

Highway Bond Financing— A Current Analysis

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This study reviews the highway borrowing practices of the States and, to a lesser extent, of the local governments during the 11-year period 1950-60. To be as current as possible, some bond-financing programs of 1961 and early 1962 are also covered.

Highway debt is examined in terms of its magnitude, its relation to other types of debt, and the comparative costs to the highway user of guaranteed and revenue bond financing. The effects of constitutional limitations on creation of debt are measured and evaluated. As the study shows, these have been largely ineffectual in restricting highway borrowing.

The development and impact of the authority device in financing highways by means of revenue bonds is thoroughly analyzed. Some 75 highway and bridge authorities were functioning in 1960, and those that issued bonds during the 1950-60 period account for nearly one-half of all highway debt.

The study compares interest costs and scheduled maturities of revenue bonds with those of other types of highway bonds, and measures the differential in terms of financing costs of the various bond types.

The latter part of the paper deals with specific bond-financing programs as they have been developed in selected States. The recent resurgence in toll road financing is covered in detail, as is the use of the authority device to finance toll-free highway programs.

The study concludes that the method of financing accelerated highway programs depends on the decision to "pay-as-you-go" or to resort to credit financing. If the latter choice is made, the selection of the debt vehicle is most important in holding the cost of borrowing to a minimum. The study points out that the levy of tolls need not presage the use of toll revenue bonds, which are the most costly to service, but may be used successfully in conjunction with bond issues that are secured by a further pledge of road-user taxes, or guaranteed by the State. In this fashion, the costs of borrowing to the public, via the highway user, can be held within satisfactory limits.

●ACCORDING TO a recent estimate by the Bureau of Public Roads (1), the total long-term highway debt of the States and their political subdivisions is expected to reach \$14.4 billion by the end of 1962. This is an increase in indebtedness of \$10 billion since 1950, more than a threefold advance. Although the highway debt of local governments has doubled (from \$2.1 billion in 1950 to an estimated \$4.2 billion in 1962), the debt of State agencies has shown a spectacular rise from \$2.1 billion in 1950 to an expected \$10.2 billion by the end of 1962.

The purpose of this paper is to weigh the significance of this increase in highway debt, measure its effect on highway financing programs and policies, and examine the nature and the technique of current borrowing practices.

The 11-year period 1950-60 has been selected for study, because it largely encompasses the era of major toll revenue bond financing and of the growth of the public authority device. Moreover, an earlier paper (2) explored rather thoroughly the history of highway borrowing, and the immediate post-war trends in bond financing during the years 1946-50; this study may be thought of as a sequel to the earlier paper.

Background

Borrowing in anticipation of future tax revenue has long been an important method of financing highway and other public improvements. Before 1900, borrowing was largely done by local governments. Massachusetts, in 1893, was the first State to borrow for highway purposes (although the territory of Idaho issued "wagon road" bonds as early as 1890). Thereafter, State borrowing for highways increased steadily, reaching peaks in the 1920's and again in the middle 1950's. During the past 70 years, only 2 States (Arizona and Nebraska) have not incurred debt for highways.

Throughout this study, bond financing is examined in light of the type of bond used or, more precisely, according to the security underlying the debt. The distinction between guaranteed and nonguaranteed debt is so fundamental to an analysis of highway borrowing practices as to justify a brief review and explanation of each type.

Definitions

Throughout this paper, highway bonds are referred to by type; i. e., according to the security behind the bond issue. The following are the three major types of bonds:

General Obligation Bonds. —Also known as guaranteed bonds, or "full-faith" bonds, general obligation bonds are guaranteed as to payment of interest and principal by the State or local government selling the bonds. The full resources and taxing power of the government are irrevocably pledged to meet debt payments.

Limited Obligation Bonds. —Sometimes called tax bonds, and often (erroneously) "revenue" bonds, limited obligation bonds are secured by a pledge of the proceeds of a specific tax, usually road-user imposts, or revenues of a specified fund, but not limited to earnings of the projects to be built. They carry no further guarantee or commitment by the issuing government in the event the pledged revenues prove inadequate to meet debt service.

Revenue Bonds. —Revenue bonds are obligations to finance alleged by self-supporting toll facilities, and are secured only by the tolls and other earnings of the project. Should these prove inadequate, the sole remedy of the bond holders is to require an adjustment in toll rates designed to improve earnings.

Interest on bonds is variously referred to as the rate of return to the lender, the cost to the borrower, or the rate declared and posted on the bond document. The following terms of distinctions are used:

Yield Rate. —The yield rate is the effective rate of return to the lender determined by the price he pays for the bond, the declared interest rate, and the length of time until maturity of the bond.

Net Interest Cost. —The net interest cost is the cost of a bond issue to the borrower. It is a function of the declared interest rate (or rates), the premium or discount on the par value of the bonds at the time of sale, and the length of maturity. It is, in effect, a weighted interest cost.

Coupon Rate. —The coupon rate is the declared rate of interest posted on the bond instrument.

General Obligation Bonds

It was common practice in the earlier years to issue highway bonds secured by a general pledge of the taxing power of the State or local issuing authority. Bonds of this type are still predominant among the obligations of the States to finance toll-free capital projects.

With the development of the road-user tax structure in the 1920's and 1930's, and the growing importance of these taxes as a source of highway funds, many States began

to issue general obligation bonds secured by a specific pledge of road-user tax revenue. Today, nearly all general obligations of the States for highways are secured by a pledge of all or a portion of these tax revenues, behind which lies the guaranteed commitment, without recourse, of the full taxing power of the issuing State.

At the end of 1960, 22 States had outstanding a total of nearly \$2.7 billion of general obligation highway bonds, or more than one-fourth of the \$9.4 billion of State highway debt then outstanding.

