

STATE OF MICHIGAN
MICHIGAN GEOLOGICAL AND BIOLOGICAL SURVEY

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DRAINAGE IN MICHIGAN

BY

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PREPARED UNDER THE TERMS OF AN AGREEMENT
BETWEEN THE
MICHIGAN GEOLOGICAL AND BIOLOGICAL SURVEY

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LETTER OF TRANSMITTAL

To the Honorable, the Board of Geological Survey.

Albert E. Sleeper, Governor.

Fred L. Keeler, Superintendent of Public Instruction.

Frank Cody, President of the State Board of Education.

Gentlemen:—I have the honor to transmit for publication a report on the drainage situation in Michigan. In recent years various proposals for State aid in drainage problems have been brought forward for the consideration of the Legislature. Through conferences with members of the Legislature, county drain commissioners, the State Highway Commissioner, judges, members of the State bar and others in official and civil life who have had to do with the drainage problems in their various ramifications it appeared that a thorough inquiry into the whole situation should be made preliminary to any material modification of or addition to the present laws and the administrative system which has been developed under them.

There is no special reason why this inquiry should have been initiated by the Board of Geological Survey; it may as well have been made by some other appropriate State agency. It was not until it became apparent that no inquiry would be made or perhaps could be made except through your Board that you consented to the plan which I laid before you late in 1917. Pursuant to this plan, early in 1918, an agreement was entered into between the Board of Geological Survey and the Bureau of Public Roads, U. S. Department of Agriculture which contained the following governing provisions:—

(a) The acquisition of complete and accurate information concerning the existing drainage conditions in Michigan.

(b) In so far as possible, the ascertainment of present and future drainage needs in Michigan.

(c) The study of the relations of drainage to other inter-related problems.

(d) Preparation of abstract of the drainage laws of other States having problems similar to those in Michigan.

(e) Recommendations for improvement in the general drainage situation in Michigan.

(f) The preparation of the manuscript and illustrations of a report which shall embody a complete account of the investigations and conclusions based thereon.

Pursuant to this agreement investigations were commenced and during 1918 every county in the State was visited by a representative of Drainage Investigations, Bureau of Public Roads, U. S. Department of Agriculture. The general plan followed in each county was to first meet the county drain commissioner and confer with him relative to the drainage situation in that county. Following this conference the drain records were examined and such data abstracted and compiled as was desired, the method followed in the different counties being as nearly uniform as was possible. In many of the counties the county surveyor was interviewed as was also the county clerk, treasurer, and such other officials and individuals as might have particular knowledge of or interest in drainage and as could be readily interviewed. In many of the counties, field trips were made and drains inspected in order to arrive at a better understanding of the practical phases and results obtained by the drains under actual working conditions. The investigations in the counties were made by Dalton G. Miller, Perry T. Simons, and Fred F. Shafer, Senior Drainage Engineers, Bureau of Public Roads.

Conditions beyond the control of either party to this investigation made it impracticable to secure all the assistants needed for the work, and it was not therefore possible to complete some parts of the investigation as had been originally planned, which would have made certain details of the report more complete.

In addition to the information obtained in the manner as outlined, the authors of this report have drawn upon such other reports and publications as in their opinions would throw any additional light on the whole drainage situation in Michigan. The single idea has been to make the report as complete as possible, working within the time and appropriation limits, and still keep it concise.

Certain parts of the report would have been amplified had time and means been less limited but I think it covers the subject in its present form in a way that will meet the purpose for which it has been prepared and any further delay in publication would make it unavailable for use in the impending session of the Legislature.

Thanks are tendered to the County Drain Commissioners, supervisors and other county officials without whose cooperation this report could not have been prepared.

Very respectfully yours,
R. C. ALLEN.
Director.

Lansing, Michigan.
Dec. 6, 1918.

CHAPTER I. CONDITIONS AFFECTING DRAINAGE

RAINFALL AND CLIMATE

Rainfall in different parts of Michigan varies but slightly. In the Southern Peninsula, the total annual rainfall ranges from between 25 and 40 inches and averages about 33 inches, and in the Northern Peninsula it ranges about the same with an average of 34 inches.

The climate* of Michigan is insular to a marked degree on account of the Great Lakes.

The mean annual temperature of Southern Michigan as a whole, is about forty-six degrees, ranging from forty-nine degrees in the extreme southwestern part to forty-two degrees in the extreme northeastern portion. The mean temperature of the Northern Peninsula is about forty degrees. The average maximum, or day temperature, ranges from about eighty-two degrees in summer to twenty-eight degrees in winter, and the average minimum, or night temperature is approximately fifty-seven degrees in summer and twelve degrees in winter. Extreme temperatures of one hundred degrees or more are not of frequent occurrence, although they have been recorded at some places on one or two days, during a majority of the summers in the past twenty-five years. Zero temperatures are an invariable rule during most winter months in the northern half of the Southern Peninsula; in the southern half of the Peninsula zero temperatures usually occur, although there have been some winters in the extreme southern counties when there has been an entire absence of zero temperature.

*C. F. Schneider, "Climatic Conditions of Michigan," Michigan Geological and Biological Survey. Pub. 25, Geol. Series 21. 1917.

TOPOGRAPHY

The surface topography of the Southern Peninsula varies from level to hilly, extreme elevations ranging from 580 feet to about 1,700 feet above sea level.

The surface of the Northern Peninsula ranges from level to mountainous, although the per cent of rugged area proper is very small as shown below under the classification of "rocky knobs and ridges." The extreme variation in altitude in the Northern Peninsula is from 580 feet to 2,023 feet above sea level.

The surface slopes of both Peninsulas of the State, in so far as related to drainage, generally average between 3 to 7 feet to the mile although some of the larger streams have slopes of less than three feet per mile.

SOILS

Michigan lies in a heavily glaciated area and as a result the soils of both Peninsulas are very complex in the matter of distribution and range in texture. In different sections of the State certain types predominate and in many sections several distinct types will be found within very small areas.

The total areas of the principal types of soils have been classified by Leverett in Surface Geology of Michigan, Publication 25, Geological Series 21 as follows:

Southern Peninsula: Swamp and lake 11.60%, clayey and sandy till 55.20%, sandy and gravelly 33.20%.

Northern Peninsula: Swamp and lake 25.00%, clayey and sandy till 49.02%, sandy and gravelly 17.50%, rocky knobs and ridges 8.00%.

CHAPTER II. WET LANDS OF MICHIGAN

Michigan, generally, is given fifth place among the States in area of swamp and overflow lands, Florida, Louisiana, Mississippi, and Arkansas being placed ahead. Swamp and overflow lands do not, however, form a fair basis for comparison among the States of the total areas which will be benefited by drainage nor do they form a fair basis in any one particular State for estimating the actual agricultural benefits which will result from drainage.

In the first place there is much land which properly may not be classed as swamp or overflow land but which by proper drainage will receive benefits almost—if not wholly—equal to those that result from the drainage of these two types of wet land. This applies particularly to the clayey soils, which are usually rich in available plant foods, but through which, because of the fineness of the clay particles, soil moisture travels but slowly. As a result this type of soil, although frequently not appearing actually too wet and which may not even be low lying, is prone to retain an excess of free water and for this reason warms but slowly during the early spring months. These lands, frequently and with reason, are referred to as being cold and damp. By surface drainage, and thorough tiling the productivity of such land may be greatly increased and sometimes more than doubled. Therefore it is almost impossible to overestimate the actual monetary value of adequate drainage to any agricultural community, where there is as much of this kind of soil as there is in Michigan. It has been estimated* that about 22 per cent of the Southern Peninsula and about 15 per cent of the Northern Peninsula are of a clayey type.

as much as has been spent on county drains within these counties during the last 20 years.

In addition to the area of 2,175,000 acres of reclaimable wet land in the 47 counties just mentioned, it has been similarly estimated, as shown in Table No. 2, that there are 661,000 acres of reclaim-able wet lands in the 21 counties of the Southern Peninsula lying north of the U. S. Land Office 2d Correction Line. There has been spent for drainage in these 21 counties in the last 20 years a total of but \$125,316.

The character of the wet lands of this part of the State varies widely, the soil ranging from a clayey type to sand. Methods of reclamation of the clayey lands have been well worked out in the southern part of Michigan and in many of the other States. The sandy lands and those swamps in which a thin layer of muck overlies the sand, should be reclaimed on a large scale only after careful consideration is given to the methods of drainage and the uses to which the lands will be put after drainage.

TABLE No. 2.
Showing Estimated Areas of Reclaimable Wet Lands in the North 21 Counties of the Southern Peninsula of Michigan.

Counties.	Areas of Counties (Acres).	Reclaimable Wet Lands.	
		Estimated areas (acres).	
Alcona.....	435,247	48,000	
Alpena.....	371,152	101,000	
Antrim.....	305,558	8,000	
Benzie.....	204,192	8,000	
Charlevoix.....	266,225	10,000	
Cheboygan.....	482,440	73,000	
Crawford.....	359,546	11,000	
Emmet.....	300,885	29,000	
Grand Traverse.....	220,278	14,000	
Iosco.....	354,822	33,000	
Kalkaska.....	359,669	8,000	
Leelanau.....	220,234	24,000	
Manistee.....	350,101	43,000	
Missaukee.....	363,290	58,000	
Montmorency.....	356,529	18,000	
Ogemaw.....	366,811	26,000	
Oshtemo.....	364,789	20,000	
Oshtemo.....	334,273	15,000	
Presque Isle.....	428,873	53,000	
Roscommon.....	338,315	56,000	
Wexford.....	366,676	4,000	
Totals.....	7,138,188	661,000	

SWAMP AND WET LANDS OF THE NORTHERN PENINSULA

The data relative swamp land for the different counties of this Peninsula as shown in Table No. 3 were compiled as shown on the original survey plats of the United States Land Office. Because of the generally undeveloped agricultural conditions of the Northern Peninsula of Michigan no effort has been made to estimate the reclaimable wet land area of this part of the State.

As indicated by the table there are 2,598,000 acres of swamp lands in this section of the State which is very nearly 25% of the total area of the Northern Peninsula. There has been but little effort made to reclaim any of this, as only 4 of the counties have spent anything whatever on county drains; the total to date amounting to but \$8,528 spent on about 12 miles of ditches. In

addition to this there have been some 70 or 80 miles of open ditches constructed by individuals and corporations under land development schemes. The area of land fully reclaimed and made suitable for farming by these schemes has been very small.

The possibilities of drainage for improving the almost wholly undeveloped agricultural resources of the Northern Peninsula are only just beginning to be generally appreciated and only then in those counties where agriculture is well established.

TABLE No. 3.
Swamp Lands in Northern Peninsula of Michigan.

Counties.	Areas Counties (Acres).	Swamp lands.	
		Area in Acres.	Per cents of counties.
Alcona.....	589,949	121,500	20.6%
Alpena.....	583,806	74,800	12.8%
Chippewa.....	999,060	340,500	34.0%
Delta.....	748,915	234,500	31.3%
Dickinson.....	491,925	110,500	22.5%
Gogebic.....	712,033	82,000	11.5%
Houghton.....	647,406	49,300	7.6%
Iron.....	760,143	115,300	15.2%
Keweenaw.....	348,468	50,000	14.4%
Luce.....	582,654	223,500	38.4%
Mackinac.....	650,255	239,000	36.8%
Marquette.....	1,182,851	235,000	19.9%
Menominee.....	670,279	292,700	43.7%
Ontonagon.....	844,754	27,200	3.2%
Schoolcraft.....	758,096	382,200	50.4%
Totals.....	10,571,544	2,598,000	Av. 24.6%

In addition to the part that drainage will play in the development of such of the swamp lands of the Northern Peninsula as may be profitably reclaimed, the history of the south half of the Southern Peninsula is sure to be duplicated to the extent that a large per cent of the clayey lands will also require drainage. As stated previously it has been estimated that almost 15 per cent of the soil of the Northern Peninsula is of a clayey type. This 15 per cent is largely in addition to the estimated 25 per cent of swamp land.

SUMMARY OF WET LANDS OF MICHIGAN

In a general way the wet land situation of Michigan can be summarized as follows. The estimates for the two Peninsulas are essentially different in character and are not comparable:

Southern Peninsula.
Reclaimable wet Lands:

47 southern counties	2,175,000 acres
21 northern counties	<u>661,000 acres</u>
Total for the 68 counties	2,836,000 acres

Northern Peninsula
Swamp and Lakes:

Total for the 15 counties	2,598,000 acres
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In addition to the swamp and lake land the Northern Peninsula has about 1,586,000 acres of clayey land much of which will need drainage if the agricultural possibilities are to be fully realized.

CHAPTER III. DRAINAGE IN MICHIGAN

EARLIER DRAINAGE

As stated elsewhere in this report the first comprehensive drain law of Michigan was passed in 1839. Between 1839 and 1897 considerable drainage was done under both county and township systems but in compiling the statistics for the different counties no general attempt was made to ascertain the amount so expended as in many cases the township records were unobtainable and many of the earlier county records were incomplete and difficult of access.

Some little information relative to that part of the earlier drainage which is properly of the nature of county work was obtained in a few of the counties. The amounts recorded in Table No. 4 probably very nearly represents the total so spent during the inclusive periods. In most of the counties much more was spent on public drains during the same period but spent under the township plan. This may be of passing interest and is contained in the following table. No information is at hand relative to the number of miles of drains on which these sums were expended excepting for Wayne County, which expenditures for the period from 1859 to 1897 were on about 1,050 miles.

TABLE No. 4.
Early Expenditures on County Drains.

County.	Period.	No. years.	Expenditures.
Branch.....	1861-1897	37	\$ 36,157 76
Calhoun.....	1871-1897	27	29,901 54
Cass.....	1871-1897	27	28,827 04
Hillsdale.....	1861-1897	37	26,126 18
Jackson.....	1867-1897	31	52,469 25
Kalamazoo.....	1878-1897	20	7,285 87
Oakland.....	1863-1897	35	104,940 40
Ottawa.....	1894-1897	4	10,639 73
St. Joseph.....	1887-1897	11	10,500 36
Van Buren.....	1882-1897	16	96,964 21
Wayne.....	1859-1897	39	516,423 21

DEVELOPMENT OF COUNTY DRAIN SYSTEM

Drainage in Michigan, under the county system as known at the present time, dates back a little more than 20 years when the county drain commissioners were given supervision of all county drains by Act 254 of the Michigan Laws of 1897. At present county drain commissioners are serving in 70 counties of the State; sixty three are located in the Southern Peninsula and 7 in the Northern Peninsula. Thirteen counties: Antrim, Crawford, Kalkaska, Oscoda and Otsego in the Southern Peninsula, and Baraga, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Mackinac and Schoolcraft in the Northern Peninsula are without county drain commissioners.

During the 20-year period from 1898 to 1917 expenditures were made on county drains in 63 of the 83 counties of the State. The following twenty counties, of which the first nine are in the Southern Peninsula and

the remaining eleven in the Northern Peninsula, have spent nothing: Alcona, Antrim, Crawford, Kalkaska, Leelanau, Montmorency, Ogemaw, Otsego, Oscoda, Alger, Baraga, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Marquette, and Schoolcraft. One of these counties, Alcona, during 1917, established its first drain so that this county might almost properly be excluded from the list as the county records will show expenditures in 1918. However, strictly speaking these will not have been made within the 20-year period, and no expenditures are shown for Alcona in Table No. 5, although a cost analysis has been made of the expenditures for one drain as shown in Table 6.

Expenditures on County Drains

Table No. 5 shows expenditures in the State as a whole and in each county during the 20-year period from 1898 to 1917 inclusive.

In the chart in Figure 1 the different counties of the State have been arranged in the order of total expenditures for these 20 years and at the right hand side of the chart the expenditures in the different counties are compared graphically.

The average amount spent annually in the State on county drains has been \$942,978 and totals \$18,859,576 for the 20 years. Of this amount all except \$135,209 has been spent in the 47 counties of the Southern Peninsula lying south of the U. S. Land Office 2nd Correction Line about latitude 44°-10', crossing the State just south of Manistee, Cadillac and Tawas City. This represents, for these 47 counties, an average per county of \$398,390 for the 20 years; and a yearly average per county of \$19,920.

The chart in Figure 2 shows graphically the annual expenditures and clearly illustrates that the trend, although fluctuating to some degree, has been decidedly upward from 1898 to 1917 as the increase from \$285,555 in 1898 to \$1,683,457 in 1917 represents an increase of 490 per cent in 20 years.

As nearly as could be determined from the many records examined the total of \$18,859,576 for the 20 years was expended on about 9,300 separate drains, having a length of approximately 19,400 miles, of which 1,775 miles were tile drains and 17,625 miles were open ditches. The average length of all classes of drains has been 2.1 miles, the average cost per drain \$2,028, and the average cost per mile of drain \$972, or \$3.03 per rod.

During the last five years of this period as shown in Table No. 6, 2,605 drains were worked on, of which 1,395 were new and 1,210 were old drains that were cleaned, deepened, widened or extended. The 2,605 drains have a total length of 5,323 miles, of which 1,058 miles, or 20%, are tile. The average length per drain for the last 5 years is shown to be 2.0 miles and the average depth 4.4 feet. The drains have cost \$3,057 per drain and \$1,496 per mile of drain, while the average

cost per acre of lands assessed has been \$2.48. The number of acres assessed for each drain has averaged 1,234 acres or a little less than 2 square miles.

an agricultural standpoint the increases probably have been well justified.

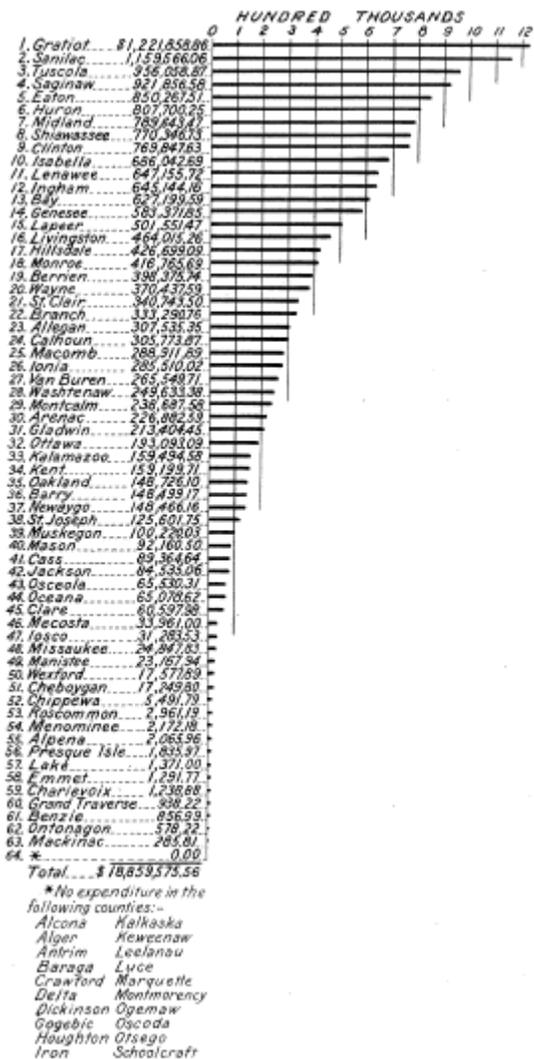


Figure 1. Expenditure on Michigan County Drains for 20-year period (1898 to 1917 inclusive) showing relative importance of counties with respect to expenditures.

Comparing the data in Table No. 5 for the 20 years from 1898 to 1917 with that in Table No. 6 for the last 5 years of this period it is found that the amount spent per drain has increased 51% while the amount spent per mile of drain has increased 54%. The average length of drain has remained about the same so that this increased cost is accounted for, in part, by the increased cost of labor and material, but principally by the increase in depth and bottom widths of the open drains. This increase seems to have been quite general throughout the State. The use of tile has also materially increased as 1,058 miles, or 60% of the total of 1,775 miles of tile laid in county drains in the State has been installed within the five-year period from 1913 to 1917. As all the factors entering into the increased cost per drain and per mile of drain, the one of increase in the price of labor and material alone excepted, have made for more efficient drainage, from

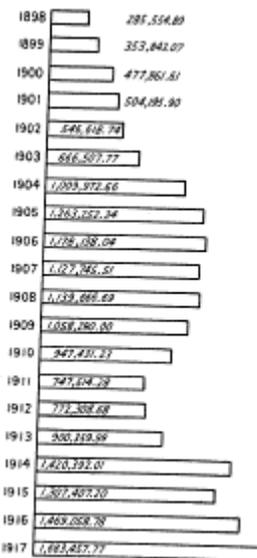


Figure 2. Chart showing total annual expenditures for county drains for 20-year period, 1898-1917 inclusive.

Note.—The expenditure \$1,263,252.34 for 1905 is correct, although through an error the diagram for 1905 was made shorter than that for 1906 in which year the expenditure was less than in 1905.

Cost Analysis of County Drains

Table No. 6 is primarily an analysis of the cost of county drains for the 5-year period from 1913 to 1917 inclusive, for each county and for the State as a whole, compiled from data taken from the records of the county drain commissioners.

As shown in this table the total expenditure for the 5-year period is \$7,962,998.98 as against \$6,780,675.15 shown in Table No. 5. This apparent discrepancy is accounted for by the fact that nearly all of the figures in Table No. 5 refer to actual disbursements made by the county treasurer on drain orders and are definite for the inclusive periods. On the contrary the expenditures for part of the drains analyzed in Table No. 6 for the years 1916 and 1917 will not be paid for until 1918 and some not until 1919. Also in selecting the drains at the beginning of the 5-year period it was the plan to analyze only such drains as were petitioned for after January 1, 1913. It was not always possible to secure complete detail data relative to every individual drain in each county. Sometimes within this 5-year period the records have shown that two or more drains were combined into one drain which sometimes made the number of drains worked on in a county rather indefinite.

In comparing expenditures one year with another, or one county with another, only those figures used in Table No. 5 or in Figures 1 and 2 should be used for the reason that Table No. 6, as already stated, is not entirely complete. It represents, however, an analysis of cost which is concise in detail and as nearly complete and

uniform for all counties for the five years as it was practicable to prepare from the drain records.

A study of Table No. 6 shows that the division of expenditures in county drains for the State as a whole for the 5-year period between 1913 and 1917 has been as follows:

TABLE No. 7

Summarized Analysis of Expenditures on County Drains for 5-year Period 1913-1917, Inclusive.

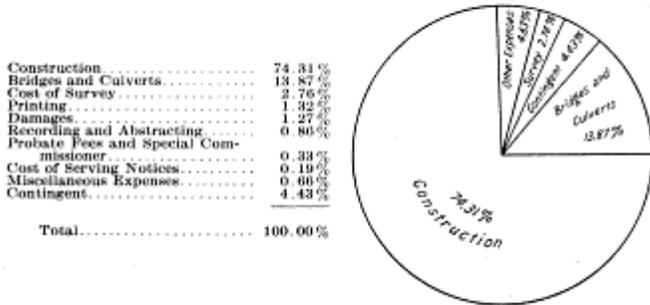


Fig. 3 Percentages of expenditures.

Figure 3. Percentages of expenditures.

The item of construction includes the cost of all tile used in county drains and in fact includes everything entering into the actual construction of the drains with the exception of the bridges and culverts which have been recorded separately. All these expenditures can be classified under three general heads, (1) Construction Expenses, (2) Overhead expenses and (3) Contingent expenses, which includes items which if they could be properly classified, could be placed under either of the two foregoing heads. From this it is seen that of all moneys spent on county drains in the several counties in Michigan during the 5-year period from 1913 to 1917 inclusive, as shown in Table No. 6, that 88.18% was Construction expense, including bridges, 7.39% Overhead expense and 4.43% Contingent expense. This is a good showing as work of this character ordinarily goes. In view of the small size of the individual projects it would not have been surprising to have found that the overhead expense ran as high as 20% of the total cost of the work. However, it will be said in this connection, that a better showing could be obtained by combining drains wherever possible so as to reduce the number of separate projects to be handled. This would result at the same time, in increasing the average size of the area assessed per drain.

There are three items of expenses in connection with the operations of the Michigan county drain system that have not been included in the data of either Tables No. 5 or No. 6 as they are not paid for directly by the property owner. These are the items of drain commissioner's salary, expenses contracted by the drain commissioner while on official trips over the county, and in some of the counties the clerical hire for recording the proceedings in the Drain Record books. The drain commissioner is paid from the general fund and in about half the counties it is the practice to pay for recording from the contingent fund

but in other counties this expense is charged against the individual drain funds. No data are at hand as to the exact amount so spent in the State but for the 5-year period, 1913 to 1917 inclusive, it has not averaged to exceed \$1,400 per year per county for the 70 counties which at present have drain commissioners. In some of the counties the total will greatly exceed this but in others practically nothing whatever has been spent. Assuming \$1,400 to represent a fair annual average, the total for the 70 counties for the five years immediately previous to 1918 would amount to \$490,000. If this be added to the total given in Table No. 6 it will increase the amount from \$7,762,998.98 to \$8,452,998.98, and increases the overhead expense from a total of \$588,856.27 to \$1,078,856.27.

Recomputing the percentages on the basis of these totals it is shown that 83.07% was for Construction expenses including bridges, 12.76% for Overhead expenses and 4.17% for Contingent expenses, which still makes a very credible showing.

