Retiring Rural Highway Bonds

IN a recently issued bulletin of the United States Department of Agriculture, entitled "Highway Bonds," the specialists of the office of public roads, in collaboration with Professor James W. Glover, of the University of Michigan, discuss in detail the various methods by which a community, having issued bonds to pay for highway improvements, can most easily meet those bonds at maturity.

The sinking fund, annuity and serial bond plans are discussed at length, with elaborate interest and amortization tables, which will enable the County Commissioners to determine easily the amount of money that must be raised yearly, as well as the total cost of any given loan.

The following is a summary of some of the conclusions:

Sinking-Fund Bonds.

The majority of highway bonds now outstanding have been issued as straight terminable bonds to be retired by sinking funds. The term of these bonds varies from 10 to 40 years, with an average of nearly 25 years. The fund to retire these bonds is accumulated by annual installments paid by the taxpayers, and is supposed to draw interest continuously and to accumulate a sufficient amount to discharge the debt at maturity.

The interest which the sinking-fund draws is usually from 1 to 2 per cent less than the interest paid for the loan. Five per cent highway bonds are common with the sinking-fund calculated to draw 3½ per cent interest.

Objections.

There are objections to the sinking-fund method of retiring highway bonds. It may not be possible to obtain continuously the requisite rate of interest on the sinking fund to discharge the debt at maturity. The existence of the sinking fund is a constant temptation to municipal officers to use it for purposes other than the purpose originally intended.

If a county, for example, issues bonds for a second object, it is easy to argue that the sinking fund already accumulated may be used to purchase the new securities and the finances of the community are in a way to become much confused. This is particularly true since the officers in charge of such operations are frequently changing. Sinking fund tax levies may be deferred through carelessness or under pressure of other needs.

The sinking fund always requires careful attention, because it does not progress automatically in most cases. It has sometimes been entirely neglected. The total cost of a bond issue retired by a sinking fund will be greater in the end than the cost of the same bond issue made by either the annuity method or by the serial method.

Annuity Bonds.

By the annuity method of issuing bonds both the principal and interest are discharged by constant annual or semiannual payments. The amount of each payment or installment is determined by the term of the bond. It usually is necessary to subdivide the bond issue into individual bonds of $100, $500 or $1000 each.

The resulting periodic payment of principal and interest must vary slightly because of this adjustment. The amount of principal retired is small at first and constantly increases while the interest charge decreases. The sum of interest and principal remains constant, and this is an advantage, as the tax is then uniform.

Serial Bonds.

The serial bond differs somewhat from the annuity bond, because, instead of keeping the annual payment of both principal and interest constant, the principal alone retired each year remains fixed. This type of bond has become more common for highway purposes in recent years, and during 1912 and 1913 the number of serial issues exceeded the number of issues for any other single given term.

The office of public roads received reports for these two years of $15,300,819 in serial highway bonds, which is over 20 per cent of the total county and district bonds for which the period or term of issue was reported.

It will be noticed that the total expense to the community under the serial plan is somewhat less than under the annuity plan. The expense by either method is, however, considerably less than the expense under the sinking-fund plan. For the purpose of comparison the total expense to the community under each plan is assembled in the accompanying table:

TOTAL COST OF $100,000 LOAN FOR 20 YEARS, COMPOUNDED ANNUALLY.

Interest (Per Cent)	Sinking Fund 3 Per Cent.	Sinking Fund 3½ Per Cent.	Sinking Fund 4 Per Cent.	Annuity.	Serial.
Four	$154,440	$150,720	$147,160	$147,152	$142,000
Four and one-half	164,440	160,720	150,160	153,752	147,300
Five	174,440	170,720	167,160	160,490	152,500
Five and one-half	184,440	180,720	177,160	167,359	157,750
Six	194,440	190,720	187,160	174,369	163,000

It is an unfortunate fact that most highways do not have a life of 30 years, and it is not quite evident that the life of the highway and not the apparent economic term of the bond should determine the length of the loan. Many miles of natural soil roads are annually built by 30-year bond issues. There is usually no provision for repair and maintenance charges, and little business organization in the county road system.

This practice is financially dangerous. No gravel road surface can last 30 years, and apparently the only road surfaces for which a 30-year life is recorded are surfaces of far more expensive construction than are usually built under the bond issues reported.

There is a further advantage in the annuity or serial bond for highway construction, because it is more likely under such a bond that the road surface will be paid for before it is entirely worn out. If an annuity or serial bond begins to mature immediately, this is not considered a serious objection among bankers.

From the nature of the annuity or the serial form of highway bonds it is never necessary to issue new or refunding bonds at the end of the term. The main advantage, however, of both of these types of bonds is that the community saves more money than under the sinking fund plan because it avoids paying a higher rate on borrowed money than it can obtain on money that it loans.

Both the annuity and the serial bonds have the advantage that they accomplish with one financial operation all that the sinking-fund type of bond can accomplish. These types of bonds are particularly adapted for financing operations which by their very nature involve a wasting of the property.

A highway is in part a wasting property and it is desirable to have established a margin of safety in highway financing. Railroads frequently issue serial equipment bonds for a period of 10 years with which to purchase rolling stock. The amount of bonds required annually is carefully adjusted so that the retirement is faster than the depreciation of the rolling stock. The difference between the outstanding bonds and the value of the equipment in any year is the margin of safety.

In the operation of the annuity bond both principal and interest are discharged by a series of equal installments, usually semi-annual. Each installment contains interest on the amount outstanding at the beginning of the interval, and the balance is applied to retiring the outstanding principal on the bonds. The effect of this method is to diminish steadily the investment of the purchaser.

If, however, the nominal rate of interest paid on the bonds is not greater than can be earned by a sinking fund such as, for example, with Government bonds and a few state issues, the borrower might arrange to set aside in a sinking fund a portion of each installment paid, equal in amount to that devoted to the reduction of the principal in the first installment, and the effect would be to leave the total investment of the purchaser undisturbed until the sinking fund had accumulated to the amount of the loan.

When the proportion of the installment applied to the sinking fund is thus taken arbitrarily, the term of the bond is absolutely determined and a modified sinking-fund plan results.

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