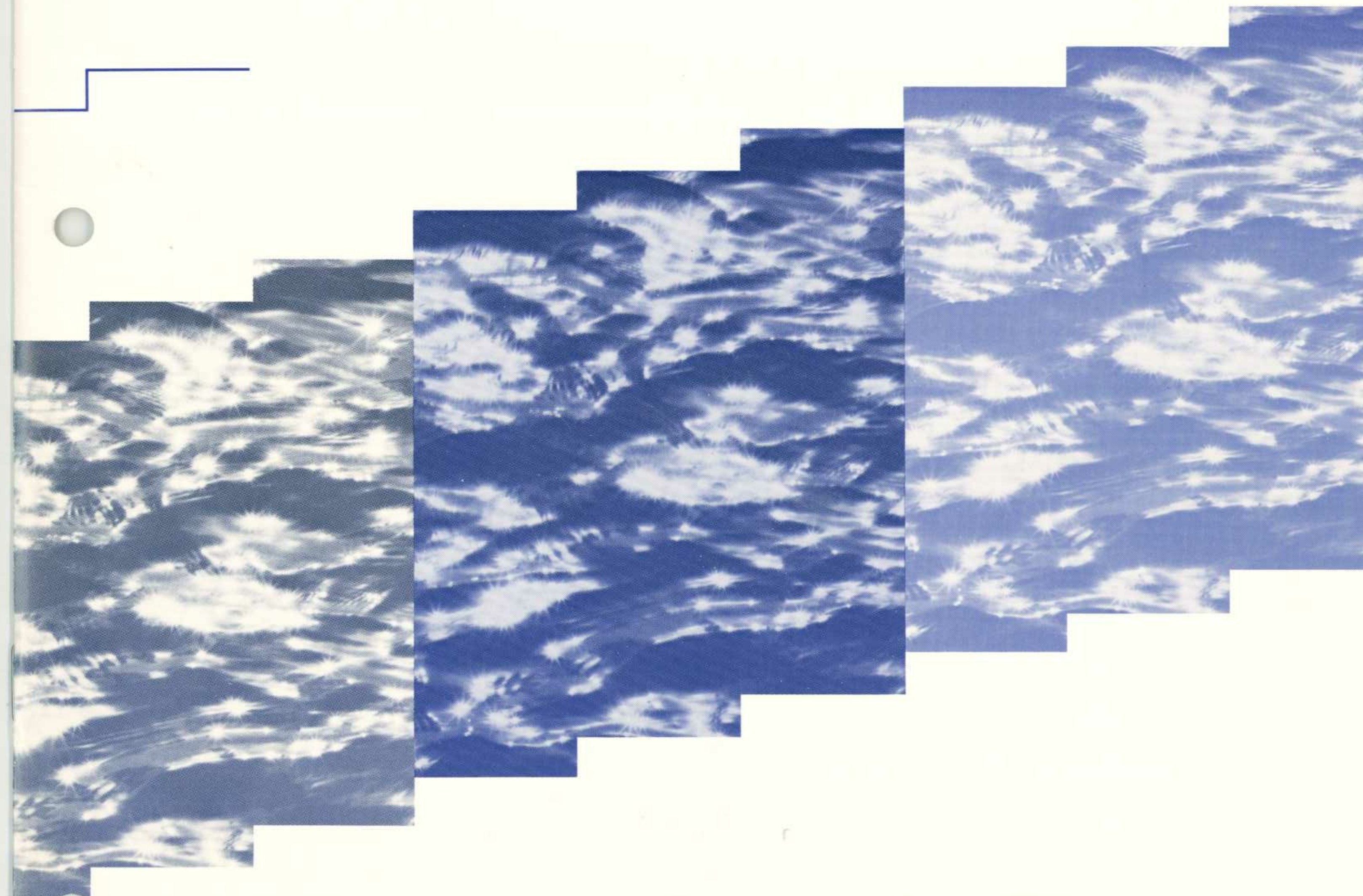
NORTHEAST OHIO REGIONAL SEWER DISTRICT

1987 ANNUAL REPORT



About the Northeast Ohio Regional Sewer District

The Northeast Ohio Regional Sewer District (the District) is an independent political subdivision of the State of Ohio. Originally named the Cleveland Regional Sewer District, it was created in 1972 for the purpose of assuming the operation and management of certain wastewater collection, treatment and disposal facilities serving the Cleveland Metropolitan area. Prior to 1972, these facilities were owned by the City of Cleveland.

The District provides wastewater treatment and interceptor sewer facilities to the City of Cleveland and 41 surrounding communities. This service area encompasses 260 square miles and has a population in excess of one million.

The system operated by the District includes three major wastewater treatment plants (Southerly, Westerly and Easterly), two smaller community plants (Berea and Strongsville "A") that will be abandoned when interceptor sewers now being constructed are completed, a network of interceptor sewers (large regional sewers that convey wastewater directly to one of the District's plants), and other associated water pollution control facilities located throughout the service area.

Lois M. Epstein, Editor
1987 Annual Report
Northeast Ohio Regional Sewer District

1987 BOARD OF TRUSTEES

William J. Reidy
Vice President

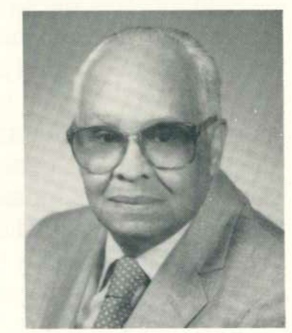
Mr. Reidy was appointed to the Board by the Mayor of Cleveland in January of 1983.

John Petruska
President

Mr.Petruska was appointed by the Suburban Council of Governments in March of 1975. He retired March 1, 1988.

Ronald D. Sulik
Secretary

Newburgh Heights Mayor Sulik was appointed by the Suburban Council of Governments in January of 1985.



Harry Alexander

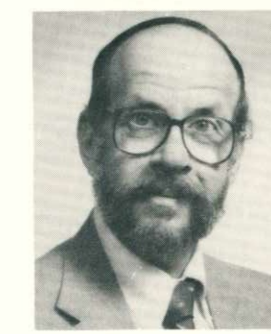
Mr. Alexander was appointed by the Mayor of Cleveland in March of 1987.

Rosemarie F. DeJohn

Mrs. DeJohn was appointed by the Cuyahoga County Commissioners in March of 1987.

Lester C. Ehrhardt

Mr. Ehrhardt was appointed by the Suburban Council of Governments in February of 1984.



Edward H. Richard

Mr. Richard was appointed by the Mayor of Cleveland in March of 1984.

Anthony C. Amato

Mr. Amato was appointed by the Mayor of Cleveland in 1980. He retired from the Board on March 1, 1987.

Edward J. Rawlins

Mr. Rawlins was appointed by the Cuyahoga County Commissioners in March of 1983. He retired on March 1, 1987.