SUGGESTIONS ON DESIGN OF DRAINS

Certain defects of the present Michigan drain law with respect to the handling of the larger projects has resulted in the construction of too many small independent drains. In this manner many areas of considerable size have been drained piecemeal by the expensive and unsatisfactory method of building several small ditches which have been separately applied for, established and constructed where a single main outlet with a well planned system of laterals, looking towards the drainage either of the entire watershed or of complete units, would have served all the lands much better. Too often small drains constructed independently, without following any general plan has resulted in discharging the water from the individual drains into existing natural or artificial water courses which already may be overtaxed; resulting in the flooding of the lower lying lands, thus aggravating the necessity for improvements of the watercourses. Because of this situation, in fairness to all, an adequate outlet for all the lands should be designed after the manner indicated by the map in Figure 4, and in accordance with suggestions which follow later in this report.

The tendency in the construction of county drains in Michigan has too often been to limit the size and depth in order that they might be of a type readily constructed by teams and scrapers (Pl. III) or, as in many cases, by hand.

This frequently has resulted in securing ditches that were known to be of insufficient size at the time of construction and which has necessitated another petition for enlargement at a later date followed by all the other legal processes.

The evils which follow from this practice could be largely eliminated were the watershed considered in its entirety, or by complete units, and adequate outlets designed and constructed on this basis. Also in many cases contract

for the construction of part or all of the laterals could be let at the time of letting the contract for the outlet. In this way the contracts would be larger and attract more bidders owning and operating different types of ditching machines. Ultimately a much more effective type of drain would be secured than it is practical to construct by team or by hand. In the end the cost would also be less as the larger machine constructed ditches with their greater capacities would require but infrequent cleanouts as compared with the smaller ditches. The drain shown in Pl. VI was constructed during 1918 to replace a shallow team and scraper ditch constructed but four years previously in 1914.

There are certain practical details that enter into the design of a drainage system which, of necessity must be left to judgment. Chief among these is the size and depth of the proposed ditch and whether it be open or tiled. It is not unusual for these details to be made wholly matters of guess work without a fair appreciation of certain well recognized underlying principals. The result of this is that often, in order to hold down the first cost, the drain is constructed too small and too shallow. This necessitates enlargement by deepening and widening at some future date, which all too frequently, is long postponed resulting in partial or entire loss of crops for several seasons because of insufficient drainage.



Plate III. Construction of open drain, three feet bottom width, four feet deep with board scraper and team.

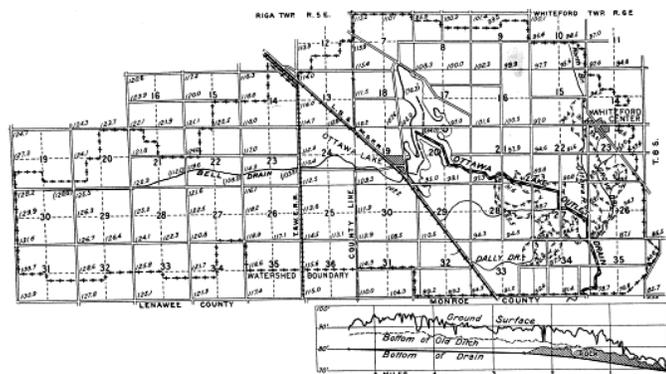


Figure 4. Map and profile of typical drainage project.

Run-off From Watersheds

In the design of a drainage system the first question arising is the quantity of water that must be cared for in order to give adequate relief. Now this quantity, called "run-off", will depend principally upon the amount and distribution of the rainfall and upon the size, shape and general nature of the area, or watershed under consideration—whether hilly or level—the type of soil, and the character of surface vegetation.

TABLE No. 8.
Number of storms occurring in different parts of Michigan during 15-year period from 1902 to 1917 inclusive. (Compiled from U. S. Weather Bureau Records.)

Station.	24-hour rainfall.			
	2-3 inches.	3-4 inches.	4-5 inches.	5-6 inches.
Alpena.....	5	0	0	0
Detroit.....	10	0	0	0
Escanaba (N. P.).....	4	0	0	0
Grand Haven.....	11	3	2	0
Grand Rapids.....	19	2	1	0
Houghton (N. P.).....	6	3	0	0
Lansing.....	7	2	0	0
Marquette (N. P.).....	7	4	1	0
Pure Huron.....	8	0	1	0
Saginaw.....	11	2	0	0
Sault Ste. Marie (N. P.).....	3	0	0	1

The rains in Michigan come in a manner to make for economical drainage in that they are quite uniformly distributed throughout the growing season and exceptionally heavy rains of long duration such as cause a high rate of run-off, are of infrequent occurrence. Table No. 8 above clearly shows this and ditches constructed on a basis of providing for relief from floods following a 24-hour rainfall of 2 to 3 inches will be satisfactory for ordinary drainage of agricultural lands throughout practically all of the State. However, in some few localities towards the northern part of the Southern Peninsula, and in some places in the northern Peninsula, the table indicates that 24-hour rains of 3 to 4 inches occur often enough to warrant some consideration in the future development by drainage.

Next in importance to rainfall the size, shape and general surface features of the watershed should be considered. Other things being equal, it naturally follows that the larger the watershed the greater the run-off, although the per cent of the run-off reaching an outlet ditch, within a given time, will be less for large watersheds than for small ones. The shape of the watershed should also be considered—as excess water from a long narrow divide or from a fan shaped watershed, all parts of which are more or less contiguous to the drain, will find its way to the drain more quickly than it will from a watershed of irregular shape, parts of which lie a considerable distance away from the drain. This does not necessarily increase the total amount of run-off but it causes heavier floods so that a larger proportion of the run-off is required to be cared for by the drain, within a given time. This can only be accomplished by increasing the size of the drain.

Next after the size and shape of the watershed the surface conditions should be given consideration as both the rate and actual amount of run-off will be greater from a hilly watershed than from a flat one.

CAPACITIES OF OPEN DITCHES IN CUBIC FEET PER SECOND
(Based on Kutter's formula $CN = 1000$ and side slopes of all ditches $1\frac{1}{2}$ to 1.)

TABLE No. 10.

Depth of Water in Ditch 6.0 feet.

Fall in feet per mile.	Bottom width of ditch.										
	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
1.0	90	110	135	160	185	210	235	260	285	315	375
2.0	135	165	195	225	260	295	330	365	405	440	540
3.0	180	225	275	315	365	405	445	495	540	605	735
4.0	240	295	365	410	465	525	580	635	700	785	945
5.0	270	335	395	450	510	575	635	700	765	850	1000
6.0	295	365	425	485	545	610	675	740	805	895	1060
7.0	315	390	455	520	585	655	720	790	855	950	1120
8.0	335	415	485	550	620	695	765	840	910	1015	1195
9.0	355	440	515	585	660	740	815	895	970	1085	1275
10.0	380	470	550	625	705	790	870	955	1035	1160	1360

TABLE No. 11.

Depth of Water in Ditch 8.0 feet.

Fall in feet per mile.	Bottom width of ditch.										
	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0	
1.0	215	255	300	340	380	420	460	500	540	650	
2.0	310	360	415	470	520	580	645	705	765	905	
3.0	400	460	525	590	655	720	785	855	920	1100	
4.0	480	550	625	700	775	850	925	1000	1075	1300	
5.0	550	630	715	800	885	970	1055	1140	1225	1500	
6.0	615	705	800	895	990	1085	1180	1275	1370	1680	
7.0	675	775	880	985	1090	1195	1300	1405	1510	1860	
8.0	735	845	960	1075	1190	1305	1420	1535	1650	2040	

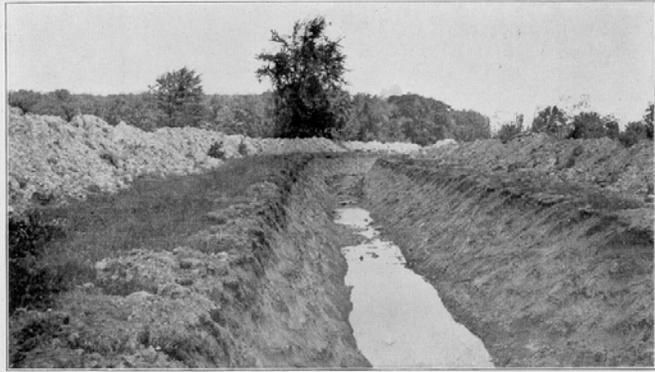


Plate IV. Dredged drain eight feet deep, six feet bottom width, in clay soil, Eaton County.

In accordance with the foregoing suggestions the following tables have been compiled showing the amount of water that open ditches of different bottom widths will carry. Side slopes in all cases $1\frac{1}{2}$ to 1 and those ditches in Table No. 10 to carry water 6 feet deep, and those in Table No. 11 to carry water 8 feet deep, during flood stage. Taken in conjunction with Table No. 9 for run-off the proper size of open drains for watersheds within the limits of sizes covered by these tables, can readily be determined.

An open drain for a watershed should be so designed that it will not have insufficient capacity in certain sections and excess capacity in others. This will mean that no drain of any considerable length will be of the same size throughout its length. The ditch should be divided into sections and the run-off from the area of land draining through each section computed, beginning with the upper section and continuing in order with each section to the outlet. These sections need not be of the same length as this is often controlled by local conditions making it desirable to change the size of the drain where it changes grade or at a junction with another drain or natural water course.

Grade for Open Ditches

The grade of an open ditch should be as nearly uniform throughout, with as few changes, as possible. It will be impossible to keep the depth uniform and accomplish this—which will necessitate deeper cutting through the

higher land resulting in a slight increase in the first cost of the drain. However, the general results will be much more satisfactory in that the ditch will keep cleaner, be more efficient and more nearly self-maintaining after construction so that the additional first cost will be well justified.

Width of Berm

The width of the berm is of importance in the problem of maintenance that develops after construction. This width should not be less than 6 feet for the small team constructed ditches and for the larger machine constructed ones a width of 8, 10 or 12 feet should be specified, depending largely on the depth of the ditch and the character of the soil. Pl. IV.

To illustrate the foregoing relative run-off and design of open ditches, suppose it be assumed that a project is under consideration, the total watershed of which embraces about 19,000 acres, 29.7 square miles, of gently rolling land. Assume the watershed to be fairly uniform in outline and that the soil of the area is part sand and part clay with some muck in the lowlands, a more or less typical Michigan watershed. By survey the outlet drain proposed for the watershed has been found, should be 5 miles in length. Of these 29.7 square miles it has been determined that 5,000 acres will drain through the lower end of the upper section of the ditch which will be designated as Section No. 1 and which is $\frac{3}{4}$ mile long. It has also been found that 9,000 acres will drain through the lower end of the next section designated as Section No. 2 and this section is 1 mile long. Section No. 3 is $1\frac{1}{4}$ miles long and 14,000 acres drain through the lower end. The outlet end of the drain is at the lower end of Section No. 4. This section is 2 miles long and through the outlet the entire watershed of 19,000 acres drains. The survey shows that it is possible to construct the ditch so that Section No. 1 will have a fall of 2 feet per mile, Section No. 2, 4 feet per mile and Sections Nos. 3 and 4, five feet per mile.

By consulting Table No. 9 it is found that Section No. 1 should have a capacity of 150 second feet, Section No. 2, 255 second feet, Section No. 3, 370 second feet and Section No. 4, 475 second feet. Now referring to Table No. 10 it is found that, with the fall per mite as determined for the several sections, a ditch with a 4.0 foot bottom, side slopes of $1\frac{1}{2}$ to 1 and carrying water to the depth of 6.0 feet will be about right for Section No. 1 while for Sections Nos. 2, 3 and 4, the bottom widths should be 6, 9 and 12 feet respectively. The capacity of a ditch with a 9 foot bottom is not shown in the tables but from inspection it is obvious that such a ditch will come nearer having the desired capacity than one with either an 8 or a 10 foot bottom, as the quantity of 370 cubic feet per second is about half way between the capacity of the 8 and 10 foot bottom ditches when the fall is 5.0 feet per mile.

Such lateral drains as it will be necessary to construct in connection with the drainage of the larger watersheds

should be designed on a basis of run-off from the area drained by each lateral in the same manner as for the outlet drain.

In the foregoing watershed of 19,000 acres assume it to be necessary to construct a lateral 1 mile long emptying into the main drain, having a fall at the rate of 5 feet to the mile, and through the outlet of which 3,000 acres will drain. The run-off from the 3,000 acres, as indicated by Table No. 9 will amount to 95 cubic feet per second. By reference to Table No. 10, it is readily seen that a ditch with a .2 foot bottom width, with a fall of 5 feet to the mile, will have more than twice the required capacity. As it is not to be desired that an open ditch with bottom width of less than 2 feet be constructed consequently this width should be specified for the lateral.

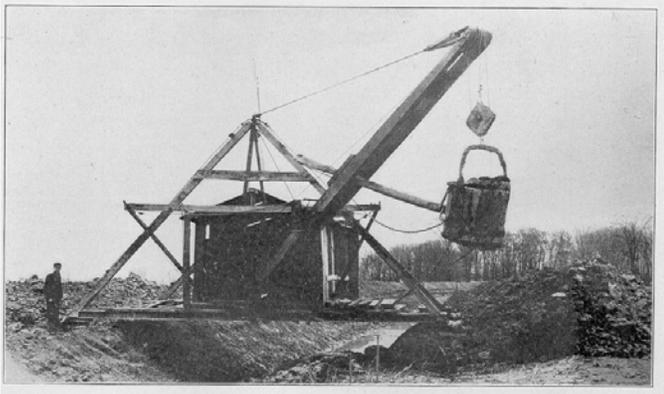


Plate V. Land dredge constructing drain shown in Plate VI. St. Clair County.



Plate VI. Drain eight feet bottom width, eight and on half feet deep, constructed by dredge shown in Plate V, in 1917, at cost of \$7.25 per rod (about \$.08½ per cubic yard) to replace shallow team and scraper drain constructed in 1914 at a cost of \$1.00 per rod.

Open ditches with bottom widths, side slopes and fall per mile the same as in Tables Nos. 10 and 11, but designed to carry a depth of water of 7.0 feet, will have capacities which may be roughly estimated as half way between those given in Tables No. 10 and 11. When the depth of flow of water, is 9.0 feet the capacities will be about 40% greater than in Table No. 10 and when the depth of flow is 10.0 feet they will be about 80% greater.

CONSTRUCTION METHODS

Greater progress has been made in the methods for handling contracts throughout the State generally than has been made in the organization and administrative affairs previously discussed and in many of the counties the construction and contract features of the work are on a substantial business basis.

There are still several localities where small open ditches constructed by team outfits are the rule. No doubt a great amount of land in Michigan has been drained by this method which however, is not, adapted to the construction of the deeper, more effective and more modern type of ditch which is rapidly displacing the shallow team constructed ditches in so many communities. But it has been found, that as the communities developed and more lands were cleared and the demand for the lower lying lands increased, that deeper and larger drains were needed in order to prevent overflow and to more completely drain the lower lying lands.

The necessity for new and deeper drains has led to the use of dredges of which there are two general types, the land dredge as illustrated by Pl. V, and Pl. IX, Fig. 1, and the floating dredge as illustrated by Pl. IX, Fig. 2. The land type of dredge is adapted to the construction of open drains with sloping sides, depths from 6 to 14 feet and bottom widths from 4 to 12 feet. The floating dredge is adapted to the construction of larger drains and ditches in swamp land which is too wet and too soft for any of the land type machines.



Plate VII. Fig. 1. Dredged drain with spoil banks leveled and cultivated.

Outlets

A very fundamental part of any drainage system is an adequate outlet, the securing of which is sometimes a serious problem. Exemplifying this Pl. VIII, Fig. 2, shows the outlet for a drain which was; dredged through a sandy ridge. This channel originally was opened with the land type of dredge similar to that shown in Pl. V. The original dimensions of this channel were about as follows: depth 23 feet; bottom width 4 feet, top width 28 feet. Dimensions at the time the picture was taken less

than two years after the channel was opened were found to be: depth 24 feet, bottom width 35 feet, top width 125 feet. Conditions seem to indicate that the material was at that time about stable and that very little, if any additional enlargement would take place.

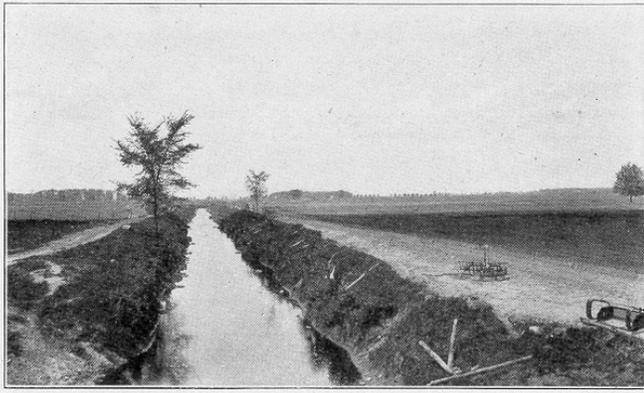


Plate VII. Fig. 2. Drain, with leveled spoil bank, dredged in 1896 made possible the reclamation of a large area of fertile land.

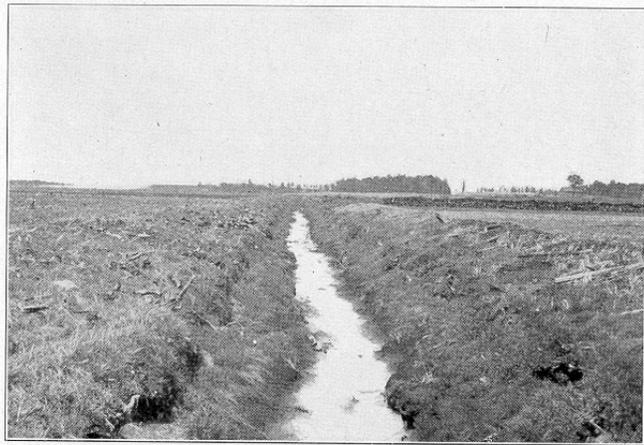


Plate VIII. Fig. 1. Dredged drain through muck soil, sandy subsoil. Sanilac County.



Plate VIII. Fig. 2. Drain 23 feet deep through ridge of sand, muck subsoil to drain swamp back of ridge. Huron County.

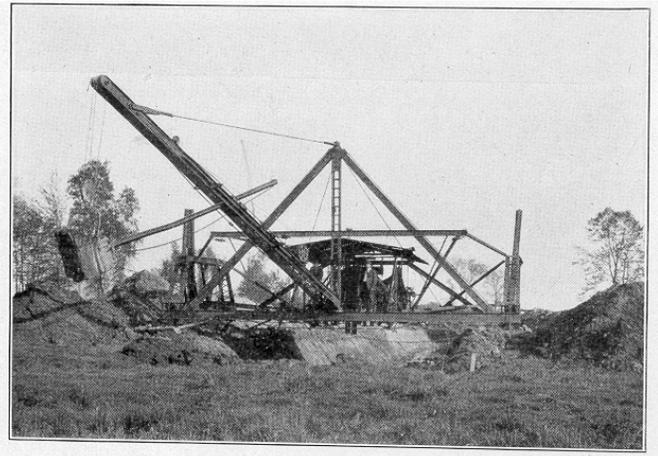


Plate IX. Fig. 1. Land type of dredge constructing open ditch ten feet deep and twelve feet bottom width.

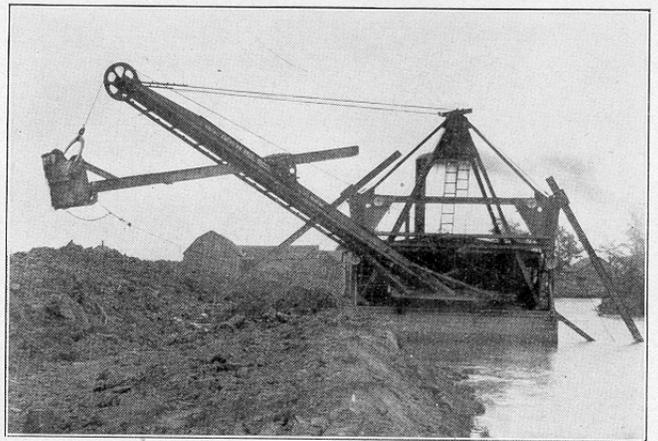


Plate IX. Fig. 2. Floating dredge, two-yard dipper, sixty-foot boom, 28x30 hull. Saginaw County.



Plate X. Fig. 1. Dredged drain which discharged into lower flat area. This type of drain may be advantageously replaced with tile when proper outlet is provided.



Plate X. Fig. 2. Dredged drain partly filled with sediment because it has no outlet.

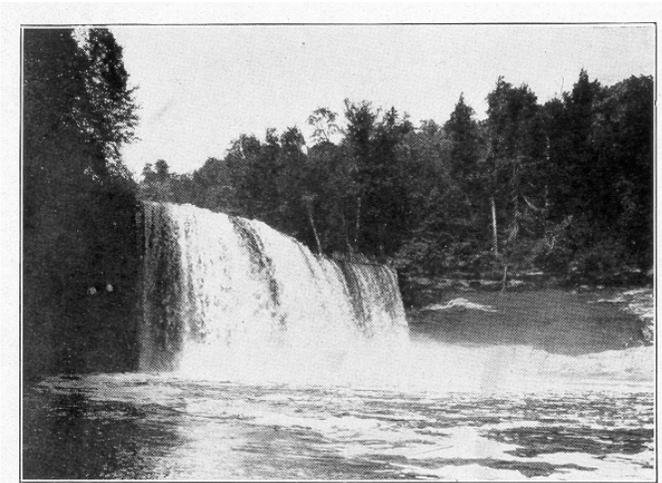


Plate XI. Fig. 1. Falls thirty-six feet high on the Tahquamenon River in Chippewa County. The rock ledge at this point obstructs the outlet for drains in the valley above the Falls. In Chippewa and Luce Counties.

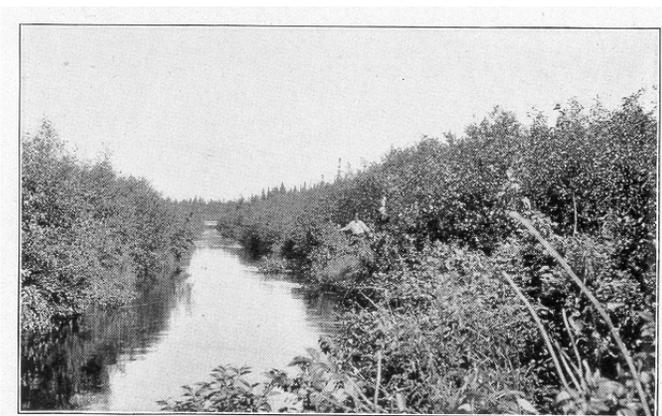


Plate XI. Fig. 2. Dredged drain which has poor outlet.

In Pl. X, Fig. 2, is shown the lower end of a dredged ditch which has become more than half filled with fine sand and silt carried down by the water and deposited

because there was no outlet below and the drain as located had very little, if any, fall.

Pl. XI, Fig. 2, shows the lower end of a drain which is so near the main stream that a satisfactory outlet cannot be secured until the water in the main stream is lowered and Pl. X, Fig. 1, shows a dredged ditch farther back from the main stream than the one shown in the preceding picture. At this point a good outlet can be secured. The soil of this particular area is muck and clay and is very fertile.

In the construction of drains to reclaim wet land it sometimes becomes necessary to construct outlets through ledges of rock. The outlet for the district shown on the map and profile in Fig. 5 is of this type. Pl. XI, Fig. 1, shows a waterfall over a rock ledge about 36 feet in height located in the Northern Peninsula. A large area of land along the stream above the falls cannot be drained until the rock ledge is lowered and a better outlet provided for the lands along the river above the fall. In one portion of the valley along this stream a few drainage ditches have already been constructed.

The utilization of land occupied by spoil banks along machine constructed channels may be carried out very successfully by grading off the material. In some counties it is specified that the contractor so spread the earth taken from the ditch that it may be readily leveled by the owners of the adjacent land. The beneficial results of such a practice is well illustrated by Pl. VII, showing a drain where this has been done and where the land ordinarily occupied by spoil banks is under cultivation.

Uniform Method of Staking Ditches

In the examination of the drain records in the different counties it was noted that no uniform practice prevails as to the length of the station used in staking the ditches, previous to receiving bids. In some counties a stake is set every 4 rods or 66 feet, in others every 6 rods or 99 feet, in still others every 100 feet while in many the stakes are set every 8 rods or 132 feet. The law specifically provides that the drain commissioner "shall set survey or grade stakes not more than eight rods apart," Compiled Laws of Michigan, 1915, Section 4881. Consequently the greatest length of stations allowable is definitely fixed but otherwise the length is entirely optional. It would simplify somewhat the preparations of estimates and also make for a uniform method throughout the State, and at the same time conform with the general practice followed in all other public works, if the ditches were staked in 100 foot stations.

Cubic Yard Basis for Letting Contracts

In many of the counties it is still the custom to let the contracts for excavation, whether new or clean out work, on a basis of so much per rod of ditch leaving the bidders to estimate the volume of material to be moved. It would be more satisfactory were these contracts let on

a basis of cubic yards of material to be excavated. An estimate of this kind has many advantages for the smaller drains and is almost indispensable for the larger machine constructed ditches, as a bidder must have this information if he is to bid intelligently on the job. If it is not of record, based on careful calculation, he guesses at it and in order to be safe generally guesses high.

In several counties this practice is already quite generally followed and were it done in all it would then be possible for contractors to bid more intelligently, and for drain commissioners to compare on a fair basis, prices paid for work in different counties. It would also enable a commissioner to more intelligently compare prices paid in different jobs in his own county. The yardage, after computation, should be made a part of the "Minutes of Survey" with the length, bottom width, depth, side slopes, width of berm and grade of the ditch and should be included in the published "Notice of Letting." This would give prospective bidders a definite idea of the nature of the work under consideration and in the end, in connection with a uniform length of station, would serve to further standardize and reduce the cost of the work throughout the State.

