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ANNUAL REPORT

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GEORGE W. KUHN
DRAIN COMMISSIONER

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OAKLAND COUNTY , MICHIGAN

VOLUME I
ANNUAL REPORT

OAKLAND COUNTY

MAY 26 1982

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April 1, 1982

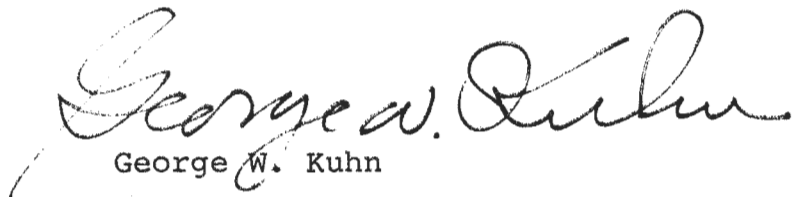
Honorable Board of Commissioners
County of Oakland
1200 North Telegraph Road
Pontiac, Michigan 48054

Ladies and Gentlemen:

As required by the Michigan Drain Code I enclose the Annual Report of the operations of the Drain Commissioner's office during the period from January 1, 1981 to December 31, 1981.

I wish to extend my sincere thanks and appreciation to all the members of the Board of Commissioners and the members of various standing committees for the excellent cooperation and assistance extended during the past year.

Most sincerely,


George W. Kuhn

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THE ENGINEERING RESPONSIBILITIES OF THE DRAIN COMMISSIONER

The Drain Commissioner has broad and varied engineering responsibilities.

The staff of engineers and other technical personnel of the Drain Commissioner are principally engaged in the following two areas of responsibility:

1. Drain Engineering

Those activities related to the Drain Code (Chapters 8, 20, and 21 of Act 40 of 1956), the Subdivision Control Act (Act 288 of 1967), the Soil Erosion and Sedimentation Control Act (Act 347 of 1972), and the Inland Lake Level Control Act (Act 146 of 1961).

2. Water and Sewer Engineering

Those activities and projects related to sanitary sewerage and water supply systems carried out under the provisions of Act 185 of 1957, Act 342 of 1939, and Act 40 of 1956.

DRAIN ENGINEERING

This unit advises the Drain Commissioner, as well as furnishes the personnel to coordinate the construction of new storm drains required to service Oakland County's expanding population. In addition, the following related activities are carried out:

CONSTRUCTION PERMITS

During this past year, a total of 45 permits for taps into County and Inter-County Drains were issued, which represents an 18% decrease from 1980.

Prior to the issuance of any permit, a thorough examination of the application and related engineering drawings is made to assure the connection conforms to our construction specifications.

At the time any of these connections is made, an inspection is made to assure that the work is done properly and in accordance with the approved engineering plan. A fee is charged to offset the cost of this inspection.

EASEMENT ACQUISITION

Prior to building any project, it is necessary to secure easements. Easements consist of permanent (land upon which the structure is placed) and temporary or construction easements (lands required to construct the Drain). On completion of the project, the temporary easements revert back to the owner, while permanent easements remain under the control of the Drain Board.

As a right in land is being transferred from a landowner to the Drain Board, compensation is paid. Fair compensation is based upon an appraisal performed by an experienced land appraiser. He can determine if a loss of property value will occur and, if so, suggest a dollar amount to offer the owner.

If no agreement can be reached, condemnation is brought under Act 188 of 1978 in the Circuit Court. The Court can provide a jury who, with the assistance of expert appraisers, will determine fair value for the easement.

Drain Engineering works in close conjunction with the design engineer to determine the minimum requirements for construction and maintenance easements.

REVIEW OF LATERALS TRIBUTARY TO THE S.O.C.S.D.S.

All connections into any sewer that is tributary to the Southeastern Oakland County Sewage Disposal System are required to be first reviewed by this office prior to being submitted to the Michigan Department of Health.

This review helps protect established Drainage Districts and allows a record to be kept of all facilities outletting into County trunk lines, as well as assuring this office that proper and approved construction standards are used.

The Drain Commissioner works closely with local governments. All plans sent to us for review are transmitted through the municipalities' engineer or Engineering Department. We do this to assure that sewer lines conform to the local community master plan for sewerage development.

The Engineering Department, between January 1, 1981 and December 31, 1981, received and reviewed 7 sets of sanitary and combined sewer plans for facilities that will outlet into the Southeastern Oakland County Sewage Disposal System.

Upon our completion of review, these plans were then forwarded to the Michigan Department of Health with our recommendation that a construction permit be issued.

LAKE LEVEL PROGRAM

Under the provisions of Act 146 of 1961, the Drain Commissioner's office has participated in legal proceedings to establish and build lake level controls for many Oakland County lakes.

There are 42 lakes in the County where levels have been established and assigned to the Drain Commissioner for control and maintenance.

The Drain Engineering Unit has prepared the Special Assessment Districts for these projects and has also prepared, as necessary, yearly assessment rolls to cover needed maintenance of these projects.

Regular inspection of control structures on a weekly basis, or more often as weather conditions dictate, is maintained throughout the year under the supervision of an engineer thoroughly familiar with all of the structures. At least weekly the levels of these lakes are read and the level control structures are adjusted to maintain the established legal level. Regular inspection also assures that the structures are in good operating condition, and permits scheduled maintenance and repairs when needed.

PLAT REVIEW

Under the provisions of Public Act 288 of 1967, the Subdivision Control Act, the Drain Commissioner must review and approve all proposed subdivisions in Oakland County, insuring that adequate storm drainage facilities have been proposed.

From January 1, 1981 through December 31, 1981, 27 preliminary plats, 46 sets of construction plans, and 54 final plats were approved by the Drain Commissioner.

Twenty-eight communities were represented in the 39 final plats, totaling 709 residential and 139 commercial lots.

After building construction, local assessors estimate that these lots will have a value of \$132,000,000, generating approximately \$3,450,000 in additional property taxes.

DRAIN AND LAKE LEVEL ASSESSMENT ROLLS

Drains constructed prior to 1956 were financed by special assessment against the property served by the drain. Maintenance charges for these drains are the obligation of the property located within the special assessment district established when the drain was constructed.

During this last year, maintenance work was performed on 49 of the special assessment (Chapter 8) drains and 14 of the special assessed Lake Level Projects.

The Board of Commissioners on October 22, 1981 approved Drain Warrants in the amount of \$72,999.58 to assess property for these maintenance costs of Chapter 8 and Lake Level Control Projects.

SOIL EROSION AND SEDIMENTATION CONTROL - ACT NO. 347

The Drain Office is, for the seventh year, the principal enforcing agency in Oakland County for the State Soil Erosion Control Act. The program continued to operate with a minimum of problems and maximum effectiveness in protecting the environment.

298 applications were received in 1981 for soil erosion permits. While the total number of projects decreased, there was a noticeable increase in municipal and industrial construction over 1980. Single family residence construction decreased from 133 permits in 1980 to 115 permits in 1981.

The amount of revenue generated from permit fees in 1981 was \$31,965.91. In 1980, the total revenue collected was \$47,372.93. Therefore, the 1980 permit revenue exceeded the 1981 permit revenue by \$15,407.02. The total amount paid by Oakland County in wages to employees who worked on Soil Erosion and Sedimentation Control in 1981 was \$57,356.87. By comparison, in 1980 the total amount paid for wages was \$64,069.62. These figures do not include the miscellaneous fixed costs associated with running the program, such as employee fringe benefits, electricity, phones, office space, copying costs, gasoline, office supplies, etc.

In an effort to solve the above described financial problem and to comply with a previous Oakland County Board of Commissioners mandate that the Soil Erosion Program be self-sustaining; this agency, in November, 1981, prepared a resolution which was presented to the Board requesting permission to raise our Soil Erosion and Sedimentation Control Permit fees. This resolution was approved and the fee increases were instituted as of January 1, 1982.

INSTRUCTIONAL MEETINGS

The Drain Office continued an ongoing program of instructional meetings with public agencies, builders, developers, engineers, architects, etc.

NATIONWIDE URBAN RUNOFF PROGRAM INVOLVEMENT

In the Spring of 1981, the Maintenance Department of the Oakland County Drain Commissioner's office modified the outlet structures on three existing retention basins, located in the City of Troy, as part of the U. S. Environmental Protection Agency's Nationwide Urban Runoff Program. This program is being administered locally by the Southeast Michigan Council of Governments (SEMCOG) for the purpose of testing the "quality" of storm water runoff.

The modifications we have constructed consist of filtering berms, riser standpipes, anti-vortex baffles, trash racks and flow restricters, etc. These modifications slow down the discharge of retention basin outflow, resulting in longer storage time, thereby improving the "quality" of the outflow by removing and/or lessening undesirable pollutants.

NATIONWIDE URBAN RUNOFF PROGRAM - Cont'd.

Actual sampling, analysis and comparison of retention basin inflow and outflow is being carried out by SEMCOG. We are assisting by providing all preventive maintenance and field changes required to keep the modifications in proper working order.

The testing program will continue throughout 1982. At its completion we will dismantle the modifications.

WATER AND SEWER ENGINEERING

In 1981 there was a large volume of construction supervised by the Water and Sewer Engineering Unit. The principal activity was the completion of construction and continuing administration and management of 78 contracts for construction of sanitary sewer and water supply systems worth more than 100 million in construction dollars. The total of all project costs was in excess of 141 million dollars.

Staff Project Engineers prepared more than 200 monthly construction estimates which the Drain Commissioner approved for payments worth nearly 10 million dollars. That level of spending accounted for 10 percent of the total expenditures for the active construction program, and approximately 13 miles of pipe in the ground, and many miles of surface restoration and clean up.

Estimates for payments to contractors are prepared monthly within a ten-day period following the twentieth of each month. The number of monthly estimates for the year ranged from a monthly low of 9 to a high of 28.

Residents of Oakland County are served by the six major sanitary sewer projects listed in Table 1. Applications filed by the Drain Commissioner and approved for funding by E.P.A. and D.N.R. under the water pollution control grant program of Public Law 92-500 have reduced the total cost to Oakland County residents. Federal and State grant funds will account for more than 47 million dollars of project costs.

Table 1 - Distribution of Grant Funds

<u>Project</u>	<u>Grants</u>	<u>Local Funding</u>	<u>Project Cost</u>
Avon Twp. Ext. No. 2	\$10,406,865	\$26,725,000	\$ 37,131,865
Holly S.D.S.	7,110,301	3,500,000	10,610,301
Waterford Ext.,Phase III	3,832,907	10,342,000	14,174,907
Waterford Ext.,Phase IV	6,773,407	12,350,000	19,123,407
Waterford Ext.,Phase V	13,454,183	13,475,000	26,929,183
West Bloomfield Ext.No.2	5,787,940	14,794,984	20,582,924
	<u>\$47,365,603</u>	<u>\$81,186,984</u>	<u>\$128,552,587</u>

More than 90 percent of approved grant funding has already been collected.

CONSTRUCTION INSPECTION

The Inspection Unit provides trained construction inspection staff in order to perform full-time inspection of various sewer, water and drain projects. More specifically, this unit provides onsite quality control of material and workmanship, insures conformance to the plans and specifications, reacts directly to citizen inquiries and complaints, keeps a daily progress log, acts as liaison between the County, the contractor and the local units of government.

