

SECTION VIII--COUNTY HIGHWAY DEPARTMENT

COUNTY HIGHWAY DEPARTMENT - COST ACCOUNTING

Objective:

The objective of a cost accounting system for county highway departments is to provide actual cost information on work completed or projects undertaken and to enable cost estimates to be projected for current and future projects. Cost accounting records can serve as a basis for comparing the cost of your operation with others and give you the tools to understand and evaluate the expenditures incurred in relation to actual accomplishments.

Establishing Road Cost Records:

The following steps should be considered in establishing cost accounting records:

1. Standardized Definitions

Uniform definitions for all functions of work should be developed and adopted so that like operations can be reported in the same way. To obtain uniformity, it is necessary to have common understanding of the meaning of the terms used.

The normal functions of a highway department are divided into two general classes of work, construction and maintenance. Construction, in a broad sense, is to develop highways or facilities on new locations or to realign or improve the quality well above the existing highway or facility and includes the following types of work:

- Removal of old roadbed and structures, and detour expense when done in connection with a larger construction project
- Significant widening or realignment of an existing roadway or structure
- Original surfacing with a material higher in quality than the adjacent roadside
- Building flood control protective structures
- Total reconstruction of structures or facilities to a higher quality than the original structure
- Significant installations or extensions of curb, gutter, or underdrain
- Significant items incidental to the improvement of a construction project as a whole

All project work undertaken by the county highway department which is not classified as construction as defined above should be considered as maintenance. It should generally be remembered that construction costs increase the value of the highway facility and are properly added to the asset, while maintenance costs are operating expenses. Judgment must be exercised to classify projects as construction or maintenance.

2. Road and Structure Identification

A simple numerical designation should be assigned to each road and road structure under the control of the county highway department as a permanent form of identification. The numerical coding used should be detailed enough to identify specific road sections and structures with a twenty foot opening or larger and should be flexible to expand to identify new roads and structures.

A map should be prepared to show all of the roads and structures for which the county is responsible with the code designation assigned to each. The county, in addition, may wish to erect visible markers indicating the beginning of a road section, subsection or the bridge designation. If the map contains adequate identification of roads and structures, it would not

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be necessary to erect markers.

Without some system of permanent identification of the site of work performed, it would be difficult to obtain accurate and comparable costs on the various types of roads.

3. Equipment Identification

A permanent numerical code should be used to identify each major piece or unit of shop, construction and maintenance equipment owned by the county highway department. The number, if possible, should be permanently affixed to the unit by the use of stencils or decals to provide positive identification of the unit when assigning costs applicable to that unit of equipment.

4. Project Identification

Work to be completed should be identified as a specific construction, road maintenance or bridge maintenance project. After the project has been identified, related expenditures will be accumulated monthly by function and object.

5. Functional or Activity Accounts

Major functional accounts should be established to serve as a control for the distribution of costs. These accounts are designed to reflect in detail the exact nature of the work performed under the major headings of construction, maintenance and administration. A suggested expenditure classification by function/subfunction is shown in Appendix A. Expenditures should be recorded to the minimum at the function level, but subfunctions are provided if a greater breakdown of expenditures is desired.

6. Object Accounts

Records should disclose the objects of expenditures; i.e., amounts spent for personal services (salaries and wages), travel, materials, supplies, contracts, rent, utilities, etc., for each activity. By the use of object accounts, together with functional accounts, the records will reflect the exact nature of the expenditures by activities. A suggested expenditure classification by object is shown in Section II, page 55 of this manual and may be expanded, if needed, to record a more detailed breakdown of expenditures by object as shown in Appendix B.

Highway Department construction and maintenance project costs contain the following components which will be charged to each project:

1. Equipment Costs

Rental Systems:

Equipment records are needed to determine the actual cost of operation of each unit of equipment and to determine the actual cost per hour of its production. To reflect equipment costs in the total cost of each operation, an equipment rental system is recommended which collects the costs into accounts for individual units of equipment and then transfers them, based on the amount of service rendered, to projects, operations or road sections. Current rental rates are based on a projection of prior year actual costs. Administrative and clerical costs and their respective benefits are not included in equipment rental costs.

The equipment costs are reflected to projects through the rental rates in the Standard Equipment Cost Journal described on page 14.