TILE DRAINS FOR COUNTY WORK

The use of tile in county drain work is increasing as indicated by the fact, previously stated in this report, that 60 per cent of the tile so used has been installed during the five year period, 1913 to 1917. This increase in the use of tile conforms with the practice in other States. In Pl. XII, Fig. 1, is shown 27-inch tile that are to be used in the reconstruction of the shallow open ditch shown in the same picture. In Pl. XII, Fig. 2, is shown the outlet of a 36-inch tile drain. The road culvert just above the outlet of this drain is necessary in this particular case because it is not possible that all the storm water which reaches the valley be carried off by the tile drain but a certain portion of it will flow over the surface of the ground. Culverts of this type are to be found quite frequently.

Substitution of tile in county work for the smaller open ditches has many advantages. Chief among these is that, for a slight increase in first cost, a drain is obtained which wastes no ground, does not cut up fields, calls for but little maintenance, and is as efficient many years after construction as it was at first. So many of the small open ditches are no sooner constructed than they begin to fill in and become less and less effective as time elapses, finally necessitating a clean-out which ordinarily results in an expense about equal to the first cost of the drain.

The limit to the size of tile for county drains beyond which their use cannot be justified on account of the cost, must necessarily vary because of local conditions such as the slope of the land, soil and subsoil, and also upon the general development of the farming community. With the prices such as prevail in Michigan during normal times, the use of tile as large in diameter as 24 inches certainly is warranted and in many cases

the use of tile larger than 24 inches is well justified. Much depends, however, upon the fall available, as the greater the fall the more capacity a tile will have. This means that the area which can drain through a tile of any size will increase as the fall increases. It is nearly always possible to so design the drainage system that the fall will somewhat exceed the natural surface slope of the land. This can be accomplished by deepening the open ditch part of the system, giving the tile lines good deep outlets. These tile outlets, while being deep, should not be so near the bottom of the open ditch that they will be submerged, excepting for short periods during highwater stages. The depth to which the tile should be laid in the line should be governed by the top of the tile rather than by the bottom as is done in so many cases and which has resulted in laying many of the large size tile too shallow. Generally for county drains this depth should be not less than about 4½ feet which will mean that the bottom of a 15-inch tile—allowing for the thickness of the tile walls—will be very nearly 6.0 feet below the ground.

Table No. 12 following has been compiled to show the amount of land which different size tile will care for when laid with a fall per mile ranging from 1 foot to 26.4 feet per mile. This fall has been expressed in three different ways in the table, as a matter of convenience. The areas are figured for outlet drains where surface water is admitted directly into the tile by suitably constructed inlets and consequently from a drainage standpoint the tile will act essentially as an open ditch with respect to the removal of flood waters. For drains where surface water is not admitted directly into the tile the number of acres which each size of tile will care for; when laid with the fall as indicated, will in each case be twice that given in the table.

The latter class of tile drains might well be used to gradually replace many of the small open ditches as they come up for clean out. As in many cases these small ditches have been constructed rather from the standpoint of under drainage than for the removal of flood waters and could safely be designed on the basis of ability to care for twice the area as indicated in Table No. 12.

INSPECTION

At frequent intervals in the progress of the construction of county ditches, it is advisable that the work be checked. In all cases before final acceptance enough measurements and levels should be taken by the engineer to definitely ascertain whether the depth and other dimensions of the ditch are in accordance with the specifications. The depths of the drain should be checked by the engineer from established benchmarks wherever possible. For tile work inspection and checking of grades and depths during construction of the drain and before final acceptance is even more important than for the open ditches.



Plate XII. Fig. 1. Old team and scraper ditch to be replaced by 27-inch tile drain. Eaton County.

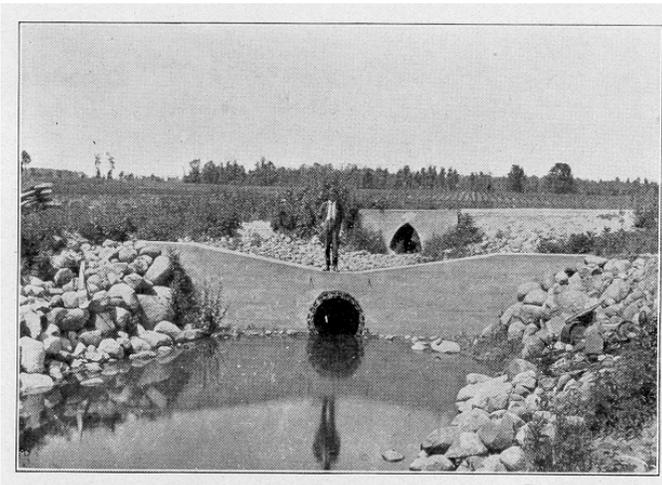


Plate XII. Fig. 2. Outlet of 36-inch segmental block drain. Eaton County.

case of the drains shown in Pl. XIII, Figs. 1 and 2. In fact, everything that reasonably can be, should be done to maintain the efficiency of the drain for only by so doing can an expensive cleanout be long delayed.

Experience in other States indicates that a ditch properly maintained will cost less to the landowners over a period of years than if constructed and allowed to deteriorate until a reconstruction is necessary. As in the case of the ditch shown in Pl. XIII, Fig. 1, which is to be replaced by a machine dug ditch similar to that shown in Pl. IV.

The maintenance of tile drains is much less of a problem than that of the open ditches but they sometimes require attention which if long delayed, may necessitate the digging up and relaying of considerable sections.

CHAPTER IV. THE MICHIGAN DRAIN LAW

PURPOSE OF THE LAW

The construction of drains is provided for in Chapter 93 of the Compiled Laws of Michigan, 1915, and in the Public Acts of the Legislature, 1917. The legislature has also passed certain acts which amend the provisions of certain sections of the general law in certain counties.

Since the passage of the law its constitutionality has been established by the Supreme Court of the State and various judicial decisions have made clear obscure provisions of the statute. The Act provides "For the construction and maintenance of drains and the assessment and collection of taxes therefor, and to repeal all other laws relative thereto." The law states, (Chapter 93, No. 4870, Sec. 1) "that drains may be located, established, constructed and maintained, and drains and water courses may be cleaned out, straightened, widened, deepened and extended whenever the same shall be conducive to the public health, convenience or welfare, (No. 4871, Sec 2). The word "drain" whenever used in this act shall be deemed to include any water course or ditch opened or proposed to be opened, and improved for the purpose of drainage and any artificial ditch or drain, levee, dike, or barrier, or tile drain proposed or constructed for such purposes."

The responsibility for initiating the petition for the drain rests entirely with the land owners whose lands will be traversed by such drain, who must file an application requesting the establishment of the drain with the county drain commissioner. The drain, but not the assessment district, is covered by the petition.

After the application is filed, the drain commissioner becomes the executive officer charged with the duty of carrying out the provisions of the law. The operation of the law and the relationship of the various parties to the proceedings are shown in diagram, Figure 5, to which references are made in the following paragraphs.

TABLE No. 12
Number of acres drained by Tile Outlet Drains where surface water is admitted to the drain through inlets.

Fall in feet per 100 feet.	Fall in feet per 100 feet.	Diameter of tile in inches.									Fall in inches per 100 ft.	
		6"	8"	10"	12"	15"	18"	24"	27"	30"		36"
2.64	0.05	4	8	17	29	53	89	198	311	438	600	0.10"
3.17	0.06	4	10	19	32	59	96	217	343	482	665	0.12"
3.72	0.08	4	12	22	37	68	114	252	397	548	750	0.15"
4.28	0.10	6	13	25	42	77	128	282	446	621	857	0.18"
4.86	0.125	7	15	28	47	87	143	318	500	708	982	0.22"
7.92	0.15	8	16	31	51	95	157	348	549	780	1,056	0.25"
9.24	0.175	8	18	33	56	103	170	377	591	825	1,149	0.30"
10.56	0.2	9	19	35	59	110	180	404	625	870	1,221	0.35"
12.24	0.3	10	22	44	73	136	221	496	780	1,090	1,500	0.40"
21.12	0.4	12	27	51	88	157	259	572	900	1,250	1,728	0.50"
28.40	0.5	13	31	57	95	176	290	642	1,005	1,385	1,935	0.60"

Based on Kutler Formula (N = 0.15). For farm drains or outlet drains where surface water is not admitted to the drain through inlets the number of acres drained by each size of tile may be doubled.
Note: Rate of run-off used, 1/2" in 24 hrs.

MAINTENANCE

All drainage systems require some maintenance after construction, if they are to retain anything near their maximum efficiency. Rapidity of deterioration of ditches varies under different conditions of soil, subsoil, size and shape of cross sections, grade of the drain and upon the nature of the vegetation that thrives along the slopes of the ditch. The drain should be kept free from logs, brush, sods, from cave-ins, refuse and other obstructions. The slopes of the ditches should be kept free of rank growths of weeds and willows and saplings should be kept grubbed out. This was not done in the

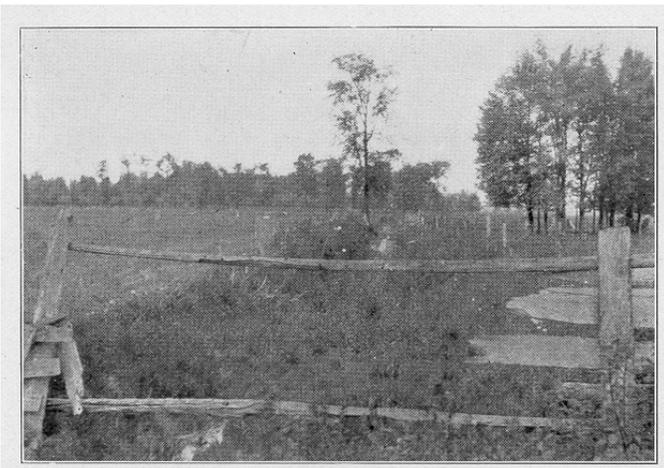


Plate XIII. Fig. 1. Open drain nearly filled in. Contract let for reconstruction with land type dredge.



Plate XIII. Fig. 2. Typical old open drain in marsh pasture land. Drain entirely filled in and grown up with vegetation. Large tile would be practical for replacing this drain.

PROCEDURE IN ESTABLISHING A DRAIN

The law provides that when it is desired to take action in regard to a given drain that an application requesting the desired action, signed by not less than one-half the freeholders whose lands are traversed by the drain, shall be filed with the county drain commissioner (1, Figure 5).

Upon the filing of an application for a drain, the county drain commissioner is required to submit the petition to the township board in the township through which the drain passes (2, Figure 5).

The board advertises in a newspaper for one week and holds a meeting and proceeds to determine the necessity of said drain and whether the same is necessary and conducive to the public health, convenience and welfare. At this meeting all persons whose lands are liable to assessment for the drain, or whose lands are crossed by the drain may appear for or against the drainage proceedings. After-hearing the evidence offered, the board determines whether or not the drain is necessary and conducive to the public

health, convenience and welfare. If the board's action is unfavorable the petition is dismissed and no further petition for the drain is legal within one year of the date of such determination. If the board's action is favorable an order is made to that effect and filed with the county drain commissioner (3, Figure 5).

The commissioner, as a means of determining the practicability of the drain, now has a survey made of the proposed drain (4, Figure 5). The minutes of the survey are then prepared from the notes of the survey for use in the First Order of Determination. (5, Figure 5.)

If the commissioner finds that the drain is practicable, he makes the First Order of Determination naming the drain and giving the essential facts in regard to it and the drain is staked out on the ground to show its exact location as described in the petition. (6, Figure 5.)

Until twenty days after the first order of determination any person who may consider himself aggrieved by the determination of necessity or by the survey, may make application to the probate court for the appointment of an engineer. Upon receipt of such application the court notifies the County Drain Commissioner and the State Highway Commissioner. It is the duty of the State Highway Commissioner to appoint an engineer, who confers with the County Drain Commissioner and the aggrieved land owner and makes such investigations and surveys as he deems proper to determine the necessity for the drain. His decision in regard to the necessity for the drain is final.

The drain commissioner, after making the first order of determination proceeds to secure right of way for the drain. This seemingly minor matter is in reality a very considerable task on most drains, (7, Figure 5). In the event that any land owner refuses voluntarily or is prohibited by law to grant a release of right of way the commissioner makes application to the probate court for the appointment of three special commissioners or a jury of twelve freeholders to determine the necessity of the drain and for the taking of private property for the use and benefit of the public, and the just compensation to be made for the property taken.

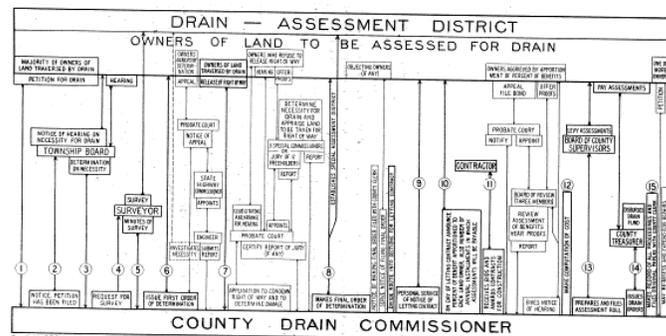


Figure 5. Diagram showing operation of Michigan Drainage Law.

The probate court to whom such application is made makes an examination of all the proceedings of the county drain commissioner so far as had and if they are

found in accord with the statute the court sets a time and a place for the hearing and issues a citation to all persons who have not released rights of way and all who claim damages, to appear at the time and place and be heard. The court, at the time and place set, proceeds to hear all persons whose lands are traversed by the drain. If no sufficient cause is shown against granting the application, the court makes an order appointing three disinterested and competent freeholders as special commissioners to ascertain and determine the necessity for such drain and to appraise the compensation to be allowed to the owners of the property to be taken for the right of way.

Any freeholder who has not released the right of way may demand a jury at any time before the appointment of the special commissioners. The special commissioners or jury view the premises and hear the interested parties, and file their award with the county drain commissioner. The drain commissioner deducts the damages from the benefits when made and pays the balance to each land owner in case the damages exceed the benefits. Special provision is made for securing right of way across the property of railroad companies. The jury, if one be appointed, makes its report to the probate judge who reports to the Drain Commissioner. The special commissioners or jury may determine the drain to be unnecessary and in such case the drain commissioner shall dismiss the proceedings for a year at the cost of petitioners.

After all the right of way for a drain is secured the drain commissioner makes a Final Order of Determination establishing the drain along the route designated by the survey (8, Figure 4) and then proceeds to determine which lands will be benefited by the drain and to establish the special assessment district to apportion the per cent of benefit to each tract of land and to let contracts for the construction of the drain.

The county drain commissioner is required to give not less than 10 days notice of the time and place of letting by serving personal notice upon every person whose lands are affected by the assessment and who reside in the township or township affected. Notice must also be given by publication and by posting notices in the manner prescribed by the law. The notice shall contain a description of the lands to be assessed and shall also state that the assessment of per cent of benefits on the land within the district shall be subject to review on the day of the letting or at such other time and place as the county drain commissioner may adjourn to. (9, Fig. 5.)

This notice although it is termed "Notice of Letting Drain Contract," is primarily intended to serve as a notice to land owners to inform them that special assessments are to be made against their lands to pay for the drain.

At the time and place of letting and before receiving bids, the county drain commissioner usually by a vote of the tax payers, determines whether the taxes to be spread for benefits to lands shall be assessed and collected in one, two or three years.

For approximately 60 per cent of the drains in the State the assessments have been paid in a single installment and for nearly all of the other drains the assessments have been paid in two annual installments, three installments being very rarely used. On the day of the letting the drain commissioner announces the per cent of benefit apportioned to each tract of land. (10, Figure 5.) Bids are then received and contract let for the construction of the drain to the lowest responsible bidder. (11, Figure 5.)

The owner of any land assessed for any benefit or the construction of a drain who may consider himself aggrieved by the assessment made by the county drain commissioner, may, within ten days after the day of review, make application to the probate court for the appointment of a board of review. The court, upon receipt of such application shall notify the county drain commissioner and shall then appoint three disinterested freeholders of such county not resident of the township or townships affected, as members of the board of review. A time and place where such board shall review the assessment shall then be fixed. Due notice of the hearing must be given to all interested parties. At such hearing the board shall hear all parties with respect to the matter of appeal and shall view the lands benefited by the drain and review all assessments on such drain and if in their judgment there be manifest error or inequality in such assessment, they shall order and make such changes as they deem equitable. The action and decision of the board shall be final and shall be delivered in writing to the county drain commissioner.

The proceedings in establishing any drain is also subject to review upon certorari, provided the proceedings are instituted within ten days after the Final Order of Determination is filed with the county clerk.

Within ten days after the letting of contract, or in case of an appeal immediately after the appeal is decided, the county drain commissioner shall make a computation of the entire cost of the drain which shall include all expenses incurred in connection with the same. (12, Figure 5.)

The county drain commissioner shall make a special assessment roll for the drain for each township or townships and city affected thereby. This roll shall contain all information necessary for levying the tax and shall be filed in the office of the clerk of the township or city in which such lands are situated. The clerk shall deliver a certified statement of the several amounts of drainage taxes to be assessed during the coming year and a description of the property to be assessed to the supervisor of the township. It is the duty of the supervisor to spread on his roll the total amount of the drainage taxes and the description of the lands to which they are assessed. (13, Figure 5.) All drainage taxes assessed are subject to the same provisions and are collected in the same manner as state and other general taxes by the township treasurer and paid by him to the county treasurer. The county drain commissioner issues orders on the county treasurer for services rendered and

work done. The funds for each drain are kept separately and expended for that drain only. (14, Figure 5.)

The clause "public health, welfare and convenience" is the basis upon which all taxation for public improvements is made.

The benefits, however, which result to any agricultural community when certain of the lands are improved and made to produce more by drainage are actual benefits and definitely increase the welfare of the community, the county and the State, and are not dependent upon any real or fancied betterment of the health and increase in convenience.

Drainage under the county system is in every sense a community problem although it is often hard for some of the property owners of the higher lying and better drained lands (whether naturally or artificially drained) within a watershed, to realize that their lands should be assessed for benefits for the construction of a drain, from which they may apparently receive no direct benefits. It is true, however, that the rain falls in equal amounts on the highest and on the lowest acre in the watershed. It is also true that as much falls on the driest acre as on the wettest and is no respecter of fence lines or the farm unit. A part of all this water ultimately must be cared for by the drain. It becomes a burden upon the community and it is impossible for the individual farm unit to escape the responsibility of assisting in some measure in caring for such part of the burden as originates on land comprising the unit. It matters not whether this water reaches the county drain directly or indirectly, whether through small open or tile farm drains or whether it runs in plow furrows into the roadside ditches, and from there finally into some part of the county system. All lands contributing water to a drain are not equally benefited by the drain and because of this the principal of assessing the costs of the drain in proportion to benefits has been worked out and when this principal is carefully applied the results are probably as equitable as it is possible to make any system of taxation.

It is the duty of the county drain commissioner to make a full record of each drain in the drainage record books of the county (15, Figure 5). All original papers must be filed with the county clerk and the law provides, "that no drain tax shall be spread until all records have been deposited and filed in the office of the county clerk."

The county drain commissioner may without petition, on the written request of one or more tax payers on a drain, expend an amount not to exceed 10 per cent of the original cost in repairing the drain where in his opinion an emergency condition exists, endangering crops or property.

Whenever a drain or portions thereof needs cleaning out, any five freeholders of the town or township in which the drain is situated one or more of whom must own land liable for assessment, may make application to the county drain commissioner setting forth the necessity of such proposed work and the county drain commissioner

shall then proceed in the same manner as provided for locating, establishing or extending a drain. If the work is found necessary, he shall fix the per cent of cost that the owners of the land benefited shall pay. Assessments shall be made according to benefits received and shall be subject to appeal as when a drain is established. The commissioner shall cause to be published at least once in a newspaper a notice which shall give the time and place of letting the contract; and shall also cause notices to be posted in regard to the letting in the manner provided by law. The steps thereafter to be taken as provided for in laying out and establishing a drain. If necessity for such cleaning out arises from the act or neglect of any land owners such act or neglect shall be taken into consideration in making the assessment. The county drain commissioner may in his discretion without application use any surplus funds for cleaning out obstructions.

In case a drain is to be deepened, widened, or straightened, the county drain commissioner shall make his First Order of Determination and steps thereafter shall be taken as provided for by law in establishing a drain.

All the powers conferred for establishing and constructing drains and for the enforcement of assessment, shall include the deepening, the widening or extending of any drain which has been constructed or may be constructed and the straightening, cleaning out and deepening the channel of creeks or streams and the constructing and maintaining, remodeling and repairing of levees, dikes and barriers for the purpose of drainage. The commissioner may relocate or extend the line of any drain if the same be necessary to secure an outlet, provided that no proceeding affecting the rights of persons or property shall be had, except upon like application, notice, hearing and award as provided for the construction of the drains.

Whenever any person shall obstruct any established drain it is the county drain commissioner's duty to compel the removal of the obstruction. The person causing such obstruction shall be liable for all expenses of removing the obstruction provided that the owners or occupants be given five day's notice to remove the obstruction.

DRAINS WHICH AFFECT MORE THAN ONE COUNTY

When it is decided to locate, establish, widen, deepen or extend a drain traversing more than one county or affecting land in two or more counties, an application therefor shall be made to the county drain commissioner of either county traversed by the proposed drain. The application shall be subject to the same obligations and liabilities as for a drain in one county except that the application is not passed upon by the township boards. If upon examination, the county drain commissioner shall deem the drain necessary and for the good of the public health, welfare and convenience, he fixes a time and

place of meeting and notifies the county drain commissioners of the other county or counties to be affected and furnishes them copies of the application. The commissioners meet at the time and place fixed and thereafter jointly take all steps and perform all acts and sign all papers as county drain commissioners are required to do in other drains, including application to probate court.

If they are unable to agree in regard to anything pertaining to the drain they may appeal to the State Highway Commissioner who has the right to subpoena witnesses and take testimony relative to the drain, and his decision is final.

Right of way is secured in the same manner as for a drain in one county. Before the contract for construction is let, the county drain commissioners agree upon the per cent of the cost of construction that each county shall bear. If they cannot agree they appeal to the State Highway Commissioner who apportions the costs between the counties. Each county drain commissioner then assesses the per cent of benefit accruing to the lands in the county for which he serves in the same manner as he would for a drain located entirely in that county. Each commissioner is required to make a full record of the drain in the drainage record book of the county for which he serves and a certified copy of each paper shall be filed in the office of the county clerk of each county.

Cleaning and widening, deepening or extending, on joint county drains are handled in the same way as for drains in one county by the drain commissioners of the counties affected by the drain in a manner similar to that provided for drains in one county and if they are unable to agree they may appeal to the State Highway Commissioner whose decision is final.

DEFICIENCIES IN PRESENT PROCEDURE

The first law provided means by which a farmer could secure an outlet across his neighbor's lands for the ditch necessary to drain his farm. As the country became more thickly settled the necessity for larger drains in which a number of land owners were interested became apparent and the first crude public drain law was passed. As need for better drainage developed, or a clearer idea of existing need obtained, the law was either amended or a new law passed. In this manner, the present methods of drainage in the State and the present drain law were developed.

Under the provisions of the Michigan drain law now in force about 9,300 drains, having a combined length of nearly 20,000 miles and costing over \$18,000,000 have been constructed. The investigations show that in general this law has quite successfully served the purpose for which it was passed. As a rule the organization of and construction of the drains have been accomplished within a reasonable period of time after the work was initiated, although on many drains there have been serious delays. The administration and

overhead charges in most instances have been low. At every stage of the proceedings ample opportunity is given to land owners who may feel aggrieved to appear and have any mistakes or injustices corrected. The litigation over drainage matters, except in a few counties has been almost negligible and the showing in this respect compares very favorably with that of other States.

In working under the law the officials charged with the administration of the affairs of the drain find that certain difficulties in the operation of the law tend to increase the time required to establish and construct a drain, to make it impossible to always secure the most efficient drain and to increase the cost of a drain and in few instances to entirely prevent land owners from securing drainage outlets. Any or all of these difficulties may occur in connection with any drain.

The petition or application for a drain on which the whole proceeding rests covers a drain limited as to size, location and kind by the petition of individuals who may have, but who frequently do not have, the best information obtainable as to size, location, kind of, and most economic drain which might be used in a given territory. A majority of the owners whose lands are to be traversed by a drain must sign the original petition and it is not possible for other owners whose land would not be crossed by the drain to initiate a project no matter how wet their lands may be or how badly they may need improved drainage. Parties desiring to drain certain lands have been unable to secure a lawful petition because a majority of owners of land to be traversed by the drain refused to sign the petition, even though a majority of the owners of the land to be assessed to pay for the drain were in favor of the project.

The interpretation of the law which requires the applicants for a drain to state in the petition the location of a drain, its course, commencement and ending point often hinders work which would otherwise be undertaken or it leads to the construction of inadequate drains. In many instances an inefficient poorly designed drain has been constructed because the location or size was limited by the petitioners who were not fully informed as to the proper location or size which should have been adopted. In certain sections of the State property owners would prefer to leave these facts to be determined by a survey, but drain commissioners are not authorized to establish a drain which is not definitely located by the application. Furthermore, the land to be benefited is not described in the petition although it would appear that the approximate amount of land to be benefited should be known before the necessity for the drain is determined.