CAPITAL IMPROVEMENT PROJECTS

History and Construction Progress of Interceptor Sewer Program

Beneath the streets of our cities lies a vast network of pipes, cables and tunnels. This network carries into the cities the necessities of daily life — water, gas, telephone, electricity — and carries out the used water and wastes from homes, businesses and industries. Out of sight and out of mind, these conveyances neither generate nor demand public attention, that is, until there is a malfunction.

Back in the 1960s, the residents of Cleveland's southwest and eastern suburbs began to take notice of their sanitary sewers. There were incidences of sewer backups and overflows and these, in turn, caused concerns about property damage and public health and worries about pollution of the area's waterways. However, due to a lack of sufficient funds and institutional mechanisms to address the problem, no action was taken at that time.
But through the court order establishing the Cleveland Regional Sewer District on July 18, 1972, such a mechanism came into existence. (The agency was renamed the Northeast Ohio Regional Sewer District in 1979 to be more reflective of the area served.)

The court order issued by Judge George J. McMonagle of the Cuyahoga County Court of Common Pleas stated that among the responsibilities to be assumed by the new agency was the "presently planned interceptor sewer facilities...the Northwest Interceptor, the Cuyahoga Valley Interceptor, the Southwest Interceptor and the Heights and Hilltop Interceptors."

Among the first goals of the new organization was the construction of the Northwest Interceptor (NWI) and the Cuyahoga Valley Interceptor (CVI). Work on the eight-mile long, $24 million NWI began in 1973. It was put into service in 1983 upon completion of the Combined Sewer Overflow Treatment Facility at the Westerly Wastewater Treatment Plant. Construction of the $71 million CVI began in 1977 and was essentially completed in 1984.

Federal funding for the first contracts of the other two large interceptor sewers was authorized in 1984 and construction of both began the following year.

Heights/Hilltop Interceptor Undergoes Required Changes

The purpose of the $196 million Heights/Hilltop Interceptor is to solve water pollution problems caused by inadequate sewer capacity in the eastern suburbs and sections of Cleveland. Approximately 252,000 residents in all or parts of the following communities will be served: Beachwood, Cleveland, Cleveland Heights, East Cleveland, Gates Mills, Highland Heights, Mayfield Village, Richmond Heights, South Euclid, Shaker Heights and University Heights. The project is divided into thirteen contracts.

In April of 1986, Region 5 of the U.S. EPA announced that it would prepare an Environmental Impact Statement (EIS) for the Hilltop portion of the interceptor. The specific issue was whether the Hilltop portion of the interceptor should be constructed as a gravity sewer, or, instead, a system implemented that combines gravity sewers with pump stations and force mains.

In September of 1986, the District formed the Hilltop Area Public Advisory Committee (HAPAC). This group met monthly to review planning information. The HAPAC and the District commented, independently, on the Draft EIS at a public hearing on August 12, 1987.

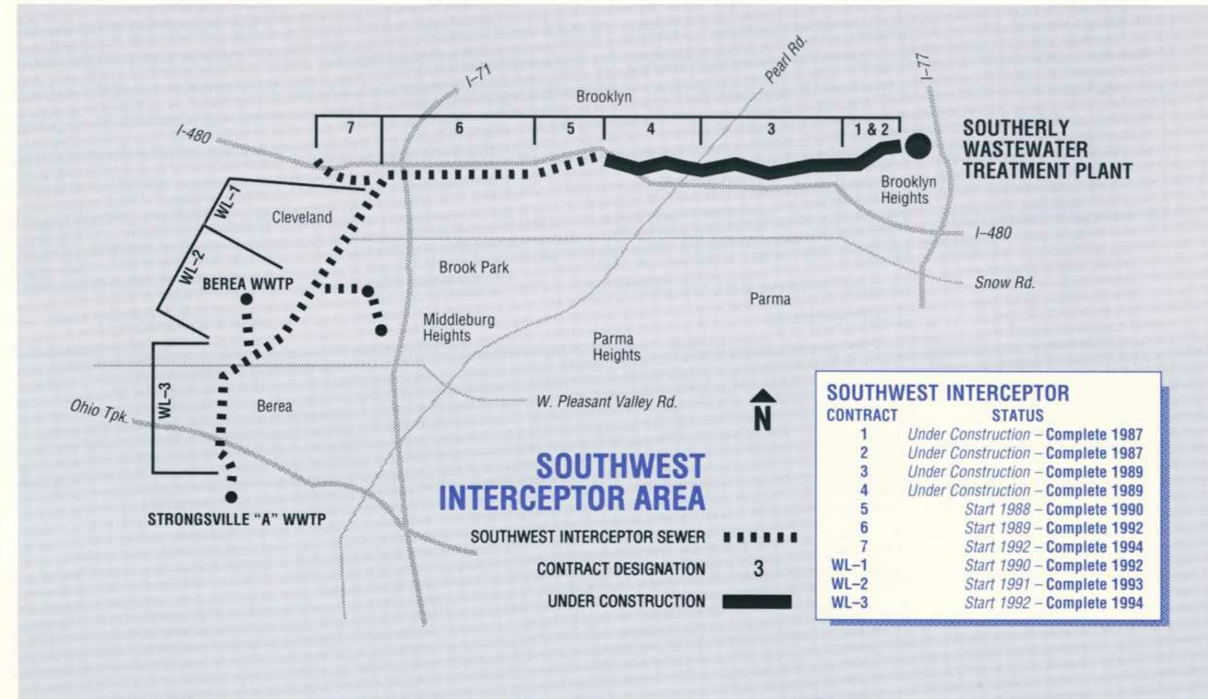
The draft EIS recommended a compromise between the gravity plan and the pumping plan. It stated that the Wilson Mills pumping station should be eliminated by a gravity interceptor, but that the Beech Hill/Bonnieview pumping system should be upgraded. It also called for pumping stations and force mains to be used to provide service to the communities of Mayfield Village, Highland Heights and Richmond Heights. (The final EIS will be published early in 1988.)

