

**BOARD OF
COUNTY ROAD COMMISSIONERS
OF THE
COUNTY OF OAKLAND
1919-1920**

**EIGHTH ANNUAL REPORT TO THE BOARD OF SUPERVISORS OF THE
COUNTY OF OAKLAND, STATE OF MICHIGAN.**



**BOARD OF COUNTY ROAD COMMISSIONERS OAKLAND COUNTY
1919-1920**

**JOHN A. ADAMS, Chairman
Addison Township**

**THOMAS LYTLE
Farmington Township**

**G. ROSS THOMPSON
Highland Township**

H. G. ROFE, Clerk

**L. V. BELKNAP, County Highway Engineer
E. F. GLASGOW, Assistant Engineer
N. W. STRAIT, Office Engineer
J. B. JEWELL, Field Engineer
C. K. REDFIELD, Bridge Engineer**

We are well aware of the fact that cheaper farm products for all the people, that more readily accessible schools and churches and places of amusement will bring about a general betterment of society, that the free movement of fresh foods to the centers of population will bring better health to the communities, that better roads bring better farm conditions and more intelligent farming, which will mean increased production.

Pontiac, Michigan, September 30, 1920

To the Honorable Board of Supervisors of the
County of Oakland:

Gentlemen:

The Board of County Road Commissioners of the County of Oakland in compliance with the statutes and in accordance with the resolutions heretofore passed by your honorable body relative to the construction of county highways, take pleasure in submitting for your approval the following eighth annual report outlining the work during the fiscal year from October 1, 1919, to September 30, 1920, the present status of the various roads, the proposed construction and the cost thereof.

Very sincerely,

Board of County Road Commissioners of the County of Oakland.

JOHN A. ADAMS, Chairman
THOMAS LYTLE
G. ROSS THOMPSON

Commissioners

Status of Concrete Pavement.

The use of motor trucks has increased by leaps and bounds within the last few years, necessitating the construction of hard-surfaced pavements. The need of a permanent thoroughfare from Pontiac to Detroit soon became evident and accordingly, the County Road Commission decided to pave Woodward Avenue with concrete. Contract for the first section of this improvement, from Royal Oak to Birmingham, was awarded March 15, 1915, to the R. D. Baker Company of Detroit. Since that time traffic has increased so rapidly and the use of trucks has become so general that the gravel roads in many localities have proven inadequate.

The "Covert Act" served the purpose of providing the necessary additional funds and made possible the construction of permanent surfaces upon our most heavily travelled highways. The following is a statement of work done and in progress to September 30, 1920.

Sec. 1—Woodward Avenue Road.

Location—Royal Oak to Birmingham.
 Length—4.2 miles.
 Class—16' one course concrete, 8" center, 6" sides.
 Mix—Approximately 1:1½:3.
 Contract awarded March 15, 1915.
 Amount—\$59,674.00.

Sec. 2—Woodward Avenue Road.

Location—Southerly limits of Pontiac to Kimball's Corners.
 Length—1.3 miles.
 Class—16' one course concrete, 8" center, 6" sides.
 Mix—Approximately 1:1½:3.
 Contract awarded August, 1915.
 Amount—\$16,355.00.

Sec. 3—Woodward Avenue Road.

Location—Kimball's Corners to Birmingham.
 Length—4.17 miles.
 Class—16' one course concrete, 8" center, 6" sides.
 Mix—Approximately 1:1½:3.
 Contract awarded November, 1915.
 Amount—\$62,090.00.

Sec. 4—Woodward Avenue Road.

Note:—This road was originally built of asphaltic concrete and was unable to withstand the traffic. It was therefore repaved with concrete.

Location—Royal Oak to the County Line.
 Length—2.12 miles.
 Class—18' two course 7" with crowned sub-base.
 Mix—Bottom course approximately 1:2¼:5—Top 1:1½:2½.
 Contract awarded April 18, 1917.
 Total Cost—\$46,501.77.

Road No. 1—Maple Avenue Road.

Location—Birmingham to Farmington Road.
 Length—6.953 miles.
 Class—16 foot concrete one course 8" center, 6" sides.
 Contract awarded September 14, 1917.
 Contractor—Slater Construction Company.
 Amount—\$143 106.09 or \$20,581.92 per mile.
 Completed.

Road No. 3—Elizabeth Lake Road.

Location—Pontiac to Elizabeth Lake.
 Length—2.846 miles.
 Class—16 foot one course concrete.
 Contract awarded September 14, 1917.
 Contractor—John T. Ladue & Company.
 Amount—\$54,961.88 or \$19,311.97 per mile.
 Road Completed.

Road No. 4—Farmington Road.

Location—Farmington Junction to North Farmington.
 Length—4.977 miles.
 Class—16 foot concrete.
 Contract awarded July 20, 1917.
 Contractor—R. D. Baker Company.
 Amount—\$117,000.02 or \$23,508.14 per mile.
 Road completed.



Concrete Paving on Orchard Lake Road.

Road No. 6—Clawson Road.

Location—Royal Oak to Clawson.
 Length—2.427 miles.
 Class—16 foot concrete one course.
 Contract awarded September 14, 1917.
 Contractor—John T. Ladue Company.
 Amount—\$54,422.87 or \$22,423.92 per mile.
 Road completed.

Road No. 8—Long Lake Road.

Location—Bloomfield Center to Orchard Lake.
 Length—5.995 miles.

Class—16 foot concrete one course.
Contractor—R. D. Baker Company.
Road completed.

Road No. 12—Orchard Lake Road.

Location—Pontiac to Orchard Lake.
Length—3.942 miles.
Class—18 foot concrete one course.
Contract awarded April 23, 1918.
Contractor—R. D. Baker & Company.
Amount—\$98,332.32 or \$24,944.77 per mile.
Road completed.

Road No. 15—Auburn Avenue Road.

Location—Pontiac to Rochester Road.
Length—6.998 miles.
Class—18 foot concrete, 7" one course.
Contract awarded April 10, 1919.
Contractor—G. P. Scharl Construction Company.
Amount—\$240,155.23 or \$34,317.70 per mile.
Road completed.

Road No. 16—Rochester Road.

Location—Royal Oak to Rochester.
Length—11.920 miles.
Class—18' concrete, 2 course, 7" thick.
Contracts awarded April 10, 1919.
Contracts awarded in two sections.
Sec. 1—5.568 miles.
Contractor—John T. Ladue & Company.
Amount—\$184,301.27 or \$33,100.08 per mile.
Completed.
Sec. 2—6.352 miles.
Contractor—R. D. Baker Company.
Amount—\$203,022.13 or \$31,958.77 per mile.
Completed.

Road No. 20—Orion Village.

Location—Orion Village.
Length—1.3 miles.
Class—18' to 46' Class "F"—two course.
Contractor—P. M. Lau.
Amount—\$78,462.59.
Completed.

Road No. 225—Grand River Road and Farmington Village.

(Supervised by State Highway Department.)
Location—County line through Farmington Village on Grand River Road.
Length—4.3 miles.
Class—"F" concrete.
Contractor—R. D Baker Company.
Amount—\$176,500.00.
Completed.

Road No. 27—Milford Village.

Location—Milford Village.
Length—2.180 miles.
Class—18' to 54' Class "F" concrete.
Contractor—John T. Ladue & Company.
Amount—\$165,000.00.
Under construction.

Road No. 29—Eleven Mile Road.

Location—Eleven Mile Road through Royal Oak Township.
Length—5.994 miles.
Class “F” concrete.
Contractor—R. D. Baker Company.
Amount—\$368,946.80.
Under construction.

Road No. 35—Rochester Village.

Location—Rochester Village.
Length—0.469 miles.
Class—“F” concrete.
Contractor—P. M. Lau.
Amount—\$76,465.90.
Under construction.



Pavement in the Village of Orion. T. L. No. 36.

Maintenance.

The proper maintenance of a system of highways is well recognized as the most difficult problem with which the Highway Engineer is confronted. The importance of this work has grown rapidly during the last few years, due largely to the increased use of motor vehicles, for both pleasure and commercial purposes.

Maintenance is a most important factor in the development of any type of highway construction but particularly is this true in the case of gravel roads, which type constitutes a major portion of Oakland County's system. The suction of the tires caused by rapidly moving automobiles displaces the fine binding material of the road and soon causes ruts to form unless given immediate attention. An examination of the traffic counts printed on the opposite page will afford an excellent impression of the service which our roads are performing daily and will demonstrate the fact that continuous maintenance is necessary to keep them in first class condition.

The patrol system of maintenance, adopted in this County about two years ago, lends itself readily to the gravel road and has been instrumental in raising the standard of our highways to the extent that Oakland County's system is now regarded as one of the best in the State.

Under the patrol system the County is divided into districts, each of which is under the direct supervision of a Maintenance Superintendent. These Superintendents have in their employ a number of Patrolmen, who are furnished with a light grader float, picks, shovels and other necessary tools. To each patrolman is allotted a section of road, from four to eight miles in length, depending upon location and amount of traffic. Each man is held responsible for his section of road and is expected to keep the surface well floated, free from ruts or depressions, and in the best possible condition at all times.



Beautiful Spot on Lakeville Road, Addison Township.



Beauty and Safety surround this curve on Lakeville Road, Addison Township.

The Maintenance Superintendent also employs gangs to some extent in cutting brush, and weeds, maintaining ditches and culverts, and performing such other work as the patrolmen are unable to care for.

Maintaining the concrete roads requires the tarring of all joints and cracks, repairing shoulders, removing broken slabs and patching or replacing with new concrete. This work has recently become a serious consideration, especially on Woodward Avenue. With but one or two exceptions, this road carries more traffic than any other road in the United States and consequently requires constant attention to maintain it in good condition.

Traffic counts were taken on trunk line roads covering a period of 24 hours. Average conditions were obtained by taking the count on Monday of the first week, Tuesday of the second week, etc., continuing until a count had been taken for each day of the week, thus covering a period of seven weeks. Chart No. 1 shows a detailed record of count taken July 28, 1920, at the intersection of Woodward Avenue with the Nine Mile Road, in Royal Oak Township. Chart No. 2 gives average for twenty-four hour period of all counts taken at the different locations throughout the County. Locations referred to by number are as follows:

NUMBER

LOCATION

1. Intersection of Woodward Avenue with Nine Mile Road, Royal Oak Township
2. Intersection of Lapeer Road with West Rochester Road in Pontiac Township.
3. Saginaw Road at Drayton Plains, Waterford Township.
4. Grand River Road at Farmington Junction, in Farmington Township.

Chart No. 1

Kind of Vehicle	7 A.M.	9 A.M.	11 A.M.	1 P.M.	3 P.M.	5 P.M.	7 P.M.	9 P.M.	11 P.M.	1 A.M.	3 A.M.	5 A.M.	Total
	to 9 A.M.	to 11 A.M.	to 1 P.M.	to 3 P.M.	to 5 P.M.	to 7 P.M.	to 9 P.M.	to 11 P.M.	to 1 A.M.	to 3 A.M.	to 5 A.M.	to 7 A.M.	
Single Horse.....	1	0	6	3	4	5	1	0	0	2	1	0	23
Double Team (Light).....	3	3	3	1	4	1	0	0	0	0	0	3	18
Double Team (Loaded).....	3	4	2	3	5	2	0	1	1	9	0	3	33
Automobile, Runabout.....	110	130	108	155	156	202	186	262	49	6	3	38	1405
Automobile, Touring Car.....	490	750	600	820	960	1117	1116	1056	292	43	26	462	7737
Motor Truck (Light).....	95	130	105	90	132	117	41	33	6	4	1	21	775
Motor Truck (Loaded).....	70	95	80	96	113	62	17	31	9	8	19	58	658
Motor Cycle.....	5	6	6	9	5	10	8	4	4	2	0	7	66
Total.....	777	1118	910	1177	1379	1516	1369	1387	361	79	50	592	10715

Chart No. 2

Kind of Vehicle	Location No. 1	Location No. 2	Location No. 3	Location No. 4
Single Horse.....	23	7	11	8
Double Team (Light).....	19	7	12	5
Double Team (Loaded)...	33	2	6	8
Automobile, Runabout....	1141	112	165	224
Automobile, Touring Car.	8555	728	1538	1647
Motor Truck (Light).....	613	70	121	97
Motor Truck (Loaded)....	479	69	117	142
Motor Cycle.....	79	9	11	9
Totals.....	10942	1004	1981	2140

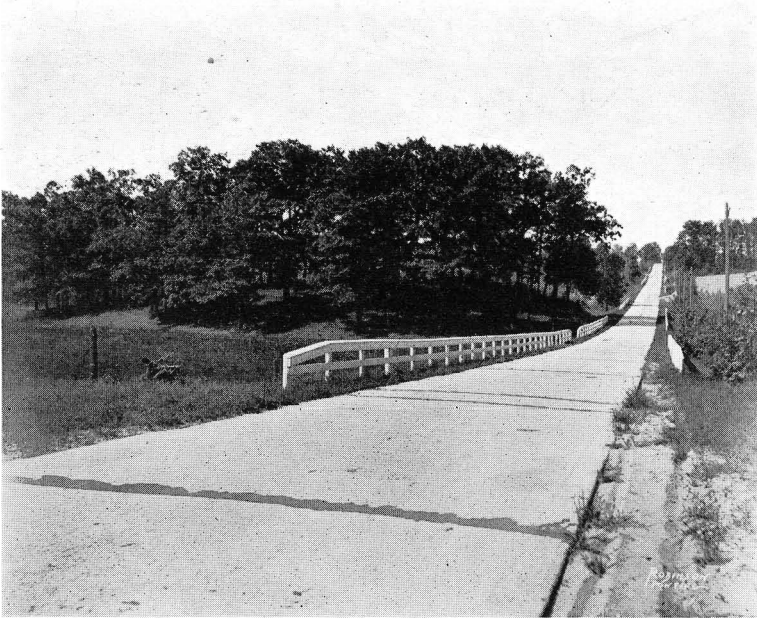
Roads Completed and Under Construction

1. Davisburg Road—Springfield and Rose Townships.

The Davisburg Road, east of Davisburg, in Springfield Township, is completed of 9 foot gravel and 22 foot grade, furnishing an outlet for the Village of Davisburg easterly to the Saginaw Road. The Davisburg Road west through Rose Township is graded 22 feet wide and graveled for a width of 9 feet. This section gives the village an outlet to Milford Road. Work performed by county forces. This road is completed to the Milford Road.