For a small drain the land owners usually have a good idea as to the general requirements but for a large drain they have no idea of the necessary requirements and this can be obtained only after surveys have been made to determine the essential facts in regard to the project and the ditches are then designed to give the required drainage. The law makes no provision for such surveys

and requires that certain facts in regard to the drain or drains shall be fixed in the application and these cannot be varied later. In certain counties of the State the necessity for this information has been recognized and it has become the common practice in these counties for the drain commissioner and the engineer to work out a plan of drainage for a given area before the application for the drain is filed. However, it would be much better if the application merely described the land to be drained and the general location of the drain or drains, leaving the details in regard to the location, points of beginning and ending, and the size and depth of the drain necessary, to the Drain Commissioner or Engineer, after sufficient data have been secured by the preliminary surveys on which to base the design of the system.

Prior to the letting of the contract no official estimate or cost of a drain is prepared and consequently the tax payers have no definite basis from which to determine the probable amount of money they will require to pay for the drain. However, various unofficial estimates of cost are prepared for practically all drains by tax payers or other individuals and usually data for such estimates are incomplete or meager. This method often leads to the preparation of unreliable statements under the guise of estimates which frequently results in arousing opposition to worthy projects because the estimates of cost are excessive or on the other hand, it may result in making projects of doubtful worth appear to be feasible because the estimates are too low. Because of this situation a reliable official estimate of cost is desirable for all drains of any considerable size. The lack of proper information on which properly to base the application has resulted in the construction of many ineffective drains, and in many cases has greatly increased the cost of the work. The investigations forming the basis of this report show that the best results have been secured where the drain commissioner has realized the advantages that come from the construction of properly designed drains, but in many counties where larger work has been handled without competent engineering advice, many expensive mistakes have been made.

The time required to secure action by the township board causes a serious delay in the proceedings without adding any apparent corresponding benefit. Frequently the board in ascertaining and determining the necessity for a drain acts in a superficial or arbitrary manner and in reality contributes nothing of value to the drain proceedings. When the drain passes through two or more townships the proceedings become unnecessarily cumbersome.

The actual value of land required for right of way is much less than the value of the special assessments which are levied to pay for drain yet the acts necessary to secure the right of way are frequently more expensive and require more time than the making of assessments of benefits. The practice of not requiring land owners to claim damages on account of the construction of the ditch, or for the land taken for rights of way, has been

followed for several years in Arkansas, Missouri, Mississippi, and other States which have or have had, large drainage problems and the same authority that assumes benefits also allows damages; Kansas recently so amended its drainage law as to provide for this. This method has the effect of simplifying and expediting the procedure, lowering the cost and reducing litigation—all desirable changes from the viewpoint of the land owner. Ordinarily the authority that assesses benefits has made a complete study of the project and consequently is in a better position to equitably assess damages than is any other authority. In some of the counties of the State considerable difficulty also has been experienced under the Michigan Act in securing rights of way from railroads for drains.

The amount of recording now required for each drain is large and considerable duplication occurs. Frequently for a drain of ordinary size the record covers 100 or more large record book pages. The minutes of survey after having been recorded once reappear many times in other papers. In one record that was examined it had been copied 13 times. In preparing statements to show the area of land embraced in assessing districts, the per cent of benefit apportioned to the separate tracts of land, and the assessment of cost of a drain, three separate statements or lists are prepared and recorded. The records could be materially shortened by combining these three statements and making a single lists of lands benefited. The number of acres of land assessed in each tract and the total acreage in the district are not recorded on the assessment roll.

The law makes no provision for paying expenses incurred in connection with the drains before the taxes are levied and paid except that payment may be made for the surveyor's services from the general fund of the county. Orders cannot be drawn on the drain fund until the contract is let and are not payable until March 15 of the year in which the taxes are required to be paid, and do not bear interest except after drain taxes become delinquent. The inability to make payments in cash for expenses incurred in connection with the drain does not make for efficiency.

The law requires that personal notice of the letting of a contract for the construction of the drain shall be given to all land owners whose lands will be assessed. Notice is also given by advertising in a newspaper and by posting notices. On a large drain where there are many landowners the serving of personal notices is a task of considerable magnitude, the necessity for which is not apparent.

In some States formerly having drain laws similar to the Michigan Act, considerable change in procedure has been made. Personal service of notice in regard to the drain or assessment rolls has been quite generally abandoned; notice being given by publication in newspapers and by posting of notices in public places in the district.

The contractor for the work performed on Michigan County Drains is required to finance the construction until the taxes are paid. When the taxes are paid in one year this is not a serious matter, but when the taxes are paid in two or three installments it may materially increase the cost of the work to the land owners.

Information obtained during the investigation indicates that in a few counties the increased cost where payment was deferred to two years was from 10 to 20 per cent, and probably averages about 10 per cent. This increase is substantially the same as is found in other States where payments are deferred. The ability to pay a contractor in cash materially reduces the cost of the work as the contractor is not required to discount the orders or carry them until funds are available.

In order to have a drain cleaned out it is necessary to file an application with the county drain commissioner who determines the per cent of benefit assessed to each tract and then proceeds as though he were constructing a new drain. There is a demand for a simpler and more expeditious method of cleaning out drains. Experience in other States indicates that an annual tax for maintenance is advisable and results in better drainage at a lower average annual cost than where the drains are repaired and cleaned only after they have become practically imperative.

No provision is made in the law for a land owner whose land is not traversed by a drain to secure an entrance to the drain across land owned by another party. If the matter cannot be arranged between owners the only way the outlet can be secured is by securing necessary signatures to an application and then constructing a drain in the manner provided by law. A simpler and quicker method than that now available is needed.

Many features of the present method of handling drains which affect two or more counties are not very satisfactory. Some counties may be vitally interested in a project but others may be interested but slightly. This inequality of interest is certain to cause delay where no centralized authority is provided. When a number of counties are interested in a drain the procedure becomes very slow and cumbersome as each county drain commissioner must sign all orders and papers connected with the work. If a drain were to be undertaken involving one of the larger streams in the State, as many as 20 drain commissioners might be required to sign each paper. Such a large body cannot work efficiently and rapidly and would make the administrative expense heavy.

NECESSITY FOR BONDING PROVISION

The problems connected with the drainage of agricultural lands are complex, depending upon many factors and are continually changing. In the early days land was cheap and when the cost of contemplated drainage went beyond certain limits, it was deemed cheaper to buy other land with better natural drainage. As the value of, and demand for land increased it often became

profitable to reclaim lands which a few years earlier the cost for reclamation would have made prohibitive.

In many localities small drains have been constructed which empty into a natural water course, which does not give an adequate outlet, and which must be dredged before much of the land immediately tributary to it can be properly drained. The improvement of this outlet is frequently expensive and the cost to the lower lying lands, which frequently are undeveloped, is so high that it is very difficult if not impossible for the land owners to pay for the construction under the method that now prevails. When cultivated lands could be cheaply reclaimed by a drain, the land owners could readily pay for the work in one or two years. As the cost of drainage increased it became difficult and sometimes impossible to do this. The necessity for paying for the construction of drains within a comparatively short time has had the effect of delaying or wholly preventing the construction of large projects draining an entire watershed although from every standpoint these larger projects are most desirable. This difficulty in constructing outlet drains is one of the reasons why so many small drains such as are so numerous on Plates I and II are constructed.

Many large tracts of timbered wet land are still to be reclaimed in the State, and many of these are so located that physical conditions make it necessary that they be drained as units, if adequate drainage is to be secured. Much of this type of land is so wet that it cannot be cultivated until it is drained, so that drainage of necessity must be the first step in the development of these lands. After the outlet ditches are constructed the lands must then be cleared and the field ditches built before they can be made to yield an income to the owner. As is well known by everyone who has had experience with such lands this takes considerable time especially if the fields to be cleared are large. The farmer who is trying to reclaim such lands usually is not in a position to make large payments for the construction of drains. To meet this condition it is desirable that some arrangement be made under the terms of which the construction work can be financed and payment for the work deferred until the land is producing and yielding returns.

Many States having undeveloped wet lands similar to many of those in Michigan, have met this difficulty by giving the assessment district the right to issue bonds which later are paid off from the taxes collected from the landowners. These bonds command a ready sale and in many States the landowner is given the privilege of paying only the interest on the bonds for the first few years while the lands are being brought under cultivation, after which the bonds are then paid off in annual installments. This arrangement has worked well in Minnesota and many of the southern States.

CHAPTER V. NECESSITY FOR CREATION OF STATE DEPARTMENT TO HANDLE WATER RESOURCES AND DRAINAGE MATTERS.

On some of the larger streams in the State there are situations where in addition to providing for drainage or overflow provision must be made for protecting cities, villages and industries along the stream. Such projects must be handled as a unit if the best results are to be secured. The attempt of one interest to protect itself without a study of the problem as a whole, generally leads to dissention and piecemeal work. Frequently ultimate failure results; in any event the solution of the problem is sure to prove more satisfactory in the end, and very much less expensive, if all interests unite in their efforts to secure protection.

The present law, although well adapted to small drains, was not enacted to cover such situations and does not meet the needs of these projects. The boundaries of these larger projects are fixed by topographic conditions and do not in any way necessarily coincide with the boundaries of the political subdivisions of the State. Such projects are not confined to Michigan alone but occur in all the States; several of which have worked out methods for handling them. Experience in other States has shown it to be desirable to centralize control of the entire project with some local board or commission which is given very broad powers and has full control of the project and all matters relating to it. This board or commission is given the power to employ such assistants as may be needed, to let contracts, and to assess and collect taxes, condemn rights of way and to finance the project by selling bonds. The interested property owners are given the right to be heard in regard to initiating the project and after it has been initiated, are generally given an opportunity to decide whether or not it shall be carried on after the plans and estimates of cost have been prepared and individual rights are fully protected. The Saginaw River may be cited as a concrete example of the complexity of the problem arising, because of the interrelation of many interests, when an attempt is made to improve the agricultural lands lying within a large river basin.

This river which is navigable for boats of considerable draught from its mouth to Saginaw, furnishes domestic water for the city and serves as a medium for the sewage disposal. A number of power plants have been constructed on certain principal tributaries and more are contemplated, and there are about 50,000 acres of overflowed land lying within the forks of the tributaries forming the main streams. This overflow area now acts as a large storage reservoir retarding the flood waters and thus reducing the maximum flood heights along the lower reaches of the streams. The overflow land is all good agricultural land and if reclaimed by drainage and

levees would produce valuable crops. To reclaim this land will necessitate the improving of the channel of the river if the height of the floods now occurring on the river are not materially increased which is not to be desired as even now floods cause serious damage both to the low lands along the streams and to the cities and villages. Indeed, the situation has become so serious that an injunction has been served forbidding further work on the principal tributaries until provision has been made for taking care of the water that will be brought down. The injunction blocks much needed work on several tributary streams where it is badly needed for the reclamation of agricultural lands. No one of the interests is paramount and they vary somewhat in importance but all are of considerable magnitude and any comprehensive scheme of reclamation should take all of them into consideration. Situations similar to those along the Saginaw River exist along many of the large streams in the State.

If the best results are to be obtained, control of the larger stream must be centralized. This would tend to harmonize the relations of the various divergent interests and work could be conducted as it cannot be at the present time, which would accomplish much toward the development of the State's natural resources.

There would be much advantage to the drainage work in the State in having a central body that could assist the various drain commissioners with their problems. Under the county unit system in use at present, difficulties and delays occur in determining the necessity for proposed drainage improvements, for large projects particularly where the land lies in several counties.

For projects of these kinds a preliminary report, prepared along-approved engineering lines, to show the plans and estimated cost of the work should be submitted to a State authority qualified to pass upon the necessity for making the improvement.

For projects situated in several counties the State authority would designate the proper drain commissioner to take charge of the project and thereby extend the authority of that commissioner to cover the whole territory involved regardless of county lines.

For all projects submitted the State office should be authorized to approve, modify or reject the preliminary and final plans and estimates, and no improvements should be constructed without the approval of the office.

The office should be authorized to determine the necessary qualifications for all civil engineers or surveyors employed to have charge of the making of surveys, plans and estimates for the larger projects and it should be required that any persons placed in charge of engineering work for the drainage assessment district should be properly qualified for the work.

The preparation of standard plans and specifications and uniform methods for making such improvements as could be standardized should be carried out in the State office. Under this division of the work would come the

making of a standard for recording important data concerning a drain, for the stating of important information only in printed notices, and the elimination of the very long records and legal forms and printing which under present methods are too expensive. Methods for inspecting and maintaining drains after the construction is completed should properly be worked out by the State office.

On appeal from the action of a county drain commissioner all questions affecting a special drain assessment district should be referred to the State office for decision.

The office should work in cooperation with other State authorities and institutions in determining whether certain drainage projects could be economically developed and should prepare general plans for the development of the larger projects which, could not be handled by local authority. In these larger projects the determination of the quality of soil, probable increase in land settlement and in agricultural pursuits in the locality where improvements are proposed should be considered. In certain portions of the State notably in the northern portion of the Southern Peninsula and in a very considerable portion of the Northern Peninsula where there has been practically no drainage development, the need for thorough and careful planning on a large scale is most apparent. The location of projects which could be developed profitably and the working out of methods for reclaiming land for agricultural purposes and for financing the projects until the land could be made productive are problems which should be handled under State authority. Besides having direct authority to handle drainage matters the office should be authorized to compile data on the subject of land reclamation to be issued as advice or information to interested parties including present and prospective land owners, legislators, county and state authorities, industrial organizations and educational institutions.

There are at present several State agencies which are doing more or less work on different phases of the drainage problem, among which are the Board of Health, Highway Commission, Public Domain Commission, University of Michigan, Michigan Agricultural College and the State Geological and Biological Survey. Their efforts are not correlated, however, and without this the larger drainage problems of the State can never be satisfactorily and economically handled.

CHAPTER VI. ABSTRACTS OF DRAINAGE LAWS OF GEORGIA, IOWA, MISSOURI, OHIO AND WISCONSIN.

DRAINAGE LAW IN GEORGIA*

(As passed in Laws of 1911 and amended in Laws of 1913 and 1917.)

Section one of the drainage law creates a Court composed of the Clerk of the Superior Court and the Board of Commissioners of Roads and Revenues, or if there be no such Board, then the Ordinary of the county, with authority to establish levee and drainage districts. When the landowners desire to form a levee or drainage district of any particular land a petition, signed either by a majority of the landowners living in the proposed district or by the owners of three-fifths of all the land, is filed with the Clerk of the Superior Court of any county in which part of the land is located. This petition must describe the land to be included in the district in such manner as to give a clear idea of its location. It also must set forth that the land is too wet for cultivation and that the public health and welfare will be promoted by a system of drainage. Accompanying the petition must be a bond acceptable to the Clerk of the Court, to cover all costs in case the request of the petitioners is not approved. To the landowners who have not joined in the petition the Clerk of the Court must issue a summons notifying them that the petition has been filed

On the day when the summons is returned, the Clerk of the Court appoints a Board of Viewers composed of a civil and drainage engineer and two resident owners of real property of the county. It is the duty of this board to examine the lands described in the petition with a view to determining the most practicable route, and to return to the Clerk of the Court within thirty days a written report setting forth

1. Whether or not the proposed drainage is practicable.
2. Whether it will benefit the public health, or any public highway, or be conducive to the general welfare of the community
3. Whether the improvement proposed will in fact benefit the lands sought to be benefited.
4. Whether or not all the lands that are benefited are included in the proposed drainage district.

With this report must be filed a map showing the locations of the proposed improvements and the lands that will be affected.

If the findings of the Board of Viewers are not favorable to the formation of the district, and if the Court shall approve such findings, the petition must be dismissed. However, if their findings are favorable and the Court shall agree, then a day for further hearing on the findings

of the Board of Viewers is set. Notice of this hearing must be given by publication for two consecutive weeks in a newspaper of general circulation, and by posting a notice at the courthouse and at five conspicuous places in the district. At least fifteen days must intervene between the date of publication and posting of notice, and the date set for the hearing. To landowners not residing in the district, written notice must be sent at least thirty days before the hearing.

At the hearing the Court passes upon any objections that may be offered to the report of the Board of Viewers. If any lands have been included which in the opinion of the Court will not receive benefit from the proposed improvements, they are excluded; and if any lands which will be benefited are not included the boundaries of the district are extended so as to include them. At the close of the hearing if the Court decides that a drainage district will be to the interest of all affected, it declares a district established and gives it a name or number. Any person who feels that his lands should not be included in the district may appeal to the Superior Court of the county. After the district is declared established the report of the Board of Viewers is referred back to them with instructions to make a complete survey and plans for the necessary improvements, and report to the Court. For making the survey the Board of Viewers are authorized to employ such assistants as may be necessary.

If lands needed for carrying out the plans cannot be secured by purchase or gift, the district has the power to condemn such lands in a manner as is provided in Chapter 9 of the 1910 Code.

It is the duty of the Board of Viewers to determine and assess all damages which may be claimed, and unless such claims are made, no damages will be paid. This board also examines all land in the district and classifies it according to benefit it will receive by the construction of the improvement, consideration being given to the degree, of wetness of the land, its proximity to the ditch or natural outlet, and fertility of the soil. The lands receiving the greatest amount of benefit are rated "Class A," the next highest "Class B," the next highest "Class C," and that receiving the least benefit "Class E." The scale of assessment upon the several classes of land is in the ratio of five, four, three, two and one; that is, as often as five mills per acre are assessed against the land in "Class A," four mills per acre are assessed against "Class B," three mills against "Class C," two mills against "Class D," and one mill against "Class E." Upon the completion of the survey and plans and the assessing of benefits and damages, the Board of Viewers files its complete report with the Court which either accepts the report and sets a day for a hearing not less than twenty days thereafter, or refers the report back to the Viewers with instructions to secure additional information. Notice of this hearing need be given by publications only as heretofore indicated. Notice must be served upon any railroad companies which may be affected. At this hearing any landowner may file objections in writing to the report of the Viewers, and the Court will make such

changes as it feels are warranted. If the Court shall find that the cost of constructing the improvements, including damages, exceeds the benefits which will accrue, it dismisses the proceedings at the cost of the petitioners; but if it finds that the cost of construction and damages will not exceed the benefits, it approves the Viewers' report, and appoints "Board of Drainage Commissioners" composed of three persons who are elected by the landowners within the district. The "Board of Drainage Commissioners" is charged with the administration of the district and becomes a body corporate possessed with powers such as usually are exercised by a corporation. From the findings of the Court, any landowner may appeal within ten days. The right of appeal also extends to railroad companies.

In order that there may be a complete record, the Clerk of the Superior Court is required to keep a "Drainage Record" showing each step in the proceedings.

Upon their organization the Commissioners appoint a competent person as superintendent of construction, who must furnish a ten thousand dollar bond to the Commissioners.

The law provides that the construction of the improvements be by contract, the Commissioners being required to give notice by publication for two consecutive weeks in some newspaper published in the county wherein the improvements are to be constructed and in such other publications as they may deem advisable, of the amount of work to be done and the time and place of letting the work. The work is awarded to the lowest bidder who must enter into a contract with the Commissioners and give a bond equal to 25 per cent of the estimated cost of the work awarded him. The superintendent of construction is required to make monthly estimates of the work performed by the contractor and to check it against the specifications. If he approve the work the Commissioners direct that an order for 90 per cent of the completed work be drawn in favor of the contractor. Before the work is accepted as complete, it is the duty of the Superintendent to check it carefully to see that it complies with the specifications. If a contractor fail to complete his contract, action may be had against him and his bond to recover such damages as may have been sustained.

When any drains cross public highways, the cost of building all new bridges across such drains must be paid by the county. Any benefits conferred upon such highways are assessed against it. To such assessments the Board of Commissioners of Road and Revenues, or, if there be no such Board, the Ordinary of the county in which the road is located, may file objections the same as landowners. Whenever the drainage improvements will cross the right of way of any railroad company, notice must be sent to the company or its agents informing them of a date when officials of the district will meet them at the place where the ditch or drain may cross the right-of-way, for the purpose of agreeing on the place and manner in which such improvements shall cross. In case no agreement can be reached, then the

district's officials determine the place and manner of crossing and the damages if any, which the railroad company may suffer. The cost of building new bridges or of enlarging and strengthening existing bridges and culverts are not to be considered as damages to the railroad companies. Benefits which may accrue to the railroad, by affording better drainage or better outlets, are assessed against the company at a fixed sum. When construction is undertaken the railroad company must be notified of the time the contractor will be ready to construct ditches across the rights-of-way, at which time it must remove its ties, rails and other obstructions, so that the excavation may proceed. Failure on the part of the railroad to remove such obstructions subjects it to a penalty of \$25 for each day of delay. For expenses incurred in such removal the railroad company is entitled to compensation by the district, though it must pay for the cost of excavation.

When the drainage system is completed, it becomes the duty of the Board of Drainage Commissioners to keep it in repair. For this purpose they are authorized to levy additional assessments in the same manner and proportion as the original assessments. However, if any repairs become necessary due to negligence on the part of owners through whose lands the improvements extend, such owners are held liable for the cost of making the required repairs. Any person damaging or obstructing any improvement becomes liable to a fine.

Any person assessed for the cost of construction has the right to use the ditch or drain as an outlet for lateral drains from his land. If his lands are separated from the outlet ditch by the lands of another, he has the right to cross the lands of such other party for the purpose of reaching the outlet ditch.

After the lands are classified according to benefits, as previously provided, and the classification approved by the Court, the Drainage Commissioners prepare an assessment roll, giving a description of all the lands, the names of the owners, and the assessment made against each tract. The total of these assessments represents all costs, including damages awarded, less assessments made against railroads.

If the total cost shall average less than twenty-five cents per acre on all land in the district, the assessment made against each tract is payable in one instalment; but if the assessment exceeds twenty-five cents per acre, the Drainage Commissioners may give notice by publication for three weeks, as heretofore provided, that they intend to issue bonds. Such notice must indicate the amount of bonds the rate of interest the bonds will bear, and when the same are payable. The interests on bonds will be additional to all other costs and must be borne by the landowners. Those not wishing to pay this interest can escape by paying their assessments in full to the County Treasurer within thirty days after the notice has been published. After the thirty days have expired the Commissioners may sell bonds, for not less than par, to the amount of the unpaid assessments, together with interest thereon, cost of collection and other incidental

expenses. These bonds, which bear six per cent interest payable annually, are paid in ten equal installments, the installment falling due three years after date of issue and one installment during each of the next nine years. In districts where the total bond issue does not exceed fifty thousand dollars, the Drainage Commissioners may fix the rate of interest at not to exceed eight per cent per annum. After bonds are issued the unpaid assessments become a lien or tax, second only to State and county taxes, upon the lands against which they are assessed. These taxes are collected by the same officers-as collect State and county taxes. If they are not paid when due, and if such default continue for six months, the holders of the bonds may bring a suit to enforce their collection. If the officers of the district fail to enforce collection, the bond holders may bring suit against them or their official bond.

In case an assessment approved by the Court is reduced by the Superior Court, the Commissioners have authority to change or modify the original assessments so as to comply with the Court's order. To provide for any deficit which may result, the Commissioners can make another assessment but such relevy must be made on the basis of the original assessment.

The rates of compensation and the fees allowed for services rendered the district are fixed by the law, except in cases of engineer and attorney, where they are fixed by the Commissioners.

Provision is made for co-operation with any departments of the United States Government.

Any person appointed under the law may be removed upon petition to the Court showing corruption, negligence of duties, or other good and satisfactory causes.

APPENDIX

AMENDMENTS TO THE STATE DRAINAGE LAW**

The following amendments have been made to the State Drainage Law since its passage by the Legislature in 1911:

AN ACT

To amend an Act providing for a system of drainage and reclaiming the wet, swamp and overflowed lands of the State, approved August 19, 1911, by authorizing a higher rate of interest on bonds in certain cases; authorizing and requiring the validation of bonds, issued under said Act in all cases requiring the cost of building new bridges thereunder to be paid for by the county, and for other purposes.

Section 1. Be it enacted by the General Assembly of the State of Georgia, and it is hereby enacted by authority of the same, That an Act providing a system for draining and reclaiming the wet, swamp and overflow lands of the State, approved August 19, 1911, be so amended that where bonds heretofore and hereafter issued thereunder do not in any case exceed the sum of twenty thousand dollars, that the rate of interest thereof may be fixed by

the Board of Drainage Commission at not more than eight per cent per annum.

Sec. 2. Be it further enacted, That said Act be also amended so that whenever bonds heretofore and hereafter issued thereunder in any case, that the same shall be validated as other bonds are now required to be validated under the provisions of existing laws of this State.

Sec. 3. Be it further enacted, That said Act be also further amended so that the cost of building all new bridges thereunder shall be borne and paid for by the county.

Sec. 4. Be it further enacted, That all laws and parts of laws in conflict with this Act be, and the same are hereby repealed.

Approved, August 16, 1913.

AN ACT

To amend an Act approved August 19, 1911, providing for a system of reclaiming the wet, swamp and overflowed lands by providing that the Tax Collector nor County Treasurer, or the equivalent officer shall receive no commission out of said drainage fund, for performing the duties imposed upon them in said Act, and to amend Section 1, of the amendment to said Act, approved August 16, 1913, authorizing a higher rate of interest on bonds in certain cases; authorizing and requiring the validation of bonds, issued under said Act in all cases requiring the cost of building new bridges thereunder to be paid for by the county by striking the words "Twenty-thousand" and inserting in lieu thereof the words "Fifty Thousand" wherever found in said Section 1, and for other purposes.

Section 1. Be it enacted by the General Assembly of the State of Georgia, and it is hereby enacted by authority of the same, that the Act of 1911 providing a system for the reclaiming of the wet, swamp and overflowed lands of the State, be so amended as to add a new section to the drainage Act as passed in 1911, by adding the following Section 41. That the Tax Collector nor the County Treasurer or the equivalent officer shall receive no commission for handling the Drainage Fund nor for performing any duty imposed upon him in said drainage Act approved August 19, 1911.

