Performance Criteria for Local Road Operations

ROBERT S. SCOTT
Scott Engineering Company, Alpena, Michigan

● THIS paper deals with the statistical comparison of the operation of local road units. A study of the records of the County Road Commissions of Michigan during the period 1951 through 1955 has indicated a new approach to the management of these operations. The research was based on data gathered by personal visits with the commissions.

This research has disclosed that regardless of the size or scope of operations or local idiosyncrasies, a clearly defined trend is noticeable in the operations of the counties. It has been taken for granted that the overall results of county operation in the State of Michigan are good, and thus, can be picked out the counties above average as setting a goal of excellence.

From the beginning, the research indicated that there were several factors that were not conducive to good road management, namely:

1. There was no incentive for commissions to administer effectively since they received no reward or recognition for efficient operations nor were they penalized for inefficient operations.
2. There were no recognized criteria for efficient operations.

Now, can something be done about this situation? It is believed that the use of statistical methods can point out a plan of improvement by reestablishing a sense of competition among the counties once each has been shown how it compares with the others.

Through comparison and analysis of the data, an audit sheet was developed to compare various factors of a county's operation against the standards of an "ideal" county of comparable size.

The use of the audit sheet is valuable since it discloses in tabular form the deviations of each county's operations from the norms or standards arrived at in the analysis. The next step is then the design of a budget which takes into account these deviations.

It may not be possible or desirable to achieve these goals in one year, but the point is that each correction is a step toward the best in operations.

This paper also reveals that it is possible to analyze some of the ingredients which make up the road administrative policies of 83 counties in Michigan. By subjecting their management policies to statistical analysis, definite trends or patterns in the proportions of labor, equipment, materials and administrative expense emerge. Similarly, the proportions of maintenance and construction expenditures, wage rates, and other items fall into definite patterns.

Now as the comparative statistical data from 83 counties are made available, each county road commission can measure how well it is spending its tax dollar in comparison with the other 82 counties.

With this knowledge—and the will to improve weak spots in operations—the average performance level of all the counties can be improved.

THE MICHIGAN COUNTY ROAD COMMISSION

Like most states, the roadways that now serve Michigan began centuries ago as a network of Indian trails. For 150 years after the first settlements in Michigan, no wagon roads were built except in and close to town.

Aside from private toll roads, the only rural highways built in Michigan for more than three decades after 1850 were township roads. A territorial law in 1827 had set up the township as the basic unit of road administration, and this form of organization was perpetuated in the revised State Constitution of 1850. In addition, the new constitution transferred to township control a number of roads built in earlier years by the state government.

Township administration bespoke the prevailing belief that road construction and support were largely the responsibility of the people who lived along the roads. Under the statute labor system then in effect, the property owner was required to "work the roads" a certain number of days each year (the exact number depending on the value of his property) or else substitute a cash payment for his labor. It was recognized, however, that

township residents who did not own property also derived benefits from roads, and these citizens were assessed one day's work a year or an equivalent tax.

Roads built under this system chiefly connected farms with the township trading center. Usually there was no money left over to build roads connecting with each other and extending from town to town. Road work moreover, was supervised by untrained officials and carried out by inexpert labor so that much of it was poorly done.

As a means of solving the problem of intertownship roads, six townships in Bay County joined with Bay City and West Bay City in 1883 to form a "Stone Road District," under a special authorization granted by the state legislature. This unique governmental combination modernized the main roads spreading from the two cities and embarked upon a maintenance program.

Success of the Bay County experiment confirmed the growing belief that an administrative unit larger than the township and a wider tax base would make possible road improvements needed by the increasing body of Michigan citizens whose business took them beyond the immediate vicinity of their homes. The state legislature responded by approving the County Road Act of 1893—the most far reaching highway legislation enacted since Michigan had become a state.

The new law permitted any county to appoint or elect a county road commission and to knit scattered township roads into a county road system. Counties which voted to set up such systems were authorized to levy road taxes up to three mills on property and to submit bond issues for popular approval.

Establishment of county road commissions made it possible to hire competent engineers, to buy better mechanical equipment, and to raise standards of road administration far beyond the township level. Nevertheless, it was more than a generation before all counties adopted such systems.

Even though county road commissions were charged with the administration of county roads from 1893 on, there was still dual responsibility with the townships and this relationship existed until the depression late in 1929. Within three years, a sweeping reorganization was made of the highway administration and financial structure which had evolved over the previous 40 years.

With property tax collections plummeting and tax delinquency ascending, there were immediate and widespread demands for a reduction in real estate taxation and for the support of a larger share of local road improvements from a more stable motor vehicle revenue. These demands led to the passage, in 1931, of the McNitt Act, which, although intended primarily as a property tax relief measure, brought about major reform of local road administration.

While county road administration in Michigan had reached a level of competence not surpassed in any other state in the country, road building by 1269 separate township authorities was widely recognized as wasteful and inefficient. The McNitt Act provided for consolidation of the 68,000 miles of township roads into 83 existing county road systems at the rate of one-fifth of the total mileage each year for five years.

Then in 1951, the state legislature enacted the Motor Vehicle Highway Fund known as Act 51 for the support of the roads. The fund originates in a 4½-cent gasoline tax and a graduated scale weight tax.

The law provides for the distribution of the Fund to the three road systems; namely, county rural roads; city and village streets; and state trunklines.

In addition, the law requires a uniform accounting for the receipts and expenditures of road moneys by each of the 575 administrations comprising the above three groups and sets a deadline for submission of an annual financial report. This report consists of 10 pages covering all phases of the county road commission operations. The summary sheet of this report is shown in Table 1.