Limited Obligation Bonds

For purposes of simplification, the remaining highway debt of the States can be labeled nonguaranteed agency debt, for which there is pledged as security the revenue from selected taxes, fees, rentals, and tolls, including the earnings of self-supporting enterprises, but for which there is no additional pledge of the general taxing power of the States. For purposes of this paper, however, it is convenient to subdivide these bonds into two major classes (limited obligations and toll revenue bonds) and a third, minor class (reimbursement obligations).

Limited obligations are those bonds secured by a pledge of road-user tax revenues, highway fund lease or rental payments under contract agreements, or in some instances by a combination of these sources together with earnings of the projects financed from the bond proceeds, such as tolls. The security for such bonds is therefore much broader than that of a true revenue bond or self-liquidating issue, but in theory is not as great as that of a general obligation bond.

New Mexico was the first State to use limited obligation bonds secured by road-user revenues. The State began issuing highway debentures in 1929, and by the end of 1960 had \$8.5 million of these debentures outstanding. Most of the issues have carried maturities of 10 years or less, and the present indebtedness matures in its entirety by 1964. These debentures carry an investment rating of "Aaa," the highest given by National rating agencies (3, p. 1303), and in fact higher than the rating given New Mexico's general obligation bonds. It is evident, at least in this State, that bonds secured by road-user tax revenues alone are a more attractive investment than bonds secured by the general taxing power of the State.

During the 1930's, other States began issuing limited obligation bonds, prompted in some instances by their attractiveness to investors, and in others because of constitutional restrictions on borrowing that made it necessary to place the issue before the electorate either by a referendum or a constitutional amendment, with the attendant uncertainties and delays in obtaining approval. The courts have generally held that the "special fund doctrine" under which limited obligation bonds have been sold is not in contravention of constitutional bans on borrowing. An example of this is found in Colorado, which in 1936 issued \$25 million of revenue anticipation warrants payable only from State highway revenues. Because the State constitution prohibits borrowing, beyond the usual exceptions for defense and casual deficits, the constitutionality of the revenue warrant act was challenged in the courts. In 1934, the voters had approved a constitutional amendment dedicating highway revenues for road purposes¹, and the State Supreme Court held that, inasmuch as highway funds by constitutional provisions were no longer available for general State purposes, the bond act was valid².

During the 1950's, additional States launched programs of bond financing with limited obligations; notably, Alabama, Florida, Georgia, Maryland, Michigan, Mississippi, Ohio, Pennsylvania, and Washington. In these States, security for the bonds is usually a pledge of motor fuel tax revenues or motor vehicle fees, or both; or, as in Georgia and Pennsylvania, by rental payments from State highway funds to an authority issuing the bonds, in annual amounts sufficient to meet interest and principal requirements.

At the end of 1960, seven States had limited obligations outstanding for specific projects or facilities for which tolls were pledged for debt service, together with a lien on road-user tax revenues or on State highway funds. Usually, these funds are drawn

¹ Colo. Const., Art. X, §18.

² Johnson v. McDonald, 97 Colo. 324, 49 P.2d 1017.

on only in the event that tolls are insufficient to meet debt requirements, but their availability nonetheless has been a significant factor in the marketability of the bond issues.

As of December 31, 1960, 16 States and the District of Columbia had outstanding \$2.2 billion of limited obligations with varying pledges of road-user tax revenues and State highway funds. These constituted slightly less than one-fourth of all State obligations outstanding as of that date, and these bonds, together with the general obligations of the States, totaled 50 percent of all State debt for highways.

Revenue Bonds

The term "revenue" bonds as used in this paper refers to obligations issued for specific facilities and secured solely by a pledge of the earnings of the facility. In all instances, State obligations of this type are for toll road or toll crossing facilities, and at the end of 1960, revenue bonds of \$4.5 billion were outstanding in 25 States—nearly one-half of all State debt for highways.

Revenue bond financing of highway facilities began with the Port of New York Authority issues of 1926. These and other early issues were limited to bridges and tunnels, and it was not until 1946 that a fully self-supporting toll road revenue bond issue was first marketed by the Maine Turnpike Authority. The Pennsylvania Turnpike, although opened to traffic six years earlier, was not financed as a wholly self-supporting facility. Nearly 42 percent of the initial cost of the project was provided by a grant from the Federal Public Works Administration, and the remainder was financed by bonds sold to the Reconstruction Finance Corporation. Subsequent extensions of the Pennsylvania Turnpike, however, have been financed as self-liquidating projects, as have most of the other major turnpike projects. Certain major exceptions to this practice have been made, however, which are discussed in a subsequent section.

Reimbursement Obligations

The last group of State obligations are those known as "reimbursement" or State-assumed debt. Between 1920 and 1940, many States undertook to reimburse the counties for their contributions to the cost of State highways or for local roads subsequently taken into the State systems. The obligations usually took one of two forms: (a) an agreement between the State and the local governments whereby the State would reimburse the local government in annual amounts for costs incurred initially in building roads that later became part of the State systems, or (b) an agreement whereby the State would pay to counties an annual amount equal to the interest and principal on local highway bonds issued for such purposes. In either case, security for this type of obligation is somewhat obscure except in instances where the State has funded or refunded the obligation from the proceeds of its own bond issues. More than \$750 million of these obligations have been assumed by the States, but the remaining indebtedness is now less than \$40 million in seven States.

BORROWING PRACTICES, 1950-60

Borrowing by States

During the 11-year period covered by this study, 39 States and the District of Columbia incurred highway obligations of all types totaling nearly \$9.8 billion (Table 1). The geographic distribution of these borrowings is shown in Figure 1. Eleven States incurred no debt during this period and, except for Alaska, they comprise a contiguous group of west-north-central and mountain States. Borrowing, quite obviously, is not uniformly practiced by the States, and much of the State highway debt is concentrated among a few States.

