

REPORT OF COMMITTEE ON UNIFORM ACCOUNTING

ANSON MARSTON, *Chairman*

KANSAS HIGHWAY PROPERTY ACCOUNTING PROCEDURES

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SYNOPSIS

Largely as a result of the work of the committees on accounting of the American Association of State Highway Officials and the Highway Research Board, the State Highway Commission of Kansas has organized complete investment and depreciation ledgers for its rural system of state highways. In organizing these ledgers, the state made use of material collected in the road life study, a special phase of the State-Wide Highway Planning Survey. In this paper the main accounting forms and the main steps of procedure are described. Some discussion of the advantages of the system and use of results is given.

The 9350 miles of the system are controlled by 488 route sections, each of which is used as a basic property unit for accounting and other record purposes. The procedures for the investment accounting are fully integrated with the regular books of account and with the normal daily routine of the regular employees. Special employees and special equipment are not required.

The ledgers show for each route section the annual cost of construction, the retirements of investment, and present remaining investment for the following items: roadway surface (by type), roadway base (by type), grading, culverts, and drainage, structures 20 to 200 feet span, structures over 200 feet long, traffic services; roadside improvement, and right of way.

Continuation of the road life studies and keeping of the mileage log are also a part of the daily routine, so that all three activities—investment, mileage control, and road life—are coordinated in a manner to insure accuracy, completion of records and reports on schedule, and the minimum handling of papers and accounts.

As state highway departments continue to emerge from the building to the operation of highway systems, it becomes more desirable for the administrators and engineers to have available a fund of information, including highway investment, from which to draw the necessary and basic facts which they must use in reaching decisions of policy and of a technical nature. This is necessary now, when a few years ago it was not, for now no one state highway engineer, nor highway commission, can keep in mind all of the details of accomplishments and progress which are necessary to wise, efficient and economical management of state highway systems. The establishment of priorities for construction projects is an involved problem today, whereas, a few years ago

the problem did not exist; the advantageous construction projects then were easily chosen.

State highway officials are managing huge transportation systems, the skillful handling of which means much to the motoring and general public. Service must be rendered with one eye guarding safety of transportation and the other, the cost of transportation. Since the state departments are now large business organizations with far reaching responsibilities, the administrators must resort to volumes of "paper work" in order that they may have at hand that information essential to good administrative direction.

In the past little attention was given by highway departments to property investment accounting, not even to the invest-

mileage log and large scale county maps showing the location of all routes and construction projects thereon. Actually the highway property ledger requires no additional special employees and has not added any material duties to any one of the employees necessary to the normal routine.

KANSAS ROAD LIFE STUDY

The road life study of the Kansas Highway Planning Survey was started in August, 1936, and was originally compiled so that it could be continued. This work provided the state with a revised mileage log and route control sections for each county. These studies furnished the basic records used in setting up the property investment ledgers. Today, the road life studies are being continued as a regular routine of the accounting department.

In the road life studies, when making the original entries on form 484 for past construction, estimates were made of the work salvaged by using the best information at hand and by judgment. These quantities are, therefore, only approximately correct, but they are corrected and modified from time to time as additional information becomes available. For all current projects the estimates of salvage are made by comparison of plans and construction quantities; later, these estimates will be prepared by the Plans and Surveys Department and checked in the field by the resident engineer as the construction is completed.

THE SYSTEM OF HIGHWAY PROPERTY INVESTMENT LEDGERS

Objectives and Methods

As indicated before, it was the original plan in Kansas to continue the road life studies from year to year. During the collection and organization of the data from the original documents it became more and more obvious that with some additions and changes in the records and

routine it would be possible to continue the work with little effort if it were completely integrated with the routine accounting procedures. At the same time rigid controls would be available for mileage, annual construction costs, and current investment balances. Accordingly, then, the forms were altered, the procedures adjusted and gradually assimilated by the regular employees in the auditing department. In 1939 the accounting department added highway investment accounts to its general ledgers.

The county route control sections were maintained, and they now constitute the main highway unit used in the accounting procedures. Individual entries, of course, originate from the construction project, whether built by contract or by State forces. For certain applications of the investment and other information available from the investment ledgers, it may prove desirable to subdivide certain of the county route sections according to urban limits or traffic volumes. This can be done with little difficulty by reference to the original construction records, form 484 (Table 1).

The construction cost items originally used in the road life study were selected before the American Association of State Highway Officials committee on accounting made tentative recommendations for construction cost classifications, but nevertheless they have been used in the property records to avoid reclassification. The classification is:

- Surface (by type)
- Base (by type)
- Grading, culverts and drainage
- Structures 20 to 200 feet span
- Structures over 200 feet long
- Traffic service
- Roadside improvement
- Right of way

The original cost analysis which is recorded on the Master Construction Record, form 484, includes the additional

Entry No. 39D

MASTER CONSTRUCTION RECORD

County
ST118

[illegible]

items of preliminary engineering, construction engineering, overhead and miscellaneous, administration, and materials research. These five items are prorated on a dollar basis or allocated otherwise to the above eight accounts for posting to the ledger accounts. Such a procedure eliminates some detail and simplifies the handling of retirements of such overhead costs.