Without uniform accounting practices the following discussion would be impossible.

To gain a sense of proportion the following Michigan data are useful: Table 2 shows that there are 107,000 miles of road in Michigan; 9 percent of this mileage is under the control of the Michigan State Highway Department; 12 percent of the mileage exists in the urban streets of 491 local communities and 79 percent of the mileage is under the control of 83 county road commissions.

It is our experience that relatively few Mich-

TABLE 1

Michigan State Highway Department

Charles M. Ziegler

State Highway Commissioner

Board of County Road Commissioner's Annual Financial Report to the State Highway Commissioner for the calendar year 1954 as required by Act 51, P. A. 1951, as amended.

Summary Sheet

County Highway Income

		Primary system	Local system	
1-1d	Federal raised revenue			
	State motor vehicle highway funds			
2-2a	Engineering services	$3,530.00	$1,470.00	$5,000.00
3-2b-c	County road systems	143,596.28	130,028.08	273,624.36
4-3c	Cities and villages adjustment			
5-4	Emergency advance			
6-5e	County raised revenue			48,633.22
7-7c	Miscellaneous receipts			7,914.98
8-9c	Borrowings for road systems			—
9-9d	Borrowings for all purposes			
10-10e	Cash received from accounts receivable			153,728.96
11-11	Total income			488,901.52
	Cash on hand January 1, 1954			
12-12c	Road systems funds only	54,212.49	−33,484.25	—
13-12e	Total cash funds			20,728.24
14	Total of road systems funds	201,338.77	98,013.83	—
15-13	Total of all available funds			509,629.76

County Highway Expenditures

16-1d	Administration-engineering acct.	13,370.41	5,567.85	
17-2h	Construction-roads and structures	79,189.31	59,514.31	
18-3i	Maintenance-roads and structures	97,248.55	61,110.95	
19-4a	Roadside parks and motor parkways			
20	Total primary and local road expend.	189,808.27	126,193.11	316,001.38
21-5c	Land and buildings (capital expend.)			2,845.00
22-6c	Net debits or credits—materials acct.			17,055.48
23-7d	Net debits or credits—equipment acct.			924.34
	Debt service expenditures	12,270.00		
24-9c	Road and structures			—
25-9d	Total debt service expenditures			12,270.00
26-10e	Reimbursable expenditures			142,052.72
27-11a	Total expenditures			491,148.92
28-11b	Accounts payable or accrued accounts			16,902.39
29-11c	Total of cash disbursements			474,246.53
	Cash on hand December 31, 1954			
30-12c	Road system funds only			—
31-12e	Total cash funds			35,383.23
32	Total of road systems funds			—
33-13	Total of expenditures and unexpended balances			509,629.76

Board of County Road Commissioners

TABLE 2

MILEAGE AND CONTROL, ROAD SYSTEMS

	Mileage		Control
State trunk lines	9,271	9%	Michigan State Highway Dept.
City and village sts.	12,843	12%	491 Local
County rural	85,535	79%	83 Rd. com.
	107,650		

TABLE 3

SOURCE OF ROAD INCOME

Motor Veh. Hwy. Fund	$136 Million (68%)
Local contributions	$39 Million (20%)
Federal funds	$12 Million (6%)
Borrowing and misc.	$11 Million (6%)
	$198 Million

igan people realize the size of the road business in their state. In 1953 it amounted to about $200 million.

Table 3 shows that 68 percent of the road money comes from the Motor Vehicle Highway Fund; 20 percent from local contributions and 6 percent each from federal funds and borrowings, etc. The total in 1953 was $198 million.

Table 4 shows how the money benefited the road systems; 38 percent to state trunklines; 32 percent to county rural roads and 30 percent to the 491 incorporated cities and villages.

From the foregoing it can be seen that we are looking at a fairly big business.

So much for the general picture. From here on, we confine our discussion to the county rural roads in Michigan.

In Michigan our county rural roads are under the control of 83 county road commissions. Each commission is appointed or else elected at the discretion of the Board of County Supervisors.

Table 5 shows how the 85,000 miles comprising the county rural road system are divided into a primary and a local system. There are approximately three miles of local roads to every mile of primary road. Insofar as Motor Vehicle Highway Fund receipts are concerned, three-quarters of the moneys are spent on one-fourth of the rural mileage as required by law.

As stated earlier, each road commission is required by law to keep accurate account of its receipts and expenditures according to uniform accounting practice. Under the provisions of the so-called Uniform Accounting Act, being Act No. 71 of the Public Acts of 1919 (Sec. 21.41 through 21.53 CL 1948 as amended), the Auditor General set forth minimum accounting requirements which are to be placed in operation and maintained by all county road commissions.

The annual financial reports of these 83 county road commissions are rich sources of data. By the use of statistical techniques they can be made to yield a wealth of information to help the individual commissions in controlling costs and planning future operations.

TABLE 4
EXPENDITURES

State trunk lines	$75 Million (38%)
County rural	$63 Million (32%)
City and village sts	$60 Million (30%)
	$198 Million

TABLE 5
COUNTY RURAL MILEAGE

System	Miles	
Primary	22,802	27%
Local	62,732	73%
	85,534	

FIRST OPERATION STUDY OF MICHIGAN COUNTIES

Everyone who has spent any time working with highway problems knows about the gradual transition from the horse and buggy days down to our present complex system. They also know that it is necessary to cope with an ever increasing demand for better service and better roads. Highway technology has kept pace by using research and engineering and thus setting higher standards of design and performance. Business as we know it today has grown up in much the same way, from the modest enterprises of the early century to the giant corporations now prevalent. However, competition has forced business to develop managerial controls and standards (as well as making the obvious engineering and scientific advances). Today's manager must have placed before him a vast amount of information concerning not only his own business but also his competitors' business so that he can make plans and determine future policies which will keep the corporate body healthy and alive.