2. Elizabeth Lake Road—Waterford and White Lake Townships.

The Elizabeth Lake Road is completed from Pontiac west to the Livingston County Line. The construction consists of a 22 foot grade and 9 foot gravel from the center of Waterford Township west to the County line. The section from Pontiac to the center of Waterford Township is constructed of concrete, 16 feet wide. This is the main highway from Pontiac through Oakland County via the Grand River Road to Howell and Lansing.



Maple Ave. Road. Showing Guard Rail Protection.

3. Franklin Road—Bloomfield and Southfield Townships.

The Franklin Road is completed through Southfield Township with the exception of one-half mile through the Village of Franklin. In Bloomfield Township this road is completed with the exception of one-half mile north of the Bloomfield Center Road. The Franklin Road provides a new route to the City of Detroit via Long Lake and the Seven Mile or Grand River Roads.

4. Commerce Road—Milford and West Bloomfield Townships.

This road is complete for a distance of two miles west of the Village of Milford. Construction consists of a 22 foot grade and a 9 foot gravel surface.

The Commerce Road in West Bloomfield Township is being built by day labor, two and one-half miles now being complete in the west half of the Township.

The Commerce Road when finally completed will furnish an improved route from the lake region of Keego Harbor to Milford and other points in the western part of the County.

5. Grange Hall Road—Groveland Township.

The Grange Hall Road, in Groveland Township, is now complete. This improvement consists of a 22 foot grade with a 9 foot gravel surface. Some very steep grades prevail on this road, several with a percentage as high as nine having been permitted in this construction, in order to keep the cost



Crescent Lake in the background. Waterford Township.

within a reasonable figure.

6. Walled Lake Road—Commerce and Novi Townships.

The Walled Lake Road, consisting of a 22 foot grade and a 9 foot gravel surface, is completed from Walled Lake south to the Village of Novi. This road was built by day labor.

The Walled Lake Road provides a convenient route for traffic from the southwestern part of the County and from points in Livingston County to the beautiful shores of Walled Lake and the lake region in West Bloomfield Township.

7. Orion Road—Avon and Oakland Townships.

This road is now complete from Rochester Junction to the Village of Orion, opening up a short route for tourists from the southeastern part of the County and Detroit to Lake Orion, Oxford, and points north. This highway follows the interurban railroad through a beautiful country of hills and valleys.

8. George Lake Road—Addison Township.

The George Lake Road extends from the Village of Leonard west for a distance of one and one-half miles, thence south to the Lakeville Road. This improvement, four miles in length and consisting of a nine foot gravelled surface, is now under contract and will soon be completed.

9. Baldwin Road—Pontiac and Orion Townships.

The Baldwin Road is now completed for a distance of five and one-half miles north of the City of Pontiac. This road furnishes an improved highway into Pontiac for a large farming section north of the City.

10. Seymour Lake Road—Brandon and Oxford Townships.

The Seymour Lake Road, in Brandon Township, is under contract from Bald Eagle Lake southeast for a distance of two miles. This section will be completed at an early date.

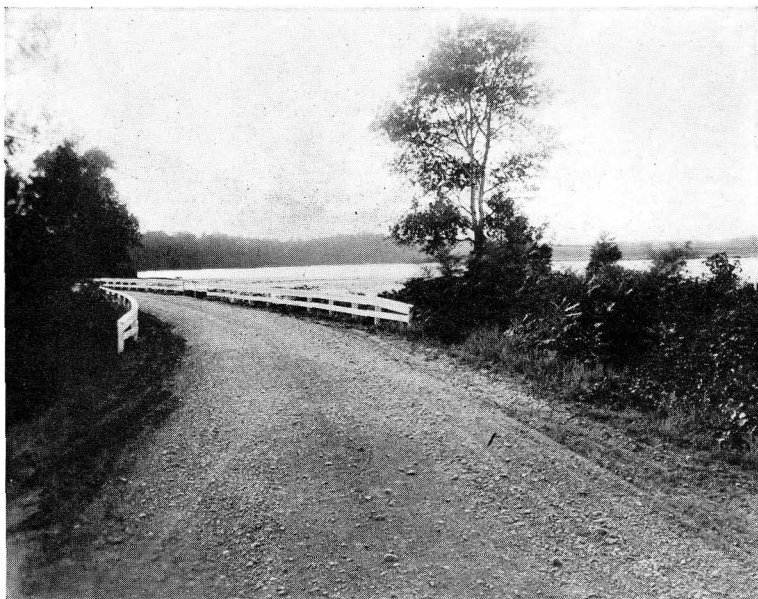
Seymour Lake Road, in Oxford Township, for a distance of three miles west from the Village of Oxford, is being built by day labor. Grading is complete and one mile on west end has been surfaced with gravel. This improvement involves the construction of a 44 foot span bridge over a sink hole requiring the driving of piles.

11. White Lake Road—Highland Township.

This road is now complete from the Village of White Lake west to Clyde and the Milford Road. This road is graded for a width of 22 feet with a nine foot gravel surface and affords an outlet to the railroad for the farming section in the northern part of White Lake Township.



Stone Retaining Walls beautify the roadside. Dodge Road.



Another reason motorists choose Oakland County for their tours. Scene near Oxbow Lake on Elizabeth Lake Road. White Lake Township.

12. Wixom Road—Town Line, Commerce Township.

Work was begun on this road in the spring of 1920. Grading has been completed and the gravel surface will be put on this fall.

13. South Commerce Road—Commerce Township.

The construction of this road has not been begun.

14. Switzer Road—Farmington Township.

The Switzer Road consists of nine foot gravel surface on a 22 foot road bed. Construction is now under way and approximately three miles will be completed this fall.

15. Milford Road—Lyon Township.

The Milford Road is now complete through Lyon Township, thus providing an improved highway from the Village of Holly to the Washtenaw County line with the exception of one mile through the Village of South Lyon.

16. Redford Road—Southfield Township.

One mile. Work not started.

“The greatest good for the greatest number can only be brought about by the building of better roads.”

Roads Petitioned Under the Covert Act.

Maple Avenue Road—Assessment District No. 1.

The Maple Avenue Road extends from Birmingham in a westerly direction to the Farmington Road, a distance of seven miles. This improvement consists of a Class "F" 10 foot concrete surface on a 24 foot road bed. Work on this road is now complete.

The Maple Avenue Road is a branch feeder to Woodward Avenue and permits heavy trucking for a large farming area.

Dodge Road—Assessment District No. 2.

This road extends from Birmingham in a northerly direction through the Townships of Troy and Avon for a distance of eleven miles. This road is now complete and consists of a Class "B" 9 foot gravel surface on a 22 foot road bed. This improvement provides an outlet for a large farming district as well as an alternate route to Detroit from the north central part of the County.



A durable road through a farming community. Maple Ave. Road.

North End Dodge Road—Assessment District No. 5.

This road is a continuation of Assessment District Road No. 2, connecting with the Lapeer Road in Orion Township. This improvement is 3.3 miles in length and is now complete as a nine foot gravel road.

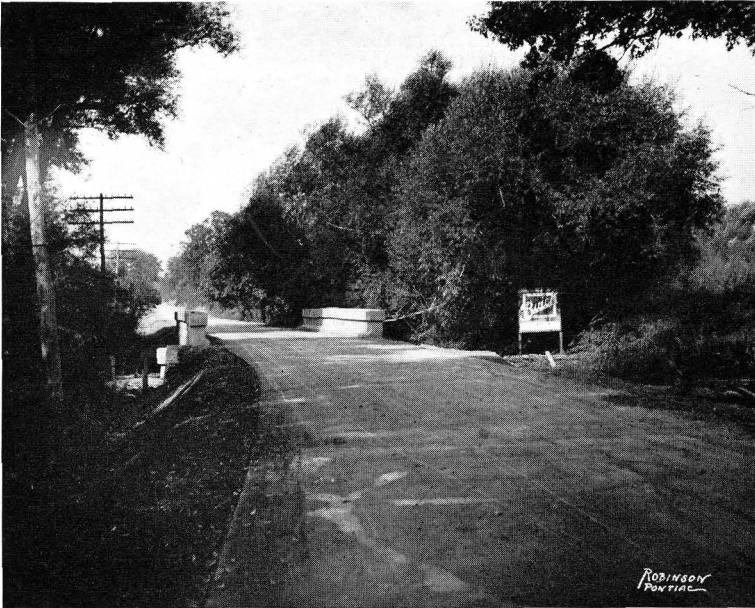
Long Lake Road—Assessment District No. 8.

This road extends from Bloomfield Center west to Orchard Lake. It is constructed of concrete 16 feet wide on a 24 foot road bed. Contract for this work was awarded to the R. D. Baker Co. of Detroit. This road connects the lake region with Woodward Avenue through the Bloomfield Hills. This improvement has just recently been completed.

Auburn Avenue Road—Assessment District No. 15.

The Auburn Avenue Road extends from Pontiac easterly to the Macomb County line. This is a state trunk line connecting Pontiac with Utica and Mt. Clemens. It is completed from Pontiac east to the Rochester Road with a one course concrete pavement 18 feet wide on a 24 foot road bed. The section from the Rochester Road to the Macomb County line has been taken over by the State and will undoubtedly be constructed in 1921.

The Auburn Avenue Road is an important link in the County system as it affords an alternate route to Detroit from Pontiac via either the Dodge, Rochester or Earl Memorial Highway.



Bridge crossing Clinton River, Auburn Avenue Road.

Rochester Road—Assessment District No. 16.

Rochester Road extends from the Village of Royal Oak to the Village of Rochester. This road was originally built of Class "B" gravel, 9 feet wide for the northern portion and with a slag foundation and gravel top on the southern portion. The heavy traffic on this road caused such expense for maintenance that the need for a higher type of pavement soon became evident. This road is now complete as a two course concrete pavement 18 feet in width on 26 foot road bed, Wisconsin granite having been used in the wearing course.

South Lyon-New Hudson Road—Assessment District No. 18.

This highway is now complete from the Village of South Lyon to the Village of New Hudson and connects the Village of South Lyon with the Grand River Road. It is also an important link in the route from Pontiac to Ann Arbor. This improvement consists of a 9 foot gravel surface and 22 foot grade.

Romeo Road—Assessment District No. 19.

The Romeo Road connects the Village of Romeo with the Rochester Road and is now complete as a Class "B" 9 foot gravel road on a 22 foot grade.

Orion Road—Assessment District No. 20.

This improvement covers that part of the Lapeer Road within the Village of Orion. It was improved under the provisions of the Covert Act, which permits the improvement of streets within a village when the same fall on a trunk line route. This street is constructed of concrete from 18 to 44 feet in width with combination curb and gutter. Work on this improvement was completed in August.

North Farmington-Walled Lake—Assessment District No. 21.

This road is now under construction as a Class "B" 9 foot gravel road on a 22 foot grade. Grading has been completed and approximately one mile of gravel surface laid. This road opens up a rich farming and fruit district between North Farmington and Walled Lake.

Randall Beach Road—Assessment District No. 22.

