



CLEVELAND REGIONAL SEWER DISTRICT



President's Message



The Cleveland Regional Sewer District was launched as a new governmental entity on July 18, 1972, when the Board of Trustees held its first organizational meeting. In the two years since that first meeting, the Board of Trustees has guided the district through a difficult period of organization and staffing. The members of the Board of Trustees have given unselfishly of their time and effort to formulate policies and make major decisions which will guide the progress of the district in the years to come.

The task confronting the Board of Trustees of forming a new governmental entity would have been totally impossible without the excellent cooperation of the various departments of the City of Cleveland, especially the Department of Public Utilities. Special mention must be made of the efforts and cooperation of the Acting Commissioner of Water Pollution Control, Clyde E. Kirsch, and his staff who were responsible for carrying on the everyday operation of the district's facilities while the board familiarized itself with its role and functions.

Two significant changes in the membership of the Board of Trustees took place during 1973. On February 26, 1973, board member Walter C. Kelley, Jr., having been appointed Mayor of the City of Shaker Heights, tendered his resignation due to a conflict with the Shaker Heights City Charter, and the Council of Governments of the suburban communities replaced Mr. Kelley with the Honorable Jack Hruby, Mayor of the City of Brecksville. On December 10, 1973, board member Richard R. Hollington, Jr. resigned from the board and was replaced by Mayor Perk with the appointment of Assistant City Law Director, Nicholas M. DeVito. Both Messrs. Hollington and Kelley were instrumental in the litigation and negotiations which led to the formulation of the district and their background and expertise will certainly be missed by the board. However, their replacements, Mayor Hruby and Mr. DeVito, are eminently qualified as board members as they have also been involved in the background of the district.

No membership changes occurred in 1974. But, on February 20,

1975, another membership change took place. The Mayor of Parma, Honorable John Petruska was elected to the Board of Trustees by the Suburban Council of Governments. Mayor Petruska replaced the Mayor of Brecksville, the Honorable Jack A. Hruby whose term had expired.

In its brief two-year history, the district has made significant progress—not only in organizing but also in carrying out the program of water pollution control which is its primary purpose. The Board of Trustees, the Director, the district staff and all the citizens of this community can be justly proud of the dual accomplishments of the district, as a pollution control agency and as an example of regional, intergovernmental cooperation.

Raymond Kudukis
President
Board of Trustees

Board of Trustees



Raymond Kudukis
President
Director of Public Utilities
City of Cleveland



Honorable Lou Bacci
Vice President
Mayor, Village of
Cuyahoga Heights



Mary Coleman
Secretary
Civic Leader



David B. Bailey
Member
Attorney



Nicholas DeVito
Member
Attorney



Honorable John Petruska
Member
Mayor, City of Parma



Jackie Presser
Member
Labor Leader

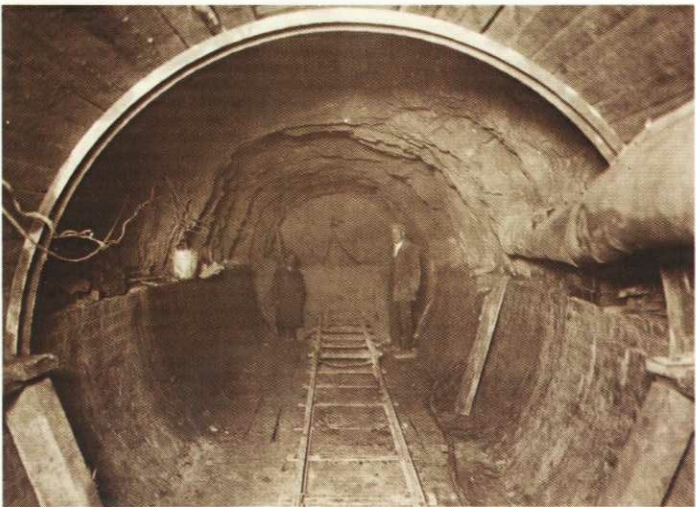
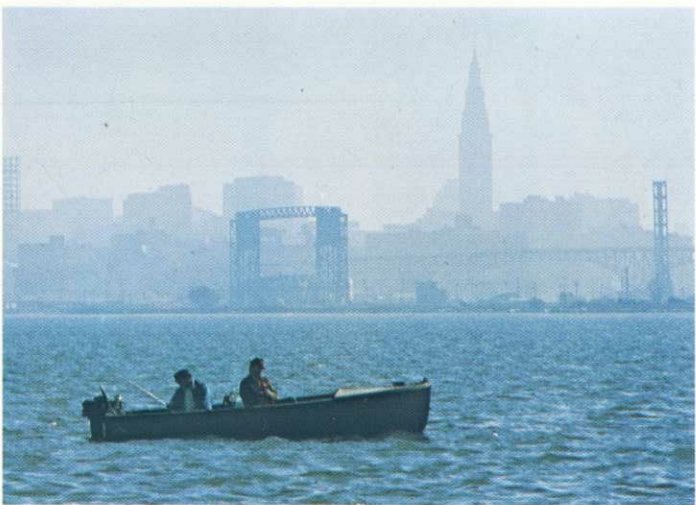


The basic problem — a legacy from the past



The Metropolitan Cleveland Area is almost completely served by sewers and sewage treatment facilities. The City of Cleveland has a system of combined sewers; that is, sanitary sewage, industrial wastes, and rainfall runoff from streets and roof downspouts are combined and carried in the same sewer pipe. Major portions of the Cleveland combined sewer system were constructed in the early part of this century, and some of the main sewers which are still in use date back to 1880.

The rate of rainfall runoff which must be carried away by the combined sewers during storm periods is much larger than the rate of flow of sanitary sewage and industrial wastes generated in the same area; during even moderate storms, the storm runoff rate is 40 to 50 times the sanitary sewage flow. It is obviously not feasible to construct and operate sewage treatment plants large enough to accommodate these peak flow rates, so it is necessary in combined sewer systems to dump the excess flow into nearby streams and lakes, allowing only about 2 to 5 times the normal dry weather sewage flow to pass to the treatment works. The diversion of excess storm flows from the combined sewers is accomplished by a structure known as a "combined sewer overflow;" the portion of the flow permitted to pass to the treatment plant is diverted into another sewer known as the "intercepting sewer." The diversion of mixed sanitary sewage and storm runoff to the streams and lake through combined sewer overflows obviously must pollute the streams, but during the late 19th and early 20th century when most large city sewer systems were constructed, it was considered far too extravagant to construct two separate sewer systems. Thus, practically every large city in the world today has a combined sewer system, and suffers its attendant pollution problems.