Today the average local road managers or boards are virtually flying by the seat of their pants in that they are operating principally in their own little sphere with very little knowledge of what the other fellow is doing.

In the past generation, the road commission dollar has shrunk some 40 percent in purchasing value. Within the same interval, traffic demand on the roads has increased by a similar amount.

Unlike industry, road commission income is fixed by statute and the commission cannot readily augment that income to balance the depreciation in purchasing power. Therefore the alternative is to get more out of the road commission dollar. One of the ways of doing this is to utilize manpower and equipment efficiently. This is the sole responsibility of the road commission. When faced with this problem, industrial management makes use of expense controls and budgeting to reach a solution. As practiced in industry, expense control is based on comparative cost statistics derived from subsidiary plants operated on a competitive basis. The idea is to find which plant does a given job at the lowest cost and then to control all other plants to this minimum.

In this sense the various road commissions are competitors and to that extent the statistics necessary to expense control are buried in their account books.

Five years have been spent in gathering these statistics and setting them up in the comparative form necessary for transforming them into expense control data.

This work has never been intended to pro-

vide the answer to all questions of management and moreover it may not be correct at all, but a start had to be made somewhere. The initial statistics were made in an endeavor to find some yardstick or some basic starting point with which to begin. In their earliest form, the first findings disclosed that no comparison similar to private industry could be made but that a new base had to be found. One of the most perplexing findings was that everyone said that he was different and we were finally compelled to admit that all were. Indeed, the only common ground was that almost everyone readily admitted that he had the best operations in the state and there was no way to disprove these statements.

The first assumption that was made was, let's admit that everyone is right—but let us add up the various operations and see if there is a pattern.

The second assumption made was that here are 83 counties spread over the entire area of Michigan, from the highly industrialized areas down to sparsely populated ones. These counties have been doing business for over 50 years with continued visible progress made down through the years. These county groups have been well organized and have had good communications through their association and local area organization. The counties have enjoyed the good will and the cooperation of both the State Highway Department and the Bureau of Public Roads and most important of all, each county had won and held the respect of its own communities.

Now with these few assumptions allowed, let us see what was taking place and just see if everyone is alike.

First, let us look at the obvious things like equipment:

Direct repairs: One county reported spending 50 percent of its total income for repair of equipment while another one reported an outlay of 4 percent.

Investment: One county reported having 105 percent of its total yearly income invested in equipment while another reported having 33 percent.

Rentals: Nearly all equipment is charged back to roads at a uniform rental rate based on agreement with the State Highway Department. One county reported receiving 80 percent of its investment in rentals while the low was 38 percent.

Road labor vs. road rental: In this comparison, one county reported 210 percent labor cost over rentals while the low was 82 percent labor cost against rentals.

New equipment vs. depreciation: One county reported buying new equipment at the rate of 180 percent against depreciation while the low was 40 percent.

Rental vs. operation: Operation cost in this instance is fuel and oil used in the equipment. Here the ratio varied from 8:1 down to 4:1 or for one dollar in fuel and oil expended four dollars to eight dollars were recovered in rentals.

In the Michigan accounting form, it is assumed that equipment expense will equal equipment rentals. The following is a breakdown of equipment expense:

Direct maintenance	42%
Depreciation	23%
Operation	18%
Indirect maintenance and storage	17%
Profit or loss	0
Rental	100% of expense

The highest profit on rental is 17 percent in one county while the highest loss is 25 percent.

The foregoing discloses that all counties did not think alike nor spend their money in the same ways. It still doesn't prove anything but it makes meat for the grinder.

The next step was to break down the expense by elements of cost, labor, rentals, stores and materials, and administration. The average for a group of smaller Michigan counties was found to be:

County hired labor charged to road operations	42%
Rentals on county owned equipment charged to road operations	33%
Stores—road materials and cost of gravel	19%
Administration	6%
Net total expenditure	100%

Here net total expenditures average 74 percent of total expenditures. That is, the average county used 26 percent of their money for other expenses not shown above.

Here again, like the equipment, the elements of cost varied from county to county with just about the same spread.

The money that was spent in the above elements was distributed to the roads in the fol-

lowing proportions:

Road construction (all costs)	26 %
Road maintenance (all costs)	70.5%
Capital expense	0.5%
Account debits	3 %
Total	100 %

But here again, actual expenditures by counties varied from 52 percent for construction down to 0 percent construction.

DEVELOPMENT OF PERFORMANCE CRITERIA

This type of analysis was followed for about three years with basically the same results. This information was given to the counties and in the majority of cases no attention was paid to it. It became apparent that further work had to be done to develop a method to show how this information could be used. It was decided at this time that no attempt should be made to refine the information for any one particular operation but that we should just stick to fundamentals.

It was now possible to show that while county road commissions basically were not too different, neither was each the best operator. However, a key to their operations was beginning to develop. This was called "internal expense." Internal expense is the remainder from total expense after subtracting capital expenditures for land and buildings, debt service, construction contracts and changes in inventories. The amounts of labor, equipment, materials and administration are dependent upon the size of internal expense.

Administration + Labor + Equipment
+ Material = Internal Expense

Now if the counties could just control these four items (A., L., E. and M.), a big step could be made toward planning and budgeting.

Like industry, a road commission spends its money for labor, equipment, materials, and administration. Relatively small amounts of money are used for capital expenditures and debt service.