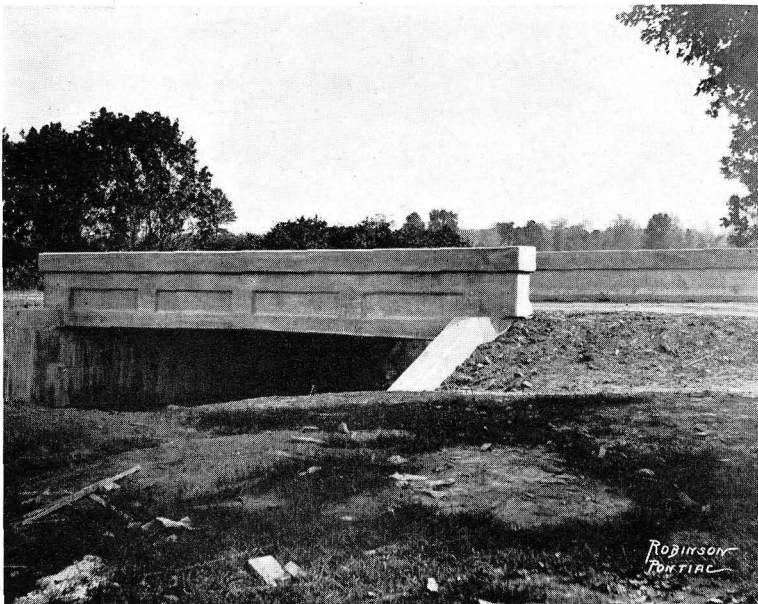
This improvement extends from the Village of Clarkston easterly to the Lapeer Road at a point just south of the Village of Orion. This road is approximately eleven miles in length, running through a rich farming country and providing a short route to Pontiac from the northeastern part of the County. Contract for this work was awarded to P. M. Lau in the spring of 1920. Grading is practically completed and placing of the gravel surface has been begun. This road will be 9 feet wide on a 24 foot grade.

Leonard Road—Assessment District No. 23.

The Leonard Road extends from the south village limits of Leonard north to the Lapeer County line. This road is now complete as a Class "B" 9 foot gravel with a 22 foot road bed.

Twelve Mile Road East—Assessment District No. 24.

This improvement extends from the Rochester Road east to the Macomb County line. Contract for this work calls for a 9 foot gravel surface with a 24 foot roadway and was completed during the summer of 1920 by Talbot Construction Company. It forms a main thoroughfare for a thickly settled portion of the County.



A fine specimen of reinforced concrete girder construction. 12-Mile Road, Royal Oak Twp.



Concrete Pavement under construction. Milford Village.

Village of Milford Road—Assessment District No. 27.

The Village of Milford also took advantage of the Covert Act to improve that portion of the Milford Road lying within the corporate limits. The contract for this work was awarded to the John T. Ladue Company of Detroit and calls for the construction of a concrete pavement varying in width from 18 to 54 feet. This road is approximately 25 per cent complete.

Eleven Mile Road—Assessment District No. 29.

This improvement extends from the Macomb County line in a westerly direction through the center of Royal Oak and Southfield Townships for a distance of nine miles, passing through the Village of Royal Oak. It consists of an 18 foot concrete pavement through Royal Oak Township with the exception of that section lying within the Village of Royal Oak, where the pavement is widened to 36 and 48 feet. The three mile section in Southfield Township consists of Class "B" 9 foot gravel road. Contract for this work was awarded to the R. D. Baker Company of Detroit. Grading is complete on that portion lying west of the Village of Royal Oak and the gravel surface has been constructed in Southfield Township.

Cooley Lake Road—Assessment District No. 32.

The Cooley Lake Road extends from the Elizabeth Lake Road on the east shore of Crescent Lake southwesterly for a distance of approximately six miles. It passes between Long Lake and Union Lake and intersects with the Commerce Road in Section 12, Commerce Township. Contract for this work was awarded to Bradley and Emery in the summer of 1920. This improvement consists of 9 foot Class "B" gravel road. Grading has been practically completed.

Stony Creek Road—Assessment District No. 34.

The Stony Creek Road is a 9 foot gravel Road approximately two and one-half miles in length extending from the Orion Road through the northern part of Oakland Township. This road is now complete.

Rochester Village West—Assessment District No. 35.

This improvement extends from Main Street in the Village of Rochester in a westerly direction along Fifth Street for a distance of approximately one-half mile to the west corporate limits. Contract for this work was awarded to P. M. Lau and calls for the construction of a Class "F" concrete pavement, a portion being 36 feet in width, the balance being 65 feet in width. This work is progressing satisfactorily.



Elizabeth Lake Road, Waterford Township.

Our present plan of municipal government is somewhat crude. The township as an organization functions scarcely at all except for the purpose of levying and collecting taxes and holding elections. In every township some beautiful spot should be appropriated for public use, preferably near some of our lakes, where the people at large might have the privilege which nature evidently designed for all. To be sure it would require some expenditure of money but it would cost less now than at any time hereafter.

STATUS OF COVERT ACT PETITIONS

ROAD	CONCRETE				GRAVEL				REMARKS
	Filed Miles	Rej. Miles	Acceptd. Miles	Cost of Construction	Filed Miles	Rej. Miles	Acceptd. Miles	Cost of Construction	
No. 1—Maple Avenue.....	6.953	.....	6.953	\$ 143,106.09	11.155	.....	11.155	\$ 70,657.25	Completed
No. 2—Dodge Road.....	.....	.....	.....	.....	.....	.....	.....	.....	Completed
No. 3—Elizabeth Lake.....	2.846	.....	2.846	54,961.88	.....	.....	.....	.....	Completed
No. 4—Farmington Road.....	4.977	.....	4.977	117,000.02	.....	.....	.....	.....	Completed
No. 5—North Dodge Road	.....	.....	.....	.....	3.341	.....	3.341	28,387.10	Completed
No. 6—Royal Oak-Clawson.....	2.427	.....	2.427	54,422.87	3.446	.....	3.446	37,890.60	Completed
No. 7—Miller Road.....	.....	.....	.....	.....	.....	.....	.....	.....	Surveyed
No. 8—Long Lake Road.....	5.995	.....	5.995	230,948.33	.....	.....	.....	.....	Completed
No. 9—Springfield Road.....	.....	.....	.....	.....	2.507	.....	2.507	14,500.00	Completed
No. 10—Northeast Oxford.....	.....	.....	.....	.....	6.818	.....	6.818	51,651.33	Completed
No. 11—John R. Road (South End)	8.000	.....	8.000	281,600.00	.....	.....	.....	.....	Surveyed
No. 12—Orchard Lake Road.....	3.942	.....	3.942	98,332.32	.....	.....	.....	.....	Completed
No. 13—John R. Road (N. End) ..	5.000	.....	5.000	176,000.00	.....	.....	.....	.....	Completed
No. 14—Grand River-Farmingto*	4.300	.....	4.300	176,500.00	.....	.....	.....	.....	Completed
No. 15—Auburn Avenue.....	6.998	.....	6.998	230,996.52	1.022	.....	1.022	10,058.71	Completed
No. 16—Rochester Road.....	11.920	.....	11.920	387,303.40	.....	.....	.....	.....	Completed
No. 17—Rochester Road**.....	.....	.....	.....	.....	.....	.....	.....	.....	Abandoned
No. 18—New Hudson-So. Lyon.....	.....	.....	.....	.....	4.604	.....	4.604	35,892.00	Completed
No. 19—Romeo Road.....	.....	.....	.....	.....	2.007	.....	2.007	17,786.60	Completed
No. 20—Village of Orion.....	1.300	.....	1.300	78,462.59	.....	.....	.....	.....	Completed
No. 21—North Farmington.....	.....	.....	.....	.....	4.898	.....	4.898	55,272.54	Under Const.
No. 22—Randall Beach.....	.....	.....	.....	.....	11.000	.....	11.000	110,000.00	Under Const.
No. 23—Leonard Road.....	.....	.....	.....	.....	2.071	.....	2.071	25,167.26	Completed
No. 24—Twelve Mile East.....	.....	.....	.....	.....	2.750	.....	2.750	27,500.00	Completed
No. 25—Halstead Road.....	.....	.....	.....	.....	8.000	.....	8.000	80,000.00	Surveyed
No. 26—Village of Holly*.....	.....	.....	.....	.....	.....	.....	.....	.....	Abandoned
No. 27—Village of Mitford.....	2.000	.....	2.000	145,000.00	.....	.....	.....	.....	Under Const.
No. 28—Hyde-Southfield.....	.....	.....	.....	.....	.....	.....	.....	.....	Ord. Surv.
No. 29—Eleven Mile Road.....	6.000	.....	6.000	210,000.00	3.000	.....	3.000	30,000.00	Under Const.

*No. 40 Substituted
 **No. 16 Substituted

Status of Covert Act Petitions, Continued

ROAD	CONCRETE				GRAVEL				REMARKS
	Filed Miles	Rej. Miles	Acceptd. Miles	Cost of Construction	Filed Miles	Rej. Miles	Acceptd. Miles	Cost of Construction	
No. 30—Twelve Mile Road, (West of Woodward)	2.500	.....	2.500	25,000.00	Surveyed
No. 31—Orion-Romeo Road	3.500	.....	3.500	35,000.00	Under Const.
No. 32—Cooley Lake Road	5.750	.....	5.750	57,500.00	Under Const.
No. 33—White Lake Road, (North Route)	4.000	.....	.....	40,000.00	On File
No. 34—Stoney Creek Road	2.500	.....	2.500	25,000.00	Under Const.
No. 35—Rochester Village West	0.500	.....	0.500	30,000.00	.....	.....	.....	.....	Under Const.
No. 36—Rochester Village North	0.400	.....	0.400	25,000.00	.....	.....	.....	.....	Surveyed
No. 37—C. M. Cross	3.000	.....	.....	30,000.00	On File
No. 38—McCracken Road	4.000	.....	4.000	40,000.00	Being Surv.
No. 39—Halstead	4.000	.....	4.000	40,000.00	Being Surv.
No. 40—Village of Holly	Surveyed
No. 41—Milford-Grand River Rd.	0.500	.....	0.500	30,000.00	.....	.....	.....	.....	Ord. Surv.
No. 42—Goodison Road	9.000	.....	9.000	90,000.00	On File
No. 43—Franklin-N. Farmington	2.000	.....	.....	20,000.00	On File
No. 44—Oxford-Ortonville	2.125	.....	.....	21,250.00	On File
No. 45—Oxford Village (E & W)	1.276	.....	1.276	120,000.00	10.000	.....	.....	100,000.00	On File
No. 46—Cass Lake Road	Surveyed
No. 47—Baldwin Road	2.000	.....	.....	20,000.00	On File
No. 48—Ortonville-Mill Street	2.000	.....	.....	20,000.00	On File
No. 49—Ortonville-Church St.	0.400	.....	.....	4,000.00	On File
No. 50—Town Line-Southfield-Farmington	2.000	.....	.....	20,000.00	On File
No. 51—Commerce Road	1.000	.....	.....	10,000.00	On File
No. 52—Village of South Lyon, (East and West)	2.000	.....	.....	20,000.00	On File
No. 53—Holcomb Road	1.250	.....	.....	12,500.00	On File
No. 54—Village of South Lyon, (North and South)	1.750	.....	.....	17,500.00	On File
	1.000	.....	.....	10,000.00	On File

Status of Covert Act Petitions, Continued.

ROAD	CONCRETE				GRAVEL				REMARKS
	Filed Miles	Rej. Miles	Acceptd. Miles	Cost of Construction	Filed Miles	Rej. Miles	Acceptd. Miles	Cost of Construction	
No. 56—Big Beaver Road.....	.....	.....	.....	.....	2,000	.....	.....	20,000.00	On File
No. 58—Donohue Road.....	.....	.....	.....	.....	2,000	.....	.....	20,000.00	On File
No. 59—Oxbow Lake Road.....	.....	.....	.....	.....	2,250	.....	.....	22,500.00	On File
White Lake North.....	.....	.....	.....	.....	3,750	.....	.....	37,500.00	Rejected
S. Side of Lake Orion.....	.....	.....	.....	.....	2,000	.....	.....	20,000.00	Rejected
Royal Oak-Clawson.....	5,000	5,000	.....	175,000.00	.....	.....	.....	.....	Rejected
Royal Oak-Clawson.....	2,000	2,000	.....	70,000.00	.....	.....	.....	.....	Rejected
Cut Off S. Birmingham... ..	4,000	4,000	.....	150,000.00	.....	.....	.....	.....	Rejected
Lone Pine Road.....	2,000	2,000	.....	70,000.00	.....	.....	.....	.....	Rejected
Franklin Road.....	9,500	9,500	.....	332,500.00	.....	.....	.....	.....	Rejected
Totals.....	97,834	22,500	75,334	\$3,385,934.02	144,394	5,750	97,869	\$1,372,512.79	
						40,775			On File

Covert Road Construction

Additions

Total Expenditure to October 1, 1919 October 1, 1919. to September 30, 1920 Total Expenditures to September 30, 1920

DISTRICT NO.

