BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

ON THE BERGEN COUNTY HACKENSACK RIVER DISTRICT SEWER SYSTEM

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS NEW YORK, N. Y.

BERGEN COUNTY (N.J.) SEWER AUTHORITY.

1952 PROJECT REPORTS
ON THE BERGEN COUNTY HACKENSACK RIVER DISTRICT SEWER SYSTEM

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS · HACKENSACK, N. J. · NEW YORK, N. Y.

DECEMBER 1952

C. S. 3401 Bogert-Childs
2nd Proof 4-17-53

TABLE OF CONTENTS

TABLES

PLATES

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
624 MADISON AVENUE • NEW YORK 22, N. Y. • PLAZA 1-1770
173 MAIN STREET • HACKENSACK, N. J. • HUBBARD 7-0740

CLINTON L. BOGERT
FRED S. CHILDS

December 31, 1952

Bergen County Sewer Authority

66 Zabriskie St.

Hackensack, N. J.

Gentlemen: Letter of Transmittal of the 1952 Project Report on the Bergen County Hackensack River District Sewer System

In accordance with the directive given us at the meeting of the Authority on October 15, 1952, and in conformity with the requirements of Section 29 of Chapter 123 of the Session Laws of 1946, there has been prepared and is transmitted herewith the 1952 Project Report on the Bergen County Hackensack River District Sewer System.

This is the third project report prepared for the Authority; the 1947 Project Report on the Overpeck Valley was limited to 13 municipalities; the 1950 Project Report dealt with 29 municipalities, including the 11 remaining in the Overpeck Project after Englewood Cliffs and Demarest failed to participate, and 18 other municipalities (classed as Stage 2). This 1952 Project Report deals with the 11 Overpeck municipalities, and the extension of the existing "District Sewer System" to provide outlet and treatment facilities for the easterly

slopes of the Boroughs of Cliffside Park and Fort Lee, which were considered in the 1947 and 1950 reports as utilizing outlet facilities on the Hudson River.

This 1952 Project Report includes 11 participants:

Cliffside Park	Palisades Park
Cresskill	Ridgefield
Englewood	Ridgefield Park
Fairview	Teaneck (easterly slope)
Fort Lee	Tenafly
Leonia	

Findings and Conclusions will be found on Pages 23 and 24.

Respectfully submitted,

BOGERT-CHILDS ENGINEERING ASSOCIATES

Clinton L. Bogert

Fred S. Childs

1952 PROJECT REPORT
BERGEN COUNTY HACKENSACK RIVER DISTRICT SEWER SYSTEM

PROVISION OF SEWAGE TREATMENT FACILITIES FOR THE OVERPECK VALLEY

The increasing pollution of the Hackensack River and its tributaries has been the subject of directives of the State Department of Health since 1936 and finally culminated in 1947 in the establishment of the Bergen County Hackensack River District Sewer System, and the appointment of the Bergen County Sewer Authority by the Board of Chosen Freeholders of Bergen County.

At the direction of the Authority the scope of the 1947 Project Report was limited to 13 municipalities and industries in the Overpeck Valley where the greatest degree of stream pollution was occurring. The east slopes of Cliffside Park and Fort Lee were not included since they drain toward the Hudson River and do not contribute pollution to the Overpeck Valley. Since Demarest and Englewood Cliffs failed subsequently to enter into the service contract with the Authority, there remain 11 contracting municipalities in the Overpeck Project.

Based on the 1947 Project Report, detailed drawings and specifications were prepared, and Contracts for participation were signed November 23, 1948 with 11 of the Overpeck municipalities.

In the summer of 1949, bids were received for the construction of the trunk sewer, the intercepting sewers, and the first stage of the sewage treatment plant of the Overpeck Project, and the 1949 Bond Issue was sold to finance the Project. Cost increases required a supplementary bond issue which was sold in 1952.

As of December 1952, the Overpeck Project is substantially completed, and sewage from the ten contracting municipalities with sewer systems and from several contracting industries is being treated at the Authority Treatment Plant at Little Ferry.

EXISTING DISTRICT SEWER SYSTEM

District Sewer System.

The Authority is empowered under Section 29 of Chapter 123 of the Session Laws of 1946 "in its discretion" to defer action on parts of the District Sewer System for which there is no immediate need. In the exercise of such powers, the Authority, in 1947, set up the Overpeck Valley Joint Sewage Works as the District Sewer System, and action on outlet facilities for the other parts of the district was deferred.

The present District Sewer System consists of a Trunk Sewer from the Treatment Plant in Little Ferry to the Authority Pumping Station in Tenafly, with a branch to Fairview and major intercepters to Ridgefield Park, Leonia, Teaneck and the west slopes of Cliffside Park and Fort Lee. This work was done under the 1949 and 1952 Bond Issues. The trunk sewer extension to Cresskill has not yet been started, since it cannot be utilized until Cresskill installs a borough sewer system. The locations of the Trunk Sewer and interceptors are shown on the Project Map, Plate 21.

The Treatment Plant is designed for the activated sludge process with a nominal capacity of 20 mgd. It was also constructed under the 1949 and 1952 Bond Issues. Expansions of the Treatment Plant, as shown on Plate 18, will be undertaken by the Authority in stages, to accommodate future increases in flow.

Revisions of Overpeck Project.

The law provides in Section 35 that "An Authority shall have full discretion in the determination of the size, capacity, route and location of all trunk, intercepting and outlet sewers . . . treatment plants or works or other plants and structures." Acting under this provision, the Authority approved plans for the Overpeck Creek Project which differ from the plan outlined in the 1947 Project Report in the following essentials:

(a) The trunk sewer will not be extended beyond Cresskill, eliminating the proposed extension to Demarest.

(b) Meter chambers have been shifted to more advantageous sites in several instances.

(c) The force main across the Hackensack River proposed in the 1947 Project Report has been replaced by a 60-inch gravity sewer, and the main pumping station has been shifted to the treatment plant site.

(d) Minor changes have been made in the route of intercepting sewers because of field conditions and considerations of rights-of-way.

NECESSITY FOR SEWAGE TREATMENT FACILITIES FOR THE EAST SLOPES OF CLIFFSIDE PARK AND FORT LEE

Cliffside Park.

The Borough of Cliffside Park at present has a greatly overloaded treatment plant treating a portion of the sewage from the East Slope; the remainder discharges into the Hudson River without treatment.

In 1946 the Interstate Sanitation Commission ordered the Borough of Cliffside Park to cease pollution of the Hudson River and to take steps to provide for the adequate treatment of sewage from its East Slope. This Commission order was amended several times, and in 1950 a Superior Court order was issued giving the borough until April 1952 to complete the first stage of a program to eliminate the pollution, and until July 1955 to complete the entire program. Commencement of contempt proceedings against the borough has been postponed several times in recent months. Plans for a new treatment plant were prepared by the borough in 1946, but work has not proceeded under this scheme inasmuch as the borough has been considering the alternative of connecting to the Authority System.

Fort Lee.

The Borough of Fort Lee at present has no treatment facilities for its East Slope, all sewage discharging into the Hudson River without treatment. During the past few years, the rapid growth of apartment developments in this portion of the borough has added greatly to the sewage disposal problem. In 1941, the Interstate Sanitation Commission

ordered the Borough of Fort Lee to cease pollution of the Hudson River and take steps to provide for the adequate treatment of sewage from its East Slope. This Commission order was amended several times, and in 1950 the Interstate Sanitation Commission gave the borough until April 1952 to complete the first stage of a program to eliminate the pollution, and until April 1953 to complete the entire program.

Plans for a new treatment plant were prepared by the borough in 1948, but work has not proceeded under this scheme inasmuch as the borough has been considering the alternative of connecting to the Authority System.

PRELIMINARY STUDIES, REPORTS AND CONFERENCES

Cliffside Park.

At the request of the borough officials of Cliffside Park, representatives of the Bergen County Sewer Authority attended conferences, which commenced in April 1952, with regard to the possibility of connecting the East Slope of Cliffside Park to the Authority System. As a result of these conferences, cost studies were made by the Authority engineers which indicated that the Authority could economically construct a new gravity intercepter along the route of the present Cliffside Park intercepter. However, studies made by engineers employed by the borough indicated that the cost of constructing a force main and pumping to this intercepter would make the project uneconomical for the borough. Thereupon the Authority initiated studies which resulted in a project which will prove economical to both the Borough and the Authority.

In brief, the project involves the construction of a sewer extending from the Authority trunk sewer in Ridgefield to the borough trunk sewer on Gorge Road as shown in plan on Plate 21, and in profile on Plate 19. This is described in greater detail on page 12.

Fort Lee.

At the request of the borough officials of Fort Lee, representatives of the Bergen County Sewer Authority attended conferences which commenced

in March 1952, with regard to the possibility of connecting the East Slope of Fort Lee to the Authority System.

As a result of these conferences, cost studies were made by the Authority engineers which indicated that the Authority could economically construct a new gravity intercepter either along the route of the present Fort Lee intercepter, or along the route of the present Cliffside Park intercepter. However, studies made by engineers employed by the borough indicated that the cost of constructing force mains and connecting sewers and of pumping to either of these intercepters would make the project uneconomical for the borough.

Thereupon, the Authority initiated studies which indicated that there would be economy to the Authority in the construction of a new intercepter from the Authority Trunk Sewer in Englewood along State Highway No. 4 to Ellery Avenue in Fort Lee and the eventual purchase by the Authority of an extension of this intercepter to be built by the borough of Fort Lee up to an amount not to exceed $300,000. The Borough Officials indicated that such an arrangement for connection to the Authority System would be acceptable to them.

1952 PROJECT REPORT

Necessity and Scope.

The 1952 Project Report is called for in Section 29 of Chapter 123, Laws of 1946, which requires the Authority to

> "prepare or cause to be prepared a project report . . . which shall show a proposed plan or method of construction of its district sewer system."

In Sects. 29 and 30 of the Act, it is provided that the Project Report shall, by means of maps and designs, "show a proposed plan or method of construction of (the) District Sewer System". There shall also be shown:

(a) The route of the District Sewer System, showing intercepting sewers, treatment plants, pumping stations, and other structures.

(b) Existing sewer systems, treatment plants and pumping stations within the sewer district, and the points of connection to the District Sewer System.

(c) Records of the amount of sewage, or estimates of future quantities of sewage, "which could advantageously be discharged into the proposed District Sewer System by each and every existing municipal system" within the sewer district.

(d) An estimate of the minimum flow expressed as a percentage of the estimated total flow that could be discharged into the proposed sewers, which minimum flow is necessary to "make possible and advisable the . . . construction and operation of the . . . District Sewer System".

(e) Detailed estimates of cost of the construction of the District Sewer System, including charges for interest, issuance and sale of bonds, the expenses of the Project Report, and the cost of all construction, including property and rights-of-way.

(f) Estimates of the money required annually during the first 40 years of operation of the District Sewer System, "for the payment of principal and interest of the bonds authorized to be issued pursuant to the act, and for the cost and expense of the operation, maintenance, depreciation and repair of the District Sewer System".

(g) Estimates of rates to be charged annually by the Authority for at least the first 10 years to raise the sums of money required for the financial and operating expenses.

(h) "Such other information as the Authority shall deem necessary".

This report must of necessity cover both the Overpeck Project for 11 municipalities, and the two proposed intercepters to serve the East Slopes of Cliffside Park and Fort Lee, setting up schedules of actual

costs for the district sewer system to be allocated to the various municipalities.

The 1952 Project Report therefore comprises:

(a) Descriptions, maps and drawings of the District Sewer System comprising the trunk sewer and intercepters heretofore built for the Overpeck Project, the two proposed intercepters and the Authority Treatment Plant.

(b) Maps of existing sewer systems, pumping stations and treatment works showing points of connections for the sewerage systems of the 30 sewered municipalities in the Sewerage District.

(c) Estimates of quantities of sewage expected from each municipality and from industries to the year 1995. (See Table 1.)

(d) Estimates of costs of the Overpeck Project including future additional Trunk Sewer and Treatment Plant facilities, and estimates of costs of construction and incidentals for the proposed intercepters to serve the East Slopes of Cliffside Park and Fort Lee. (See Table 2.)

(e) Estimates of budgetary requirements of the Authority until 1995, and calculations of rates or charges per million gallons to the contracting municipalities and industries for the Overpeck Project (Table 7), for the Overpeck Project plus the East Slope of Cliffside Park (Table 8), for the Overpeck Project plus the East Slope of Fort Lee (Table 9), and for the Overpeck Project plus the East Slopes of both Cliffside Park and Fort Lee. (Table 10.)

(f) Advantages to Fort Lee and Cliffside Park of utilizing the Authority's facilities.

POPULATION FORECASTS

Purpose.

A great deal of consideration has been given to forecasting populations for the 11 municipalities for the years up to 1995. These preliminary studies are required in order to arrive at estimates of the quantities of domestic sewage contributed to the District Sewer System.

A figure must also be set up, more or less arbitrarily, for the industrial flow reaching the District Sewer System, and added to the domestic figures to arrive at the future flows.

These flow figures are required for four purposes:

(a) Determining the sizes of trunk and intercepting sewers, which must be adequate for the 11 municipalities and industries in the year 1995.

(b) Establishing the size and adequacy of the Treatment Plant structures which, under the regulations of the New Jersey State Department of Health, must suffice the 11 municipalities served by the District Sewer System until at least the year 1963, and must be supplemented in the future when they become inadequate.

(c) Setting up budget requirements which vary with the quantity of sewage, and which must cover the period from 1954 to 1995.

(d) Forecasting rates per million gallons, which must cover at least the first 10 years. (Rates have been forecast to the year 1995).

Forecasts.

On Plates 1 to 11 are shown population statistics from the U. S. Census for the decades 1900 to 1950, inclusive, for the 11 municipalities in the Overpeck Project, and forecasts of populations to 1995. For Teaneck, which is only partially sewered to the Overpeck Project, the forecast of the population sewered to the Overpeck Project is also shown.

Populations have been estimated to 1995 since the Law requires estimates of rates and charges "required in each and every year during the first 40 years from the estimated time for the commencement of operations of the district sewer system". The date of commencement of use of the intercepters to the East Slopes of Cliffside Park and Fort Lee is placed at 1954.

In addition, there is shown on Plates 1 through 11 in pie-graph and in tabular form, a classification of acreages as:

Suitable for Residential and Business
Public and Open Spaces
Unsuitable for Development
Suitable for Industrial.

These are compiled from figures presented in the 1947 Report on "Future Land Development in Bergen County" by the Bergen County Planning Board.

These plates also show densities of population ("Persons per Acre") derived by dividing the Population figures (census or forecast) by the area "Suitable for Residential and Business".

Mass curves of the 11 municipalities in the Overpeck Project are shown on Plate 12. The difference between Curve A "11 Municipalities - Total Population" and Curve C "11 Municipalities - Population in Overpeck Project and East Slopes of Cliffside Park and Fort Lee" represents the population in that portion of Teaneck which is not sewered to the Overpeck Project.

The population estimates for the Sewerage District as a whole have been based to a large extent on the relative growth to date of the District and the Metropolitan Region and on estimates of future growth of the Region. The forecasts were governed to a certain extent by the ultimate average densities each municipality is capable of accommodating. The ultimate populations of the municipalities (shown on Plates 1 to 11), as compiled by the Bergen County Planning Board, may or may not be reached depending on conditions which can in no wise be anticipated at present. The ultimate values were, except in a few cases, considered peak points, and guided the predictions, patterned on conditions heretofore explained.

However, the population forecasts in suburban communities cannot be based entirely on curves of past growth, i. e., on the assumption that existing conditions will continue. Large scale developers may, if permitted, erect multiple family apartments or large groups of single-family houses, almost overnight; large industrial plants may also be developed, bringing an inrush of new inhabitants that no population study can forecast.

The boroughs of Cliffside Park and Fort Lee are among the most accessible from New York, of the 50 municipalities in the Authority district. Fort Lee has since 1949 experienced a phenomenal large-scale apartment house development, and large open areas are still available. Due to the high cost of excavation of the rock which lies very close to the surface in Fort Lee, the difference in costs per apartment of multiple-family and single family dwellings is less than in municipalities not underlain with rock. For these reasons, the forecasting of the population of Fort Lee is particularly uncertain.

PRELIMINARY INVESTIGATIONS FOR THE 1952 PROJECT REPORT

Field Investigations.

For the purpose of the Project Report, field inspections and instrument surveys were made of the proposed routes of the Cliffside Park East Slope Intercepter and the Fort Lee East Slope Intercepter.

MAPS PREPARED

Maps of the Existing Sewerage Systems.

While Chapter 123, Laws of 1946, stipulates that the Project Report shall show the existing sewerage systems of each sewered municipality, and the "proposed points of connection thereof, with the proposed district sewer system", these maps, on advice of counsel, are included only in certain master copies of the Project Report which were filed in 1947 with the Board of Chosen Freeholders, State Department of Health, the Bonding

Attorneys and the Authority. Changes made since 1947 on most of these local maps are concerned chiefly with extensions of small sewers in residential areas, and the selected points of connection to the District Sewer System are not changed, so that the presently filed copies substantially meet the requirements of the 1952 Project Report. Revised maps covering the new points of connection for the intercepters to serve the East Slopes of Cliffside Park and Fort Lee have been filed with the master copies.

Project Map.

There has been prepared for the Project Report a Project Map, Plate 21, showing the District Sewer System constructed to afford outlet facilities for the 11 municipalities and the industries presently included in the Overpeck Project, together with the proposed Cliffside Park East Slope Intercepter and Fort Lee East Slope Intercepter.

DESIGN BASIS

Sewers.

Trunk sewers and intercepters are designed to provide capacity for domestic sewage and industrial waste for peak flow rates at least 40 years in the future. "At least 40 years in the future" was taken as 1990 for the Overpeck Project and is being taken as 1995 for the extensions to the East Slopes of Cliffside Park and Fort Lee. Peak rates for domestic flow are taken at 225 gallons per capita per day when the sewers are flowing full. Enlargement of trunk sewer facilities will be required in the future as indicated in Table 2.

Load from Participating Industries.

The industrial flow used for design of the sewers is assumed to come entirely from the few large industries which have contracted, or may in the future contract directly with the Authority for service. The flows from small industries, many of which are connected to the municipal systems, and a few of which have sewage contracts with the Authority, are too small

to consider in the estimates of flows. However, the Authority is vitally concerned that the trade wastes from these small industries will not be injurious to the Authority structures. No unusual industrial flows are expected, or provided for, in the new intercepters.

Treatment Plant.

The Treatment Plant at Little Ferry is to be built in stages as indicated on Plate 18. The first stage, which was constructed for the Overpeck Project, has a nominal capacity of 20 mgd. When the growth of the Overpeck municipalities and future participants requires it, the Treatment Plant will be expanded in stages up to a capacity of 60 mgd. On the basis of an average flow rate of 110 gallons per capita per day for municipal sewage and an average industrial load of 0.8 million gallons per day, expansion to 25 or 30 mgd. for the Overpeck Municipalities will be required in the future as indicated in Table 2.

Pumping Stations.

There are two pumping stations owned and operated by the Authority: (1) the Tenafly pumping station designed to handle sewage from Cresskill and Tenafly at a peak rate of 225 gallons per capita per day and (2) the main pumping station, at the Treatment Plant Pump and Blower House, also designed for a peak rate of 225 gallons per capita per day. No additional pumping facilities will be constructed by the Authority for the extensions to the East Slopes of Cliffside Park and Fort Lee.