In addition to the inspection of new sewer, water and storm drain projects, this unit has been extensively involved in manhole and sewer inspection of the existing Evergreen-Farmington system. All of the manholes are being entered and visually inspected and their physical condition recorded. The sewers are being inspected by lamping the lines. These reports are then forwarded for analysis and interpretation and will provide valuable information on problem areas in the system.

MAINTENANCE UNIT

The Oakland County Drain Commissioner is responsible for the regular maintenance of established storm drains located throughout Oakland County. For this purpose maintenance personnel are employed to provide a wide variety of maintenance and repair services. Primary work includes the inspection and maintenance of approximately 600 miles of established county drainage and combined storm and sanitary systems. In addition, dams used in the regulation, operation and control of the legal levels of 42 Oakland County lakes are maintained by maintenance staff.

In the performance of these functions, personnel use various types of vehicles and construction equipment, including basic and specialized hand and power tools and certain necessary safety equipment. Inventory, repair and proper care of these tools and equipment is a function of the maintenance unit.

GENERAL DRAIN MAINTENANCE

Periodic maintenance activities include removing roots, silt and other debris from enclosed drains; repairing structures that have failed or have been damaged; rehabilitating open drains by removing brush, debris, shoals and silt; cleaning and maintaining manholes and catch basins; and inspection and cleaning of diversion gates, meter chambers and outfall structures.

General drain maintenance was performed on 44 Chapter 20 drains, 3 Chapter 21 drains, 49 Chapter 8 drains and 2 Act 342 projects.

DRAIN INSPECTIONS

Routine inspections are made, periodically, on all drainage systems. Once inspected the necessary repairs are performed. This preventive maintenance system assures reliable drainage to the residents of Oakland County and avoids costly drain failures.

During 1981 the following drains were inspected by the Oakland County Drain Commissioner's Maintenance Unit: 49 Chapter 20 drains, 2 Chapter 21 drains, 39 Chapter 8 drains and 1 Act 342 project.

EQUIPMENT

In order to increase efficiency while maintaining personnel at a constant level, the maintenance unit employs specialized power equipment.

The most important piece of equipment is the Vactor Jet. The Vactor works with water pressure and vacuum to clean out storm and sanitary sewers. It is especially efficient in cleaning catch basins, manholes and sewer lines of 30 inch and lesser diameter pipe. By using the Vactor, more work can be done with a two-man crew than formerly could be done with hand equipment and substantially more manpower. It has enabled the maintenance unit to clean drains and sewers on an orderly and routine schedule. The result is decreased costs per job, and increased service to the public.

The Drain Commissioner employs the necessary safety equipment needed to meet OSHA and MIOSHA standards as well as the hazards of the particular drain maintenance work.

MAINTENANCE OF DAMS

The drain maintenance unit also maintains dams including dike repair, painting and repair of structures, and repair of gates and landscaping. During 1981 maintenance was performed at 14 Lake Level Control locations.

RAIN GAUGE OPERATIONS

There are 23 rain gauges located throughout Oakland County. Drain maintenance personnel install, maintain and repair rain gauges in cooperation with the U. S. Government Department of Agriculture, Weather Service Office. Supplies are distributed to the various stations and recorded data is collected and processed.

WORK SPONSORSHIP PROGRAMS

In addition to maintenance labor provided by full-time County employees, the Drain Commissioner has used programs that permit the use of workers at little or no cost to the taxpayer. Temporary Summer Employment and County Welfare recipient programs supplied laborers for these programs during 1981.

Temporary Summer employees were used by the maintenance unit primarily for our Lake Level Dam Maintenance program and as additional help to regular crews. County Welfare recipient workers were used to remove brush and debris from open drainage channels on older drains in rural areas of the County.

With minimal costs of supervisory personnel and equipment, these maintenance crews assisted permanent County employees in the maintenance work at substantial cost savings.

INTER-DEPARTMENTAL SERVICES

The Drain Commissioner also cooperates with other County departments to provide specialized personnel and/or equipment as required. By lending personnel and equipment at minimal rates, other County departments were able to reduce their costs to complete specific maintenance assignments. The Departments of Facilities and Operations, Oakland-Pontiac Airport, Water and Sewer Engineering, Public Works, Parks and Recreation and Construction Inspection utilized these available maintenance services during 1981.

SPECIAL PROJECTS

The Drain Commissioner undertook certain Special Projects during 1981 utilizing Maintenance staff expertise enabling substantial project cost savings. Projects were completed on the Claude H. Stevens, Randolph Street, Rummell Relief, Twelve Towns Relief and Wixom Drains. In addition major efforts were extended for SEMCOG's National Urban Runoff Program.

SOUTHEASTERN OAKLAND COUNTY
SEWAGE DISPOSAL SYSTEM

SOUTHEASTERN OAKLAND COUNTY SEWAGE DISPOSAL SYSTEM

POLLUTION CONTROL FACILITIES

The County of Oakland was ordered and directed by a Final Order of Determination of the Michigan Water Resources Commission adopted December 10, 1969, to abate pollution of the Red Run Drain and the Clinton River on or before December 1, 1972. The Order set forth a time schedule that included a requirement that the facilities had to be placed under construction on or before October 1, 1970.

The Oakland County Drain Commissioner, acting for the Southeastern Oakland County Sewage Disposal System, employed the firm of Hubbell, Roth and Clark, Inc., of Bloomfield Hills, to prepare plans and specifications for a proposed Pollution Control Facilities Project.

The area served includes all or part of fourteen communities encompassing a drainage district of 24,500 acres and a population exceeding 350,000 people.

Construction involved the use of existing easements occupied by the Red Run Drain, a large and deep open drainage course, to create an enclosed structure 11,000 feet long, with an in-line retention of 62.2 million gallons. Accessory structures include a complete garage to house service vehicles, a laboratory addition to the existing control building, and a dewatering pump station. The retention structure with its accessory facilities was designed to reduce overflows of storm drainage from the existing combined wastewater systems to meet acceptable limits of governing authorities. The design provided that storm discharge would be less than if the area served had separate sanitary and storm systems. In addition, provision was made so that extreme storm runoffs will now be chlorinated with adequate detention prior to discharge downstream.

During rainstorms or snow melt periods, a high weir and skimming structure at the inlet (formerly the outlet for the Twelve Towns Drainage District) skims floating debris and high storm water flow into the retention basin. The main retention facility consists of an enclosed reinforced concrete structure with a cross section 65 feet wide, 20 feet deep and approximately two miles in length providing 190 acre feet of retention. The 11,000 feet length of retention structure was constructed within the drainage course of the Red Run Drain. The outlet structure has a 950 feet long weir and baffle adequate to handle the full design flow, eliminating the need for relief gates. Provision was also made so that maintenance vehicles could enter the structure from the outlet end.

When an overflow from the upstream Twelve Towns Drainage System enters the main retention structure, it is chlorinated and retained in the structure until such time as it can be pumped from the downstream pump station into an interceptor for further treatment in the Detroit system. If the capacity of the main retention structure is exceeded, overflow will occur over the weir at the outlet into the

downstream open drainage course, the Red Run Drain, east of Dequindre Road. After the retention structure has been dewatered (pumped out), the cleaning or flushing of the system can begin.

The negative aspect of a two mile long structure was converted to a positive factor by using the length to provide required detention time for the automatic injection of sodium hypochlorite solution which is controlled by the wastewater crest above the inlet weir, and also to provide for automatic sequence flushing of the structure. Periodic flushing of the structure is required to remove solids deposited by retained storms and to flush these solids to an interceptor for subsequent treatment at the Detroit Wastewater Treatment Plant. Sequence flushing was incorporated to make use of an available water supply as dictated by the quantities and pressure required.

The flushing system is activated at the laboratory building after dewatering the main retention structure, using water from the Detroit Metropolitan Water System, protected by a barometric loop, through a 20 inch water main in banks of fifteen nozzles. Once actuated the flushing sequence proceeds automatically throughout the full length of the structure. Control may be varied at the laboratory building depending upon available water for flushing and available flow in the receiving interceptor. In all, there are over 3,200 individual nozzles.

The chlorination system includes three 30,000 gallon underground concrete sodium hypochlorite storage tanks, provisions for dilution pumps, constant head tank, distribution system within the retention structure, and control valves located within the laboratory building. Exhaust fans for the main retention structure are interlocked with an ozone generator, also located at the laboratory building, to eliminate odor conditions that may possibly occur. The on-site laboratory is equipped, including the provision of an emergency electrical power system, to permit continuous laboratory testing of dry weather and storm flows.

Bids for the Project were taken on September 23, 1970. R. E. Dailey and Co. was low bidder and awarded the contract in the amount of \$19,440,000 on September 28, 1970. The facility became functional in June, 1973. Final construction payment was made in March, 1976. Total Project Cost was \$24,618,172.80. Project financing was by sale of bonds in the amount of \$13,275,000 along with a Federal Grant of \$11,639,656 and a State Grant of \$5,336,116.

Subsequent to the construction of the Pollution Control Facility, the Oakland County Department of Parks and Recreation requested authorization to construct a 9 hole golf course and driving range on the property over the buried retention basin. After obtaining consent from the United States Army Corps of Engineers and the various communities within the Southeastern Oakland County Sewage Disposal System which would be affected by this proposal, the Drain Commissioner authorized use of approximately 140 acres for recreational use. The Red Oaks Golf Course located on this site opened in June, 1978 and now provides additional recreational space for the highly developed Southeastern Oakland County area.

1981 MAINTENANCE PROGRAM

The Red Run Drain is an inter-county drain originally 11 miles in length. Since construction of the Southeastern Oakland County Sewage Disposal System Pollution Control Project has now taken place upstream from Dequindre Road, maintenance responsibility for the Red Run Drain originates at Dequindre Road in the City of Warren and terminates at the south branch of the Clinton River, east of Utica Road, north of Metropolitan Parkway. Its invert width varies from 40 feet at the Pollution Control Facilities outlet structure to 120 feet at the Clinton River. The top of the channel varies from 90 to 200 feet in width. This drainage channel accepts most of the flow of storm waters of Southeastern Oakland County, as well as a large area of Southern Macomb County.

Rapid property development has occurred in the past few years along this drain. New residential subdivisions, parks and industrial development have intensified the importance of proper drain maintenance, both to insure that the maximum section is available for flood protection and also to improve the general appearance of the area.

Along with periodic inspection of the Red Run right of way after rainstorms or other severe weather conditions, an annual inspection was performed during the month of May, 1981, and a formal report was prepared.

Weed spraying was undertaken during the Spring and again in the Fall to control growth of unwanted weeds. Mowing of some sections of the right of way was necessary.

Control of rats was carried out by means of placing rat bait at indicated locations along the right of way. Success was evident by lack of tracks after fresh snowfall.

Roadways along the right of way were kept in repair by filling of ruts and washouts and removal of abandoned car parts and dumped trash along the entire length of right of way was necessary throughout the year.