Four States (Massachusetts, New Jersey, New York, and Ohio) accounted for nearly two-fifths of all bond issues, and the 10 States that issued \$400 million or more bonds accounted for two-thirds of all obligations.

Figure 1 shows that these 10 States are concentrated in the north-central and Atlantic Coastal areas, where the pattern of highway congestion, traffic densities, and highway costs is typically high.

TABLE 1
HIGHWAY OBLIGATIONS ISSUED OR ASSUMED BY STATES, 1950-60¹
(\$ × 10³)

State	General Obligation Bonds	Limited Obligation Bonds	Toll Revenue Bonds		Reimbursement Obligations Assumed	Total
			Crossing Bonds	Road Bonds		
Ala.	25,000	99,000	-	-	4,528	128,528
Alaska	-	-	-	-	-	-
Ariz.	-	-	-	-	-	-
Ark.	14,000	-	7,000	-	-	21,000
Calif.	-	-	167,374	-	-	167,374
Colo.	-	43,688	-	-	-	43,688
Conn.	155,840	347,500	30,000	-	-	533,340
Del.	91,225	-	8,450	-	-	99,675
Fla.	-	194,804	20,880	74,000	27,125	316,809
Ga.	-	140,335	6,650	-	-	146,985
Hawaii	-	12,500	-	-	-	12,500
Idaho	-	-	-	-	-	-
Ill.	-	-	-	479,000	-	479,000
Ind.	-	-	-	280,000	-	280,000
Iowa	-	-	-	-	-	-
Kans.	-	19,500	-	160,000	-	179,500
Ky.	100,000	-	9,361	38,500	-	147,861
La.	100,000	75,000	-	-	-	175,000
Me.	52,500	-	-	58,806	-	111,306
Md.	-	266,320	145,963	-	-	412,283
Mass.	610,000	-	53,781	239,000	-	902,781
Mich.	-	471,000	116,050	-	-	587,050
Minn.	46,000	-	-	-	-	46,000
Miss.	-	42,659	18,360	-	2,218	63,237
Mo.	-	17,900	200	-	62	18,162
Mont.	-	-	-	-	-	-
Neb.	-	-	-	-	-	-
Nev.	-	-	-	-	-	-
N. H.	67,150	-	899	-	-	68,049
N. J.	291,600	-	25,500	511,200	-	828,300
N. Mex.	-	11,000	-	-	-	11,000
N. Y.	712,860	-	128,122	440,000	-	1,280,982
N. C.	150,000	-	-	-	-	150,000
N. Dak.	-	-	-	-	-	-
Ohio	-	438,000	3,500	326,000	-	767,500
Okla.	-	-	-	106,000	-	106,000
Ore.	92,600	-	-	-	-	92,600
Pa.	-	105,000	89,157	298,000	-	492,157
R. I.	32,000	-	3,100	-	-	35,100
S. C.	52,000	-	1,500	-	1,668	55,168
S. Dak.	-	-	-	-	-	-
Tenn.	52,000	-	725	-	-	52,725
Texas	-	-	-	58,500	948	59,448
Utah	-	-	-	-	-	-
Vt.	40,800	-	-	-	-	40,800
Va.	-	-	328,651	75,150	-	403,801
Wash.	-	146,353	73,257	-	-	219,610
W. Va.	84,500	-	5,000	133,000	-	222,500
Wis.	-	-	-	-	4,099	4,099
Wyo.	-	-	-	-	-	-
D. C.	-	2,000	-	-	-	2,000
Total	2,770,075	2,432,559	1,243,480	3,277,156	40,648	9,763,918

¹Excluding refunding issues.

Toll revenue bond financing was employed by 29 of the 39 borrowing States during the 1950-60 period, and in 6 States (California, Illinois, Indiana, Oklahoma, Texas, and Virginia) was the only major type of bond financing used. Even excluding this type of debt (and the small amount of reimbursement obligations) does not change the geographic concentration of the remaining indebtedness (Fig. 2). The 7 northern and eastern States that issued \$200 million or more of general and limited obligation bonds accounted for nearly two-thirds of all such bonds issued.