The properly designed rental system will enable the highway department to establish rental rates that will reflect in hourly rates the cost of owning, repairing and operating equipment. Requirements for such a system are:

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- Reporting procedures which will provide the information needed with respect to use, cost and accrued rental of each piece of equipment
- A perpetual or historical record of the individual unit to reflect accumulated cost and performance data
- A periodic comparison of equipment cost and rental charges that disclose the discrepancy between these two items, for each group of like units, and for the fleet as a whole
- A schedule of rental charges that will cover depreciation and the estimated cost of supplies and repairs. Such a schedule is generally prepared to provide a single rate for a class or group of equipment of like use, size and capacity, rather than for each individual unit of equipment. A rental computation should be made by totaling all equipment costs by class or type and dividing that total by the total number of hours of operation of all equipment within that class. It should be recognized that equipment within the same class or group could have different size or efficiency and would therefore require separate rental rates. By relating the actual cost of operation of each unit with the schedule rate for the group, a ready comparison of the economy and efficiency of each unit is obtained. This schedule should be adjusted each year on the basis of an analysis of actual cost and rental.

As discussed above, the equipment cost is a projected cost and it would be possible if needed at year end to determine the actual equipment costs of a particular project from the newly computed rental rates.

A sample format to determine actual rental rates and to project future rental rates is included as Appendix C.

Components of Equipment Costs:

Equipment costs refers to the overall cost involved in providing the services of county-owned equipment, excluding wages and expenses of operators. This cost is composed of "direct costs," "indirect costs," and "depreciation."

- (a) Direct costs are composed of two parts, repair and operating costs. Direct costs are costs which can be identified to a particular unit of equipment.
- Repair cost means the cost of parts and materials installed or consumed in repairing or overhauling equipment, together with the labor expended in these operations. Also included are the costs of services performed by commercial shops.
 - Operating cost means the cost of supplies consumed in operating and servicing equipment, including servicing obtained from commercial services. It includes the cost of consequential amounts of labor involved in servicing, other than that of operators on duty with the equipment. The following are typical operating cost items:
 - Fuel
 - Lubricants
 - Grease
 - Tires and tubes
 - Tire repairing
 - Insurance
 - Expendable accessories (spark plugs, batteries, fan belts, etc.)

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Direct equipment costs are posted to the Equipment Record shown in Appendix E.

(b) Indirect equipment costs are those not identified with any particular unit of equipment, thus requiring prorating costs of all equipment benefited. The following are typical examples of indirect costs:

- Shop storage and miscellaneous costs of an overhead nature relating to the care and handling of equipment, such as:

Salaries of Indirect Nature to shop

- Utilities
- Rental and maintenance
- Replacement of expendable shop tools and small equipment
- Shop supplies
- Insurance on buildings and small equipment
- Depreciation on buildings (40 year life)

Indirect equipment costs are apportioned yearly over all equipment based on their hours of operation. Indirect equipment costs are accumulated in the Administration and Overhead Cost Journal as illustrated on page 15 before being apportioned to the Equipment Record as shown in Appendix E.

The indirect equipment costs assigned to a particular unit of equipment are determined by a ratio of hourly operation of each unit of equipment to the total hourly operation of all equipment as determined from the summary of all the individual equipment records of Appendix E. The resulting ratio, when applied to the total indirect equipment costs, provides the indirect equipment cost applicable to that particular unit of equipment. The indirect equipment costs (overhead) would be applied as follows:

Indirect Equipment Cost Per Equipment Unit =

$$\frac{\text{Hourly Operation of Each Unit of Equipment}}{\text{Hourly Operation of All Equipment}} \times \frac{\text{Total Indirect Equipment Costs}}{\text{Indirect Equipment Costs}} = \text{Indirect Equipment Cost for Unit No.1}$$

$$= \frac{1,000 \text{ hours}}{15,000 \text{ hours}} \times \$3,500 = \$233.33$$

This procedure should be continued for each piece of equipment annually and should be saved in the form of a detailed work-sheet as shown above. The individual indirect costs should be added to the individual equipment record for the purpose of computing future rental rates.

The actual indirect equipment cost of a specific project can be computed at year end if needed.

(c) Depreciation is the measurement of the declining value of property due to age and wear. It is normally based on the original cost of the equipment including erection, attachments and transportation, less the estimated salvage value at the time the equipment is retired from service. This is the amount to be depreciated and will be computed using the straight-line method which distributes the cost equally over the useful life of the equipment. The original cost should equal the cash outright purchase price or should represent the cash purchase price plus the actual value of the trade-in allowed. The actual value of the trade-in allowed for new purchases should be determined by obtaining the purchase quotes/bids to include the cost, both with and without trade-in. Depreciation is computed at year end and should be added to the individual Equipment Record as per Appendix E for the purpose of computing future

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rental rates.