1.....	\$105,715.39	\$ 59,884.17	\$ 165,599.56
2.....	69,329.83	11,116.34	80,466.17
3.....	60,689.85	36.00	60,725.85
4.....	129,907.26	23.48	129,930.74
5.....	943.06	20,941.48	21,884.54
6.....	58,114.51	86.25	58,200.76
7.....	362.19	15.31	377.50 - Const
8.....	3,330.34	174,346.94	177,677.28
9.....	16,468.11	7.00	16,475.11
10.....	670.14	62.00	732.14
11.....	1,723.24	.....	1,723.24 - Const
12.....	85,036.21	29,739.72	114,775.93
13.....	164.60	.....	164.60 - Const
14.....	.....	.....	.....
15.....	87,880.55	150,416.10	238,296.65
16.....	260,700.23	185,544.35	446,244.58 - Const
17.....	.....	.....	.....
18.....	727.50	29,081.47	29,808.97
19.....	636.27	23,363.39	23,999.66
20.....	1,401.37	74,820.72	76,222.09
21.....	1,148.89	24,510.86	25,659.75
22.....	1,958.45	69,126.01	71,084.46
23.....	373.05	28,947.26	29,320.31
24.....	428.00	20,976.59	21,404.59
25.....	.....	.....	.....
26.....	1,190.75	14.25	1,205.00 - Const
27.....	.....	54,311.29	54,311.29 - Const
28.....	.....	139.62	139.62
29.....	.....	68,391.49	68,391.49 - Const
30.....	.....	805.35	805.35 - Const
31.....	.....	980.94	980.94 - Const
32.....	.....	21,424.68	21,424.68
33.....	.....	12.50	12.50
34.....	.....	26,305.50	26,305.50
35.....	.....	30,064.29	30,064.29
36.....	.....	767.58	767.58
37.....	.....	.....	.....
38.....	.....	185.85	185.85 - Const
39.....	.....	190.59	190.59 "
40.....	.....	416.16	416.16 "
41.....	.....	147.50	147.50 "
42.....	.....	.....	.....
43.....	.....	.....	.....
44.....	.....	.....	.....
45.....	.....	597.96	597.96 - Const
46.....	.....	.....	.....
47.....	.....	.....	.....
48.....	.....	.....	.....
49.....	.....	.....	.....
50.....	.....	5.77	5.77 - Const

Total Covert Rd. Construction... \$888,899.79

\$1,107,896.76

\$1,996,706.55

Summary of Covert Act Road.

TOTAL PETITIONS FILED	NO ACTION—ON FILE	REJECTED	ACCEPTED
97.834 miles..\$3,385,934.02 Concrete	22.500 miles..\$797,500.00	75.334 miles..\$2,588,434.02	75.334 miles..\$2,588,434.02
144.394 miles.. 1,372,512.79 Gravel	5.750 miles.. 57,500.00	97.869 miles.. 907,262.79	97.869 miles.. 907,262.79
242.288 miles..\$4,758,446.81 Sum Total	40.775 miles....\$407,750.00	28.250 miles..\$855,000.00	173.203 miles..\$3,495,696.81

Recapitulation of Accepted Miles.

CONCRETE	GRAVEL
*Ordered Surveyed.....	9.000 miles.....\$ 90,000.00
*Being Surveyed.....	8.000 miles..... 80,000.00
*Surveyed.....	20.764 miles..... 194,541.93
Under Construction.....	30.648 miles..... 312,772.54
Completed.....	29.457 miles..... 229,948.92
75.334 miles.....\$2,588,434.02	97.869 miles.....\$907,262.39

*Construction not finally ordered.

Proposed New Construction

We respectfully request that your Honorable Board levy a tax of one and one-half dollars on each one thousand dollars of assessed valuation according to the assessed valuation of the preceding year, all as per Act 283, P. A. 1909, as amended, paragraph 4366. The funds so derived to be used for the construction of the following roads:

HOLLY TOWNSHIP.

Commencing at the $\frac{1}{4}$ corner common to Sections 15 and 16 at the north end of Application No. 3408, Holly Township; thence northerly along the present travelled highway to the county line at the northeast corner of Section 4 of said Holly Township. A distance of approximately $2\frac{1}{2}$ miles.

Estimated Cost.....\$ 23,209.95



Paving Crew at Work. Material Dumped on Sub-grade, Milford Village.

MILFORD TOWNSHIP.

Commencing at the westerly end of Application No. 7964 in Section 5 of Milford Township; thence northwesterly along the present travelled highway to the county line to a point near the northwest corner of Section 6, said Milford Township. A distance of approximately $1\frac{1}{4}$ miles. Estimated Cost.....\$ 11,604.96

WHITE LAKE TOWNSHIP.

Commencing at the $\frac{1}{4}$ corner common to Sections 3 and 4 of White Lake Township and the easterly end of Application No. 5401; thence easterly along the present travelled highway through Sections 3 and 2 to a point near the center of Section 2; thence northerly and easterly through Sections 2 and 1 to the northeast corner of Section 1. A distance of approximately $3\frac{1}{2}$ miles. Estimated Cost.....\$ 32,493.92

INDEPENDENCE TOWNSHIP.

Commencing at the southwest corner of Section 31, Independence Township; thence easterly and northerly along the present travelled highway to the south end of Application No. 3472, known as the Depot Road. A distance of approximately $\frac{1}{2}$ mile.

Estimated Cost.....\$ 4,641.99

WEST BLOOMFIELD TOWNSHIP.

Commencing at the intersection of the Walled Lake and Orchard Lake Roads (so-called) near the $\frac{1}{4}$ corner common to Sections 14 and 15, West Bloomfield Township; thence southerly and westerly through Section 15; thence along the section line between Sections 15 and 22, 16 and 21,—a distance of two miles.

Estimated Cost.....\$ 18,567.96

FARMINGTON TOWNSHIP.

Commencing at the Section corner common to Sections 13, 14, 23 and 24, Farmington Township; thence southerly along the present travelled highway to an intersection with the Grand River Road (so-called) on the section line between Sections 35 and 36. A distance of approximately $2\frac{1}{2}$ miles. Estimated Cost..\$ 23,209.95

SOUTHFIELD TOWNSHIP.

Commencing at the corner of Sections 15, 16, 21 and 22, Southfield Township; thence northerly along the present travelled highway to the corner of Sections 9, 10, 15 and 16; thence easterly to the corner of Sections 10 11, 14 and 15—a distance of approximately 2 miles. Estimated Cost.....\$ 18,567.96



A Gravel Screening and Crushing Plant, County Pit. Highland Township.



Clarkston Road. Independence Township. A Fine Type of Gravel Surfacing

ROYAL OAK TOWNSHIP.

Commencing at the corner of Sections 1, 2, 11 and 12, Royal Oak Township; thence southerly along the present travelled highway to the corner of Sections 13, 14, 23 and 24,—a distance of approximately 2 miles. Estimated Cost.....\$ 18,567.96

ADDISON TOWNSHIP.

Commencing at the corner of Sections 8, 9, 16 and 17, Addison Township; thence southerly along the present travelled highway to the intersection with the Lakeville Road at the corner of Sections 20, 21, 28 and 29, a distance of approximately 2 miles. Estimated Cost.....\$ 18,567.96

Total Mileage, 18¼. Total Amount.....\$169,432.61
 All of the above roads indicated as new construction to be improved under Michigan State Highway Department specifications for a gravel surface Class B-9 24 foot roadway.

MAINTENANCE.

We respectfully request that your Honorable Board levy a tax of twenty-five cents on each one thousand dollars of assessed valuation according to the assessment roll of the preceding year, all as per Section 4366, Act 283, P. A. of 1909, as amended. The funds so derived to be used for the maintenance of county roads. Amount of Tax.....\$ 28,238.77

OAKLAND COUNTY HIGHWAYS

COMPLETED AND UNDER CONSTRUCTION

TOWNSHIP	ASSESSMENT DISTRICT ROADS			COUNTY ROADS			TOTAL MILES		
	Completed Gravel	Under Const. Gravel	Under Const. Concrete	Completed Gravel	Completed Concrete	Under Const. Gravel	Under Const. Concrete	Completed	Under Const.
Addison.....	4.078	.....	.....	11.251	.....	2.004	.....	15.329	2.004
Avon.....	6.086	.....	0.469	6.345	.....	.....	.....	19.773	0.469
Bloomfield.....	2.134	.....	.....	6.130	5.648	.....	.....	23.337	.....
Brandon.....	.....	.....	.....	11.283	.....	.....	.....	11.283	.....
Commerce.....	.....	3.428	.....	9.804	.....	2.636	.....	9.804	6.064
Farmington.....	.....	2.992	.....	7.086	4.335	3.015	.....	16.398	6.007
Groveland.....	.....	.....	.....	10.089	.....	.....	5.719	10.089	5.719
Highland.....	.....	.....	.....	16.141	.....	.....	.....	16.141	.....
Holly.....	.....	.....	.....	10.682	.....	.....	1.938	10.682	1.938
Independence.....	.....	5.381	.....	8.973	.....	.....	.....	8.973	5.381
Lyon.....	4.604	.....	.....	9.938	.....	.....	.....	14.542	2.857
Milford.....	.....	.....	0.677	7.998	.....	2.857	.....	9.501	0.677
Novi.....	.....	.....	.....	14.728	.....	1.500	.....	14.728	1.500
Oakland.....	4.468	.....	.....	13.978	.....	.....	.....	18.446	.....
Orion.....	1.428	.....	5.358	8.775	.....	2.126	.....	11.405	7.484
Oxford.....	.....	.....	.....	8.834	.....	1.903	.....	8.834	1.903
Pontiac.....	.....	.....	.....	11.249	.....	.....	.....	14.249	.....
Rose.....	.....	.....	.....	9.259	.....	.....	.....	9.259	.....
Royal Oak.....	2.938	.....	5.995	.....	5.738	.....	.....	13.503	5.995
Southfield.....	3.011	.....	.....	9.377	.....	1.012	.....	12.388	1.012
Springfield.....	.....	.....	.....	10.666	.....	.....	2.398	10.666	2.398
Troy.....	2.036	.....	.....	4.438	0.464	.....	.....	12.703	.....
Waterford.....	.....	3.051	.....	8.766	.....	.....	.....	11.612	3.051
West Bloomfield.....	.....	1.000	.....	7.758	.....	.....	.....	15.261	1.000
White Lake.....	.....	.....	.....	9.792	.....	.....	.....	9.792	0.227
Totals.....	30.783	48.390	21.437	7.141	16.185	17.053	10.055	328.698	55.886

STATEMENT OF FUNDS

BOND CONSTRUCTION FUND

October 1, 1919, to September 30, 1920
 Balance in hands of Treasurer October 1, 1919.....\$ 68,165.38

Receipts—
 Indemnity from Massachusetts Bonding Co..... 6,500.00
 Refunds..... 15.51
 Two Mill Tax..... 167,259.06
 Interest on Deposits..... 640.00

\$242,579.95

Disbursements—

Checks drawn.....
 Reimbursement of County Road Fund for Misc. Expense and
 Depreciation previously charged to Misc. Co. Road Acct....
 Credit to County Road Fund for construction material.....
 Transfers.....
 Funds overdrawn Sept. 30, 1920.....

\$245,639.14
 15,436.99
 650.00
 221.36

\$261,947.49

19,367.54

\$261,947.49

MAINTENANCE FUND

October 1, 1919, to September 30, 1920
 Balance in hands of Treasurer October 1, 1919.....\$ 46,082.42

Receipts—
 State Reward..... 287,967.82
 Refunds..... 8,253.80
 Auto Tax..... 102,678.47
 Interest on Deposits..... 1,040.00

\$446,022.51

Disbursements—

Checks drawn.....
 Reimbursement of County Road Fund for Misc. Expense and
 Depreciation previously charged to Misc. Co. Road Acct....
 Balance in hands of Treasurer Sept. 30, 1920.....

\$274,646.92
 4,074.00

\$278,720.92

\$446,022.51

\$446,022.51

Statement of Funds--Continued

COUNTY ROAD FUND

October 1, 1919, to September 30, 1920

Fund overdrawn October 1, 1919..... \$ 14,999.90

Receipts—

Rent of Farm.....	\$ 145.00
Delinquent Taxes and Interest.....	26,975.40
Sale of Loading Plant.....	350.00
Return Premium, Insurance.....	26.18
Rebate of Freight Charges.....	57.70
Tax Sales.....	822.35
Taxes from Townships, 1919.....	71,205.66
Transfers from Maintenance and Bond Funds to cover Misc. Expense and Depreciation.....	57,813.77
Refunds from Assessment Districts.....	134,973.47
	\$292,369.53

Disbursements—

Checks drawn.....	85,236.72
Loans to Assessment Districts.....	215,810.25
Fund overdrawn Sept. 30, 1920.....	23,677.34
	\$316,046.87
	\$316,046.87

Road Construction Bond Fund.