As before indicated, the whole process of the property accounting for the highways is an integral part of the daily routine followed in the auditing department. In addition, the mileage control by surface types is carried on at the same time. The tie-in with the general ledger accounts furnishes the necessary fiscal control for the cost of construction. The entire procedure results in a minimum handling of the documents, a minimum lag in the availability of current mileage, construction cost and investment information, and a maximum amount of information available all from the one office. As will be seen from the following brief description of the main steps of procedure, little work in addition to that normally required in the regular handling of the estimates and payments to contractors is necessary.

Step by Step Procedure and Forms

The main procedures and forms used for continuation of the property ledgers are given in the following steps. In the end, one complete ledger for each of the 470 county rural route sections is maintained, see form 469 (Table 2). Connecting links through cities are not carried on the investment ledgers at this time.

1 The Plans and Surveys Department, at the time project preliminary estimates are made, estimates the existing construction which is to be reused, or salvaged, in the reconstruction. Retirements are then obtained by comparison with the quantities and costs recorded on form 484, for all previous construction projects.

This department also indicates the mileages and special structures that are to be eliminated or added by the new construction.

2 The auditor's office upon receipt of the original copy of the contract makes up form 484, Master Construction Record, complete except for the cost of the improvement in block 2. On the reverse side of the form the original cost values of all prior work less the anticipated retirements caused by the reconstruction just contracted for is entered. Upon final acceptance of the work and close out of the project, changes are made in these entries if the completed work differs from the estimates. In block 4.1 the adjustments in mileage are recorded on the basis of the plans. These are also changed later if the completed work is not in accord with the plans.

3 When the contract is received the location of the project is shown on the project location map. This set of maps shows the locations of the state highway routes to a scale of 1 in. to the mile. The listing upon the map also gives an index to the construction record form 484.

4 A tabulating machine card 463 (IBM 80-column card) is punched except for a detailed breakdown of costs and the date closed. The total estimated costs are punched as the contractors bid plus 10 percent. The purpose of this card is to be able to make tabulations of construction work in progress. When the project is finished the date closed is punched and the card removed from the current file to the projects completed file. From the completed file and the current file, tabulations are run to show the contracts awarded or in progress for any time period.

5 Cash expenses are punched on cash expenditure record tabulating machine card No. 404, balanced against the warrant register and other accounts and sorted in project order. Detailed tabulating ma-

County Ellis No 2

TABLE 2. FORM 469

STATE HIGHWAY COMMISSION OF KANSAS—HIGHWAY INVESTMENT LEDGER
STATE HIGHWAY SYSTEM ANNUAL CONSTRUCTION AND RETIREMENTRoute 40

| Year built | Date of entry year retired or transf | Miles | Surface* | | | | Base* | Grading culverts and drainage | Bridges and structures | | Traffic service | Right of way | Total Construction |
|---------------|---|--------|--------------------|------------------------------|-----------------------|-------------------|----------|--|------------------------|----------------|--------------------|-----------------|-----------------------|
| | | | Bit surf. treat | Bit surf treat on base | Bit mixed surf. | P. C. concrete | | | 20 ft to 200 ft. | Over 200 ft | | | |
| Subtotal | | 29 388 | 4,744 49 | | 34,989 77 | 238,408 01 | | 110,008 13 | 53,886 73 | 42,776 79 | 4,065 02 | 9,191 76 | 498,070 70 |
| 1938 | 1938 | 1 293 | | | | | | 22,043 63 | | | | 6,994 87 | 29,038 50 T |
| 1938 | 1938 | 0 017 | | | | | | 1,382 02 | | | | | 1,382 02 |
| 1938 | 1938 | | | | | | | | | | | | |
| 1937 | 1938 | 1 293 | | | | | | 22,043 63 | | | | 6,994 87 | 29,038 50 |
| 1938 | 1938 | 1 293 | | 1,921 11 | | | 6,021 95 | 22,043 63 | | | | 6,994 87 | 36,972 56 |
| 1938 | 1938 | 1 293 | | 1,921 11 | | | 6,021 95 | 133,433 78 | | | | 16,186 63 | 536,425 28 |
| Subtotal | | 29 405 | 4,744 49 | 1,921 11 | 34,989 77 | 238,408 01 | | | 53,886 73 | 42,776 79 | 4,065 02 | 3 55 | 3 55 |
| 1939 | 1939 | | | | | | | | | | | | |
| 1939 | 1939 | 0 019 | | | | | | | | | | 3 55 | 3 55 |
| 1938 | 1939 | | | | | | | | | | | 3 55 | 3 55 T |
| 1939 | 1939 | | | | | | | | | | | 16,190 18 | 536,428 83 |
| Subtotal | | 29 424 | 4,744 49 | 1,921 11 | 34,989 77 | 238,408 01 | 6,021 95 | 133,433 78 | 53,886 73 | 42,776 79 | 4,065 02 | | 38 86 T |
| 1929 | 1939 Adjusted | | | | | | | 38 86 | | | | | 0 30 R |
| 1929 | 1939 Adjusted | | | | | | | 0 30 | | | | | 536,389 67 |
| Subtotal | | 29 424 | 4,744 49 | 1,921 11 | 34,989 77 | 238,408 01 | 6,021 95 | 133,394 62 | 53,886 73 | 42,776 79 | 4,065 02 | 16,190 18 | 536,389 67 |
| 1929 | 1939 | | | | | | | 38 86 | | | | | 38 86 |
| 1929 | 1940 | | | | | | | 0 30 | | | | | 0 30 R |
| Subtotal | | 29 424 | 4,744 49 | 1,921 11 | 34,989 77 | 238,408 01 | 6,021 95 | 133,433 78 | 53,886 73 | 42,776 79 | 4,065 02 | 16,190 18 | 536,428 83 |

* The printed form, 15 x 22 inches, provides additional columns for other types.