It appears, therefore, that from an administrator's viewpoint, criteria are necessary for the four items—administration, labor, equipment and material expenses—which make up internal expense.

Figures 1 and 2 are examples of the method. Here the labor data are plotted against internal expense for 60 odd counties in the lower peninsula of Michigan.

Conventional statistical methods using least square computations have been used in the above figures and in the following charts.

In Figures 1 and 2, the straight line running diagonally is an average through all of the points and it is referred to as the regression line.

In Figure 1 a vertical dotted line has been drawn through one of the points. The height of the point above the horizontal axis represents the actual amount of labor drawn to scale. The height of the intersection with the regression line represents the average amount of labor for a county of the same internal expense. In each category the second figure is a magnified section of the lower left hand corner of the preceding figure. These 30 smaller counties could not be shown in the other chart.

Those counties above the line spend more than the average for labor, and those below spend less than the average.

Figures 3 and 4 show equipment expense

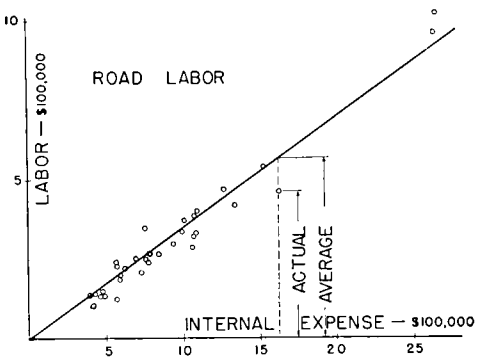

Figure 1.

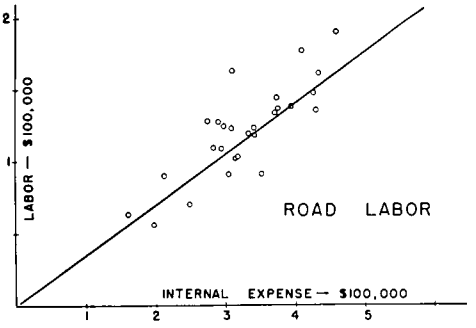

Figure 2.

against internal expense. Once more the spread is seen with some higher than average and some lower than average. Also, notice that the regression or averaging line does not pass through the origin. This means that small counties spend a larger proportion of their money for equipment operation than do the larger counties. Figures 5 and 6 show administrative costs in comparison with internal expense.

After the money is spent for labor, equipment, and administration what is left goes into material. Road material in place is what the vehicle travels on.

Figure 7 also shows that the regression line does not pass through the origin. In this case, we see that the larger counties spend a larger proportion of their money for road materials than do the smaller counties.

The trick in management of these road commissions is to spend as little as possible for labor and equipment in order to get the most material on the roads. The way to do this is to get those counties which spend more than the average to budget lower amounts for labor and equipment and so get these items under control. Those are large amounts of money.

If all the higher than average cost counties were brought to the averages of those that are below average, many millions of dollars could be put to more productive uses.

Figure 8 shows a magnified section of the last chart. Here it can be seen that a county having

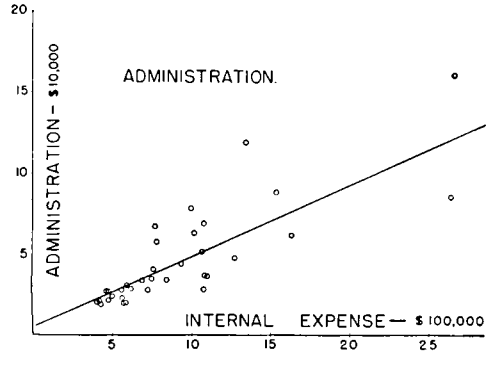

Figure 5.

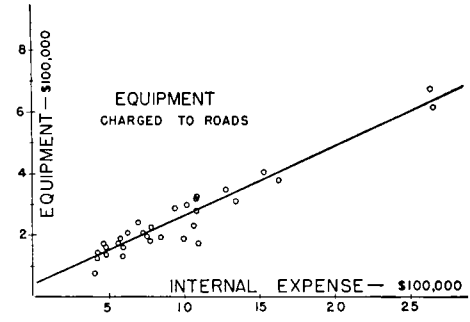

Figure 3.

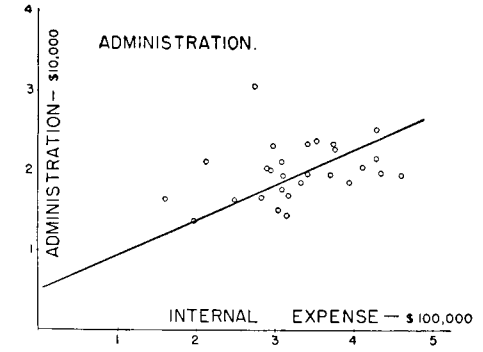

Figure 6.

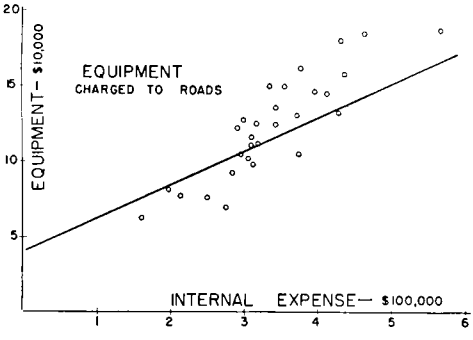

Figure 4.