LABORATORY REPORT

SAMPLING AND ANALYSIS

During calendar year 1981, approximately 25,000 analyses were performed on more than 5,000 samples collected in the Twelve Towns drainage area which includes all of the Cities of Royal Oak, Ferndale, Berkley, Clawson, Hazel Park, Madison Heights, Pleasant Ridge, Huntington Woods, Oak Park, and Royal Oak Township, and part of the Cities of Troy, Birmingham, and Southfield, and the Village of Beverly Hills.

Monthly reports are compiled from the thousands of samples analyzed and are submitted to the office of the Michigan Water Resources Commission in Lansing and the Detroit Water Board.

OVERFLOWS

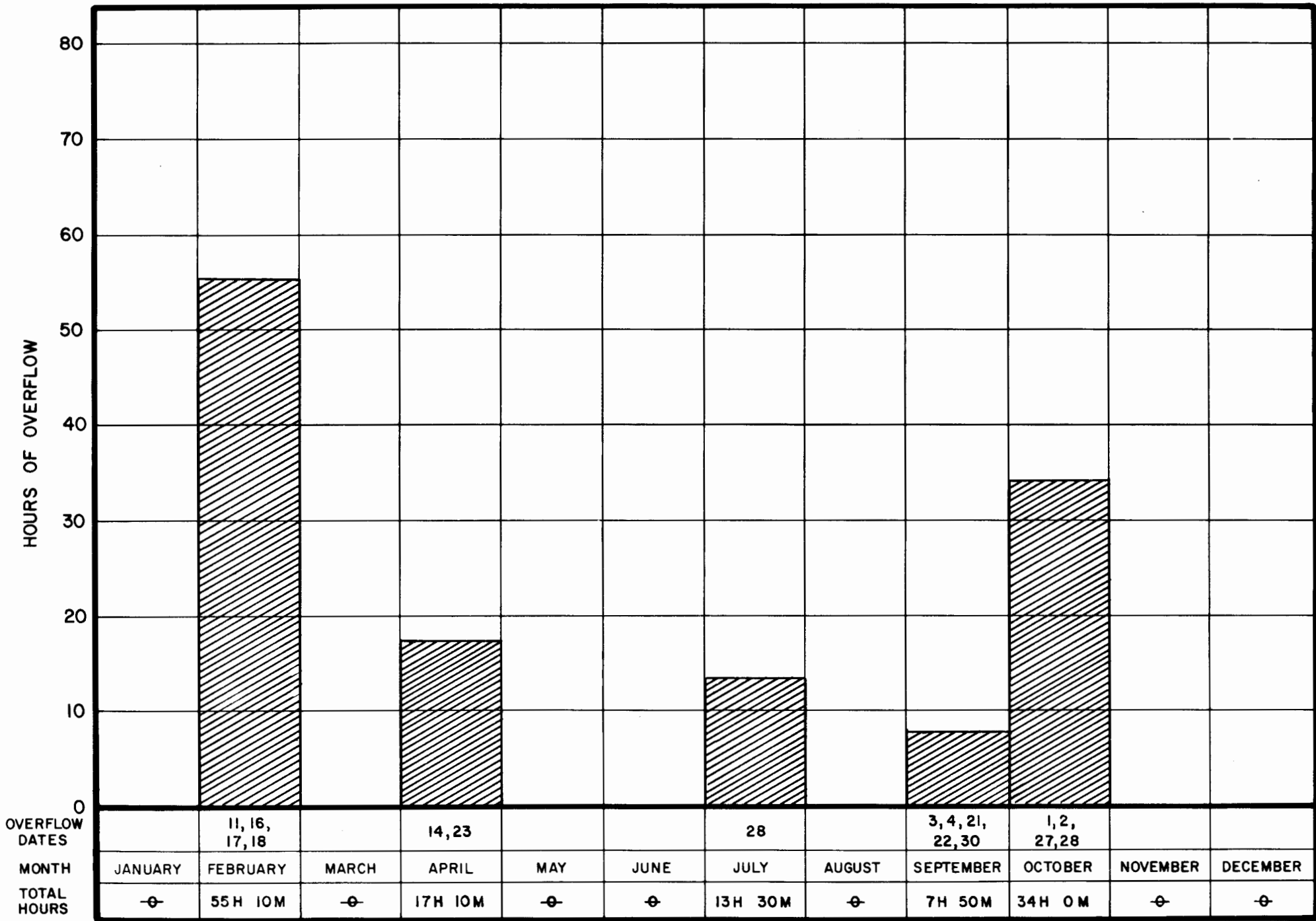
The Twelve Towns Relief Drains retention system experienced 21 spills to the Pollution Control Retention Basin which has a holding capacity of 190 acre feet of combined storm water and sewage. Of these, 12 were retained, thus, experiencing 9 overflows to the Red Run Drain, for a total of 128 hours.

During an overflow, the quality of water now entering the Red Run Drain at the Dequindre outlet is greatly improved due to the chlorination of overflows entering the Retention Basin. Sampling is performed continuously on all waters entering the Red Run Drain and standard analyses are performed in accordance with National Pollution Discharge Elimination System, Permit Number MI 0026115.

COOPERATION AND VIGILANCE TO CONTROL POLLUTION

The Southeastern Oakland County Sewage Disposal System's Laboratory staff has worked closely with and wishes to acknowledge the assistance and cooperation received from the Michigan Water Resources Commission, the City of Detroit, City of Warren, U. S. Corps of Engineers and U. S. Environmental Protection Agency, in the effort to clean up County and Inter-County Drains discharging industrial and domestic waste into waters controlled by their respective offices.

A constant and continuing program of sampling and testing will continue to prevent destructive effluents from entering the Southeastern Oakland County Sewage Disposal System and to control pollution of County and Inter-County Drains, as well as the receiving waters of the State of Michigan.



SOUTHEASTERN OAKLAND COUNTY SEWAGE DISPOSAL SYSTEM
 JANUARY 1, 1981 THRU DECEMBER 31, 1981

CONSTRUCTION ACTIVITY

DRAIN CONSTRUCTION

The Drain Commissioner, under the provisions of the Michigan Drain Code, Act 40 of Public Acts of 1956, as amended, is authorized to construct county drains.

Construction of a county drain is undertaken only after a petition has been filed with the Drain Commissioner. Petitions are normally filed by one or more governmental units, however, a petition may be filed by a property owner or group of property owners.

During the time period covered by this report, two drainage projects were completed, twenty-two drains are in various stages of planning and development, and two drains are presently under construction.

DRAIN CONSTRUCTION PROJECTS COMPLETED BETWEEN JANUARY 1, 1981 AND DECEMBER 31, 1981

KELLY DRAIN

The Township of Independence petitioned the Oakland County Drain Commissioner to locate, establish and construct this drain on October 1, 1979. The drain serves an area of Independence Township in Sections 28 and 29, north of Maybee Road and east of M-15 and Dixie Highway. The purpose of the drain is to relieve an existing drainage problem in the Hi-Wood Subdivision and to provide an outlet for drainage facilities from the Chestnut Hills Subdivision, presently being developed. The developer of the Chestnut Hills Subdivision is responsible for all the costs of the drain, except for an assessment against the County of Oakland on account of drainage of county roads.

The Drainage Board received bids for construction of the Kelly Drain on October 8, 1980. On October 30, 1980, the contract for construction was awarded to Chris Nelsen & Son, Inc., a subsidiary of Ric-Man Construction, Inc., the low bidder in the amount of \$162,572.00. Construction was completed during November and December of 1980 and the facility was put in service on December 15, 1980. Clean-up and restoration operations were completed in the spring of 1981.

TEN MILE-ROUGE SANITARY DRAIN

A petition to locate, establish and construct this sanitary drain was filed by the City of Farmington Hills. The project consists of sanitary sewers, branches and four pumping stations.

Previous to the petition to the Drain Commissioner, this project had proceeded under Act 185 and was under the direction of the Oakland County Department of Public Works.

TEN MILE-ROUGE SANITARY DRAIN - Cont'd.

The engineering firm of Pate, Hirn & Bogue, Inc. prepared plans, specifications and an estimate of cost of the Ten Mile-Rouge Sanitary Drain.

Bids for construction were received by the Drainage Board. Upon recommendation of the engineers, the Board awarded contracts to Joseph J. Sinacola, Mole Construction Co., Inc., O'Laughlin Construction Co., Rocco Ferrera Company, and Rotor Electric Company in the total amount of \$2,939,801.55.

Sub-surface soils were not suitable to support one mile of sewer between 12 and 13 Mile Roads. After additional soils exploration, it was determined that a cost effective installation would entail rerouting the sewer.

Additional plans and specifications were prepared by Pate, Hirn & Bogue, Inc., and bids for construction along the new route were received by the Drainage Board. Upon recommendation of the consulting engineer, the Board awarded the contract for construction to L. Gianetti Co. in the amount of \$551,131.00.

Construction was suspended on the new route when an underground surface was encountered. The aquifer could not be controlled by practical dewatering methods, and therefore another route was sought. After a new route was approved, construction was resumed and was completed shortly thereafter.

A 110 foot extension to the contract was requested by the City of Farmington Hills and built as part of this contract enabling an existing lateral sewer built by others to be connected to the system.

All construction on the entire Ten Mile-rouge Sewer System has now been completed, and the system is now in service. Final surface restoration work will be completed during 1982.

DRAINS UNDER CONSTRUCTION

KASPER DRAIN

The Kasper Drain is located in Sections 14 and 23 of Pontiac Township and serves a commercial area along Opdyke Road and a large residential area east of Interstate 75.

The Township of Pontiac petitioned the Oakland County Drain Commissioner to locate, establish and construct a storm drain because of periodic flooding and poor drainage in this area.

The engineering firm of Orchard, Papke, Hiltz & McCliment, Inc., was employed by the Drainage Board to prepare plans and specifications for the Drain.

As designed, the outlet of the drain is 96 inch diameter reinforced concrete pipe and is enclosed by various sizes of pipe to its upper terminus. Also at the request of the Township of Pontiac, road ditching was designed into the project to relieve road flooding in the Hawthorne Acres and the Chandler Estates Subdivisions. Branch No. 1 Extension was deleted from the project because of difficulty in right of way acquisition.

The Board accepted construction bids for the Kasper Drain on February 17, 1978, and the contract for construction was awarded to A & P Construction Company, the low bidder, in the amount of \$1,678,002.00.

Construction of the main drain has been completed and is presently in use.

After the problems with right of way acquisition were resolved, the Board received construction bids for the Branch No. 1 Extension. On September 23, 1981, the contract for construction of Branch No. 1 Extension was awarded to Triangle Excavating Company, the low bidder, in the amount of \$114,599.58. Construction began in December 1981.

MOXLEY DRAIN

The City of Troy petitioned the Oakland County Drain Commissioner to locate and establish this drain to improve drainage along Wattles Road, between Rochester and Dequindre Roads.

The drain is being constructed in various phases, with the City of Troy Engineering Department preparing all of the construction plans and specifications. The project has been financed through the sale of bonds.

Phase I of the project was constructed as part of the recent Michigan Department of Transportation improvement of Rochester Road through the City of Troy. The drain was constructed by the M & B Contracting

MOXLEY DRAIN - Cont'd.

