEWER FUND
 PRC FCMA INCOME STATEMENT
 1950
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$34,853,139.20
OTHER OPERATING INCOME.....	\$2,514,597.20
NONOPERATING INCOME.....	\$5,249,642.00

TOTAL INCOME.....	\$42,617,378.40
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$14,527,123.20
DEPRECIATION.....	\$6,434,080.80
BOND INTEREST AND FEES.....	\$6,264,554.94
NONOPERATING EXPENSES.....	\$3,788,709.60
NET WATER AND SEWER SURPLUS (DEFICIT).....	-----
	\$11,602,909.86

TABLE CCLXIV

CITY OF DALLAS
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CCNCITICN 4

EQUITY.....	\$27,858,376.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$139,212,332.00
GENERAL OBLIGATION BONDS.....	\$13,031,039.00
OTHER LONG TERM DEBT.....	\$2,804,746.00

RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,697,864.00
RESERVE FOR AUTHORIZED EXPENDITURES.....	\$2,515,045.00
WATER AND SEWER CONTINGENCY FUND.....	\$772,093.00
FEDERAL GRANTS.....	\$89,844,125.00
RETAINED EARNINGS.....	\$157,570,000.00
TOTAL CAPITAL STRUCTURE.....	\$442,705,620.00

APPENDIX Y
CITY OF FORT WORTH, TEXAS
DATA ANALYSIS TABLES

TABLE CCLXV

SUMMARY INCOME STATEMENT FOR CITY OF FORT WORTH, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Income from operations:					
Water and sewer collections	\$ 11,666,498	\$ 12,306,785	\$ 12,330,542	\$ 13,134,916	\$ 13,912,386
Other operating income	347,516	276,336	279,695	434,773	363,727
Nonoperating income	96,701	284,959	489,182	382,466	572,218
Total income	\$ 12,110,715	\$ 12,868,080	\$ 13,099,419	\$ 13,952,155	\$ 14,848,331
Deduct expenses:					
Operating expenses	4,323,598	4,942,930	5,444,257	5,968,764	6,197,543
Depreciation	1,412,382	1,785,067	1,827,109	1,831,373	1,895,175
Bond interest and fees	1,946,033	1,882,929	1,946,650	1,995,015	2,176,143
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 4,428,702	\$ 4,257,153	\$ 3,881,404	\$ 4,157,003	\$ 4,579,469

TABLE CCLXV--Continued

	1965	1966	1967	1968	1969
Income from operations:					
Water and sewer collections	\$13,062,267	\$14,238,330	\$15,126,042	\$14,488,675	\$16,086,068
Other operating income	335,670	330,055	289,425	404,647	323,001
Nonoperating income	454,356	461,583	247,907	346,811	399,568
Total income	\$13,852,293	\$15,029,968	\$15,663,374	\$15,240,133	\$16,808,637
Deduct expenses:					
Operating expenses	5,952,422	6,313,692	6,435,374	6,745,382	7,243,686
Depreciation	2,059,510	2,043,683	2,244,889	2,631,393	2,387,459
Bond interest and fees	2,309,288	2,063,032	2,000,155	1,829,336	1,714,577
Special charges					
Nonoperating expenses					
Net water and sewer surplus (deficit)	\$ 3,531,073	\$ 4,609,562	\$ 4,982,956	\$ 4,035,022	\$ 5,462,915

TABLE CCLXV--Continued

	1970	1971	1972	1973	1974
Income from operations:					
Water and sewer collections	\$15,238,777	\$17,441,069	\$16,882,725	\$14,500,603	\$13,336,711
Other operating income	299,221	248,299	396,432	302,562	169,084
Nonoperating income	979,550	838,093	991,430	1,225,012	1,306,092
Total income	\$16,517,461	\$18,527,461	\$18,220,587	\$16,046,177	\$14,811,887
Deduct expenses:					
Operating expenses	7,135,699	8,514,229	8,166,700	7,804,699	6,353,095
Depreciation	2,160,304	2,212,021	2,135,787	2,338,411	1,783,561
Bond interest and fees	1,708,877	2,022,958	2,223,925	2,321,955	1,754,364
Special charges					
Nonoperating expenses		76,810	51,678	39,629	12,084
Net water and sewer surplus (deficit)	\$ 5,512,668	\$ 5,701,443	\$ 5,692,496	\$ 3,541,463	\$ 4,908,783