CLIFFSIDE PARK INTERCEPTER

The Cliffside Park East Slope Intercepter is shown in general location on the Project Map, Plate 21, and in profile on Plate 19. This intercepter consists of a pressure sewer which will be built in easements paralleling the property lines of the New York Central Railroad and of the New York, Susquehanna and Western Railroad through the boroughs of Ridgefield and Fairview; and extending from the Authority Trunk Sewer to

the tunnel of the New York, Susquehanna and Western Railroad. In the tunnel, the sewer pipe will be laid in a rock trench in the floor of the tunnel, to a point underneath Gorge Road in Cliffside Park, and thence vertically in a shaft to a point adjacent to Gorge Road where a connection will be made to the sewer system of the Borough of Cliffside Park. As a result of several conferences, preliminary approval of the location of the sewer pipes along the tunnel wall has been obtained from the Susquehanna Railroad.

FORT LEE INTERCEPTER

The Fort Lee East Slope Intercepter is shown in general location on the Project Map (Plate 21), and in profile on Plate 20. This intercepter is partially pressure sewer and partially gravity sewer extending from the Authority Trunk Sewer in Englewood, easterly along Van Nostrand Avenue, and along the north shoulder of State Highway No. 4 to U. S. Highway 46. From there, a force main will extend to the intersection of Ellery Avenue and Lewis Street.

East of this intersection the Authority will purchase connecting sewers and force mains to be constructed by the borough of Fort Lee to intercept all flow from its East Slope. These sewers and force mains are to be deeded to the Authority on payment of amounts not in excess of $300,000.

SCHEDULES OF COSTS AND CHARGES

Interest not Limited to the Overpeck Municipalities

While this 1952 Report is concerned chiefly with the charges to be billed annually by the Authority to the 11 municipalities which are scheduled to utilize the outlet facilities afforded by the District Sewer System, it must be realized that the remaining 39 municipalities in the Sewerage District on which action is deferred, may be called upon at a later date, when they have signed contracts with the Authority to

participate in the District Sewer System, to assume their share of the outstanding charges on the present, proposed and subsequent bond issues. Similarly, insofar as the 11 presently contracting municipalities are concerned, when it is necessary to issue additional bonds to extend the District Sewer System to the other 39 municipalities in the Sewerage District, outstanding charges on the Bond Issues for the Overpeck Project and the proposed intercepters will be merged with the new bond issue requirements.

Financing the Costs.

All financing and operating costs will be billed yearly to the participating municipalities. No participant will be required to issue bonds for the District Sewer System, as this is a responsibility of the Authority. Therefore, participation requires no encroachment on the debt limit of the municipality beyond the cost of constructing or modifying its own internal sewage system. The yearly service charge will be pro-rated to the quantity of sewage from each municipality as determined by the meters installed and maintained by the Authority, or by other approved methods as prescribed by the Act.

Bond Issues.

A breakdown of the present, proposed and future bond issues which includes the various reserves established in the Bond Resolutions adopted in 1949 and 1952 is presented in Table 2.

The construction costs in Table 2 for the Overpeck Project include the costs to date plus the estimated balance for the contracts for which the final cost is not yet determined. Construction costs for the intercepters serving the East Slopes of Cliffside Park and Fort Lee are based on December 1952 prices when the Engineering News-Record Construction Cost Index (Plate 13) was 282.4. Allowance for the quantities of rock, timbering, stabilization of foundations and other items, which are impossible to forecast, have been based on the experiences in the Overpeck Project. The Bond Issue for the Fort Lee East Slope Intercepter also includes $300,000 for the purchase of connecting sewers to be constructed by the borough.

The Bond Issues for the anticipated expansions of the Treatment Plant and enlargement of the Trunk Sewer facilities are also based on December 1952 costs, although the expenditures will not be incurred for several years. As explained in the notes at the bottom of Table 2, the Treatment Plant expansion and enlargement of Trunk Sewer facilities will, due to the greater total sewage flows, be required at earlier and different dates, if the extensions of intercepters to the East Slopes of Cliffside Park and/or Fort Lee are completed, than for the Overpeck Project alone.

It may be calculated from Table 2 that the total bonds outstanding in December 1952 for the Overpeck Project plus both the Cliffside Park and Fort Lee East Slope Intercepters would be $14,698,000. This is well within the maximum limitation of 10% of the assessed valuation allowed by the Act, since the 1952 assessed valuation of the 11 participants is $168,300,000 (see Plate 14).

Charges for Bond Issues

The yearly financial charges for the various Bond Issues are shown in Tables 3, 4, 5 and 6. The charges for the Bond Issues involving the Cliffside Park Intercepter (Table 4), the Fort Lee East Slope Intercepter (Table 5), and both intercepters (Table 6) do not start until July 1954 since charges prior to that date have been included in the Interest Funds of the respective Bond Issues.

The charges for the Bond Issues for the Cliffside Park and Fort Lee East Slope Intercepters, as well as for the new Bond Issues for future expansions of the Treatment Plant and future enlargement of the Trunk Sewer facilities, are based upon an average interest rate of 3.1% as recommended by the bonding advisers in accordance with the present bond market conditions. Retirement of bonds is spread over varying periods up to the allowable maximum of 40 years, as a result of conferences with the bonding advisers, with the intention that the retirements established would result in yearly financial charges, considering all projects, including extensions for future stages, which would increase in reasonable proportion to the total flows indicated in Table 1.

Treatment Plant Operating Costs.

Plate 15 indicates the present-day costs of operating activated sludge plants of various sizes, with sludge disposal in lagoons. The dashed heavy line, reproduced from the 1947 Project Report, was based on 1945 conditions. The higher dashed heavy line in Plate 15 is derived by raising 1945 costs 70% to reflect the estimated increase in plant operating costs (labor and supplies) from 1945 to December 1952.

The three sharply sloping lines indicate the estimated operating costs for the Authority Treatment Plant at various flows with the present 20 mgd capacity, and with the Treatment Plant expanded in capacity to 25 mgd and 30 mgd. These costs are based on the data shown from other plants and also on the operating costs of the Authority Treatment Plant to date. The forecasts of operating costs derived from these sharply sloping lines vary from the average cost figures used in the 1947 Project Report in that they attempt to reflect more accurately variations in cost with increased flow and expansion of the Treatment Plant, based on the more detailed local cost data which is now available for the Authority Treatment Plant.

Yearly Flows.

Estimates of yearly flows from the 11 municipalities and participating industries are listed in Table 1. Yearly flows from municipalities are derived from the Population Forecasts on Plates 1 to 11, by multiplying the forecast populations for any year by 110 gallons per capita per day, and by 365 days. (The degree of approximation of the estimates warrants disregarding the extra day in leap years.)

A figure of 110 gallons per capita per day is used rather than the figure of 100 gallons per capita per day used in the 1947 Project Report, since calculations based on the flow records for the Overpeck Project indicate that the daily per capita flow to date from the present participants averages about 110 gallons. It should be noted that this is an average rate of flow used to estimate unit costs and may be expected to fluctuate from year to year with individual municipalities varying above

or below the average (analysis of the Overpeck Project flow records for 1952 for the ten municipalities indicates the yearly averages varying from 95 to 146 gallons per capita per day).

The costs for the schedules required in the Project Report are based on the assumption that the entire East Slopes of Cliffside Park and/or Fort Lee will begin using the District Sewer System in July 1954; therefore, flows are based on the participation of these areas for one half-year in 1954. It is also assumed that Cresskill will connect to the District Sewer System in 1954, although this is a matter of greater conjecture than in the case of Cliffside Park and Fort Lee which are under Interstate Sanitation Commission orders. If Cresskill is not connected, the total flows would be reduced about three to five percent. The industrial flow is assumed to vary, from 200 million gallons per year in 1954 to 300 million gallons per year from 1955 to 1995. The total flows for each year shown in Table 1 are the sum of the domestic and industrial flows.

Calculations of Charges.

Calculations of annual rates per million gallons to be charged for the Overpeck Project, Overpeck Project plus East Slope of Cliffside Park, Overpeck Project plus East Slope of Fort Lee, and Overpeck Project plus East Slopes of both Cliffside Park and Fort Lee are tabulated in Tables 7, 8, 9 and 10, respectively.

Table 7. "CALCULATIONS OF ANNUAL RATES TO BE CHARGED, OVERPECK PROJECT". This table is figured for participation of the 11 municipalities of the Overpeck Project without the East Slopes of Cliffside Park and Fort Lee.

Table 8. "CALCULATIONS OF ANNUAL RATES TO BE CHARGED, OVERPECK PROJECT PLUS EAST SLOPE OF CLIFFSIDE PARK". This table is figured for participation of the 11 municipalities of the Overpeck Project plus the East Slope of Cliffside Park only.

Table 9. "CALCULATIONS OF ANNUAL RATES TO BE CHARGED, OVERPECK PROJECT PLUS EAST SLOPE OF FORT LEE". This table is figured for participation of the 11 municipalities of the Overpeck Project plus the East Slope of Fort Lee only.

Table 10. "CALCULATIONS OF ANNUAL RATES TO BE CHARGED, OVERPECK PROJECT PROJECT PLUS EAST SLOPES OF CLIFFSIDE PARK AND FORT LEE". This table is figured for participation of the 11 municipalities of the Overpeck Project plus the East Slopes of both Cliffside Park and Fort Lee.

The column-by-column explanation of the methods of obtaining the costs in Tables 7, 8, 9 and 10 follows:

Columns 1, 2 and 3.

Flows are taken from Table 1.

The yearly flows in Column 2 divided by 365 give the average flows in million gallons per day.

Columns 4 and 5.

"Treatment Plant Operation and Maintenance". The costs of treatment per million gallons for the average flows in Column 3 are obtained from Plate 15 and entered in Column 4. The products of Columns 4 and 2 are entered in Column 5.

Columns 6 and 7.

"Pumping Costs" are based on the rates of the Public Service Electric and Gas Co. as of December 1952 and the quantities of sewage to be pumped at the Tenafly Pumping Station and the Treatment Plant.

Column 8.

"Other Operation and Maintenance" costs comprise:

1. Cost of operation of the Tenafly Pumping Station.
2. An estimated cost of maintenance for the sewers and reading of the meters. The costs are increased in 1954 in Tables 8, 9 and 10 and also at the time of future enlargements of trunk sewer facilities, on account of the additional sewers and meters to be maintained.

Column 9.

"Administration" costs represent the administrative salaries and office expenses of the Authority. They are increased in 1954 in Tables 8, 9 and 10 to allow for the increased administrative costs resulting from the increased size of the District Sewer System.

Column 10.

"Additions to Operating Reserve" are required by the Bond Resolution; they are the annual sums required which, upon addition to the Operating Reserve Fund, will maintain a 6 months reserve for operation.

Column 11.

"Depreciation and Equipment Replacement" costs are computed only for the mechanical equipment, chiefly at the Treatment Plant and at the Tenafly Pumping Station. They consist of payments into a sinking fund until 1976 (which is considered the absolescence point of the present equipment), and payments on a 40 year bond issue from 1977 to 2016 for the cost of replacement not covered by the sinking fund. The bond issue payments have been so established as to keep them to the minimum allowable by the Act, prior to 1989 (when the payments on the Bond Issue for the Overpeck Project will end). In addition, the payments into the sinking fund and on the bond issue prior to 1989 have been scheduled as proportionate to the Overpeck Project flows, to provide a uniform cost per million gallons for this item. Interest on the sinking fund is assumed at 1.5% and on the bond issue at 3.1%. Mechanical equipment included in the future plant expansions may not require replacement prior to 1995 and therefore the cost of replacement has been considered as being subject to financing by a bond issue after that date.

Column 12.

"Total Financial Charges" are derived from Tables 3, 4, 5 and 6 and allow for the costs of the Overpeck Project, the Cliffside Park East Slope Intercepter (Tables 8 and 10), the Fort Lee East Slope Intercepter (Tables 9 and 10) and future Treatment Plant expansions and enlargements of Trunk Sewer facilities.

Column 13.

"Total Yearly Cost" is the sum of figures listed in Columns 5 through 12.

Column 14.

The "Total Yearly Cost" in Column 13 divided by the Total Flows in Column 2 gives the "Rate per Million Gallons" for each year.

The average rates per million gallons for the period 1953 to 1965 are also listed in each table.

Average Unit Costs.

Table 11 is a summary of the average rates per million gallons from 1953 to 1965 taken from Tables 7 to 10. It also includes the average yearly costs per capita for the same period, based upon 110 gallons per capita per day.

Minimum Volume of Sewage.

The 1946 Law, Section 30, subsection (b), requires that the Project Report show estimates of volumes of sewage which could "advantageously be discharged into the proposed district sewer system". Such estimates, based on the estimated populations of the 11 municipalities and on an average flow of 110 gallons per capita per day may be found in Table 1.

The law further requires an estimate of "a specified minimum per cent of the volume of sewage" which must be assured, in order to make possible and advisable the advantageous and economical construction and operation of the proposed District Sewer System. The figures in Table 1 for the East Slopes of Cliffside Park and Fort Lee are 100 percent of the "volume of sewage."

The "minimum percent of the volume of sewage" would be 62 percent for the East Slope of Cliffside Park. This is derived from Plate 16 and is based on a comparison of the 13-year average unit costs for operating the Overpeck Project plus the East Slope of Cliffside Park, under various assumed percentages of total flow from the East Slope of Cliffside Park, with the 13-year average unit costs for the Overpeck Project alone.

The "minimum per cent of the volume of sewage" would be 52 per cent for the East Slope of Fort Lee. This is derived from Plate 17 and is based on a comparison of the 13-year average unit costs for operating the Overpeck Project plus the East Slope of Fort Lee, under various assumed percentages of total flow from the East Slope of Fort Lee, with the 13-year average unit costs for the Overpeck Project alone.

ADVANTAGES OF A JOINT PROJECT TO PARTICIPANTS

Economy.

In the region being served and to be served by the District Sewer System, there are 11 municipalities and several industries which would pollute the streams of the Hackensack Valley and the Hudson River if satisfactory treatment facilities were not provided and which are interested in keeping the annual costs for preventing this pollution as low as possible. It is brought out in this report that pollution can be controlled more cheaply and efficiently by a joint project than by individual efforts.

It must be kept in mind that the estimates of annual costs in Tables 7, 8, 9 and 10 for the period till 1995 are based not only on calculations involving many uncertainties, but also on the assumption that every year the municipalities will contribute an average flow equivalent to 110 gallons per day per capita for the population in that year, whereas as mentioned previously, it is evident from the records that the per capita rate of flow varies from year to year and that no two municipalities have the same per capita rate. Furthermore, but of less significance in differentiating costs between participants, since all are equally affected, prices are based on December 1952 levels, and are assumed to stay at that level till 1995. While the annual charges give a reasonable basis for comparison at present price levels, they should be used with discretion in measuring the benefits of the Bergen County Hackensack River District Sewer System. The prime consideration, in the last analysis, should be the control of pollution, or in the words of the Act (Section 62), "the protection and preservation of public health, safety and welfare".

In addition, in those cases where participation in the Authority Project may involve a slight increase in cost, it should be realized that this small difference in cost allows the individual municipalities to enjoy the many advantages of participation in the District Sewer System.

Other Advantages to Participants.

Other advantages of participation in the Authority Project are:

(a) Construction of new treatment plants or reconstruction and extension of existing inadequate treatment plants would create a tremendous expense. Within a relatively few years, it is possible that these facilities, even if expanded, might again become inadequate, thereby requiring further expenditures.

(b) Since obligations to the Authority are taken care of each year in the municipal budget, the borrowing capacity of the municipality is not encroached on by the contract with the Authority, and is therefore available for schools and other much needed improvements.

(c) A municipality is free to convert the site of the existing or proposed treatment plant into a municipal park, or into apartment or industrial sites.

(d) Sewage from existing treatment plants or sewers is diverted away from the streams where it would cause a nuisance.

(e) To operate any individual plant satisfactorily, a trained operator is essential and continued operation of individual plants under the supervision of a competent staff of operators for each plant is unnecessarily expensive. Better and more assured supervision is secured in a larger single plant, with resulting economies in operating costs.

Specific Advantages to Cliffside Park.

Extension of the Authority System to include the East Slope of Cliffside Park would remove the threat of legal action by the Interstate Sanitation Commission. The extension would eliminate the cost to the borough of constructing and operating a new treatment plant, as well as eliminating the necessity of the pumping station in connection with this plant. Participation in the Authority Project would also eliminate the sludge disposal problem for the borough. In addition, the cost to Cliffside Park for the flow from its West Slope would be reduced due to the lower unit costs to all participants resulting from the extension.

Specific Advantages to Fort Lee.

Extension of the Authority System to include the East Slope of Fort Lee would remove the threat of legal action by the Interstate Sanitation Commission. The extension would eliminate the cost to the borough of constructing and operating a new treatment plant. Participation in the Authority Project would also eliminate the sludge disposal problem for the borough. In addition, the cost to Fort Lee for the flow from its West Slope would be reduced due to the lower unit costs to all participants resulting from the extension.

FINDINGS

1. The average rate to be charged for the 13-year period, 1953 to 1965, for the Overpeck Project is estimated to be $132.75 per million gallons.

2. Extension of the Authority System to include the East Slope of Cliffside Park only, would reduce the average 13-year unit cost by $4.01 per million gallons.

3. Extension of the Authority System to include the East Slope of Fort Lee only, would reduce the average 13-year unit cost by $4.38 per million gallons.

4. Extension of the Authority System to include the East Slopes of both Cliffside Park and Fort Lee would reduce the average 13-year unit cost by $5.01 per million gallons.

5. These findings do not apply unless the boroughs of Cliffside Park and Fort Lee undertake forthwith the construction of intercepting sewers, so that all flow from their eastern slopes is delivered into the Authority System by the middle of 1954.

CONCLUSIONS

Extensions of the Authority System to include the East Slopes of Cliffside Park and/or Fort Lee would result in reduced unit costs for all the presently participating municipalities, and would also provide a satisfactory and economical method for the Boroughs of Cliffside Park and/or Fort Lee to handle the sewage treatment problem for their East Slopes, and to meet the demands of the Interstate Sanitation Commission and the New Jersey State Department of Health.