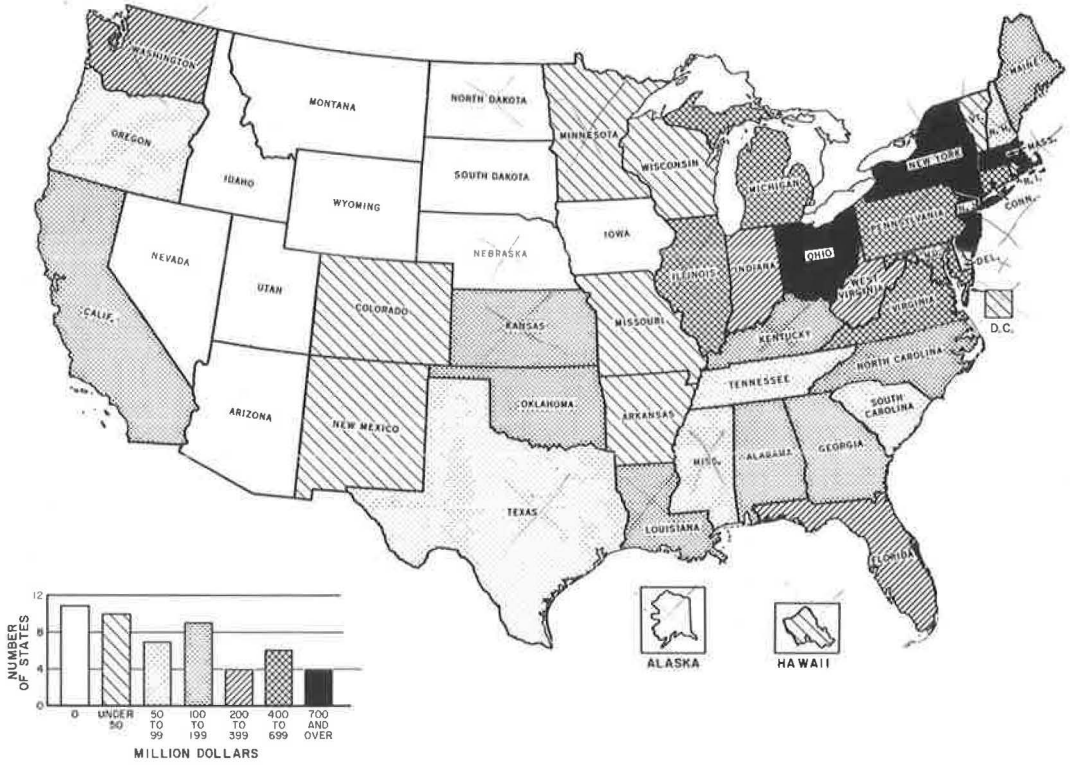


Figure 1. Borrowing States, 1950-60.

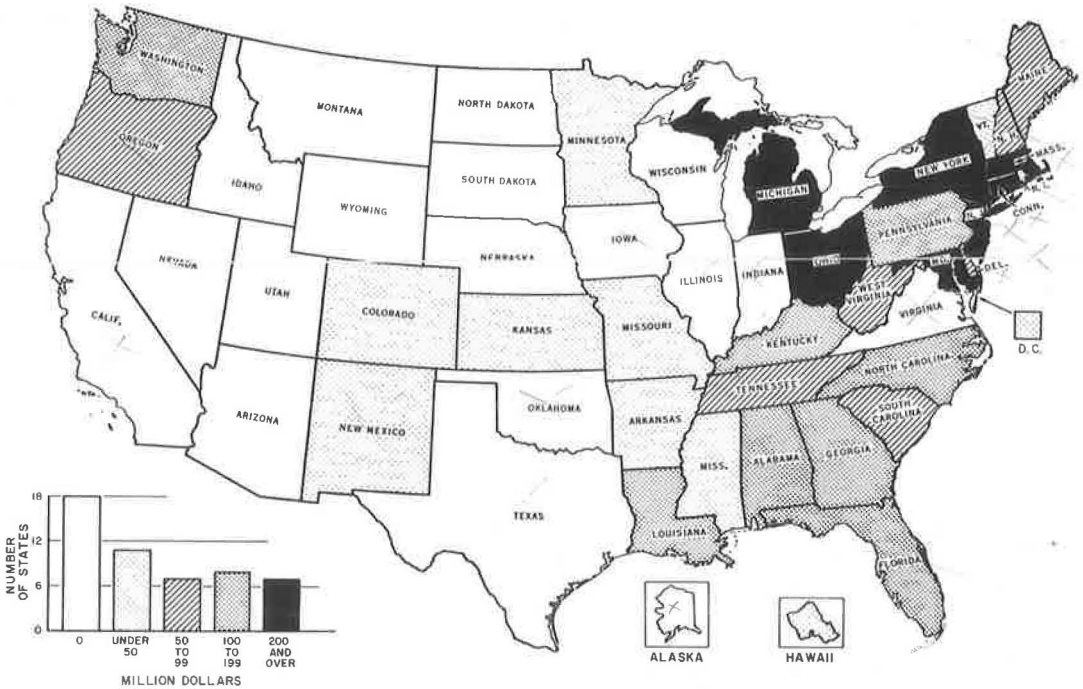


Figure 2. Borrowing States, 1950-60 (excluding revenue debt).

General obligation bonds were used by 19 States, and exclusively so in 4 States (Minnesota, North Carolina, Oregon, and Vermont). Sixteen States and the District of Columbia issued limited obligation bonds, and this was the only type of bond used by Colorado, Hawaii, and New Mexico. In the District of Columbia, the obligations consist of interest-bearing loans from the Federal Treasury.

Seven States assumed obligations of local governments, and this was the only type of debt incurred in one State (Wisconsin).

Highway bond financing by a selection of two of the three major types of obligations was found in 24 States, and 1 State (Connecticut) issued all three major types of bonds.

During the span of years covered in this paper, some States borrowed annually, or at least over a considerable period of years under authority of various bond-financed capital programs. Delaware, Massachusetts, New York, and West Virginia entered the bond market during each of the 11 years from 1950 through 1960 (Table 2). Several other States were nearly as active, issuing bonds in all but one or two of the years covered, whereas at the other extreme, among those States that borrowed, Indiana sold bonds only in 1954, and North Carolina has not marketed bonds since 1951. Bond sales are recorded for Hawaii only in 1959, the year of Statehood; but the Territory sold highway bonds in all but one of the preceding nine years.

The most active year in terms of magnitude of bond issues was 1954 when \$2.3 billion of highway bonds were sold by 26 States. However, 1958 saw the most States (27) enter the bond market. In no year did less than 18 States issue bonds, and the average during the period was 22 States.