T = transferred to another classification.

R = retired from accounts

chine runs are made for posting by book-keeping machines to the project ledgers.

6. Non-cash charges are punched on project cost record card 407 and balanced each month with the journal entries posted to the general ledger. They are then sorted by projects, tabulated and posted to the project ledger, the same as is done with the cash disbursements.

7. When the contractor completes the job, notice of its acceptance is given by the division office engineer on a special form. This is followed in 30 days or so by the final estimate of payment to the contractor, which estimate is then handled the same as monthly estimates. Any changes in mileages from that on the original plans is reported along with the notice of acceptance.

8. At the close of each month the division engineer submits two copies of his listing of the final inspection of all projects which affects the log mileage by type of surface. This form is checked against the master construction record form 484 and then posted to the record of the state highway system mileage by type on form 485 (Table 3). At the close of this posting a corrected listing is returned to the division engineer.

9. After a sufficient time has lapsed to allow all project costs to come in after the acceptance of the project, the project is closed out and the project cost statement is prepared from the project ledger. This gives the final total cost of the project.

Administration expenses are carried in a suspense account and ultimately allocated to construction and to maintenance. When the cost statement is completed the percentages of administration expenses chargeable to the project are recorded on the form. Material research is handled likewise and the charge to the project entered on the cost statement.

10. The final costs are posted to the master construction record form 484. The breakdown of the construction costs

to highway accounts is made by reference to the contractor's final estimate. All change orders and supplementary agreements are checked for changes in plans, affecting construction costs, retirements and mileage. This step completed the posting of form 484.

Highways acquired from other authorities (counties, cities) are set up on form 484 in the same manner as are State constructed projects, except that estimated costs are used when construction costs are not available.

11. From the completed form 484 tabulating machine cards are punched once each month as follows:

Form 483 (green) Construction Mileage and Cost Record

Form 482 (brown) Construction Retirement Record

Form 483 (yellow) Transfer and Type Adjustments

A card is punched for each cost item including the total cost.

12. These cards are sorted and tabulated once each month for the dollars in each ledger account. The construction totals from card 483 are debited to account 750 (or 760, or 770), completed construction work account, and subaccounts 751a—n by construction item; credits are to account 1,157 for construction work in progress charged to completed construction or to account 1,158 for additions and betterment work in progress charged to completed construction.

Account 1,162, acquisition of highways and highway structures, is credited with the costs of highways taken over from other authorities, as was listed on form 484 (step 10) and as debited in step 12 from the tabulating machine totals obtained in step 11.

In addition to the credits to 1,157 and 1,158, account 1,155, administration and miscellaneous expense, and account 1,156, materials research and miscellaneous surveys, are also credited with a predeter-

TABLE 3 FORM 485
STATE HIGHWAY COMMISSION OF KANSAS
RECORD OF STATE HIGHWAY SYSTEM MILEAGE BY TYPE

Division 3 Dist _____
County Ellis
Route Co No 40-26

| Authority | Date | Deductions | | | | Additions | | | | State system mileage by maintenance types (Exclusive of connecting links) | | | | | | | | | | Totals | | | | Total mileage maintained by state 10+11+21 |
|------------------------------------|--------|------------------------|------|---------------------------|-------|------------------------|------|---------------------------|-------|--|---|----|-------------|-------|--------|--------|-------------|-------|----|-------------------------|------------|----------------------------|--------|---|
| | | State system | | Connecting links | | State system | | Connecting links | | | | | | | | | | | | State system | | Connecting links | | |
| | | Rural roads 10 + 11 | | Maint by city 20 | | Rural roads 10 + 11 | | Maint by city 20 | | | | | | | | | | | | Rural roads 10+11 | | Maint by state 21 | | |
| | | Miles | Type | Miles | Miles | Miles | Type | Miles | Miles | 1 | 5 | 15 | 20 | 25 | 30 | 35 | 45 | 55 | 65 | 75 | Type 99 | | | |
| Corrected to plan lengths | 7-1-37 | | | | | | | | | 1 293 | | | | | | | | | | | 29 388 | 1 920 | 0 810 | 30 198 |
| Revised resolution city of Hays | 10-38 | | | 0 810 | 0 120 | | | | | | | | | 6 734 | | 12 063 | | 9 298 | | | | | | |
| Final insp | 10-38 | | | | | | | | | | | | | | | | | | | | | | | |
| FAGH 388D | | 1 293 | 1 | | | | 5 | | | | | | | | | | | | | | 29 388 | 1 243 | 1 569 | 30 957 |
| FA 388D | | 1 293 | 5 | | | | 25 | | | | | | | | | | | | | | 29 403 | 1 243 | 1 563 | 30 968 |
| Correction | 12-38 | | | | 0 006 | | | | | | | | | | | | | | | | 29 403 | 1 171 | 1 563 | 30 968 |
| City resolution | 1-39 | | | 1 182 | | | | | | | | | | | | | | | | | 29 403 | 1 166 | 1 564 | 30 969 |
| City limit adj | 3-39 | | | 0 011 | | | | | | | | | | | | | | | | | 29 403 | 1 171 | 1 564 | 30 969 |
| City limit adj | 4-39 | | | 0 019 | | | 65 | | | | | | | | | | | | | | 29 424 | 1 147 | 1 564 | 30 988 |
| Begin split on base sections | 1-40 | 1 293 | 25 | | | | 20 | | | | | | 1 293 6 751 | | 12 063 | | 9 298 0 019 | | | 29 424 | 1 147 | 1 564 | 30 988 | |
| Revised city reso- lutions | 6-40 | | | 1 147 | 1 564 | | | | | | | | 1 293 6 751 | | 12 063 | | 9 298 0 019 | | | 29 424 | 1 220 | 1 491 | 30 915 | |