Township	Road	Balance Oct. 1, 1919		Additions		Total Expenditures	
		Road	Township	Oct. 1, 1919 Road	Sept. 30, 1920 Township	Road	Township
Addison	Rochester	\$28,403.28	\$28,403.28	\$ 1,043.78		\$29,447.06	
	George Lake			18,263.81	\$ 19,307.59	18,263.81	\$ 47,710.87
Brandon	Clarkston			1,035.12		33,147.69	
	Seymour Lake	191.12	32,303.69	11,308.76		11,499.88	
Commerce	Oakwood			16,869.27	29,213.15	16,869.27	61,516.84
	Walled Lake	3,069.73		2,460.54		5,530.27	
	South Commerce	85.63		11.93		97.56	
	Wixom	74.62	3,229.98	7,184.98	9,657.45	7,259.60	12,887.43
Farmington	Switzer	8,588.89		5,298.22		13,887.11	
Farm. & Bloomfield	Switzer	2,874.59	11,463.48		5,298.22	2,874.59	16,761.70
Groveland	Grange Hall	9,432.84		7,166.82		16,599.66	
	Grange Hall	6,131.66		6,141.85		12,273.51	
	Clarkston		15,564.50	14,641.15	27,949.82	14,641.15	43,514.32
Holly	Milford	87.74	87.74			87.74	87.74
Highland	White Lake	6,950.19		19,939.08		26,889.27	
	Elizabeth Lake		6,950.19	19,178.80	39,177.88	19,178.80	46,068.07
Lyon	South Lyon	19,570.88		812.64		20,383.52	
	Grand River	13.23		17.38		30.61	
	Milford		19,584.11	9,391.37	10,221.39	9,391.37	29,805.50
Millford	Commerce	4,949.02	4,949.02	11,163.08	11,163.08	16,112.10	16,112.10
Novi	Walled Lake	9,922.05		13,816.65		23,738.70	
	South Lyon	18,996.76		2,445.93		21,442.69	
	Wixom	6.00	28,924.81	475.21	16,737.79	481.21	45,662.60
Oakland	Orion		33,306.45	3,112.88	3,112.88	36,419.33	36,419.33
Orion	Baldwin	289.90	289.90	20,352.62	20,352.62	21,142.52	21,142.52
Oxford	Seymour Lake	92.02		7,283.46		7,375.48	
	Lapeer	35,608.55	35,700.57	2,304.20	9,587.66	37,912.75	45,288.23
Pontiac	Baldwin	129.30		9,014.36	9,014.36	9,143.66	9,143.66
Rose	Davisburg	10,897.96	10,897.96	8,785.93	8,785.93	19,683.89	19,683.89
Springfield	Davisburg	11,680.80	11,680.80	1,485.00	1,485.00	13,165.80	13,165.80
Southfield	Redford			120.07	120.07	120.07	120.07
Waterford	Elizabeth Lake	23,175.04	23,175.04	57.00	57.00	23,232.04	23,232.04

ROAD CONSTRUCTION BOND FUND (Continued)

Township	Road	Balance Oct. 1, 1919		Additions		Total Expenditures	
		Road	Township	Oct. 1, 1919	Sept. 30, 1920	Road	Township
West Bloomfield	Commerce	7,023.00	.....	21,693.52	.....	28,716.52	.....
	Switzer (Town Line)	1,539.59	.....	.....	.....	1,539.59	.....
	Farmington	5.77	.....	21.65	.....	27.42	.....
White Lake	Elizabeth Lake	46,413.70	.....	17,664.67	.....	64,078.37	.....
Total Bond Construction		\$321,622.88		\$261,061.73		\$582,684.61	

1107807
 1,368,868

"The welfare of every city and village is bound up in transportation."

ROAD MAINTENANCE

OCTOBER 1, 1919—SEPTEMBER 30, 1920

TOWNSHIP	ROAD		Total Township
Addison	Romeo	\$ 180.68	
	Rochester	3,521.91	
	Lakeville	3,032.61	\$ 6,735.20
Avon	Auburn	714.70	
	Road No. 16 (Detour)	320.13	
	West Rochester	2,625.45	
	Orion	1,001.04	
	Dodge	5,971.81	
	Rochester	3,861.41	14,494.54
Bloomfield	Maple	1,616.30	
	Dodge	729.03	
	Redford	379.15	
	Orchard Lake	258.59	
	Franklin	2,153.21	5,136.28
	Oakwood	3,224.08	
Brandon	Clarkston	2,891.83	6,115.91
	Walled Lake	1,425.82	
Commerce	Commerce	3,892.41	5,318.23
	Farmington	1,436.23	
Farmington	Asst. Dist. No. 4	1,609.37	
	Grand River No. 225	411.26	
	Farmington (Town Line)	186.99	3,643.85
	Clarkston	23.47	
	Grange Hall	1,796.85	1,820.32
Holly	Milford	734.58	
	Grange Hall	554.13	1,288.71
Highland	Elizabeth Lake	4,838.19	
	Milford	1,986.80	
	White Lake	960.83	7,785.82
Independence	Clarkston	5,254.37	
	Depot	736.34	5,990.71
Lyon	South Lyon	1,104.34	
	Milford	230.97	1,335.31
	Milford	4,121.77	
Novi	Commerce	831.48	4,953.25
	Walled Lake	2,274.42	
	South Lyon	865.85	3,140.27
Oakland	Romeo	117.76	
	Orion	3,037.26	
	Rochester	6,395.65	
	Stoney Creek	414.09	9,964.76
	Orion	1,330.35	1,330.35
Orion	Orion	1,374.22	1,374.22
Oxford	Lakeville	1,374.22	
	Auburn	56.90	
Pontiac	West Rochester	2,090.17	
	Baldwin	1,060.02	
	Mt. Clemens	4,545.32	
	Dodge	554.50	8,306.91
	Milford	5,055.19	
Rose	Davisburg	440.37	5,495.56
	Rochester	1,197.34	
Royal Oak	Clawson	1,000.63	2,197.97
	Davisburg	2,005.04	2,005.04
Springfield	Redford	5,130.10	
Southfield	Franklin	5,927.23	11,057.33

ROAD MAINTENANCE--Continued

TOWNSHIP	ROAD		Total Township
Troy	Road No. 16 (Detour).....	379.19	
	Rochester.....	6,115.93	
	Dodge.....	1,105.58	
	Big Beaver.....	3,743.83	11,344.53
Waterford	Elizabeth Lake.....	7,994.94	7,994.94
West Bloomfield	Long Lake.....	209.45	
	Commerce.....	1,631.42	
	Farmington.....	6,475.39	
	Walled Lake.....	124.53	
	Maple.....	1,992.26	
	Orchard Lake.....	2,853.25	13,286.30
White Lake	White Lake.....	1,298.69	
	Elizabeth Lake.....	5,508.14	6,806.83
			<hr/>
			\$148,923.14
State Trunk Line ...	10-1.....	\$42,827.85	
	10-2.....	12,457.89	
	10-3.....	7,369.83	
	10-4.....	8,254.54	
	87-1.....	9,959.35	
	87-2.....	6,070.50	
	16-1.....	1,502.87	
	16-2.....	7,560.10	
	16-3.....	3,623.62	
	36-1.....	10,240.73	
	36-2.....	4,759.88	
	36-3.....	8,745.33	123,372.49
			<hr/>
			\$272,295.63
Total Maintenance.....			



Scene on Elizabeth Lake Road. A difficult piece of construction.

Covert Act Roads.

STATEMENT OF TAXES DUE AND PAYABLE—1921

OAKLAND COUNTY AT LARGE		Total Tax	Taxes Paid to Date	Unpaid	Interest Due	Total Principal & Int.	Installment	Installment & Interest Due 1921
Road No. 1	.....	\$ 47,225.01	\$ 9,445.00	\$ 37,780.01	\$ 2,266.80	\$ 40,046.81	\$ 4,722.50	\$ 6,989.30
Road No. 2	.....	19,430.75	3,886.16	15,544.59	932.88	16,477.27	1,943.08	2,875.76
Road No. 3	.....	18,137.42	3,627.48	14,509.94	870.60	15,380.54	1,813.74	2,684.34
Road No. 4	.....	38,600.86	7,720.18	30,880.68	1,852.84	32,733.52	3,860.09	5,712.93
Road No. 5	.....	15,829.71	1,532.97	14,246.74	854.80	15,101.54	1,532.97	2,437.77
Road No. 6	.....	14,966.29	2,993.26	11,973.03	718.38	12,691.41	1,496.63	2,215.01
Road No. 8	.....	76,205.84	7,620.58	68,585.26	4,115.12	72,700.38	7,620.58	11,735.70
Road No. 9	.....	3,987.50	797.50	3,190.00	191.40	3,381.40	398.75	590.15
Road No. 12	.....	56,246.09	5,624.61	50,621.48	3,037.29	53,658.77	5,624.61	8,661.90
Road No. 225 (State Road)	.....	108,370.00	10,837.00	97,983.00	5,878.98	103,861.98	10,837.00	16,765.98
Road No. 15	.....	159,904.40	15,990.44	143,913.96	8,634.84	152,548.80	15,990.44	24,625.28
Road No. 16	.....	294,855.94	29,485.59	265,370.35	15,922.22	281,292.57	29,485.59	45,407.81
Road No. 18	.....	20,194.06	2,019.41	18,174.65	1,090.48	19,265.13	2,019.41	3,109.89
Road No. 19	.....	10,046.38	1,004.64	9,041.74	542.50	9,584.24	1,004.64	1,547.14
Road No. 20	.....	49,605.54	4,960.55	44,644.99	2,678.70	47,323.69	4,960.55	7,639.25
Road No. 21	.....	30,960.63	3,096.06	27,864.57	1,671.87	29,536.44	3,096.06	4,477.93
Road No. 22	.....	105,086.66	.....	105,086.66	3,678.08	108,764.69	10,508.67	14,186.70
Road No. 23	.....	14,094.12	1,409.41	12,684.71	761.08	13,445.79	1,409.41	2,170.49
Road No. 24	.....	16,438.51	.....	16,438.51	986.31	17,424.82	1,643.85	2,630.16
Road No. 27	.....	83,337.66	.....	83,337.66	2,500.13	85,837.79	8,333.77	10,833.90
Road No. 29	.....	163,881.27	.....	163,881.27	4,616.44	168,497.71	15,388.13	20,004.57
Road No. 32	.....	26,510.11	.....	26,510.11	795.30	27,305.41	2,651.01	3,446.31
Road No. 34	.....	20,830.00	.....	20,830.00	833.20	21,663.20	2,083.00	2,916.20
Road No. 35	.....	17,253.70	.....	17,253.70	690.15	17,943.85	1,725.37	2,415.52
Total	.....	\$1,402,498.45	\$112,150.84	\$1,290,347.61	\$66,120.14	\$1,356,467.75	\$140,249.85	\$206,369.99

Covert Act Roads Continued

	Total Tax	Taxes Paid to Date	Unpaid	Interest Due	Total Principal & Int.	Installment	Installment & Interest Due 1921
ADDISON TOWNSHIP							
Road No. 19.....	\$ 2,489.64	\$ 248.96	2,240.68	\$ 134.44	\$ 2,375.12	\$ 248.96	\$ 383.40
Road No. 23.....	7,047.06	704.71	6,342.35	380.54	6,722.89	704.71	1,085.25
Total.....	\$ 9,536.70	\$ 953.67	\$ 8,583.03	\$ 514.98	\$ 9,098.01	\$ 953.67	\$ 1,468.65
AVON TOWNSHIP							
Road No. 2.....	\$ 6,995.06	1,399.02	5,596.04	\$ 335.76	\$ 5,931.80	\$ 699.51	\$ 1,035.27
Road No. 15.....	24,793.09	2,479.31	22,313.78	1,338.82	23,652.60	2,479.31	3,818.13
Road No. 16.....	49,922.70	4,992.27	44,930.43	2,695.83	47,626.26	4,992.27	7,688.10
Road No. 35.....	5,751.24	.....	5,751.24	230.05	5,981.29	575.12	805.17
Total.....	\$ 87,462.09	\$ 8,710.60	\$ 78,591.49	\$ 4,600.46	\$ 83,191.95	\$ 8,746.21	\$ 13,346.67
BLOOMFIELD TOWNSHIP							
Road No. 1.....	\$ 19,677.09	\$ 3,935.42	15,741.67	\$ 944.50	\$ 16,686.17	\$ 1,967.71	\$ 2,912.21
Road No. 2.....	4,663.38	932.68	3,730.70	223.84	3,954.54	466.34	690.18
Road No. 8.....	36,362.27	3,636.23	32,726.04	1,963.56	34,689.60	3,636.23	5,599.79
Road No. 12.....	6,749.53	674.95	6,074.58	364.47	6,430.05	674.95	1,430.42
Road No. 15.....	1,377.39	137.74	1,239.65	74.38	1,314.03	137.74	212.12
Total.....	\$ 68,829.66	\$ 9,317.02	\$ 59,512.64	\$ 3,570.75	\$ 63,083.38	\$ 6,882.97	\$ 10,453.72
COMMERCE TOWNSHIP							
Road No. 3.....	\$ 604.58	\$ 120.92	483.66	\$ 29.02	\$ 512.68	\$ 60.46	\$ 89.48
Road No. 12.....	1,637.38	168.74	1,518.64	91.12	1,609.76	168.74	259.86
Road No. 21.....	3,077.72	307.77	2,769.95	166.20	2,936.15	307.77	473.97
Road No. 32.....	3,313.75	.....	3,313.75	99.41	3,413.16	331.37	430.78
Total.....	\$ 8,683.43	\$ 597.43	\$ 8,086.00	\$ 385.75	\$ 8,471.75	\$ 868.34	\$ 1,254.09

Covert Act Roads Continued.