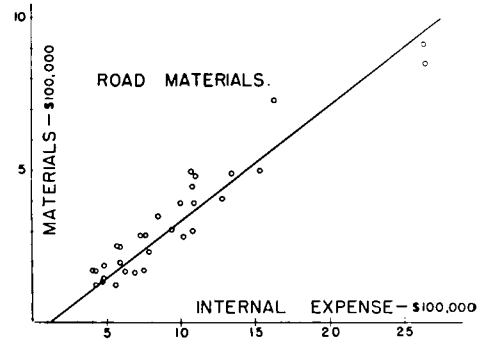

Figure 7.

only $100,000 to spend does not buy many road materials.

Now, going back to the purpose of our investigation, we review the internal expense formula in Figure 9. Figures 10 and 11 show how internal expense breaks down.

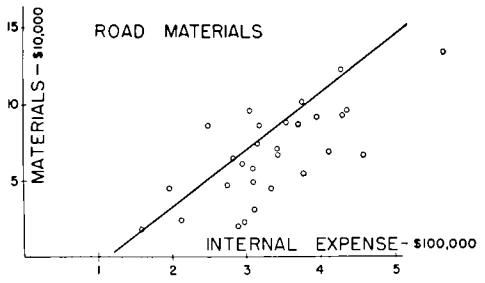

Figure 8.

Labor Charge to Roads + Equipment Charge to Roads + Material Charge to Roads + Admistration Equals Internal Expense

Figure 9.

Figure 11 shows how the sum of the parts shown in Figure 10 equals the whole—internal expense.

The averages of performance for a county of given income may be seen from the regression lines shown in Figure 11. Comparison of the actual amounts from their annual reports immediately shows what kind of a job an individual commission is doing.

At this point it should be remembered that industry criteria maximize profit. Since there is no profit criterion in public road work, some equally valid criterion is necessary. This shows up in minimizing the amount of labor and equipment required to place a dollar's worth of material on the road.

Figure 12 shows the average rates for the cost of placing material using the equation of the regression lines shown in Figure 11. When comparisons are made with the actual costs for placing material as reported in the various county annual data, another perspective of the individual county operation appears (see Table 6).

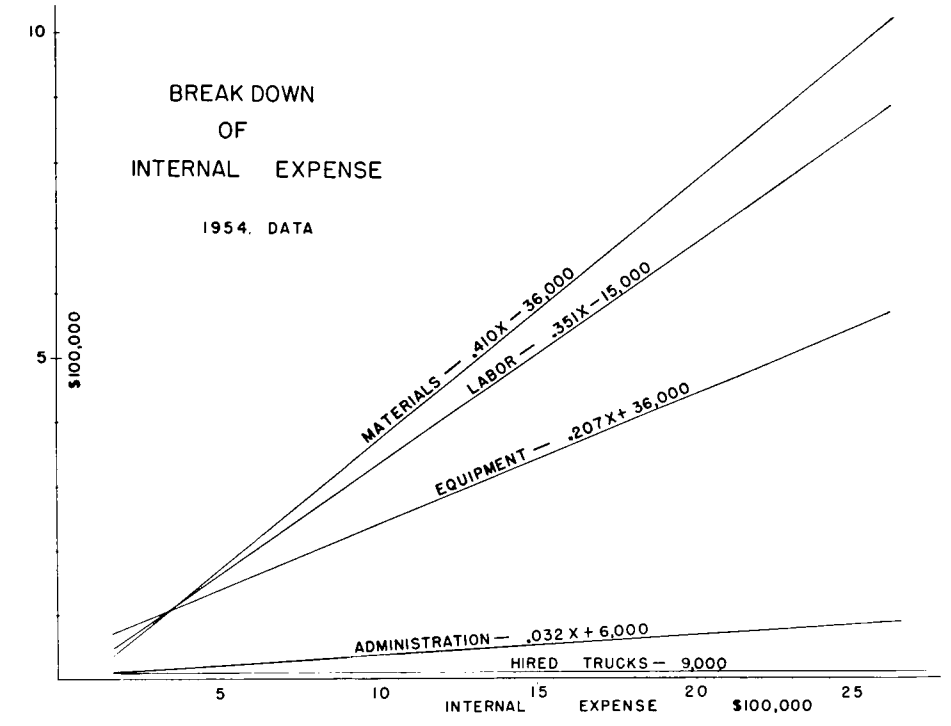

Figure 10.

ROAD COMMISSION POLICY

From the initial statistics and the subsequent analysis of county road data, it became possible to formulate a policy.

Here are 83 groups of men who have witnessed both the growth of their own communities and the changes in highway growth. Now out of the thinking of all of these groups there should emerge a general approach to the problem of county road administration. In other words, how does the money that is received materialize in benefits to the taxpayer in the way of construction and maintenance of the county roads.

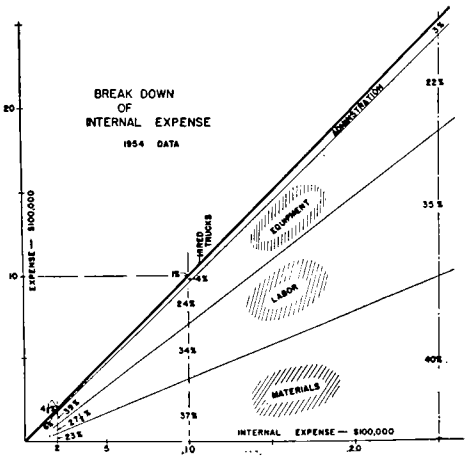

Figure 11.

Figure 13 best expresses the policy of a road commission. The taxpayer pays his money through item I, and under item II the commission spends the money to give the taxpayer the items under III. Until recent years, public auditing only asked for an accounting of income (I) and expense (II), with little emphasis as to whether money was wisely spent for labor, equipment, road material, and administration. Up until now the question had never been raised about expenditures (III).