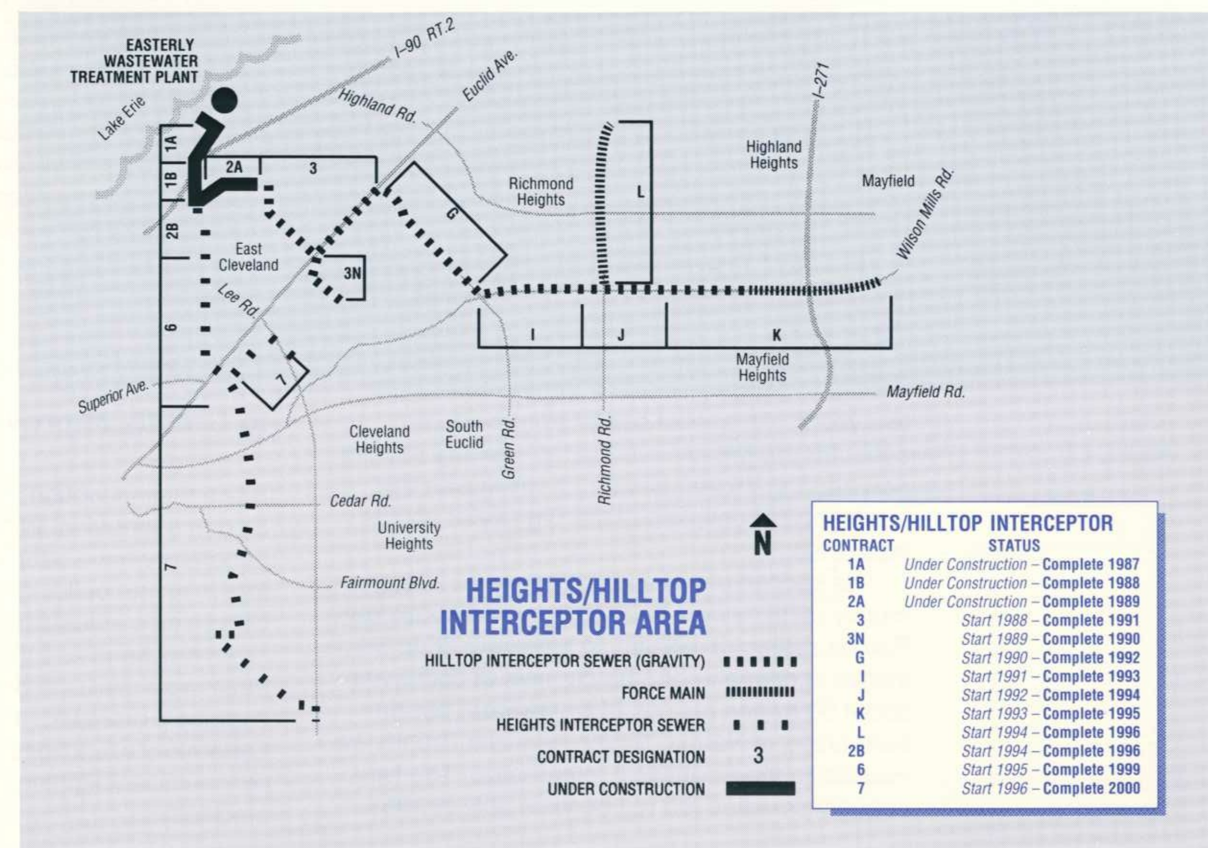
Southwest Interceptor Progresses on Schedule

Approximately 284,000 residents of Cleveland's southwest suburbs will reap the benefits of the $154 million Southwest Interceptor when it is completed in 1994. All or part of the following communities will be served: Broadview Heights, Brooklyn, Brooklyn Heights, Brook Park, Cleveland, Cuyahoga Heights, North Royalton, Parma, Parma Heights, Riveredge Township, Seven Hills, Middleburg Heights, Berea and Strongsville.

The project is divided into two main sections — the 10.25-mile-long Main Leg and the 5.74-mile-long West Leg. The Main Leg is composed of seven major contracts which are bid on a yearly basis. The West Leg is composed of three contracts. The majority of the 66 to 114–inch–diameter interceptor is being tunnelled.

Construction progress of the Heights/Hilltop and Southwest Interceptors is shown on the following maps.





Intercommunity Relief Sewers Improve Waterway Protection

The District's interceptor sewers are designed to convey wastewater from communities directly to one of the District's newly renovated wastewater treatment plants. These plants have the capacity and technology to provide effective and efficient treatment that will help protect the area's waterways from pollution. But for the interceptor sewers to be effective, the community sewers connected to them must have adequate capacity and be in sound condition. If that is not the case, environmental pollution can occur before the wastewater ever reaches the interceptors.

To determine how best to solve these problems, Sewer System Evaluation Studies were undertaken for the areas to be served by the Southwest and Heights/Hilltop Interceptors. The completed studies recommended new sewers and sewer rehabilitation. The District has accepted the responsibility to construct the new large relief sewers that will cross community boundaries. These sewers are called intercommunity relief sewers.

Scheduled for completion in 1999, the entire program is estimated to cost $115 million. While required by the federal government, none of the work is expected to be federally funded.

Design work for the first and largest project in the program was completed during 1987. The Pearl Road Relief Sewer will be four miles long, range in size from 60 to 66 inches in diameter, and will be constructed in a tunnel 60 to 80 feet below the ground. It will be capable of conveying over 100 million gallons of wastewater flow per day from areas of Middleburg Heights, Parma and Parma Heights directly to the Southwest Interceptor. Construction is projected to begin in August of 1988, with completion in two years. This relief sewer will provide an outlet for the greatly overloaded sanitary sewers now serving 75,000 people. It will lessen the incidences of pollution of the Big Creek and its tributaries.

The second of the approximately 50 intercommunity relief sewers to be built is the Broadview-Ravine sewer. It will vary in size from 36 to 60 inches in diameter and be capable of conveying about 50 million gallons of wastewater per day from areas of Parma, Seven Hills and Broadview Heights to the Southwest Interceptor. The two-year construction job will begin in July of 1989.

District Engineers Ease Transition Period at Southerly

After seriously lagging behind schedule, the prime contractor on a $44 million construction project at Southerly defaulted and walked off the job in February of 1986.

When the contractor defaulted, his bonding company assumed responsibility for seeing that the project was completed. District engineers worked with the company to map out the remaining scope of work. The bonding company then hired a new contractor to pick up where the other one had left off.

During the transition period, the District worked closely with the new contractor to help determine the exact status of all elements of the project.

The work resumed during 1986. During 1987, the construction of the first stage aeration tanks was completed and brought on line. Flow was diverted into these tanks for the first time on November 2, 1987. This action represented the first operational step in converting Southerly from a single-stage biological process to a two-stage process. (The first stage breaks down organic materials. The second stage is a totally separate unit process designed and optimized to treat ammonia and organic nitrogen.)

In December, 10 newly-renovated primary tanks were placed into operation. The last major contract , consisting of miscellaneous improvements, is scheduled to get underway during 1988 and will cost $7.2 million.

Upon the completion of Southerly, the District will have invested nearly $322 million in this plant which is the largest of all the District's facilities.

Two New Buildings Expected to Greatly Improve Efficiency

Since their inception in 1974, Sewer Control Systems, Industrial Waste and the Central Laboratory have been located in leased quarters in an old building on Broadway Avenue in Cleveland's industrial "Flats" area.

As functions and the number of personnel have increased, the offices have become extremely cramped. In addition, the Laboratory's functions have become hampered by insufficient lighting, air handling and electricity.