To determine depreciation allowance, the service life, expressed in years, is used to determine the period during which the amount to be depreciated of the equipment will be charged off. The amount to be depreciated divided by the years of service life will give the depreciation rate to be included in the rental charge. For example, if given an amount to be depreciated of \$12,000.00 and an estimated service life of 10 years, it would require a yearly depreciation rate of \$1,200.00 to earn its original value by the time the service life is exhausted:

Cost of Equipment	\$15,000.00
Less Salvage Value	3,000.00

Amount to be Depreciated	\$12,000.00
Divided by estimated Service Life	10 years

Depreciation Cost per Year	\$ 1,200.00/year
	=====

Except in cases where the unit is rebuilt to extend the service life or it is damaged beyond economical repair, depreciation will not ordinarily have to be adjusted during the service life of the unit.

The depreciated value (purchase price less accumulated depreciation) of a unit of equipment will seldom equal the actual secondhand market value of the particular unit. The age, amount of use and mechanical condition will determine the resale or trade-in value, which may be greater or less than the depreciated or book value.

Depreciation is to be recognized for buildings and will be depreciated over forty years.

A table of suggested useful lives in years and salvage value percentages for equipment is shown in Appendix D.

The depreciation record can be incorporated with the Fixed Asset Record discussed in Section IV of this manual.

Detailed Equipment Records:

In order to obtain performance and cost data on each unit, all repairs, supplies and accessories must be charged to the particular unit as they are furnished. Daily records are necessary to properly and accurately assign costs to individual units of equipment.

At year end, indirect costs and depreciation expense are computed and posted to the detailed equipment records. A sample format of an Equipment Record is included as Appendix E.

2. Labor Costs

The salaries and expenses of equipment operators and other field employees engaged in construction and maintenance activities should be directly charged to the projects and activities on which they are assigned and recorded in the Direct Labor Journal. The distribution of these costs should show the location and exact nature of the work performed. Each report should be complete in itself and eliminate the need for additional forms for the distribution of costs. The tabulation of the costs to be charged to each road or bridge and to the work classifications may be made daily, but are generally deferred until the end of the payroll period. If the employees are covered by social security, vacation and sick leave, or have any other fringe benefits paid by the county, the total of these costs used should be accumulated through the Administration and Overhead Cost Journal at page 15 and prorated to the various work activities. For this record, administrative salaries are maintained separately and are prorated to maintenance projects. The fringe benefits paid by the county are also referred to as payroll additives or indirect labor as these costs cannot be directly applied to

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equipment or a specific project.

Indirect labor costs are apportioned at year end based on a percent-age of total direct labor costs and are then added to equipment and project records based on individual equipment and project direct labor costs. Total direct labor costs can be determined from the direct payroll recorded on the journals described in this cost system. The computation of indirect labor apportioned would appear as follows:

Indirect labor ratio per project or equipment unit =

Total Indirect Labor Costs for Year Ended December 31, 20__

 Total Direct Labor Cost for Year Ended December 31, 20__

Indirect Labor Ratio x Direct Labor of each project or equipment = amount of Indirect Labor Cost to be applied to each project or equipment annually.

Indirect Labor Cost \$ 17,870
 ----- = ----- = 10.5% = Indirect Labor Ratio

Total Direct Labor Cost \$170,000

Ratio x Direct Labor Cost of Equipment No. 1 = Indirect Labor Cost = 10.5% x \$4,000 = \$420.00

The indirect labor cost computed should be determined each year and added to the respective equipment or project record. Only those payroll additives actually paid from county highway funds should be included in determining total benefits to be distributed.

The indirect labor ratio should be used for current project reports based on the previous year and added at the completion of the project based on direct labor of the project. At year end, the actual indirect labor cost of a specific project can be computed if needed.

An acceptable, **but not necessary recommended** alternative procedure to prorate fringe benefits to projects and equipment would be to add the hourly value of fringe benefits to the hourly salary of employees and apply them through the direct labor and indirect labor costs. For example, if an employee earns \$5.00 per hour plus \$2.00 per hour of fringe benefits, the total hourly direct and indirect salary charge would be \$7.00 per hour.

Administrative **indirect labor** costs are apportioned at year end to all maintenance projects based on the total miles of county roads and bridges under the administrative control of the county highway department. Administrative costs are not prorated to construction projects or township projects. Under this proration, the administrative cost per mile and bridge are equal. The computation of administrative salaries apportioned would appear as follows:

Total Administrative Costs
 ----- = Cost Per Mile
 Total Miles of County Roads + Number of Bridges or Bridge

\$40,000.00 \$40,000.00
 ----- = ----- = \$80.00 per Mile
 450 Miles + 50 Bridges 500 Miles and Bridges or Bridge

Therefore, a road maintenance project with 10 miles would have an administrative cost of \$800.00 (10 x \$80.00) and each bridge maintenance project would have an administrative cost of \$80.00.