Suburbs in the District are almost entirely served by separate storm and sanitary sewer systems. But studies have shown that there is a considerable degree of cross connection between the sanitary sewers and storm drains within the suburban systems themselves, before reaching Cleveland's borders. When sewers back up due to lack of capacity and immediate action is necessary, the easiest solution is to

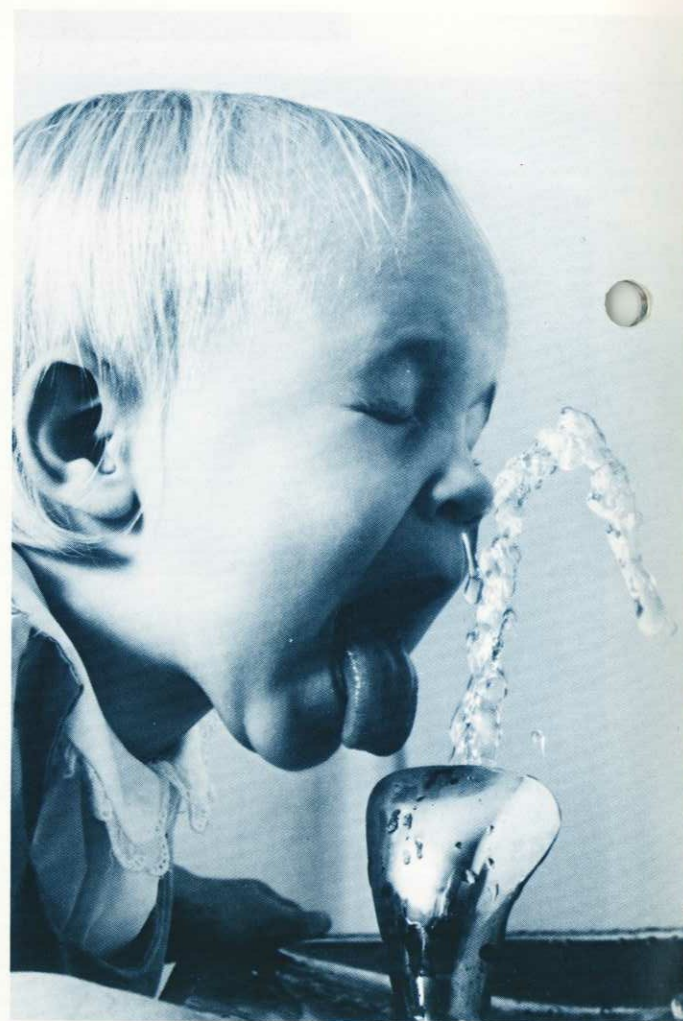
relieve the overloaded sanitary sewer by connecting it with a storm sewer, so that sanitary sewage will automatically overflow into the storm sewer and thus into lake or streams. Such a cross connection is similar to a combined sewer overflow, and its effect in pollution of the receiving water is the same.

Although a detailed field inspection has not been conducted of all of the suburban sewer systems,

preliminary examination during the conduct of this study has revealed approximately 105 cross connections of this kind. This indicates that an extensive program of sewer rehabilitation and re-construction is necessary in many of the suburban systems. Detailed discussion of the sewer systems and of recommended improvements for both City and suburban systems will be the District's approach to eliminate pollution.



Aeration tank influent



Final settling tank



Analysing plant effluent

The basic solution — Regional Control

The Cleveland Regional Sewer District is the largest of its kind in the State of Ohio. Its creation has been hailed as a milestone in intergovernmental cooperation for the solution of serious water pollution control problems facing not only the Greater Cleveland Area but also the entire nation.

The District is currently made up of the City of Cleveland and thirty-three surrounding suburbs whose

sewer systems are tributary to Cleveland's three sewage treatment plants and main interceptor sewer systems. The City of Cleveland is Subdistrict No. 1, and the thirty-three suburbs constitute Subdistrict No. 2.

The regional approach to sewer management is seen as the only practical way to effectively protect the public's health and well-being in this regard and to improve the quality

of life...without incurring unacceptably high costs. It eliminates municipal rivalries, duplication of facilities and duplication of effort and allows efficient, businesslike operation of the sewer system for the benefit of all.

The Cleveland Regional Sewer District is governed by a Board of Trustees. A seven-member Board was determined to be the most reasonable configuration. Members of the Board of Trustees are appointed as follows: Two by the Mayor of the City of Cleveland, two by the Council of Governments of all suburban communities within the District, one by the Board of County Commissioners of Cuyahoga County, one by the appointing authority of the Subdistrict with the greatest sewage flow, and one by the appointing authority of the Subdistrict with the greatest population.

The Board of Trustees held its first meeting on July 18, 1972, and since that time has concentrated its efforts on the immense job of forming, staffing and operating a new governmental entity while at the same time carrying forward a mammoth capital improvement program designed to meet the effluent requirements set by the state and federal regulatory agencies.

In its first year of operation, the District has moved judiciously and consistently to establish its own identity by working closely with the City of Cleveland to effect the transfer of responsibility from the City to the District.

The design of a massive capital improvement program and expansion of the District's three treatment plants and construction of five new major interceptor sewers is now being carried out by the District.

Service Area



The Cleveland Regional Sewer District, as it is presently constituted, serves twenty-two cities, nine villages and two townships within Cuyahoga County. The service area is subdivided into three districts, known as the Easterly, Southerly and Westerly Districts, each of which is served by a wastewater treatment plant. A map of the service area showing plant locations and municipal boundaries is shown on page 12.

The population served by the District has been estimated, using base

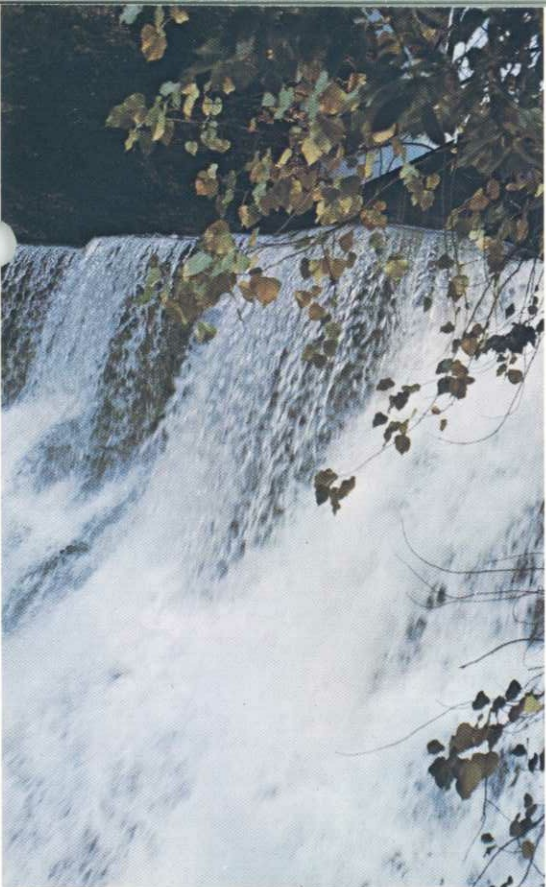
figures of the Real Property Inventory and the U.S. Census, at a total of 1,286,000 persons. Of this total, about 814,000 live in District No. 1 and 472,000 live in District No. 2. A projection of population increase has been prepared showing the expected population in each District and in the entire service area for the years 1980 and 2000. These estimates have been based on projections of the Real Property Inventory, as well as recent studies of each of the waste-water treatment plants.