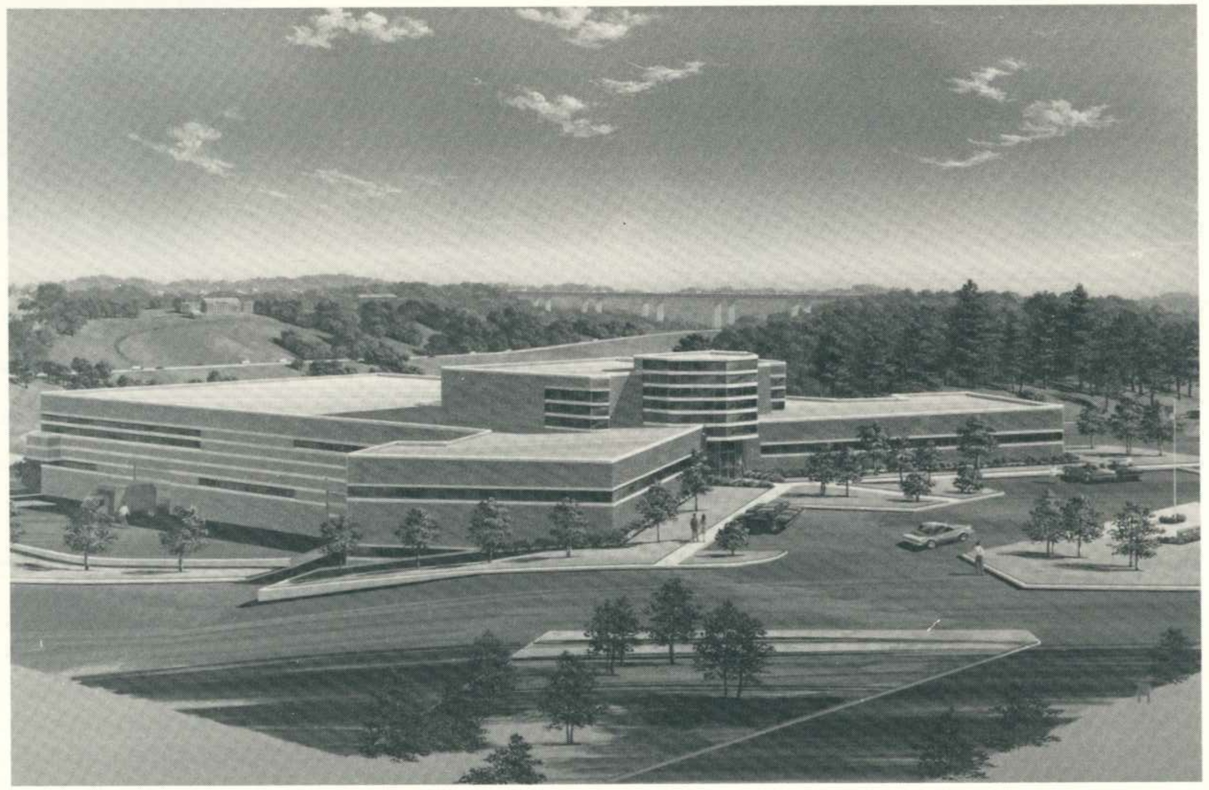
The maintenance of the District's fleet of vehicles and trucks has been taking place at the Southerly Plant, in an area originally intended to be used for servicing only Southerly's vehicles. With no other space available it became the location for all vehicle maintenance activities.

To increase efficiency and allow room for expansion, the District's Board of Trustees authorized consolidating all of these functions in one location. They subsequently approved the construction of two new buildings to be located on District property adjacent to the Southerly Plant. Design work for the buildings was completed in 1987.

Industrial Waste, Sewer Control Systems and the Central Laboratory will be housed in a building to be known as the Operations Center. This building will have a total of 91,874 square feet as compared with the current 37,630 square feet now available. There will be 35,200 square feet of office space, 19,500 square feet for the laboratory and 41,700 square feet for the garage and stockroom.

The one and one half story Vehicle Maintenance Building will have a floor area of 18,400 square feet as compared with the 9,000 square feet now dedicated to that function.

Groundbreaking will take place in the summer of 1988 with completion scheduled for December of 1989. The engineering estimate for construction is $14 million.



The District's new Operations Center is expected to be completed late in 1989.

Contractor Tunnels Through Ice Ring

Nearly every day, 120 freight trains thunder across a section of track near East 136th and Aspinwall Avenue in the City of Cleveland. This is part of Conrail's main line between Chicago and Buffalo.

Yet this was the very area where the second contract of the Heights/Hilltop Interceptor sewer was to be tunneled, only 12 feet beneath the surface.

The District needed to ensure that the task could be undertaken and completed without endangering the construction workers, the trains, their crews, and the tracks, and, with no disruption in rail service.

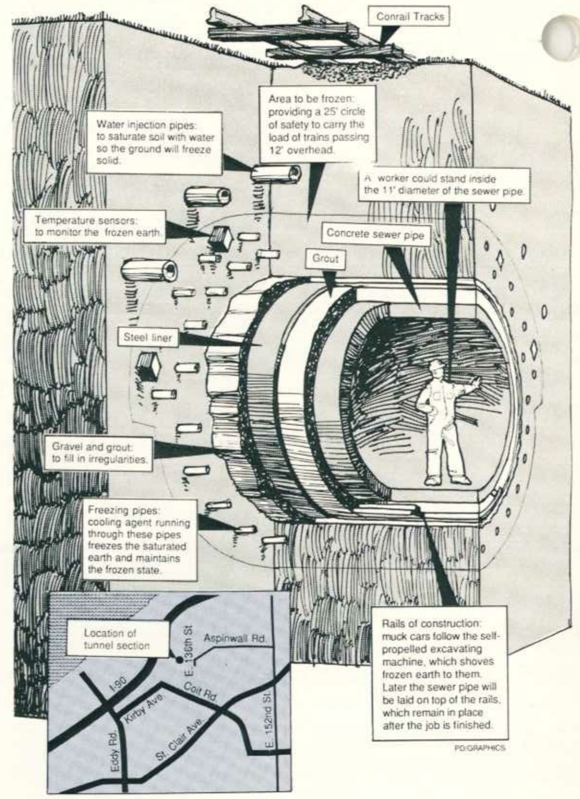
To the layman, the task seems almost irresolvable. But the engineering experts had the solution. The tunnel would be mined through a ring of ice. This would be accomplished using the so-called "Poetsch Process," a method that is well-proven but seldom-used in this part of the country. The technique provides temporary ground support and groundwater control during the course of the mining.

PROBLEM SOLVING

The prime contractor for this section of the interceptor subcontracted out the ground freezing project to a specialist. And, peculiar as it may seem, in August, on one of the most scorching days of the summer, the work began.

The assignment was to freeze the ground in an ice ring, 25 feet in diameter and 140 feet long. The ring would completely surround the tunnel excavation. To construct the frozen earth structure, approximately 32 refrigeration pipes, 3.5 inches in outside diameter were installed horizontally every 3 to 3 1/2 feet around two concentric circles, 19.5 feet and 21.5 feet in diameter. The pipes contained calcium chloride brine. Water was then injected into the soil to be frozen.

The continuously cooling pipes were operated by a self-contained refrigeration plant that consisted of a compressor-condenser-chiller system located in a trailer near the tunnel entrance. During operation of the refrigeration plant, the ground and coolant temperatures were monitored by sensors.



To protect workers putting in a 140-foot-long, 11-foot diameter section of sewer line directly beneath active railroad tracks, a 25-foot diameter cylinder of earth surrounding the sewer line was saturated with water and then frozen.

The entire operation proceeded and was completed successfully and safely.