In the same way as for expense items, statistics have told what has been done for construction and maintenance.

And thus we are able to chart the policy of the Michigan counties.

Figure 14 shows the answer from 83 counties in Michigan. Primary road maintenance expenditures have been plotted against their total primary expenditures. The close group-

$$Y = \text{RATIO}: \frac{\text{ADMINISTRATION} + \text{EQUIPMENT} + \text{LABOR} + \text{HIRED TRUCKS}}{\text{MATERIAL}}$$

$$Y = \frac{.590X + 36{,}000}{.410X - 36{,}000}; \qquad (Y-1.44)(X-88{,}000) = 215{,}000$$

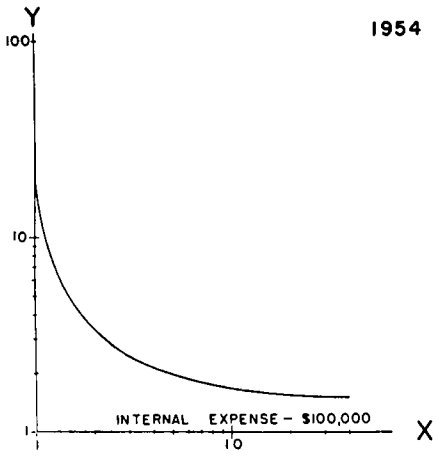

Figure 12.

ing of the data about the regression line, which appears diagonally, tells the story.

Another plot showing the elements making up total primary expenditures is shown in Figure 15 and for local roads in Figure 16.

It should be kept in mind that it is not so much a question of how much should you spend for maintenance as how much can you afford to spend and live with the situation and still stay within your income.

As a by-product of this statistical analysis there are other elements that go to make up the policy thinking of a road commission. One is a study of the wage rates of county employees which shows what a county pays and what they could pay or should pay. Another study compares the mileage of roads within each county to other counties. In the future this may be important as it may become necessary for a commission to ask themselves how much road mileage they can afford to support.

These two studies alone are too lengthy to include in this paper and could very well be subjects for other discussions. This by no means exhausts the possibilities for further study of other items that go to make up road commission activities. There are many more now in process and it is likely that a good deal more haven't even come to light.

THE OPERATION AUDIT

The foregoing charts are examples of the steps taken to determine how the counties are doing or what the status quo is. Each year as the new annual reports are received, every operation is again analyzed and plotted, reflecting those changes in county operations that may have taken place.

This new criterion is then used to produce an operations audit sheet. The audit sheet is a history of the more important operations performed by a county. Tabulated against the actual county expenditures are the state averages (taken from the charts). With the audit sheet, it is possible to compare the various county operations with other counties. An example of this comparison is shown for labor in Table 7.

Only the first five counties listed alphabetically are shown in the example, but they are typical of the remaining counties.

It will be noticed for instance that Antrim County over-spent by 39 percent or 36,000 dollars and Alpena under-spent by 24 percent or 29,000 dollars.

Another example, maintenance expenditure, is shown in Table 8. In this case, Allegan

TABLE 6

Ratio: $\frac{\text{Admin.} + \text{Labor} + \text{Eq.} + \text{Hired Trucks}}{\text{Material}}$

	Actual	Average		Actual	Average
Alcona	2.63	3.75	Allegan	2.16	1.70
Alpena	2.11	2.60	Barry	1.70	1.93
Antrim	3.38	2.75	Bay	1.16	1.77
Arenac	1.65	2.80	Berrien	1.35	1.65
Benzie	1.91	3.35	Branch	2.67	2.05
Charlevoix	2.70	2.50	Calhoun	1.13	1.67
Cheboygan	5.12	2.67	Cass	1.42	1.90
Clare	5.20	2.60	Eaton	2.62	1.95
Crawford	16.30	3.90	Genesee	2.26	1.60
Emmet	2.73	2.45	Gratiot	2.07	1.95
Gladwin	6.30	2.60	Hillsdale	1.31	1.95
Grand Traverse	1.88	2.20	Huron	2.68	1.82
Iosco	1.85	2.53	Ingham	1.23	1.63
Isabella	3.00	2.08	Ionia	2.60	1.90
Kalkaska	2.60	2.80	Jackson	1.42	1.65
Leelanau	2.20	2.92	Kalamazoo	1.47	1.70
Manistee	2.38	2.42	Kent	1.47	1.53
Mecosta	4.10	2.23	Lapeer	2.26	1.93
Midland	1.70	1.88	Lenawee	1.13	1.78
Missaukee	6.30	2.80	Livingston	2.70	2.10
Montcalm	2.44	1.88	Macomb	1.12	1.57
Montmorency	3.32	3.35	Monroe	1.61	1.70
Newaygo	2.02	1.95	Muskegon	1.84	1.70
Oceana	8.20	7.30	Oakland	1.97	1.52
Ogemaw	3.78	3.35	Ottawa	1.38	1.68
Osceola	6.30	2.55	Sanilac	2.20	1.82
Otsego	4.10	3.03	Shiawassee	1.12	1.92
Presque Isle	6.60	3.03	St. Clair	1.77	1.63
Roscommon	3.90	2.62	St. Joseph	1.46	1.97
			Tuscola	1.88	1.80
			Van Buren	1.61	1.81
			Washtenaw	0.97	1.65

Equilibrium Equation

I		II		III
Income	=	Expense	=	Expenditures to roads
[From taxes]		[Road labor, Equipment, Road Material, Administration]		[Construction, Maintenance]

Figure 13.