Sec. 2. Be it further enacted by the authority aforesaid, that Section 1 of the amendment thereto, approved August 16, 1913, be, and the same hereby is amended by striking therefrom the words "Twenty Thousand" and inserting in lieu thereof the words "Fifty Thousand" wherever found in said Section 1, so that said section, when so amended will read as follows: Section 1. Be it enacted by the General Assembly of the State of Georgia, and it is hereby enacted by the authority of the same: That an Act providing the reclaiming the wet, swamp and overflowed lands of the State approved August 19, 1911, be so amended that where bonds heretofore or hereafter issued thereunder do not, in any case exceed the sum of Fifty Thousand Dollars, that the

rate of interest thereof may be fixed by the Board of Drainage Commission at not more than eight per cent per annum.

Sec. 3. Be it further enacted by authority aforesaid, That all laws and parts of laws in conflict with this Act are hereby repealed.

Approved August 21, 1917.

*Bulletin No. 32, Geological Survey of Georgia. Discussion of Georgia law by H. S. Yohe, Expert on Drainage Organization, Bureau of Public Roads, U. S. Department of Agriculture.

**The State Drainage Law passed by the Legislature in 1911, will be found as the Appendix to Bull. No. 25, Drainage Investigations in Georgia, issued by the State Geological Survey.

DRAINAGE LAWS OF IOWA

The constitution of the State of Iowa provides for Drainage Laws, Article 1, Sec. 18, The general assembly, however, may pass laws permitting the owners of lands to construct drains, ditches, and levees for agricultural, sanitary or mining purposes across the lands of others, and provide for the organization of drainage districts, vest the proper authorities with power to construct and maintain levees, drains and ditches and to keep in repair all drains, ditches and levees, heretofore constructed under the laws of the State, by special assessments, upon the property benefited thereby. The general assembly may provide by law for the condemnation of such real estate as shall be necessary for the construction and maintenance of such drains, ditches and levees, and prescribe the method of making such condemnation.

Iowa has several drainage acts, but the one under which the greater part of the work is done is the "Act providing for the establishment of drainage districts," Sections 1989-A1 to 1989-A79, inclusive.

Synopsis of Sections 1989-A1 to 1989-A79 inclusive.

SEC. 1989-A1: "The Board of Supervisors of any county shall have jurisdiction, power and authority at any regular, special or adjourned session to establish a drainage district or districts, and to locate and establish levees, and cause to be constructed as hereinafter provided any levee, ditch, drain, or water course, or to straighten widen, deepen or change any natural water course in such county whenever the same will be a public utility or conducive to the public health, convenience, or welfare and the drainage of surface waters from agricultural lands shall be considered a public benefit and conducive to the public health, convenience, utility and welfare."

SEC. 1989-A2. When a petition signed by one or more land owners whose lands will be affected by, or assessed for the expenses of, the proposed improvements, shall be filed in the office of the County auditor, setting forth that any body or district of land in the county, described by metes and bounds, or

otherwise, so as to convey an intelligible description of such lands, is subject to overflow and too wet for cultivation and that the public benefit or utility, or the public health, convenience or welfare will be promoted by draining, ditching, tiling, or leveeing the same, or by changing the route of a natural water course; and setting forth the starting point, route and terminus, and lateral branches, if necessary, of the proposed improvement and accompanied by a bond in the amount and with sureties approved by the County Auditor, to pay all expenses in the proceedings, if it is not approved by the Board of Supervisors. The board at its first regular session thereafter appoints a competent engineer, who is required to give bond for the satisfactory performance of his duties. The engineer is given a copy of the petition, and proceeds to examine the lands and to lay out and locate such improvements as may be practicable and feasible, to carry out the purposes of the petition, and which will be a public benefit or utility, or conducive to the public health, convenience and welfare. A report is submitted to the County auditor in which report is described in detail the location and dimension of the improvements, together with a plat and profile showing the improvements; the boundaries of the district, and such other information as he may deem pertinent. A description of each tract of land and the names of the owners as shown by the transfer books in the Auditor's Office, and the probable cost shall be included in the report.

The board has the right to change engineers at any time. The law requires that where practicable drains shall follow natural water courses. Whenever a ditch or drain crosses a railroad right-of-way it shall, wherever possible, be located at the natural waterway unless the railroad has provided another place for the water to pass; and if located at the place provided, the railroad Company is estopped from afterwards objecting to the location on the ground that it is not a natural waterway.

SEC. 1989-A3. Upon the filing of the report of the engineer if the same recommends the establishment of the district, the Board examines the report and if the plans meet their approval they direct the auditor to give notice as later provided. If they do not approve the report they may direct the engineer, or another selected by them, to report another plan. The plan may be amended at any time prior to the establishment of the district. When the plan has finally been adopted by the board, they order the auditor to cause notice to be given to the owners of each tract or land, or lot within the proposed district, as shown by the transfer books in the auditor's office, including the railroad companies having right-of-way in the district, and to each lien holder or encumbrancer of any land through which, or abutting upon which, the proposed improvement extends as shown by the County records; and also to all other persons whom it may concern including the actual occupants of land in the proposed district without naming individuals, of the pendency of the petition, of the favorable report of the engineer and that such report may be amended before final action, the day set for

hearing, and that all claims for damages must be filed with the Auditor's office at least five days before the date set for the hearing, which notice, except as later provided, shall be served by publication thereof once each week for two consecutive weeks in a newspaper of general circulation in the County. The last publication to be at least twenty days prior to the date of hearing. Proof of publication must be made by the publisher. Anyone who has filed his address with the County Auditor requesting that a copy of the notice be sent to him, shall be entitled to receive a copy of the notice by registered mail. This notice must be sent at least twenty days prior to the date of the hearing. If, at the date of hearing, it appears that any person entitled to receive notice has not been or has been improperly served, the board may set another date for the hearing, and notice of such hearing shall be given the omitted party.

SEC. 1989-A4. Any person who does not file his claim for damages in the office of the County Auditor at least five days prior to the date of hearing on the petition shall be held to have waived his rights thereto; provided, that it shall not be necessary to file claims covering value of lands appropriated for right-of-way for construction of proposed improvements.

SEC. 1989-A5. The Board of Supervisors at the session set for hearing said petition shall proceed to hear and determine the sufficiency of the petition in form and substance, which petition may be amended as to form and substance at any time before final action thereon. If deemed necessary, the board may view the premises, and if they find that the proposed district will not be for the public benefit or utility, or conducive to the public health, welfare and convenience, they shall dismiss the proceedings; but, if they find that the improvements are conducive to the public health, convenience and welfare and to the public benefit or utility, and no claims shall have been filed for damages, they may, if they deem it advisable, locate and establish the same in accordance with the recommendations of the engineer, or, they may refuse to establish as they deem advisable. And at this hearing, if deemed advisable, they may order the engineer to make further examination and report to said board; and if they determine that further examination and report shall be made or if claims for damages have been filed, the board of supervisors proceed no further than to determine the necessity of the district. Further proceedings are continued to a later time, the date of which shall be fixed at the time of adjournment and the county auditor appoints three appraisers to assess damages, one of whom shall be the engineer.

SEC. 1989-A6. Assessment of Damages. The appraisers appointed to assess damages, view the premises and determine and fix the amount of damages to which each claimant is entitled, and place a valuation upon all acreage taken for right-of-way, as shown by plat of the engineer, and at least five days before the date fixed by the board to hear and determine the same, file with the county auditor a report in writing showing the amount of damages sustained by each claimant. The

board considers the amount of damages awarded in their final determination in regard to establishing such levee or drainage district, in their opinion, the cost of construction and the amount of damages awarded is not excessive and a greater burden than should be properly borne by the land benefited by the improvements, they locate and establish the same, and appoint an engineer as a commissioner, who shall make a permanent survey of the district, and shall file a report of the same with the County auditor, together with a plat and profile thereof. The board then determines the amount of damages sustained by each claimant, and may hear evidence in respect thereto and may increase or diminish the amount awarded; and any party aggrieved may appeal from the findings of the board in establishing or refusing to establish the district; or from its findings in the allowance of damages, to the District Court by filing notice of such appeal with the County Auditor at any time within 20 days after such finding, and at the same time filing a bond conditioned to pay all the costs and expenses of the appeal, unless the finding of the District Court shall be more favorable to the appellant or appellants than the finding of the Board.

SEC. 1989-A7. The amount of damages finally determined by the Board in favor of any claimant or claimants must be paid by the parties benefited, or secured to be paid by sufficient bond to be fixed and approved by the County Auditor; and after such damages shall have been paid or secured, the board shall divide the improvements into suitable sections, and appoint a competent engineer to have charge of the work of construction thereof, who shall be required to give bond

SEC. 1989-A8. The Board shall give notice by publication once each week for two consecutive weeks in some newspaper published in the county where such improvement is located, and such additional publication elsewhere as they may direct, of the time and place of letting the work of construction; they shall award the contract or contracts for each section of the work to the lowest responsible bidder, and they may exercise their own discretion as to letting such work as a whole or in sections. The right is reserved to reject any or all bids and to re-advertise the work. Each person bidding for such work is required to deposit a sum equal to ten per cent of the amount of the bid as a guarantee of his good faith in entering on said contract, if awarded to him. The successful bidder is required to execute a bond with sufficient sureties in favor of the county, for the use and benefit of the district, in an amount equal to twenty-five per centum of the estimated cost of the work.

SEC. 1989-A9. The engineer in charge of the construction furnishes the contractor monthly estimates of the work done on each section, which are filed with the auditor who draws a warrant in favor of the contractor, or delivers him improvement certificates, as the case may be, for eighty per cent of the value of the work done, according to the estimate; and when the improvement is completed to the satisfaction of the

engineer and the board of supervisors, the auditor draws a warrant in favor of contractor for the balance due.

SEC. 1989-A10. Makes provision for completing any portion of the work when the contractor has failed to do so.

SEC. 1989-A11. Provides for changing the dimensions of any of the improvements after the district is established.

SEC. 1989-A12. When the improvements provided for have been located and established, or when it is necessary to cause the same to be repaired, enlarged, reopened, or cleared from any obstructions therein, the board appoints three commissioners—one of whom shall be a competent civil engineer and two of whom shall be resident freeholders of the State not living in the district and not interested therein, or in a like question, nor related to any party whose land is affected thereby, and they shall, within twenty days after appointment, begin to personally inspect and classify the lands benefited by the location and construction of the improvements or the repairing of the same, in tracts of forty acres or lots according to legal or recognized subdivisions in a graduated scale of benefits to be numbered according to the benefit to be received from the proposed improvement, and they shall make an equitable apportionment of the cost, expenses, cost of construction, fees, and damages assessed for the construction of such improvement, or the repairing, or reopening thereof, and make a report in writing to the board of supervisors. In making the estimate, the lands receiving the greatest benefits shall be marked on a scale of 100 and those benefited in a less degree shall be marked with such percentage of 100 as the benefit received bears in proportion thereto. This classification, when fully established, shall remain as a basis for all future estimates unless the board later orders a re-classification. The auditor shall cause notice to be served upon each person whose name appears as owner, and also upon the person or persons in actual occupancy of any such land in the time and manner provided for the establishment of a levee or drainage district, which notice shall state the amount of special assessments to such owner upon each tract or lot; the date set for hearing the same before the board of supervisors, and that all objections must be made in writing and filed with the county auditor on or before noon of the day set for said hearing. On the date set the board of supervisors hear and determine all objections made and filed to said report, and may increase, diminish, annul or affirm the apportionment made in said report or any part thereof as they may deem just and equitable. When such hearing shall have been had the board shall levy such apportionment so fixed by it, upon the lands within the district, and all installments of the tax shall be levied at that time and shall bear interest at 6 per cent per annum from that date; provided, that any land owner against which any such levy shall have been made shall within twenty days from the date of such assessment promise and agree in writing, filed in the

office of the county auditor, that in consideration of his having the right to pay his assessments in installments, he will not make any objection as to the legality or regularity, of the assessments of benefits or levy of such taxes upon or against his property, but will pay such assessments as follows: One-third of the amount of said assessment at the time of filing the above agreement; one-third of the amount within ten days after the engineer in charge of said district shall certify that the improvement is half completed, and the remaining one-third within ten days after the board of supervisors shall have accepted the work.

If the first assessment made by the board of supervisors is insufficient the board may make an additional assessment and levy.

SEC. 1989-A13. In estimating the benefits to the lands not traversed by said improvements the benefit that such lands will receive after some other improvements shall have been constructed shall not be considered, but only the benefits which will be received by reason of the construction of the improvement in question. The drainage tax is levied upon land owners and collected in the same manner as other general taxes. The funds so collected are required to be kept separate.

SEC. 1989-A14. Any land owner aggrieved by the order of the Board fixing the assessment of benefits may appeal to the Circuit Court within twenty days after the completed service of notice of such apportionment. The appeal shall be tried in equity, and the appearance term shall be the trial term.

SEC. 1989-A15. Penalties are provided for anyone obstructing the drain.

SEC. 1989-A16. Former surveys may be used, or as much thereof as may be applicable

SEC. 1989-A17. When a district has been established and the improvements constructed and taxes levied against the land, and when for any reason levy for taxes cannot be enforced the board shall proceed as to all lands benefited by said improvement in the same manner as if the appraisalment and apportionment of benefits had never been made, using as a basis the entire cost of said improvement. In taxing up said benefits account shall be taken of the amount of tax, if any, that has been paid by those benefited and credit therefore given.

SEC. 1989-A18. When a ditch is to be constructed across a railroad right-of-way the auditor causes notice to be served on the railroad company stating the nature of the improvement to be constructed, the place where it will cross the right-of-way of such company, and the full requirements for its complete construction across such right-of-way, as shown by the report of the engineer, and directs such company to construct the improvement at the place designated, and to build or construct the necessary culvert or bridge where any ditch, drain or water course crosses its right-of-way, so as not to obstruct or interfere with the free flow of the water.

Within thirty days from the time of the service of such notice the railroad company is required to construct the improvement, and if it fails to do so, the auditor shall cause the same to be done under the supervision of the engineer in charge of the improvement, and such railroad company shall be liable for the cost thereof. The cost of constructing the improvement across the right-of-way of such company, not including the cost of building and constructing or rebuilding or reconstructing any necessary culvert or bridge where such improvement is located at the place of the natural waterway, or other place provided by the railroad company for the flow of water shall be considered as an element of such company's damages by the appraisers thereof, and the cost of building and constructing, or rebuilding or reconstructing any necessary culvert or bridge when such improvement is located at the place of the natural water-way, or place provided by the railroad company for the flow of the water shall be borne by such railroad company without reimbursement therefor.

SEC. 1989-A19. Whenever a ditch, drain, levee, or change of any natural water course crosses a public highway and makes necessary the removal of, building or rebuilding of any bridge or bridges, the board of supervisors shall remove, build or rebuild such bridge or bridges, paying the cost and expenses thereof from the county bridge fund.

When highways within the district are beneficially affected by the construction of the improvement, it is the duty of the commissioners appointed to classify and assess the benefits, and determine and return the amount of benefit to such highway.

SEC. 1989-A20. The board of supervisors are given, power to lay out and establish ditches or drains along the public highways.

SEC. 1989-A21. When any drainage district has been established and the improvements constructed, they are at all times under the control and supervision of the board of supervisors, and it is their duty to keep them in repair. The cost of such repairs or necessary changes shall be paid from the drainage fund of said district, or by assessing or levying the cost of such repair or change on the lands in the district.

SEC. 1989-A22. The owner of any land which has been assessed for the construction of improvements in the district shall have the right to use the drain as an outlet for lateral drains from his lands. The board of supervisors make specifications as to the manner in which connection shall be made and these specifications must be followed.

SEC. 1989-A23. If any person who owns land in the district has been assessed for benefits and is separated from drains by the land of another or others, and is unable to agree with them on the terms and conditions on which he may enter on their lands and construct a drain or ditch necessary to drain his lands, he may file a petition with the county auditor asking the Board to establish a sub-district within the limits of the original

district for the purpose of securing more complete drainage. The petition shall describe the lands to be benefited by metes and bounds, or otherwise, and the bond and all other procedure shall be the same as hereinbefore provided for the establishment of a district. When the improvements are constructed they shall become a part of the drainage system of the district.

SEC. 1989-A24. When two districts have their outlet in the same water course or stream and it shall become necessary to deepen or enlarge it, each district shall be assessed for the cost of such work in the same ratio to such total cost as the discharge of waters of the several districts emptying into the stream, but no district shall be liable to contribute for any improvement or cost and expenses incurred in improving said stream above the point of discharge of the waters of said district into the same.

SEC. 1989A-25. If a district proves insufficient to protect or drain all the lands therein, upon proper petition the board of supervisors shall have authority to include it in a new district. When a new district is established, the commissioners that classify the benefits shall take into account the value of the old improvements.

SEC. 1989-A26. Special assessments for benefits made by the commissioners appointed for that purpose as corrected and approved by the board of supervisors shall be levied at one time by the board against the property so benefited, and when levied and certified shall be payable at the office of the County Treasurer. Any land owner has the right to waive objections of illegality or irregularity as to the assessment of benefits or levy of such tax upon or against his property within thirty days from the date of such assessment; in consideration of having waived this he is allowed to pay his taxes in ten annual installments, with interest at six per cent the first of which shall mature and be payable on the date of such assessment, and the others, with interest, on the whole amount unpaid, annually thereafter, at the same time and in the same manner as the March semi-annual payment of ordinary taxes. All of such taxes with interest become delinquent on the first of March next after its maturity. If no such waiver is filed by the owner of the land, then the whole of the special assessment so levied against the property matures and is due and payable with interest from the date of such assessment, and shall be collected at the next succeeding March semi-annual payment of ordinary taxes. The board may provide for the issuance of Improvement Certificates payable to bearer or to the contractor, each of which certificates shall state the amount of one or more assessments, the part thereof made against the property designating it and the owners thereof liable to assessment for the cost of the same. Such certificates may be sold and are a lien against the assessment; they bear interest at not to exceed six per cent per annum, payable annually. Any property owner is given the right to pay the tax levied against his property, with interest thereon to date, at any time that

he desires to do so. Certificates cannot be sold for less than par value.

SEC. 1989-A27. If the board of supervisors determines that the cost of the district is greater than should be paid in one year, instead of issuing improvement certificates it may fix the amount that shall be levied and collected each year, and may issue drainage bonds of the County, bearing not more than six per cent interest and payable semi-annually in the proportions and at the same time when such taxes have been collected, and may devote the same at par with accrued interest to the payment of the work as it progresses; or may sell the same at not less than par with accrued interest, and devote the proceeds to the construction of the district. Any property owner may pay the full amount of the benefit assessed against his property before the bonds are issued. The terms and times of the bonds issued shall be fixed by the county supervisors and shall not be for more than fifteen years.

SEC. 1989-A28. Owners of land which require combined drainage may mutually agree to the establishment of a drainage district and may file with the county auditor such an agreement. Upon the filing of such agreement the supervisors at their next session thereafter establish the drainage district and thereafter have full and complete power over it.

SEC. 1989-A29. When the district extends into two or more counties and embraces land in two or more counties, the petition of one or more land owners affected must be filed with the county auditor of each of said counties at the same time and bond must be provided. Upon the presentation of such petition and the approval of the bond, the supervisors of each county appoint a commissioner and the commissioners meet within thirty days and appoint a competent engineer. Such commissioners and the engineer together make a survey of the lands embraced in the district, determine what improvements are necessary and file a copy of the report in the office of the auditor of each county. If the report recommends the establishment of the district the auditor causes the owners of the land as shown by the transfer books to be notified. Such notice is served in the same manner as when the drain is located in one county. The board of each county has equal power.

SEC. 1989-A30. Any person claiming damages files his claim in writing in the office of the county auditor of the county in which his land is located, at least five days prior to the time of hearing. Failure to file such claim at the time specified, waives the right thereto.

SEC. 1989-A31. At the time set for the hearing on the petition the boards of the several counties meet and sit jointly in considering the petition, and proceed in the same manner as provided for drains located in one county, except that if it becomes necessary to appoint appraisers, the Boards of Supervisors appoint one appraiser from each county; and if the district extends into or through only two counties the two appraisers choose a third. The appraisers have the same

qualifications as those for drains wholly in one county and they proceed in the same manner except that a copy of their return must be filed in the auditor's office in each county.

SEC. 1989-A32. If the joint boards establish the district, they appoint a commission, one of whom shall be selected from each county; and in addition thereto a competent engineer to classify the land and make an equitable apportionment of the costs of the improvement. Upon the filing of their report, the several county auditors, acting jointly, cause notice to be served of the time and place where the boards of supervisors will consider such report. The proceedings shall be the same as when the district is in one county, except after the amount to be assessed against the several tracts has been finally determined, the several boards acting separately and within their own counties, shall proceed to levy and collect the taxes in the same manner as when the district is in one county.

SEC. 1989-A33 to 35, inclusive, provide that the boards of supervisors acting jointly, shall let contracts, appoint a supervising engineer, and hear appeals in the same manner as provided when the district is wholly in one county.

SEC. 1989-A36. Whenever the establishment of a district is petitioned for in two or more counties, and one of the boards of supervisors neglects, fails, or refuses to take action the procedure is transferred to the district court.

SEC. 1989-A37. The board of supervisors are granted the same authority as provided where the improvement is wholly in one county, and provides that the proceedings shall be the same so far as applicable and not otherwise provided.

SEC. 1989-A38. Authority is given to the board of supervisors to establish a levee or drainage district that includes the whole or any part of any incorporated town or city, and gives the same powers to assess damages and benefits as they have in other cases.

SEC. 1989-A39. When a drainage district cannot obtain suitable outlet within a State, the board of supervisors is given authority and power to purchase a right-of-way for such outlet in an adjoining State, and pay for the same out of the funds of the district.

SEC. 1989-A40. The right to employ watchmen for levees, and authority to make repairs thereon in times of emergency is given to the board of supervisors.

SEC. 1989-A41. The engineer employed under the provisions of this Act shall receive compensation as fixed by the board of supervisors. Appraisers and commissioners, other than the engineer, shall receive not to exceed \$4.00 per day each. All other fees and costs required under the provisions of this Act shall be the same as provided by law for like services in other cases. The amount of fees for publication of notices shall be fixed by the board of supervisors.

SEC. 1989-A42. The county auditor is the custodian of all papers and records pertaining to the levee or drainage matters in his county, and shall keep a book known as the Drainage Record.

SEC. 1989-A43. Relates to the drainage of highways.

SEC. 1989-A44. The board of supervisors of any county in which a drainage district has been established shall cause a competent engineer to inspect such improvement whenever that may deem it necessary, and at least once each year, and he shall make a report to the board of the condition of the improvement, together with such recommendations as he may deem necessary.

SEC. 1989-A45. The tax provided for in this Act, when levied shall be a lien upon all premises upon which the same is assessed, to the same extent and in the same manner as the levy for general taxes.

SEC. 1989-A46. The provisions of this act shall be liberally construed to promote the ditching, draining and reclamation of wet, overflowed or agricultural lands. The collection of the assessments shall not be defeated where the proper notices have been given, by reason of any defects in the proceedings occurring prior to the hearing of the board locating and establishing the district. Upon appeal the Court shall, if it deems it just and proper, release any person, or modify his assessment or liability; but this shall not affect the rights or liability of any other person. The failure to appeal from the order of the board of supervisors of which complaint is made shall be a waiver of any illegality in the proceedings, and the remedies provided for in this act shall exclude all other remedies.

SEC. 1989-A47. Relates to certain other acts.

SEC. 1989-A48. Authorizes the payment of all necessary preliminary expenses in connection with the drainage district out of the general county fund, or, if there shall be more than one county, from the general county fund from each of the counties included in the district in such proportion as the work done or the expensess created in each county bears to the whole amount of work done or expenses created; the amounts to be determined by the engineer in charge of the work. The funds advanced shall be repaid to the county or counties as soon as possible after the drainage district is established; or, if not established, shall be paid from the proceeds of the bond deposited with the county auditor.

SEC. 1989-A49 to A-52. provide for the establishment of pumping stations, and the election of trustees to manage the same.

SEC. 1989-A53. The owner of any land may drain the same in the general course of natural drainage by constructing open or covered drains, discharging same into any natural water course, or into any natural depression whereby the water will be carried into some natural water course. When such drainage is wholly upon the owner's land he shall not be liable in damages therefor to any person or persons or corporation

SEC. 1989-A54. Provides a method of including additional lands in the district after it has been established.

SEC. 1989-A55. Provides for the acquisition of outlets in drainage districts outside of the county in which the drain is located. The board is given the power to condemn property for this purpose.

SEC. 1989-A56 to Sec. 1989-A60 relate to pending litigation, claims of sub-contractors, adjudication of claims and release of claims.

TRANSFER OF CARE OF CERTAIN DRAINAGE DISTRICTS TO LOCAL BOARDS OF TRUSTEES

SEC. 1989-A61. In all drainage or levee districts heretofore established, or which may be established, not containing pumping station, and costing one hundred thousand dollars or more, and less than 25 per cent of which has been spent for tile construction, any three or more persons who own land in the district which has been assessed for benefits may, after the completion of the construction work, file a petition signed by a majority of the persons owning land within the district assessed for benefits, and who in the aggregate own a majority of the number of acres assessed for benefits, asking that such district be placed under the management and control of three trustees who are owners of land assessed for benefits in the district, and residents of the county or counties in which the district is situated, to be elected by the persons owning lands assessed for benefits in such district. Such trustees shall be the agent of the property owners and have the management of the business of the district, but not considered public officers.