Corporation. Their low bid was \$207,690.80. Final construction costs for this phase have still not been tabulated.

Phase II of the project begins at the intersection of the Henry-Graham Drain and Wattles Road and extends westerly to Rochester Road, connecting to Phase I. There is also a branch north along John R. Road. This phase was also constructed by the M & B Contracting Corporation. Their low bid was \$1,027,819.50. Actual construction began in September, 1980, and was completed during the summer months of 1981. The final construction cost for Phase II was \$1,081,451.94.

In December 1981, bids were taken for Phase III. A contract was subsequently awarded to the Western Construction Company for their low bid of \$311,690.72. Actual construction is scheduled to begin in the spring of 1982. Phase III begins at the aforementioned Henry-Graham Drain and extends easterly to Dequindre Road, then northerly along Dequindre Road.

Phase IV of the project is presently in the design stage. It will be constructed along Forsyth Street, which is located north off Wattles Road. The estimated construction cost for Phase IV is \$150,000.00. Tentatively, this phase is scheduled to be let for bid in the summer of 1982.

PONTIAC LAKE DAM REPAIR PROJECT

Upon the recommendation of the Corps of Engineers in a report dated June 1979 concerning Pontiac Lake Dam, and the subsequent recommendation of the Department of Natural Resources by letter dated January 7, 1980, the Drain Commissioner contracted with the consulting engineering firm of Halpert Associates, Inc. to perform certain geotechnical evaluations on the condition of the Pontiac Lake Level Control structure. The results of the Halpert analysis were received on January 26, 1981. Their in-depth report suggested greater stability and safety problems than identified by the Corps of Engineers report.

After the findings were reviewed by the D.N.R., a design contract with Halpert Associates was executed on April 15, 1981 for their services to prepare plans and specifications to repair the dam.

The basic design called for a lake drawdown at least ten (10) feet below the legal lake level of 962.83 feet above sea level. The project included excavation and removal of the deteriorated earthen dam, and placement and densification of fill material in the earth berms on each side of the existing concrete spillway, and rehabilitation of the spillway. Upon completion of the work the lake would be refilled to the legal level using the natural spring runoff of the Huron River.

Financing for the project will utilize a seven year special assessment against property owners on Pontiac Lake who will benefit from the repair and the lake improvements. The extremely high cost of borrowing funds threatened to delay the project. Because of the dangerous condition of the dam, the Oakland County Board of Commissioners agreed to advance funds from the general fund of the County to cover the anticipated cost of the repairs, to be repaid over 7 years from the special assessment proceeds. The Board further agreed to advance these funds as an interest free loan, thereby substantially reducing the total cost of the project, and reducing the financial hardship on the property owners who will be required to pay the special assessments for the project.

The drawdown was initially scheduled to begin in September, 1981 with construction work to begin in October, 1981, and to be essentially completed by early December, 1981, so that the lake refill could then begin with the legal level being achieved by the beginning of April, 1982.

During the design stage, the D.N.R. together with the Pontiac Lake Improvement Board requested that a permanent aeration system and a supplemental well be included in the Dam Repair Project in order to implement an already proposed Pontiac Lake Improvement Project. This would allow both the Dam Repair Project and the Lake Improvement Project to be coordinated with the lake drawdown activity.

Although a temporary, portable aeration system, if necessary, was deemed sufficient for the Dam Repair Project, a permanent stationary aeration system was called for to meet the D.N.R. and Federal grant

PONTIAC LAKE DAM REPAIR PROJECT - Cont'd.

requirements of the Lake Improvement Project. The supplemental well was not a requirement of the Dam Repair Project to achieve a lake refill, but was included to provide additional flow to the low lake levels generally encountered during the summer months.

After receiving the appropriate permits from the Corps of Engineers and the DNR, and authorization from the Circuit Court to lower the lake level during the repairs, construction bids were received on October 2, 1981.

Although the lake drawdown began as scheduled, setbacks were encountered that seriously delayed the original schedule. Unusually heavy and unseasonable fall rains mandated the closing of the Pontiac Lake control gate because of downstream high water and flooding. Another problem that was uncovered during the drawdown was the obstruction created by the presence of two undersized culverts that carried the flow of the Huron River under Lakeview Drive located south of Oxbow Lake.

At an emergency meeting held on November 24, 1981, the Pontiac Lake Improvement Board, after reviewing various alternate plans, recommended that every effort be made to remove the obstructions in order to implement the drawdown and then to proceed with a winter project to make the necessary repairs to the deteriorating dam.

After the appropriate approvals, and an emergency DNR permit were obtained, a bypass was constructed on December 7, 1981 which allowed more water to pass through the restricted area in the vicinity of Lakeview Drive.

On December 30, 1981 with the lake only 5'-2" below legal level, and knowing actual construction could not commence until the lake was at least 10 feet below legal level, it was decided to proceed with the Dam Repair Project. On that date the construction contract in the low bid amount of \$275,770.00 was awarded to C. A. Hull, Inc. of Walled Lake, Michigan. Construction to repair the dam is presently proceeding.

SANITARY SEWER CONSTRUCTION

AVON TOWNSHIP EXTENSIONS NO. 2

This system consists of 107.6 miles of sanitary sewers, 6-inch through 30-inch in size, and two pumping stations serving residents and businesses located in the southern one-half of Avon Township. The firm of Johnson and Anderson, Inc. designed the system, prepared construction plans and specifications, and assisted the Drain Commissioner's staff to obtain federal and state funding under the Public Law 92-500 grant program.

Thirteen construction contracts were awarded to eight construction contractors. The total cost of construction contracts was \$26,099,861.08. Approximately 47 percent of the project is eligible for 80 percent cost participation by the United States E.P.A. and the State of Michigan, jointly. More than 10.4 million dollars will have been received when all project work is complete.

Construction of the system was completed in 1980. Almost all remaining contract work, principally surface restoration, was completed during 1981. Final restoration work and all final construction payments to contractors should be completed by mid-1982.

BINGHAM FARMS SEWER AND WATER

Two separate systems, one for water supply and the other for sanitary sewerage service were combined into one project to be financed and constructed simultaneously. Both systems follow construction of initial segments of both utilities in prior years, and are intended to be the final stage necessary to provide service to the entire Village of Bingham Farms.

The project consists of 7.8 miles of sanitary sewers, 6-inch through 18-inch in size and one lift station, and 6.2 miles of water mains 8-inch through 16-inch in size. The sanitary sewer system includes a trunk line located in the flood plain of the Franklin Branch of the Rouge River. This trunk line runs from the south limit of Bingham Farms northwesterly and just into the Village of Franklin at a point north of Thirteen Mile Road where the river crosses Telegraph Road. This outlet and one constructed in prior years near Telegraph Road one-half mile south of Thirteen Mile Road provide for the future needs of the Village of Franklin.

The firm of Giffels-Webster Engineers, Inc. designed the system, prepared construction plans and specifications and worked in close harmony with the Drain Commissioner's staff to provide protective requirements for the Village environment.

Two construction contracts, both of which included construction of sanitary sewer and water main, were awarded to Troelsen Excavating Co. on May 4, 1978. The total cost of construction contracts was \$2,081,569.25.

BINGHAM FARMS SEWER AND WATER - Cont'd.

All contract work was completed during 1981. Final construction payments to contractors should be processed during the first quarter of 1982.

HOLLY SEWAGE DISPOSAL SYSTEM

The system consists of 4.7 miles of sanitary sewers, 8-inch through 18-inch in size, eight pumping stations, and the expansion and improvement of the treatment plant.

The firm of Capital Consultants, Inc. of Lansing, Michigan designed the project, prepared construction plans and specifications, and assisted in obtaining federal and state funding under the Public Law 92-500 grant program, and provides resident engineer inspection services at the treatment plant.

Four construction contracts were awarded to four contractors; Lerner-Linden, Inc., V.I.L. Construction, Inc., Iacobelli Construction, Inc., and A & B Sewer Clearing, Inc. The total cost of construction contracts was \$8,014,335.00.

Approximately 81 percent of the project is eligible for 80 percent cost participation by the United States E.P.A. and the State of Michigan, jointly. More than 7 million dollars will be received when all project work is complete.

Construction of the collector system has been completed. The treatment plant is expected to be ready for service by mid-1982.

HURON GARDENS EXTENSION

The system consists of approximately 3.1 miles of 6-inch through 21-inch interceptor sewers, force mains and house leads, and two submersible pumping stations. Residents and businesses located in the southeast portion of Waterford Township north of Sylvan Lake and west of Telegraph Road lie within the sanitary sewer service district which is presently receiving sewage disposal services from the City of Pontiac.

The basic purpose for this project is to disconnect the sanitary sewer service from the City of Pontiac and re-direct sewage flow to the Clinton-Oakland Interceptor System.

The firm of Johnson and Anderson, Inc. designed the project, prepared construction plans and specifications, and assisted with the preparation of applications for federal and state funding under the Public Law 92-500 grant program. All funding under that program was denied, so surplus funds from Waterford Extension projects completed in prior years were transferred by the Oakland County Board of Commissioners to cover the estimated \$2,095,000 project costs.

HURON GARDENS EXTENSION - Cont'd.

Construction bids were received on June 29, 1981. The construction contract was awarded to Mago Construction Co., on July 16, 1981, in the amount of \$837,193.12. Contract work was approximately 30 per cent complete by year end.

OAKLAND-ORION SEWAGE DISPOSAL SYSTEM

General Motors Corporation announced plans to build a new three million square foot automobile assembly plant on 450 acres in south-central Orion Township.

Adequate sanitary sewerage facilities were not available near the site to service this very large industrial facility. After extended discussions involving the County Executive, the Department of Public Works, the Drain Commissioner, and Orion Township officials, contracts for construction and financing of the system were approved by the Oakland County Board of Commissioners on August 14, 1980. Proceeds of a bond sale under the provisions of Act 94, P.A. of 1933, as amended (revenue bonds) will finance construction of the system.

Sanitary sewerage and appropriate industrial waste disposal services will be supplied by construction of a pipeline northeasterly from the assembly plant site at Giddings and Silverbell Roads, to the Paint Creek Interceptor located northeast of Gunn and Kern Roads, in Oakland Township.

The consulting firm of Johnson and Anderson, Inc. designed the system and prepared construction plans and specifications. The Drain Commissioner's staff, cooperating with the County Executive and the Department of Public Works provided contract administration, right of way acquisition services, and construction inspection services during construction.

Construction bids were received on December 22, 1980 for two contracts estimated to cost \$2,520,212.00. The low bids for both contracts, submitted by Ric-Man Construction, Inc., totaled \$1,092,113.06, substantially below the estimate. The revised project cost, reflecting the lower bid prices, is \$2,525,000.00, rather than the \$4,850,000.00 originally estimated.

Contracts were awarded to Ric-Man Construction, Inc., on January 16, 1981. Construction started immediately and the sewer was ready for the use intended by September. All surface restoration should be complete by mid-1982.

WATERFORD EXTENSIONS - PHASE III (2nd Section)

The system consists of 26.5 miles of sanitary sewers, 6-inch through 18-inch in size, and five pumping stations serving residents and businesses located in the northeasterly part of Waterford Township.