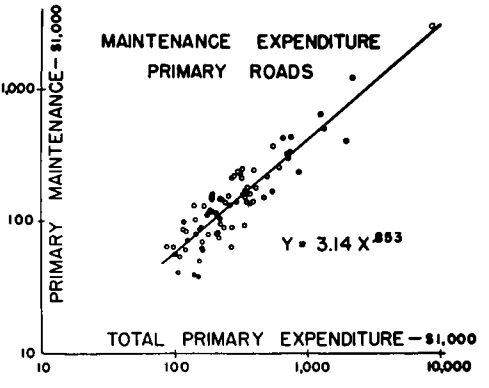

Figure 14.

County over-spent by 47 percent or 118,000 dollars and Barry County under-spent by 53 percent or 72,000 dollars. This spread is again typical for the state.

Tables 9 and 10 are examples of operations audit sheets.

In addition to the annual report, it has been necessary to seek out further information and this is done at the time each county is visited to pick up their annual report. An example of this additional information is found in Table 11.

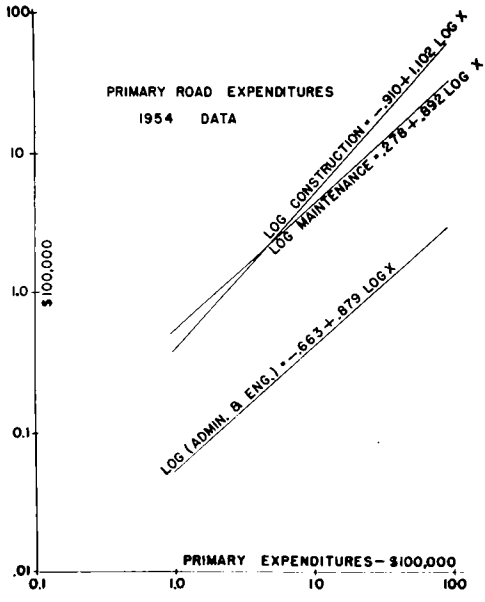

Figure 15.

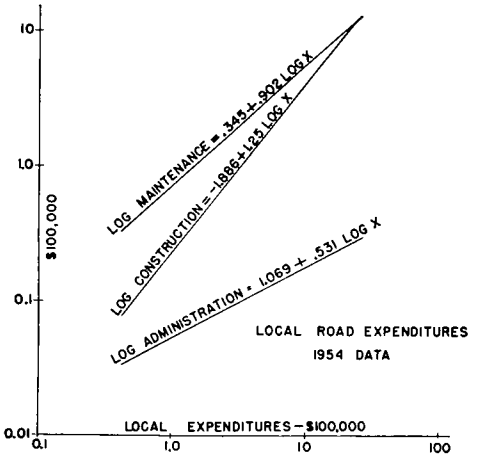

Figure 16.

TABLE 7
LABOR DATA: COUNTIES IN MICHIGAN

County	Labor, Actual	Labor, Average
Alcona	$122,000	$104,000
Alpena	91,000	120,000
Allegan	387,000	375,000
Antrim	128,000	92,000
Arenac	91,000	90,000

TABLE 8
MAINTENANCE EXPENDITURES

County	Actual Dollars	Average Dollars
Allegan	368,000	250,000
Barry	63,000	135,000
Bay	230,000	155,000
Genesee	505,000	540,000
Oakland	1,224,000	820,000

TABLE 9
SCOTT AUDIT—COUNTY ROAD OPERATIONS
(Ex Reimbursible Accounts)
County: Alpena, 1954

	State Average	Actual
1. Administration, net	$15,000	$19,000
2. Equipment	92,000	100,000
3. Road labor	77,000	65,000
4. Road materials	84,000	84,000
5. Hired trucks	2,000	1,900
Contract correction dr	none	none
Total, internal expense	270,000	270,000
6. Primary construction	81,000	79,000
7. Primary maintenance	99,000	97,000
8. Primary engineering and administration	10,000	13,000
Total primary expenditures	190,000	190,000
9. Local construction	31,000	60,000
10. Local maintenance	89,000	61,000
11. Local engineering and administration	6,000	6,000
Total local expenditures	126,000	126,000
12. Wage rate, L.T.O.	1.35	1.45
13. Fringes, L.T.O.	.18	.13
14. Township contribution vs. sales tax diversion money	53%	71%
15. Primary mileage	227	164
16. Local mileage	785	464
17. Capital equity		

THE BUDGET

All of the foregoing would have no value unless it could be put to a useful purpose; this is done through the medium of a budget. It was observed that many county budgets were cumbersome, that is, they were too detailed in spelling out construction attempts and by the time their bookkeeping methods caught up, it was usually too late to do anything about the budget. Therefore, a streamlined budget

TABLE 10
SCOTT AUDIT—COUNTY ROAD OPERATIONS
(Ex Reimbursible Accounts)
County: Presque Isle, 1954

	State Average	Actual
1. Administration, net	$13,000	$13,000
2. Equipment	85,000	71,000
3. Road labor	65,000	107,000
4. Road materials	54,000	28,000
5. Hired trucks	none	none
Contract correction dr.	2,000	
Total, internal expense	219,000	219,000
6. Primary construction	88,000	32,000
7. Primary maintenance	100,000	152,000
8. Primary engineering and administration	6,000	10,000
Total primary expenditures	194,000	194,000
9. Local construction	18,000	27,000
10. Local maintenance	59,000	52,000
11. Local engineering and administration	5,000	3,000
Total local expenditures	82,000	82,000
12. Wage rate, L.T.O.	1.32	1.35
13. Fringes, L.T.O.	.17	.21
14. Township contribution vs. sales tax diversion money	53%	41%
15. Primary mileage	125	178
16. Local mileage	720	517
17. Capital equity		