mined amount allocated on a percentage basis which amounts were previously debited to accounts 750, 760 or 770 for completed construction.

13. The construction retirement totals obtained from card 482 (brown) are credited once a month to general ledger accounts 750, 760, or 770 and debited to account 1,161, retirements and eliminations from state highway system.

14. From card 483 (yellow) the transfers of dollars because of salvage and change of surface types are obtained and posted to the proper subaccounts at the same time that the totals from card 483 (green) are posted.

15. In the final step to complete the investment ledger, the tabulating cards 482 and 483, used each month in posting the totals to the general ledgers, are saved and at the end of the year they are run by county route sections for each subaccount. These totals are hand posted to each investment ledger, form 469, for each county route section. The balances for each subaccount are then totaled by hand for all route sections and verified with the corresponding account balances in the general ledger.

These cards are saved and used for special tabulations, including the preparation of the planning survey road life mileage tables, or for tables of dollars in a form different from that on the property ledger form 469.

Procedure for the Depreciation Ledger

The handling of depreciation, both annual and accrued, is a procedure entirely independent of the procedures for the investment ledgers and mileage controls. The depreciation ledger and supporting forms can be omitted without in any way interfering with the other routine, either for normal accounting or for investment procedures. The step by step procedure is described in the following:

1. Tabulating machine cards 482 and 483 are rerun to develop the information

in somewhat different form from that posted to the investment ledger for use with the highway depreciation data sheet form 27 (Table 4) which is filled out for each route section by account item, and by age, in order to facilitate estimates of probable lives and salvage values at retirement.

2. Each division engineer is furnished with form 28 (Table 5) field condition questionnaire, on which he lists the various route sections in his division and indicates his judgment as to the adequacy of the improvements and his estimate of when the surface probably will be replaced. Other notations useful in estimating life expectancy and salvage values are furnished by the division engineer.

3. Upon receipt of the condition survey from the field, the planning survey engineers enter on form 27 traffic information, maintenance costs, life curve type, average life, and other information useful in estimating the probable life expectancy and salvage value of each item on each route section. By study of the data on form 27, together with judgment and the use of life curves computed for roadway surfaces from the road life mileage study, the planning survey prepares a final estimate of life expectancy and salvage value at retirement. The depreciation ledger data sheet form 27 is then turned over to the accounting department for final calculation of depreciation.

4. The original cost of the existing property as of June 30 is taken from the investment ledger, form 469, and brought forward to the highway depreciation ledger, form 470 (Table 6).

5. From the results of steps 2 and 3, the average age, remaining life, and estimated salvage percentage, are brought forward to form 470 from form 27. The adjusted annual depreciation rate is then calculated and applied to the original cost to obtain the total depreciation to date for each account item on the county route section.