WATERFORD EXTENSIONS - PHASE III (2nd Section) - Cont'd.

Much of the construction was located in the vicinity of lake country adjacent to the Eagle, Woodhull and Oakland lake chain. Many sewers were constructed through narrow strips of land between permanent lake-front homes and the waters edge, and in one instance across open water to serve an island at the east end of Island Park Drive.

The firm of Johnson and Anderson, Inc. designed the system and prepared construction plans and specifications. Johnson and Anderson, Inc. also assisted in obtaining federal and state funding under the Public Law 92-500 grant program. Six construction contracts were awarded to four construction contractors; John Cavaliere Cement Contractors, Inc., Sterling Garrett Contracting Co., Inc., Ric-Man Construction, Inc., and Giannetti Brothers Construction Co., Inc. The total cost of construction was \$5,660,862.34. Approximately 72 percent of the project is eligible for 80 percent cost participation by the United States E.P.A. and the State of Michigan, jointly. More than 3.8 million dollars will be received when all project work is complete.

Construction of the system and all surface restoration are complete. Final construction payments to contractors should be processed within the first quarter of 1982.

WATERFORD EXTENSIONS - PHASE IV

The system consists of 47.6 miles of sanitary sewers, 6-inch through 30-inch in size, and four small submersible-pump, pumping stations serving residents and businesses located in the west-central portion of Waterford Township.

The firm of Johnson and Anderson, Inc. designed the system, prepared construction plans and specifications, and assisted in obtaining federal and state funding under the Public Law 92-500 grant program. All of this activity took place under a substantially accelerated schedule to permit the project to qualify for funding.

Ten construction contracts were awarded to nine construction contractors; M.C.S. & J.P. Harte, Pi-Con, Inc., Guymann Construction, Inc., Warren Contractors, Inc., Triangle Excavating Company, Rocco Ferrera & Co., Inc., DiPonio & Morelli Construction Co., Ric-Man Construction, Inc., and Union Construction Co. & Schaefer Lumber Co. The total cost of construction contracts was \$15,005,170.78.

Approximately 50 percent of the project is eligible for 80 percent cost participation by the United States E.P.A. and the State of Michigan, jointly. More than 6.7 million dollars will be received when all project work is complete.

Construction of the system and all surface restoration are complete. Final construction payments to contractors should be processed within the first quarter of 1982.

WATERFORD EXTENSIONS - PHASE V

The system consists of 75.4 miles of sanitary sewers, 6-inch through 21-inch in size, and fourteen submersible-pump, pumping stations serving residents and businesses located in the northwest corner of Waterford Township.

A substantial portion of the construction is located in the populated areas adjacent to the Van Norman, Lester, Lotus, Maceday and Williams lake chain, surrounding Huntoon Lake.

The firm of Johnson and Anderson, Inc. designed the system, prepared construction plans and specifications, and assisted in obtaining federal and state funding under the Public Law 92-500 grant program.

Fourteen construction contracts were awarded to six contractors; Giannetti Brothers Construction Co., Inc., Rocco-Ferrera & Co., Inc., Douglas M. Higgins, Inc., Ric-Man Construction, Inc., Sterling Construction Co., Inc., and Guymann Construction, Inc. The total cost of construction contracts was \$21,522,392.52.

Approximately 71 percent of the project is eligible for 80 percent cost participation by the United States E.P.A. and the State of Michigan, jointly. More than 13.4 million dollars will be received when all project work is complete.

Construction of the system has been completed. All remaining contract work, principally surface restoration, should be completed by mid-1982.

WEST BLOOMFIELD EXTENSIONS NO. 2

This system consists of 67.1 miles of sanitary sewer, 6-inch through 16-inch in size, and five lift stations serving residents and businesses located in the northwesterly one-third of West Bloomfield Township.

The system provides lateral sewer service to individual users in the high density developments of both old and new homes next to the shores of Cass, Green, Upper Straits, Middle Straits, Union and Pleasant Lakes.

A portion of this system presented a significant challenge to both the engineer-designer and the contractor. "Zox Lakeside Park" and the "Lagoon Addition" is a private subdivision of platted lots located on the northwesterly shore of Cass Lake and Gerundegut Bay. Much of the land within the plat was marshland with deep pockets of muck, marl, silt and peat soils with unstable qualities and a high ground water level.

In order to construct sanitary sewers on a stable foundation system the combined efforts of the Drain Commissioner's staff, the engineering firm of Hubbell, Roth and Clark, and the contractor, Guymann Construction Company developed a pile support system to be installed

WEST BLOOMFIELD EXTENSIONS NO. 2 - Cont'd.

without the use of enormous equipment or conventional pile driving hammers. Steel pipe piles were pushed and vibrated into the ground with calibrated machinery which produced no damaging effects on homes or bridges. That machinery was of the type used routinely for construction of sanitary sewers. Approximately 40,000 feet of steel pipe piles, more than seven and one-half miles, were constructed in some cases to depths of 85 feet below ground surface.

The firm of Hubbell, Roth and Clark designed the system and prepared construction plans and specifications. Hubbell, Roth & Clark also assisted in obtaining federal and state funding under the Public Law 92-500 grant program.

Thirteen construction contracts were awarded to nine construction contractors; Guymann Construction, Inc., J. P. Capello, Inc., Warren Contractors, Inc., Ric-Man Construction, Inc., Iannucci Contracting Co., Inc., Triangle Excavating Company, Ben P. Fyke & Sons, Inc., Imperial Construction Co., Inc., and S.B.G. Construction, Inc., and Union Co. and Schaefer Lumber Co. The total cost of construction contracts was \$15,555,418.81.

Approximately 41 percent of the project is eligible for 80 percent cost participation by the United States E.P.A. and the State of Michigan, jointly. More than 5.7 million dollars will be received when all project work is complete.

Construction of the system has been completed. All remaining contract work, minor surface restoration, should be completed by mid-1982. Final construction payments to contractors should all be processed within the third quarter of 1982.

WEST BLOOMFIELD EXTENSIONS NO. 3

This system consists of 3,700 lineal feet of sanitary sewer, 6-inch and 8-inch in size, to provide service for platted building sites south of Greer Road and east of Hiller Road, in West Bloomfield Township.

The firm of Hubbell, Roth and Clark, Inc., designed the system and prepared construction plans and specifications.

The contract for construction was awarded to Adamo Equipment Rental Co. of Detroit, Michigan on September 26, 1980, in the amount of \$67,623.75.

All contract work including surface restoration is complete. The final construction payment to the contractor should be processed by March 1, 1982.

WEST BLOOMFIELD EXTENSIONS NO. 4

Sanitary sewers included in this project were once a part of the Extension No. 2 project bid in 1978 for subsequent construction, but were deleted from that project when the cost to construct exceeded available funds. The need for the system remained, and surplus funds from prior years' sewer construction became available to finance the project.

West Bloomfield Township requested the extension of the system on January 5, 1981, and on February 5, 1981 the Oakland County Board of Commissioners established the project, transferred the estimated project cost of \$378,000.00 in surplus funds to the project account, and assigned project development and construction to the Drain Commissioner, as County Agency.

The project consists of 2.5 miles of sanitary sewers, 6-inch through 10-inch in size to serve residents of the subdivided area immediately south of Pleasant Lake, east of Halstead Road in West Bloomfield Township. The firm of Hubbell, Roth and Clark, Inc. designed the system and prepared construction plans and specifications.

Construction bids were received on June 23, 1981. The construction contract was awarded to Grove Cement & Construction Co., Inc. on July 8, 1981 in the amount of \$306,069.44. Contract work was approximately 85 percent complete by year end.

This water system project was approved by the Board of Commissioners on May 10, 1981. In response to a request from the Drain Commissioner, the Board of Commissioners approved the project and authorized the County Agency for project development and construction. Funds for the project were transferred from the County Agency to the Drain Commissioner to provide the necessary financing.

The system is composed of 2.5 miles of sanitary sewer main, 6-inch and 10-inch in size, and all necessary valves, fittings and appurtenances. The system will be constructed in two phases. The first phase will be the construction of the 2.5 miles of sanitary sewer main and 10-inch manholes. The second phase will be the construction of the 6-inch sanitary sewer main and 6-inch manholes. The estimated cost of the project is \$306,069.44. The project is being financed by the County Agency.

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WATER SUPPLY CONSTRUCTION

TROY WATER SUPPLY SYSTEM - DETROIT CONNECTIONS

The original design for the Troy system included several supply connections to Detroit's transmission mains. Two of these connections were not constructed under prior Troy contracts because of delays in construction of the Detroit mains. Two connections to the 84-inch Detroit main, a 30-inch at South Blvd. and Rochester Road, and a 24-inch at South Blvd. and Crooks Road, were constructed during 1980.

The firm of Hubbell, Roth & Clark, Inc. designed the connections, and prepared construction plans and specifications for receipt of bids June 3, 1980.

One construction contract was awarded to Ric-Man Construction, Inc. on June 9, 1980, in the amount of \$73,827.00. Construction is complete and the final construction payment to the contractor should be processed during the first quarter of 1982.

WATERFORD WATER SUPPLY SYSTEM - EXTENSION 5

This water system project was established by the Oakland County Board of Commissioners on May 20, 1980, in response to a formal request from Waterford Township, and assigned to the Drain Commissioner as the County Agency for project development and construction. Surplus funds from water system projects completed in prior years were transferred to provide the necessary financing.

The system is composed of 4.74 miles of water distribution mains, 8-inch and 12-inch in size, and all necessary valves, fittings and fire hydrants to service two areas of the Township. Approximately 94 percent of the system will be constructed near Clintonville and Mann Roads in the very northeast corner of the Township, and the remaining 6 percent along the southwesterly shore of Watkins Lake in Forest Street.

The firm of Johnson and Anderson, Inc. designed the system, and prepared construction plans and specifications for receipt of bids on July 19, 1980.

One construction contract was awarded to John Cavaliere Cement Contractors, Inc. on July 10, 1980, in the amount of \$385,582.75. Construction of the system was completed on December 22, 1980. Final restoration will be completed by May, 1982. The final construction payment to the contractor should be processed by mid-1982.

WATERFORD WATER SUPPLY SYSTEM - EXTENSION NO. 6

This water supply system project was established by the Oakland County Board of Commissioners on July 24, 1980. Project development and construction was assigned to the Oakland County Drain Commissioner, acting as County Agency. The \$865,000.00 estimated project cost is financed with funds provided by Waterford Township.

The project is composed of 5.42 miles of water transmission and distribution mains, 8-inch and 12-inch in size, and all necessary valves, fittings, and fire hydrants. Residents in six areas located in the northeasterly and southwesterly parts of Waterford Township will receive service.

The firm of Johnson and Anderson, Inc. designed the system, and prepared construction plans and specifications for receipt of bids on February 5, 1981.

One construction contract was awarded to Triangle Excavating Co., Inc. on February 18, 1981 in the amount of \$553,177.60. Contract work was approximately 70 percent complete by year end.