District	1970		1980		2000	
	Pop.	Area Acres	Pop.	Area Acres	Pop.	Area Acres
Easterly	556,300	41,100	583,000	42,000	608,000	42,000
Southerly	558,300	55,200	662,000	81,500	783,000	81,500
Westerly	161,400	9,400	151,000	9,400	152,000	9,400
TOTAL	1,286,000	105,700	1,396,000	132,900	1,543,000	132,900

Municipalities by Treatment Plant

Easterly District:

	Acres With Combined Sewers	Acres With Separate Sewers	Total Tributary Acres
Beachwood		1,575	1,575
Bratenahl	212	460	672
Cleveland	16,063		16,063
Cleveland Heights		5,226	5,226
East Cleveland	120	1,810	1,930
Euclid (1)		345	345
Gates Mills		117	117
Highland Heights		543	543
Lyndhurst		2,976	2,976
Mayfield Heights		2,592	2,592
Mayfield Village		757	757
Richmond Heights		115	115
Shaker Heights		4,187	4,187
South Euclid		2,847	2,847
University Heights		1,152	1,152
Subtotal:	16,395	24,702	41,097



Westerly District:

Brooklyn City	239		239
Cleveland (2)	8,651	230	8,881
Lakewood	321		321
Subtotal:	9,211	230	9,441

Southerly District:

Beachwood	350	350
Bedford Heights	235	235
Brooklyn City	2,417	2,417
Brooklyn Heights	353	353
Brookpark	2,207	2,207
Cleveland	16,290	22,390
Cuyahoga Heights	1,452	1,452
Garfield Heights	1,400	3,736
Linndale	64	64
Maple Heights	2,628	2,628
Middleburg Heights	370	370
Newburgh Heights	352	352
North Randall	499	499
Parma	11,309	11,309
Parma Heights	2,573	2,573
Seven Hills	427	427
Warrensville Heights	2,165	2,165
Warrensville Twp.	1,643	1,643
Subtotal:	19,558	55,170



Secondary activated sludge control centers

The sources of pollution



Rain gauge

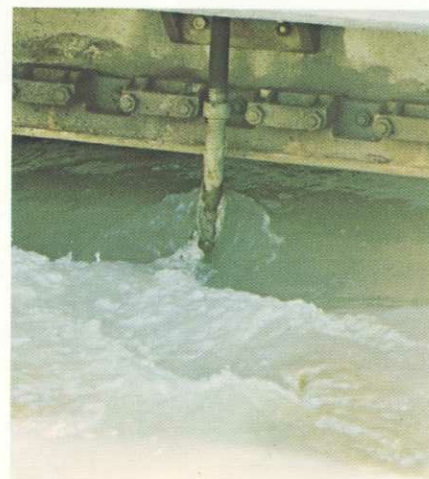


The pollution problem in the Metropolitan Cleveland Area is caused by several sources. One of these sources is combined sewer overflows which is the mixture of sewage and storm water runoff from heavy rainfalls. Once overflows occur, it results in the pollution of the Cuyahoga River and eventually Lake Erie.

Another direct cause of pollution is the cross connections between sanitary sewers and storm drains. The connections are located in the suburbs' separate sewer systems and relief connections, which permit overloaded sanitary sewers to discharge into streams creating a pollution problem in a similar manner to combined sewer overflows.

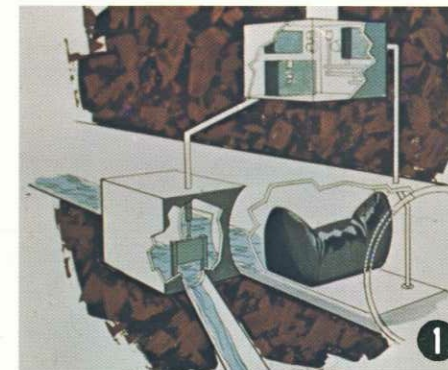
The wastewater treatment plants are designed to handle maximum flow rates. Once the flow rates are exceeded, flows are bypassed to the Cuyahoga River and Lake Erie. The District presently has a comprehensive expansion program to upgrade and eliminate this problem.

Direct industrial waste discharges by some commercial and industrial establishments discharge wastes directly into streams, storm drains or Lake Erie. This practice is illegal and dangerous unless it is treated prior to discharge under a permit issued by the Ohio Environmental Protection Agency.



Aeration tank influent

Sewer control by computer



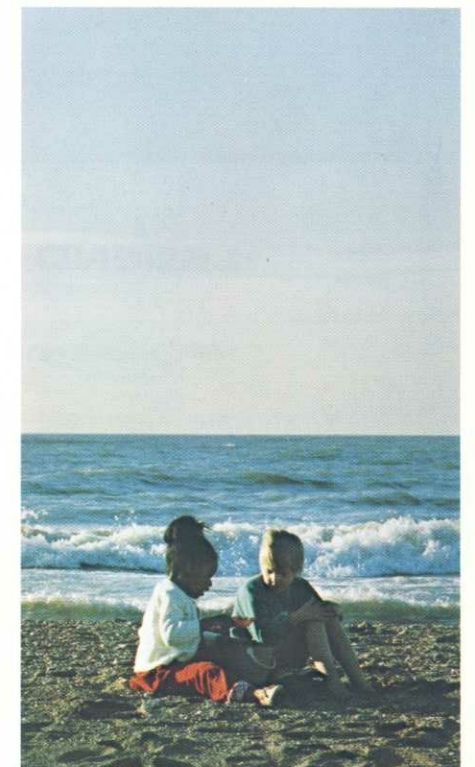
① Sewer flow is ② monitored by a central computer ③ via telemetry and telephony lines.

The City of Cleveland, Ohio, has been developing a combined sewer control system for approximately two years, now being activated by the Cleveland Regional Sewer District. A computer-based real-time data acquisition system has been installed and is in operation. Automatic wastewater samplers have been purchased, and automated chemical analyzers are being acquired. Mathematical models have been developed and used as analytical tools for the design and control of sewer system improvements. Remotely operated regulators have also been designed. This project is a significant first step toward controlling combined sewer overflow pollution of the Cuyahoga River and Lake Erie.