TABLE 4. FORM 27

STATE HIGHWAY COMMISSION OF KANSAS—HIGHWAY PLANNING DEPARTMENT

DEPRECIATION LEDGER DATA SHEET

| Surface type or item | Miles | Average daily traffic | | | Surf maint cost per mile | | Type curve | Existing surface | Year constructed | | Total cost | Age and average age in years | Probable years remain. | | Estimated salvage value % | Bridge danger factor | Remarks |
|--------------------------------|--------|-----------------------|--------|----------------------|--------------------------|----------------------------|--------------|--------------------|------------------|-------|--------------------------|------------------------------|------------------------|-----------|---------------------------|----------------------|--|
| | | State average | Actual | Recommended by AASHO | Probable future traffic | Present physical condition | This section | State average | Surf. or item | Grade | | | Theoretical | Estimated | | | |
| Brick | 0 019 | 1850 | 949 | 750-4000 | | Excd. | 236 | S ₂ -28 | J | 1939 | | 0 | 28 | 28 | 50 | | Transferred from city in 1939. |
| Concrete | 9 298 | 1450 | 1626 | 750-4000 | | Good | 88 | S ₂ -30 | I | 1931 | 238,408 01 238,408 01 | 8 | 22 | 22 | 50 | | Weighted ave |
| Bit. mix.. | 12 063 | 616 | 1110 | 300-750 | | Ave | 440 | S ₂ -8 | E | 1932 | 34,989.77 34,989 77 | 7 | 2 | 4 | 15 | | Assume partial relocation within 4 years. Weighted ave. |
| Bit. surf tr. | 1 310 | 616 | 949 | 300-750 | | Poor | 701 | R ₂ -9 | D | 1938 | 1,912 11 6,021 95 | 1 | 8 | 4 | 0 | | Assume to be replaced with bit mix. within 4 years. Weighted ave—surface. Weighted ave—base |
| Stab. base | Base | | | | | | | | | 1938 | 1,912 11 6,021 95 | 1 | 14 | 14 | 50 | | Blade grade Assume to be brought to standard grade and higher. Assume higher type within 3 years (type surface within 3 years) Assume higher type within 3 years Weighted ave. |
| Bit. surf. tr | 5 540 | 616 | 1767 | 0-300 | | Poor | 701 | R ₂ -9 | D | 1933 | 3,770 39 | 6 | 4 | 3 | 0 | | Partial relocation. Relocation. |
| | 0 475 | 616 | 1767 | 0-300 | | Poor | 701 | R ₂ -9 | D | 1933 | 323 08 | 6 | 4 | 3 | 0 | | Weighted ave |
| | 0 719 | 616 | 1767 | 0-300 | | Poor | 701 | R ₂ -9 | D | 1935 | 651 02 | 4 | 6 | 3 | 0 | | Bridges calculated independently of grading and surfacing. |
| Grading, culverts and drainage | | | | | | | | | | | 4,744 49 | 6 | 3 | 3 | 0 | | Weighted ave |
| | | | | | | | | | | | 62,270 82 21,276 78 | 8 | 22 | 22 | 50 | | Weighted ave |
| | | | | | | | | | | | 2,689 79 | 11 | 4 | 4 | 20 | | Weighted ave |
| | | | | | | | | | | | 22,043 63 | 11 | 49 | 3 | 15 | | Weighted ave |
| | | | | | | | | | | | 11,563 84 | 11 | 30 | 40 | 40 | | Weighted ave |
| | | | | | | | | | | | 3,033 96 | 10 | 45 | 50 | 41 | | Weighted ave |
| | | | | | | | | | | | 10,354.96 133,433.78 | 5 | 24 | 24 | 41 | | Weighted ave |
| | | | | | | | | | | | 1,800 07 | 11 | 24 | 24 | 0 | | Weighted ave |
| | | | | | | | | | | | 3,122 59 | 11 | 24 | 24 | 0 | | Weighted ave |
| | | | | | | | | | | | 3,539 62 | 11 | 24 | 24 | 0 | | Weighted ave |
| | | | | | | | | | | | 5,794.05 | 11 | 24 | 24 | 0 | | Weighted ave |
| | | | | | | | | | | | 4,169 65 | 11 | 34 | 34 | 0 | | Weighted ave |
| | | | | | | | | | | | 2,548 23 | 11 | 24 | 24 | 0 | | Weighted ave |
| | | | | | | | | | | | 16,398 78 | 10 | 25 | 25 | 0 | | Weighted ave |
| | | | | | | | | | | | 16,513 74 | 10 | 25 | 25 | 0 | | Weighted ave |
| | | | | | | | | | | | 53,886.73 | 10 | 26 | 26 | 0 | | Weighted ave |
| Bridges under 200 ft | | | | | | 8 | | | 1928 | | | | | | | | |
| | | | | | | 8 | | | 1928 | | | | | | | | |
| | | | | | | 8 | | | 1928 | | | | | | | | |
| | | | | | | 9 | | | 1928 | | | | | | | | |
| | | | | | | 9 | | | 1928 | | | | | | | | |
| | | | | | | 9 | | | 1928 | | | | | | | | |
| | | | | | | 8 | | | 1929 | | | | | | | | |
| | | | | | | 8 | | | 1929 | | | | | | | | |

TABLE 4 FORM 27.—CONTINUED

| Surface type or item | Miles | Average daily traffic | | | | Present physical condition | Surf maint cost per mile | | Type curve | Existing surface | Year constructed | | Total cost | Age and average age in years | Probable years remain | | | Estimated end salvage value % | Bridge danger factor | Remarks |
|----------------------|-------|-----------------------|--------|--------------------------|-------------------------|----------------------------|--------------------------|---------------|------------------|------------------|------------------------------|------------------------------|---|------------------------------|-----------------------------|------------------------------|-------------------|-------------------------------|---|---------|
| | | State average | Actual | Recommended by A A S H O | Probable future traffic | | This section | State average | | | Surf or item | Grade | | | Theoretical | Estimated | Ratio | | | |
| Bridges over 200 ft | | | | | | 10 10 | . . | | . | | 1929 1934 | | 18,685 89 24,090 90 42,776 79 | 10 6 8 | 35 44 40 | 0 0 0 | 000 000 000 | | Weighted ave | |
| Traffic service | | | | | | | . . . | | I E D | | 1931 1932 1933 | 1931 1928 1928 | 1,014 60 2,535 17 515 25 4,065 02 | 8 11 11 10 | 22 3 3 8 | 0 0 0 0 | | | Assume traffic service ends with life of grading. Weighted ave | |
| R/W. | | | | | | | . . . | | I D D D | | 1931 1938 1933 1935 | 1931 1938 1928 1933 | 4,484 66 6,998 42 1,193 46 3,513 64 16,190 18 | 8 1 11 6 5 | 42 49 100 44 43 | 100 100 0 100 93 | | | 50-year life assigned to R/W. Weighted ave | |