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3. Material Costs

The procurement and production of materials and supplies represents one of the three major expenditures for roadwork. Therefore, it is important that accurate records be maintained of the procurement costs and uses of materials. There are two generally accepted methods of keeping material records:

- To hand all materials (except minor or local purchases) through stores or inventory accounts
- To limit purchases to immediate needs, and charge materials directly to the project or unit of equipment to be benefited

The first method has several advantages; most important, there is complete control over the procurement and use of material. It permits the purchase of materials in quantities beyond the immediate department needs with savings in unit costs through quantity buying and discounts, and the department can maintain stocks of commonly used material on hand for immediate or emergency use and often eliminate costly delays in the progress of work.

In this method, the cost of the materials and supplies are charged to stores accounts when acquired and the costs transferred to the work benefited as materials are used. This method is recommended for major purchases in all cases where the road department is in a position to take advantage of its benefits.

The second method is used where materials and supplies are obtained only as needed and are charged directly to the work on which they are used. This method is satisfactory for material for immediate use, especially repair parts or accessories for equipment. When field employees are authorized to make minor purchases for immediate use, they should be charged directly to the work to avoid carrying the costs through the inventory accounts.

As can be seen from the above, a combination of the two methods may be employed effectively. The first method produces lower costs and the second eliminates unnecessary record keeping, stockpiling and handling costs and also avoids tying up county funds in inventories.

Materials purchased for direct use require no further stock records as the purchase document charges the costs to the activity benefited.

When materials are purchased for storage, inventory records should be charged with new materials as they are received. Inventory records must reflect the quantity of materials on hand at all times. This is important to ensure that all materials moving through the stores be properly accounted for.

No materials should be withdrawn from stock without a stock issue requisition or some form of documentation, and inventory should only be accessible to authorized employees.

Materials purchased directly or consumed through the issuance of a stock order ticket are entered into the cost system through the Direct Materials Journal and the Administration and Overhead Cost Journal on pages 13 and 15, respectively.

It should be remembered that to properly record fuel usage on vehicles the equipment must be refueled and fuel consumed should be reconciled monthly with inventory.

At least annually, inventory records of materials purchased for storage should be verified by physical inventory or actual count of the stock on hand.

Materials purchased for administrative purposes and as accumulated through the Administration and Overhead Cost Journal on page 15 are apportioned annually to all maintenance projects. The administrative material costs are apportioned to county roads and bridges using the same procedure as prorating administrative salaries as explained in the

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previous section.

4. Engineering, Right-of-Way and Contract Costs

These costs are simple straightforward costs that can be charged directly to the individual project and are entered into the system through the Miscellaneous Voucher Journal shown at page 16.

Documents that provide basic cost information are as follows:

1. Employee Time Cards

Employee time cards provide hours worked each day, project worked on and duties performed. The time cards are summarized and posted as direct labor to each individual project, to the Equipment Record for equipment serviced or to the Administration and Overhead Cost Journal for administrative costs which can not be directly related to a project or unit of equipment. Time should be recorded on employee time cards at the minimum to the nearest half hour increment.

2. Equipment and Vehicle Use Report

Equipment and vehicle use reports provide the hours or miles operated as applicable, description of work or travel and the total hours or miles for each day of operation. These documents are recorded in the individual Equipment Records shown at Appendix E and in the Standard Equipment Cost Journal shown at page 14 where the costs are accumulated and spread to various equipment and projects. The project equipment cost is computed in the Standard Equipment Cost Journal by multiplying the total hours each unit of equipment is used by the established rental rates determined from a projection of the previous year's actual cost of operation of that unit. The Equipment Rental Rate projection is illustrated in Appendix C.

3. Stock Issue Tickets

The stock issue tickets provide the information for recording costs of fuels, supplies and materials issued to equipment and projects. Stock issue tickets provide the source document from which materials can be directly charged to projects, or repair and operating costs can be charged to equipment which will be reflected to the project by the rental rate. Whenever items are taken from inventories a stock issue ticket should be prepared, the inventory value should be adjusted and the cost of equipment or project affected should be recorded.

4. Vendor Billings-Vouchers

This document is used to directly charge goods and services received to projects or equipment. This document will be used to charge the cost of goods not maintained on an inventory basis and will be used to record the value of services received, such as contracted labor.

Note: Not all vouchers prepared for the county auditor will be posted as source documents. The only vouchers posted as part of this cost record will be for goods not stockpiled as inventory and for services provided by non-county employees.

The individual source documents mentioned above provide the basic costs which must be accumulated to provide the total project costs. It is acceptable that the above source documents be combined. For example, the timesheet could possibly contain the equipment and vehicle use report information. The accumulation of costs is accomplished by recording the source documents into journals as shown on the following pages.