TABLE 11
Scott Engineering Company
405 River Street
Alpena, Michigan
Date
County: Alpena
Year: 1954

	Labor	Equipment Rental
Primary construction	$4,338.60	$4,203.43
Local construction	11,914.93	17,813.88
State maintenance	47,028.20	50,253.92
Primary maintenance	27,406.90	43,695.11
Local maintenance	15,149.12	33,626.63
Accounts receivable	8,797.30	10,057.44
Equipment direct	20,157.13	
Equipment indirect	12,336.10	
Pits	9,887.47	27,010.10
Administration	15,678.57	
Vacation and sick leave	8,605.62	
Paid holidays	1,123.20	
Compensation insurance	2,232.24	
Social security or retirement	3,869.32	
Hospitalization	1,971.34	
Group life	162.96	
Other misc.	166.82	
Construction contracts		46,698.49
Other hired facilities		1,941.00
Gravel or stone purchased		

was designed, spelling out the income, the road budget and the internal budget. This type of budget was found to be workable because labor and its control seemed to be the key to operations and the information was available at least every two weeks.

In setting norms for the budgetary items, it is believed that if most of the counties of a certain size find it necessary or desirable to spend a certain percent of their income for construction, there is nothing wrong in setting construction budgets higher. For those people who are not so minded, it was found that the approach to spending for construction or materials is a frame of mind and that with proper guidance this frame of mind can be directed to set up higher goals.

An example of a budget is found in Table 12. It is divided into three parts—income, road budget, and internal budget. Income shows the source of revenue and it is the bill being paid by the taxpayer. The internal budget shows the way a road commission will spend this money. In this internal budget will be found some items that are fixed, such as debt payments and construction contracts. The important items over which the commission has discretionary control are administration, labor, equipment, and materials (item II shown in Figure 13). After the total amount of internal expense is determined, the individual

TABLE 12
PRESQUE ISLE COUNTY ROAD COMMISSION
1955 BUDGET

	Income	Road Budget	Internal Budget
Motor vehicle highway fund:			
Primary roads	$145,000		
Local roads	85,000		
County raised funds	20,000		
State maintenance contract	100,000	$100,000	
State project detour	4,000	4,000	
1955 bond payment		12,000	$12,000
Primary maintenance ($565/mile)		100,000	
Local maintenance		60,000	
Local construction		39,000	
Primary construction, county force		35,000	
Primary construction, contract		24,000	24,000
Less equipment profit on rental		−20,000	
Road material			40,000
Administration			21,000
Road labor, incl. fringes			125,000
New equipment			37,000
Equipment maintenance and operation			95,000
	$354,000	$354,000	$354,000

expenses are compared with the average to determine how their individual expenses compare with the state average which has been worked out on the audit of operations sheet. If the road commissions learn to stay within the expenses shown in the internal budget, they can be confident that they are approaching the level of operations of the rest of the

Michigan counties and that they are on safe ground.

The last item of the budget is the road budget or the service and expenditures that will benefit the road user or the taxpayer. Here again the goals are set by the performance of the other counties. That is, the state averages are taken from the audit sheets and the level of performance will approach this state average if control is exercised.

Good results have been obtained in the use of this type of budget because it is simple to control and comparative performance has been achieved.

This budget is the administrative tool the commission will use to achieve the goals of competence that have been set by the over-all state operation at the county level.

SUMMARY

In summary, it will be fair to say that the present day Michigan County Road Commission has had a good heritage backed by good laws and an understanding people. In working with counties for the past 20 years, the writer has observed the high integrity and honesty that is prevalent in all county operations. However there has been a noticeable lack of urgency or, let us say, a sense of competition. There has been a great amount of work done in construction research, pointing out ways of taking advantage of local materials and local resources but very little has been done with management.

It has been noticed that there is a great lack of understanding among county administrators as to their real purpose. We have come a long way from the days when taxpayers worked out their taxes either by labor or material on the roads. In the highly complex atmosphere of today, with all the other agencies clamoring for a larger share of the tax dollar, it is evident that we as road people are going to be in stiff competition for the taxpayer's dollar. Therefore, it behooves us as road people to know where we stand. We are going to have to have proof that we are exercising the best methods of management and engineering to prove to the taxpayer that his dollar is being well spent.

In observing county boards or road commissions over the past years, their greatest need seems to be operational background. They know prices of material, labor, and equipment because competition has set the gauge. As far as these purchases are concerned, they have a good background of competitive buying. However, when it comes to standards of performance there is little understanding as to what is good operation because they have no way to compare their results except through observation and their own integrity.

Local governments have long recognized the value in having fiscal audits. There is no longer any question as to the merits of an outside audit. Because of the monopolistic atmosphere in which the counties operate, there is a need for performance criteria.

It has been demonstrated that it is possible to determine performance criteria through the exercise of statistical methods and that statewide norms can be found. The production of an audit of operations has been useful in setting up controls for the budget. A half dozen Michigan counties have now used this information for four years with good results. Three of the counties were hopelessly in debt but within two years they were able to again work in the black and they no longer are hesitant about the future since they each have vigorous construction programs contemplated for 1956.

The purpose of this research is not to tell the county how to do it, but to point out the bumps in the road so they can, with confidence, correct a poor operation.

It is hoped that this research will stimulate the competitive spirit that has made our country great and that the counties will be able to face up to their critics with competent and forceful answers. Further, it is hoped that the counties will be able to meet the challenge of present and future road demands with confidence and that they can demonstrate to their stockholders, the taxpayers, that every trick of management and engineering is being used.