TABLE 5. FORM 28

DIVISION ENGINEERS' FIELD CONDITION QUESTIONNAIRE FOR STATE SYSTEM AND CITY CONNECTING LINKS

Division 3

| Map Ref No. | City or county | Route | Approx section length | Existing surface type | Grading and culverts | | Surface | | | Location | | Remarks |
|-------------|----------------|-------|-----------------------|-----------------------|-------------------------|---------------------------|-------------------------|---------------------------|---------------------------------------|-------------------------|---------------------------|--|
| | | | | | Ade- quate ² | Inade- quate ² | Ade- quate ² | Inade- quate ² | Est. year of replacement ¹ | Ade- quate ² | Inade- quate ² | |
| 18 | Ellis | 183 | 17 5 | 20 | X | . | X | X | Over 5 years 1941 | X | X | Thin mat breaking up. Stabilized base needed Should be a mat. Has a stabilized base. Surface in good condition |
| 19 | Ellis | 183 | 12 | 35 | X | X | . | X | 1941 | X | X | |
| 20 | Ellis | 40 | 1.3 | 20 | X | X | X | X | 1943 | X | X | |
| 21 | Ellis | 40 | 7 | 35 | X | X | X | X | . | X | X | |
| 22 | Ellis | 40 | 6 | 35 | X | X | X | X | . | X | X | |
| 23 | Ellis | 40 | 9 | 55 | X | X | X | X | 1943 | X | X | |
| 24 | Ellis | 40 | 6 | 25 | X | X | X | X | . | X | X | |

¹ If not to be replaced in five years, write in "Over five years"² Check the column which applies Adequate means adequate for present traffic.

TABLE 6 FORM 470
STATE HIGHWAY COMMISSION OF KANSAS
Highway Depreciation Ledger

| Item | Average age, years | Estimated remain- ing life, years | Estimated salvage % at retire- ment | Adjusted annual deprecia- tion rate % | Original cost of existing property | Depreciation | | | | Total to date Dr Cr | |
|--|--------------------------|--|--|---|---|----------------------|------------|----|-----------------------------------|------------------------------|--------|
| | | | | | | During year Cr | Adjustment | | Net total for year Dr or Cr | | |
| | | | | | | | Dr | Cr | | | |
| TO JUNE 30, 1939 | | | | | | | | | | | |
| Surface { Gravel or stone Bit surface treated Bit. surface treated on base Bit mixed surface P C concrete | 6 | 3 | 0 | 11 11 | 4,744 49 | | | | | | 3,162 |
| | 1 | 4 | 0 | 20 00 | 1,912 11 | | | | | | 382 |
| | 7 | 4 | 15 | 7 73 | 34,989 77 | | | | | | 18,932 |
| | 8 | 22 | 50 | 1 67 | 238,408 01 | | | | | | 31,851 |
| Base { Gravel—stone | 1 | 14 | 50 | 3 33 | 6,021 95 | | | | | | 200 |
| | 7 | 24 | 41 | 1 90 | 133,394 62 | | | | | | 17,741 |
| Grading, culverts, and drainage bridge { 20 ft to 200 ft Over 200 ft | 10 | 26 | 0 | 2 78 | 53,886 73 | | | | | | 14,980 |
| | 8 | 40 | 0 | 2 08 | 42,776 79 | | | | | | 7,118 |
| Traffic service Roadside improvement Right of way | 10 | 8 | 0 | 5 56 | 4,065 02 | | | | | | 2,260 |
| | .. | | | | 16,190 18 | | | | | | |
| Total | | | | | 536,389 67 | | | | | | 96,626 |

DISCUSSION OF THE SYSTEM

One of the greatest advantages of the system of highway property ledgers as used in Kansas is the fact that all procedures are a part of the established daily routine of the accounting department. This alone prevents the work from getting behind, being put on the shelf, or being done in a loose inaccurate manner by untrained temporary employees. It also is proving to be an excellent and economical way of keeping the road life studies of the planning survey currently up to date. In addition it furnishes correct and current information on highway construction costs and highway investment. The fiscal control with the general ledger and the mileage control in conjunction therewith prevents error and eliminates rehandling of any of the papers of original entry. At the close of the fiscal year, complete reports on construction, mileage and investment are available as readily as are the ordinary reports of receipts and disbursements.