WEST BLOOMFIELD TOWNSHIP WATER - SECTIONS IV & V

The Oakland County Board of Commissioners established two separate projects for construction of water transmission mains in West Bloomfield Township. Project development and construction were assigned to the Drain Commissioner's office, as the County Agency, and surplus funds were transferred from projects completed in prior years to provide financing.

The Section IV project consists of 2,000 lineal feet of 16-inch water transmission main located in Drake Road from Maple Road, south, and a pressure-reducing valve chamber located near the intersection of 14 Mile and Farmington Roads. The Section V project consists of 4,800 lineal feet of 16-inch water transmission main located in Maple Road from Halstead Road, west, to Haggerty Road.

The firm of Hubbell, Roth & Clark, Inc. designed the systems and prepared construction plans and specifications. The construction contract was awarded to Pacentro Construction Company, Inc. on October 31, 1979, in the amount of \$232,252.40. Construction was completed on both Sections by mid-1980. Minor items of work at the pressure-reducing valve pit and minor surface restoration was completed in 1981. Final payment has been made to the contractor.

WEST BLOOMFIELD TOWNSHIP WATER - SECTION VI

This water system project was established by the Oakland County Board of Commissioners on March 13, 1980, and assigned to the Drain Commissioner as the County Agency for project development and construction. Surplus funds from water system projects completed in prior years were transferred to provide the necessary financing.

WEST BLOOMFIELD TOWNSHIP WATER - SECTION VI - Cont'd.

The system is composed of 1,639 feet of 20-inch transmission main and all necessary valves, fittings and fire hydrants. It is located in Walnut Lake Road between Drake and Halstead Roads and is a further extension of the growing water transmission and distribution system planned by West Bloomfield Township.

The consulting firm of Hubbell, Roth & Clark, Inc. designed the system and prepared construction plans and specifications. Construction bids were received on October 21, 1980. The construction contract was awarded to Pacentro Construction Company, Inc. on December 1, 1980, in the amount of \$74,501.50. Construction was completed during 1981.

All work is essentially complete except for several minor restoration problems. The final construction payment to the contractor should be processed by mid-1982.

COMPLETED PROJECTS - OPEN CONSTRUCTION ACCOUNTS

CLARKSTON-INDEPENDENCE EXTENSIONS

This system provides sanitary sewer service to the Village of Clarkston and the southwestern portion of Independence Township south of the I-75 freeway. Construction was completed several years ago and the system is in service. Construction accounts remain open because of a lawsuit and counter-suit filed by the contractor and the County, respectively, over the contractor's default in contracts T-3 and T-6.

WATERFORD EXTENSIONS - PHASE II

This system provides sanitary sewer service to the east-central portion of Waterford Township. Construction was completed several years ago and the system is completely in service. Construction accounts remain open because a lawsuit filed by the Contract 19 contractor remains unresolved.

PROPOSED PROJECTS

PROJECTS UNDER DEVELOPMENT

EVERGREEN-FARMINGTON POLLUTION CONTROL FACILITIES (SEWER)

Two, independent, sanitary sewer, interceptor systems known as the "Farmington" and the "Evergreen" were planned and designed in the mid 50's, and constructed in the late 50's and early 60's. The districts they serve are located in the south-central portion of Oakland County, from the City of Pontiac, south to Eight Mile Road. They have a common north-south boundary along the extended alignment of Inkster Road, the Evergreen to the east and the Farmington to the west.

Discharges from these two interceptors flow by a common connection to a City of Detroit Interceptor located at Eight Mile and Southfield Roads, and thence to the Detroit Sewage Treatment Plant. The Detroit Interceptor sewer carries both storm water and sanitary sewage, commonly called combined sewage. The Evergreen Interceptor also carries some combined sewage which was designed to spill only periodically into the Rouge River at control structures along its route during times of intense rainfall and limitations of downstream capacity.

Substantial growth has taken place in south Oakland County since the two interceptor systems were completed in the early 60's. The density and character of the growth in both districts have exceeded, substantially, that which was or could have been anticipated during the design phases. Consequently, physical capacities began to show severe strain and only periodic spills to the Rouge River became frequent spills. Growth and development in the districts continue today although the pace is much slower, but each increase adds to that strain.

Many new public regulations dealing with pollution of the waters of the state have been enacted within the decade of the 70's. As a result, stream water quality standards have been upgraded to a degree that requires much stricter control of pollutant discharges from all sources.

Much developed area within these districts is still served by onsite disposal through septic tanks and tile fields which for a variety of reasons do not function in their modern environment. Collector sewers must be constructed in such areas. New regulations also call for much stricter control over the discharge of combined sewer overflows. Such controls result in an increased demand for capacity to transport and treat sewage. Several sewage collector systems in the district constructed in earlier years contribute excessive non-sanitary flows of ground water or surface water origin. Such flows have increased the intensity of the problem.

Approximately sixteen years ago, the National Sewage Foundation engaged in a study of the future needs for sanitary sewer in the Detroit Metropolitan Area. The resulting report recommended that

EVERGREEN-FARMINGTON POLLUTION CONTROL FACILITIES (SEWER) - Cont'd.

sewage collection and treatment should be developed as a region-wide effort and that sewage should be transported via interceptor sewers directly to the Detroit Sewage Treatment Plant. The plan which developed included a requirement for a sanitary interceptor to provide capacity for, at least, the flows from these two districts. The construction of that interceptor has become the basis for the solution to the problem.

On-going studies for project development address many major considerations. Three of these have a considerable impact. Cost to construct the necessary facilities continues to escalate rapidly. Available capacities within the districts' interceptors and the Detroit outlet continue to dwindle. The cost of transportation and treatment of storm and other non-sanitary water inflows continues to grow to rather high proportions. This latter indicates that there is an increasing cost-effectiveness to reducing or eliminating non-sanitary flows.

The enactment of Public Law 92-500 and Public Law 95-217 offer strong incentives in the form of federal and state grant funding to conduct the intensive studies necessary to identify and provide solutions to problems of this nature. They also make grant funding available for design, preparation of construction plans and, ultimately, for construction of facilities judged to be eligible for participation. Although grant program laws, rules and regulations are currently under going further change, grant participation is expected to remain at the 80% level for this program.

Early in 1976, sixteen communities located in the districts requested Oakland County to apply for a Facilities Planning Grant (Step 1) and provided the twenty percent local share as an advance to finance studies. The Board of Commissioners approved that request and assigned the work to the Drain Commissioner's office, as County Agency under Act 342, Public Acts of 1939, as amended. A subsequent Step 1 grant application was filed and approved by the D.N.R. and E.P.A.

Hubbell, Roth and Clark, Inc. was selected as the consulting engineer to perform the study. The Drain Commissioner's staff continues to provide assistance in certain phases of the work.

The draft Facility Plan was completed in July, 1979. The findings indicated that further Step 1 studies were necessary concurrent with Phase 1 of a sewer system evaluation survey. This required additional local share funding which was requested from the sixteen communities. The findings further indicated that the program needs approach 44 million dollars for interceptors, 40 million dollars for combined sewer overflow controls, and 8 million dollars for sewer systems rehabilitation.

Detroit Facility Planning is also in progress. The plan includes additional outlet capacity for the Evergreen-Farmington district.

EVERGREEN-FARMINGTON POLLUTION CONTROL FACILITIES (SEWER) - Cont'd.

Eight of the sixteen communities within the districts have initiated Facility Planning for local needs. These efforts are expected to provide master plans for collector sewers within both developed and undeveloped areas. Construction for these needs could reach a level in excess of 50 million dollars for which grant funding could be up to 80 percent for the eligible portions.

OAKLAND TOWNSHIP EXTENSION NO. 2 (SEWER)

Late in 1979 and early 1980 owners of property located in south-central Oakland Township approached their Township officials and the Drain Commissioner's office with a request for Oakland County to construct a small, trunk sanitary sewer connecting to the Paint Creek Interceptor to serve a district easterly of Orion and Silverbell Roads. The project to be financed with private funds placed on deposit with Oakland Township.

The Oakland Township Board approved a contract on January 13, 1981 and the Oakland County Board of Commissioners on February 19, 1981. Project development and construction was assigned to the Drain Commissioner's office, as County Agency under Act 342, P.A. of 1939, as amended.

The construction firm of Giffels-Webster Engineers, Inc. was contracted to design the system and prepare construction plans and specifications. The system will be composed of approximately 4,900 lineal feet of 6-inch and 10-inch sanitary sewer. Bids for construction should be received by mid-year. The total estimated project cost is \$332,000.00.

SEWER SYSTEM EVALUATION SURVEY (SSES) - WATERFORD TOWNSHIP

In April of 1977, the United States E.P.A. approved a grant amendment requested by Oakland County, to the Waterford Township Facilities Plan of Study (Step 1) grant, under the Public Law 92-500 grant program, to conduct a Sewer System Evaluation Survey (SSES) for sanitary sewer systems, in the "Huron-Gardens", "Coleman-Friedman", and "Lorraine-Manor" subdivisions of Waterford Township. The need for the SSES was based on data contained in the Facilities Plan which identified excess inflow and infiltration (I/I) problems. The grant provided the funds to perform the tasks necessary to obtain an accurate determination of the sources of I/I and sufficient other information to develop recommendations for rehabilitation or replacement.

The consulting firm of Johnson and Anderson, Inc. was selected to conduct the survey. Stage I and II tasks consisting of flow metering, preparatory cleaning and internal inspection of sewers, and installation and monitoring of ground water level devices have been completed. Johnson and Anderson, Inc. should have the final report and recommendations ready for use early in 1982. Any appropriate rehabilitation or replacement work should follow soon afterward.

ORION TOWNSHIP EXTENSION NO. 2 (SEWER)

Orion Township officials initiated discussion with the Drain Commissioner's staff in October 1981 concerning the possible construction of a trunk sanitary sewer extension to the recently completed Oakland-Orion S.D.S. interceptor sewer to serve an area north of Greenshield Road in the vicinity of the M-24 highway corridor. The principal, immediate need is for service to the Orion Community schools complex on Scripps Road where sanitary sewerage needs are being provided by a troublesome onsite disposal system.

The proposed contract between Orion Township and the County of Oakland was approved by the Township Board on December 21, 1981. The Oakland County Board of Commissioners are expected to approve the contract on February 4, 1982, assign project development and construction to the Drain Commissioner's office as County Agency, and to transfer \$437,000 in surplus funds from prior years construction to finance the project work.

13-MILE ROAD ARM, SECTION 1

West Bloomfield Township has requested Oakland County to construct a sanitary sewer to serve the area of Maple and Halstead Roads in which the Township plans to construct a new fire station. The Township approved a contract on September 21, 1981 and the Oakland County Board of Commissioners approved the contract on October 22, 1981 and assigned project development and construction to the Drain Commissioner's office as County Agency. Surplus funds in the amount of the project cost of \$99,960.00 were transferred from prior years construction to finance the work.

The consulting firm of Giffels-Webster Engineers, Inc. was awarded the contract to design the system and prepare construction plans and specifications. The system will be composed of approximately 2,000 lineal feet of 6-inch and 8-inch sanitary sewer. Bids for construction should be received by mid-year.

