PROPOSED IMPROVEMENT OF RABEY ROAD FROM U. S. 16 TO SAGINAW ST.

THESIS FOR THE DEGREE OF B. S.

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F. A. Anderson

1933

THESIS

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Proposed Improvement of Rabey Road
From
U.S. 16 to Saginaw St.

A Thesis Submitted to

The Faculty of

MICHIGAN STATE COLLEGE

of

AGRICULTURE AND APPLIED SCIENCE

By

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Candidates for the Degree of

Bachelor of Science

June 1933

THESIS

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Rabey road, as it now exists, is very hilly, having grades exceeding 12%, has just a fair gravel surface, and has a right of way of only forty feet. It will be the purpose of this thesis to present plans and specifications for converting this road into a first class county road with maximum grades of 6%, a right of way of sixty six feet, and a good gravel base black top surface.

The work naturally divides itself into three parts:

1. Field work
2. Office work

1. Field work

This work is farther divided into three parts:

1. Location survey
2. Levels
3. Topographic features

Location survey

The road is described as being the north 275.55 feet of the east one eighth line of section 20, Meridian Township; the east one eighth of section 17, Meridian Township; and the south 2259.0 feet of the east one eighth line of section 8, Meridian Township, and extending from the north edge of U.S. Highway 16 to the south edge of Saginaw Road.

In as much as it was deemed advisable to follow the original road, as closely as was consistant with good

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design, the location survey was not of prime importance and was not carried to entire completion. The section corner common to 16-17-20-21 and the ¼ post between 17 and 20 were located. A traverse between these points was employed for the location of the east one eighth post between 17 and 20.

Levels

Starting with the U.S. Gov't bench mark, elevation 851 feet above sea level, located in the south west fence corner at the intersection of the east one eighth line and the north section of 17, as reference to the datum plane, continuous levels were run. Shots on the center line and 20 feet each side of the center line were taken at every 100 foot station except where a radical change in grade took place. Here 50 foot stations were employed. The existing road bed is 15 feet wide and was considered as level.

Topographic features

At the completion of the location and level surveys, the topographic features were located with two tapes. The distance from a 100 foot station was read on one tape and the distance from the center line of the road to the object was read on the other. Such objects as trees, telephone poles, roads, and buildings were located within the 66 foot right of way.

2. Office work

This work is farther divided into three parts:

1. Reducing of notes and drawing of plan and profile
2. Computing the amount of earth work and materials
3. Cost estimate

Reducing of notes and drawing of plan and profile

It is needless here to explain this detail as the tracing contained in this thesis will show all points necessary.

Computing the amount of earth work and materials

The profile of the road was plotted, grade lines assumed and drawn in. Cross sections were plotted for each station and the end areas computed from the assumed grade. The grade was varied until one was found at which the cuts approxamatly balanced the fills. 10% was allowed on the fills to take care of any settlement.

The amount of aggregate to be used was computed by multiplying the length of the road by the area of the cross section. The amount of bitumenous materials was calculated from tables in a handbook.

Cost estimate

The cost estimate was based on unit prices compiled by the Ingham County Road Commission for a similar road in the year of 1931.

SPECIFICATIONS

The surface proposed is, as was stated above, a gravel base and an oil mix cut back surface. This type was chosen principally because the extention of the same road to the north was the same surface. A similarity of surfacing simplifies maintainance.

The base course will be applied 10" thick and is expected to compact to 8" before the application of the wearing surface. This will be made not less than one year after laying of base course.

The gravel should conform to the following limitations.

Passing 1" screen	100%
" ¼" "	50 - 70%
" #10 mesh sieve	35 - 60%
" #200 " "	7 - 14%

At the end of the specified time, two inches of the surface will be bladed into windrows. Before application of the asphaltic material, the windrowed aggregate should be bladed over the road surface in a layer of uniform thickness, for the entire width of construction. If wet or damp, it first should be bladed back and forth until no free moisture can be distinguished by sight or touch.

The asphaltic material should be heated in the tank car and applied uniformly at a temperature of not less than 160 degrees F., by means of a pressure distributor.

Application of the asphaltic material should be made for the full width of the road in increments of about one-half gallon per square yard each, until the required quant-

ity has been applied. Between each increment of the application, the material already applied should be mixed with the aggregate. No application should be made unless the air temperature in the shade is above 50 degrees F.

CUT		FILL	
Station	Cu. Yds.	Station	Cu. Yds.
3 0		0 0	
4 0	34.3	1 0	170.0
5 0	362.0	1 50	136.0
		2 0	84.2
Total	396.3		390.2
6 0	510.0	6 30	
6 30	54.0	7 0	92.0
10 50		8 0	460.0
11 0	42.5	9 0	630.0
12 0	316.0	10 0	397.0
13 0	680.0	10 50	48.4
14 0	765.0	14 80	
14 80	296.0	15 0	5.7
		16 0	116.0
		17 0	201.0
		18 0	198.0
		19 0	74.0
Total	2653.5		2221.1
21 75		19 0	
22 0	4.0	20 0	104.0
22 90	15.0	21 0	63.0
23 25		21 75	11.0
24 0	46.0	22 90	
25 0	42.0	23 0	.5
25 50	72.5		
Total	179.5		178.5

CUT		FLLL	
Station	Cu. Yds.	Station	Cu. Yds.
25 50		30 10	
26 0	50.0	31 0	233.0
27 0	140.0	32 0	518.0
28 0	337.0	33 0	477.0
29 0	585.0	34 0	236.0
30 0	375.0	34 50	85.0
Total	1487.0		1549.0
34 75		39 80	
35 0	12.0	40 0	4.0
36 0	74.0	41 0	226.0
37 0	188.0	42 0	368.0
38 0	425.0	43 0	290.0
39 80	306.0	44 0	187.0
45 40		45 0	96.0
46 0	78.0	45 40	37.0
47 0	277.0		
Total	1356.0		1208.0
47 0		50 50	
48 0	439.0	51 0	48.0
48 50	329.0	52 0	590.0
49 0	510.0	53 0	1115.0
50 0	1340.0	54. 0	940.0
51 0	898.0	55 0	516.0
51 50	79.0		
Total	3595.0		3209.0

CUT		FILL	
Station	Cu. Yds.	Station	Cu. Yds.
58 90		55 0	
59 0	52.6	56 0	294.3
60 0	978.0	57 0	395.3
		58 0	270.0
		58 90	59.0
Total	1030.6		1018.6
60 0		62 50	
61 0	927.0	63 0	33.0
62 0	592.0	64 0	78.0
63 0	188.0	65 0	44.0
64 0	55.0	67 25	
65 0	603.0	68 0	119.0
66 0	1525.0	69 0	794.0
67 0	1810.0	70 0	1410.0
67 25	222.0	71 0	1278.0
		72 0	723.0
		73 0	248.0
		74 0	100.0
		75 0	141.0
		76 0	210.0
		77 0	277.0
		78 15.55	171.0
Total	5922.0		5626.0

COST ESTIMATE

Item	Quanity	Unit Price	Total
Earthwork	16,900 cu. yds.	$0.40	$6,760.00
Overhaul	34,739 sta. yds.	0.03	1,043.17
Concrete	30 cu. yds.	1.50	45.00
Gravel	4,344 cu. yds.	0.491	2,130.90
Oil	35,168 gal.	0.0213	749.12
Culvert Pipe	12" 124 feet	0.21	26.04
Guard Rail	1,000 feet	0.50	500.00
		Total Estimate --------	$11,253.33
		Engineering & Supervision --------	1,687.99
		Grand Total --------	$12,941.32

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