Complete control of combined sewer overflow pollution has not yet been achieved in any major American city with combined sewers. Separation of combined sewer systems

can be dismissed as being too costly; and because there is increasing evidence of significant pollution in urban runoff, may be of limited benefit. Therefore, the achievement of comprehensive control of combined sewer overflow pollution must be accomplished with other available techniques — control, storage, conveyance and treatment. It is now widely recognized that no single combined sewer pollution abatement technique can be employed economically, to the exclusion of others. Consideration must be given to a combination of abatement techniques matching the characteristics of the particular sewer system, the wastewater loading and hydrologic phenomena; a highly complex problem.

Combined sewer performance from a flow standpoint has been measured through use of a data acquisition system. The system utilizes rain gauges and sewer level




or depth monitors located in the field, communicating to a central computer via telemetry and leased telephone lines. Information is transmitted continuously to the central station from twelve rain gauges and 17 sewer level monitors.

The sewer level monitors are enclosed in cabinets and pole-mounted at grade. A small diameter air line is installed in the sewer for depth measurement with a pressure transducer in the cabinet. The monitors are movable and are being used to gather data from about 40 different locations in the sewer system.


A permanent data acquisition system has been designed to monitor pollution load in the Southerly District. This system will include about 35 sewer level monitors, four pumping station monitors and a more powerful computer capable of operating the entire overflow pollution control system.

Cleveland Regional Sewer District


LEGEND




Wastewater Treatment Center




Pump Station




Holding Tank



Easterly District




Westerly District

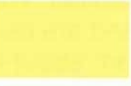


Southerly District


Future Service Areas




Northwest Interceptor




Southwest Interceptor



Cuyahoga Valley Interceptor



Southeast Interceptor



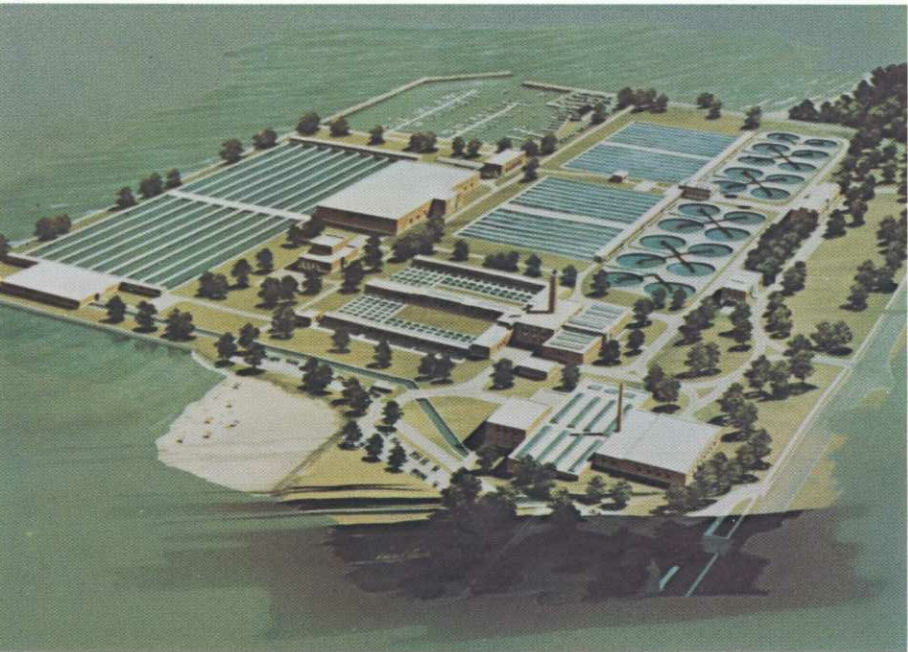
Heights Suburban Interceptor

This map illustrates the service areas and infrastructure of the Cleveland Regional Sewer District. The map is divided into several color-coded regions: Northwest Interceptor (blue), Southwest Interceptor (yellow), Cuyahoga Valley Interceptor (green), Southeast Interceptor (pink), and Heights Suburban Interceptor (orange). These areas are further subdivided into districts: Easterly (cross-hatched), Westerly (dotted), and Southerly (diagonal lines). The map also shows the locations of Wastewater Treatment Centers (large black rectangles), Pump Stations (small black rectangles), and Holding Tanks (small black circles). A compass rose is located in the upper left quadrant. The map includes labels for various municipalities and townships, such as Avon Lake, Bay Village, Rocky River, Lakewood, CLEVELAND, Newburgh Hts., Garfield Hts., North Randall, Bedford Hts., Solon, and many others. The map also shows the locations of various interceptors and the surrounding areas of Lorain, Cuyahoga, and Summit counties.

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Easterly Wastewater Treatment Center



The Easterly Wastewater Treatment Center is located at East 140 Street off Lakeshore Boulevard, and serves approximately 540,000 people. The present gross service area is about 41,000 acres. Of this gross total, 16,000 acres are inside the City of Cleveland and the remaining 25,000 acres are in fifteen suburban communities.

The Easterly Plant was designed as an activated sludge secondary treatment plant during the early 1930's, and was completed and placed in service in 1938. It was designed for an average daily flow of 123 million gallons per day, and for peak flows of 307 million gallons per day through primary treatment and 184 million gallons per day through secondary treatment. Easterly is operated by a staff of 70

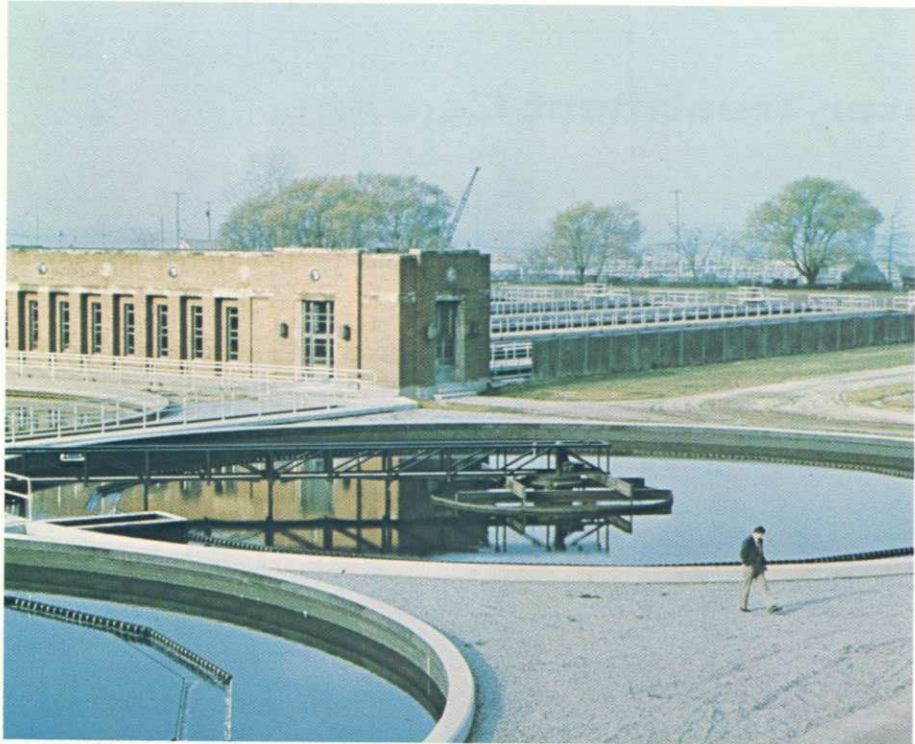
employees. The several treatment components include coarse bar screens and comminutors, detritus tanks for grit removal, pre-aeration tanks to assist oil and grease separation, primary settling tanks for removal of suspended and floating material, aeration and final settling tanks with air blower and diffuser equipment for secondary treatment, and chlorination facilities for disinfection of the effluent before discharge into Lake Erie. The sludges resulting from treatment are pumped thirteen miles through force main to the Southerly Center for processing and disposal, and the grit is sluiced to a lagoon on the Easterly site.