WEST BLOOMFIELD WATER - SECTION VII

West Bloomfield Township has indicated its intention to request Oakland County to proceed with development of a project to construct a 20-inch water transmission main along the southerly limits of the City of Orchard Lake Village westerly from Orchard Lake Road. The formal request by the Township for a project estimated to cost \$680,000 is expected in January 1982. Approval by the Oakland County Board of Commissioners and assignment of the Drain Commissioner as County Agency for project development and construction is expected to take place early in February of 1982.

PLANNED DRAINS

AARON DRAIN

At the time of construction of the Owens Drain in the City of Southfield, the policy of the City was to only build trunk sewers and to let future development take care of the construction of laterals to the trunk line.

The Owens Drain replaced two open ditch county drains known as the Morgan and Griffin Drains. Portions of the open drains were used as laterals to the Owens Drain. Although the flows in the open ditches were greatly reduced, the cross-section dimensions of the ditches remained the same. Consequently, the flows in the ditches were not of sufficient volume and velocity to effect a cleansing action and allowed water to become stagnant and cause a nuisance for citizens residing in the area.

Because of the above-described nuisance and because development in the area has not resolved the problem, the City of Southfield petitioned the Oakland County Drain Commissioner to locate, establish and construct a county drain to serve these problem areas in Sections 26, 34 and 35. Such drain would serve as laterals to the Owens Drain and would replace sections of the Morgan and Griffin Drains.

After necessary hearings and determining that the proposed project was practical, the Drainage Board designated the project as the Aaron Drain and employed the engineering firm of Hubbell, Roth & Clark, Inc., to prepare plans and specifications for the drainage facility.

After the plans and specifications were prepared, the Board advertised for and received construction bids for the Aaron Drain on July 26, 1978. All bids were rejected by the Board because the bids far exceeded the estimated cost of the project.

Proceedings and all further work relative to the Aaron Drain have been suspended until such time as a method of financing the construction becomes available.

BALL DRAIN

Periodic flooding has occurred in Bloomfield Township in Sections 12 and 24. As a result of this localized drainage problem, the Township of Bloomfield petitioned the Oakland County Drain Commissioner to locate, establish and construct drainage facilities to alleviate the flooding. The petition described three separate drains. After consideration of the petition, and after necessary determinations and legal hearings, the Drainage Board determined that the project was practical and, since all three drains were included in the same petition, the three drains would be considered as one project. The Board designated the proposed project as the Ball Drain. The engineering firm of Hubbell, Roth & Clark, Inc., was employed to prepare plans and specifications for the proposed drain.

DI GIOVANNI DRAIN

The Township of West Bloomfield petitioned the Oakland County Drain Commissioner to locate, establish and construct a county drain under the provisions of Chapter 20 of Act 40 of the Public Acts of 1956, as amended. The petition was filed on July 18, 1979. At the first meeting of the Drainage Board held on July 25, 1979, the Board determined that the proposed project was practical and designated the project as the DiGiovanni Drain. The DiGiovanni Drain, as proposed, would serve an area east of Union Lake in Section 5 of West Bloomfield Township.

Proceedings on the DiGiovanni Drain have been suspended until such time as a method of financing the construction and an adequate outlet are available.

DOYON DRAIN

The Township of West Bloomfield petitioned the Oakland County Drain Commissioner to construct a Chapter 20 storm drain in Section 17 of the Township. Purpose of the proposed drain is to provide drainage for the Riding Club Addition to Twin Beach Country Club Subdivision. At the first meeting of the Drainage Board it was determined that the petition was sufficient and that the entire cost of the proposed project would be borne by the petitioner. The Board named the proposed facility the Doyon Drain. The firm of Giffels-Webster Engineers, Inc. was employed to prepare plans and specifications for the Doyon Drain. The project is being financed through the use of Community Development Block Grant Funds made available by the U. S. Federal Government. The estimated construction cost of the drain is \$190,000.00. Bids for the work will be taken on March 31, 1982.

INDEPENDENCE M-15 DRAIN

A public hearing was held in the Independence Township Hall in the matter of the application for the locating, establishing and constructing of a storm drain in Independence Township. The primary purpose of the drain would be to provide storm drainage for improvement and widening highway M-15 north of Dixie Highway.

Mr. Stanley R. Quackenbush, Deputy Director of the Michigan Department of Agriculture, explained that these proceedings were initiated by an application filed by the Michigan Department of State Highways and Transportation pursuant to the provisions of Section 32, Act 40, Public Acts of 1956, as amended.

Several persons at the hearing expressed comments regarding the proposed project. All were in favor of the drain. Mr. Quackenbush determined that the proposed drain was practical and necessary.

On June 28, 1978, the Oakland County Drain Commissioner determined that the application for the laying out and designating a drainage

INDEPENDENCE M-15 DRAIN - Cont'd.

district for said drain should be granted and that the said drain is practical, in accordance with the survey. The Drain Commissioner also determined that the name of the drain shall be the Independence M-15 Drain.

LARSEN DRAIN

A petition was filed by the Township of Avon with the Oakland County Drain Commissioner requesting that a drainage district be established in Section 2 of the Township. Upon receipt of the petition, the Drainage Board determined that the project was practical and that the drainage system would be designated as the Larsen Drain. The Larsen Drain is designed to provide storm drainage for the Whispering Heights Subdivision. The developer of the subdivision would be responsible for all costs associated with establishing the Chapter 20 Drain by means of a separate agreement with Avon Township. The engineering staff of the Oakland County Drain Commissioner was employed by the Board to prepare plans and specifications for the project.

MAPLEHURST DRAIN

A petition was filed with the Oakland County Drain Commissioner by the Township of Pontiac. The purpose of the petition was to institute proceedings for enclosing a section of the existing Maplehurst Drain.

Upon receipt of the petition, the Drain Commissioner appointed Michael J. Warren, James L. Reid and Arthur W. VanBrook as a Board of Determination. The Board of Determination held a meeting at the proposed project site and, after hearing comments from a number of residents and officials present, the Board determined that the drain was necessary for the protection of the Public Health in the municipalities of Avon and Pontiac Townships and that the whole cost thereof, except that which may be apportioned for benefits to highways, shall be apportioned to said municipalities at large.

A contract by and between the Oakland County Drain Commissioner and the firm of Orchard, Papke, Hiltz & McCliment, Inc., was signed. The engineering firm, under authority of the provisions of said contract, will supply plans, specifications, estimate of cost and certain other engineering services for the proposed project.

PATNALES DRAIN

A petition to locate, establish and construct an intra-county drain was filed with the Oakland County Drain Commissioner by the City of Novi and the Township of Farmington.

The proposed drain would have at its point of beginning a location on the west line of Section 35 in the City of Novi in the Walled Lake Branch of the Middle River Rouge and continue northeasterly to

PATNALES DRAIN - Cont'd.

Meadowbrook Lake; thence continuing northeasterly across Meadowbrook Lake to the Ingersall Creek; thence continuing northeasterly in Ingersall Creek to the Francis Drain and then continuing along the route of the Francis Drain across the Interstate 96 to its upper terminus in Section 18.

The Drainage Board, after necessary hearings and legal proceedings, determined that the proposed project was practical and designated the project as the Patnales Drain.

The engineering firm of Johnson & Anderson, Inc., was employed by the Board to prepare construction plans and specifications for the Patnales Drain.

Construction plans and specifications have been delivered to the Drainage Board.

PATTERSON DRAIN

A petition to locate, establish and construct an intra-county drain was filed with the Oakland County Drain Commissioner by the Townships of Commerce and West Bloomfield. The proposed drain would receive excess water from Lower Straits Lake and transport the water to the Huron River. Periodic flooding has occurred along the route of the present outlet channel. Upon receipt of the petition, the Drainage Board determined that the project proposed therein was practical and the Board designated the project as the Patterson Drain.

The engineering firm of Johnson & Anderson, Inc., was employed by the Board to prepare construction plans and specifications for the project. Plans and specifications for construction of the Patterson Drain have been delivered to the Board by Johnson & Anderson, Inc. Further proceedings in construction of the drain have been delayed because of difficulty obtaining easements necessary for construction of the drain.

SIMSON DRAIN

Because of an existing drainage problem in the southwest quarter of Section 35 of the City of Southfield, the City petitioned the Oakland County Drain Commissioner to locate, establish and construct an intra-county drain. The drain would have as its outlet the existing Eight Mile Road Drain and would serve an area north of Eight Mile Road, roughly bound by Eight Mile Road, Boening, Melrose and Stahelin Streets.

After determining that the proposed project was practical, the Drainage Board designated the project as the Simson Drain and employed the engineering firm of Hubbell, Roth & Clark, Inc., to prepare construction plans and specifications for the drain.

SIMSON DRAIN - Cont'd.

Proceedings on the Simson Drain have been suspended until such time as a method of financing the project becomes available.

THORNTON DRAIN

The City of Troy petitioned the Drain Commissioner to locate, establish and construct an intra-county drain to serve an area in Section 2 of the City. The proposed drain would replace a portion of the Renshaw and Ferry Drains north of Square Lake Road and east of Rochester Road. It would also serve as an overflow from Emerald Lakes.

Several large housing developments in the area of the proposed improvement have overloaded existing storm drainage facilities and have caused some flooding and severe erosion to the existing drains.

After the necessary hearings and legal proceedings, the Drainage Board determined that the project was practical and necessary. The Board designated the proposed project as the Thornton Drain.

The engineering firm of Hubbell, Roth & Clark, Inc., was employed to prepare plans and specifications for construction of the Thornton Drain.

The project has been delayed because of difficulties encountered in obtaining the necessary easements for construction of the drain.

PROPOSED DRAINS

ATCHISON DRAIN

The City of Birmingham and the Village of Beverly Hills petitioned the Oakland County Drain Commissioner to locate, establish and construct an intra-county relief drain in the two municipalities located in Sections 35 and 36. The relief drain would be designed to intercept existing storm sewers in the two political subdivisions. Primarily the facility would supplement and relieve the Acacia Park Drain that presently serves the area.

After necessary determinations and legal proceedings, the Drainage Board employed Johnson & Anderson, Inc., Registered Professional Engineers of Pontiac, Michigan, to prepare plans and specifications for the proposed project.

The Atchison Drain has been delayed because it is a combined sewer and discharges to the Rouge River. The Michigan Department of Natural Resources has withheld approval of a permit pending further study.

CLAIRE DRAIN

The City of Southfield, under provisions of Chapter 20 of the Drain Code, petitioned the Oakland County Drain Commissioner to locate, establish and construct a drain in Sections 22, 27 and 28 of the City. The purpose of the drainage project would be to relieve flooding in the Rouge River between the 696 freeway downstream to a point several hundred feet west of Lahser Road. The Drainage Board designated the proposed project as the Claire Drain.

Early in the legal proceedings by the Board, it was learned that there were many citizens living in the area affected by the drain that were very concerned about the environmental damage that could occur because of construction of the drain as conceived in the petition.

The Drainage Board ordered that an Environmental Impact Statement be prepared before proceeding with construction. The Board employed the firm of Hubbell, Roth & Clark, Inc., to prepare plans, specifications and an Environmental Impact Statement for the project.

Plans, specifications and the EIS were completed and delivered to the Board by Hubbell, Roth & Clark, Inc. All were accepted and approved by the Board.