The offices of highway planning, design, and administration have available much of the fiscal, cost, and road life information that they require in carrying out their respective responsibilities, and without the duplication of work or of original records. An accounting department, to be of the most value to the State highway department, must be considered as a service organization available to furnish all fiscal, cost accounting, and statistical information desired by any of the other departments which can be obtained from the routine flow of original papers and documents through the auditing office. To the extent that the accounting department can render service to the other departments, it should be requested to do so, whenever such service may originate from the regular handling of accounting papers. On the other hand, outside of performing the necessary fiscal accounting to account properly for funds, the accounting depart-

ment need not keep records, summaries, and statistical information which are not made available to those departments which could use the information to advantage. In this respect the highway property and mileage records are proving to be sources of valuable information to several of the departments.

The procedures outlined cover all the steps required to collect and compile information for three distinct results: (1) mileage log and mileage control, (2) road life tables of mileages built and retired and construction dollars expended and retired, and (3) a continuing record of highway investment by route sections and cost items. The labor and cost required to operate these three functions is difficult to separate from that required for the normal fiscal and cost accounting operations because all phases of the work are done by the one set of employees and at the same time. Recent trend in the department, however, has been to fewer employees rather than to increases in number.

The auditing department of the State Highway Commission of Kansas has kept, since 1927, the total investment in state highways. This figure was maintained by adding to the previous total the annual expenditure for construction and to subtract an allowance for previous work retired. To estimate the retirements, use was made of a set of county maps, one-fourth inch to the mile scale, on which was recorded each completed project. By 1937 the hand process of keeping this record became burdensome and the results none too reliable. Consequently, with the undertaking of the road life studies, opportunity was taken to develop an improved system.

In 1934 the highway commission assigned to the auditing department the task of maintaining a mileage log of the State system. It was set up in 1934 from speedometer logging and has been maintained by the auditing department ever since. Of course, the original speedometer distances

have been altered to agree with surveyed distances and planning survey inventory results wherever possible.

From the foregoing history, it is seen that the road life mileage study is the only new work added to the procedures existing about 1936. Both the mileage and investment ledger work have been improved in procedure and extended in details. However, it is believed that the present integrated procedures require no greater work nor time than they did before by the less efficient procedures which produced less information.

In any State highway department, however, not keeping similar records at this time, perhaps two additional employees would be required in the auditing department if it were to take over work comparable in scope and volume to these three phases handled by the auditing department of the State Highway Commission of Kansas.

There is no reason why the procedures as described herein would not be suited to any State highway department. Certain detailed procedures would need to be altered to fit existing routine and methods of accounting. The principles are sound from the accounting standpoint and the procedure logical, practical, and low in cost. The system is particularly adaptable to the continuation of the road life studies of the highway planning surveys.

ADMINISTRATIVE USES OF HIGHWAY PROPERTY RECORDS

The uses of the information provided in the property investment and depreciation ledgers are mainly associated with administrative and management affairs. The highway administrator is confronted with three main, but closely related, problems. First, planning what should be done; second, proving that his plan should be carried out and getting acceptance of it, and third, reporting accomplishments. Carrying out an approved plan is a relatively simple, though highly important,

part of the administrator's duties. In the introductory statements it was mentioned that because of the extensive and varied character of today's highway departments, it is no longer within the capabilities of one man to administer the department from memory, first hand information, and personal contact with jobs and details, but that a complete system of reports, records, and files is necessary. Further, that the creation of a highway plan requires careful analysis of the situations on all routes and the probabilities of the future. Property records are part of the useful tools that should be available to all State highway commissioners and engineers to aid in the solution of the three main problems.

All plans for highway development evolve out of present conditions plus carefully made estimates of what the future conditions are most likely to be. Intelligent forecasts are a result of trend studies in which the past and present is projected into the future with those modifications that expert judgment believes to be warranted. Considering the highways from only the standpoint of economic values, much can be gained in determining an improvement program by a study of the relative costs and investments for all sections of routes, together with the motor vehicle revenues allocated to the route sections on the basis of traffic analyses. The property ledgers will furnish the basic information for these studies. If the traffic counts are obtained from the traffic surveys and the maintenance costs from the cost accounting records, material is then available to complete the following for each route section, each route, each county and for the system as a whole:

1. Investment per mile
2. Investment per vehicle-mile
3. Annual road cost per mile
4. Annual road cost per vehicle-mile
5. Annual revenue per mile
6. Annual revenue per mile per dollar-investment
7. Annual net earnings per mile

The investment studies may be extended to show the comparative values for each investment item, such as surface, grading and culverts, right of way, etc. Having the seven factors listed above, means is at hand to select those sections which stand at both extremes for further detailed analyses. Thus, the safety features, accident rates, satisfaction of service and other factors are deserving of consideration in the final selections. The above study has the additional advantage of bringing to attention those sections of highway which are over built for present traffic as well as indicating the under-built sections that should be scheduled for reconstruction.

Further analyses of the investment in relation to traffic will clearly point out the general range within which the road is fairly certain to be satisfactorily constructed from the economic angle.

Long range planning requires the development of trends bearing upon the investment, construction costs, operating costs and lives of the facilities. These all may be developed from the property ledgers and supporting information. The ledgers give directly the investment per mile for all items of cost for each of the past years. The trend of investment, and therefore the trend of cost, is available for projection into the future. Further, by study of the dollars of investment retired each year in relation to the dollars of construction completed and the dollars of remaining investment, forecasts are possible to indicate the rate of future retirements and the extent that construction must take place in order to make good the normal retirements. Such studies have already been completed for roadway surfacings using the mile unit for analysis, but with the investment ledgers, the studies can be made on a dollar unit for each highway cost element.