SEC. 1989-A62. If the district is located in more than one county petitions shall be presented to the boards of supervisors of the several counties in which the district is located.

SEC. 1989-A63 to A69. These sections make provisions for the holding of election of trustees and for the tenure of office of trustees, time of elections and the filling of vacancies.

SEC. 1989-A70. As soon as the trustees have qualified, they organize by electing one of their own members chairman and select some other tax payer of the district as clerk of the board.

SEC. 1989-A71. The trustees qualify by giving bond in the sum of Five Thousand Dollars for the faithful performance of their duty, with sureties acceptable, to the county auditor. On the election and qualification of the trustees they have control and supervision of the district in the same manner and with the same powers conferred upon the board of supervisors. By the Drainage and Levy laws of Iowa if a re classification and readjustment of the assessment of property should have to be made, it shall be done under the Board of Supervisors in the same manner as the original assessment. All costs and expenses incurred by the trustees shall, on certificate of the trustees to the board

of supervisors, of the amount of the sum necessary therefor, be levied and collected on the land in the districts in the same manner as taxes are levied and collected on such land for drainage purposes.

SEC. 1989-A72. The trustees are required to report their proceeding to the county auditor and the same are published as a part of the proceedings of the board of supervisors.

SEC. 1989-A73. In all elections held under this act the owner of each tract of land, if he or she is over twenty-one years of age shall, without regard to sex, and any railroad or corporation owning property in such district and assessed for benefits shall be entitled to at least one vote, and anyone whose land is assessed for benefits in a sum exceeding Ten Dollars shall be entitled to one vote for each Ten Dollars of the original assessment for benefits against the land actually owned by him in such district at the time of the election and which has been assessed for benefits in such district; but in order to have his ballot counted for more than one vote he shall write his name upon his ballot. The vote of any resident of a county in which the district is located in whole or in part must be cast in person. The vote of any owner of land, including railroads and corporations, assessed within the district that is not a resident of the county in which the district is located in whole or in part, may have his or its vote cast by some resident tax payer of the district or agent of such railroad or corporation who is authorized by a Power of Attorney signed and acknowledged by such non-resident land owner, or duly authorized officer of such railroad or corporation, to cast the vote for him, but the power of attorney in such case shall be filed with the County Auditor.

SECS. 1989-A74 to 1989-A79, provide for the compensation of the trustees; for certified copies of assessments to determine voting power, repeal conflicting acts and provide for interstate drainage, and for the repair and improvement of any drainage works in the district.

MISSOURI DRAINAGE LAW

ORGANIZATION OF DRAINAGE DISTRICTS BY CIRCUIT COURTS. SESSION LAWS OF MISSOURI, 1913, PAGE, et Seq.

SECTION 1. Repeals Article I, of Chapter 41, and enacts a new Article I.

SEC. 2. FORMATION OF DRAINAGE DISTRICTS: The owners of a majority of acreage in any contiguous body of swamp, wet or overflowed land or lands subject to overflow, situate in one or more counties in this State, may form a drainage district for the purpose of having such lands and other property reclaimed and protected from the effects of water, for sanitary or agricultural purposes, or when the same may be conducive to the public health, convenience or welfare, or of public utility or benefit, by drainage or otherwise, and for that purpose they make and sign articles of association, in which shall

be stated: The name of the district, and the number of years the same is to continue; the boundary lines of the proposed drainage district, the names of the owners of lands or other property in said district, together with a description of the lands and other property owned by each when the name of the owner of any of said lands or other property is unknown, this fact shall be set out in said articles; said articles shall further state that the owners of real estate and other property within said district whose names are subscribed to said articles are willing to and do obligate themselves to pay the tax or taxes which may be assessed against their respective lands or other property to pay the expense of organizing and of making and maintaining the improvements that may be necessary to effect the reclamation of said lands and other property, so formed into a drainage district, and to drain and to protect the same from the effects of water, and said articles of association shall contain a prayer, praying that the lands and other property described therein be declared a drainage district under the provisions of this act. After said articles of association and petition have been so signed the same shall be filed in the office of the circuit clerk of the county in which such lands and other property are situate; or, if such lands and other property be composed of tracts or parcels situate in two or more different counties then in the office of the clerk of the Circuit Court of the county in which there are situate more of said lands and other property than in any other county.

SEC. 3. *Circuit Clerk shall give notice by publication of application to form drainage district—form of notice.* Immediately after such articles of association shall have been filed, the clerk in whose office the articles of association have been filed shall give notice by causing publication to be made once a week for four consecutive weeks in some newspaper published in each county in which are situate lands and other property of the district, the last insertion to be made at least fifteen days prior to the first day of the next regular term of the circuit court at which said articles of association and petition are to be heard; said notice shall be substantially in the following form and it shall be deemed sufficient for all purposes of this act:

NOTICE OF APPLICATION TO FORM DRAINAGE DISTRICT

Notice is hereby given to all persons interested in the following described real estate and other property in..... County of Missouri (here describe the property as set out in the articles of association) that articles of association asking that the foregoing lands and other property be formed into a drainage district under the provisions of an act of the legislature, entitled "An act to repeal Article 1 (entitled "Organization of drainage districts by Circuit Courts") of Chapter 41, (entitled 'Drains and Levees') of the Revised Statutes of Missouri of 1909, and to repeal an act amending and adding to said Article 1 enacted in 1911 and found on pages 205 to 222 of the laws of Missouri of 1911, and to enact a new act in lieu thereof to be known as article 1

(pertaining to the organization of drainage districts by circuit courts) of said Chapter 41, with an emergency clause," as enacted by the 47th Missouri general assembly in 1913, and that the lands and other property as above described will be affected by the formation of said drainage district and be rendered liable to taxation for the purpose of paying the expenses of organizing and making and maintaining the improvements that may be found necessary to drain, protect and reclaim the lands and other, property in said district, and you and each of you are hereby notified to appear at the next term of this court to be held on the..... day..... 19.... at..... in County, and show cause, if any, there be why said drainage district as set forth in the articles of association shall not be organized as a public corporatoin of the state of Missouri.

.....
Clerk of the Circuit Court..... County.

The circuit court of the county in which said articles of association have been filed shall thereafter maintain and have original and exclusive jurisdiction coextensive with the boundaries and limits of said district without regard to county lines, for all purposes of this act: PROVIDED, that where lands in different counties are sought to be incorporated in the same district, it shall not be necessary to include all of the lands and other property in said proposed drainage district in the notice published in the different counties, but only such lands and other property in the district as are situate in the respective counties.

SECTION 4. Any owner of real estate or other property who has not signed the Articles of Association, who objects to the organization of the district, shall file his objections on or before the first day of the term of Court, at which the objections are to be heard. The objections are limited to a denial of the statements of the articles of association, and are heard by the Court in a summary manner, and without delay. In case the objections are overruled the Circuit Court, by an order, shall decree the drainage district a public corporation of the State for a term not exceeding the time mentioned in the Articles of Association. The Court may exclude property which, in its judgment, should not be included. If the Court finds that the district shall not be incorporated, it dismisses the proceedings and charges the cost to the signers of the Articles of the Association in proportion to the acreage represented by each. Any person who has signed the Articles of Association cannot withdraw without the written consent of the majority in acreage of the owners who signed the petition. The Clerk is required to file a certified copy of the findings and decree establishing the district with the Secretary of State and the County Recorder in each County having land in the district. A plat of the district shall also be filed in each County.

SECTION 5. Provides that within thirty (30) days after the district shall have been incorporated the Circuit Court of the County in which the Articles of Association were filed

shall give notice by publication for two weeks in a newspaper that on a certain date a meeting will be held for the purpose of electing a board of five supervisors, to be composed of owners of real estate in said district at least two of which shall be residents of the County or Counties in which the district is situated. The land owners organize by electing a chairman and secretary of the meeting, who conduct the election. "At such election, each and every acre of land in the district shall represent one share, and each owner shall be entitled to one vote in person or by proxy, for every acre of land owned by him in such district, and the five persons receiving the highest number of votes shall be declared elected as supervisors; and said supervisors shall immediately by lot determine the terms of office which shall be respectively one, two, three, four and five years, and they shall serve until their successors shall have been elected and qualified."

SECTION 6. In the same month of each year after the election of the first board of supervisors the board shall call a meeting of the owners of real and other property who shall meet at the time and place fixed and elect one supervisor, who shall hold his office for five years, or until his successor qualifies.

After the report of the commissioners has been confirmed by the Court under the provisions of Section 16, only owners of land and other property having benefits assessed against it shall be entitled to vote.

SECTION 7. Provides for the supervisors taking oath to faithfully perform their duties.

SECTION 8. Provides for the organization of the Board of Supervisors and the election of one of their board as President, and some suitable person as secretary. The board receives no compensation for their services unless the owners shall determine to pay a per diem, which in no case shall exceed Five Dollars (\$5.00). Their actual necessary expenses are paid. The Secretary, if a member of the Board shall be entitled to compensation as provided later.

SECTION 9. Within sixty days after organizing, the board appoints a competent civil engineer as chief engineer, who engages such assistants as the board may approve. The chief engineer has control of the engineering work and is charged with the making of plans for the system of drainage. His report to the Board of Supervisors is made in writing and shall contain a plan for drainage with accompanying maps and profiles. The chief engineer may, with the consent of the Board, employ and consult with eminent engineers.

SECTION 10. The supervisors receive the chief engineers report and plan for reclaiming the district, and after consulting with the engineer and having such modifications made as they think desirable and as are approved by the chief engineer, they adopt the report which thereafter is known as the Plan for Reclamation. The chief engineer is required to submit an annual report to the supervisors.

SECTION 11. A uniform tax of not more than fifty cents (50c) per acre may be levied on all land in, or that later may be, included in the district to pay expenses incurred, or to be incurred in the organization of the district making surveys, assessing benefits and damages, and other expenses.

SECTION 12. Within twenty days after the adoption of the plan for reclamation a certified copy is filed with the circuit clerk of the County Court of the County organizing said district, and at the same time the board of supervisors petition the Court to appoint commissioners to appraise the lands within and without the district to be acquired for the right-of-way, holding basins and other drainage works of the district, and to assess benefits and damages accruing to all lands in the district and other property by reason of the plan for reclamation. Within thirty days after the filing of the petition, the Court is required to appoint the commissioners who shall be freeholders residing in the State of Missouri, not land owners of the district, nor of kin within the fourth degree of consanguinity to any person owning land in the district. A majority of the commissioners control on all questions.

SECTION 13. The Circuit clerk notifies in writing each commissioner of his appointment and of the date of their first meeting. At the first meeting or within ten days thereafter, they take the oath to faithfully and impartially discharge their duties and make a true report. One of the commissioners is elected chairman. The Secretary of the Board of Supervisors is ex-officio Secretary of the Board of Commissioners. The secretary is required to furnish them a complete list of all corporate or other property described in the articles of Association, or adjacent thereto, that will be affected by carrying out the plan of reclamation, with the names of the owners, and a copy of the plan for reclamation, with maps and profiles.

SECTION 14. Within thirty days after qualifying the commissioners shall begin their duties. They may call upon the Attorney of the district for legal advice and opinions relative to their duties, and the chief engineer or one of his assistants shall accompany the commissioners at all times and render his opinion in writing when called for. They view the premises and determine the value of all land and other property within or without the district, and to be acquired, and used for right-of-way, holding basins and other works set out in the plan for reclamation. They assess the amount of benefits and damages, if any, that will accrue to each Government Lot, Forty-acre tract or other sub-division according to ownership; public highway, railroad, and other right-of-way, railroad road-way, and other property from carrying out and putting into effect the plan of reclamation. In assessing the benefits they shall not consider what benefits will be derived after their ditches or improvements shall have been constructed, but only the benefits that will be derived from the construction of the works and improvements set out in the plan for reclamation; or as the same may afford an outlet for drainage or provide protection from over-flow of such

property. Credit is given for improvements previously constructed and which afford partial or complete protection to any land in the district. The public highways, railroads and other right-of-way, road-ways, railroads and other properties shall be assessed according to the increased physical efficiency and decreased maintenance cost by reason of the protection to be derived. A report of their findings is prepared by the secretary under the advice, supervision and direction of the attorney. The law requires that it be arranged in tabular form and shall show: "Owners of Property Assessed," "Description of Property Assessed," "Number of Acres Assessed," "Amount of Benefits Assessed," "Number of Acres taken for Right-of-way," "Value of Property Taken," and "Damages."

The commissioners, by and with the advice of the engineer estimate the cost of the work set out in the plan for reclamation. The estimate shall include the cost of property required for right-of-way, holding basins and other works, and damages and the probable expenses of organization and administration as estimated by the Board of Supervisors shall be tabulated. The report must be signed by a majority of the commissioners and shall be filed in the office of the Clerk of the Circuit Court organizing the district. The Commissioners report to the Board of Supervisors the number of days which have been employed and the actual expense incurred. Each commissioner is paid Five Dollars (\$5.00) per day for his services and necessary expenses. Commissioners have no power to change the plan of reclamation.

SECTION 15. Upon the filing of the report of the commissioners the Clerk of the Circuit Court gives notice thereof by causing publication to be made once a week for three consecutive weeks in some newspaper published in each County in the District. The form of notice is prescribed, and it is not necessary to give the names of the parties interested. The notice states that the commissioners have filed their report and that it may be examined at the office of the Clerk and exceptions filed to all or any part of the report, as provided bylaw.

SECTION 16. The drainage district or any owner of land or property may file exceptions to the report as to any assessment of benefits or damages within ten days after the last day of publication of the notice. Exceptions are heard by the Court and determined in a summary manner. The court may amend or modify the report if the Court is satisfied that the estimated cost of constructing the improvements contemplated in the plan for reclamation is less than the benefits assessed in the district, the report as amended and modified is approved and confirmed. The court then apportions the cost incurred by the exceptions filed, and condemns any land or other property that the report shows is needed for right-of-way or other purposes. A certified copy of the court Decree and the Commissioners Report as amended and modified by the Court are transmitted to the Secretary of the Board of Supervisors who transmits a certified copy to the Recorder of each County having

land in the district. Any person may appeal from the judgment of the Court on the following questions:

1. Whether just compensation has been allowed for property appropriated;
2. Whether proper damages have been allowed for property prejudicially affected by the improvement.

SECTION 17. The board of supervisors are given full authority to construct any improvements that may be necessary to carry out, maintain and protect the plan of improvement. The board is authorized to purchase equipment and do the work under its own direction; or, it may let contracts for the works and improvements. If contracts are let, they shall be advertised and let to the lowest and best bidder, who is required to give a bond with ample security for the proper performance of his contract. Plans and specifications for the work shall be prepared by the chief engineer and incorporated in the contract. The chief engineer is the superintendent of all works and improvements and is required to make a full report once a year of all work done and improvements made, and make such suggestions and recommendations to the Board as he deems proper.

SECTION 18. After the list of lands and other property, with the assessed benefits and the degree and judgment have been filed, as provided in Sec. 16, then the board of supervisors levy a tax of such portion of soil benefit upon all lands and other property assessed benefits as may be found necessary by the supervisors to pay the costs of the completion of the plan for reclamation and in carrying out the objects of said district, plus ten per cent, (10%) for emergencies. The tax is apportioned to and levied on each tract of land, or other property in proportion to benefits assessed. If bonds are to be issued, the estimated amount of interest that will accrue on the bonds is included and added to the tax. The interest on the bonds shall not be considered a part of the cost in determining whether or not the cost of the improvements are or are not equal, to the benefits assessed. The secretary, as soon as the tax is levied must prepare a list of the taxes in the form of a well-bound book which shall be signed and certified by the president and secretary of the Board, attested by the seal of the district, and shall become a permanent record in the office of the secretary.

SECTION 19. The Board of Supervisors each year determines and levies the amount of the total tax that shall become due and be collected at the same time that State and County taxes are due and collected. The form of certificate and schedule to the collector of revenue are prescribed.

SECTION 20. The collector of revenue is required to collect the taxes, and shall pay over and account for all moneys collected, to the treasurer of the District. The collector of the taxes is required to give bond. The collection of delinquent taxes is also provided for.

SECTION 21. This section provides for taxes unpaid after December 1st, becoming delinquent and bearing interest at the rate of two per cent. (2%) per month.

SECTION 22. This section provides penalties for failure of collector to pay over taxes at the proper time. For his services the collector is allowed one per cent (1%) of the amount of the taxes collected by him and two per cent (2%) of the amount he collects of delinquent taxes.

SECTION 23. All drainage tax provided in the act, together with penalties for default in payment of same, and all cost of collection including attorney's fees, shall from the date of filing of the certificate in the office of the Recorder in which the lands and property are situated, until paid constitute a lien to which only the lien of the State and County for general taxes shall be paramount. The form of certificate and accompanying tables are prescribed.

SECTION 24. Provision is made for the collection of delinquent tax or the sale of lands on which taxes are not paid.

SECTION 25. The secretary of the Board of Supervisors holds the office of Treasurer, and gives bond to the amount fixed by the Board; his books are to be audited once each year.

SECTION 26. The supervisors are clothed with authority to do any necessary work or any necessary act; in order that they may accomplish this they are given the right of eminent domain. Authority to hold, control and develop water power created by the construction of the district is also granted.

SECTION 27. The board is authorized to employ an attorney to act for the district and advise the Board, officers and employees. He shall also conduct all legal proceedings and suits where the district is a party, or interested.

SECTION 28. Provides for the keeping of the records of the district.

SECTION 29. The Board of Supervisors are required to pay for all lands appropriated before entering upon the same. If lands are not paid for within five years from the date of filing the Commissioner's report, all proceedings as to the taking of such property shall abate at the expense of the District.

SECTION 30. All bridges and all enlargement of bridges already in existence shall be built and enlarged in accordance with the plans, specifications and orders made and approved by the chief engineer. Corporations are required to construct or enlarge bridges at their own expense. Land owners at their own expense and in compliance with the provision of this act, may construct bridges across ditches. Within ten days after a drain shall have been constructed across a highway a bridge must be constructed and maintained over the ditch. The word "corporation" in this Section is not to include counties.

SECTION 31. When right-of-way is secured across an embankment, the owner at his own cost is required to raise it so that it will conform with the levee of the district.

SECTION 32. Any warrant issued under this Act that is not paid when presented to the Treasurer because of lack of funds in the treasury draws interest at 6% per annum until such time as there are funds to pay the amount of the warrant and accrued interest.

SECTION 33. Provides that surety bonds are to be made payable to the district.

SECTION 34. Provision is made for change of venue.

SECTION 35. Action under this Act shall not abate by reason of the death or disability of any party to the proceeding; but upon the suggestion of death or disability the cause is immediately revived in the name of the heirs, devisees or other legal representatives and summonses required to be served on them.

SECTION 36. No appeal from the action of the Circuit Court under this Act shall be permitted to act as supersedeas, or to delay any action or work begun under the law.

SECTION 37. If, after deciding the objections to the Commissioner's report, the Court finds that the estimated cost of the works and improvements as reported or amended exceed the estimated benefits, the Court shall render a decree declaring the district dissolved as soon as all costs and obligations are paid. If the tax levied under Section 2 is found insufficient to pay all such costs, the Board of Supervisors shall make such uniform tax levies as will be sufficient to pay the deficit.

SECTION 38. The Board of Supervisors is authorized to provide compensation for work done and necessary expenses incurred by employees and County officers.

SECTION 39. The word "owner" means the owner of freehold estate as appears by the deed record, and does not include reversioners; remainder men, trustees or mortgagees, who need not be notified or served by process, but are represented by the owner.

SECTION 40. The Board of Supervisors, or any owner of land adjacent to the district, may petition the Court organizing the district to amend its former decree by correcting the names of land owners, by striking out such names, by adding, striking out or correcting the descriptions of land within the district, or to amend the decree in any manner as to changing the plan for reclamation, or to correct errors, omissions, or mistakes that may have been discovered in the plans for reclamation, or to extend the boundaries to include lands not included in the Articles of Association and Decree of the Court incorporating the district. If the petitioner asks the Court to change the plan of reclamation or boundary lines of the district, the Court appoints three Commissioners as provided in Section 12. Notice is also given as provided in Section 3. The form of notice is prescribed. Land owners affected have the right to

object, and their objections are heard in a summary manner. The Court then issues its decree; if the plan for reclamation is amended, changed or boundaries extended the Court then appoints three commissioners with the same qualifications as those appointed under the provisions of Section 12, who shall perform the duties required of commissioners by Section 14, after which the case shall be proceeded with in the same manner as is provided for in previous sections of this act.

SECTION 41. The board of supervisors has the power to appoint an overseer or overseers to keep the works of the district in good repair and to report to the Board at such times as they may require, the condition of the works. The overseer has power to call out all able-bodied citizens between certain ages in case of emergency or danger and to compel them to do such work as is necessary. Penalties are provided for any person that may refuse.

SECTION 42. The Board of Supervisors may issue bonds not to exceed ninety per cent of the total amount of the tax levied; they shall bear interest at the rate of six per cent (6%), payable semi-annually, and are to mature at annual intervals within twenty years, commencing after a period of years not later than five, to be determined by the Board of Supervisors. Both principal and interest to be payable at some convenient banking house or trust company to be named in the bonds. The bonds shall not be sold for less than 95% and accrued interest. A sufficient amount of the drainage tax shall be appropriated for the purpose of paying the principal and interest of the bonds. In case the tax levied proves insufficient, an additional tax shall be levied. The treasurer shall give a bond to protect the district from loss. All sales of bonds must be promptly reported, and unsold bonds must be returned to the Board on demand. The Board issues warrants for the payment of maturing bonds and accruing interest, and the treasurer deposits sufficient funds at the place of payment to pay the maturing bonds and coupons when due.

SECTION 43. The Board of Supervisors on or before the first of September of each year may levy a tax for the maintenance of the improvements. This tax is apportioned on the same basis as the original tax, and shall not exceed ten per cent (10%) thereof in any one year. The tax collector collects this tax in the same manner as the annual installment tax.

SECTION 44. When there has been a material change in the value of the property in the district the owners of twenty-five per cent or more may petition for a readjustment of the assessment of benefits for the purpose of making a more equitable basis for the levy of the maintenance tax. Notice is given as provided in Section 3 on a prescribed form. If the Court finds that there has been a material change in the value of the property since the last assessment of benefits, the Court orders a readjustment of benefits and appoints commissioners with qualifications as prescribed in Section 12 to make such adjustment in the manner prescribed in Section 14. The commissioners in making

the readjustment are not limited by any previous assessment. The annual maintenance tax is limited to not more than ten per cent of the amount of benefits as readjusted. Benefits shall not be readjusted oftener than once in five years.

SECTION 45. Any two or more adjacent districts may be united in one district, and a new district has all the rights of a district organized under this act. To effect such consolidation the Board of Supervisors of each district call an election setting the time, place and object of the election. If the majority of acreage in each district vote in favor of the consolidation, the supervisors then petition the Circuit Court in which the greatest amount of land is located; when the petition is filed, the Clerk of the Circuit Court gives notice as prescribed in Section 3. Any person owning land in either district on or before the first day of Court may file objections to the regularity or sufficiency of the proceedings, and if the objections are overruled, or no objections made, the Court shall order that any two or more of the districts asking shall be united and consolidated as one district with all the rights, powers, and privileges of a district organized under this Act, and the lands included, if in the district, shall be subject to all liens, liabilities, and obligations of the original district. A new Board of Supervisors is elected.

SECTION 46. If it is necessary to raise funds to complete the plan for reclamation, pay for work already completed, pay outstanding bonds or interest thereon, restore any work or contract new work or for any other cause to extend the time for which the district has been incorporated, a meeting is called and an election held as provided in Section 5. If a majority in acreage vote in favor of the extension the Board of Supervisors petition the Circuit Court praying for the extension of the corporate life of the district. After the petition is filed, the procedure is the same as for incorporating the district.

SECTION 47. If the work set out in the plan of reclamation is found insufficient to reclaim in whole or in part any or all of the land or property in the district, the Supervisors can formulate new and amended plans, and additional assessments may be made as provided in Section 14. If the total amount of tax levied, as provided in Section 18 is insufficient, an additional levy may be made to provide funds. The total of all levies of such tax must not exceed the total amount of benefits assessed.

SECTION 48. Authority is given the Board of Supervisors to remove any employee.

SECTION 49. All existing ditches, or water courses in the district, shall be connected with and made a part of the plan of drainage; but no ditch constructed after the completion of said plan for drainage shall be connected therewith until the written consent of the Supervisors has been obtained, and such connection must be in strict accordance with the method, terms and conditions laid down.

SECTION 50. In counties where the provisions of Chapter 119 of the Revised Statutes of Missouri, of 1909, are in force, the taxes are certified to the township collector

and collected in the same manner as the State and County taxes. Delinquent taxes are certified and collected by the County Treasurer, as provided in Section 24.

SECTION 51. The owner of land or other property has the privilege of paying tax levied, less the amount added thereto for interest, at any time on or before a date fixed by the Board of Supervisors. When such payment is made, the Secretary of the Board notes on the Drainage tax record and the certificate in the Recorder's office, opposite each tract on which the tax has been paid, "Paid in Full."

SECTION 52. Provision is made by which districts previously organized, in process of organization, or that may be hereafter organized under previous or existing statutes may, at their option, reorganize under the provisions of this Act.

SECTION 53. Districts reorganizing sign articles of association and file the same with the Clerk of the Circuit Court, and then follow the procedure prescribed in the law, but are required to keep the same name as they now have and the life of the district must not be for fewer years than the life of any existing obligation.

SECTION 54. After the articles of Association have been filed with the Circuit Clerk he gives notice in the manner and at the time fixed in Section 3 on a prescribed form, of the proposed incorporation of the district. The Circuit Court in which the first filing is made has jurisdiction.