Table 3 and Figure 3 show that outstanding highway debt at the beginning of the study

TABLE 2
HIGHWAY OBLIGATIONS ISSUED OR ASSUMED BY THE STATES, 1950-60¹
(\$ × 10⁷)

State	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Total
Ala.	-	784	25,000	323	-	16,944	15,000	21,317	4,000	20,000	25,160	128,528
Alaska	-	-	-	-	-	-	-	-	-	-	-	-
Ariz.	-	-	-	-	-	-	-	-	-	-	-	-
Ark.	7,000	7,000	-	-	-	-	-	-	-	7,000	-	21,000
Calif.	-	8,350	14,024	65,000	-	46,000	-	-	-	-	34,000	187,374
Colo.	6,300	-	-	-	2,388	-	8,000	16,000	5,000	6,000	-	43,688
Conn.	-	-	-	-	100,000	-	100,000	150,000	77,000	70,900	35,440	533,340
Del.	2,000	8,900	7,500	7,455	8,045	3,559	10,441	13,050	18,675	10,700	9,350	99,675
Fla.	28,000	21,755	800	-	6,000	104,050	6,500	47,892	11,085	48,872	41,855	316,809
Ga.	-	-	-	9,750	27,535	14,500	15,500	35,000	44,700	-	-	146,985
Hawaii ²	-	-	-	-	-	-	-	-	-	12,500	-	12,500
Idaho	-	-	-	-	-	-	-	-	-	-	-	-
Ill.	-	-	-	-	-	-	415,000	-	64,000	-	-	479,000
Ind.	-	-	-	-	280,000	-	-	-	-	-	-	280,000
Iowa	-	-	-	-	-	-	-	-	-	-	-	-
Kans.	-	-	-	-	160,000	-	-	19,500	-	-	-	179,500
Ky.	-	-	-	4,361	43,500	-	-	-	70,000	-	30,000	147,861
La.	10,000	-	-	15,500	81,400	-	-	-	8,100	30,000	30,000	175,000
Me.	-	-	13,500	78,206	-	-	4,600	-	5,500	9,500	-	111,306
Md.	25,000	25,000	-	25,000	172,253	40,048	16,567	32,088	27,657	26,966	21,684	412,283
Mass.	60,000	44,000	32,000	34,250	308,750	40,000	136,000	70,500	92,500	69,781	15,000	902,781
Mich.	-	-	80,000	20,000	109,800	5,000	61,000	52,000	100,000	75,000	84,250	587,050
Minn.	-	-	-	-	-	-	10,000	12,000	12,000	12,000	-	46,000
Miss.	2,218	8,400	-	9,960	13,000	5,159	-	2,500	4,000	11,000	7,000	63,237
Mo.	-	-	16,000	62	1,750	200	-	-	-	-	150	18,162
Mont.	-	-	-	-	-	-	-	-	-	-	-	-
Neb.	-	-	-	-	-	-	-	-	-	-	-	-
Nev.	-	-	-	-	-	-	-	-	-	-	-	-
N.H.	-	7,000	10,000	-	9,500	899	12,500	-	23,150	5,000	-	68,049
N.J.	75,500	180,000	55,000	270,000	182,200	40,600	25,000	-	-	-	-	828,300
N.Mex.	-	-	-	-	-	-	5,000	4,000	2,000	-	-	11,000
N.Y.	22,000	77,911	6,000	255,917	395,650	73,400	101,000	32,280	103,844	131,800	81,000	1,280,982
N.C.	75,000	75,000	-	-	-	-	-	-	-	-	-	150,000
N.Dak.	-	-	-	-	-	-	-	-	-	-	-	-
Ohio	-	-	326,000	-	30,000	52,000	75,000	128,500	125,000	31,000	-	767,500
Okla.	31,000	-	7,000	-	-	68,000	-	-	-	-	-	106,000
Ore.	-	15,000	15,000	42,000	-	-	-	20,600	-	-	-	92,600
Pa.	-	25,000	65,000	109,157	253,000	-	-	-	20,000	10,000	10,000	492,157
R.I.	-	-	5,000	-	7,000	3,100	-	10,000	10,000	-	-	35,100
S.C.	10,000	5,000	820	10,000	100	2,000	450	5,298	15,000	6,500	-	55,168
S.Dak.	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	-	725	-	17,000	-	-	-	-	15,000	10,000	10,000	52,725
Texas	338	-	-	533	77	58,500	-	-	-	-	-	59,448
Utah	-	-	-	-	-	-	-	-	-	-	-	-
Vt.	2,800	-	-	-	-	-	6,000	6,000	8,000	10,000	8,000	40,800
Va.	23,000	-	-	-	79,803	69,000	20,000	-	6,150	-	205,848	403,801
Wash.	-	17,150	500	54,710	2,590	782	20,175	22,203	30,150	15,450	55,900	219,610
W.Va.	18,500	7,500	117,000	8,500	42,000	2,000	3,000	1,400	10,000	5,000	7,600	222,500
Wis.	1,468	968	691	469	340	-	-	163	-	-	-	4,099
Wyo.	-	-	-	-	-	-	-	-	-	-	-	-
D.C.	-	-	-	-	-	-	-	-	-	-	2,000	2,000
Total	400,124	535,443	796,835	1,038,153	2,316,881	645,741	1,066,733	702,271	912,511	668,989	680,237	9,763,918

¹Excluding refunding bonds. ²Bonds issued during Territorial status before 1959 are omitted.

TABLE 3
 TYPES OF STATE HIGHWAY OBLIGATIONS ISSUED, REDEEMED, AND
 OUTSTANDING, 1950-60¹
 (\$ × 10³)

Type of Obligations	Outstanding Dec. 31, 1949	Issued 1950-60	Redeemed 1959-60	Outstanding Dec. 31, 1960
General obligation bonds	994,952	2,770,075	1,112,129	2,652,898
Limited obligation bonds	160,873	2,432,559	386,958	2,206,474
Toll revenue bonds	614,789	4,520,636	651,766	4,483,659
Reimbursement obligations	<u>68,205</u>	<u>40,648</u>	<u>69,429</u>	<u>39,424</u>
Total	1,838,819	9,763,918	2,220,282	9,382,455

¹Excluding refunding issues.