TABLES

TABLE 1

ESTIMATES OF YEARLY FLOWS FROM 11 MUNICIPALITIES AND PARTICIPATING INDUSTRIES

(MILLION GALLONS PER YEAR)

CALENDAR YEAR	CLIFFSIDE PARK West Slope	CLIFFSIDE PARK East Slope	CRESSKILL	ENGLEWOOD	FAIRVIEW	FORT LEE West Slope	FORT LEE East Slope	LEONIA	PALISADES PARK	RIDGEFIELD	RIDGEFIELD PARK	TEANECK	TENAFLY	INDUSTRIAL	TOTALS OVERPECK PROJECT	TOTALS OVERPECK PROJECT plus EAST SLOPE of CLIFFSIDE PARK	TOTALS OVERPECK PROJECT plus EAST SLOPE of FORT LEE	TOTALS OVERPECK PROJECT plus EAST SLOPES of CLIFFSIDE PARK AND FORT LEE
1953	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,832	4,832	4,832	4,832
1954	138	279	162	1,004	355	235	192	322	410	385	498	957	445	200	5,111	5,390	5,303	5,582
1955	139	558	167	1,023	357	249	407	329	416	398	502	976	459	300	5,315	5,873	5,722	6,280
1956	139	560	172	1,041	358	263	430	335	422	411	506	994	473	300	5,414	5,974	5,844	6,404
1957	139	561	178	1,060	360	278	453	342	428	423	510	1,013	487	300	5,518	6,079	5,971	6,532
1958	140	563	183	1,079	362	292	476	348	434	436	514	1,031	502	300	5,621	6,184	6,097	6,660
1959	140	565	188	1,098	364	307	499	355	440	449	518	1,051	516	300	5,726	6,291	6,225	6,790
1960	141	566	193	1,116	365	321	522	361	446	462	522	1,068	530	300	5,825	6,391	6,347	6,913
1961	141	567	200	1,136	369	331	536	367	448	469	526	1,085	544	300	5,916	6,483	6,452	7,019
1962	141	569	206	1,156	372	341	550	373	451	476	530	1,103	559	300	6,008	6,577	6,558	7,127
1963	142	570	213	1,175	375	351	564	379	453	483	534	1,120	573	300	6,098	6,668	6,662	7,232
1964	142	571	220	1,195	378	361	578	385	455	491	538	1,137	588	300	6,190	6,761	6,768	7,339
1965	143	572	227	1,215	381	371	592	392	458	498	542	1,154	602	300	6,283	6,855	6,875	7,447
1966	143	573	234	1,234	385	381	606	398	460	505	546	1,172	617	300	6,375	6,948	6,981	7,554
1967	143	575	241	1,254	388	391	620	404	463	512	550	1,189	631	300	6,466	7,041	7,086	7,661
1968	144	576	247	1,274	391	402	634	410	465	520	554	1,206	646	300	6,559	7,135	7,193	7,769
1969	144	577	254	1,293	394	412	648	416	467	527	558	1,223	660	300	6,648	7,225	7,296	7,873
1970	145	578	261	1,313	398	422	663	422	470	534	562	1,241	675	300	6,743	7,321	7,406	7,984
1971	145	580	270	1,337	402	432	677	428	472	536	566	1,255	689	300	6,832	7,412	7,509	8,089
1972	145	581	279	1,360	406	442	691	434	474	538	570	1,269	703	300	6,920	7,501	7,611	8,192
1973	146	583	287	1,384	410	452	705	441	476	540	574	1,283	718	300	7,011	7,594	7,716	8,299
1974	146	585	296	1,408	414	462	719	447	478	542	578	1,297	732	300	7,100	7,685	7,819	8,404
1975	147	586	305	1,431	418	472	733	454	480	544	582	1,311	747	300	7,191	7,777	7,924	8,510
1976	147	588	314	1,455	422	482	747	460	482	546	586	1,325	761	300	7,280	7,868	8,027	8,615
1977	147	589	323	1,479	426	492	761	467	484	548	590	1,339	776	300	7,371	7,960	8,132	8,721
1978	148	591	332	1,502	430	502	775	473	486	550	594	1,353	790	300	7,460	8,051	8,235	8,826
1979	148	593	340	1,526	434	512	789	479	488	552	598	1,367	805	300	7,549	8,142	8,338	8,931
1980	149	594	349	1,550	438	522	803	486	490	554	602	1,381	819	300	7,640	8,234	8,443	9,037
1981	149	596	358	1,580	442	533	816	493	492	555	606	1,389	834	300	7,731	8,327	8,547	9,143
1982	149	597	366	1,609	446	544	830	499	494	556	610	1,397	848	300	7,818	8,415	8,648	9,245
1983	150	599	375	1,639	451	555	843	506	496	557	614	1,405	862	300	7,910	8,509	8,753	9,352
1984	150	601	383	1,669	455	565	856	513	498	557	618	1,413	877	300	7,998	8,599	8,854	9,455
1985	151	602	391	1,698	460	576	869	520	500	558	622	1,421	891	300	8,088	8,690	8,957	9,559
1986	151	604	400	1,728	464	587	883	527	502	559	626	1,429	906	300	8,179	8,783	9,062	9,666
1987	151	605	408	1,758	469	598	896	534	504	560	630	1,437	920	300	8,269	8,874	9,165	9,770
1988	152	607	417	1,787	473	609	909	540	506	561	634	1,445	935	300	8,359	8,966	9,260	9,875
1989	152	609	425	1,817	477	620	922	547	508	561	638	1,453	949	300	8,447	9,056	9,369	9,978
1990	153	610	434	1,847	482	630	936	554	510	562	642	1,462	964	300	8,540	9,150	9,476	10,086
1991	153	612	442	1,887	487	641	949	557	512	563	646	1,466	978	300	8,632	9,244	9,581	10,193
1992	154	614	451	1,927	493	651	963	559	515	564	650	1,471	992	300	8,727	9,341	9,690	10,304
1993	155	615	460	1,967	499	662	976	561	517	565	654	1,476	1,007	300	8,823	9,438	9,799	10,414
1994	156	617	469	2,008	504	672	990	564	520	565	658	1,481	1,021	300	8,918	9,535	9,908	10,525
1995	157	618	478	2,048	510	683	1,004	566	522	566	663	1,486	1,036	300	9,015	9,633	10,019	10,637

TABLE 2

BREAKDOWN OF BOND ISSUES

ITEM	OVERPECK PROJECT $12,898,000 BOND ISSUE	ENLARGEMENTS OF TRUNK SEWER FACILITIES $700,000 BOND ISSUE (a)	ENLARGEMENTS OF TRUNK SEWER FACILITIES $3,000,000 BOND ISSUE (b)	TREATMENT PLANT EXPANSIONS $1,500,000 BOND ISSUE (c)	CLIFFSIDE PARK EAST SLOPE INTERCEPTER $1,000,000 BOND ISSUE	FORT LEE EAST SLOPE INTERCEPTER $800,000 BOND ISSUE
Construction of Trunk Sewers	$ 4,296,300	$535,900	$2,337,500	-		-
Construction of Intercepting Sewers	1,942,300	-	-	-	$ 699,700	$372,700
Construction of Treatment Plant	4,713,700	-	-	$1,250,000	-	-
Contingencies and Fees (d)	583,300	126,100	518,400	207,300	165,000	76,700
Acquisition of Real Estate and Easements	175,000	15,000	60,000	-	75,000	305,000 (f)
Six Months Operating Reserve	80,000	-	-	-	-	-
Interest Fund	691,300	-	-	-	31,000	24,800
Bond Reserve Fund	366,100	23,000 (e)	84,100 (e)	42,700 (e)	29,300 (e)	20,800 (e)
Expenses to Beginning of First Fiscal Year	50,000	-	-	-	-	-
TOTAL	$12,898,000	$700,000	$3,000,000	$1,500,000	$1,000,000	$800,000

(a) Enlargement required in 1980.

(b) Enlargement required in 1) 1985 for Overpeck Project;
2) 1985 for Overpeck Project plus East Slope of Cliffside Park;
3) 1975 for Overpeck Project plus East Slope of Fort Lee;
4) 1975 for Overpeck Project plus East Slopes of Cliffside Park and Fort Lee.

(c) 5 MGD expansions required in 1) 1977 for Overpeck Project;
2) 1970 and 1990 for Overpeck Project plus East Slope of Cliffside Park;
3) 1970 and 1987 for Overpeck Project plus East Slope of Fort Lee;
4) 1964 and 1981 for Overpeck Project plus East Slopes of Cliffside Park and Fort Lee.

(d) Not including interest earned during construction.

(e) Bond Reserve Fund increased to 2/3 of maximum annual debt service for Overpeck Project plus East Slopes of Cliffside Park and Fort Lee - as other combinations have somewhat smaller requirements.

(f) Includes $300,000 for purchase of connecting sewers to be constructed by Fort Lee.

TABLE 3

FINANCIAL CHARGES FOR OVERPECK PROJECT

CALENDAR YEAR	OVERPECK PROJECT TOTAL BOND ISSUE ($12,898,000)	ENLARGEMENTS OF TRUNK SEWER FACILITIES 1979 BOND ISSUE ($700,000)	ENLARGEMENTS OF TRUNK SEWER FACILITIES 1984 BOND ISSUE ($3,000,000)	PLANT EXPANSION 1975 BOND ISSUE ($1,500,000)	TOTAL ANNUAL FINANCIAL CHARGES
1953	$419,700	-	-	-	$419,700
1954	504,100	-	-	-	504,100
1955	509,100	-	-	-	509,100
1956	515,100	-	-	-	515,100
1957	520,800	-	-	-	520,800
1958	521,200	-	-	-	521,200
1959	531,600	-	-	-	531,600
1960	536,600	-	-	-	536,600
1961	541,400	-	-	-	541,400
1962	545,700	-	-	-	545,700
1963	549,600	-	-	-	549,600
1964	553,200	-	-	-	553,200
1965	556,600	-	-	-	556,600
1966	559,600	-	-	-	559,600
1967	567,000	-	-	-	567,000
1968	569,000	-	-	-	569,000
1969	570,700	-	-	-	570,700
1970	572,100	-	-	-	572,100
1971	578,100	-	-	-	578,100
1972	578,700	-	-	-	578,700
1973	579,000	-	-	-	579,000
1974	579,000	-	-	-	579,000
1975	583,700	-	-	$46,500	630,200
1976	587,900	-	-	46,500	634,400
1977	585,000	-	-	51,500	636,500
1978	580,700	-	-	51,300	632,000
1979	579,100	$ 21,700	-	51,200	652,000
1980	587,200	31,700	-	51,000	669,900
1981	584,900	31,400	-	50,900	667,200
1982	592,200	31,100	-	50,700	674,000
1983	599,000	30,800	-	50,600	680,400
1984	605,200	30,500	$ 93,000	50,400	779,100
1985	605,900	30,200	103,000	50,300	789,400
1986	616,200	29,800	102,700	50,100	798,800
1987	610,800	29,500	102,400	50,000	792,700
1988	610,200	29,200	102,100	49,800	791,300
1989	309,100	128,900	141,800	74,600	654,400
1990	-	115,500	140,200	98,700	354,400
1991	-	112,400	138,700	97,000	348,100
1992	-	109,300	137,100	100,300	346,700
1993	-	106,200	135,600	98,400	340,200
1994	-	103,100	134,000	101,600	338,700
1995	-	-	182,500	99,600	282,100

TABLE 4

FINANCIAL CHARGES FOR OVERPECK PROJECT PLUS EAST SLOPE OF CLIFFSIDE PARK

CALENDAR YEAR	OVERPECK PROJECT TOTAL BOND ISSUE ($12,898,000)	ENLARGEMENTS OF TRUNK SEWER FACILITIES 1979 BOND ISSUE ($700,000)	ENLARGEMENTS OF TRUNK SEWER FACILITIES 1984 BOND ISSUE ($3,000,000)	PLANT EXPANSIONS 1968 BOND ISSUE ($1,500,000)	PLANT EXPANSIONS 1988 BOND ISSUE ($1,500,000)	CLIFFSIDE PARK EAST SLOPE INTERCEPTER 1953 BOND ISSUE ($1,000,000)	TOTAL ANNUAL FINANCIAL CHARGES
1953	$419,700	-	-	-	-	- *	$419,700
1954	504,100	-	-	-	-	$15,500*	519,600
1955	509,100	-	-	-	-	36,000	545,100
1956	515,100	-	-	-	-	35,900	551,000
1957	520,800	-	-	-	-	35,700	556,500
1958	521,200	-	-	-	-	40,600	561,800
1959	531,600	-	-	-	-	40,200	571,800
1960	536,600	-	-	-	-	39,900	576,500
1961	541,400	-	-	-	-	39,600	581,000
1962	545,700	-	-	-	-	39,300	585,000
1963	549,600	-	-	-	-	38,900	588,500
1964	553,200	-	-	-	-	43,700	596,900
1965	556,600	-	-	-	-	38,200	594,800
1966	559,600	-	-	-	-	42,900	602,500
1967	567,000	-	-	-	-	42,500	609,500
1968	569,000	-	-	$ 46,500	-	47,000	662,500
1969	570,700	-	-	46,500	-	41,400	658,600
1970	572,100	-	-	51,500	-	45,900	669,500
1971	578,100	-	-	51,300	-	45,200	674,600
1972	578,700	-	-	51,200	-	49,700	679,600
1973	579,000	-	-	56,000	-	43,800	678,800
1974	579,000	-	-	55,700	-	48,300	683,000
1975	583,700	-	-	55,400	-	52,500	691,600
1976	587,900	-	-	55,100	-	46,500	689,500
1977	585,000	-	-	54,800	-	50,800	690,600
1978	580,700	-	-	54,500	-	49,900	685,100
1979	579,100	$ 21,700	-	54,200	-	43,900	698,900
1980	587,200	31,700	-	53,900	-	43,100	715,900
1981	584,900	31,400	-	53,600	-	37,400	707,300
1982	592,200	31,100	-	53,200	-	41,800	718,300
1983	599,000	30,800	-	52,900	-	36,000	718,700
1984	605,200	30,500	$ 93,000	52,600	-	35,300	816,600
1985	605,900	30,200	98,000	57,300	-	39,700	831,100
1986	616,200	29,800	97,800	56,900	-	43,900	844,600
1987	610,800	29,500	97,700	56,400	-	38,100	832,500
1988	610,200	39,200	97,500	55,900	$ 46,500	37,200	886,500
1989	309,100	118,600	142,400	85,500	46,500	201,500	903,500
1990	-	115,500	140,800	84,100	66,500	185,500	592,400
1991	-	112,400	139,300	82,700	65,900	-	400,300
1992	-	109,300	137,700	81,300	65,300	-	393,600
1993	-	106,200	136,200	109,900	64,600	-	416,900
1994	-	103,100	134,600	107,600	64,000	-	409,300
1995	-	-	163,100	110,200	63,400	-	336,700

* Interest from July 1953 to July 1954 included in bond issue.

TABLE 5

FINANCIAL CHARGES FOR OVERPECK PROJECT PLUS EAST SLOPE OF FORT LEE

CALENDAR YEAR	OVERPECK PROJECT TOTAL BOND ISSUE ($12,898,000)	ENLARGEMENT OF TRUNK SEWER FACILITIES 1979 BOND ISSUE ($700,000)	ENLARGEMENT OF TRUNK SEWER FACILITIES 1974 BOND ISSUE ($3,000,000)	PLANT EXPANSIONS 1968 BOND ISSUE ($1,500,000)	PLANT EXPANSIONS 1985 BOND ISSUE ($1,500,000)	FORT LEE EAST SLOPE INTERCEPTER 1953 BOND ISSUE ($800,000)	TOTAL ANNUAL FINANCIAL CHARGES
1953	$419,700	-	-	-	-	- *	$419,700
1954	504,100	-	-	-	-	$ 12,400*	516,500
1955	509,100	-	-	-	-	29,800	538,900
1956	515,100	-	-	-	-	29,600	544,700
1957	520,800	-	-	-	-	29,500	550,300
1958	521,200	-	-	-	-	29,300	550,500
1959	531,600	-	-	-	-	29,200	560,800
1960	536,600	-	-	-	-	29,000	565,600
1961	541,400	-	-	-	-	28,900	570,300
1962	545,700	-	-	-	-	28,700	574,400
1963	549,600	-	-	-	-	28,600	578,200
1964	553,200	-	-	-	-	28,400	581,600
1965	556,600	-	-	-	-	33,300	589,900
1966	559,600	-	-	-	-	32,900	592,500
1967	567,000	-	-	-	-	32,600	599,600
1968	569,000	-	-	$ 46,500	-	32,300	647,800
1969	570,700	-	-	46,500	-	37,000	654,200
1970	572,100	-	-	51,500	-	36,500	660,100
1971	578,100	-	-	51,300	-	36,100	665,500
1972	578,700	-	-	51,200	-	35,600	665,500
1973	579,000	-	-	56,000	-	40,200	675,200
1974	579,000	-	$ 93,000	55,700	-	39,500	767,200
1975	583,700	-	98,000	55,400	-	38,900	776,000
1976	587,900	-	97,800	55,100	-	43,300	784,100
1977	585,000	-	97,700	54,800	-	42,500	780,000
1978	580,700	-	97,500	54,500	-	41,700	774,400
1979	579,100	$ 21,700	102,400	54,200	-	41,000	798,400
1980	587,200	31,700	102,100	53,900	-	40,200	815,100
1981	584,900	31,400	101,800	53,600	-	39,400	811,100
1982	592,200	31,100	101,500	53,200	-	33,600	811,600
1983	599,000	30,800	101,100	52,900	-	33,000	816,800
1984	605,200	30,500	100,800	52,600	-	32,400	821,500
1985	605,900	30,200	105,500	57,300	$ 46,500	31,800	877,200
1986	616,200	29,800	105,100	56,900	46,500	31,200	885,700
1987	610,800	29,500	104,600	56,400	56,500	35,500	893,300
1988	610,200	29,200	104,100	55,900	56,200	34,800	890,400
1989	309,100	128,900	103,700	85,500	55,900	149,000	832,100
1990	-	115,500	113,200	84,100	65,600	154,700	533,100
1991	-	112,400	112,400	82,700	65,000	-	372,500
1992	-	109,300	111,600	81,300	64,300	-	366,500
1993	-	106,200	110,900	109,900	73,700	-	400,700
1994	-	103,100	110,100	107,600	72,800	-	393,600
1995	-	-	209,300	110,200	71,900	-	391,400

* Interest from July 1953 to July 1954 included in bond issue.

TABLE 6

FINANCIAL CHARGES FOR OVERPECK PROJECT PLUS EAST SLOPES OF CLIFFSIDE PARK AND FORT LEE

CALENDAR YEAR	OVERPECK PROJECT TOTAL BOND ISSUE ($12,898,000)	ENLARGEMENTS OF TRUNK SEWER FACILITIES		PLANT EXPANSIONS		CLIFFSIDE PARK AND FORT LEE EAST SLOPE INTERCEPTERS	TOTAL ANNUAL FINANCIAL CHARGES
		1979 BOND ISSUE ($700,000)	1974 BOND ISSUE ($3,000,000)	1962 BOND ISSUE ($1,500,000)	1979 BOND ISSUE ($1,500,000)	1953 BOND ISSUE ($1,800,000)	
1953	$419,700	-	-			- *	$419,700
1954	504,100	-	-	-	-	$ 27,900*	532,000
1955	509,100	-	-	-	-	65,800	574,900
1956	515,100	-	-	-	-	65,500	580,600
1957	520,800	-	-	-	-	65,200	586,000
1958	521,200	-	-	-	-	69,900	591,100
1959	531,600	-	-	-	-	69,400	601,000
1960	536,600	-	-	-	-	68,900	605,500
1961	541,400	-	-	-	-	68,500	609,900
1962	545,700	-	-	$ 46,500	-	68,000	660,200
1963	549,600	-	-	46,500	-	67,500	663,600
1964	553,200	-	-	56,500	-	72,100	681,800
1965	556,600	-	-	56,200	-	71,500	684,300
1966	559,600	-	-	55,900	-	75,800	691,300
1967	567,000	-	-	55,600	-	75,100	697,700
1968	569,000	-	-	55,300	-	79,300	703,600
1969	570,700	-	-	55,000	-	78,400	704,100
1970	572,100	-	-	54,600	-	82,400	709,100
1971	578,100	-	-	54,300	-	81,300	713,700
1972	578,700	-	-	59,000	-	85,300	723,000
1973	579,000	-	-	58,600	-	84,000	721,600
1974	579,000	-	$ 93,000	58,100	-	87,800	817,900
1975	583,700	-	103,000	57,600	-	91,400	835,700
1976	587,900	-	102,700	57,200	-	89,800	837,600
1977	585,000	-	107,400	61,700	-	93,300	847,400
1978	580,700	-	106,900	66,100	-	91,600	845,300
1979	579,100	$ 21,700	111,500	65,300	$46,500	84,900	909,000
1980	587,200	26,700	110,800	64,500	46,500	83,300	919,000
1981	584,900	26,500	120,200	63,800	66,500	76,800	938,700
1982	592,200	26,400	119,300	68,000	65,900	75,400	947,200
1983	599,000	31,200	123,400	67,000	65,300	69,000	954,900
1984	605,200	30,900	122,300	66,100	64,600	67,700	956,800
1985	605,900	30,600	126,200	70,200	64,000	71,500	968,400
1986	616,200	35,300	124,900	64,100	63,400	75,100	979,000
1987	610,800	34,800	128,700	68,200	62,800	73,600	978,900
1988	610,200	34,400	127,300	72,100	62,200	72,000	978,200
1989	309,100	38,900	130,900	80,800	61,500	350,500	971,700
1990	-	68,300	144,400	99,300	70,900	340,200	723,100
1991	-	91,700	167,300	102,100	70,000	-	431,100
1992	-	89,400	169,600	99,800	69,100	-	427,900
1993	-	87,100	171,600	97,500	73,100	-	429,300
1994	-	84,800	173,500	100,200	72,100	-	430,600
1995	-	82,400	180,300	97,700	71,000	-	431,400

* Interest from July 1953 to July 1954 included in bond issue.