	Total Tax	Taxes Paid to Date	Unpaid	Interest Due	Total Principal & Int.	Installation	Installation & Interest Due 1921
FARMINGTON TOWNSHIP							
Road No. 4.....	19,300.43	3,860.08	1,574.17	\$ 94.45	\$ 1,668.62	\$ 196.77	\$ 291.22
Road No. 21.....	4,616.58	461.66	15,440.35	772.02	16,212.37	1,930.04	2,702.06
Road No. 225 (State Road).....	21,010.00	2,101.00	4,184.92	249.30	4,404.22	461.66	710.96
Total.....	\$ 46,894.72	\$ 6,816.28	\$ 40,078.44	\$ 2,439.40	\$ 42,517.84	\$ 4,689.47	\$ 7,128.87
HIGHLAND TOWNSHIP							
Road No. 27.....	\$ 7,576.16	.....	7,576.16	\$ 227.28	\$ 7,803.44	\$ 757.62	\$ 984.90
Total.....	\$ 7,576.16	.....	\$ 7,576.16	\$ 227.28	\$ 7,803.44	\$ 757.62	\$ 984.90
INDEPENDENCE TOWNSHIP							
Road No. 9.....	797.50	159.50	638.00	\$ 38.28	\$ 676.28	\$ 79.75	\$ 118.03
Road No. 22.....	29,424.26	.....	29,424.26	1,029.85	30,454.11	2,942.43	3,972.28
Total.....	\$ 30,221.75	\$ 159.50	\$ 30,062.26	\$ 1,068.13	\$ 31,130.39	\$ 3,022.18	\$ 4,090.31
LYON TOWNSHIP							
Road No. 18.....	\$ 10,097.02	\$ 1,009.70	9,087.32	\$ 545.24	\$ 9,632.56	\$ 1,009.70	\$ 1,554.94
Total.....	\$ 10,097.02	\$ 1,009.70	\$ 9,087.32	\$ 545.24	\$ 9,632.56	\$ 1,009.70	\$ 1,554.94
MILFORD TOWNSHIP							
Road No. 27.....	\$ 37,880.76	.....	37,880.76	\$ 1,136.42	\$ 39,017.18	\$ 3,788.08	\$ 4,924.50
Total.....	\$ 37,880.76	.....	\$ 37,880.76	\$ 1,136.42	\$ 39,017.18	\$ 3,788.08	\$ 4,924.50
NOVI TOWNSHIP							
Road No. 21.....	\$ 3,077.72	\$ 307.77	2,769.95	\$ 166.20	\$ 2,936.15	\$ 307.77	\$ 473.97
Total.....	\$ 3,077.72	\$ 307.77	\$ 2,769.95	\$ 166.20	\$ 2,936.15	\$ 307.77	\$ 473.97

Covert Act Roads, Continued.

	Total Tax	Taxes Paid to Date	Unpaid	Interest Due	Total Principal & Int.	Installment	Installment & Interest Due 1921
OAKLAND TOWNSHIP							
Road No. 5.....	\$ 5,062.80	\$ 506.28	\$ 4,556.52	\$ 273.40	\$ 4,829.92	\$ 506.28	\$ 779.68
Road No. 16.....	18,721.01	1,872.10	16,848.91	1,010.93	17,859.84	1,872.10	2,883.03
Road No. 19.....	2,489.64	248.96	2,240.68	134.44	2,375.12	248.96	383.40
Road No. 34.....	9,257.77	.....	9,257.77	370.31	9,628.08	925.78	1,296.09
Total.....	\$ 35,531.22	\$ 2,627.34	\$ 32,903.88	\$ 1,789.08	\$ 34,692.96	\$ 3,553.12	\$ 5,342.20
ORION TOWNSHIP							
Road No. 5.....	\$ 3,375.20	\$ 337.52	\$ 3,037.68	\$ 182.26	\$ 3,219.94	\$ 337.52	\$ 519.78
Road No. 20.....	9,593.54	959.35	8,634.19	518.05	9,152.24	959.35	1,477.40
Road No. 22.....	23,119.06	.....	23,119.06	809.17	23,928.23	2,311.91	3,121.08
Total.....	\$ 36,087.80	\$ 1,296.87	\$ 34,790.93	\$ 1,509.48	\$ 36,300.41	\$ 3,608.78	\$ 5,118.26
PONTIAC TOWNSHIP							
Road No. 2.....	\$ 3,108.92	\$ 621.78	\$ 2,487.14	\$ 149.23	\$ 2,636.37	\$ 310.89	\$ 460.12
Road No. 15.....	16,528.72	1,652.87	14,875.85	892.55	15,768.40	1,652.87	2,545.42
Total.....	\$ 19,637.64	\$ 2,274.65	\$ 17,362.99	\$ 1,041.78	\$ 18,404.77	\$ 1,963.76	\$ 3,005.54
ROYAL OAK TOWNSHIP							
Road No. 6.....	\$ 10,177.08	\$ 2,035.42	\$ 8,141.66	\$ 488.50	\$ 8,630.16	\$ 1,017.71	\$ 1,506.21
Road No. 16.....	74,884.05	7,488.41	67,395.64	4,043.74	71,439.38	7,488.41	11,532.15
Road No. 24.....	11,431.78	.....	11,741.78	704.51	12,446.29	1,174.18	1,878.69
Road No. 29.....	65,399.54	.....	65,399.54	1,961.99	67,361.53	6,539.95	8,501.94
Total.....	\$ 162,202.45	\$ 9,523.83	\$ 152,678.62	\$ 7,198.74	\$ 159,877.36	\$ 16,220.25	\$ 23,418.99
SOUTHFIELD TOWNSHIP							
Road No. 1.....	\$ 1,967.71	\$ 393.54	\$ 1,574.17	\$ 94.45	\$ 1,668.62	\$ 196.77	\$ 291.22
Road No. 29.....	11,541.10	.....	11,541.10	346.23	11,887.33	1,154.11	1,500.34
Total.....	\$ 13,508.81	\$ 393.54	\$ 13,115.27	\$ 440.68	\$ 13,555.95	\$ 1,350.88	\$ 1,791.56

Covert Act Road, Continued.

	Total Tax	Taxes Paid to Date	Unpaid	Interest Due	Total Principal & Int.	Installment	Installment & Interest Due 1921
SPRINGFIELD TOWNSHIP							
Road No. 9.....	\$ 3,190.00	\$ 638.00	\$ 2,552.00	\$ 153.12	\$ 2,705.12	\$ 319.00	\$ 472.12
Total.....	\$ 3,190.00	\$ 638.00	\$ 2,552.00	\$ 153.12	\$ 2,705.12	\$ 319.00	\$ 472.12
TROY TOWNSHIP							
Road No. 2.....	\$ 4,663.38	\$ 932.68	\$ 3,730.70	\$ 223.84	\$ 3,954.54	\$ 466.34	\$ 690.18
Road No. 6.....	\$ 4,789.21	\$ 957.84	\$ 3,831.37	\$ 229.88	\$ 4,061.25	\$ 478.92	\$ 708.80
Road No. 15.....	\$ 4,132.18	\$ 413.22	\$ 3,718.96	\$ 223.14	\$ 3,942.10	\$ 413.22	\$ 636.36
Road No. 16.....	\$ 31,201.69	\$ 3,120.17	\$ 28,081.52	\$ 1,684.89	\$ 29,766.41	\$ 3,120.17	\$ 4,805.06
Total.....	\$ 44,786.46	\$ 5,423.91	\$ 39,362.55	\$ 2,361.75	\$ 41,724.30	\$ 4,478.65	\$ 6,840.40
WATERFORD TOWNSHIP							
Road No. 3.....	\$ 9,068.71	\$ 1,813.74	\$ 7,254.97	\$ 435.30	\$ 7,690.27	\$ 906.87	\$ 1,342.17
Road No. 32.....	\$ 7,455.99	.....	\$ 7,455.99	\$ 223.67	\$ 7,679.66	\$ 745.60	\$ 969.27
Total.....	\$ 16,524.70	\$ 1,813.74	\$ 14,710.96	\$ 658.97	\$ 15,369.93	\$ 1,652.47	\$ 2,311.44
WEST BLOOMFIELD TOWNSHIP							
Road No. 1.....	\$ 12,930.55	\$ 2,586.12	\$ 10,344.43	\$ 620.67	\$ 10,965.10	\$ 1,293.06	\$ 1,913.73
Road No. 3.....	\$ 604.58	\$ 120.92	\$ 483.66	\$ 29.02	\$ 512.68	\$ 60.46	\$ 89.48
Road No. 4.....	\$ 6,433.48	\$ 1,286.70	\$ 5,146.78	\$ 308.81	\$ 5,455.59	\$ 643.35	\$ 952.16
Road No. 8.....	\$ 24,241.52	\$ 2,424.15	\$ 21,817.37	\$ 1,309.04	\$ 23,126.41	\$ 2,424.15	\$ 3,733.19
Road No. 12.....	\$ 8,999.37	\$ 899.94	\$ 8,099.43	\$ 485.97	\$ 8,585.40	\$ 899.94	\$ 1,385.91
Road No. 21.....	\$ 4,616.58	\$ 461.66	\$ 4,154.92	\$ 249.30	\$ 4,404.22	\$ 461.66	\$ 710.96
Road No. 32.....	\$ 5,799.08	.....	\$ 5,799.08	\$ 173.97	\$ 5,973.05	\$ 579.91	\$ 753.88
Total.....	\$ 63,625.16	\$ 7,779.49	\$ 55,845.67	\$ 3,176.78	\$ 59,022.45	\$ 6,362.53	\$ 9,539.31
WHITE LAKE TOWNSHIP							
Road No. 3.....	\$ 1,813.74	\$ 362.74	\$ 1,451.00	\$ 87.06	\$ 1,538.06	\$ 181.37	\$ 268.43
Road No. 32.....	\$ 2,485.32	.....	\$ 2,485.32	\$ 74.55	\$ 2,559.87	\$ 248.53	\$ 323.08
Total.....	\$ 4,299.06	\$ 362.74	\$ 3,936.32	\$ 161.61	\$ 4,097.93	\$ 429.90	\$ 591.51

Summary of Covert Act Tax.

	Annual Interest	Annual Installment	Total Due 1921
Oakland County at Large.....	\$66,120.14	\$140,249.85	\$206,369.99
Addison Township at Large.....	514.98	953.67	1,468.65
Avon Township at Large.....	4,600.46	8,746.21	13,346.67
Bloomfield Township at Large.....	3,570.75	6,882.97	10,453.72
Commerce Township at Large.....	385.75	868.34	1,254.09
Farmington Township at Large.....	2,439.40	4,689.47	7,128.87
Highland Township at Large.....	227.28	757.62	984.90
Independence Township at Large.....	1,068.13	3,022.18	4,090.31
Lyon Township at Large.....	545.24	1,009.70	1,554.94
Milford Township at Large.....	1,136.42	3,788.08	4,924.50
Novi Township at Large.....	166.20	307.77	473.97
Oakland Township at Large.....	1,798.08	3,553.12	5,342.20
Orion Township at Large.....	1,509.48	3,608.78	5,118.26
Pontiac Township at Large.....	1,041.78	1,963.76	3,005.54
Royal Oak Township at Large.....	7,198.74	16,220.25	23,418.99
Southfield Township at Large.....	440.68	1,350.88	1,791.56
Springfield Township at Large.....	153.12	319.00	472.12
Troy Township at Large.....	2,361.75	4,478.65	6,840.40
Waterford Township at Large.....	658.97	1,652.47	2,311.44
West Bloomfield Township at Large.....	3,176.78	6,362.53	9,539.31
White Lake Township at Large.....	161.61	429.90	591.51
Total.....	\$99,266.74	\$211,215.20	\$310,481.94



Walled Lake. Walled Lake Road.