Having arrived at a plan of construction or development of a highway system, it frequently becomes necessary to con-

vince public officials, legislators and delegations of the motoring public that the plan is economically and otherwise sound, and that the priorities for improvement are just. Proof of these points usually is possible by careful presentation in comparative arrangements of the facts used in reaching the conclusions on which the plans are based. The relation of one specific section of highway to all other sections within the system is usually unknown to the special and pressure groups which promote certain projects. Thus, their proposals are usually easily proved sound or unsound when set forth in comparison with the conditions of other highway route sections.

Presentation of a complete balance sheet (see Table 7) along with other fiscal and cost statements makes it possible for an administration to report its activity and accomplishments in a manner which discloses its true condition and its true advancement. Simple cash statements do not suffice, and, of course, present no information about the value or extent of the existing highway properties. Retirements of highway properties are becoming an important item to report in order that administrators can guard against the development of the erroneous idea that the value of the highway system should be equal to the accumulation of past annual construction costs. As the construction becomes of greater age, annual retirement of investment approaches the volume of annual construction, except for extensions and betterments of the system, and thus there will be little net gain in the system in spite of large annual budgets for construction. A series of balance sheets and tabulations of retired investments will do much to acquaint the public with this situation, a normal one, but one which is not always recognized. Also, the gradual increase in investment per mile of highway can be shown by the balance sheets from year to year, thus bringing out that additional tax revenues are necessary to

Current Liabilities:

| | |
|-----------------------|-------------|
| Accounts payable .. . | \$94,426.58 |
|-----------------------|-------------|

| | |
|----------------------------|----------------|
| Contracts unearned .. | \$8,388,676 59 |
| Federal fund agreements .. | 4,590,061.96 |
| | 12,978,738 55 |

| | | | | | | |
|-----------------------------------|--|--|--|--|----------------------|--|
| Revenue anticipation warrants .. | | | | | \$ 2,324,000 00 | |
| Benefit district costs payable... | | | | | 15,949,943 53 | |
| | | | | | <u>18,273,943 53</u> | |

| | | |
|--|----------------|------------------|
| Materials and supplies | \$391,860 41 | |
| Highway equipment | 1,775,126 87 | |
| Administration equipment | 118,705 61 | |
| Highway patrol equipment | 54,647.01 | |
| Highways and highway structures | 121,435,164.94 | |
| Land | 32,324 36 | |
| Materials research, miscellaneous surveys and other deferred costs | 390,136 39 | |
| Highway planning surveys | 656,232 91 | |
| Motor vehicle department equipment | 37,555.02 | |
| | <hr/> | \$124,891,753.52 |
| Cash appropriations | | 8,024,822.91 |
| | | <hr/> |
| | | 132,916,576.43 |
| | | <hr/> |
| | | \$164,263,685 09 |

Survey, and the supervisors of the road life study were responsible for the collection and summary of the basic information and for many worth-while suggestions.

The author's contribution was primarily that of a consultant who was in contact with all phases of the work, starting with the road life study in 1936. He is appreciative of the opportunity of being associated with the work, of having been able to offer some help, and of having had the privilege of associating with the men who did the work.

The state managers of the Highway Planning

PROF. R. L. MORRISON, *University of Michigan* How are the earnings computed?

of determining relative earnings of the roads of the State.

PROF. MORRISON: I cannot see that it is logical to compute highway earnings on the basis of tax payments. Earnings are usually the returns obtained by the investors in an enterprise, and the investors in the case of most highway systems are the motorists who furnish the capital, and running expenses, in the form of contributions called taxes. This capital is fur-

nished only because of the returns it will bring to the taxpayers in the form of more economical, efficient, safe, and comfortable transportation. No capital is invested in this enterprise by anyone except the taxpayers, who are generally the users, and what the capital earns appears to me to be the return which these investors receive.

Converting traffic volumes into "earnings" by arithmetical manipulation of tax contributions and vehicle-miles would probably be harmless except that it tends to make the highway engineer forget that his only function is to give the taxpayer-investor the most possible service for his money. Returns to the taxpayers form the sole justification for highway improvement and the theory of "earnings" in terms of tax contributions, instead of in terms of returns made for these contributions, appears to collapse entirely when applied to local systems financed by real estate taxes.

PROF. WINFREY: I believe you are confusing what you might call savings with what I term revenue. I made no mention of economic savings effected by road improvement, but indicated that a known yearly tax income could be allocated to highway routes on the basis of the volume and character of traffic.

DEAN ANSON MARSTON, *Iowa State College*: I understand that the State of Kansas publishes in its Annual Report the facts which these accounts show at the end of the year, including a balance sheet. Is that correct?

PROF. WINFREY: The last Annual Report I have from the State Highway Commission of Kansas did carry a balance sheet in which is shown the total investment in highways. There are other details published which come directly from the investment ledger and depreciation ledgers.