Contract 1B, of which the ground freezing was one section, is a $3.4 million, three-year-long project. Groundbreaking took place in April of 1986. A total of 10 contracts will complete the $196 million interceptor by May 31, 2000.

Tunnels Clear by Only Three Feet

Forty-six feet underground, a sharp-toothed mechanical monster digs its way through soft ground as it excavates a 114-inch diameter tunnel.

With a clearance of only three feet, it is about to cross an old eight-foot diameter brick interceptor. This pipe, the Big Creek Interceptor (BCI), transports approximately 45 to 50 million gallons of wastewater per day to the Southerly Wastewater Treatment Plant.

Just a nudge of the 50-year-old structure by the 60-ton tunnel mining machine could result in a collapse of the old sewer, devastating pollution of the Cuyahoga River, and, subsequently, an extremely expensive repair project.

This is the problem that confronted the District's engineers during construction of one section of the Southwest Interceptor during 1987.

A conservative approach would have been to hand-excavate the crossing area, a costly and time-consuming process. But the District engineers and the contractor were certain that experience combined with planning and modern technology would permit the use of a tunnel mining machine.

A number of precautions were taken to ensure the safety of the job. First, the workers reinforced and strengthened the inside of the old interceptor with steel liner plates and steel channel rings, for a distance of 100 feet. The void behind the liner plates was grouted to provide continuous contract with the existing brick lining.

The steel supports were then equipped with instrumentation that included 12 strain gauges to monitor stresses and 8 extensometers to monitor diameter deformations. The instrumentation wires were run up a manhole so that instant monitoring could be conducted on the surface.

During the excavation, the instrumentation readings remained within acceptable limits. However, when the tunneling machine was about two feet from the crossing area, small pieces of brick, sandstone and a hardened piece of clay with distinct brick impressions were found on the conveyor belt removing the excavated material from the tunnel. At the same time, a scraping sound was heard. The contractor immediately stopped the mining process.

The monitoring data was carefully checked. There was no evidence of contact. The workers then conducted a visual inspection of the BCI. No evidence of damage was found and the operation continued without further delays or problems.

The brick and sandstone pieces found on the conveyor belt are believed to have been the back fill material wedged behind the tunnel. In the absence of an instrumentation program, their discovery would have called a halt to the mechanical tunneling. Instead, the instrumentation provided a means for monitoring the contractor's performance and a warning system to avoid adverse effects on the BCI.

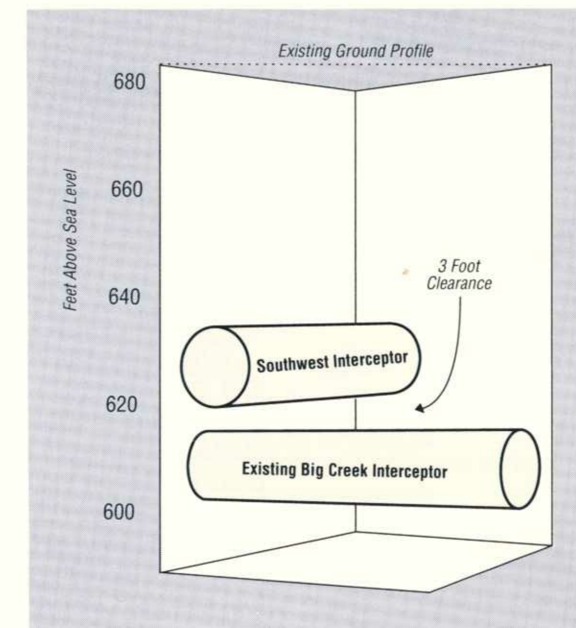


Illustration shows proximity of Southwest Interceptor and the Big Creek Interceptor at the point where they cross.

Westerly Challenges District's Ingenuity

Bringing Westerly, the world's largest physical-chemical municipal wastewater treatment plant, to operations status is proving to be a major challenge.

The physical-chemical process was originally chosen for the new plant because of its adaptability to the small site available. While the processes employed by the plant have been shown to work individually and on a pilot plant scale, the technology remains unproven on a large scale.

Since construction of the plant was completed in 1985, a joint team of the District's engineering and operations specialists have been working together to develop solutions to the problems, which, to date, have hindered the complete operation of the plant.

Take the case of one major problem tackled this year: clogging of the pressure filter system. Pressure filtration follows primary settling of the plant's wastewater and removes fine particles which escape the settling process. To enhance solids removal in the settling stage, the plant was designed for the addition of lime, both to aid settling and remove phosphorus.

When the Operations Department discovered that the pressure filters were clogging, a methodical process to solve the problem was started. To ensure that a lime product was not precipitating on the sand particles, operating personnel began closely controlling the process in a very narrow pH range.

When that did not resolve the problem, attention focused on organics as the possible clogging agent. Full scale process experiments were conducted using a chlorine solution as a cleaning agent. Based upon encouraging results, a prefiltration chlorination process was designed and installed. However, the total solution to the problem eventually involved a complete change from lime to ferric chloride. Apparently, grease, which is soluble at the high pH of lime treatment, was forming on the sand filters after the pH was readjusted to a neutral range. In the end, the change resulted in substantial cost savings. Ferric chloride is less costly than lime, and the waste stream does not require major pH readjustment.

The handling of problems with diffusers in the carbon columns is another example of the District's determined and methodical approach to problem-solving. The problem was noticed when carbon particles were found in the plant effluent. Investigation of the carbon columns disclosed that the internal diffusers, used to backwash the carbon columns, were failing. That was of major concern because of the huge number of diffusers involved. Each of the 30 carbon vessels contains 670 plastic diffusers—for a total of 20,100. The chosen solution was to reinforce the bottom of the diffusers by gluing on plastic washers. Just as this rehabilitation effort got underway, it was discovered that the stainless steel screens, which are part of the diffusers, were corroding. It appears likely that all of the diffusers will have to be replaced.

Through its continuing efforts, the District is hopeful of achieving full process operation of Westerly soon. Process problems must be solved and operational costs reduced before the physical-chemical plant is proven effective for municipal wastewater treatment. Undoubtedly, the Westerly Plant will require the full use of the District's problem-solving capabilities in the future, as it has in the past.

Pictured are some of Westerly's 14 pressure filters that were clogging until the change was made from lime to ferric chloride.

FACILITIES RENOVATION

A Timely Repair Reduces Major Damage

When plant equipment and facilities approach the end of their design life, critical decisions need to be made regarding replacement and rehabilitation. In some cases, replacement is the only answer, but in others, rehabilitation is more cost-effective. Timing is also important in keeping equipment functioning, especially when many processes are dependent on others.

An example of the adage "a stitch in time saves nine," occurred in the fall of 1986 when it was noticed at Easterly that one of the outfall pipes, through which wastewater is discharged to Lake Erie, appeared to have shifted from its normal position. District engineers hired an underwater contractor to inspect the two partially-submerged 440-foot-long pipes. A diver found that not only had the pipes been displaced from their wooden supporting trestles, but also that large holes had been worn through both pipes.