Covert Act Road Fund.

OCTOBER 1, 1919, to SEPTEMBER 30, 1920

Dist. No.	Balance Oct. 1, 1919	Loans from C. Fund, P.A.	Interest on De- bits	Sale of Bonds	Accrued Int. on Bonds	Refunds Cost of Fill	Transfers	Total Revenue	Total Receipts	Disburse- ments	Balances Sept. 30, 1920,
	\$	\$	\$					\$	\$	\$	\$
2	46,038.85	14,590.58	1,432.99	3,000.00	26.50			16,023.57	61,032.42	61,839.42	193.00
3	7,443.01	1,923.73						4,950.23	123,333.84	12,261.84	132.00
4	58.45	1,752.83						719.69	832.80	640.80	192.00
5	38.34	250.00	150.00	30,300.00	229.76			1,752.83	1,811.28	1,619.28	192.00
6	35.95							30,923.76	30,986.70	22,421.24	8,565.46
7	137.81							833.07	833.42	687.82	195.25
8	693.66	1,150.00	1,410.00	217,000.00	1,582.28	20,638.56		241,780.84	242,450.60	181,079.22	61,371.28
9	122.36	62.72						62.72	74.72	74.72	
10	129.86							129.86	276.76	276.76	67.86
11	276.16							276.16	29,739.72	29,739.72	40.29
12	21,731.19	8,048.82						8,048.82	29,780.01	335.40	
13	335.40								335.40		
14	164,490.07		640.00				115.31	640.00	165,130.07	153,020.95	12,109.12
15	157,944.35	33,000.00	66.66					33,181.97	190,726.32	189,862.61	863.71
17	772.50		280.00	36,000.00	309.75			36,589.75	37,362.25	30,891.22	6,471.03
18	183.38	9,964.96		17,900.00			2,692.80	30,557.76	30,741.34	26,876.04	3,865.30
19	198.63	10,000.00	180.00	74,000.00	251.53			88,831.53	89,030.16	87,113.71	1,916.45
20	351.11		440.00	55,200.00				55,640.00	55,991.11	26,010.86	29,980.25
21	41.95	53,000.00	46.66	183,500.00	3,141.67			243,058.33	243,099.88	124,126.01	120,973.87
22	126.95	10,800.00	50.99	25,000.00	109.38		168.31	36,128.35	36,255.30	30,524.95	5,730.35
23	72.00	4,000.00	332.37	40,200.00	283.36			44,820.93	44,892.93	25,476.59	19,416.34
25									509.25	509.25	
26	509.25		393.33	165,900.00	2,930.90			184,724.23	184,724.23	69,811.29	114,912.94
27		15,500.00						500.00	500.00	139.62	360.38
28		500.00						420,200.51	420,200.51	74,641.49	345,559.02
29	6,250.00			407,900.00	6,050.51			1,000.00	1,000.00	805.35	194.65
30	1,000.00							2,000.00	2,000.00	1,019.06	980.94
31	2,000.00							79,896.84	79,896.84	25,474.68	54,422.16
32	4,500.00		183.33	74,350.00	1,313.51			12.50	12.50	12.50	
33	2.50							44,131.32	44,131.32	28,305.50	15,825.82
34	2,000.00		133.92	41,500.00	498.00			100,793.98	100,793.98	58,564.29	47,229.69
35	23,500.00		293.32	76,000.00	1,000.66			3,500.00	3,500.00	767.58	2,732.42
36	3,500.00							1,000.00	1,000.00		814.15
37		1,000.00						1,000.00	1,000.00	190.59	809.41
38		1,000.00						3,595.00	3,595.00	416.16	3,178.84
39	3,100.00						495.00	1,000.00	1,000.00	147.50	852.50
40	4,100.00										
41		1,000.00									
42											
43											
44		800.00						800.00	800.00	597.96	202.04
45											
46											
47											
48											
49											
50											
	\$401,312.28	\$215,810.25	\$6,402.84	\$1,457,150.00	\$17,732.81	\$20,638.56	\$3,471.42	\$1,721,205.98	\$2,122,518.16	\$1,261,512.79	\$861,005.37



Lapeer Road, Oxford Township.

Specifications for Roads.

GRAVEL SURFACE

(Class B.)

Description.—This road shall consist of a gravel surface of the cross-section shown on the plans, constructed in two courses on the subgrade prepared as herein specified, and each course when compacted shall have the thickness specified herein.

Material.

Gravel.—The gravel used in this work shall be composed of hard, durable particles of rock, of high resistance to abrasion, together with sand and clay or other binding material, and shall be free from thin or elongated pieces.

The gravel for the base course shall be that portion of the "run of pit", which, when tested by means of of laboratory screens and sieves, shall meet the following requirements:

Passing two and one-half inch screen.....100%
Retained on one-eighth inch sieve, not less than..... 60%

The gravel for the top or wearing course shall be that portion of the "run of pit", which, when tested by means of laboratory screens and sieves, shall meet the following requirements:

Passing one inch screen.....100%
*Retained on one-eighth inch sieve, not less than..... 75%

If clay gravel is used, there shall be no free lumps of clay and the clay content shall be not greater than ten (10) per cent, by weight.

Construction Methods.

Base Course.—The base course of gravel shall consist of a single layer of gravel of the sizes and quality as herein specified, spread uniformly on the prepared subgrade to such a depth that when compacted it will have a thickness of five (5) inches. After the gravel has been spread, it shall be thoroughly harrowed with a spike tooth harrow and floated with a road drag, four-wheeled grader or both, as may be required by the engineer. Rolling shall be done if ordered by the engineer. When ordered, it shall be done lengthwise of the road and shall begin at one edge of the course and progress gradually to the center of the road in such a manner as to insure uniform compacting. Rolling shall then begin at the opposite edge and proceed as above. All irregularities and depressions that may develop shall be corrected immediately with base course gravel. Ruts formed by hauling over the gravel shall be kept filled by using the harrow twice or more every day, preferably just before quitting time noon and night.

Top or Wearing Course.—After the base course has been thoroughly compacted, **the earth shoulders shall be built up or reshaped to conform to the finished cross-section of the road, and a wearing course of gravel consisting of a single layer of gravel of the sizes and quality as herein specified for this course, shall be pread uniformly to such a depth that when compacted the finished road shall have a thickness of eight (8) inches. The spreading, harrowing, floating, wetting and correction of irregularities and depressions as specified in the first course, shall apply to th's course. Rolling the top course with a heavy roller will not be permitted, but a light horse drawn roller, sheepsfoot or tamping roller may be used, if approved by the engineer.

Maintenance.—If after the road or any portion thereof is opened to traffic, there appears prior to final settlement on the contract under which the work was done, evidence of rutting or undue loosening of the surface the road shall be harrowed, wearing course gravel added where needed to fill the depressions and the road wetted and floated until the surface is firm and even.

Basis of Payment.

Payment for this work at the contract price per square yard of compacted surface, shall include the necessary reshaping of the subgrade and shoulders, furnishing the gravel (unless otherwise specified) and constructing the road complete and ready for travel, as herein specified.

Rolling the base course, when ordered, shall be paid for as extra work.

*The amount of gravel retained on a one-eighth inch sieve as here given applies to roads on state trunk lines. On roads not on state trunk lines, the amount of gravel shall be sixty (60) per cent unless otherwise noted in special specifications to be hereto attached.

**The first course of gravel must be completed sufficient time in advance of the placing of the second course to allow thorough compacting. Travel may be allowed on the first course to hasten compacting. All ruts and depressions shall be corrected as herein specified.



One Course Concrete Pavement

(Class F.)

Description.—This pavement shall consist of a single course of concrete of the cross-section shown on the plans laid on the prepared subgrade in strict accordance with these specifications. The concrete shall be composed of the following materials proportioned by volume: One (1) part of cement, one and one-half ($1\frac{1}{2}$) parts of fine aggregate, three (3) parts of gravel, and water in the amount as directed by the engineer; or one (1) part of cement, one and three-quarters ($1\frac{3}{4}$) parts of fine aggregate, three (3) parts of crushed stone, and water in the amount as directed by the engineer.

Materials.

Cement.—The cement shall meet the requirements of the standard specifications for Portland cement adopted by the American Society for Testing Materials in 1916, serial designation C917.

All cement shall be held at least ten days after sampling before it is used in any part of the work. If the cement satisfactorily passes all tests that may be made within that time it may be used and the twenty-eight day test will not be insisted upon, but if it should fail to pass satisfactorily any test made within that time, then the cement shall not be used until it has passed satisfactorily all tests, including the twenty-eight day test. The cement shall be delivered on the work in cloth or paper bags containing ninety-four (94) pounds, net weight, and this amount of cement shall be considered as having a volume of one (1) cubic foot. If it is necessary to store the cement in order to allow ample time for inspecting and testing, it shall be stored in a suitable weather tight building, having the floor raised from the ground and shall be so stored as to permit of easy access for proper inspection and so that each car-load shipment may be readily identified.

Fine Aggregate.—The fine aggregate shall be composed of particles of hard durable stone and shall contain not more than two (2) per cent, by weight, of clay or silt, and shall be free from lumps of clay and all vegetable or other deleterious substances. The particles of stone shall be graded in size uniformly from coarse to fine and shall, when tested by means of laboratory screens and sieves, meet the following requirements:

Passing one fourth inch screen.....	100%
Retained on No. 20 sieve, not more than 60% nor less than.....	20%
Passing No. 50 sieve, not more than.....	20%

The fine aggregate shall be of such quality that mortar in the proportion of one (1) part of cement to three (3) parts of fine aggregate made according to standard laboratory methods, when tested at any age not exceeding twenty-eight (28) days, will have a tensile strength of at least one hundred (100) per cent of that developed in mortar of the same age and of the same proportions, made of the same cement and standard Ottawa sand. The cement used in these tests shall be from an accepted shipment of that proposed to use with the proposed fine aggregate.

Coarse Aggregate.—The coarse aggregate shall consist of gravel or crushed stone meeting the following requirements:

The gravel shall be composed of hard, sound, durable particles of stone and shall contain not more than two (2) per cent, by weight, of clay or silt.



Commerce Road. Near Green Lake.

No clay, however, will be permitted if it occurs as a coating on the particles of stone. It shall not contain any lumps of clay or any particles of soft sandstone, shale, slate, or other material which may readily disintegrate. The particles of stone shall, when tested by means of laboratory screens, meet the following requirements:

Passing two inch screen.....	100%
Retained on one inch screen, not less than.....	25%
Passing one inch screen, not less than.....	25%
Retained on one-fourth inch screen, not less than.....	95%

The crushed stone shall be that portion of the product of the crusher which will pass a revolving screen having circular openings two and one-fourth ($2\frac{1}{4}$) inches in diameter and will be retained in a revolving screen having square or circular openings one-fourth ($\frac{1}{4}$) inch in diameter when the crusher is so adjusted that the maximum distance between the fixed and moving elements is not less than two and one-fourth ($2\frac{1}{4}$) inches. Not more than five (5) per cent shall be of such size as would pass a laboratory screen having circular openings one-fourth ($\frac{1}{4}$) inch in diameter. It shall be free from lumps of clay and particles of soft or disintegrated stone. A sample of the stone when tested in accordance with the methods described in U. S. Department of Agriculture Bulletin No. 357, shall have a toughness of not less than eight (8) and a French coefficient of wear of not less than ten (10).

Water.—The water shall be free from oil, acid, alkali, vegetable matter and fairly free from clay or silt.

Joint Filler.—The joint filler shall consist of an asphaltic or tar felt, three-eighths ($\frac{3}{8}$) inch in thickness, of a quality approved by the engineer, of a width equal to the thickness of the pavement plus one (1) inch and of a length equal to the width of the pavement.

Forms.—The forms shall be of wood or metal, straight and free from warp, of sufficient strength to resist springing out of shape during the progress of depositing concrete against them, and of a width equal to the edge thickness of the pavement, so designed that the various sections may be fastened together in such a manner as to prevent relative vertical or horizontal movement of the ends.

Construction Methods.

Placing Forms.—The forms shall be set true to line and grade, shall be well staked and braced and shall have uniform bearings on the subgrade throughout their entire length. In general the setting of forms shall proceed at least two hundred (200) feet in advance of the mixing and placing of concrete.