TABLE 7

CALCULATIONS OF ANNUAL RATES TO BE CHARGED

OVERPECK PROJECT

1	2	3	4	5	6	7	8	9	10	11	12	13	14
					PUMPING COSTS								
CALENDAR YEAR	TOTAL FLOW (mg/yr.)	AVERAGE FLOW (mgd)	TREATMENT PLANT OPERATION & MAINTENANCE per mg	TREATMENT PLANT OPERATION & MAINTENANCE Total	MAIN PUMPING STATION	TENAFLY PUMPING STATION	OTHER OPERATION & MAINTENANCE	ADMINISTRATION	ADDITIONS TO OPERATING RESERVE	DEPRECIATION & EQUIPMENT REPLACEMENT	TOTAL FINANCIAL CHARGES	TOTAL YEARLY COST	RATE PER MILLION GALLONS
1953	4,832	-	-	-	-	-	-	-	-	-	-	$619,414	$128.19
1954	5,111	14.00	$27.40	$140,000	$14,700	$2,100	$10,000	$45,000	$1,800	$12,100	$504,100	729,800	142.79
1955	5,315	14.56	26.65	141,600	15,200	2,200	10,000	45,000	1,100	12,600	509,100	736,800	138.63
1956	5,414	14.83	26.30	142,400	15,500	2,300	10,000	45,000	600	12,800	515,100	743,700	137.37
1957	5,518	15.12	25.95	143,200	15,700	2,300	10,000	45,000	500	13,000	520,800	750,500	136.01
1958	5,621	15.40	25.65	144,200	16,000	2,400	10,000	45,000	700	13,200	521,200	752,700	133.91
1959	5,726	15.69	25.35	145,200	16,200	2,400	10,000	45,000	600	13,400	531,600	764,400	133.50
1960	5,825	15.96	25.05	145,900	16,500	2,500	10,000	45,000	600	13,700	536,600	770,800	132.33
1961	5,916	16.21	24.80	146,700	16,700	2,600	10,000	45,000	500	13,900	541,400	776,800	131.30
1962	6,008	16.46	24.55	147,500	17,000	2,600	10,000	45,000	600	14,100	545,700	782,500	130.24
1963	6,098	16.71	24.30	148,200	17,300	2,700	10,000	45,000	500	14,300	549,600	787,600	129.16
1964	6,190	16.96	24.05	148,900	17,500	2,700	10,000	45,000	500	14,500	553,200	792,300	128.00
1965	6,283	17.21	23.80	149,500	17,800	2,800	10,000	45,000	500	14,800	556,600	797,000	126.85
1966	6,375	17.47	23.60	150,500	18,100	2,800	10,000	45,000	600	15,000	559,600	801,600	125.74
1967	6,466	17.72	23.35	151,000	18,300	2,900	10,000	45,000	400	15,200	567,000	809,800	125.24
1968	6,559	17.97	23.10	151,500	18,500	2,900	10,000	45,000	400	15,400	569,000	812,700	123.91
1969	6,648	18.21	22.85	151,900	18,800	3,000	10,000	45,000	400	15,600	570,700	815,400	122.65
1970	6,743	18.47	22.70	153,100	19,000	3,000	10,000	45,000	700	15,800	572,100	818,700	121.41
1971	6,832	18.72	22.50	153,700	19,300	3,100	10,000	45,000	500	16,100	578,100	825,800	120.87
1972	6,920	18.96	22.35	154,700	19,500	3,100	10,000	45,000	600	16,300	578,700	827,900	119.64
1973	7,011	19.21	22.15	155,300	19,800	3,100	10,000	45,000	400	16,500	579,000	829,100	118.26
1974	7,100	19.45	21.95	155,800	20,000	3,200	10,000	45,000	400	16,700	579,000	830,100	116.92
1975	7,191	19.70	21.75	156,400	20,200	3,200	10,000	45,000	400	16,900	630,200	882,300	122.70
1976	7,280	19.95	21.55	156,900	20,400	3,300	10,000	45,000	400	17,200	634,400	887,600	121.92
1977	7,371	20.19	23.45	172,800	20,700	3,300	10,000	45,000	8,100	17,400	636,500	913,800	123.97
1978	7,460	20.44	23.25	173,400	20,900	3,400	10,000	45,000	500	17,600	632,000	902,800	121.02
1979	7,549	20.68	23.05	174,000	21,100	3,500	10,000	45,000	400	17,800	652,000	923,800	122.37
1980	7,640	20.93	22.85	174,600	21,400	3,500	10,500	45,000	700	18,100	669,900	943,700	123.52
1981	7,731	21.18	22.65	175,100	21,600	3,600	10,500	45,000	400	18,300	667,200	941,700	121.81
1982	7,818	21.42	22.50	175,900	21,900	3,600	10,500	45,000	600	18,500	674,000	950,000	121.51
1983	7,910	21.67	22.30	176,400	22,100	3,700	10,500	45,000	400	18,700	680,400	957,200	121.01
1984	7,998	21.91	22.10	176,800	22,400	3,800	10,500	45,000	400	18,900	779,100	1,056,900	132.15
1985	8,088	22.16	21.95	177,500	22,600	3,800	11,500	45,000	900	19,100	789,400	1,069,800	132.27
1986	8,179	22.41	21.75	177,900	22,800	3,900	11,500	45,000	400	19,400	798,800	1,079,700	132.01
1987	8,269	22.65	21.60	178,600	23,000	3,900	11,500	45,000	400	19,600	792,700	1,074,700	129.97
1988	8,359	22.90	21.40	178,900	23,300	4,000	11,500	45,000	400	19,800	791,300	1,074,200	128.51
1989	8,447	23.14	21.25	179,500	23,500	4,000	11,500	45,000	400	27,400	654,400	945,700	111.96
1990	8,540	23.40	21.10	180,200	23,700	4,100	11,500	45,000	500	27,400	354,400	646,800	75.74
1991	8,632	23.65	20.95	180,800	23,900	4,100	11,500	45,000	400	27,400	348,100	641,200	74.28
1992	8,727	23.91	20.75	181,100	24,200	4,200	11,500	45,000	300	27,400	346,700	640,400	73.38
1993	8,823	24.17	20.60	181,800	24,400	4,200	11,500	45,000	500	27,400	340,200	635,000	71.97
1994	8,918	24.43	20.45	182,400	24,700	4,300	11,500	45,000	500	27,400	338,700	634,500	71.15
1995	9,015	24.70	20.30	183,000	24,900	4,300	11,500	45,000	400	27,400	282,100	578,600	64.18

1953 to 1965

Total Cost = $9,804,314
Total Flow = 73,857 mg
Average Rate = $ 132.75

TABLE 8

CALCULATIONS OF ANNUAL RATES TO BE CHARGED

OVERPECK PROJECT PLUS EAST SLOPE OF CLIFFSIDE PARK

1	2	3	4	5	6	7	8	9	10	11	12	13	14
					PUMPING COSTS								
CALENDAR YEAR	TOTAL FLOW (mg/yr.)	AVERAGE FLOW (mgd)	TREATMENT PLANT OPERATION & MAINTENANCE per mg	TREATMENT PLANT OPERATION & MAINTENANCE Total	MAIN PUMPING STATION	TENAFLY PUMPING STATION	OTHER OPERATION & MAINTENANCE	ADMINISTRATION	ADDITIONS TO OPERATING RESERVE	DEPRECIATION & EQUIPMENT REPLACEMENT	TOTAL FINANCIAL CHARGES	TOTAL YEARLY COST	RATE PER MILLION GALLONS
1953	4,832	-	-	-	-	-	-	-	-	-	-	$619,414	$128.19
1954	5,390	14.77	$26.40	$142,300	$15,400	$2,100	$10,800	$45,300	$3,900	$12,100	$519,600	751,500	139.42
1955	5,873	16.09	24.90	146,200	16,700	2,200	11,500	45,500	3,100	12,600	545,100	782,900	133.30
1956	5,974	16.37	24.65	147,300	17,000	2,300	11,500	45,500	700	12,800	551,000	788,100	131.92
1957	6,079	16.65	24.35	148,000	17,300	2,300	11,500	45,500	500	13,000	556,500	794,600	130.71
1958	6,184	16.94	24.05	148,700	17,600	2,400	11,500	45,500	600	13,200	561,800	801,300	129.58
1959	6,291	17.24	23.80	149,700	17,900	2,400	11,500	45,500	600	13,400	571,800	812,800	129.20
1960	6,391	17.51	23.55	150,500	18,100	2,500	11,500	45,500	600	13,700	576,500	818,900	128.13
1961	6,483	17.76	23.30	151,100	18,400	2,600	11,500	45,500	500	13,900	581,000	824,500	127.18
1962	6,577	18.02	23.10	151,900	18,600	2,600	11,500	45,500	500	14,100	585,000	829,700	126.15
1963	6,668	18.27	22.90	152,700	18,800	2,700	11,500	45,500	500	14,300	588,500	834,500	125.15
1964	6,761	18.52	22.70	153,500	19,100	2,700	11,500	45,500	600	14,500	596,900	844,300	124.88
1965	6,855	18.78	22.45	153,900	19,300	2,800	11,500	45,500	300	14,800	594,800	842,900	122.96
1966	6,948	19.04	22.25	154,600	19,600	2,800	11,500	45,500	500	15,000	602,500	852,000	122.63
1967	7,041	19.29	22.05	155,300	19,800	2,900	11,500	45,500	500	15,200	609,500	860,200	122.17
1968	7,135	19.55	21.85	155,900	20,100	2,900	11,500	45,500	500	15,400	662,500	914,300	128.14
1969	7,225	19.79	21.65	156,400	20,300	3,000	11,500	45,500	400	15,600	658,600	911,300	126.13
1970	7,321	20.06	23.55	172,400	20,600	3,000	11,500	45,500	8,100	15,800	669,500	946,400	129.27
1971	7,412	20.31	23.35	173,100	20,800	3,100	11,500	45,500	500	16,100	674,600	945,200	127.52
1972	7,501	20.55	23.15	173,600	21,000	3,100	11,500	45,500	400	16,300	679,600	951,000	126.78
1973	7,594	20.81	22.95	174,300	21,300	3,100	11,500	45,500	500	16,500	678,800	951,500	125.30
1974	7,685	21.06	22.75	174,800	21,500	3,200	11,500	45,500	400	16,700	683,000	956,600	124.48
1975	7,777	21.31	22.55	175,400	21,800	3,200	11,500	45,500	400	16,900	691,600	966,300	124.25
1976	7,868	21.56	22.40	176,200	22,000	3,300	11,500	45,500	600	17,200	689,500	965,800	122.75
1977	7,960	21.81	22.20	176,700	22,300	3,300	11,500	45,500	400	17,400	690,600	967,700	121.57
1978	8,051	22.06	22.00	177,100	22,500	3,400	11,500	45,500	300	17,600	685,100	963,000	119.61
1979	8,142	22.31	21.85	177,900	22,700	3,500	11,500	45,500	600	17,800	698,900	978,400	120.17
1980	8,234	22.56	21.65	178,300	23,000	3,500	12,000	45,500	600	18,100	715,900	996,900	121.07
1981	8,327	22,81	21.50	179,000	23,200	3,600	12,000	45,500	500	18,300	707,300	989,400	118.82
1982	8,415	23.05	21.30	179,200	23,400	3,600	12,000	45,500	200	18,500	718,300	1,000,700	118.92
1983	8,509	23.31	21.15	180,000	23,600	3,700	12,000	45,500	500	18,700	718,700	1,002,700	117,84
1984	8,599	23.56	21.00	180,600	23,800	3,800	12,000	45,500	500	18,900	816,600	1,101,700	128.12
1985	8,690	23.81	20.80	180,800	24,100	3,800	13,000	45,500	700	19,100	831,100	1,118,100	128.67
1986	8,783	24.06	20.65	181,400	24,300	3,900	13,000	45,500	500	19,400	844,600	1,132,600	128.95
1987	8,874	24.31	20.50	181,900	24,600	3,900	13,000	45,500	400	19,600	832,500	1,121,400	126.37
1988	8,966	24.56	20.35	182,500	24,800	4,000	13,000	45,500	400	19,800	886,500	1,176,500	131.22
1989	9,056	24.81	20.20	182,900	25,000	4,000	13,000	45,500	300	27,400	903,600	1,201,700	132.70
1990	9,150	25.07	21.85	199,900	25,200	4,100	13,000	45,500	8,700	27,400	592,400	916,200	100.13
1991	9,244	25.33	21.70	200,600	25,400	4,100	13,000	45,500	400	27,400	400,300	716,700	77.53
1992	9,341	25.59	21.55	201,300	25,600	4,200	13,000	45,500	500	27,400	393,600	711,100	76.13
1993	9,438	25.86	21.40	202,000	25,800	4,200	13,000	45,500	500	27,400	416,900	735,300	77.91
1994	9,535	26.12	21.25	202,600	26,100	4,300	13,000	45,500	500	27,400	409,300	728,700	76.42
1995	9,633	26.39	21.10	203,300	26,300	4,300	13,000	45,500	400	27,400	336,700	656,900	68.19

1953 to 1965

Total Cost = $10,345,414
Total Flow = 80,358 mg
Average Rate = $ 128.74

TABLE 9

CALCULATIONS OF ANNUAL RATES TO BE CHARGED

OVERPECK PROJECT PLUS EAST SLOPE OF FORT LEE

1	2	3	4	5	6	7	8	9	10	11	12	13	14
					PUMPING COSTS								
CALENDAR YEAR	TOTAL FLOW (mg/yr.)	AVERAGE FLOW (mgd)	TREATMENT PLANT OPERATION & MAINTENANCE per mg	TREATMENT PLANT OPERATION & MAINTENANCE Total	MAIN PUMPING STATION	TENAFLY PUMPING STATION	OTHER OPERATION & MAINTENANCE	ADMINISTRATION	ADDITIONS TO OPERATING RESERVE	DEPRECIATION & EQUIPMENT REPLACEMENT	TOTAL FINANCIAL CHARGES	TOTAL YEARLY COST	RATE PER MILLION GALLONS
1953	4,832	-	-	-	-	-	-	-	-	-	-	$619,414	$128.19
1954	5,303	14.53	$26.70	$141,600	$15,200	$2,100	$10,500	$45,300	$3,300	$12,100	$516,500	746,600	140.79
1955	5,722	15.68	25.35	145,100	16,300	2,200	11,000	45,500	2,700	12,600	538,900	774,300	135.32
1956	5,844	16.01	25.00	146,100	16,600	2,300	11,000	45,500	700	12,800	544,700	779,700	133.42
1957	5,971	16.36	24.65	147,200	17,000	2,300	11,000	45,500	700	13,000	550,300	787,000	131.80
1958	6,097	16.70	24.30	148,200	17,300	2,400	11,000	45,500	700	13,200	550,500	788,800	129.38
1959	6,225	17.05	23.95	149,100	17,600	2,400	11,000	45,500	600	13,400	560,800	800,400	128.58
1960	6,347	17.39	23.65	150,100	18,000	2,500	11,000	45,500	800	13,700	565,600	807,200	127.18
1961	6,452	17.68	23.40	151,000	18,300	2,600	11,000	45,500	600	13,900	570,300	813,200	126.04
1962	6,558	17.97	23.15	151,800	18,600	2,600	11,000	45,500	600	14,100	574,400	818,600	124.82
1963	6,662	18.25	22.90	152,600	18,800	2,700	11,000	45,500	500	14,300	578,200	823,600	123.63
1964	6,768	18.54	22.65	153,300	19,100	2,700	11,000	45,500	500	14,500	581,600	828,200	122.37
1965	6,875	18.84	22.45	154,300	19,400	2,800	11,000	45,500	700	14,800	589,900	838,400	121.95
1966	6,981	19.13	22.20	155,000	19,700	2,800	11,000	45,500	500	15,000	592,500	842,000	120.61
1967	7,086	19.41	21.95	155,500	20,000	2,900	11,000	45,500	500	15,200	599,600	850,200	119.98
1968	7,193	19.71	21.75	156,400	20,200	2,900	11,000	45,500	500	15,400	647,800	899,700	125.08
1969	7,296	19.99	21.50	156,900	20,500	3,000	11,000	45,500	500	15,600	654,200	907,200	124.34
1970	7,406	20.29	23.35	172,900	20,800	3,000	11,000	45,500	8,100	15,800	660,100	937,200	126.55
1971	7,509	20.57	23.15	173,800	21,000	3,100	11,000	45,500	600	16,100	665,500	936,600	124.73
1972	7,611	20.85	22.90	174,300	21,300	3,100	11,000	45,500	400	16,300	665,500	937,400	123.16
1973	7,716	21.14	22.70	175,200	21,600	3,100	11,000	45,500	600	16,500	675,200	948,700	122.95
1974	7,819	21.42	22.50	175,900	21,900	3,200	11,000	45,500	600	16,700	767,200	1,042,000	133.27
1975	7,924	21.71	22.25	176,300	22,200	3,200	12,000	45,500	800	16,900	776,000	1,052,900	132.87
1976	8,027	21.99	22.05	177,000	22,400	3,300	12,000	45,500	500	17,200	784,100	1,062,000	132.30
1977	8,132	22.28	21.85	177,700	22,700	3,300	12,000	45,500	500	17,400	780,000	1,059,100	130.24
1978	8,235	22.56	21.65	178,300	22,900	3,400	12,000	45,500	500	17,600	774,400	1,054,600	128.06
1979	8,338	22.84	21.45	178,900	23,200	3,500	12,000	45,500	500	17,800	798,400	1,079,800	129.50
1980	8,443	23.13	21.25	179,400	23,500	3,500	12,500	45,500	600	18,100	815,100	1,098,200	130.07
1981	8,547	23.42	21.10	180,300	23,800	3,600	12,500	45,500	700	18,300	811,100	1,095,800	128.21
1982	8,648	23.69	20.90	180,700	24,000	3,600	12,500	45,500	300	18,500	811,600	1,096,700	126.82
1983	8,753	23.98	20.70	181,200	24,200	3,700	12,500	45,500	400	18,700	816,800	1,103,000	126.01
1984	8,854	24.26	20.55	181,900	24,500	3,800	12,500	45,500	500	18,900	821,500	1,109,100	125.27
1985	8,957	24.54	20.40	182,700	24,800	3,800	12,500	45,500	600	19,100	877,200	1,166,200	130.20
1986	9,062	24.83	20.20	183,100	25,000	3,900	12,500	45,500	300	19,400	885,700	1,175,400	129.71
1987	9,165	25.11	21.85	200,300	25,200	3,900	12,500	45,500	8,700	19,600	893,300	1,209,000	131.91
1988	9,260	25.39	21.65	200,700	25,500	4,000	12,500	45,500	400	19,800	890,400	1,198,800	129.35
1989	9,369	25.67	21.50	201,400	25,700	4,000	12,500	45,500	500	27,400	832,100	1,149,100	122.65
1990	9,476	25.96	21.30	201,800	25,900	4,100	12,500	45,500	300	27,400	533,100	850,600	89.76
1991	9,581	26.25	21.15	202,600	26,200	4,100	12,500	45,500	600	27,400	372,500	691,400	72.16
1992	9,690	26.55	21.00	203,500	26,400	4,200	12,500	45,500	600	27,400	366,500	686,600	70.86
1993	9,799	26.85	20.85	204,300	26,600	4,200	12,500	45,500	500	27,400	400,700	721,700	73.65
1994	9,908	27.15	20.65	204,600	26,900	4,300	12,500	45,500	300	27,400	393,600	715,100	72.17
1995	10,019	27.45	20.45	204,900	27,100	4,300	12,500	45,500	300	27,400	391,400	713,400	71.20