At the request of the City of Southfield, the Board accepted bids for construction of a portion of the Claire Drain immediately west of Lahser Road. The City required the project to be completed in this area because of construction of their headquarter's fire station immediately adjacent to the Claire Drain. This was an area where extensive erosion had occurred and, in order to protect the integrity of the stream banks, it was necessary to construct a Gabion Retaining Wall as part of the construction. Construction of the Gabion Retaining Wall has been completed.

Construction of the remaining portions of the Claire Drain has been delayed because of difficulty in easement acquisition and financing the project.

FORTINO DRAIN

Due to very poor drainage facilities in the Sylvan Manor area of West Bloomfield Township in Sections 1 and 12, the City of Sylvan Lake and the Township of West Bloomfield petitioned the Oakland County Drain Commissioner to locate, establish and construct a storm drain to relieve the problem.

The proposed drain would originate in the vicinity of the intersection of Woodrow Wilson Boulevard and Empire and proceed southerly to its lower terminus in an existing channel located at the rear of Lots 109 and 112 of the Pine Lake Manor Subdivision. The drain would discharge into Pine Lake through the channel.

FORTINO DRAIN - Cont'd.

The firm of Giffels-Webster Engineers, Inc. prepared plans and specifications for the project.

Residents surrounding Pine Lake vigorously objected to the drain outletting to Pine Lake and because of environmental concerns instituted legal action. Their allegation, which the court concurred with, was that pollution carried by storm waters from the drain would have a deleterious effect on Pine Lake. To settle the lawsuit, a lesser modified version of the project acceptable to the Homeowner's Association was designed. The City of Sylvan Lake has withdrawn from this lesser modified design feeling it does not benefit their residents, leaving West Bloomfield Township as the sole petitioner. The project is being held in abeyance due to the lack of available financing.

JOACHIM RELIEF DRAINS

The City of Pontiac petitioned the Oakland County Drain Commissioner to locate, establish and construct a drain in the northeastern section of the City, south and west of Galloway Lake. The proposed drainage facility would outlet into the Clinton River by way of the Galloway Creek.

After receiving the petition from the City of Pontiac, the Drainage Board employed Jones & Henry Engineers Ltd., to prepare construction plans and specifications for the proposed project. Because of environmental concerns, the Board also had an Environmental Impact Statement prepared.

Construction plans and specifications were delivered to the Drainage Board by Jones & Henry and bids for construction of the Joachim Relief Drains were received by the Board. The contract for construction was awarded to Rocco Ferrera Co., Inc., subject to the sale of bonds.

Environmental concerns and difficulty in obtaining necessary construction permits delayed financing of the project. As a result, the period of time during which the bid was held firm by the Rocco Ferrera Co. expired. The project then was dormant until 1977. Plans to reinstitute the project then were hampered by the Corps of Engineers who informed the Drain Office that a 404 permit would have to be acquired from their office. Plans were then sent to the Corps of Engineers for their review. The U. S. Department of the Interior (Fish and Wildlife Service) rejected the design outlet for the proposed project for ecological reasons and suggested an alternate location.

The project again became dormant until October 1981, when the City of Pontiac adopted a resolution requesting the Drain Commissioner to proceed with the project, resolve the problems with the Corps of Engineers, and update the construction plans.

JOACHIM RELIEF DRAINS - Cont'd.

The Engineering Department of the Drain Commissioner's office will replace Jones & Henry as the design engineers. The anticipated bid date for this project is late Fall, 1982.

LEWAND DRAIN

The Charter Township of Waterford petitioned the Drain Commissioner on December 7, 1979 to locate, establish and construct a drain to serve a portion of the Township in Sections 25 and 36 roughly bounded by Highland Road (M-59), Telegraph Road and Voorheis Road. The drain would begin near Highland Road and proceed southerly to its outlet into Sylvan Lake. The engineering firm of Johnson & Anderson, Inc. was employed to prepare plans, specifications and an estimate of cost of the Lewand Drain.

Further work on the Lewand Drain has been suspended due to difficulty in financing the project.

MAINLAND DRAIN

The Mainland Drain was petitioned for by the Charter Township of Waterford and the County of Oakland.

The purpose of the drain is to improve drainage in the Oakland County Service Center located in Waterford Township and the City of Pontiac. It would also serve as an outlet for drainage for an area north of the Pontiac Mall shopping center and south of Pontiac Lake Road which is presently being developed. The proposed drain would have as its point of beginning a point located in the Augusta Drain approximately 150 feet south and 250 feet west from the northeast corner of Section 30, Pontiac Township, and would proceed northwesterly through the Oakland County Service Center to its point of ending at Pontiac Lake Road approximately 270 feet west of the centerline of Telegraph Road.

The Drainage Board determined that the proposed project was practical and designated the project as the Mainland Drain. The City of Pontiac indicated that it would not object to the project if they would be removed from any financial obligations for the project, and if retention was used to limit the flow to the Augusta Drain.

The engineering firm of Johnson & Anderson, Inc., was employed to prepare construction plans and specifications for the proposed project.

The project has been delayed because of problems with right-of-way and difficulty in financing the project.

MOFFITT DRAIN

Petition to locate, establish and construct an intra-county drain was filed in the office of the Oakland County Drain Commissioner by the Charter Township of Waterford.

MOFFITT DRAIN - Cont'd.

After necessary legal proceedings and hearings, the Drainage Board determined that the proposed project was practical and designated the project as the Moffitt Drain.

Primarily the Moffitt Drain would replace an existing county drain known as the Pontiac Creek Extension Drain. The drain would extend from Telegraph Road at a point approximately 1,320 feet southwest of the intersection of Dixie Highway and Telegraph Road and proceed westerly to Alhi Street in Waterford Township. Improvement of drainage facilities is necessary because of intense development in the Pontiac Creek Extension drainage area. Severe flooding is occurring in the westerly portion of the district.

The engineering firm of Johnson & Anderson, Inc., was employed to prepare plans and specifications for construction of the project.

Further proceedings on the Moffitt Drain have been suspended because of difficulty in financing the project.

NOWAK DRAIN

The City of Southfield petitioned the Oakland County Drain Commissioner to locate, establish and construct an intra-county drain in Section 17 of the City.

The drain would begin at the Pernick Drain where it crosses the Northwestern Service Drive, at a point 400 feet northwesterly of Case Avenue, and proceeding thence southeasterly in the Northwestern Service Drive to its intersection with Lockdale Road; thence northerly in Lockdale Road to its intersection with 12 Mile Road.

After receiving the petition, the Drainage Board determined that the proposed project was practical and designated the project as the Nowak Drain. The Board employed the engineering firm of Hubbell, Roth & Clark, Inc., to prepare construction plans and specifications for the project.

The Nowak Drain has been delayed pending construction of the Pernick Drain.

Proceedings on the Nowak Drain have been suspended until such time as a method of financing the project becomes available.

PERNICK DRAIN

Because of continuing intense development in portions of the City of Southfield, flows in existing drainage structures and watercourses have been overburdened and flooding has occurred in periods of heavy precipitation.

PERNICK DRAIN - Cont'd.

In order to relieve one such problem area, the City of Southfield petitioned the Oakland County Drain Commissioner to locate, establish and construct an intra-county storm drain. The drain would follow a tributary of the Rouge River from a point approximately 600 feet west of the east property line of the Holy Sepulchre Cemetery property in the northwest quarter of Section 20 and proceed northerly along the Pebble Creek Branch to approximately one-half mile north of Twelve Mile Road.

The Drainage Board determined that the proposed project was practical and designated the project as the Pernick Drain. The engineering firm of Hubbell, Roth & Clark, Inc., was employed to prepare construction plans and specifications for the drain.

Further proceedings on the Pernick Drain have been delayed because of environmental concerns and difficulty in financing the project.

PRICE DRAIN

Severe flooding has occurred to properties adjoining Sylvan Lake, Otter Lake and Cass Lake in recent years. During periods of intensive precipitation and heavy spring runoff, damage has been sustained by low lying properties in the vicinity of these lakes due to inadequate facilities to control the levels. The area most affected is west of Telegraph Road in West Bloomfield and Waterford Townships. The lakes are a part of the Clinton River system. Recent intensive development upstream from the lakes has increased the velocity and volume of runoff and has caused present control facilities to become inadequate. Present control of the levels of these lakes requires regulation of the Dawson Mill Pond dam, controlled by the City of Pontiac, and operation and control of dams on Cass Lake, controlled by the Oakland County Drain Commissioner. Coordination of these two efforts in the past has occasionally been difficult.

Because of the difficulty of maintaining constant levels in the Clinton River and the subject lakes, the Charter Township of Waterford and the City of Sylvan Lake petitioned the Oakland County Drain Commissioner to locate, establish and construct an intra-county drain under provisions of Act 40 of the Public Acts of 1956, as amended.

The Drainage Board determined that the proposed project was necessary for the public health and was practical and designated the project as the Price Drain. At the hearing held on September 8, 1976, there were several objections registered to the project and the hearing was adjourned.

Because the original petition did not include the Dawson Mill Pond dam, an amended petition was submitted by the City of Keego Harbor, the Township of West Bloomfield, the Township of Waterford and the City of Sylvan Lake. The amended petition includes the Dawson Mill Pond dam.

PRICE DRAIN - Cont'd.

The engineering firm of Hubbell, Roth & Clark, Inc., was employed by the Drainage Board to prepare a study with regard to proposed Clinton River Improvements from and including the Dawson Mill Pond dam and the Clinton River system upstream through Cass Lake. The report has been completed and has been delivered to the Drainage Board.

The U. S. Army Corps of Engineers, under the direction of Project Engineer Dennis Oakes, is also making a study of improvements to relieve flooding problems in this area.

On December 20, 1979, the Drainage Board tentatively determined that the project proposed in revised petitions submitted by the City of Keego Harbor, City of Sylvan Lake, Township of West Bloomfield and the Charter Township of Waterford were of sufficiency and that the project proposed therein was practical.

RICHARDS DRAIN

A petition was filed in the office of the Oakland County Drain Commissioner to locate, establish and construct an intra-county drain by the Township of Waterford.

The Township petitioned for a new drain to replace the existing Drayton Plains Drain and Drayton Plains Extension Drain and also included some areas that were not serviced by the present facility.

Relief of the present drains is necessary because the area served by the Drayton Plains Drain has experienced intense development. The area served by the proposed facility includes industrial, as well as extensive commercial and residential development.

The Drainage Board determined that the project was practical and designated the proposed drainage project as the Richards Drain. The engineering firm of Johnson & Anderson, Inc., was employed to prepare plans and specifications for construction of the project.

Further proceedings on the Richards Drain have been suspended due to difficulty in financing the project.

FINANCIAL STATEMENTS

A full financial statement for each drainage district which includes an itemized statement of the various accounts maintained for the funds received by the Oakland County Drain Commissioner in connection with the construction, operation and maintenance of all of the projects under the jurisdiction of the Oakland County Drain Commissioner are contained in Volume II of this Annual Report.

Reference should be made to the Table of Contents of the Financial Statements in Volume II for reference to any specific project or fund account.