TABLE CCLXVI

SUMMARY CAPITAL STRUCTURE STATEMENT FOR CITY OF FORT WORTH, TEXAS,
WATER AND SEWER FUND, 1960-1974, IN CONSTANT DOLLARS

	1960	1961	1962	1963	1964
Equity	\$ 4,983,620	\$ 5,269,569	\$ 5,634,850	\$ 5,811,752	\$ 6,121,285
Long term debt:					
Revenue bonds	60,451,744	35,823,000	58,810,900	54,364,097	54,285,893
General obligation bonds	7,078,311	6,237,750	14,865,427	13,381,900	23,025,879
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement					
Reserve for authorized expenditures					
Contributions					
Federal grants	51,804,486	51,385,839	50,754,938	59,602,512	63,578,490
Retained earnings					
Total Capital Structure	\$124,318,262	\$ 98,716,158	\$130,066,117	\$133,302,415	\$147,011,548

TABLE CCLXVI -- Continued

	1965	1966	1967	1968	1969
Equity	\$ 4,835,737	\$ 4,686,852	\$ 5,375,327	\$ 12,346,690	\$ 14,173,005
Long term debt:					
Revenue bonds	54,093,559	48,885,087	46,613,434	42,261,041	34,649,763
General obligation bonds	23,046,864	21,419,187	22,174,003	22,325,946	19,305,012
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	73,672	89,548	60,334	91,264	8,336,369
Reserve for authorized expenditures					
Contributions					
Federal grants					
Retained earnings	67,858,739	75,104,085	85,555,856	83,897,473	85,939,521
Total Capital Structure	\$149,908,574	\$150,184,762	\$159,778,957	\$160,922,416	\$162,360,670

TABLE CCLXVI--Continued

	1970	1971	1972	1973	1974
Equity	\$ 15,429,944	\$ 15,281,121	\$ 15,757,571	\$ 16,908,290	\$ 40,591,050
Long term debt:					
Revenue bonds	30,674,615	34,041,666	33,920,103	29,516,000	21,453,345
General obligation bonds	18,878,807	20,275,739	19,671,265	21,900,000	
Other long term debt					
Reserves and contributions:					
Reserve for bond retirement	6,748,232	6,990,027	6,833,188	6,537,934	5,664,529
Reserve for authorized expenditures					
Contributions					
Federal grants	1,257,988	6,951,398	6,446,474	9,151,970	8,171,291
Retained earnings	79,029,668	78,269,126	74,785,876	75,280,068	100,128,994
Total Capital Structure	\$152,019,257	\$161,809,079	\$157,414,480	\$159,294,262	\$176,009,211