1953 to 1965

Total Cost = $10,225,414
Total Flow = 79,656 mg
Average Rate = $ 128.37

TABLE 10

CALCULATIONS OF ANNUAL RATES TO BE CHARGED

OVERPECK PROJECT PLUS EAST SLOPES OF CLIFFSIDE PARK AND FORT LEE

1	2	3	4	5	6	7	8	9	10	11	12	13	14
					PUMPING COSTS								
CALENDAR YEAR	TOTAL FLOW (mg/yr.)	AVERAGE FLOW (mgd)	TREATMENT PLANT OPERATION & MAINTENANCE per mg	TREATMENT PLANT OPERATION & MAINTENANCE Total	MAIN PUMPING STATION	TENAFLY PUMPING STATION	OTHER OPERATION & MAINTENANCE	ADMINISTRATION	ADDITIONS TO OPERATING RESERVE	DEPRECIATION & EQUIPMENT REPLACEMENT	TOTAL FINANCIAL CHARGES	TOTAL YEARLY COST	RATE PER MILLION GALLONS
1953	4,832	-	-	-	-	-	-	-	-	-	-	$619,414	$128.19
1954	5,582	15.29	$25.80	$144,000	$15,900	$2,100	$11,300	$45,500	$5,300	$12,100	$532,000	768,200	137.62
1955	6,280	17.21	23.80	149,500	17,800	2,200	12,500	46,000	4,600	12,600	574,900	820,100	130.59
1956	6,404	17.55	23.50	150,500	18,200	2,300	12,500	46,000	800	12,800	580,600	823,700	128.62
1957	6,532	17.90	23.20	151,500	18,500	2,300	12,500	46,000	600	13,000	586,000	830,400	127.13
1958	6,660	18.25	22.90	152,500	18,800	2,400	12,500	46,000	700	13,200	591,100	837,200	125.71
1959	6,790	18.60	22.60	153,500	19,200	2,400	12,500	46,000	700	13,400	601,000	848,700	124.99
1960	6,913	18.94	22.35	154.500	19,500	2,500	12,500	46,000	700	13,700	605,500	854,900	123.67
1961	7,019	19.23	22.10	155,100	19,800	2,600	12,500	46,000	500	13,900	609,900	860,300	122.57
1962	7,127	19.53	21.85	155,700	20,000	2,600	12,500	46,000	400	14,100	660,200	911,500	127.89
1963	7,232	19.81	21.65	156,600	20,300	2,700	12,500	46,000	700	14,300	663,600	916,700	126.76
1964	7,339	20.11	23.50	172,500	20,600	2,700	12,500	46,000	8,100	14,500	681,800	958,700	130.63
1965	7,447	20.40	23.30	173,500	20,900	2,800	12,500	46,000	700	14,800	684,300	955,500	128.31
1966	7,554	20.70	23.05	174,100	21,200	2,800	12,500	46,000	400	15,000	691,300	963,300	127.52
1967	7,661	20.99	22.80	174,700	21,500	2,900	12,500	46,000	500	15,200	697,700	971,000	126.75
1968	7,769	21.28	22.60	175,600	21,800	2,900	12,500	46,000	600	15,400	703,600	978,400	125.94
1969	7,873	21.57	22.35	176,000	22,000	3,000	12,500	46,000	400	15,600	704,100	979,600	124.43
1970	7,984	21.87	22.15	176,800	22,300	3,000	12,500	46,000	500	15,800	709,100	986,000	123.50
1971	8,089	22.16	21.95	177,600	22,600	3,100	12,500	46,000	600	16,100	713,700	992,200	122.66
1972	8,192	22.44	21.75	178,200	22,800	3,100	12,500	46,000	400	16,300	723,000	1,002,300	122.35
1973	8,299	22.74	21.55	178,800	23,100	3,100	12,500	46,000	500	16,500	721,600	1,002,100	120.75
1974	8,404	23.02	21.35	179,400	23,400	3,200	12,500	46,000	500	16,700	817,900	1,099,600	130.84
1975	8,510	23.32	21.15	180,000	23,600	3,200	13,500	46,000	900	16,900	835,700	1,119,800	131.59
1976	8,615	23.60	20.95	180,500	23,900	3,300	13,500	46,000	400	17,200	837,600	1,122,400	130.28
1977	8,721	23.89	20.75	181,000	24,200	3,300	13,500	46,000	400	17,400	847,400	1,133,200	129.94
1978	8,826	24.18	20.60	181,800	24,400	3,400	13,500	46,000	600	17,600	845,300	1,132,600	128.33
1979	8,931	24.47	20.40	182,200	24,700	3,500	13,500	46,000	400	17,800	909,000	1,197,100	134.04
1980	9,037	24.76	20.25	183,000	25,000	3,500	14,000	46,000	800	18,100	919,000	1,209,400	133.83
1981	9,143	25.05	21.85	199,800	25,200	3,600	14,000	46,000	8,500	18,300	938,700	1,254,100	137.17
1982	9,245	25.33	21.70	200,600	25,400	3,600	14,000	46,000	500	18,500	947,200	1,255,800	135.84
1983	9,352	25.62	21.55	201,500	25,700	3,700	14,000	46,000	700	18,700	954,900	1,265,200	135.29
1984	9,455	25.90	21.35	201,900	25,900	3,800	14,000	46,000	300	18,900	956,800	1,267,600	134.07
1985	9,559	26.19	21.20	202,700	26,100	3,800	14,000	46,000	500	19,100	968,400	1,280,600	133.97
1986	9,666	26.48	21.05	203,500	26,300	3,900	14,000	46,000	600	19,400	979,000	1,292,700	133.74
1987	9,770	26.77	20.90	204,200	26,600	3,900	14,000	46,000	500	19,600	978,900	1,293,700	132.42
1988	9,875	27.05	20.70	204,400	26,800	4,000	14,000	46,000	200	19,800	978,200	1,293,400	130.98
1989	9,978	27.34	20.55	205,00	27,000	4,000	14,000	46,000	400	27,400	971,700	1,295,500	129.84
1990	10,086	27.63	20.40	205,800	27,200	4,100	14,000	46,000	600	27,400	723,100	1,048,200	103.93
1991	10,193	27.93	20.25	206,400	27,500	4,100	14,000	46,000	400	27,400	431,100	756,900	74.26
1992	10,304	28.23	20.10	207,100	27,300	4,200	14,000	46,000	600	27,400	427,900	755,000	73.27
1993	10,414	28.53	19.95	207,800	28,000	4,200	14,000	46,000	400	27,400	429,300	757,100	72.70
1994	10,525	28.84	19.80	208,400	28,200	4,300	14,000	46,000	500	27,400	430,600	759,400	72.15
1995	10,637	29.14	19.70	209,500	28,500	4,300	14,000	46,000	700	27,400	431,400	761,800	71.62

1953 to 1965

Total Cost = $11,005,314
Total Flow = 86,157 mg
Average Rate = $ 127.74

TABLE 11

AVERAGE UNIT COSTS

(1953-1965)

	RATE PER MILLION GALLONS	YEARLY COST PER CAPITA
Overpeck Project	$132.75	$5.33
Overpeck Project plus East Slope of Cliffside Park	128.74	5.17
Overpeck Project plus East Slope of Fort Lee	128.37	5.15
Overpeck Project plus East Slopes of Cliffside Park and Fort Lee	127.74	5.13

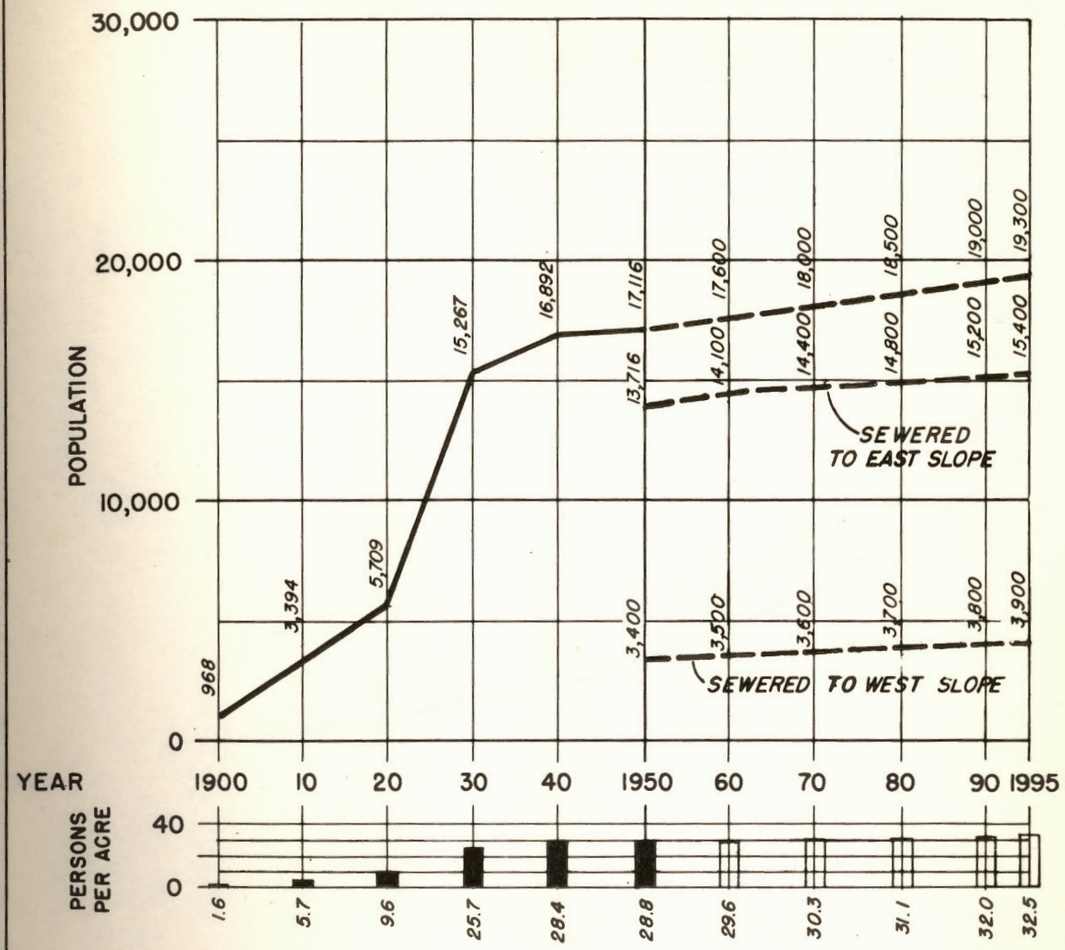
PLATES

POPULATION FORECAST

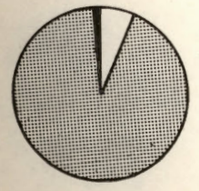
CLIFFSIDE PARK

ULTIMATE POPULATION - 18,432*

ULTIMATE AVERAGE DENSITY - 31.0*



*ULTIMATE LAND USE**



Suitable for RESIDENTIAL and BUSINESS	594	
PUBLIC and OPEN SPACES	39	
Unsuitable for Development	—	
Suitable for INDUSTRIAL	7	
TOTAL AREA	640	*Acres*

* *Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

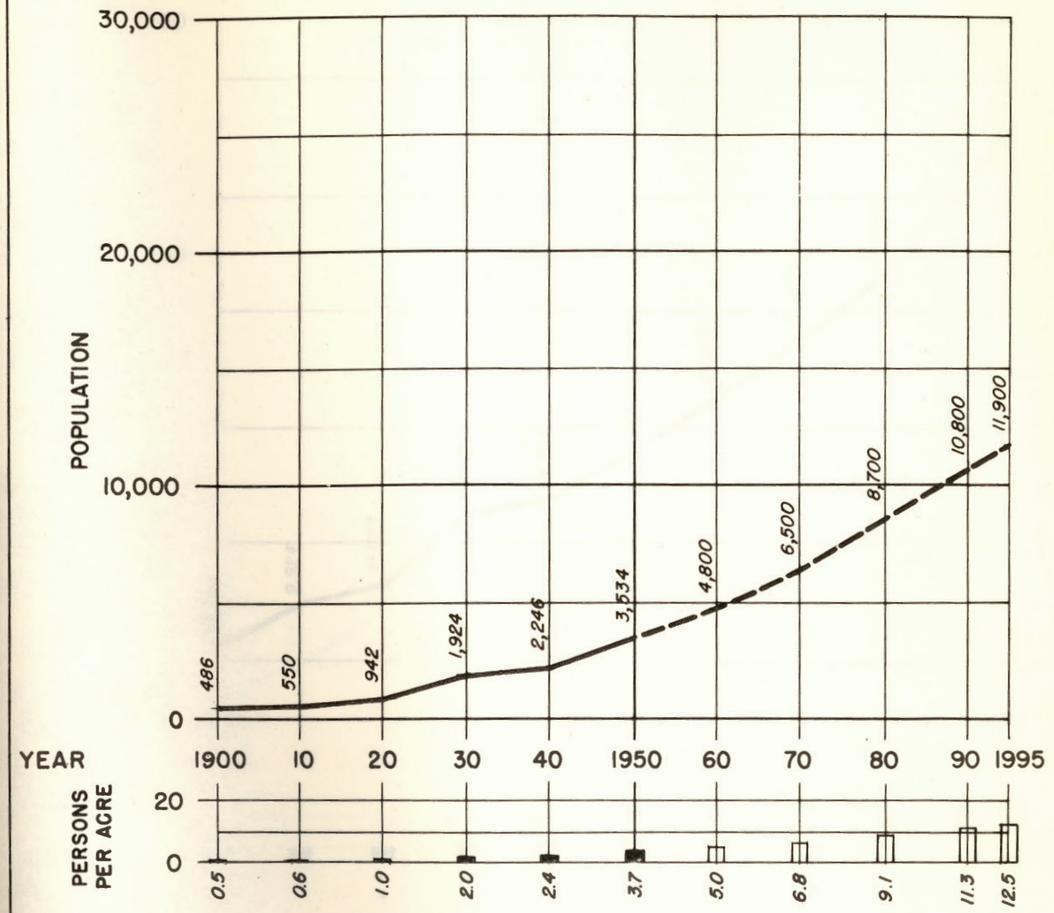
BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

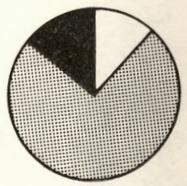
POPULATION FORECAST
CRESSKILL

ULTIMATE POPULATION - 17,491*

ULTIMATE AVERAGE DENSITY - 18.3*



*ULTIMATE LAND USE**



	Suitable for RESIDENTIAL and BUSINESS	*955*
	PUBLIC and OPEN SPACES	*148*
	Unsuitable for Development	*—*
	Suitable for INDUSTRIAL	*177*
	TOTAL AREA	*1,280 Acres*

** Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

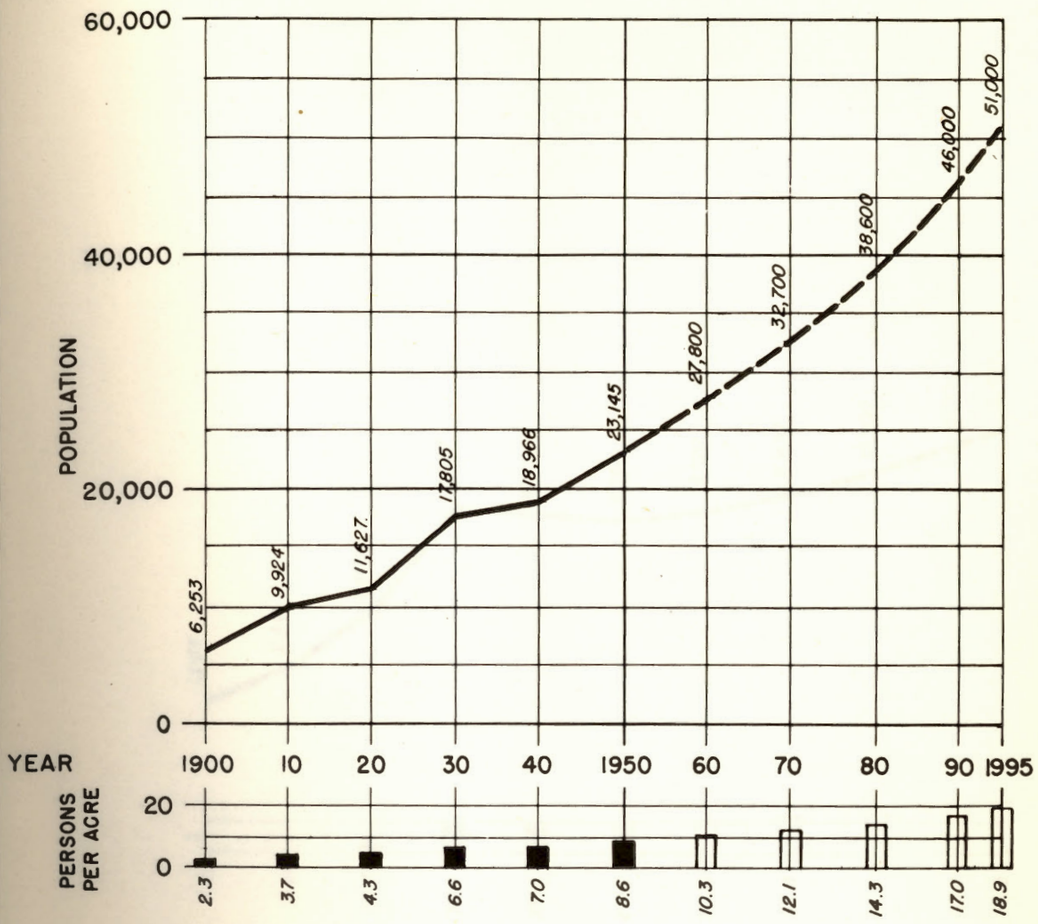
BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

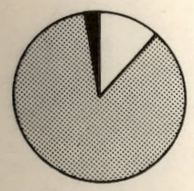
POPULATION FORECAST
ENGLEWOOD

ULTIMATE POPULATION - 67,896*

ULTIMATE AVERAGE DENSITY - 25.2*



*ULTIMATE LAND USE**



Suitable for RESIDENTIAL and BUSINESS	*2,698*	
PUBLIC and OPEN SPACES	*354*	
Unsuitable for Development	—	
Suitable for INDUSTRIAL	*88*	
TOTAL AREA	*3,140*	*Acres*

** Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

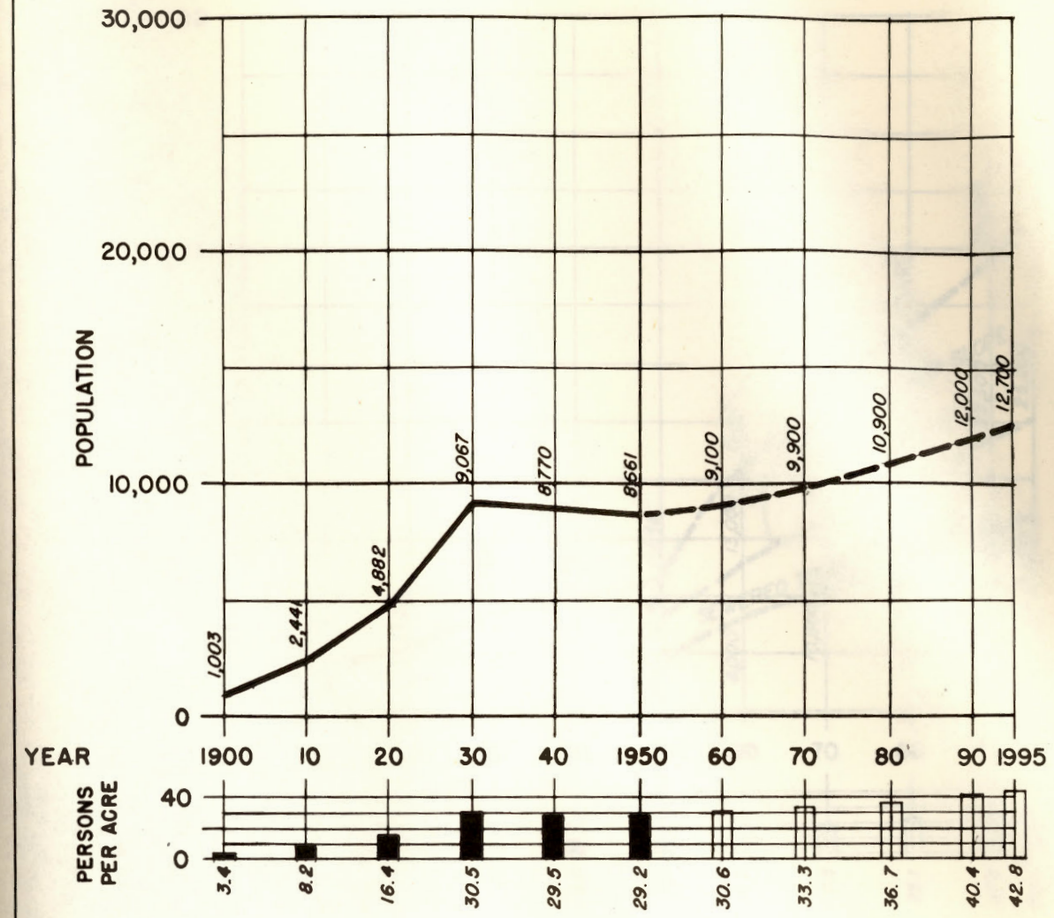
BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

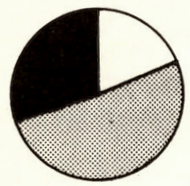
POPULATION FORECAST
FAIRVIEW

ULTIMATE POPULATION - 17,765*

ULTIMATE AVERAGE DENSITY - 59.8*



*ULTIMATE LAND USE**



	Suitable for RESIDENTIAL and BUSINESS	*297*
	PUBLIC and OPEN SPACES	*108*
	Unsuitable for Development	—
	Suitable for INDUSTRIAL	*171*
	TOTAL AREA	*576 Acres*

** Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

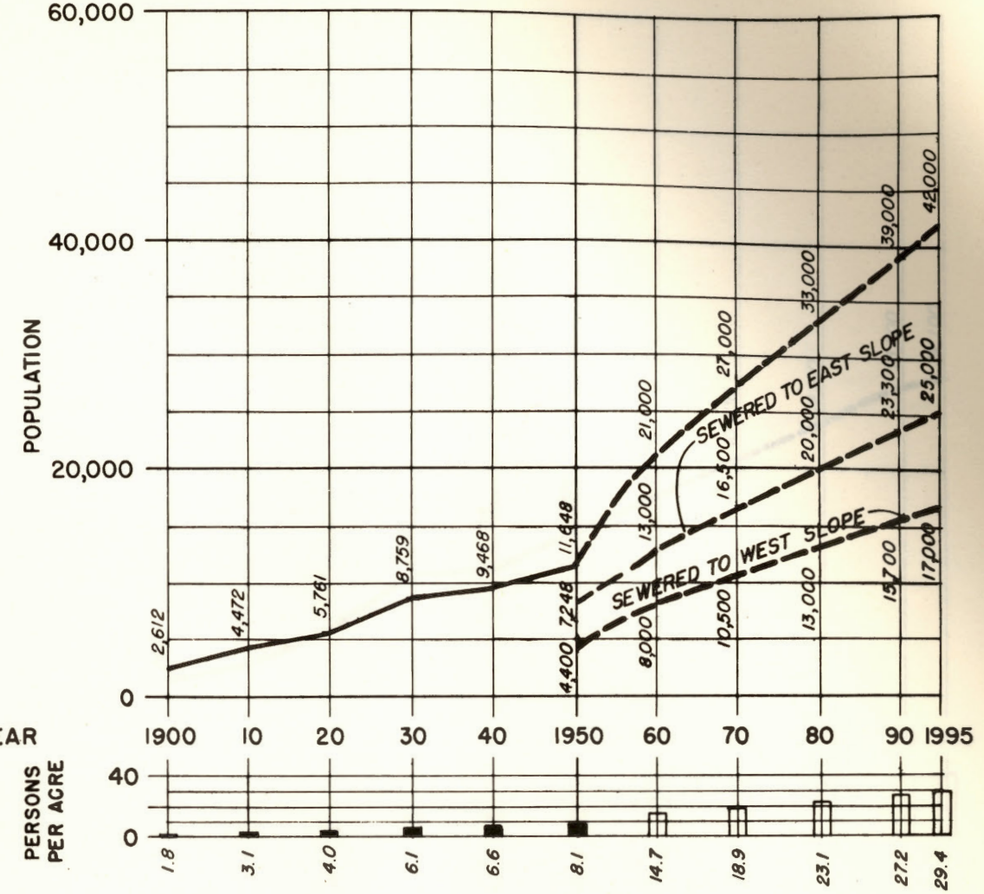
BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

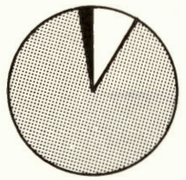
POPULATION FORECAST
FORT LEE

ULTIMATE POPULATION - 52,723*

ULTIMATE AVERAGE DENSITY - 36.8*



*ULTIMATE LAND USE**



	Suitable for RESIDENTIAL and BUSINESS	*1,431*
	PUBLIC and OPEN SPACES	*129*
	Unsuitable for Development	—
	Suitable for INDUSTRIAL	*40*
	TOTAL AREA	*1,600* **Acres**

** Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

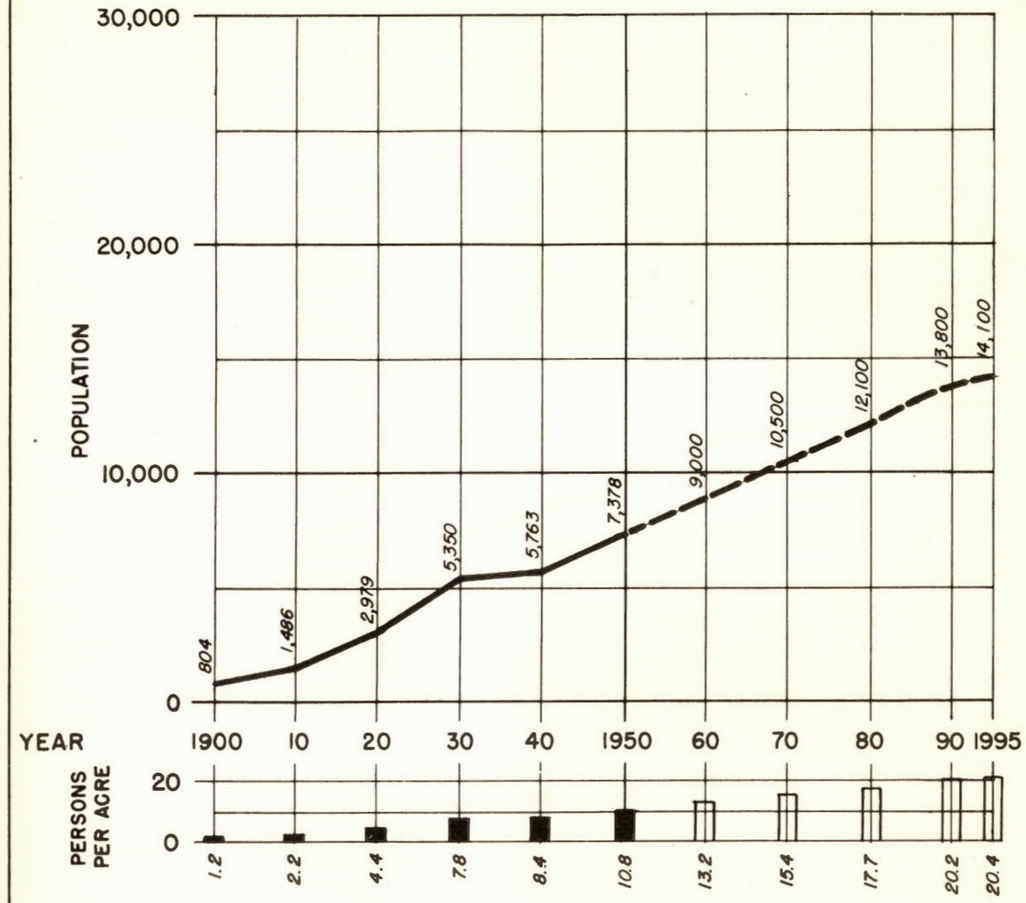
BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

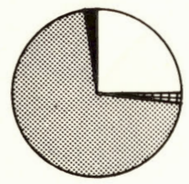
POPULATION FORECAST
LEONIA

ULTIMATE POPULATION - 14,768*

ULTIMATE AVERAGE DENSITY - 21.6*



*ULTIMATE LAND USE**



	Suitable for RESIDENTIAL and BUSINESS	*683*
	PUBLIC and OPEN SPACES	*237*
	Unsuitable for Development	*19*
	Suitable for INDUSTRIAL	*21*
	TOTAL AREA	*960 Acres*

* *Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

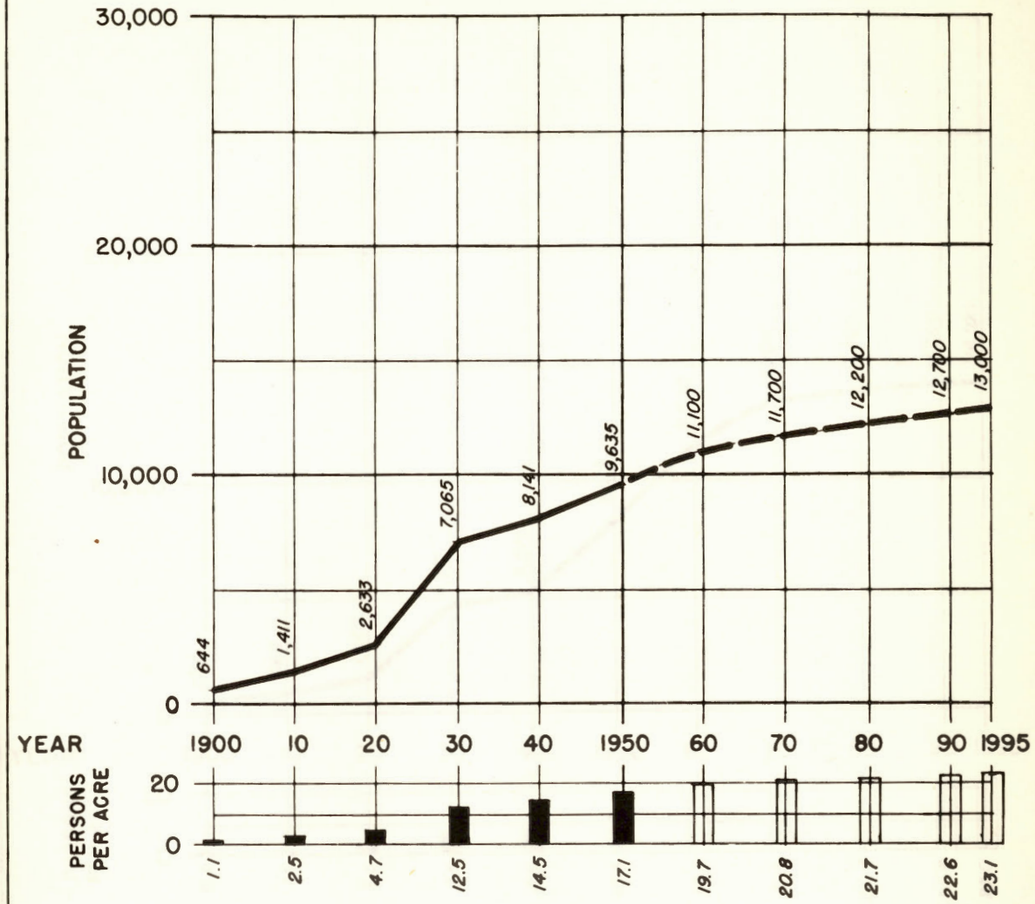
1952 PROJECT REPORT

POPULATION FORECAST

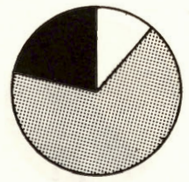
PALISADES PARK

ULTIMATE POPULATION - 15,106*

ULTIMATE AVERAGE DENSITY - 26.8*



*ULTIMATE LAND USE**



	Suitable for RESIDENTIAL and BUSINESS	*563*
	PUBLIC and OPEN SPACES	*94*
	Unsuitable for Development	*–*
	Suitable for INDUSTRIAL	*175*
	TOTAL AREA	*832 Acres*

* *Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

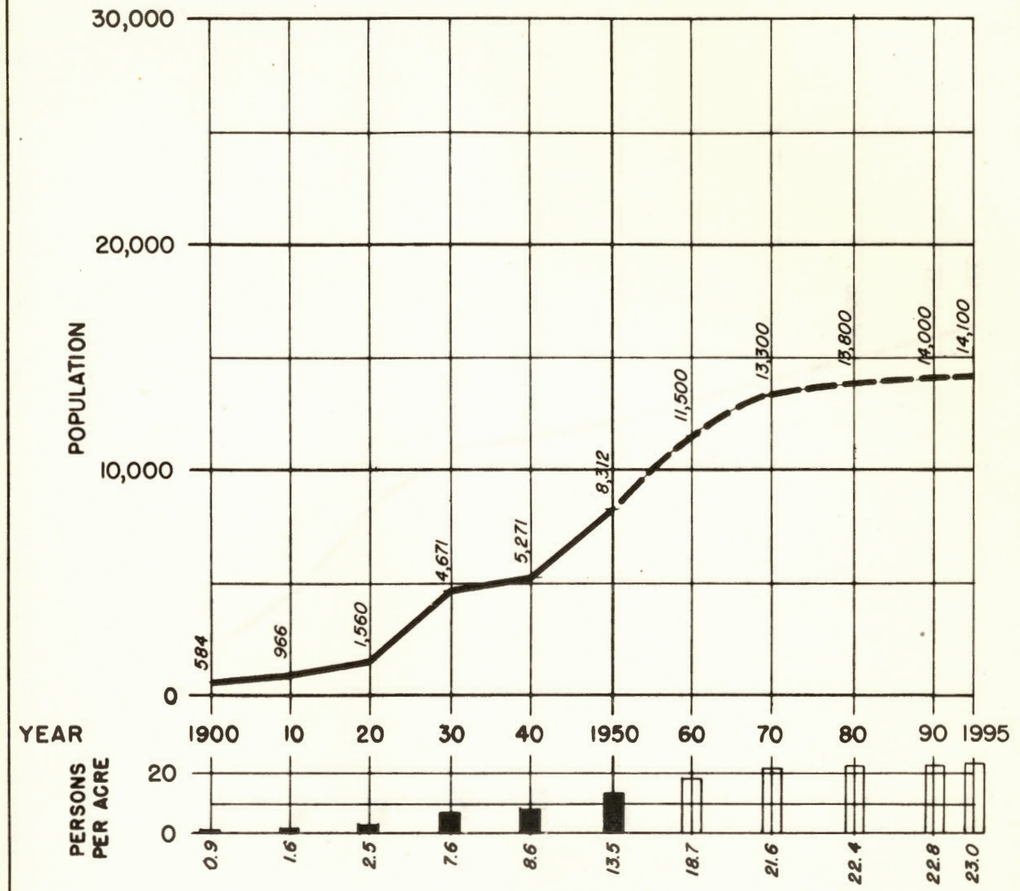
BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

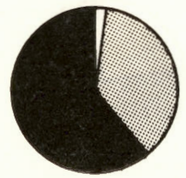
POPULATION FORECAST
RIDGEFIELD

ULTIMATE POPULATION - 17,661*

ULTIMATE AVERAGE DENSITY - 28.7*



*ULTIMATE LAND USE**



Suitable for RESIDENTIAL and BUSINESS	615	
PUBLIC and OPEN SPACES	38	
Unsuitable for Development	–	
Suitable for INDUSTRIAL	1,012	
TOTAL AREA	1,665	*Acres*

** Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

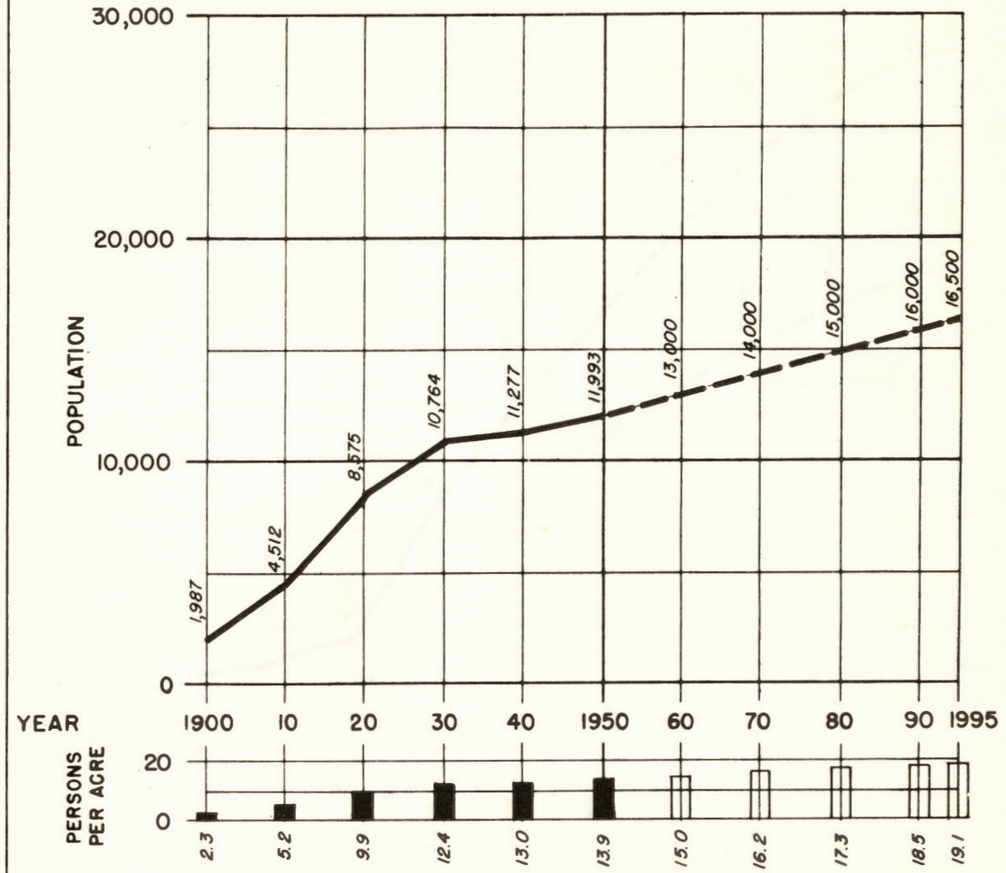
1952 PROJECT REPORT

POPULATION FORECAST

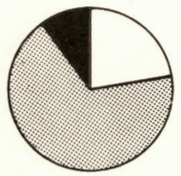
RIDGEFIELD PARK

ULTIMATE POPULATION - 13,297*

ULTIMATE AVERAGE DENSITY - 15.4*



*ULTIMATE LAND USE**



Suitable for RESIDENTIAL and BUSINESS	866
PUBLIC and OPEN SPACES	285
Unsuitable for Development	–
Suitable for INDUSTRIAL	129
TOTAL AREA	*1,280 Acres*