SECTION 55. After notice has been given, the procedure is the same as where the Articles for the incorporation of the district have been filed.

SECTION 56. Immediately after the Board of Supervisors have been elected and have completed the election of their officers, the officers having charge of the old districts are required to turn over all funds records, contracts, files, books, plats, and other articles or records to the proper officers of the districts, who are required to receipt for the same.

SECTION 57. The supervisors may take advantage of proceedings had under old organizations. When an existing district has reorganized under this Act it is liable for all just obligations of the old organization. No right of action shall exist nor remedy be allowed which did not exist or was not allowed prior to the time of reorganization. Two or more districts may reorganize and unite as a single district.

(Sections 58 to 65 inclusive, relate to reorganization of districts begun under earlier laws and are of only local interest.)

ABSTRACTS OF THE CONSERVANCY LAW OF OHIO

Passed February 6, 1914

To prevent floods, to protect cities, villages, farms and highways from inundation, and to authorize the organization of drainage and conservation districts.

ORGANIZATION OF DISTRICT

Section 2. Court of Common Pleas to Organize Districts. The Court of Common Pleas of any county in this State, or any Judge thereof in vacation, is hereby vested with jurisdiction, power and authority, when the conditions stated in the third section of this act are found to exist, to establish conservancy districts, which may be entirely within and partly without, the county in which said court is located, for all or any of these purposes:

- (a) of preventing floods;
- (b) of regulating stream channels by changing, widening and deepening the same;
- (c) of reclaiming or of filling wet and overflowed lands;
- (d) of providing for irrigation where it may be needed;
- (e) of regulating the flow of streams;
- (f) of diverting, or in whole or in part eliminating water courses; and incident to such purposes and to enable their accomplishment, to straighten, widen, deepen, change, divert, or change the course or terminus of, any natural or artificial water course; to build reservoirs, canals, levees, walls, embankments, bridges or dams; to maintain, operate and repair any of the construction herein named; and to do all other things necessary for the fulfilment of the purposes of this act.

Section 3. Petition. Before any court shall establish a district as outlined in Section 2, a petition shall be filed in the office of the clerk of said court, signed either by five hundred (500) freeholders, or by a majority of the freeholders, or by the owners of more than half of the property, in either acreage or value, within the limits of the territory proposed to be organized into a district. Such a petition may be signed by the governing body of any public corporation lying wholly or partly within the proposed district, in such manner as it may prescribe, and when so signed by such governing body such a petition on the part of the said governing body shall fill all the requirements of representation upon such petition of the freeholders of such public corporation, as they appear upon the tax duplicate; and thereafter it shall not be necessary for individuals within said public corporation to sign such a petition. Such a petition may also be signed by railroads and other corporations owning lands.

And such petition may also be filed by any city or cities interested in some degree in the improvement, upon proper action by their governing bodies.

The petition shall set forth:

- First: The proposed name of said district.
- Second: The necessity for the proposed work and that it will be conducive to the public health, safety, convenience or welfare.
- Third: A general description of the purpose of the contemplated improvement, and of the territory to be included in the proposed district. Said description need not be given by metes and bounds or by legal subdivisions, but it shall be sufficient if a generally accurate description is given of the territory to be organized as a district. Said territory need not be contiguous, provided it be so situated that the public health, safety, convenience or welfare will be promoted by the organization as a single district of the territory described.
- Fourth: Said petition shall pray for the organization of the district by the name proposed.

No petition with the requisite signature shall be declared null and void on account of alleged defects, but the court may at any time permit the petition to be amended in form and substance to conform to the facts, by correcting any errors in the description of the territory, or in any other particular. Several similar petitions or duplicate copies of the same petition for the organization of the same district may be filed and shall together be regarded as one petition. All such petitions filed prior to the hearing on said petition shall be considered by the court the same as though filed with the first petition placed on file.

In determining when a majority of land owners have signed the petition the court shall be governed by the names as they appear upon the tax duplicate, which shall be prima facie evidence of such ownership.

Section 6. Hearing on Petition. Organization of District. Any owner of real property in said proposed district who individually may not have signed such a petition and who wishes to object to the organization and incorporation of said district shall, on or before the date set for the cause to be heard, file his objections why such district should not be organized and incorporated. Such objections shall be limited to a denial of the statements in the petition, and shall be heard by the court as an advanced case without unnecessary delay.

In case of a district lying in more than one county, one Common Pleas Judge of each of the counties having land in the district shall sit as a Court in the Court House where the original petition was filed, to make the findings required by this section and by section 12 herein. The majority of said judges shall be necessary to render a decision. In case of a tie said matter shall be forthwith

certified to the Court of Appeals of said county, and said Court shall hear and determine said matter as an advanced case in preference to all other business.

Section 7. Decree of Incorporation Filed. Within thirty (30) days after the said district has been declared a corporation by the court, the clerk of the court shall transmit to the Secretary of State, and to the County Recorder in each of the counties having lands in said district, copies of the findings and the decree of the court incorporating said district. The same shall be filed and recorded in the office of the Secretary of State in the same manner as articles of incorporation are now required to be filed and recorded under the general law concerning corporations, and copies shall also be filed in the office of the County Recorder of each county in which a part of the district may be, where they shall become permanent records and the Recorder in each county shall receive a fee of \$1 for filing and preserving the same, and the Secretary of State shall receive for filing and for recording said copies such fees as now are or hereafter may be provided by law for like services in similar cases.

ORGANIZATION OF BOARD—ITS POWERS AND DUTIES

Section 8. Appointment of Directors. Within thirty (30) days after entering the decree incorporating said district, the court shall appoint three (3) persons, at least two (2) of whom shall be resident freeholders within the district, as a Board of Directors of the district—one for a term of three (3) years, and one for a term of five (5) years and one for a term of seven (7) years. At the expiration of their terms of office appointments shall be made for terms of five (5) years. The court shall fill all vacancies which may occur on the said Board.

In case of a district lying in more than one county, appointments of directors under this Section, and of appraisers under Section 26 of this act shall not be effective until approved by a majority of the judges constituting the court provided for in Section 6 of this act.

Section 12. To Prepare Plans. Upon their qualification, the board shall prepare or cause to be prepared a plan for the improvements for which the district was created. Such plan shall include such maps, profiles, plans and other data and descriptions as may be necessary to set forth properly the location and character of the work, and of the property benefited or taken or damaged, with estimates of cost and specifications for doing the work.

Section 13. To Execute Works. The board of directors shall have full power and authority to devise, prepare for, execute, maintain and operate any or all works of improvements necessary or desirable to complete, maintain, operate and protect the Official Plan. They may secure and use men and equipment under the supervision of the chief engineer or other agents, or they may in their discretion let contracts for such works, either as a whole or in parts.

Section 15. General Powers. In order to effect the protection, reclamation or irrigation of the land and other property in the district, and to accomplish all other purposes of the district, the board of directors is authorized and empowered to clean out, straighten, widen, alter, deepen or change the course or terminus of any ditch, drain, sewer, river, water course, pond, lake, creek or natural stream in or out of said district; to fill up any abandoned or altered ditch, drain, sewer, river, water course, pond, lake, creek or natural stream, and to concentrate, divert or divide the flow of water in or out of said district; to construct and maintain main and lateral ditches, sewers, canals, levees, dikes, dams, sluices, revetments, reservoirs, holding basins, floodways, pumping station and syphons, and any other works and improvements deemed necessary to construct, preserve, operate or maintain the works in or out of said district; to construct or enlarge or cause to be constructed or enlarged any and all bridges that may be needed in or out of said district; to construct or elevate roadways and streets; to construct any and all of said works and improvements across, through or over any public highway, canal, railroad right-of-way, track, grade, fill or cut, in or out of said district; to remove or change the location of any fence, building, railroad, canal, or other improvements in or out of said district; and shall have the right to hold, encumber, control, to acquire by donation, purchase or condemnation, to construct, own, lease, use and sell real and personal property, and any easement, riparian right, railroad right of way, canal, cemetery, sluice, reservoir, holding basin, mill dam, water power, wharf, or franchise in or out of said district for right of way, holding basin or for any necessary purpose, or for material to be used in constructing and maintaining said works and improvements, to replot or subdivide land, open new roads, streets and alleys, or change the course of an existing one.

Section 16. To Advertise and Let Contracts. When it is determined to let the work by contract, contracts in amounts to exceed one thousand dollars (\$1,000) shall be advertised after notice calling for bids shall have been published, once a week for five (5) consecutive weeks completed on date of last publication, in at least one newspaper of general circulation within said district, where the work is to be done, and the board may let said contract to the lowest or best bidder who shall give a good and approved bond with ample security, conditioned on the carrying out of the contract. But said contract shall not be let to another than the lowest bidder unless upon a hearing before the court; and with notice to all parties interested, an order to be obtained therefor. Such contract shall be in writing, and shall be accompanied by or shall refer to plans and specifications for the work to be done, prepared by the chief engineer. Said contract shall be approved by the board of directors and signed by the president of the board and by the contractor, and shall be executed in duplicate. Provided, that in case of sudden emergency when it is necessary in order to protect the district, the advertising of contracts may be waived upon the unanimous consent of the

board of directors, with the approval of the court or judge in vacation.

Section 17. Dominant Right of Eminent Domain. Said board, where necessary for the purposes of this act, shall have a dominant right of eminent domain over the right of eminent domain of railroad, telegraph, telephone, gas, water power and other companies and corporations, and over townships, villages, counties and cities.

In the exercise of this right due care shall be taken to do no unnecessary damage to other public utilities, and, in case of failure to agree upon the mode and terms of interference, not to interfere with their operation or usefulness beyond the actual necessities of the case, due regard being paid to the other public interests involved.

Section 18. May Condemn Under General Law. Said board shall also have the right to condemn for the use of the district, any land or property within or without said district not acquired or condemned by the court on the report of the appraisers, according to the procedure provided by law for the appropriation of land or other property taken for telegraph, telephone and railroad rights of way, instead of having appraisals and assessments made by the board of appraisers.

Section 19. May Make Regulations to Protect Works. Where necessary in order to secure the best results from the execution and operation of the plans of the district, or to prevent damage to the district by the deterioration or misuse, or by the pollution of the waters, of any water course therein, the board of directors may make regulations for and may prescribe the manner of building bridges, roads or fences or other works in, into, along or across any channel, reservoir or other construction; and may prescribe the manner in which ditches or other works shall be adjusted to or connected with the works of the district or any water course therein; and, when not in conflict with the regulations of the State Board of Health, may prescribe the manner in which the water courses of the district may be used for sewer outlets or for disposal of waste.

Section 21. Passing Equipment Through Bridge or Grade. In case it is necessary to pass any dredge boat or other equipment through a bridge or grade of any railroad company or other corporation, county, township, or municipality, the board of directors shall give twenty (20) days' notice to the owner of said bridge or grade that the same shall be removed temporarily to allow the passage of such equipment or that an agreement be immediately entered into in regard thereto. The owner of said bridge or grade shall keep an itemized account of the cost of the removal, and, if necessary, of the replacing of said bridge or grade, and said actual cost shall be paid by the district. In case the owner of said bridge or grade shall refuse to provide for the passage of said equipment, the board of directors may remove such bridge or grade at its own expense, interrupting traffic in the least degree consistent with good work and without

delay or unnecessary damage. In case they shall be prevented from doing so, the owner of said bridge or grade shall be liable for damage for the resulting delay.

Section 22. May Make Surveys and Investigations. The board of directors shall also have the right to establish and maintain stream gages, rain gages, a flood warning service with telephone or telegraph lines or telephone or telegraph service, and may make such surveys and examinations of rainfall and flood conditions, stream flow, and other scientific and engineering subjects as are necessary and proper for the purpose of the district, and they may issue reports of their findings.

Section 24. Water Power and Supply. The rights of landowners, municipalities, corporations, and other users of water to the waters of the district for domestic use, water supply, industrial purposes, for water power, or for any other purposes shall extend only to such rights as were owned by them prior to the organization of the district, and to such use as could be made of such waters if the improvements of the district had not been made. Wherever the organization of, or the improvements made by the district make possible a greater, better, or more convenient use of, or benefit from, the waters of the district for any purpose, the right of such greater, better, or more convenient use of, or benefit from, such waters shall be the property of the district; and such rights may be leased, sold, or assigned by the district in return for reasonable compensation.

Where the district is a riparian owner along the streams of the district, it shall have in addition the rights which go with riparian ownership.

All the rights and property of the district in the waters and water courses of the district, and in their uses, shall be exercised in such manner as to promote the welfare of the district and of all inhabitants thereof, and to promote the safest and most economical and reasonable use of the waters thereof; to encourage and promote industries and agriculture, and to pay the cost of the construction and maintenance of the improvement. Charges for such use shall not be greater than are necessary to accomplish these purposes.

Persons, corporations, municipalities, or other parties desiring to secure such use of the waters or water courses of the district, or of the district rights therein, may make application to the board of directors for lease, purchase, or permission for such use. Such application shall state the purpose and character of such use, the period and degree of continuity of such use, the amount of water desired and the place of use. In case any party makes greater, better or more convenient use of the waters of the district without formal application, the fact of such use shall serve all purposes of an application, and the board may proceed to determine a reasonable rate of compensation the same as though formal application had been made. Where it is not possible nor reasonable to grant all applications, preference shall be given to the greatest need and to the most reasonable use, as may be determined by the board of directors,

subject to the approval of the court. Preference shall be given, first, to domestic and municipal water supply, and no charge shall be made for the use of water taken by private persons for home and farm yard use, or for watering stock; second, to supplying water used in processes of manufacture, for the production of steam, for refrigerating, cooling and condensing, and for maintaining sanitary conditions of stream flow; third, for irrigation, power development, recreation, fisheries and for other uses.

The board of directors shall not permanently sell, lease, assign, permit or otherwise part with the control by the district of the use of the waters thereof, and rates for light, power or other services charged by vendees, assignees, lessees or licensees of such board of directors shall be subject at all times to revision and control by State law. Assignments, leases, sales or permissions may be made for periods of not greater than fourteen (14) years. At the termination of the period of such assignments, sales, leases, or permissions, they shall be renewed for a reasonable period not to exceed fourteen (14) years, on the condition that a new determination is made of a reasonable charge therefor, as herein provided; unless there are other applications on file, the granting of which would result in filling a greater need or in a more reasonable use. In case such applications are on file, they shall have preference.

APPRAISALS OF BENEFITS

Section 26. Appointment of Appraisers. At the time of making its order organizing the district or at any suitable time thereafter, either in term or in vacation, the court or judge shall appoint three (3) appraisers, who shall in every case where appraisers are appointed under this act be recommended by the board of directors, and whose duty it shall be to appraise the lands or other property within and without the district to be acquired for rights of way, reservoirs and other works of the district, and to appraise all benefits and damages accruing to all lands within or without the district by reason of the execution of the Official Plan. Said appraisers shall be freeholders residing within the State of Ohio, who may or may not own lands within said district. Each of the appraisers shall, before taking up his duties, take and subscribe to an oath that he will faithfully and impartially discharge his duties as such appraiser, and that he will make a true report of such work done by him. The said appraisers shall at their first meeting elect one of their own number chairman, and the secretary of the board of directors or his deputy shall be ex-officio secretary of said board of appraisers during their continuance in office. A majority of the appraisers shall constitute a quorum, and a concurrence of the majority in any matter within their duties shall be sufficient for its determination. Said appraisers shall continue to hold their offices until excused by the court, and the court shall fill all vacancies in the board of appraisers, or may appoint a new board for subsequent appraisals, as occasion may require. Such new board, if appointed, shall fill all the

requirements of the board of appraisers of the district, and perform its duties.

Section 28. Land Affected Outside District. If the appraisers find that lands or other property not embraced within the boundaries of the district will be affected by the proposed improvement or should be included in the district, they shall appraise the benefits and damages to such land, and shall file notice, in the court, of the appraisal which they have made upon the lands beyond the boundaries of the district, and to the land which in their opinion should be included in the district. The appraisers shall also report to the court any lands which in their opinion should be eliminated from the district.

Section 30. Board Shall Make Report. The board of appraisers shall prepare a report of its findings which shall be arranged in tabular form and bound in book form, and which shall be known as the Conservancy Appraisal Record. Such record shall contain the name of the owner of property appraised as it may appear on the tax duplicate or the Deed Records, a description of the property appraised, the amount of benefits appraised, the amount of damages appraised, and the appraised value of land or other property which may be taken for the purposes of the district. They shall also report any other benefits or damages or any other matter which in their opinion should be brought to the attention of the court. No error in the names of the owners of real property or in the descriptions thereof shall invalidate said appraisal or the levy of assessments or taxes based thereon, if sufficient description is given to identify such real property.

When their report is completed, it shall be signed by at least a majority of the appraisers and deposited with the clerk of the court who shall file it in the original case. At the same time copies of that part of the report giving the appraisal of benefits and appraisals of land to be taken and of damages, in any county shall be made, certified to, and filed with the clerk of the Court of Common Pleas of such county.

Section 31. Notice of Hearing on Appraisals. Upon the filing of the report of the appraisers, the clerk of the court shall give notice thereof, as provided in this act, in each county in the district. Said notice shall be substantially as in Form 6 of the Schedules hereto attached. It shall not be necessary for said clerk to name the parties interested.

It shall not be necessary to describe separate lots or tracts of land in giving said notice, but it shall be sufficient to give such descriptions as will enable the owner to determine whether or not his land is covered by such description. For instance, it will be sufficient to state "All land lying in the Ward of the City of.....," or "All land abutting on Street in the City of.....," or "All land lying west of..... River and east of..... Railroad in..... Township," or any other general description pointing out the lands involved.

Where lands in different counties are mentioned in said report, it shall not be necessary to publish a description of all the lands in the district in each county, but only of that part of the said lands situate in the county in which publication is made.

Section 32. Hearing on Appraisals. Any property owner may accept the appraisals in his favor of benefits and of damages and of lands to be taken made by the appraisers, or may acquiesce in their failure to appraise damages in his favor, and shall be construed to have done so unless he shall within ten (10) days after the last publication provided for in the preceding section file exceptions to said report or to any appraisal of either benefits or damages or of land to be taken which may be appropriated. All exceptions shall be heard by the court beginning not less than twenty (20) nor more than thirty (30) days after the last publication provided for herein, and determined in advance of other business so as to carry out, liberally, the purposes and needs of the district. The court may, if it deem necessary, return the report to the board of appraisers for their further consideration and amendment, and enter its order to that effect. If, however, the appraisal roll as a whole is referred back to the appraisers, the court shall not resume the hearing thereof without new notice, as for an original hearing thereon. But the court may, without losing jurisdiction over the roll, order the appraisers to recast the roll when the order of the court specifies the precise character of the changes thereof.

Section 41. Proceedings Not Invalid. No fault in any notice or other proceedings shall affect the validity of any proceeding under this act except to the extent to which it can be shown that such fault resulted in a material denial of justice to the property owner complaining of such fault.

FINANCIAL ADMINISTRATION

Section 42. Funds. The moneys of every conservancy district organized hereunder shall consist of three separate funds: (1) Preliminary Fund, by which is meant the proceeds of the ad valorem tax authorized by this act and such advancements as may be made from the general county funds as provided in Section 43 of this act; (2) Bond Fund, by which is meant the proceeds of levies made against the special assessments of benefits equalized and confirmed under the provisions of this act; and (3) Maintenance Fund, which is a special assessment to be levied annually for the purpose of upkeep, administration and current expenses as hereinafter provided. It is intended that the cost of preparing the Official Plan, the appraisal (except as paid out of the Preliminary Fund) and the entire cost of construction and superintendence, including all charges incidental thereto, and the cost of administration during the period of construction, shall be paid out of the Bond Fund.

No vouchers shall be drawn against the Preliminary Fund (except for advances from the general county

funds) or against the Maintenance Fund until a tax-levying resolution shall have been properly passed by the board of directors, and duly entered upon its records; no bonds shall be issued against the Bond Fund until an assessment-levying resolution shall have been properly passed by the board of directors and duly entered upon its records, and until the property owners shall have been given an opportunity for a period of not less than thirty (30) days to pay the assessments so levied against their respective properties.

Section 43. Preliminary Expenses.—How Paid. After the filing of a petition under this act, and before the district shall be organized, the costs of publication and other official costs of the proceedings shall be paid out of the general funds of the county in which the petition is pending. Such payment shall be made on the warrant of the auditor on the order of the court. In case the district is organized, such cost shall be repaid to the county out of the first funds received by the district through levying of taxes or assessments or selling of bonds, or the borrowing of money. If the district is not organized, then the cost shall be collected from the petitioners or their bondsmen. Upon the organization of the district, the court shall make an order indicating a preliminary division of the preliminary expenses between the counties included in the district in approximately the proportions of interest of the various counties as may be estimated by said court. And the court shall issue an order to the auditor of each county to issue his warrant upon the treasurer of his county to reimburse the county having paid the total cost.

Expenses incurred thereafter prior to the receipt of money by the district from taxes or assessment, bond sales, or otherwise, shall be paid from the general funds of the counties upon the order of the court and upon certification of the clerk of the court of such order specifying the amount and purpose of the levy, to the auditor of each county, who shall thereupon at once issue his warrant to the treasurer of his county, said payments to be made in proportion of the order outlined by the court aforesaid. Upon receipt of funds by the district from the sale of bonds or by taxation or assessment the funds so advanced by the counties shall be repaid.

As soon as any district shall have been organized under this act, and a board of directors shall have been appointed and qualified, such board of directors shall have the power and authority to levy upon the property of the district not to exceed three-tenths of a mill on the assessed valuation thereof as a level rate to be used for the purpose of paying expenses of organization, for surveys and plans, and for other incidental expenses which may be necessary up to the time money is received from the sale of bonds or otherwise. This tax shall be certified to the auditors of the various counties and by them to the respective treasurers of their counties. If such items of expense have already been paid in whole or in part from other sources, they may be repaid from the receipts of such levy, and such levy may

be made although the work proposed may have been found impracticable or for other reasons is abandoned. The collection of such tax levy shall conform in all matters to the collection of taxes and assessments for the district outlined in this act, and the same provisions concerning the non-payment of taxes shall apply. The board may borrow money in any manner provided for in this act, and may pledge the receipts from such taxes for its repayment, the information collected by the necessary surveys, the appraisal of benefits and damages, and other information and data being of real value and constituting benefits for which said tax may be levied. In case a district is disbanded for any cause whatever before the work is constructed, the data, plans and estimates which have been secured shall be filed with the clerk of the court before which the district was organized and shall be matters of public record available to any person interested.

Section 44. May Borrow Money. In order to facilitate the preliminary work, the board may borrow money at a rate of interest not exceeding six per cent per annum, may issue and sell or pay to contractors or others, negotiable evidence of debt (herein called warrants) therefor signed by the members of the board, and may pledge (after it has been levied) the Preliminary Tax of not exceeding three-tenths of a mill for the repayment thereof. If any warrant issued by the board of directors is presented for payment and is not paid for want of funds in the treasury, that fact with the date of refusal shall be endorsed on the back of such warrant, and said warrant of refusal shall be endorsed on the back of such warrant, and said warrant shall thereafter draw interest at the rate of six per cent, until such time as there is money on hand sufficient to pay the amount of said warrant with interest.

Section 45. Board of Directors to Levy Assessment for Bond Fund.—Additional Levies. After the list of real property, with the appraised benefits as approved. by the court, or that part thereof from which no appeal is pending, has been filed with the secretary of the district, then from time to time, as the affairs of the district demand it, the board of directors shall levy on all real property, upon which benefits have been appraised, an assessment of such portion of said benefits as may be found necessary by said board to pay the cost of the execution of the Official Plan including superintendence of construction and administration, plus ten per cent, of said total, to be added for contingencies, but not to exceed, in the total of principal, the appraised benefits so adjudicated. The said assessment shall be apportioned to and levied on each tract of land or other property in said district in proportion to the benefits appraised, and not in excess thereof, and in case bonds are issued as provided herein and hereafter, then the amount of interest, which will accrue on such bonds, as estimated by said board of directors, shall be included in and added to the said assessment, but the interest to accrue on account of the issuing of said bonds shall not be construed as a part of the cost of construction in determining whether or not the expenses and costs of making said improvement are or are not equal to or in

excess of the benefits appraised. As soon as said assessment is levied, the secretary of the board of directors, at the expense of the district, shall prepare in duplicate an assessment record of the district. It shall be in a well-bound book endorsed and named, "Conservancy Assessment Record of..... District". It shall contain in tabular form a notation of the items of property appraised, the total amount of benefits appraised against each item, and the total assessment levied against each item. Where successive levies of assessment are made for the Bond Fund, the Conservancy Assessment Record shall contain suitable notation to show the number of levies and the amount of each, to the end that the Conservancy Assessment Record may disclose the aggregate of all levies for the Bond Fund up to that time.

Upon the completion of such record it shall be signed and certified by the president and secretary of the board of directors, attested by the seal of the district, and the same shall thereafter become a permanent record in the office of said district. A copy of that part of the Conservancy Assessment Record affecting lands in any county shall be filed with the auditor of such county.

If it should be found at any time that the total amount of assessments levied is insufficient to pay the cost of works set out in the Official Plan or of additional work done, the board of directors may make an additional levy to provide funds to complete the work, provided the total of all levies of such assessment exclusive of interest does not exceed the total of benefits appraised.