By 1966, the average daily sewage flows to Easterly had reached the full design capacity of the plant. The Easterly Plant had always accom-

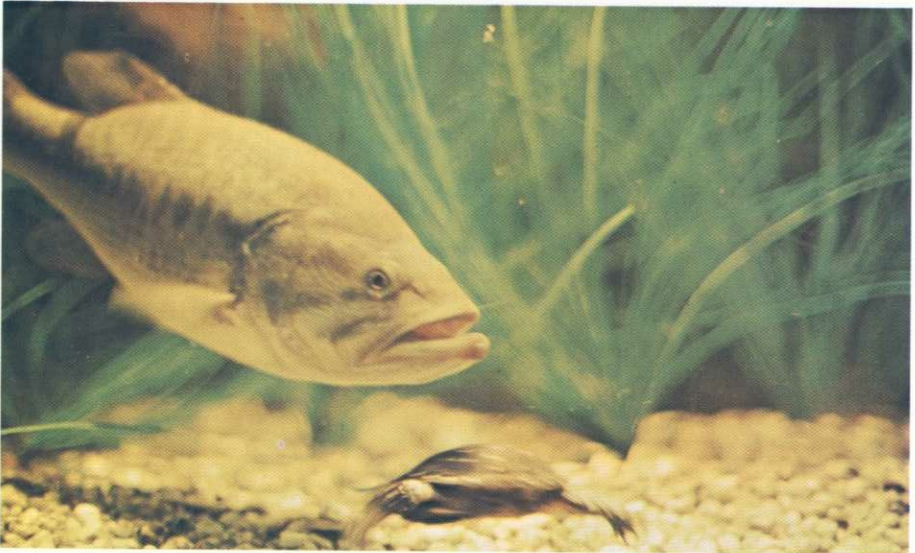
plished a high degree of treatment, and a report recommended that the same processes be continued, with provision for increased operating flexibility in the activated sludge process. It was recommended that design average flow be increased to 170 million gallons per day, and that the hydraulic capacities through primary and secondary treatment be increased to 380 million gallons per day.

In the light of recent emphasis on water pollution abatement, the District has undertaken a comprehensive program to extend its sewerage district boundaries for increased regional service, to provide treatment of combined sewer overflows, and to increase the degree of pollution removal at all of its wastewater treatment centers.

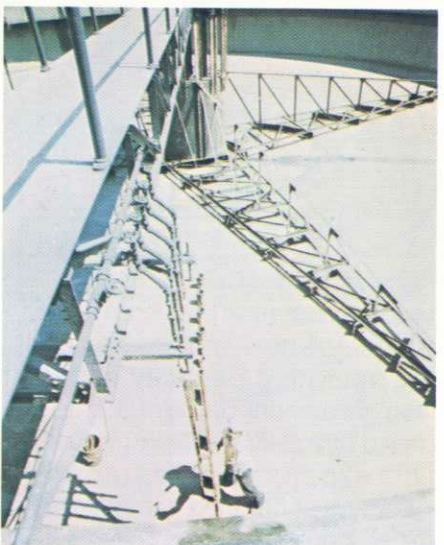
The Easterly Treatment Center is presently treating 120 million gallons of sewage per day. An expansion of the primary and secondary structures was recently completed and a \$13 million headworks modification is now underway. A pilot plant for advanced wastewater treatment is expected to be put into operation this year. From this pilot plant, data will be derived for the design of the Advanced Wastewater Treatment (AWT) system to further treat the wastewater before discharge into Lake Erie. Construction of the AWT system is expected to begin about 1976 and take approximately two years to complete. In the meantime, various modifications to the plant will be under construction.



Final settling tanks



New comminutor building

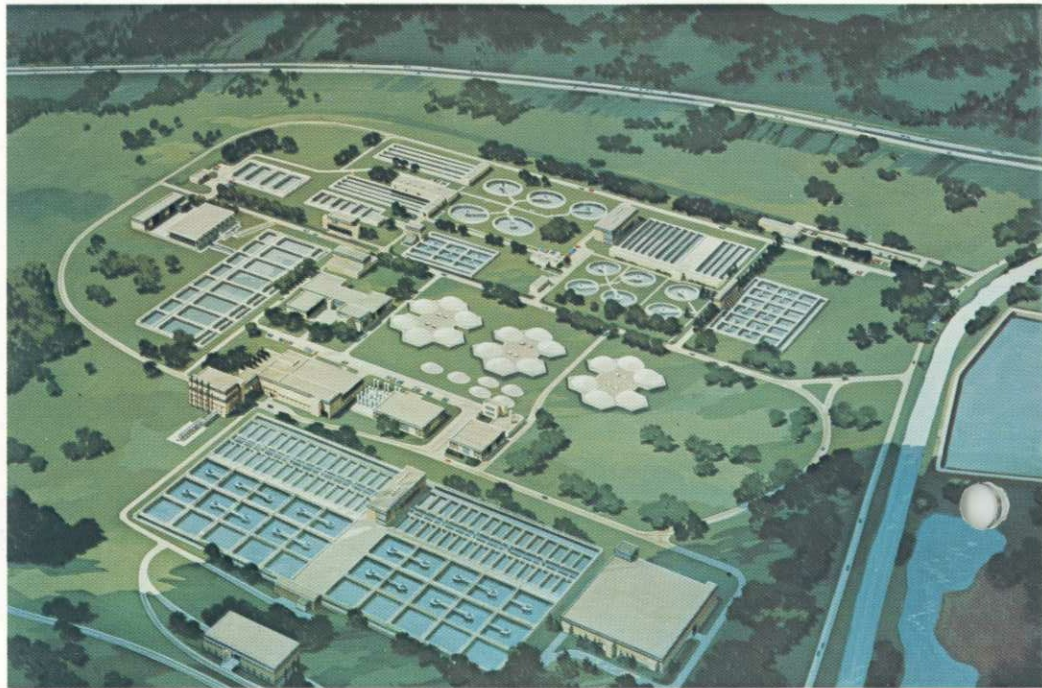


Empty final settling tank



Sludge incinerator control

Southerly Wastewater Treatment Center



The Southerly Treatment Plant, in Cuyahoga Heights, was placed in operation in 1927. The plant presently serves over 61,000 acres with a population of 550,000. This includes the southern portion of Cleveland and eighteen suburbs.