* *Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

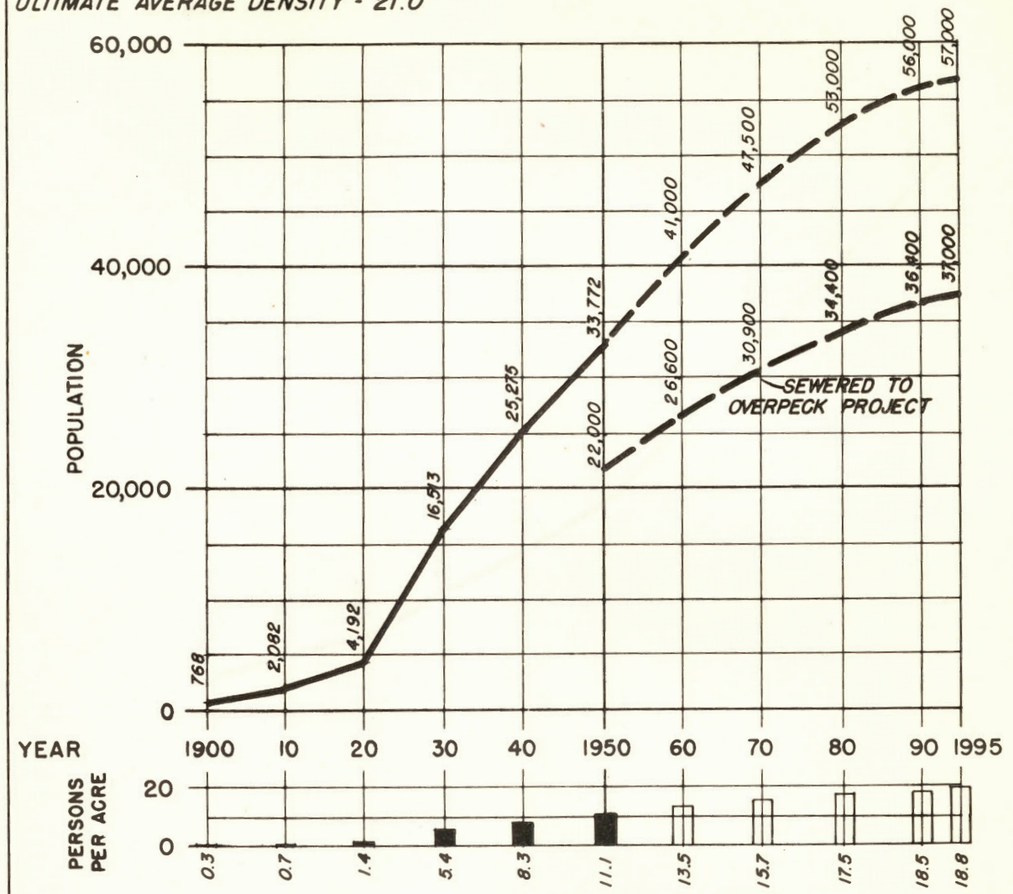
1952 PROJECT REPORT

POPULATION FORECAST

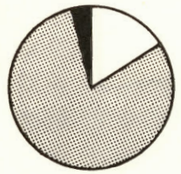
TEANECK

ULTIMATE POPULATION - 63,660*

ULTIMATE AVERAGE DENSITY - 21.0*



*ULTIMATE LAND USE**



Suitable for RESIDENTIAL and BUSINESS	*3,032*
PUBLIC and OPEN SPACES	*601*
Unsuitable for Development	*—*
Suitable for INDUSTRIAL	*147*
TOTAL AREA	*3,780 Acres*

* *Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

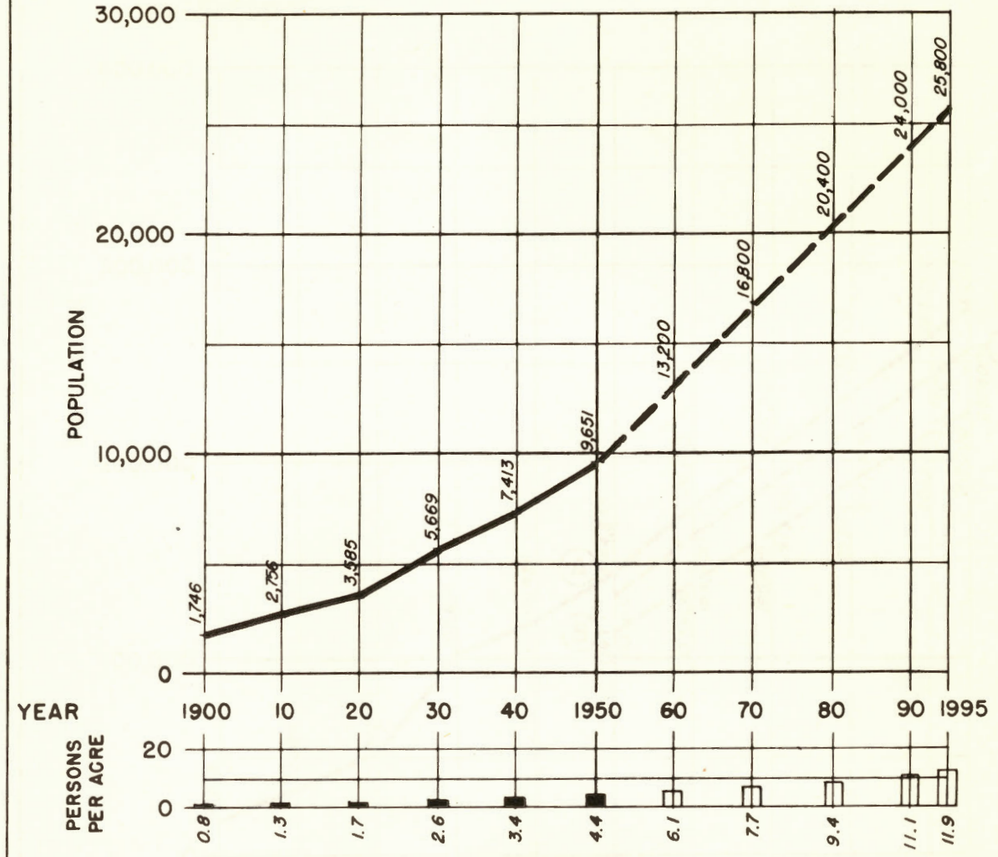
BERGEN · COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

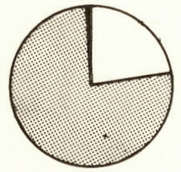
POPULATION FORECAST
TENAFLY

ULTIMATE POPULATION - 35,228*

ULTIMATE AVERAGE DENSITY - 16.2*



*ULTIMATE LAND USE**



	Suitable for RESIDENTIAL and BUSINESS	*2,171*
	PUBLIC and OPEN SPACES	*631*
	Unsuitable for Development	*–*
	Suitable for INDUSTRIAL	*18*
	TOTAL AREA	*2,820 Acres*

** Data derived from "Future Land Development in Bergen County", Bergen County Planning Board, 1947.*

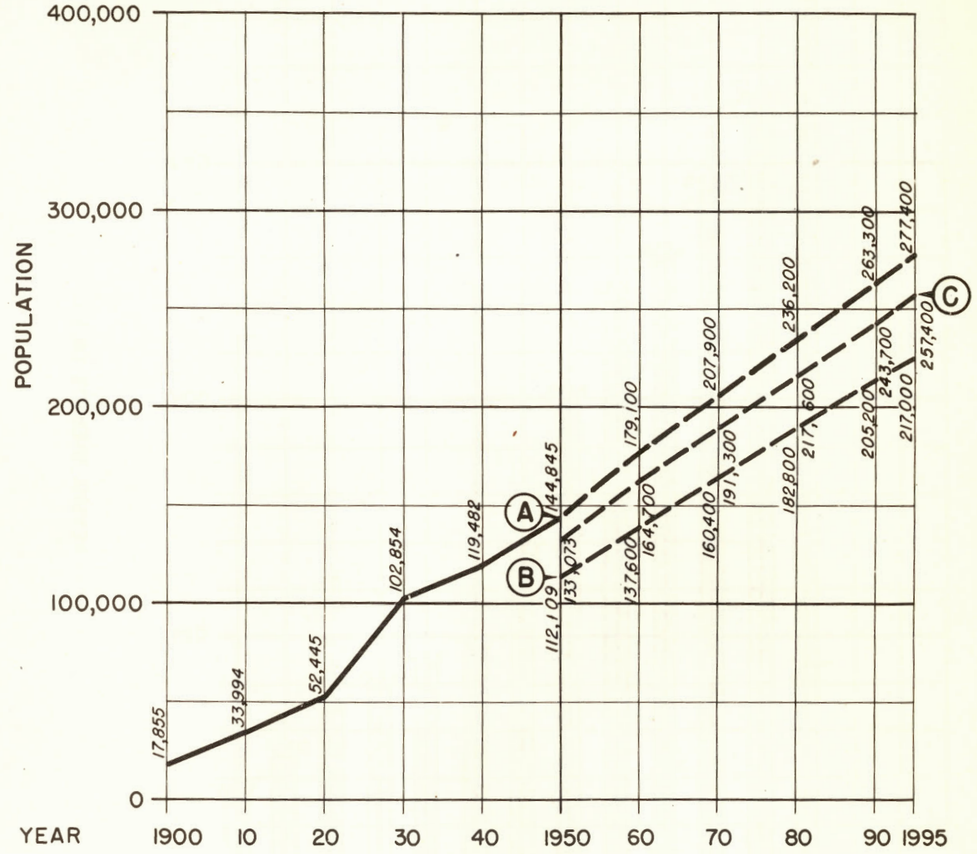
BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

POPULATION FORECAST

TOTALS FOR OVERPECK PROJECT AND EXTENSIONS



(A) *11 MUNICIPALITIES - TOTAL POPULATION.*

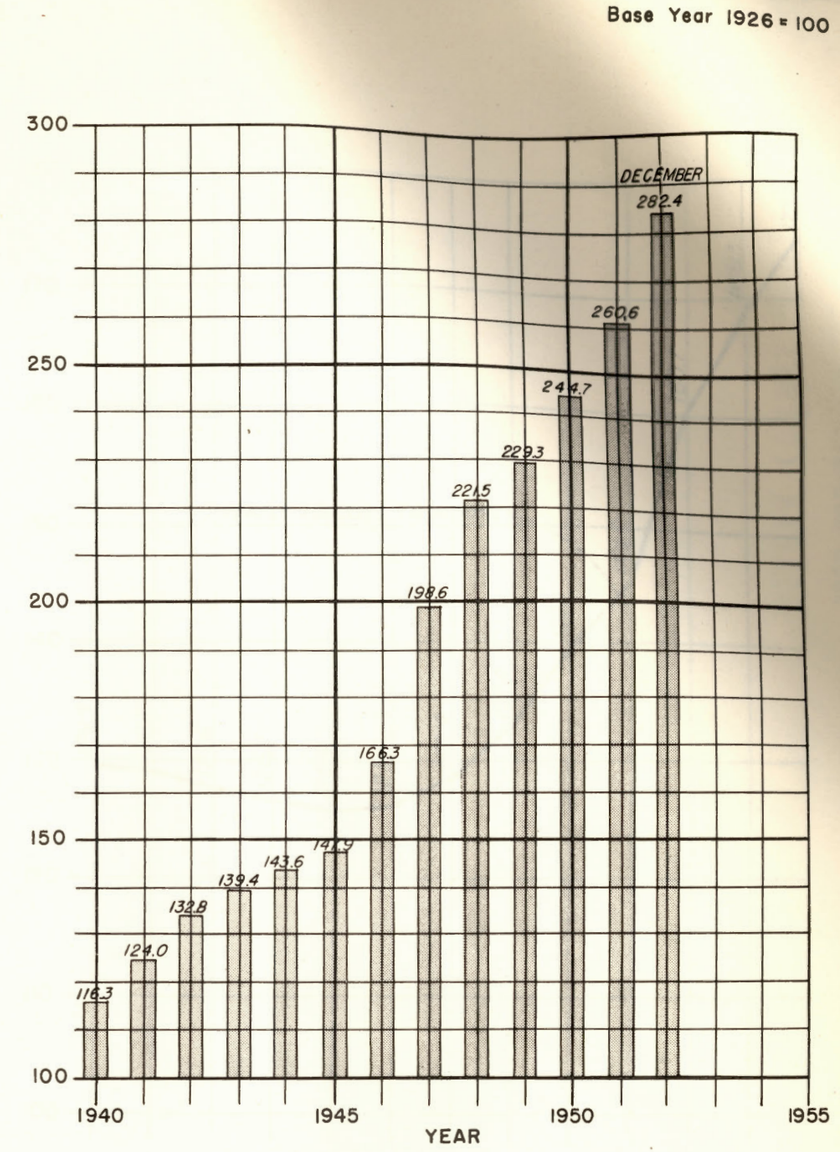
(B) *11 MUNICIPALITIES - POPULATION IN OVERPECK PROJECT.*

(C) *11 MUNICIPALITIES - POPULATION IN OVERPECK PROJECT AND EAST SLOPES OF CLIFFSIDE PARK AND FORT LEE.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT



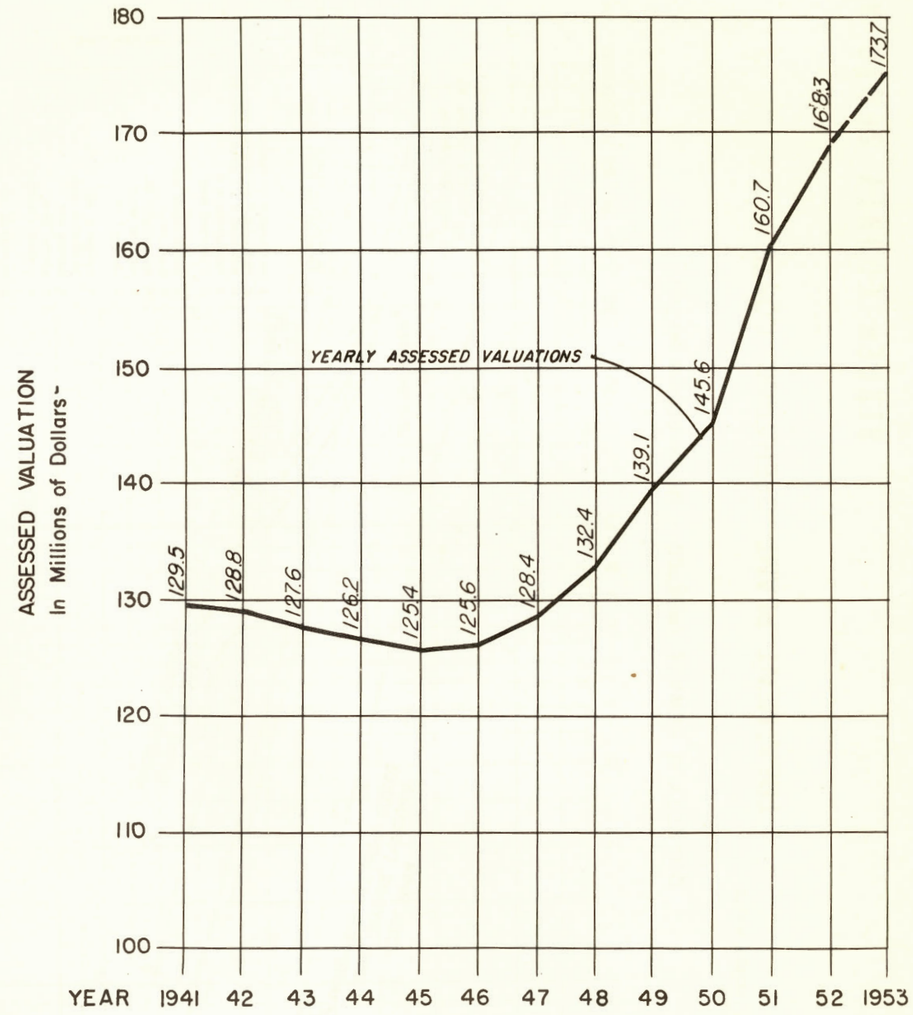
CONSTRUCTION COSTS

VARIATIONS in ENGINEERING NEWS RECORD INDEX

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT



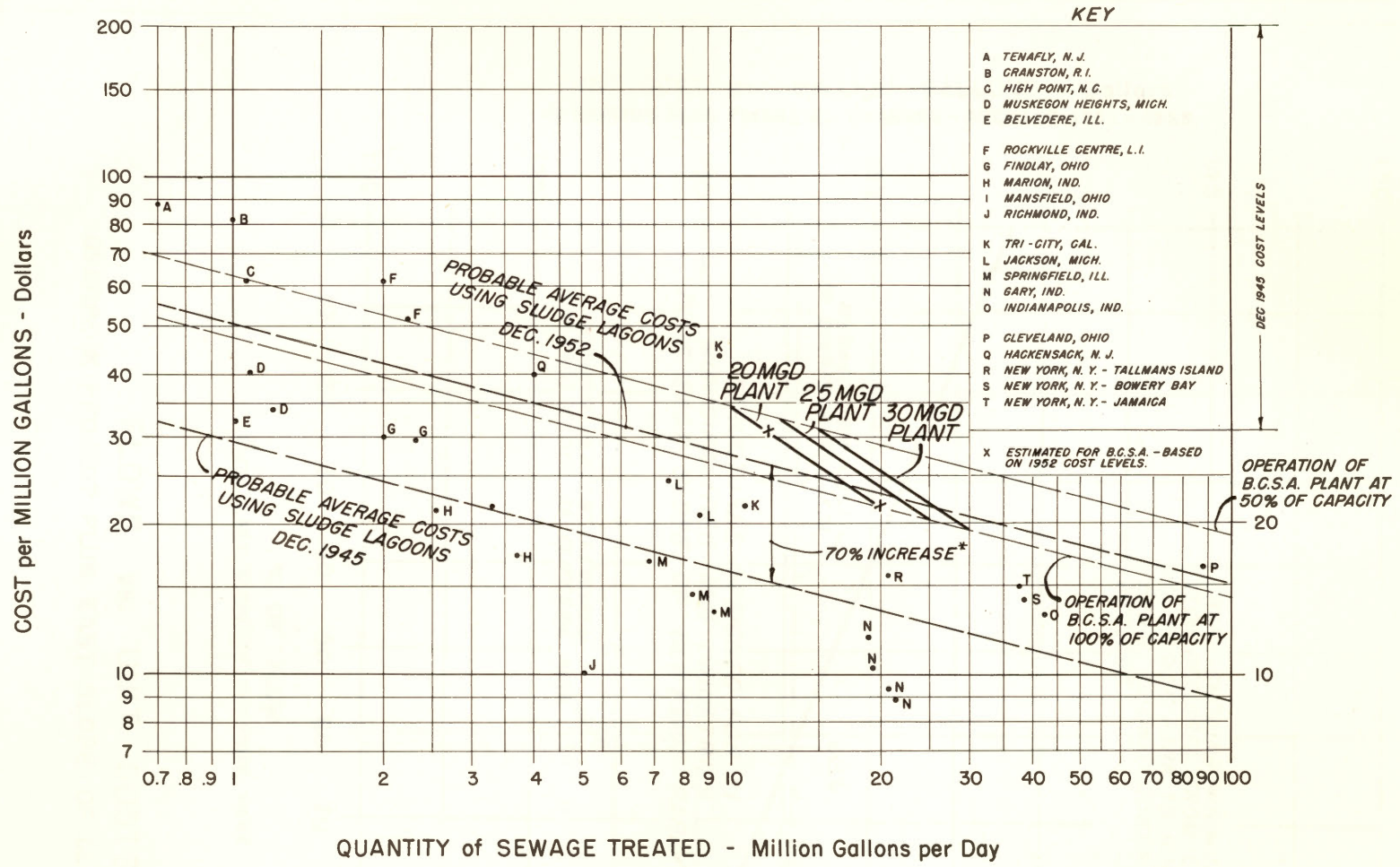
ASSESSED VALUATION

IN 11 OVERPECK MUNICIPALITIES

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT



*BASED ON INCREASE IN NATIONAL AVERAGE WAGE RATES (ENR 20 City Average), MATERIAL COSTS, POWER COSTS AND INCREASED COSTS AT OTHER PLANTS.