Section 46. Property Owners May Pay Assessment in Full. When the assessment roll is placed on file in the office of the district, notice by publication shall be given to property owners that they may pay their assessments. Any owner of real property assessed for the execution of the Official Plan under the provisions of this act shall have the privilege of paying such assessment to the treasurer of the board of directors within thirty (30) days from the time such assessment is placed on file in the office of the district, and the amount to be paid shall be the full amount of the assessment less any amount added thereto to meet interest. When such assessment has been paid, the secretary of the board shall enter upon the said assessment record opposite each tract for which payment is made the words "Paid In Full", and such assessment shall be deemed satisfied. The payment of such assessment shall not relieve the land owner from the necessity for the payment of a maintenance assessment nor for payment of any further assessment which may be necessary as herein provided. Any property owner failing to pay assessments in full as provided for herein shall be deemed to have consented to the issuance of bonds as provided for in this act, and to payment of interest thereon.

After the expiration of the period of thirty (30) days within which the property owners may pay their respective assessments, as limited herein, the treasurer of the district shall certify to the board of directors the

aggregate of the amount so paid, and thereupon the board of directors shall pass and spread upon their records a Bonding Resolution in which shall be stated the amount of the assessment, and the amount thereof paid as aforesaid, and thereupon the board shall in the same resolution apportion the uncollected assessment into installments or levies, provide for the collection of interest upon the unpaid installments, and they may order the issuance of bonds (in an amount not exceeding ninety (90) per cent, of the levy) in anticipation of the collection of said installments. The residue of the tax so levied (not less than ten (10) per cent.) shall constitute a contingent account to protect the bonds, from casual default, and any part thereof in excess of ten (10) per cent, of the next installment of maturing bond principal, together with the next two (2) installments of semi-annual interest, if not needed for this purpose maybe transferred from time to time to the Maintenance Fund of the district.

Section 47. Board of Directors May Issue Bonds.—How Paid.—Funds.—How to be Used. The board of directors may, if in their judgment it seems best, issue bonds not to exceed ninety (90) per cent, of the total amount of the assessments, exclusive of interest, levied under the provisions of this act, in denomination of not less than one hundred dollars (\$100), bearing interest from date at a rate not to exceed six per cent per annum, payable semi-annually, to mature at annual intervals within thirty (30) years, commencing not later than five (5) years, to be determined by the board of directors, both principal and interest payable at the office of the treasurer of the State of Ohio. * * * * *

A party who has not sought a remedy against any proceeding under this act until after bonds have been sold or the work constructed, cannot for any cause have an injunction against the collection of taxes or assessments for the payment of said bonds.

Section 48.

* * * * *

The amount of the Maintenance Tax paid by any parcel of land shall not be credited against the benefits assessed against such parcel of land; but the Maintenance Tax shall be in addition to any tax that has been or can be levied against the benefit assessment.

Section 49. Petition for Readjustment of Maintenance Assessments. Whenever the owners or representatives of twenty-five (25) per cent or more of the acreage or value of the lands in the district shall file a petition with the clerk of the court in whose office the petition was filed, stating that there has been a material change in the value of the property in the district since the last previous appraisal of benefits, and praying for a readjustment of the appraisal of benefits for the purpose of making a more equitable basis for the levy of the maintenance assessment, the said clerk shall give notice of the filing and hearing of said petition in the manner hereinbefore provided.

Section 50. Annual Levy. The board of directors shall each year thereafter determine, order and levy the part of the total assessments levied under this act, which shall become due and be collected during each year at the same time that state and county taxes are due and collected, which annual levy shall be evidenced and certified by said board not later than September 1 each year to the auditor of each county in which the real property of said district is situate.

Section 53. Conservancy Assessment to Constitute a Lien.—How Evidenced. All conservancy assessments and taxes provided for in this act, together with all penalties for default in payment of the same, all costs in collecting the same, including a reasonable attorney's fee, to be fixed by the court and taxed as costs in the action brought to enforce payment, shall, from date of filing the certificate herein described in the office of the auditor for the county wherein the lands and properties are situate, and until paid, constitute a lien, to which only the lien of the state for general state, county, city, village, school and road taxes shall be paramount, upon all the lands and other property against which such taxes shall be levied as is provided in this act.

Section 57. Surplus Funds and Annual Reports. Any surplus funds in the treasury of the district may be used for retiring bonds, reducing the rate of assessment or for accomplishing any other of the legitimate objects of the district.

At least once a year, or oftener if the court shall so order, the board of directors shall make a report to the court of its proceedings and an accounting of receipts and disbursements to that date which shall be filed with the clerk of the court. Thereupon the court shall order the auditing of said accounts by public accountants of recognized standing who shall file their report thereon with the clerk of the court.

INTERCORPORATE RELATIONS AND CONFLICT IN JURISDICTION

Section 61. Union of Districts. In case two or more districts have been organized under this act in a territory, which, in the opinion of the directors of either of the districts, should constitute but one district, the board of directors of any one of the districts may petition the court for an order uniting said districts into a single district.

Section 63. Subdistricts. Whenever it is desired to construct improvements wholly within or partly within and partly without any district organized under this act, which improvements will affect only a part of said district, for the purpose of accomplishing such work, subdistricts may be organized upon petition of the owners of real property, within or partly within and partly without the district, which petition shall fulfill the same requirements concerning the subdistricts as the petition outlined in Section 3 of this act is required to fulfill concerning the organization of the main district, and shall be filed with

the clerk of the same Court of Common Pleas, and shall be accompanied by a bond as provided for in Section 4 of this act. All proceedings relating to the organization of such subdistricts shall conform in all things to the provisions of this act relating to the organization of districts.

SYNOPSIS OF DRAINAGE LAWS OF WISCONSIN

In Wisconsin there are several Drainage Laws, but only two seem to be used extensively; they are known as The Town Drain Law and the Drainage District Law.

THE TOWN DRAIN LAW

APPLICATION: Whenever any six or more land owners in any town, one or whom shall be the owner of land affected by the proposed drainage, wish to have a ditch, or drain, or dike, or other work laid out, or water course enlarged in said town for the purpose of draining any marsh, swamp or overflow lands lying within said town, or for the purpose of preventing erosion or the depositing of sand, sediment, or debris they shall make such application in writing to the supervisors of said town, which application shall set forth:

1. The necessity of the proposed work, describing the same;
2. Map of the boundary of the area proposed to be drained;
3. The location of the proposed drain or drains;
4. A profile of the proposed drain or drains;
5. A name for the proposed drain;
6. The names of the owners of the land within the proposed drainage area so far as known;
7. The names of the person or persons who caused the survey to be made upon which the plans shall have been based;
8. An itemized statement of the cost of such survey;
9. A report of the College of Agriculture on:
 - (a) The quality of the soil.
 - (b) The feasibility of draining the area mapped.
 - (c) The probable benefits from the proposed work.
 - (d) The probable cost of constructing the proposed work.
- (e) The probable distribution of the benefits among the several parts of the district.
10. A prayer for the organization of a town drainage by the name and with the boundaries proposed, and for the construction of said drain under the direction of said Board of Supervisors. Upon receiving such application the supervisors make out a notice and fix therein a time

and place at which they will meet to examine and decide upon the need for the drain. The notice specified as nearly as practicable the route of the proposed improvement and the lands traversed. The petitioners cause personal service to be made upon each resident owner, and three notices to be posted in the town at least ten days before the hearing. Five days' notice by personal service is sufficient. The supervisors meet at the time and place fixed, and, being satisfied that ample notice has been given, proceed to examine the location of the proposed improvements, and hear reasons for or against the proposed improvement and decide upon the application.

If they find in favor of the improvement and that the benefit will exceed the damages and cost of construction, within ten days thereafter they grant the petition and award the damages to each piece of land; contracts for construction are then let.

If any public highway will be benefited by the improvement the amount of benefit is determined and assessed against the town. The benefits to the lands are then assessed. The cost of the drain, less the amount assessed to the town, is apportioned to the benefited land in proportion to benefits received. The assessment of benefits must be made within ten days after the contract is let. As soon as the contract is let for the construction of the drain, and the assessment for benefits is made, the taxes fall due and are paid to the town treasurer who holds them as a separate fund.

Whenever the supervisors find that a drain constructed under the provisions of this act needs to be cleaned or repaired or it is necessary to raise money for any reason, they levy an additional assessment upon the benefited land on the basis of the previous assessment of benefits. All unpaid assessments are a lien against the property.

If at any time it is found that a land owner has not been notified, they adjourn until such notice has been given; or, if after the order for the laying out of the drain has been issued, they give him an opportunity to appear, consider his objections, and either reaffirm their former order or make such modifications as are equitable.

If a drain extends to the boundary of, but does not enter the adjoining town the supervisors at the time of making the assessment in their own town, or at any time thereafter, may assess the adjoining town a just amount of benefits. If the supervisors of the adjoining town object to the assessment, the supervisors of each township select a disinterested person and the two select a third, and the three review the assessment and make it equitable. Upon receipt of the committee's decision, the supervisors of the adjoining township proceed to assess the benefits to the land benefited.

Whenever it is necessary for a dredge, or other machinery, to cross the right-of-way, of a highway, railroad, telephone or telegraph company, or any other right-of-way, the supervisors give notice to the corporation at least eight days before the day on which

the dredge is to cross the right-of-way. On the day specified, or a mutually agreeable day, the dredge crosses. The cost of crossing is included as part of the cost of construction.

Any land owner aggrieved by any order of the supervisors within twenty days thereafter may appeal to the County Court. The Court appoints three disinterested, competent persons commissioners who give notice when and where they will review the order or orders; upon the date fixed, they will look over the drain, hear all persons who desire to be heard and affirm or modify the order so as to make it equitable, and return the decision to the County Judge who transmits it to the Clerk of the town. In case of appeal from the refusal of the supervisors to lay out a drain, if the commissioners decide in favor of a drain the supervisors shall proceed to lay it out.

If the lands that it is desired to drain are in a City, application is made to the mayor and aldermen, who appoint a committee of three suitable, competent, disinterested persons who are sworn honestly, faithfully and impartially to discharge their duties; and who thereafter have the same powers, perform the same duties and have the same obligations as given to and imposed upon the supervisors heretofore. In villages application is made in the same manner to the President and Board of Trustees.

If the land to be drained lies partly within two towns or partly within a town and partly within a city or village, the application shall be made in duplicate and one copy shall be filed with the clerk of each. The mayor and aldermen of the City, or president and trustees of the village shall meet separately and appoint a committee, which committee shall be sworn as previously provided. The supervisors and committee then act jointly as a single drainage board and have all the powers, perform the duties, and are subject to the same obligations as the town supervisors.

A majority of any body, committee or board shall constitute a quorum and have full powers to act. The same appeal to the County Court may be taken by aggrieved land owners as is provided for, from order of the town supervisors. The Court to which appeal is first made has jurisdiction.

Cities and villages are assessed for and pay benefits to the public highways the same as a town. If any officer or body fails or refuses to perform any act or acts required of them, then within a specified time, the facts being brought before the Circuit Court of the County the Judge shall order the body to show cause why he or they should not perform such act or acts, and said officer or body be ordered to perform the act or acts unless good cause to the contrary be shown.

In case the owners of a majority of the assessed lands desire it, the supervisors may borrow money to pay the cost of construction; such money to be repaid in three annual installment, in which event, one-third of which installments shall be due each year. Drainage securities

bearing six per cent interest may be issued, which securities are a lien on the assessments and the said assessment shall bear six per cent interest until collected. Any assessment may be paid in full at any time before such securities are sold. When upon an appeal to the County or Circuit Court an error is discovered in any of the proceedings prior to said appeal or action, the Court shall exercise equitable jurisdiction therein and correct or cure such error by order, and thereafter progress shall be made as if there had been no error in the original proceedings.

When any land owner or owners desire drainage of undrained lands under any Public Drain Law of Wisconsin, they may apply to the County or Circuit Court wherein such lands may lie, for the permit to survey the undrained lands; such permit authorizes them to go on such lands as are sought to be included in the drainage scheme and make necessary surveys. Anyone interfering with them is guilty of a misdemeanor.

THE DRAINAGE DISTRICT LAW

Whenever a majority of the adult owners of land within any district of wet, swampy, marshy or overflowed lands, who shall represent one-third of the area of the lands within said district to be reclaimed or benefited, or whenever an adult owner or owners of more than one-half of the lands within such district desires or desire to construct one or more drains, ditches, levees or other works across the lands of others for the promotion of the public health or welfare and the drainage of said lands; or desire to maintain or keep in repair any such drain, ditch or levee heretofore constructed under any law of this State, such owners may file in the Circuit Court of any County in which the lands or any part of them shall lie, a petition setting forth:

1. The necessity of the proposed work, describing the same.
2. A map of the boundaries of the proposed district.
3. The location of the proposed drain or drains.
4. A profile of the proposed drain or drains.
5. A name for the proposed drainage district.
6. The names of the owners of the land within the proposed district, so far as known.
7. The name or names of the person or persons who caused the preliminary survey to be made upon which the plan shall have been based.
8. An itemized statement of the cost of said survey.
9. A report of the College of Agriculture on:
 - (a) The quality of the soil;
 - (b) The feasibility of draining the area included in said map;
 - (c) The probable benefits from the proposed work;
 - (d) The probable cost of constructing the proposed work;
 - (e) The probable distribution of the benefits among the several parts of the district.

10. A prayer for the organization of a drainage district by the name and with the boundaries of the plans proposed, and for the appointment of commissioners for the execution of the proposed work according to the provisions of this and the following sections.

No petition having the required number of signers shall be declared void, but the Court shall permit it to be amended to conform to the facts if the facts justify the organization of a district. Several similar petitions may be circulated, and when filed are regarded as one petition, having as many signers as there are separate qualified citizens on the several petitions.

The territory included in the district need not be contiguous, provided that it is so situated that the public health and welfare will be promoted by the drainage of each part and the benefits in each part will exceed the cost, and the court is satisfied that said proposed work can be done more cheaply as a single district.

The guardian or next of kin of minors or incompetents may sign the petition of the establishing of the district. In case they have no guardian and the next of kin does not reside in Wisconsin any person interested in the proposed drainage district may file an application for the appointment of a guardian, and the Court in its discretion may appoint such general guardian. All lands owned by minors and incompetents whose guardians sign such petitions shall be counted in determining whether sufficient land owners have signed such petition.

On the petition being filed, the Judge makes an order fixing the time and place of hearing, and the Clerk of the Court gives notice by posting notices thereof in five public places in the district, and by serving a copy of such notice on each owner of land in the proposed district, who resides in any county in which any lands in the proposed district are situated, either personally or by leaving a copy at his usual place of abode, and by publishing a copy of the notice at least once a week for three successive weeks in some newspaper published in each county from which part of the district is to be taken. The notice must state the court in which the petition is filed, describe briefly the drain, give a general description of the proposed work, the proposed boundaries of, or a general description of all lands in the district; the name for said district, and state the time and place of hearing.

The names and addresses of non-residents must be given, if known, and a copy of such notice shall be mailed to each non-resident land owner within six days of the first publication of the notice.

If it should be found before the hearing on the petition that one or more land owners have not been duly served with notice of said hearing, the hearing shall be adjourned by the Court until service of notice has been made upon each land owner; upon the adjourned day the same proceedings, adjournments, trial, findings and order may be had as in the case of complete service in the first instance. In case of failure to mail or publish

notice as required, the Court may adjourn for a sufficient time to permit the mailing or publication.

At the hearing on the petition it may be contested on the following grounds: The sufficiency of the petition; the sufficiency of the signers of the petition; the sufficiency of the notice; the constitutionality of the law; the jurisdiction of the Court; whether or not the public health and welfare will be benefited; and whether the benefit will exceed the cost. The court after hearing all the evidence decides for or against the establishment of the district.

If the district is established, three suitable, competent persons are appointed commissioners and their bonds fixed. The persons appointed commissioners need not be residents of the county in which the district is situated, but must reside within 25 miles of the district and may own land in it. After the commissioners are appointed the district is a fully organized drainage district with the right to sue and be sued, and with all the rights and powers of a public corporation and in addition has the power to borrow money. The commissioners take oath to support the Constitution of the United States, the Constitution of the State of Wisconsin, and faithfully and impartially to discharge their duties and make a true account of their dealings, and execute a bond. They organize by electing one of their members chairman, one secretary and one treasurer, and a majority shall constitute a quorum. Their term of office is for two years and accurate record is required to be kept of all monies received and disbursed and an accurate and full record of their proceedings, and they are required to submit an annual statement showing all receipts and disbursements, the cost of and the work accomplished. They are paid \$3.50 per day and actual reasonable expenses. They are, at all times, under the jurisdiction of the court and must obey its direction.

The commission employs a qualified drainage engineer as district engineer and fixes his compensation. They then have necessary surveys made, lay out the proposed work and make and file a report to the court. This report states: Whether the proposed work and location are proper and feasible, and if any repairs the most feasible changes; the changes in boundaries are shown; the lands that will be damaged and the damages awarded to each tract; the lands that will be benefited and the benefits awarded each tract, and afterwards referred to as assessments of benefits; the total cost of the improvements; any corporations that receive special benefits from the construction of the improvements shall pay its proportionate share of the cost of the proposed work. "Corporation" is defined to include railroad corporations and other private corporations, towns, cities, villages, and other drainage districts. That portion of the cost of construction not assessed against the lands in the district is apportioned to the corporations.

The probable cost of keeping the proposed work in repair, and if the district is to do further work on an existing drain the commissioners report on the feasibility of the project, the probable cost of upkeep; the lands

that will be benefited; whether or not the benefits exceed the damages and whether or not the district embraces all lands that will be benefited; maps, plans and specifications shall be included in the report.

The commissioners have the authority to make any changes necessary in the plans proposed by the petitioners and to include or exclude lands from the district. Their report is filed with the clerk of the court. Upon the filing of the report the court fixes the time and place where all persons interested may appear and remonstrate against the confirmation of the report. Notice of the hearing is given by publication and by personal service on all persons or corporations who it is proposed to assess, and who reside in the County at least twenty days before the date of the hearing. The notice contains full information in regard to the damages and benefited to the several tracts.

Two or more days before the date set for the hearing, any person or corporation may file a remonstrance against the whole or any part of the proposed work or any changes in boundaries of the assessment of benefits or damages, or for any other reasons. The Court fixes the time at which the remonstrants will be heard. Land owners remonstrating against the assessments of benefits or amount of damages may demand a jury trial; all other remonstrants are heard by the court. If the report requires modification the Court orders the commissioners to modify it. If there are no remonstrances, or if the court finds in favor of the report as filed, or as it has been modified to conform to the findings of the Court, the Court confirms the report and establishes the district and the assessments are confirmed. The order of confirmation is final, unless appeal be taken within thirty days to the Supreme Court. The order of confirmation may be amended on petition of the commissioners after such notice as the court may require. The report may be confirmed in part from time to time at the discretion of the Court.

After the assessments are confirmed, the court orders the assessments to be paid in not more than fifteen annual installments and fixes a date not more than five years thereafter on which the first installment of the assessment for construction shall become due. Each installment shall draw interest from the date of the order. Unless otherwise ordered the assessment shall be due and payable at once. Any land owner may pay his assessment before the commissioners have contracted to borrow money and issue securities therefor based on the assessment.

From the time of entry of the order and the filing of the notice thereof with the register of deeds the assessments and interest thereon become a lien on the land.

The commissioners are required to receive competitive bids for the money desired or for the sale of bonds.

The commissioners are required to file an annual report each year with the clerk of the circuit court, which report shall contain:

1. An itemized report of receipts and expenditures.
2. A statement of all bonds paid off during the past year.
3. All work done in the district during the year and the location thereof.
4. What bonds have been issued since their last report.
5. What repairs to the work will be necessary during the next coming year.
6. Location and probable cost of such repairs and of the upkeep of the work.
7. What sum it will be necessary to raise in incidental expenses for the next succeeding year.
8. Assess the cost of necessary repairs, up-keep and incidentals; which assessment shall be known as Assessment for Repairs and shall be apportioned on the sum total of all assessments of benefits then in force.

The land owners have a right to object to the report, and objections are heard and determined by the Court. Notice of the filing of the annual report is given by publication and a copy is mailed to each land owner whose address is known. The annual report is heard by the court. All objectors are heard, the amount of assessments fixed and determined and recorded.

After assessments for construction are confirmed, notice of the confirmation and the time and place where assessments may be paid is given by publication. If assessments are not paid when due the lands are certified to the clerk of the town, city, or village in which situated and the assessments are collected in the same manner as other general taxes. Lands on which assessments are not paid are sold by the County treasurer in substantially the same manner as lands are sold for other general taxes. In case of error, the law makes provisions for the correction thereof.

The town treasurer is required to transmit the drainage moneys collected by him to the commissioners and penalties are provided for failure to do so.

The county treasurer keeps a separate account for each drainage district whose funds he handles, and must turn over these funds on demand, to the commissioners.

If assessments are payable in installments, each installment shall draw interest at the rate of six per cent, payable annually from the date of the order fixing the assessment until paid.

The commissioner and their employees, servants or agents have the right to go upon all lands along the improvements for the purpose of inspecting, repairing, deepening or widening whenever necessary.

If the court confirms the assessment of benefits and the validity of the same is later questioned by the commissioners or other interested parties, the law provides that the Judge may hear the matter, make the necessary corrections and amendments to former proceedings and issue an order of validation which

renders valid and binding all former proceedings as amended by the Court.

The commissioners are given the right to construct drains across railroad right-of-way and the district is required to pay the reasonable costs of the culverts and bridges made necessary by the construction of the drain. Upon fifteen day's notice, the railroad company is required to open its right-of-way and permit the construction of the drain. Appropriate penalties are provided in case the company does not do so.

If the assessment for construction is not sufficient, or additional funds are necessary to pay the legal indebtedness of the district, additional assessments are proportioned on the sum of all the assessments of benefits made by the commissioners and approved by the court. The additional assessments when confirmed by the court, are collected in the same manner as original assessments. The cost of construction already assessed, and the cost of construction proposed shall not exceed the benefits already assessed.

The commissioners of any district when petitioned by the owners of one-tenth of the land in the district, or of their own initiative may enlarge existing drains or construct new drains when in their judgment the plan of drainage is insufficient. The procedure is practically the same as for the organization of the drain. The supplemental benefits are so assessed that the sum total of such supplemental benefits and the total benefits already assessed against the land shall be proportional to the actual benefits accruing to the said lands from all the drains constructed. The assessment of supplemental benefits does not operate to change the apportionment of assessment for construction previously confirmed.

The law makes provision for the correction of erroneous assessments when discovered.

The commissioners may borrow money not exceeding in amount the amount of assessments for construction, additional assessments, or assessments for repairs unpaid at the time of borrowing, for the purpose of paying lawful obligations of the district, and may secure the same by notes or bonds bearing interest at a rate not to exceed 6% and not running beyond one year after the last installment of the assessment on account of which the money shall be borrowed. The notes or bonds are a lien upon the assessment.

In letting contracts costing to exceed \$500.00 the commissioners are required to advertise for sealed bids in a newspaper published in the county and in their option, in one or two published without the county. Contracts shall be let to the lowest responsible bidder. The commissioners of any district having at least eight miles of open ditch, drain or levees within its boundaries may petition the court stating that it is necessary to make annual repairs to said improvements and that in order to make such repairs certain machinery is necessary and that it would be more economical for the district to own the necessary machinery and do the work itself than to have it done under contract, and requesting that they be

authorized to purchase, operate, and maintain such machinery, dredges or other appliances as are necessary to keep the improvements in repair. The court holds a hearing on this petition; hears the protests of the land owners, and if it finds against the purchase of the necessary machinery costs are charged to the general fund of the district. If the court finds in favor of the purchase of the machinery, the commissioners are authorized to proceed with the purchase and operation of the necessary machinery and may levy such additional assessments on all the assessable land in the district as are necessary to pay for the cost of the machinery; provided, that the said assessment shall not exceed 15% of the original assessment.

Damages allowed the owners of land must be paid or tendered before the commissioners are authorized to enter on the land.

The law provides that the owners of the land not abutting on a drain, by filing affidavit with the commissioner that he owns land in the district, that it needs drainage, and that it is shut off from a public drain, may secure entrance to the drain. When such affidavit is filed the commissioners give notice, hold a hearing, and if they decide that such drain is needed establish it as a public drain and apportion the costs to the lands benefited.

When any lands outside the district are benefited the commissioners may file a report to the court showing the facts, and proceedings are initiated for bringing these lands into the district. District boundaries cannot overlap.

The law specifically provides that the court shall, at all times have supervision of commissioners of drainage districts, and may at any time require them to make a report on any matter or matters connected with their duties as commissioners, and may remove the commissioners from office for neglect of duty or malfeasance in office, or for other good reason, or require that they give new bonds. The court is charged with general supervision over all matters pertaining to drainage districts and may make such orders with respect to all matters pertaining to the carrying out of the work as may be for the best interests of the district.

After the expiration of five years from the confirmation of the report of the commissioners, upon petition of one-fourth of the owners of the land within the district setting forth that said original estimate of benefits is inequitable and unjust the court shall direct the commissioners to reassess the lands of the district for benefits. On such reassessment the benefits to said lands will be assessed according to the actual benefits without reference to the original report. Hearing is heard on the reassessment in the same manner as for the original assessment. All assessment for construction, additional assessments and assessments for repairs shall be based on the latest assessment of benefits confirmed by the court.

Districts are authorized to condemn land for the purpose of constructing, maintaining and operating drainage improvements. Penalty is provided for placing

obstruction in drains that may have been constructed by any district.

The method of connecting lateral ditches with the drains of the district is fixed, and no person shall make such connection without first securing the written consent of the commissioners and the connection is to be made in accordance with the specifications for connecting such lateral with such drainage districts or canals as are furnished by the Dean of College of Agriculture of the University of Wisconsin.

The law provides for the withdrawal of water from the drainage districts for irrigation purposes.



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