The Southerly Treatment Center is the largest of the three treatment plants in the District, with the expectation that the impending expansion will result in its becoming the largest plant of its kind in the country. This center is the most modern of the three treatment plants, with facilities to provide biological, activated-sludge-type secondary treatment to combined sanitary and storm water flows.

The major facilities at the center include provision for grit removal,

primary tanks for the removal of suspended solids, and a secondary treatment system consisting of aeration tanks and final clarifiers. The solids that have settled in the primary tanks and those produced in the secondary treatment system are removed to a solids treatment process where, after mixing with the solids from the Easterly Plant, they are anaerobically digested, dewatered and incinerated.

The plant receives flow from three major interceptors and has an optimum operating capacity of 115 million gallons per day. Southerly is operated by a staff of 140 employees.

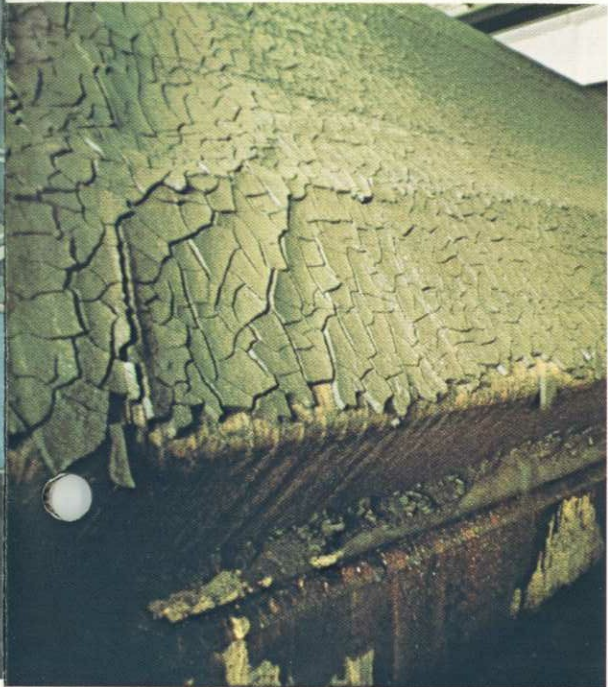
The expansion program at Southerly is scheduled to begin this year and continue for approximately four years. The program will consist

of expanding and upgrading the present facilities to a 200 million gallons per day advanced wastewater treatment system employing two-stage biological treatment followed by effluent filtration and disinfection. Peak wet-weather flow anticipated to reach the facility after completion of new interceptors will be 735 million gallons per day.

The expansion program for the Southerly Plant will cost \$180 million over the next four-year period. This expansion program and programs like it will mean less pollution in lakes and streams and will make local water areas safer for residents to swim, boat and fish in.



Aeration tank blower motors



Sludge vacuum filter cake



In-center maintenance



Final settling tank

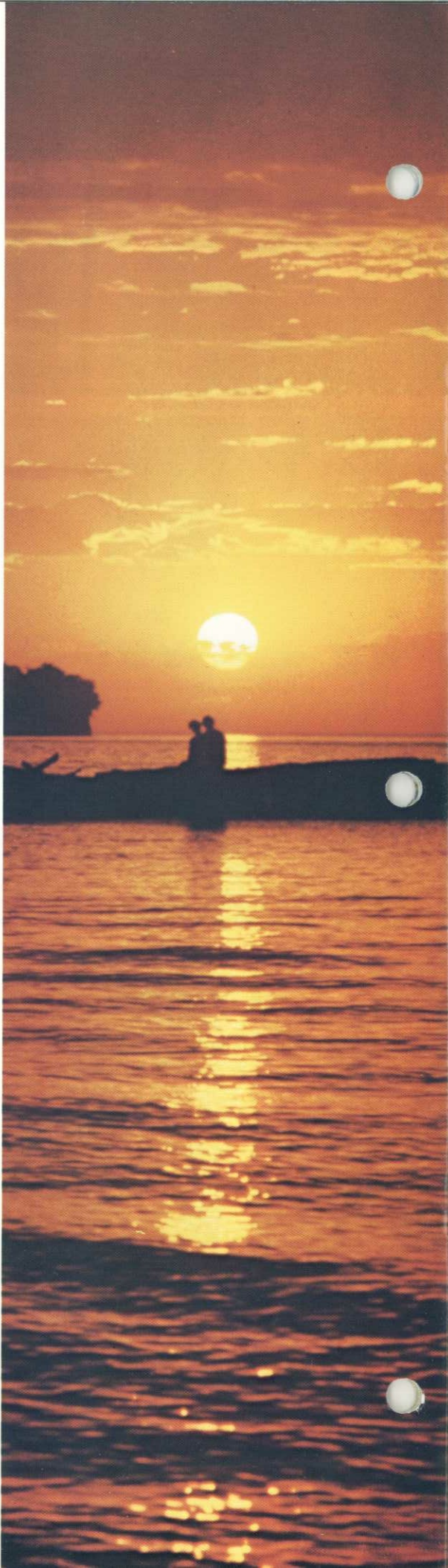
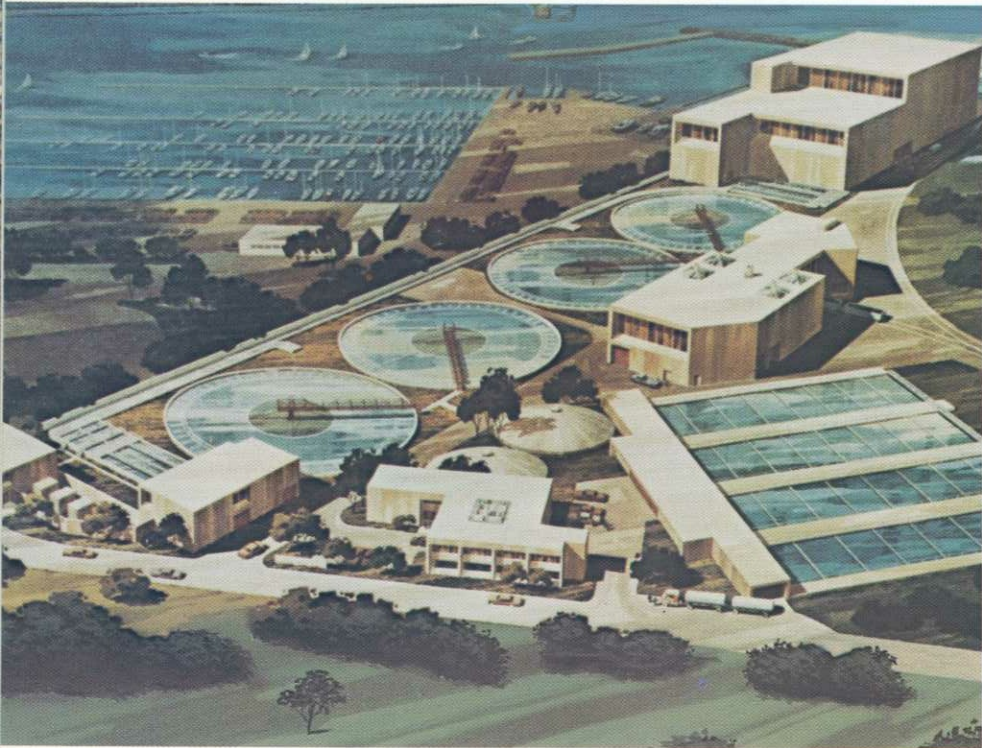
Westerly Wastewater Treatment Center