All forms shall be thoroughly cleaned before concrete is placed against them.

Measuring Materials.—The fine and coarse aggregate shall be measured in suitable boxes or in wheelbarrows of a measured capacity. Each wheelbarrow load shall be surface struck with a template.

Mixing Concrete.—The materials composing the concrete shall be thoroughly mixed in a machine mixer of the batch type so designed, constructed and operated that the thorough mixing of the materials is assured and that the consistency of all batches of concrete is the same. The materials shall remain in the drum of the mixer for a period of not less than one (1) minute, during which time the drum shall revolve at the rate of not less than fourteen nor more than twenty revolutions per minute. Hand mixing will only be permitted to complete a slab in the event of a break-down of the mixer, and shall be done in accordance with the directions of the engineer or inspector.

Placing Concrete.—Concrete shall be placed only on a moist subgrade. The operation of transporting the concrete from the mixer drum to its proper place in the road and of spreading and putting it in place shall be so conducted as not to cause or permit any separation of the materials of the concrete. Concrete shall be distributed to the required depth and for the entire width of the pavement as a continuous operation between transverse joints without the use of intermediate forms or bulkheads. The surface of the concrete shall then be shaped true to grade and cross-section by means of a properly constructed strike board or template. The template shall be moved with a longitudinal and crosswise motion in the direction in which the work is progressing until within three (3) feet of a transverse joint, at which point it shall be lifted to the joint and the striking off of the slab completed and all excess concrete removed.



Scene on Orion-Clarkston Road--Walters Lake.

Constructing Transverse Joints.—Transverse joints shall be spaced as shown on the plans. In case, however, of an unavoidable interruption of the work a transverse joint shall be placed as herein specified at the point of stopping work, provided that the section on which work has been suspended shall not be less than ten feet in length. They shall be perpendicular to the subgrade and extend entirely through the concrete. They shall be formed during the placing of the concrete by securely staking in proper position a metal bulkhead, against which the joint filler shall be placed. The metal bulkhead shall be at least one-fourth ($\frac{1}{4}$) of an inch in thickness, of a width at least one (1) inch more than the greatest depth of the pavement and of a length approximately equal to the width of the pavement. The concrete shall then be placed simultaneously against the bulkhead and joint filler to a depth approximately equal to the depth of the finished pavement. The bulkhead shall then be removed carefully so that the joint filler will not be disturbed and will extend to the bottom of the finished pavement and be perpendicular to its surface. After the concrete has set and before the pavement is open to traffic the joint filler shall be cut off one-half ($\frac{1}{2}$) inch above the surface of the pavement.

--- Finishing Concrete Surface.—After the concrete has been struck off it shall be rolled with an approved metal hand roller by passing the roller from one edge of the pavement to the other in one operation until free water ceases to come to the surface. The hand roller shall have a smooth even surface, be six feet in length, not less than ten nor more than twelve inches in diameter, shall weigh not less than sixty nor more than one hundred pounds and shall be so equipped with handle or ropes that the rolling may be done by men standing at the edge of the pavement and so that the pressure of the roller on the pavement will be uniform.

After the rolling has been completed the concrete surface shall be finished by moving a belt along it with a longitudinal and crosswise motion. Care shall be taken so that the edges of the belt will not dig into and mar the surface of the concrete, or will not work the crown out of the pavement.

The belt shall be of canvas or rubber not less than twelve inches in width and about two feet longer than the width of the pavement.

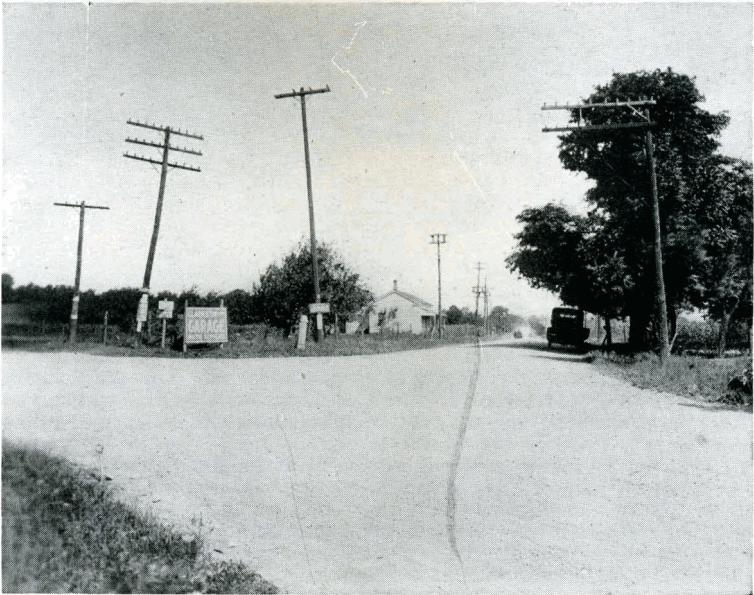
The concrete surface adjacent to the transverse joints shall be finished with a split wood float to proper elevation and cross-section. The finishing of the joints shall be done from a bridge which does not rest on the concrete surface at any point.

The finished surface shall be free from porous or open spots. No portion of it shall be more than one-fourth ($\frac{1}{4}$) inch below a template, cut to the crown shown on the cross-section drawings, placed on the pavement at right angles to the center line of the road, and no portion of it shall be more than one-fourth ($\frac{1}{4}$) inch below a straight edge ten (10) feet in length, laid on the pavement parallel to the center line of the road.

Protection of Concrete.—As soon as the concrete surface has been finished it shall be protected from rain and the direct rays of the sun with canvas or some other suitable material. As soon as the concrete has set to the extent that the surface will not be marred by a man walking upon it the above covering shall be removed and the concrete shall be covered entirely with a layer of earth approximately (2) inches in thickness. This layer of earth shall then be wet thoroughly and kept wet for at least two (2) weeks, during which time no traffic shall be allowed upon the pavement. Before traffic is permitted upon the pavement the earth covering shall be removed and disposed of as were other materials or excavation.

Basis of Payment.

The contract price per cubic yard for the concrete pavement shall be compensation in full for furnishing all materials, laying, sprinkling and protecting the concrete, furnishing and setting all forms, constructing necessary transverse joints and doing all other incidental work.



Clarkston Road, Independence Township, Built of Gravel.

Construction Details

EXCAVATION AND EMBANKMENT.

Description.—Excavation and embankment shall consist of grading the roadway in conformity with the plans true to the lines and grades given. This grading shall include all clearing and grubbing, removing structures, shaping and sloping, compacting and other work that may be necessary in bringing the roadway and its appurtenances to the required grade, alignment and cross-section, also the grading of all intersecting roadways, driveways and approaches. This work shall be done in accordance with these specifications.

Clearing and Grubbing.—Clearing shall consist of cutting off level with the ground, all brush, trees and stumps, from the area between the slope stake lines, provided, however, that the minimum width of clearing shall be fifty (50) feet, measured twenty-five (25) feet each way from the center line of the roadway.



Commerce Road, West Bloomfield Township.

Grubbing shall consist of grubbing up all brush, roots and stumps, so that no root, three (3) inches or more in diameter, shall be within twenty-four (24) inches of the surface of the completed road between the lines of the slope stakes.

All timber within the right of way, six (6) inches or more in diameter shall be cut into logs of merchantable lengths and neatly piled on skidways along the line of the improvement. Provided, however, That the Contractor will not be required to cut the timber into less than twelve (12) foot lengths.

All brush, stumps, logs and other debris, except the merchantable logs, shall be piled and burned within the right of way in such manner as not to injure or destroy growing timber or public or private property.

All trees and shrubbery within the right of way designated by the Commissioner as reserved, shall not be removed by the Contractor, but shall be protected by him and saved from damage during the construction of the road.

All grass, weeds and other vegetation within the lines of the slope-stakes shall be removed before the ground is broken up for excavation or before embankment is made thereon.

Excavation.—Excavation shall consist of the removal and satisfactory disposal of all materials necessary for the preparation and construction of the road bed, embankments, slopes, side ditches, trenches, waterways and approaches to intersecting highways and private entrances, in accordance with the plans and specifications; the removal and disposal of such muck and unsuitable materials occurring in the road bed as may be ordered by the engineer; and the digging of such borrow pits as may be necessary to secure sufficient additional materials for making embankments and replacing unsuitable materials.

In general the materials of excavation shall be used in making the necessary embankments, but materials unsuitable for use in embankments shall be disposed of as directed by the engineer.

During the excavation of the roadway, the sides of the road bed shall be kept lower than the center and the surface shall be maintained in such a condition as to insure adequate drainage.

All excavated materials will be classified as earth or rock. Rock in place which requires blasting for removal and boulders of one-half cubic yard or more in volume will be classified as "rock" and all other materials as "earth."

Embankments.—Embankments shall be formed of good sound earth, stone or gravel and carried up full width. The material shall be deposited in layers not more than one foot in thickness and each layer shall be thoroughly compacted by rolling with a roller weighing not less than ten (10) tons and not more than fifteen (15) tons or by some other method satisfactory to the engineer. When embankments are to be constructed on existing embankments or hill sides, the slopes which the embankments will cover shall be ploughed deeply or deep steps cut before the filling is begun in order that the old and new materials may bond together. When the embankments are constructed of stone and earth, the stone shall be properly distributed and the interstices completely filled with earth. No stone four (4) inches or more in diameter will be permitted within six (6) inches of the subgrade.

Disposal of Surplus Excavation Material.—If there is more material taken from the cuts than is required to construct the embankments as shown on the plans, the excess material shall be used in uniformly widening the embankments or shall be deposited where the engineer may direct. The placing of unsightly piles of surplus material on the sides of the road outside of the ditches will not be permitted.

Borrow Excavation.—When the materials of excavation, suitable for use in the embankments are insufficient for making the necessary embankments, additional material shall be secured from such borrow pits as are designated by the engineer. Deep, wide or unsightly borrow pits along the side of the roadway will not be permitted.

Formation of Subgrade.—That portion of the road upon which the surfacing material is to be laid shall be known as the subgrade and shall be true to the lines, grades and cross-section shown on the plans. It shall be rolled until firm and hard, with a roller of the macadam type, weighing not less than ten (10) tons. Should earth be encountered which shall not compact by rolling, so as to be firm and hard, it shall be removed and replaced with suitable material, and that portion of the subgrade shall be again rolled. When the rolling is completed, the surface of the subgrade shall conform to the cross-section shown on the plans and shall have the proper elevation and alignment and shall be so maintained until the surfacing is in place. In the construction of gravel and crushed stone roads, when deep mealy sand is encountered, where rolling is impracticable, marsh hay, cedar bark, wet straw or fine brush shall, if ordered by the engineer, be laid or clay shall be spread on the sub-grade, completely covering it, in sufficient quantities to prevent the first course of stone or gravel from mixing with the sand.

During the preparation of the subgrade on which is to be placed a concrete base or concrete pavement, all portions of the present traveled way within the limits of the subgrade which shall be within twelve (12) inches of

the surface of the completed subgrade whether composed of earth, gravel or crushed stone shall be thoroughly broken up to a depth of not less than six (6) inches by scarifying, plowing or other efficient means.

No foundation or surfacing material shall be deposited on the subgrade until it has been checked and approved.

Shoulders.—The shoulders shall be constructed of earth, or other approved material, and rolled with a roller weighing not less than ten (10) tons, and when completed shall have the cross-section shown on the plans. Rolling may be omitted, upon the order of the engineer, if the material composing the shoulders will not compact under the roller. No material which contains weeds, roots or other perishable matter and which will not compact under the roller shall be placed in the shoulders.

In the construction of gravel or broken stone roads the shoulders shall be built during the preparation of the subgrade, and before any surfacing material is placed, to a height not less than the edge thickness of the first course before it is compacted. They shall be true in alignment and shall have the edges next to the subgrade as nearly vertical as the nature of the soil will permit. If the material composing the shoulders should be so loose that a fairly vertical edge cannot be obtained, boards may be staked in line to hold the stone or gravel in place. As soon as the first course of stone or gravel has been spread, the earth shall be placed up against the boards and they shall be removed before any rolling is done. Before the second course is spread, sufficient material shall be added to the shoulders to bring them to a height equal to the height of the second course before it is compacted, and such that the shoulder when rolled shall have the cross-section shown on the plans.

Should the Contractor prefer, he may build the shoulders at one operation before any surfacing material is placed on the subgrade, so that they shall be reshaped after the first course is rolled and before the second course is spread.

Method of Determining Excavation Quantities.—All excavation will be measured in its original position by the cross-section method and volumes will be determined by the average end area method.



One of Oakland County's Sink-holes, on Saginaw Road in Holly Township.