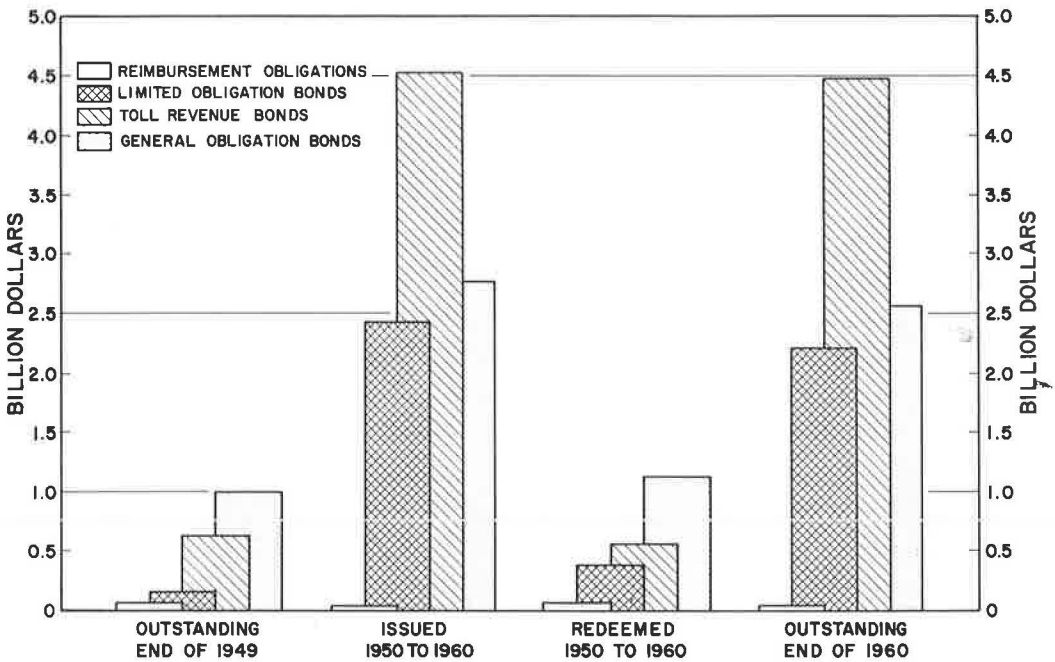


Figure 3. Types of State highway debt.

period totaled \$1.8 billion. During the period 1950-60, \$2.2 billion of bonds were redeemed, so that at the end of 1960, the \$9.4 billion outstanding indebtedness of the States was only slightly less than the amount of bonds issued during the 11-year period.

With the exception of reimbursement obligations, the outstanding debt in each of the three major categories increased substantially, but not, however, at equal rates. General obligation debt increased from \$995 million at the end of 1949 to \$2,653 million at the end of 1960, or 2.67 times; toll revenue debt exceeded 7 times its 1949 level; and limited obligation debt showed more than a thirteenfold increase during this period.

Although revenue bond financing has occupied a position of prominence throughout the 1950's, and indeed into the 1960's, road-user tax bonds and other limited obligations have evidenced a significant increase, which is discussed later.

Borrowing by Local Governments

It is estimated that \$2.5 billion of road and street debt of cities and other local municipalities was outstanding at the end of 1960 (Table 4) and that the road debt of counties, townships, and other rural governments would reach nearly \$1.3 billion.

It is likely that the road and street debt of the municipalities has been understated. Many jurisdictions issue "general purpose" or "capital improvement" bonds and apply the proceeds to various capital projects including, but not specified as to, road and street improvements. Undoubtedly some of this debt escapes detection as a "highway" debt. However, municipal finance studies have been conducted in all but one State since 1954, and data for the later years may be expected to be reasonably inclusive.

Municipal highway debt has shown a much faster rate of growth than has that of counties and other rural governments. If the outstanding debt at the beginning of 1950 is assigned an index value of 100, by the end of 1960, municipal debt stood at 215.5 and local rural debt at 148.0 of the base year.

The more pervasive demand for credit financing by the municipalities compared with the rural units undoubtedly is due in part to the relatively greater State assistance for highways granted the rural units. In 1960, for example, municipalities applied \$1.79 billion toward highway capital outlay, maintenance, administration, and debt service. Of this amount, \$390 million (22 %) was derived from State grants-in-aid. Rural units applied about the same amount (\$1.67 billion) for these purposes in 1960, but received \$845 million in State grants (51 % of total) (1, Table HF-1). Thus, the municipalities have had to rely on their own financial resources much more than have the rural units. The latter, on the average, continue to enjoy a favored position with respect to State grants-in-aid and shared tax revenues.

Another factor, or course, has been the rapid growth of metropolitan areas and traffic volumes during the 1950's that has severely taxed the cities' resources in attempting to alleviate traffic congestion and at the same time to provide for expanded

TABLE 4
TYPES OF LOCAL GOVERNMENT HIGHWAY DEBT, ISSUED, REDEEMED, AND OUTSTANDING, 1950-60¹
(\$ × 10³)