With emphasis on the protection of Lake Erie, the Cleveland Regional Sewer District broke ground in April, 1974, for the new \$78 million facility to be built on the Westerly site. The Westerly Treatment Center when completed will be the largest physical-chemical treatment center in the world. Upon completion, the Center will provide advanced waste treatment to an average flow of 50 million gallons per day. This project will aid in abating pollution in the Edgewater Park beach waters, and result in making the area safe for water-based recreation again.

The Westerly Wastewater Treatment Center is located on the northwest side of the City of Cleveland on the shore of Lake Erie near Edgewater

Park. The present service area of the Westerly Center is 9,400 acres, with a population of about 161,000 people on the west side of Cleveland and several suburban communities. Westerly is operated by a staff of 50 employees. The plant was built in 1922 with moderate improvements undertaken periodically to meet standards established by regulatory agencies.

The present center consists of bar screens, grit removal facilities, pre-aeration tanks, primary sedimentation in imhoff tanks, anaerobic sludge digestion, sludge dewatering, incineration and disinfection. The present facilities utilize chemical precipitation to increase treatment efficiencies.



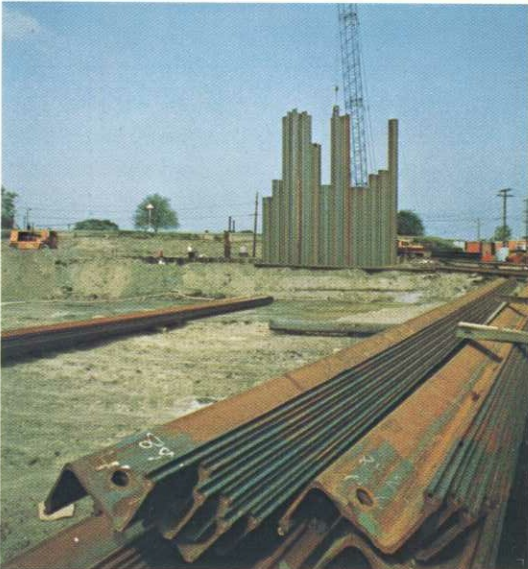
Sludge digestors



Grit tank



Pipe gallery



Industrial Wastes



The Cleveland Regional Sewer District's Industrial Waste Section is responsible for assessing, sampling and evaluating wastewater discharges into the sewers, rivers, streams and lake by industrial and residential customers.

Since charges are based on meter readings in MCF (measurement per thousand feet), the costs of treating pollutants can best be handled if they are apportioned to the water usage. This can be done if the amount of pollutants from a user is divided by the amount of water being used.

All of the materials that arrive at a treatment center receive exactly the same treatment, at the same cost per



unit, and it is impossible to determine the origins of the material. In other words a gallon of water from a domestic user receives the same treatment as the industrial users and the cost for handling them is the same.

The Industrial Waste Section makes recommendations to companies to resolve any problem that the company may be experiencing in its facility sewer, in order that it may discharge waste and wastewater in the District sewer system. If improper use of the sewer is being employed by a company, the Section will advise the company and take affirmative action.

The Section also traces illegal and excessive dumping of chemicals and solids into the sewer system which will be detrimental to the process of extraction of chemicals or solid products by treatment facilities in order to protect our lake, rivers and streams. The Section investigates septic tanks and scavenger waste that is hauled to our plants for treatment or dumped in our sewers by private and industrial users. It acts as a clearing-house for complaints on sewer charges, odors from sewers, or questions concerning acceptable waste and maintenance and design of private and industrial sewer systems.



New Construction



The District has over \$60 million worth of construction underway and \$500 million worth proposed over the next five years.

Bonnieview Pump Station

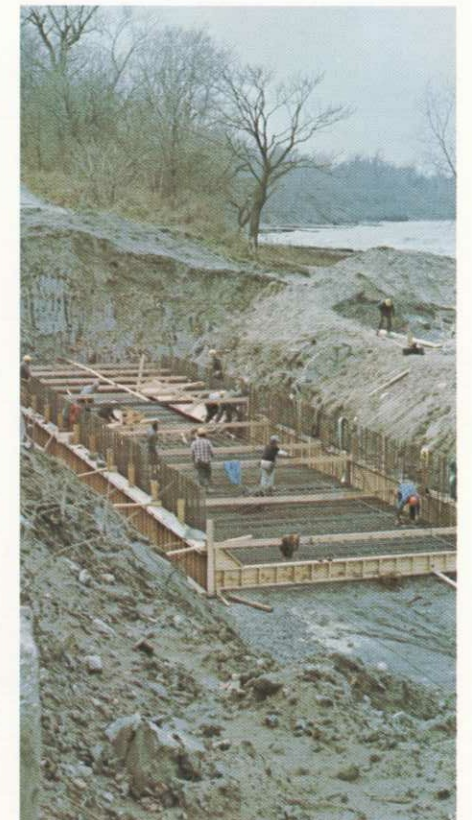
Construction began on the Bonnieview Pump Station in late 1973 and is to be completed by the end of 1974. The improvements include the replacement of pumps at Wilson Mills and Beech Hill and the addition of a 1.2 million gallon holding tank at Bonnieview. These additions will function to store storm water during



heavy rains and pump it back into the system during dry periods. The cost of these improvements is \$1.1 million.

Northwest Interceptor

The Northwest Interceptor is now under construction by the District. This is a relief sewer for combined sewer overflows which discharge into Lake Erie, along the lake shore from the Westerly Treatment Plant to Lakewood. Construction is to be completed in 1976. This is a \$23.4 million project.