CITY OF FORT WORTH

WATER AND SEWER FUND
TREND ANALYSIS OF TOTAL OPERATING INCOME
FOR THE YEARS 1960-1974

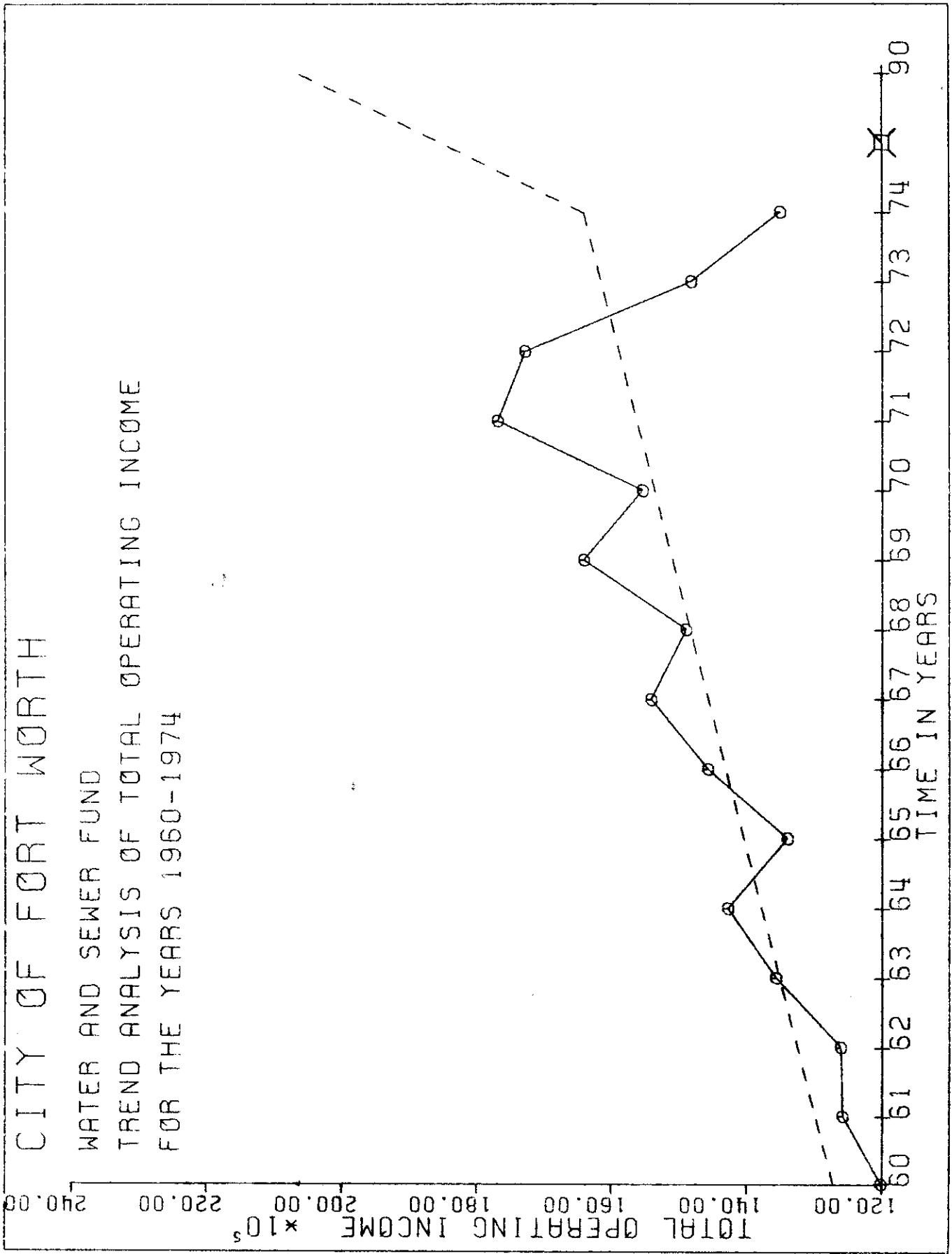


Fig. 59

CITY OF FORT WORTH
WATER AND SEWER FUND
TREND ANALYSIS OF EQUITY
FOR THE YEARS 1960-1974

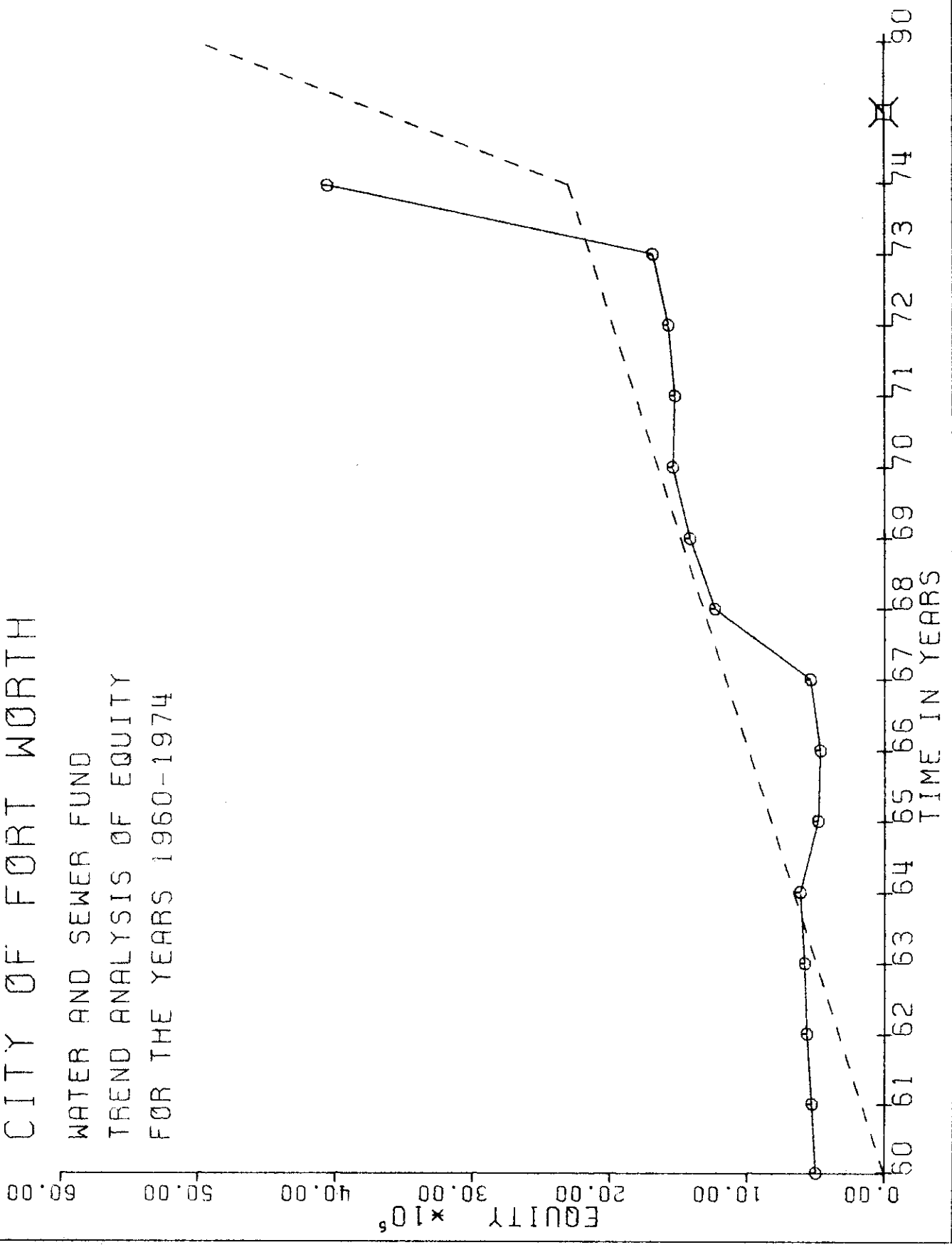


Fig. 60

TABLE CCLXVII

CITY OF FORT WORTH, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF INCOME AND EXPENSE ITEMS
TO TOTAL OPERATING INCOME, 1960 - 1974

Income or Expense Item	Percent
Income:	
Water and Sewer Collections	97.77
Other Operating Income	2.23
Nonoperating Income	4.10
Expenses:	
Operating Expenses	44.39
Depreciation	14.08
Bond Interest and Fees	13.84
Special Charges	0.00
Nonoperating Expenses	0.07

TABLE CCLXVIII

CITY OF FORT WORTH, TEXAS, WATER AND SEWER FUND
AVERAGE RATIO OF CAPITAL STRUCTURE ELEMENTS
TO EQUITY, 1960 - 1974

Capital Structure Element	Percent
Equity	100.00
Long Term Debt:	
Revenue Bonds	646.31
General Obligation Bonds	225.50
Other Long Term Debt*	0.00
Reserves and Contributions:	
Reserve for Bond Retirement	16.80
Reserve for Authorized Expenditures	0.00
Contributions	0.00
Federal Grants	11.25
Retained Earnings	870.25

*Includes: Trinity River Bonds, Notes Payable, and
Amounts Due Other Municipal Funds