Issuing Government	Year	Issued			Redeemed			Outstanding at End of Year		
		General Obligation and Special Assessment Bonds	Toll Revenue Bonds	Total	General Obligation and Special Assessment Bonds	Toll Revenue Bonds	Total	General Obligation and Special Assessment Bonds	Toll Revenue Bonds	Total
Municipalities	1949	-	-	-	-	-	-	851,947	306,724	1,160,671
	1950	148,066	14,857	162,923	79,067	17,129	96,196	920,946	306,452	1,227,398
	1951	168,028	10,423	178,451	87,375	23,901	111,276	1,005,369	292,518	1,297,887
	1952	200,201	8,246	208,447	91,418	12,235	103,653	1,106,166	288,529	1,394,695
	1953	189,034	11,126	200,160	108,948	9,816	118,764	1,182,245	289,828	1,472,073
	1954	239,975	14,041	254,016	148,387	8,049	156,436	1,293,440	295,821	1,589,261
	1955	222,115	112,583	334,698	133,770	7,199	140,969	1,371,417	399,524	1,770,941
	1956	295,784	17,528	313,312	136,471	5,242	141,713	1,541,499	412,556	1,954,055
	1957	359,636	5,858	365,494	157,600	22,703	180,303	1,757,107	395,673	2,152,780
	1958	294,211	5,196	299,407	177,806	19,017	196,823	1,872,639	381,852	2,254,491
	1959	308,394	27,810	336,204	197,083	13,231	210,314	1,988,455	397,741	2,386,196
	1960 ²	234,000	102,000	336,000	200,000	20,000	220,000	2,022,000	480,000	2,502,000
Counties and other rural governments	1949	-	-	-	-	-	-	795,248	70,121	865,369
	1950	77,924	10,674	88,598	78,774	3,210	81,984	794,398	77,585	871,983
	1951	66,920	11,750	78,670	78,015	3,689	81,704	780,828	87,074	867,902
	1952	87,941	15,250	103,191	78,762	3,524	82,286	797,067	98,785	895,852
	1953	104,780	850	105,630	81,704	3,460	85,164	817,500	96,175	913,675
	1954	87,828	6,759	94,587	83,261	2,475	85,736	833,087	100,007	933,094
	1955	159,277	46,225	205,502	85,663	3,500	89,193	884,364	142,736	1,027,100
	1956	96,541	5,350	101,891	87,401	3,500	90,901	892,439	144,560	1,036,999
	1957	121,785	1,156	122,941	87,937	3,618	91,555	942,729	142,079	1,084,808
	1958	133,889	6,219	140,108	86,310	4,060	90,370	986,304	144,238	1,130,542
	1959	152,845	-	152,845	87,443	4,641	92,084	1,045,571	140,543	1,186,114
	1960 ²	189,000	1,000	190,000	90,000	6,000	96,000	1,145,000	135,000	1,280,000

¹Excluding refunding bonds and short-term notes. When it was not possible to distinguish between toll revenue bonds and general obligations issued for toll facilities, both were included as toll bonds. Computed outstanding debt does not necessarily balance issues and redemptions because of incomplete data.

²Estimated.

services of all types. Many of the counties and other so-called rural units have been faced, too, with the need for expanded credit financing programs brought about by the climbing demand for highway and other public works, particularly in the metropolitan counties where the population explosion has occurred.

General obligation bonds are the predominant type of local issues, although recently an upward trend in the issuance of special assessment paper by municipalities has been evident, but in many instances these, too, are guaranteed by the issuing authority. The nonguaranteed assessment bonds are not popular, and are least acceptable to the bond market.

Local toll revenue bond financing, though small in proportion, has been firm throughout the 1950-60 period. Concentrated within a few States, the revenue bond has been used to finance local toll crossing facilities, frequently by means of the authority device.

Compared to the States, the local governments have made by far the greater use of short-term obligations. Short-term financing has been used in the main to anticipate the collection of current taxes or in the form of bond anticipation notes. Further reference to short-term financing is made later in this study.

Table 5 and Figure 4 show the gross amount of State and local highway debt outstanding at the end of each of the years 1950-60. State obligations accounted for about one-half of all highway debt in 1950, but had risen to more than two-thirds by 1960.

Magnitude of Existing Debt

In comparison with total public and private debt, or even in terms of public debt alone, the \$13.2 billion of outstanding State and local highway borrowing at the end of 1960 does not assume a dominant role. According to the 1961 annual report of the Council of Economic Advisors (4), the Nation's net public and private debt stood at \$882.9 billion at the end of 1960. The composition of this debt and its growth since 1950 (Table 6) is indicative of the demand for credit financing in the economy.

Although modest in terms of total debt, the obligations of State and local governments, which include both highway and nonhighway issues, have shown the largest percentage increase since 1950, save that of mortgage debt, of any class of obligation.

TABLE 5
GROSS HIGHWAY DEBT OUTSTANDING BY ALL
UNITS OF GOVERNMENT, 1950-60¹
(\$ × 10⁶)

Year	States	Counties and Other		Municipalities	Total
		Local	Rural Units		
1950	2,096		872	1,227	4,195
1951	2,476		868	1,298	4,642
1952	3,116		896	1,395	5,407
1953	4,006		914	1,472	6,392
1954	6,155		933	1,589	8,677
1955	6,609		1,027	1,771	9,407
1956	7,491		1,037	1,954	10,482
1957	7,936		1,085	2,153	11,174
1958	8,598		1,131	2,254	11,983
1959	9,002 ²		1,186	2,386	12,574
1960	9,382		1,280 ³	2,502 ³	13,164

¹Values include debt of highway toll authorities.

²Hawaii included in 1959 and following year.

³Estimated.