A contractor was quickly hired and the repair initiated. The work consisted of pouring concrete fill around the pipes to seal the holes, driving 415 lineal feet of sheet piling alongside the pipes, and filling the areas between the sheet piling walls and the pipes with crushed stone, to support and reinforce the pipes in lieu of the deteriorating trestles. A 590-foot-long shore protection wall was constructed to further protect the pipes from the action of the waves. The work was completed in December.

Two months later, on February 7, 1987, a violent winter storm came roaring into the Greater Cleveland area. High winds whipped the lake into a frenzy. After the storm abated, the operators of the plant assessed the damage. They found that the high waves had washed away some of the stone fill next to the outfall pipes, and that a new gabion wall (a type of retaining wall) had been damaged, as well as the old breakwater and some plant fencing. But the new shore protection wall and the outfall pipes themselves withstood the onslaught of the waves in perfect condition.

There was no question that had the repair work not been completed just a short time earlier, the outfall pipes would have been totally destroyed. The District's Engineering Department prepared a detailed report on the damage which is scheduled to be rectified before the winter of 1988.

Program to Rehabilitate Interceptor Manholes is Initiated

The District's Sewer Control Systems section is responsible for maintaining the 154 miles of sewers which comprise 16 interceptors.

Many of these interceptors and the brick manholes that access them are more than 40 years old. Over the years, the mortar holding the bricks in place has worn away, bricks have fallen out, and the cast iron manhole frames and covers have cracked and become misaligned. This situation frequently leads to storm water infiltration which, if not corrected, may cause erosion of the pavement base and subsequent collapse of the pavement around the manholes.

In the past, the District has made manhole repairs on an as-required or emergency basis. But a determination was recently made that a more cost-effective and convenient approach would be to initiate a continuing program of inspection, rehabilitation and repair of the manholes, beginning with the more critical areas first.

During 1987, 12 known trouble spots were inspected to determine the extent of the problems and the repairs that would be required. These sites are scheduled to be repaired early in 1988.

Tentative plans are to bid one major repair contract each year for the next four to five years. Each contract will include approximately 15 manhole locations on a given street or in a contiguous area.

Repairing these critical sites before emergencies occur will result in substantial cost savings to the District.

Easterly's Grease Reactor Renovated

A fluidized bed reactor was placed into operation at the Easterly Wastewater Treatment Plant in 1976. The reactor is used to incinerate grease and scum removed from the wastewater at the rate of 1,833 wet pounds per hour.

The reactor functioned well with few problems until April of 1984 when an explosion occurred in the windbox at the bottom of the incinerator. Since the effective life expectancy of this type of equipment is ten years, the engineers decided that the reactor should not be repaired and returned to service. Instead, they determined that the entire system should be rehabilitated. In April of 1986, a contract was awarded for modifications and improvements to the grease handling and disposal facilities. Renovations were made to the following systems: the dissolved air flotation system for concentrating grease and scum; the conveyance system for pumping grease and scum; and the fluidized bed reactor itself, which comprised the majority of the work.

On-site work began in January of 1987, and in June the reactor was restarted for performance testing and debugging. Performance testing of other equipment will be completed during 1988.

Total cost of the grease reactor project is expected to be approximately $1.5 million, all of which will be locally funded.

Temporary Ash Line Halts Constant Ruptures

The underground ash line at Southerly ruptured 11 times between January and September of 1987. There had been isolated ruptures in the nine years since the pipeline was installed, but these continual ruptures were a serious problem.

The 12-inch diameter ash line pipe, made of a chrome alloy, is used to transport the ash, resulting from incinerated sludge, across a distance of 4,500 feet where it is disposed of in lagoons constructed for that purpose.

The ash is pumped through the pipe as a slurry mixed with water. This highly abrasive mixture wore away the bottom of the pipe, causing ruptures at different locations along its length.

These ruptures proved to be very expensive. Each time a section had to be repaired, the cost was $13,000 to $26,000. In addition, with the ash line out of service, the sludge cake had to be hauled to a landfill instead of being used to produce steam for plant processes and heating. This cost the District $9,000 each day the ash line could not be used.

A temporary solution had to be found that would eliminate the problem while permitting continuous service of the ash handling system, until a permanent replacement could be constructed.

In July, the Board of Trustees approved the purchase of materials for a temporary ash line to be constructed on an emergency basis.

In a coordinated effort, the District's Engineering Department designed a partial temporary line; 24 District employees and two supervisors installed 1,850 feet of fiberglass reinforced pipe and rubber hose; and an outside contractor

The temporary ash line leads out of the basement of the Incinerator Building at Southerly. It is laid on railroad ties and secured in place with rubber stra

made the tie-ins to the part of the existing line where no ruptures had occurred. The job was completed in less than four days at a cost of about $160,000. Another section of temporary line will be installed during 1988.

The design of a total replacement line will take place in 1988 with construction and completion during 1989. To ensure that the replacement line will not suffer the same problem as the present one, the District engineers have determined that the new pipe must be capable of being rotated to reduce the amount of abrasion at any one point. Rather than bury the pipe underground, as it is now, the new pipeline will be laid in a concrete trench with a removable cover over it. The pipe will be constructed in 20-foot-long sections, each of which can be rotated by a crew of two or three men using a hoist or crane.

As additional insurance that the integrity of the pipe will be maintained, it will be composed of a different and more abrasion–resistant material. The exterior layer will be steel, the interior basalt, (a hard, dense volcanic rock) and a layer of cement grout will bind the two together.

PREPARING OR THE FUTURE

MIS Enables District to Anticipate Needs

When the last phases of a Management Information System (MIS) are implemented during 1988 and 1989, the District will be greatly aided in its ability to anticipate problems and needs.

The MIS will provide a vehicle for computerized and integrated fixed assets control, inventory control, equipment maintenance management, and financial management functions.

Some of the specific benefits the District will derive from the MIS are: fewer equipment breakdowns, equipment parts will be available when needed, and appropriate maintenance can be pre-scheduled . All of these benefits, in turn, will lead to increased equipment life span.

During 1986, the District engaged three individuals to form a consulting team dedicated exclusively to the design and implementation of the MIS. By using this approach, the District projects a savings of at least 50 percent as compared with the cost of having an outside consulting firm design and implement the project.

Throughout 1987, the District was concerned with the myriad and complex aspects involved in preparing for this system.

Through a cooperative effort between the team and District staff members, fixed asset information was accumulated; a suitable computerized maintenance/materials management system was found; and arrangements were made to procure, through a five-year lease arrangement, an IBM System 38 computer to replace the District's Wang VS80. The Wang VS80 did not have the capacity to handle all applications necessary in the MIS.

During the year, the new computer was installed at the District's Administrative Office, following electrical, telephone and air conditioning modifications to the computer room. All of the District's plants and Sewer Control Systems were linked to the computer via phone lines connected to modems. Thirty-six computer terminals were installed for use at the District's facilities.

A vehicle maintenance system was installed and an inventory of District vehicles, spare parts and supplies was entered into the system. When the MIS is completely operational, the District will have invested in excess of $1.6 million.