TABLE CCLXIX

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 1

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$20,175,817.20
OTHER OPERATING INCOME.....	\$460,182.80
NONOPERATING INCOME.....	\$846,076.00

TOTAL INCOME.....	\$21,482,076.00
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$9,160,320.40
DEPRECIATION.....	\$2,505,548.80
BOND INTEREST AND FEES.....	\$17,510,716.82
NONOPERATING EXPENSES.....	\$14,445.20

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$8,108,955.22D8

TABLE CCLXX

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 1

EQUITY.....	\$49,484,000.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$389,127,040.40
GENERAL OBLIGATION BONDS.....	\$111,586,420.00
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,313,312.00
FEDERAL GRANTS.....	\$5,566,950.00
RETAINED EARNINGS.....	\$430,634,510.00

TOTAL CAPITAL STRUCTURE.....	\$994,712,232.40

TABLE CCLXXI

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 2

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$20,175,817.20
OTHER OPERATING INCOME.....	\$460,182.80
NONOPERATING INCOME.....	\$846,076.00

TOTAL INCOME.....	\$21,482,076.00
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$5,160,320.40
DEPRECIATION.....	\$2,905,548.80
BOND INTEREST AND FEES.....	\$16,419,131.57
NONOPERATING EXPENSES.....	\$14,445.20

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$7,017,369.97DB

TABLE CCLXXII

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 2

EQUITY.....	\$49,484,000.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$364,865,590.40
GENERAL OBLIGATION BONDS.....	\$111,586,420.00
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,313,312.00
FEDERAL GRANTS.....	\$29,824,400.00
RETAINED EARNINGS.....	\$430,634,510.00

TOTAL CAPITAL STRUCTURE.....	\$994,712,232.40

TABLE CCLXXIII

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 3

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$20,175,817.20
OTHER OPERATING INCOME.....	\$460,182.80
NONOPERATING INCOME.....	\$846,076.00

TOTAL INCOME.....	\$21,482,076.00
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$5,160,320.40
DEPRECIATION.....	\$2,905,548.80
BOND INTEREST AND FEES.....	\$20,600,653.90
NONOPERATING EXPENSES.....	\$14,445.20

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$11,198,892.30DB

TABLE CCLXXIV

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 3

EQUITY.....	\$49,484,000.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$315,820,040.40
GENERAL OBLIGATION BONDS.....	\$111,586,420.00
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,313,312.00
FEDERAL GRANTS.....	\$5,566,950.00
RETAINED EARNINGS.....	\$430,634,510.00
STATE GRANTS.....	\$69,307,000.00

TOTAL CAPITAL STRUCTURE.....	\$994,712,232.40

TABLE CCLXXV

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA INCOME STATEMENT
 1990
 ALTERNATIVE CONDITION 4

INCOME FROM OPERATIONS:	
WATER AND SEWER COLLECTIONS.....	\$20,175,817.20
OTHER OPERATING INCOME.....	\$460,182.80
NONOPERATING INCOME.....	\$846,076.00

TOTAL INCOME.....	\$21,482,076.00
DEDUCT EXPENSES:	
OPERATING EXPENSES.....	\$9,160,320.40
DEPRECIATION.....	\$2,505,548.80
BOND INTEREST AND FEES.....	\$15,171,605.57
NONOPERATING EXPENSES.....	\$14,445.20

NET WATER AND SEWER SURPLUS (DEFICIT).....	\$5,769,843.97DB

TABLE CCLXXVI

CITY OF FORT WORTH
 WATER AND SEWER FUND
 PRO FORMA CAPITAL STRUCTURE
 1990
 ALTERNATIVE CONDITION 4

EQUITY.....	\$49,484,000.00
LONG TERM DEBT:	
REVENUE BONDS.....	\$337,146,790.40
GENERAL OBLIGATION BONDS.....	\$111,586,420.00
RESERVES AND CONTRIBUTIONS:	
RESERVE FOR BOND RETIREMENT.....	\$8,313,312.00
FEDERAL GRANTS.....	\$57,547,200.00
RETAINED EARNINGS.....	\$430,634,510.00

TOTAL CAPITAL STRUCTURE.....	\$994,712,232.40

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