Future projects proposed

Heights Suburban Interceptor

Construction of the Heights Interceptor sewer is scheduled to begin early in 1975. With a price tag of approximately \$20 million, the interceptor will serve an area of 33,000 acres with a peak population of 322,000. The interceptor service area will extend southward to the Southerly District and eastward to the Chagrin River valley. The interceptor will function as an express sewer to deliver separate sewage (no storm runoff) on a priority basis to the Easterly Treatment Center. The integrity of the function will be maintained by the use of meters at each of the influent points of the interceptor.

Cuyahoga Valley Interceptor

Construction of the Cuyahoga Valley

Interceptor is expected to start sometime in 1974. The sewer will be built in three phases. The first phase will extend to Brecksville, the second phase will continue on from Brecksville south to Hudson and Richfield Township, and the third phase will extend westward to Bedford Heights and down to Streetsboro. The sewer is designed to serve a population of 580,000 in a 200,000 acre area. The cost of the first two phases of the interceptor is expected to be in the range of \$35 million. The cost for the third phase has not yet been estimated.

Southeast Interceptor

Construction on the Southeast Suburban Interceptor is expected to begin in early 1975 and extend over a period of approximately a year and a half. The interceptor will serve

an area of 18,500 acres with a projected population of 253,000. The fundamental purpose of the interceptor is to reduce pollutant discharge to Mill Creek and the Cuyahoga River. The interceptor will serve the areas bordered by Warrensville Heights on the east and Garfield Heights on the west, and will cost approximately \$12 million.

Southwest Interceptor

The proposed Southwest Interceptor will service the southwest suburban communities. At this point, the extent of the area which will be served by the interceptor has not been determined. Consequently, the cost of the interceptor cannot be predicted. The interceptor will probably go under construction in 1976, once a decision has been made as to its ultimate service area.

Director's Message



Andrew T. Ungar
Director, Cleveland Regional Sewer District

We of the Cleveland Regional Sewer District are proud of our accomplishments of the past two and one half years. As we look to the future we can see that our ultimate hope of controlling the pollution of our waters is a realistic goal and will be met.

Despite our successes in surveying the system to identify problem areas and project future needs, possibly our most single important accomplishment was establishing viable liaison with the municipalities and other government entities involved. Lacking this kind of public support, the end results of the Cleveland Regional Sewer District would be unattainable.

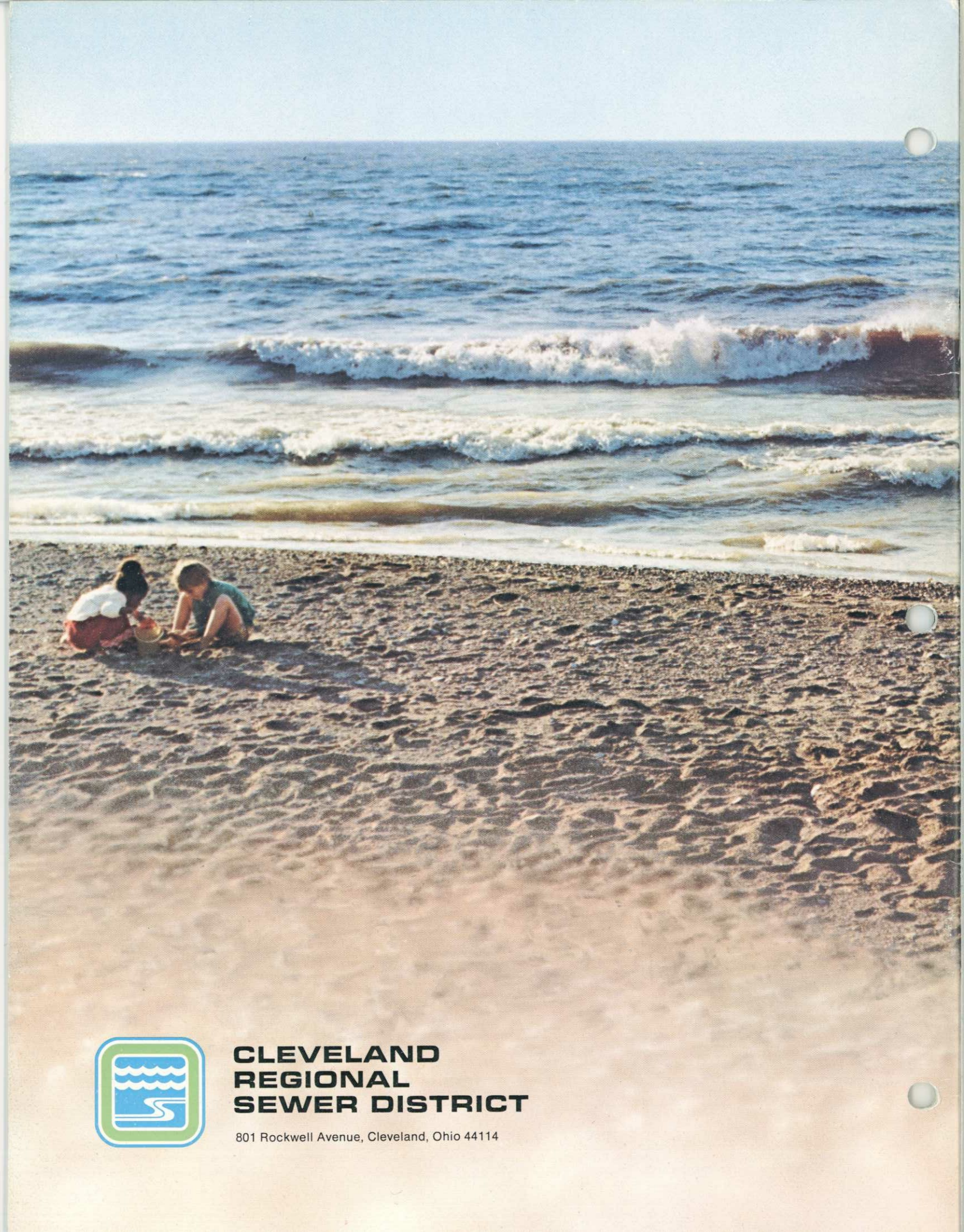
This report to the public has

detailed the solid progress made in actual physical construction of the system of the future. This is, however, only half of the picture.

We have been fortunate in assembling a talented team of dedicated professionals and scores of men and women at our treatment centers who transform theory into action. They make things happen. They are the force responsible for making our area a healthier place in which to live, work and play.

Our thanks to them and to our Board of Trustees, to our staff and the many government officials who have assisted our effort. Together we will achieve reality of a vision and find our hope a dream come true.





**CLEVELAND
REGIONAL
SEWER DISTRICT**

801 Rockwell Avenue, Cleveland, Ohio 44114