Training Programs Improve Effectiveness

Imagine the following scenario: It is 2 a.m. An operator at a wastewater treatment plant is checking a pressure gauge. Suddenly, the quiet is pierced by a blaring horn indicating a problem in the adjoining building. Rushing to the building, the worker pushes open the door and begins looking for the cause of the alarm. But within seconds, he is overcome by fumes and loses consciousness.

If a treatment plant employee does not know or follow proper safety procedures, this imaginary situation could become a reality.

Safety training has always been stressed at the District. Hazardous materials training is an extremely important aspect of the program. It is a joint effort developed and conducted by the District's Training, Operations and Industrial Waste personnel.

Depending on their job classification and responsibilities, employees are trained in emergency procedures, hazard control procedures (including protection and monitoring equipment), chlorine tank hook-up and disconnect procedures, safe confined space entry and containment, and control and clean up of spills.

The improvement and enhancement of management skills is another priority at the District. Since 1983, in-house training has been provided for managerial and professional employees. During 1987, this training stressed District policies and procedures so that managers could learn how to deal with counseling, discipline, grievance and arbitration matters.

Employees who operate and maintain the treatment plants receive training in equipment operation, maintenance and repair. Some of this information is transmitted through videotapes prepared by the District's Training Department.

Other in-house training classes are given in CPR, first aid, eye safety, and the use of self-contained breathing apparatus. Computer training classes are also given.

Throughout the District, at all levels, most of the training is conducted by employees who are experts in their specialities through experience and/or education. During the past year, nearly every District employee participated in one or more of these training classes.

WASTEWATER TREATMENT PLANT CHARACTERISTICS AND 1987 OPERATING HIGHLIGHTS

Westerly Wastewater Treatment Plant

LOCATION
5800 West Memorial Shoreway, Cleveland
TYPE OF PLANT
Primary and Advanced Treatment (Physical/Chemical) and Solids Handling
RESIDENTS SERVED
215,600
NUMBER OF PERSONNEL
108
PLANT DESIGN CAPACITY
50 mgd, dry weather
TOTAL GALLONS OF WASTEWATER TREATED
12.5 billion gallons
TOTAL SLUDGE PROCESSED AND HAULED TO LANDFILL
46,243 wet tons
1987 OPERATING COST
$7,887,763
EFFLUENT DISCHARGE POINT
Lake Erie

Easterly Wastewater Treatment Plant

LOCATION
14021 Lake Shore Boulevard, Cleveland
TYPE OF PLANT
Primary and Secondary Treatment (Activated Sludge, Step Aeration)
RESIDENTS SERVED
540,000
NUMBER OF PERSONNEL
81
PLANT DESIGN CAPACITY
155 mgd, dry weather
TOTAL GALLONS OF WASTEWATER TREATED
49 billion gallons
TOTAL SLUDGE PUMPED TO SOUTHERLY
576 million gallons
1987 OPERATING COST
$3,787,566
EFFLUENT DISCHARGE POINT
Lake Erie

Southerly Wastewater Treatment Plant

LOCATION
6000 Canal Road, Cuyahoga Heights
TYPE OF PLANT
Primary and Secondary Treatment (Two–Stage Activated Sludge) with Effluent Filtration and Solids Handling
RESIDENTS SERVED
605,000
NUMBER OF PERSONNEL
258
PLANT DESIGN CAPACITY
175 mgd, dry weather
TOTAL GALLONS OF WASTEWATER TREATED
43.6 billion gallons
TOTAL SLUDGE FILTER CAKE PROCESSED
*81,030 wet tons **
TOTAL SLUDGE INCINERATED
64,970 wet tons
TOTAL SLUDGE HAULED TO LANDFILL
16.060 wet tons
1987 OPERATING COST
$14,302,026
EFFLUENT DISCHARGE POINT
Cuyahoga River

**Includes 576 million gallons of Easterly sludge; 7,318 tons of sludge cake hauled from Strongsville "A"; and 23,100 tons of liquid sludge hauled from Berea.*

Strongsville "A" Wastewater Treatment Plant

LOCATION
22707 Sprague Road, Strongsville
TYPE OF PLANT
Conventional Activated Sludge with Solids Handling
RESIDENTS SERVED
19,300
NUMBER OF PERSONNEL
6
PLANT DESIGN CAPACITY
2.6 mgd, average
TOTAL GALLONS OF WASTEWATER TREATED
1,080 million gallons
TOTAL SLUDGE FILTER CAKE PROCESSED AND HAULED TO SOUTHERLY
7,318 wet tons
1987 OPERATING COST
$610,556
EFFLUENT DISCHARGE POINT
Blodgett Creek (tributary of Rocky River)

Berea Wastewater Treatment Plant

LOCATION
400 Barret Road, Berea
TYPE OF PLANT
Primary and Secondary Treatment (Contact Stabilization)
RESIDENTS SERVED
23,000
NUMBER OF PERSONNEL
7
PLANT DESIGN CAPACITY
3.0 mgd, average
TOTAL GALLONS OF WASTEWATER TREATED
911 million gallons
TOTAL SLUDGE HAULED TO SOUTHERLY FOR FURTHER PROCESSING
23,100 wet tons
1987 OPERATING COST
$620,802
EFFLUENT DISCHARGE POINT
East Branch of Rocky River

1987 PLANT PERFORMANCE DATA

(in milligrams per liter)

TREATMENT PLANT	PARAMETERS	NPDES LIMITS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
*Southerly	BOD	20	19	14	17	11	14	9	5	5	8	5	3	3
	TSS	12	2	4	8	3	2	3	2	3	2	3	2	2
	PHOS.	1	0.7	0.7	0.8	0.5	1.0	0.9	0.9	1.0	1.0	0.7	0.5	0.5
*Westerly	BOD	85	45	56	60	48	55	46	43	41	54	37	48	60
	TSS	30	15	17	27	19	16	17	16	19	18	17	21	31
	PHOS.	1	0.5	0.7	0.9	0.6	0.7	0.7	0.9	0.9	1.0	0.9	0.9	0.9
Easterly	BOD	20	24	22	24	15	24	25	18	19	22	24	22	21
	TSS	20	7	8	10	8	8	9	7	14	9	10	6	10
	PHOS.	1	0.3	0.4	0.6	0.4	0.5	0.5	0.6	0.7	0.8	0.6	0.6	0.6
*Strongsville "A"	BOD	30	22	24	22	17	14	13	12	13	17	17	23	19
	TSS	30	16	15	14	11	11	15	10	11	15	13	21	19
	PHOS.	1	0.7	0.6	0.6	0.5	0.7	0.8	0.9	0.7	1.0	0.8	1.0	0.7
Berea	BOD	21	41	36	28	21	19	12	10	12	14	18	22	15
	TSS	24	22	19	13	8	10	11	7	10	9	11	15	10
	PHOS.	1	3.8	3.2	1.1	0.5	0.9	0.5	0.8	0.9	0.9	0.7	0.8	0.5