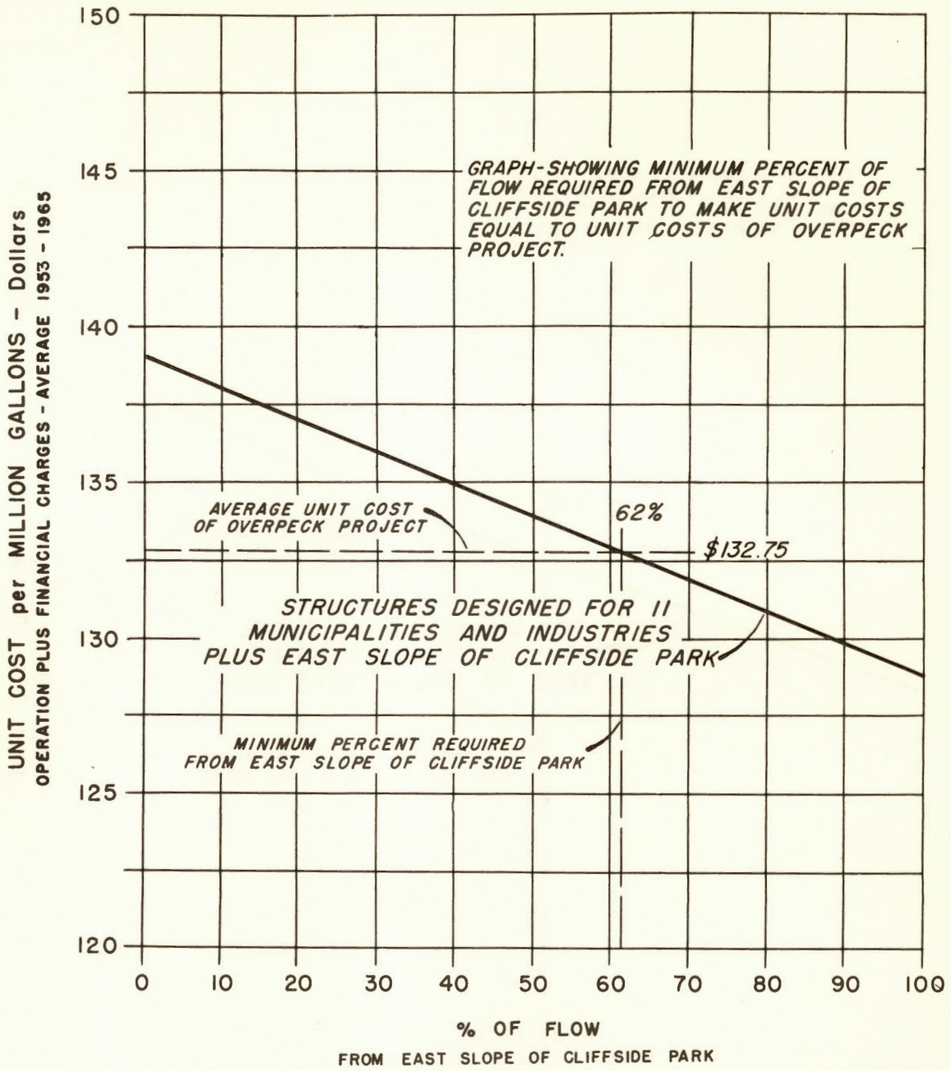
TREATMENT PLANT OPERATING COSTS

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

Plate 15



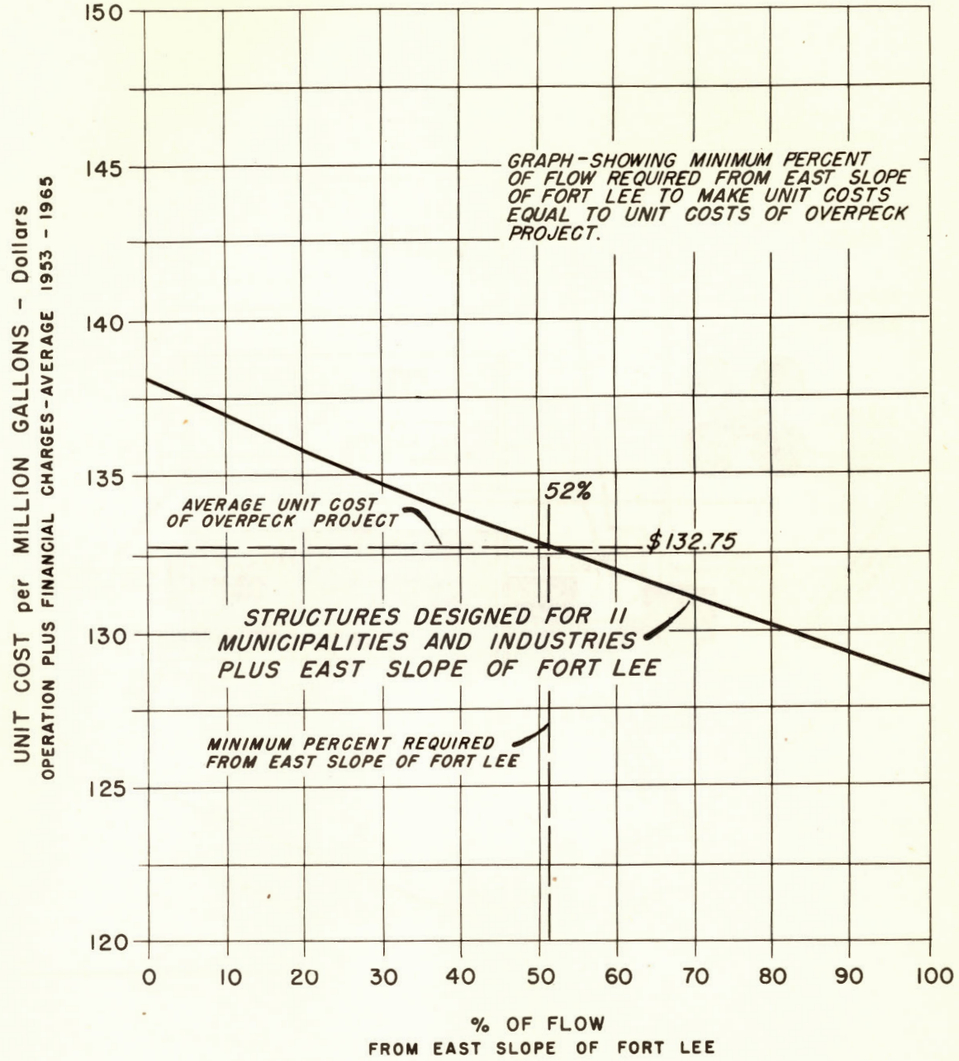
FLOWS vs. UNIT COSTS

OVERPECK PROJECT PLUS EAST SLOPE OF CLIFFSIDE PARK

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT



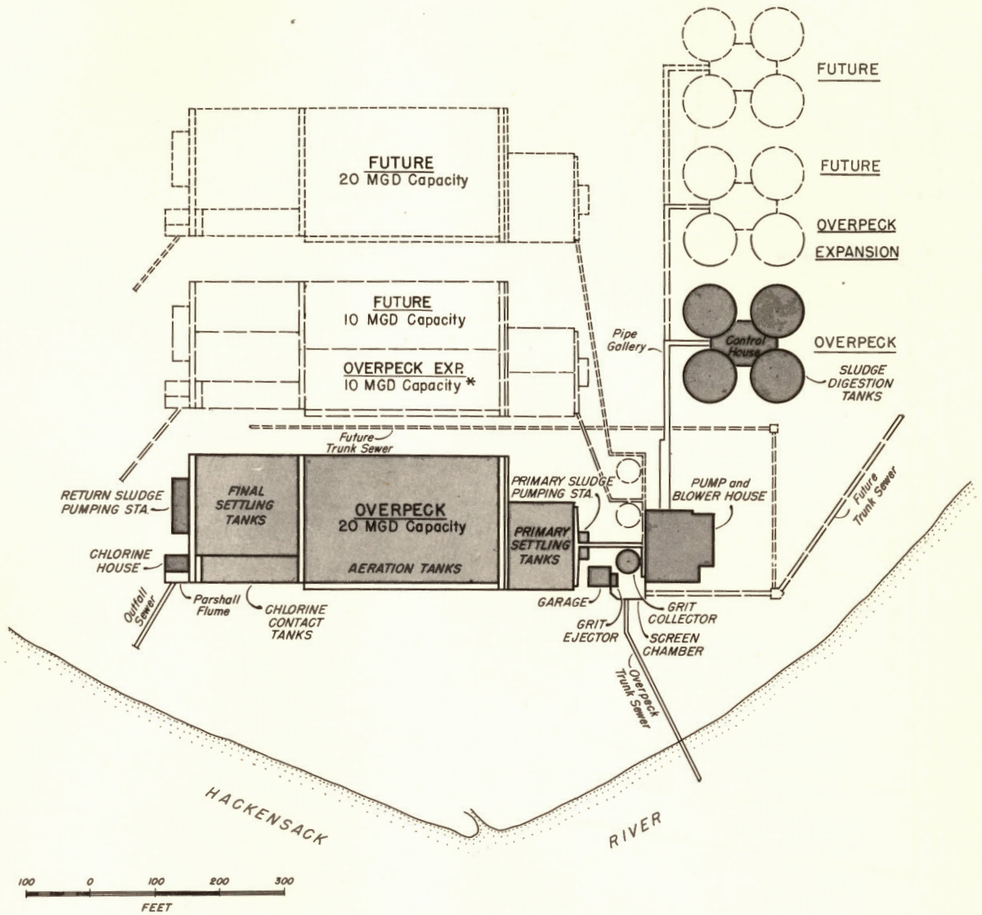
FLOWS vs. UNIT COSTS

OVERPECK PROJECT PLUS EAST SLOPE OF FORT LEE

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT



SEWAGE TREATMENT PLANT

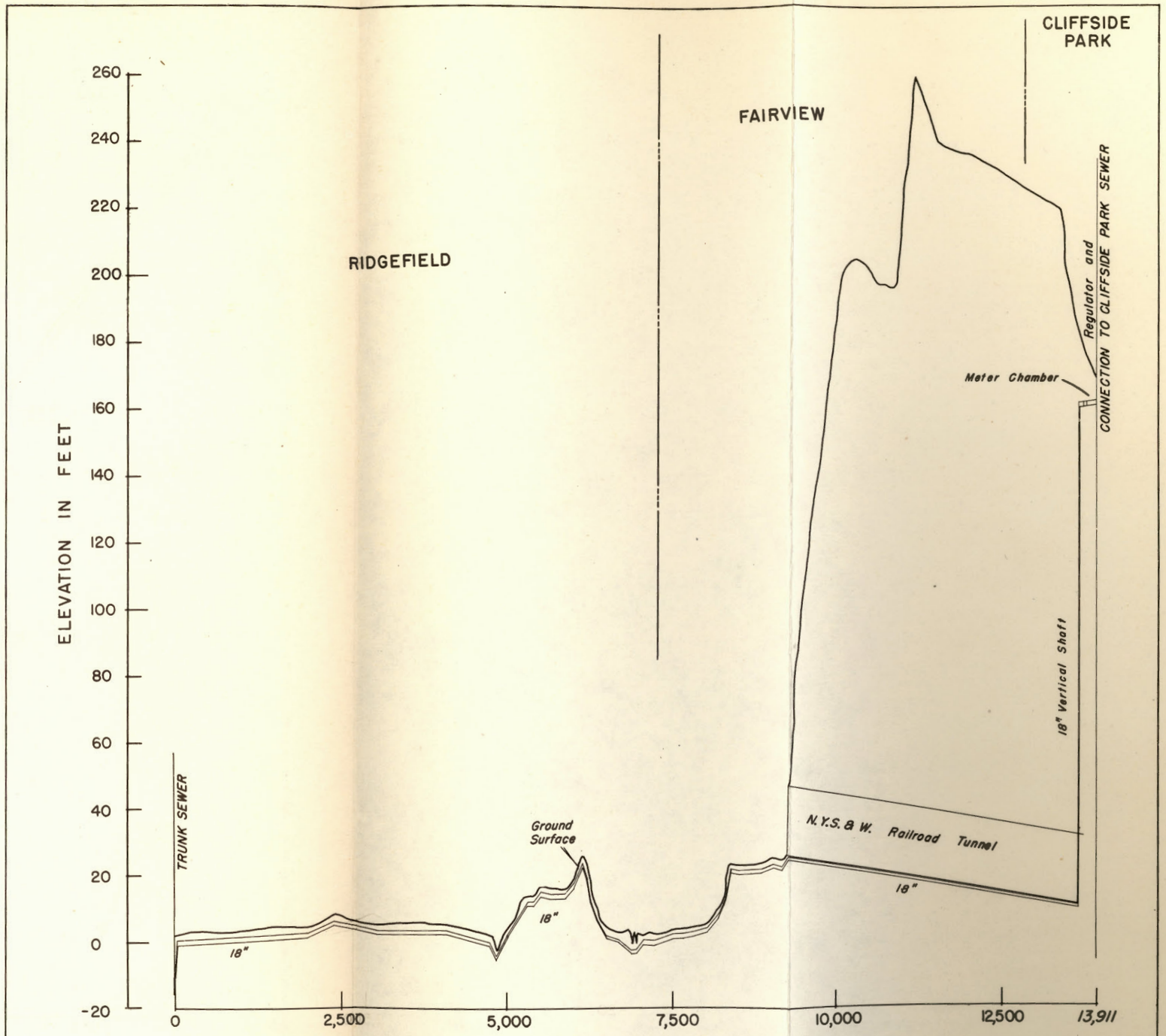
PROPOSED STAGE CONSTRUCTION

* *In 5 MGD increments.*

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

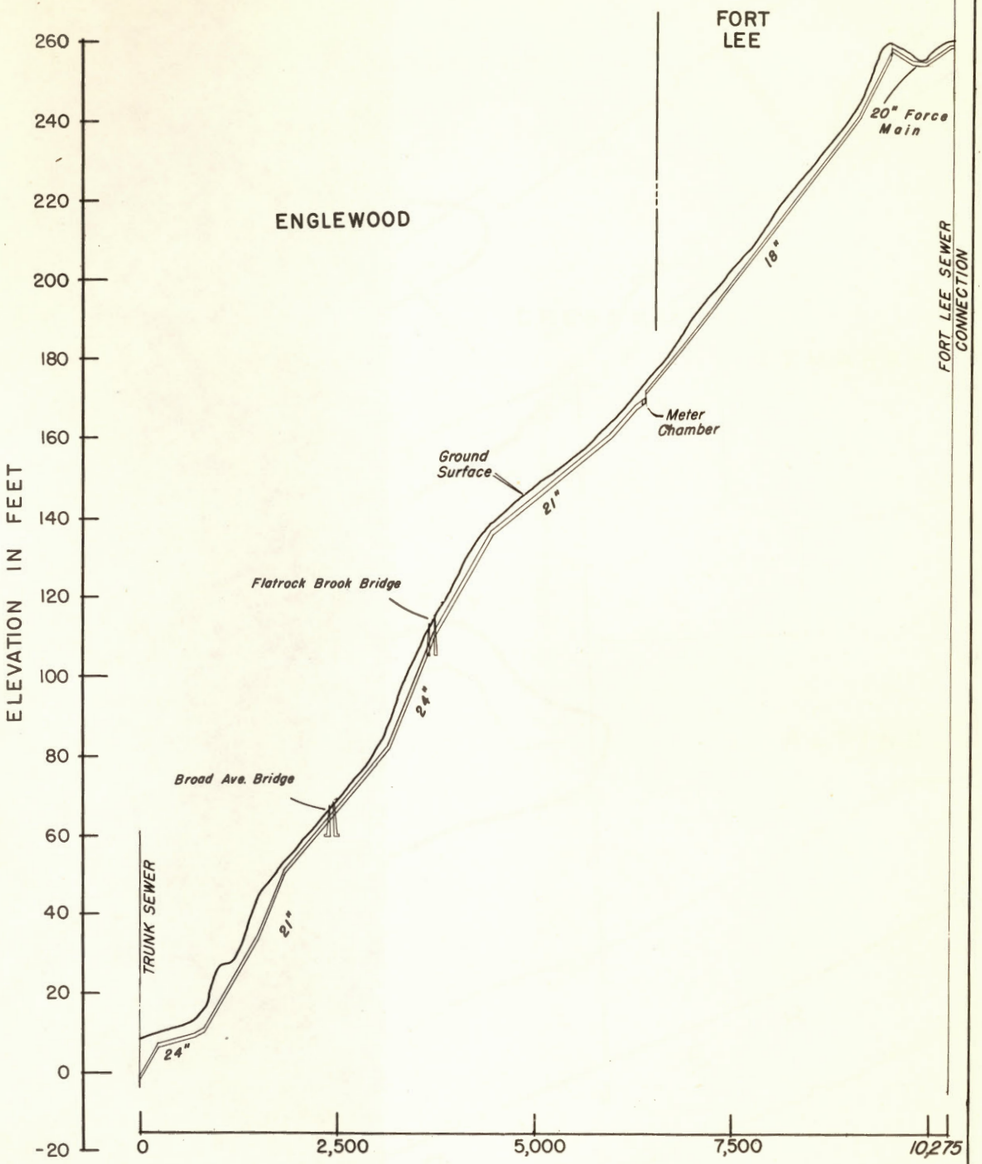
1952 PROJECT REPORT



PROFILE of CLIFFSIDE PARK EAST SLOPE INTERCEPTER

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY
1952 PROJECT REPORT



PROFILE of FORT LEE EAST SLOPE INTERCEPTER

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT

PROJECT MAP

SCALE IN FEET
0 2000 4000 6000

DUMONT
BERGENFIELD
CRESSKILL
DEMAREST
TENAFLY
ALPINE
ENGLEWOOD
ENGLEWOOD CLIFFS
LEONIA
PALISADES PARK
RIDGEFIELD
RIDGEFIELD PARK
BOGOTA
TEANECK
LITTLE FERRY
FAIRVIEW
CLIFFSIDE PARK
EDGEWATER
FORT LEE
OVERPECK CREEK
HACKENSACK RIVER
HUDSON RIVER
TREATMENT PLANT
TRUNK SEWER
FORT LEE EAST SLOPE INTERCEPTER
CLIFFSIDE PARK EAST SLOPE INTERCEPTER
PUMPING STATION
GLENWOOD PARK PUMPING STA.
FLINTKOTE CO.
PFISTER CHEMICAL CO.
LOWE PAPER CO.
BELLMAN'S BROOK BLEACHERY
DRAINAGE AREA
LIMIT OF

LEGEND

- EXISTING AUTHORITY SEWERS
- EXISTING MUNICIPAL SEWERS
- PROPOSED AUTHORITY SEWERS
- PROPOSED MUNICIPAL SEWERS
- AREAS SEWERED BY EXTENSIONS OF OVERPECK PROJECT

BOGERT-CHILDS ENGINEERING ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, N. Y.

BERGEN COUNTY SEWER AUTHORITY

1952 PROJECT REPORT