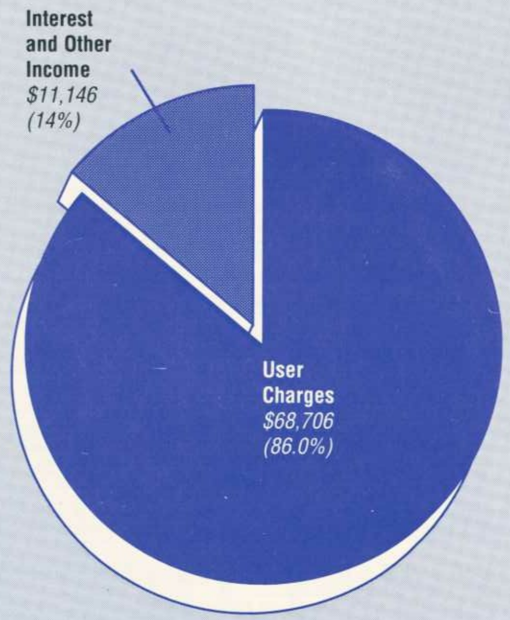
BOD	Biochemical Oxygen Demand
TSS	Total Suspended Solids
PHOS.	Phosphorus
NPDES	National Pollutant Discharge Elimination System Permit

* This plant received the Association of Metropolitan Sewerage Agencies (AMSA) Silver Award presented to member agencies whose facilities had five or less NPDES permit violations during 1987.

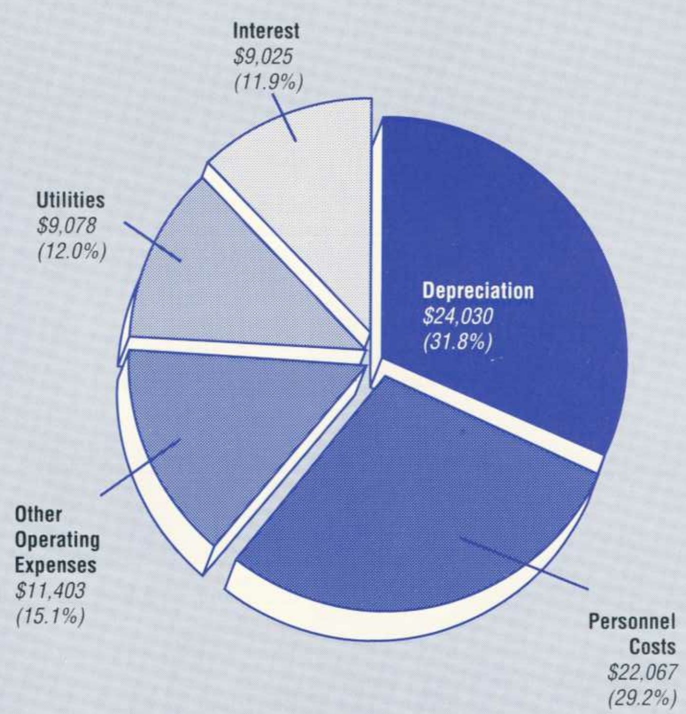
REVENUE AND EXPENSES FOR 1987

(in thousands)

REVENUE
$79,852



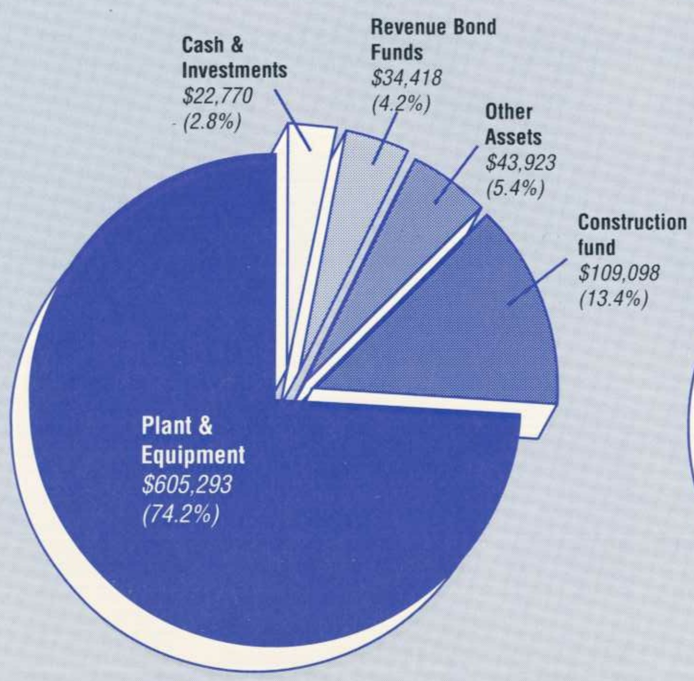
EXPENSES
$75,603



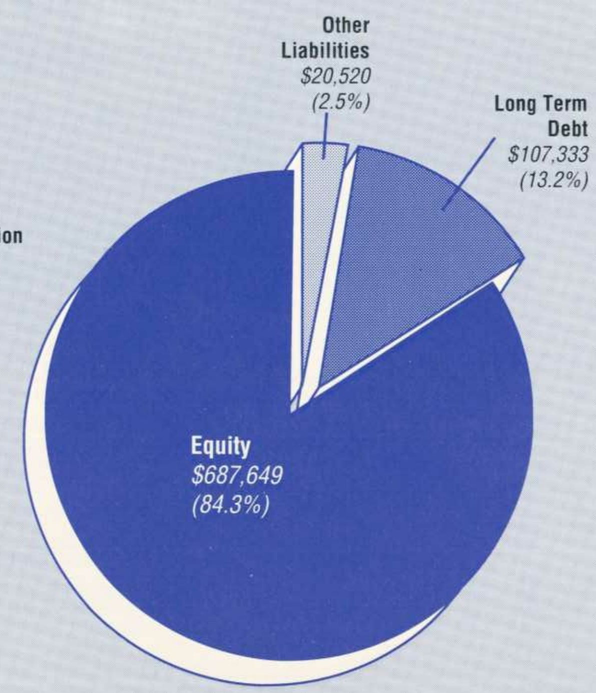
FINANCIAL POSITION AS OF DECEMBER 31, 1987

(in thousands)

ASSETS
$815,502



EQUITY & LIABILITIES
$815,502



A copy of the detailed financial statements may be obtained by writing to: Comptroller, Northeast Ohio Regional Sewer District, 3826 Euclid Avenue, Cleveland, Ohio 44115

SENIOR STAFF

The senior staff is standing in front of the new first stage aeration blowers at the Southerly Wastewater Treatment Plant. With the installation of this equipment, the building, constructed in the 1930s, has been put to a new use. Pictured from left to right are: William B. Schatz, General Counsel; Dale F. Patrick, Chief of Operations; Erwin J. Odeal, Director; Charles J. Vasulka, Chief Engineer; David A. DeMarco, Comptroller; and Kenneth A. Pew, Chief of Support Services.

NORTHEAST OHIO REGIONAL SEWER DISTRICT
3826 EUCLID AVENUE
CLEVELAND, OHIO 44115