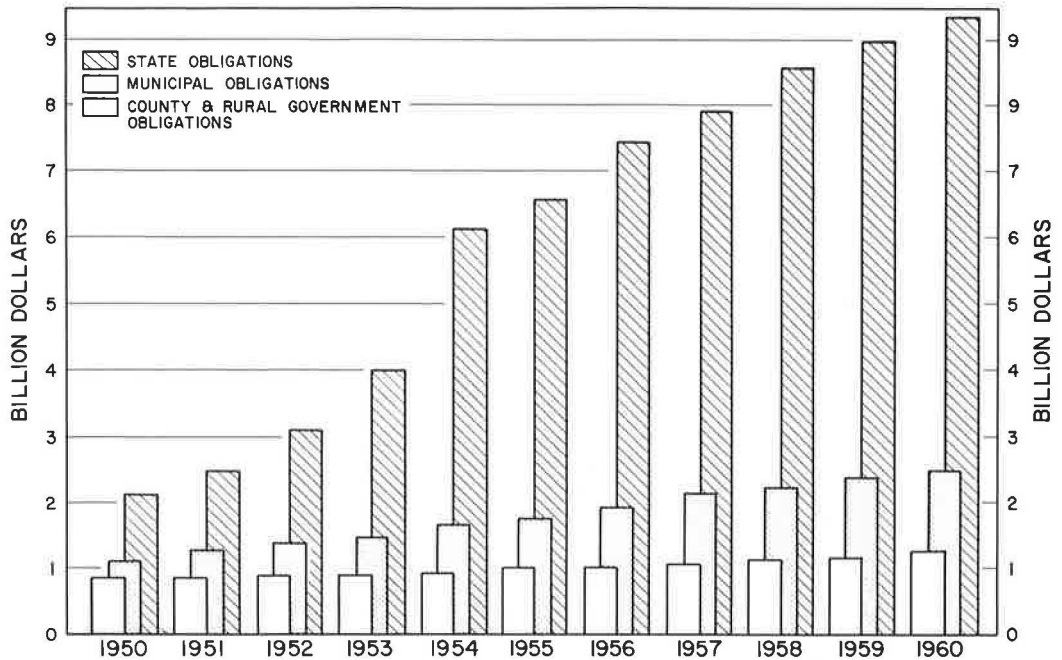


Figure 4. Gross highway debt outstanding, 1950-60.

TABLE 6
NET PUBLIC AND PRIVATE DEBT
(\$ × 10⁹)

Type of Debt	1950	1960	Percentage Increase
Public:			
Federal government	218.7	241.0	10.2
State and local governments	20.7	60.0	189.8
Private:			
Corporate	142.1	295.0	107.6
Farm	12.2	25.4	108.2
Mortgage	59.4	173.9	192.8
Commercial and consumer	37.2	87.6	135.5
Total	490.3	882.9	80.1

Lest this comparison suggest an unwarranted degree of abandon in State and local borrowing policies, it is necessary to examine the highway debt component in terms of other related factors. One of these is automobile credit paper. Table 7 and Figure 5 compare the extension of credit on vehicle purchases with highways borrowings, and the amount of each outstanding at the end of the years 1950-60. Although this comparison is between short-term automobile credit, and long-term highway borrowing, and thus is imprecise on its face, the public acceptance of credit financing to acquire highway vehicles would seem to parallel similar acceptance of credit financing to acquire the modern highway plant such vehicles use demands.

TABLE 7

TOTAL HIGHWAY BONDS ISSUED AND OUTSTANDING, AND INSTALLMENT
CREDIT ON PASSENGER CARS EXTENDED AND OUTSTANDING, 1950-60
(\$ × 10⁶)

Year	Installment Credit Extended on New and Used Passenger Cars During Year ¹	Total Highway Bonds Issued During Year	Installment Credit Out- standing at End of Year on New and Used Passenger Cars ¹	Total Highway Debt Outstand- ing at End of Year
1950	8,530	652	6,074	4,195
1951	8,956	793	5,972	4,642
1952	11,764	1,108	7,733	5,407
1953	12,981	1,344	9,835	6,392
1954	11,807	2,665	9,809	8,677
1955	16,745	1,186	13,472	9,407
1956	15,563	1,482	14,459	10,482
1957	16,545	1,191	15,409	11,174
1958	14,316	1,352	14,237	11,983
1959	18,001	1,158	15,590	12,574
1960	18,250	1,206 ²	18,350	13,164 ²

¹Board of Governors of Federal Reserve System, quoted in "Automobile Facts and Figures" (1961).

²Debt of local governments estimated.

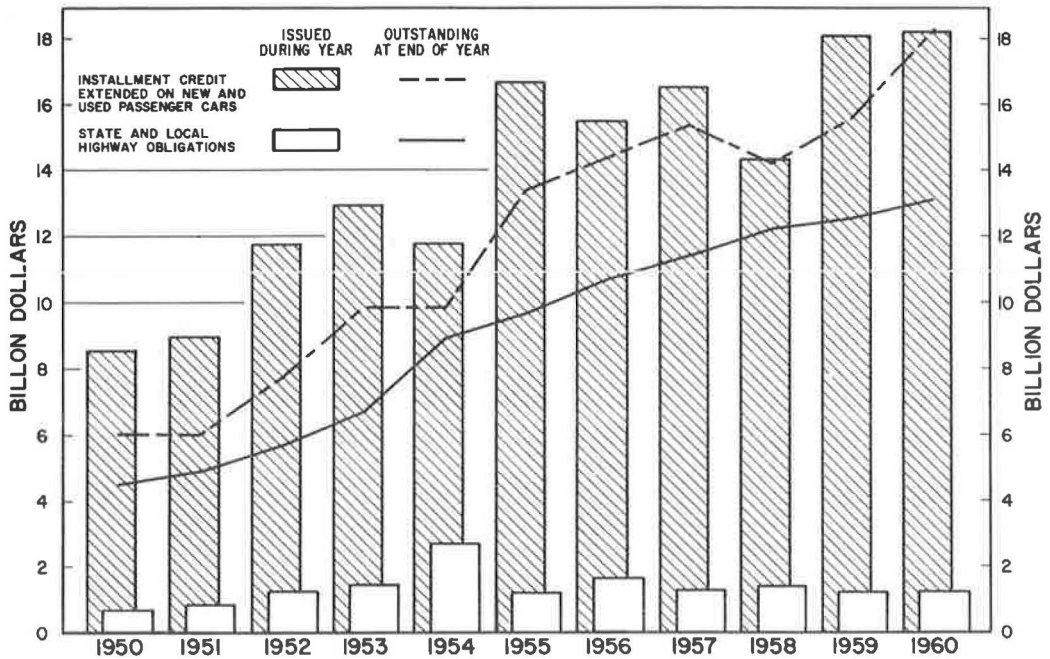


Figure 5. Borrowings for passenger cars and for highways.

The relative burden of highway debt is also measured by the degree to which credit financing draws on tax revenues for debt service. Table 8 compares for 1960 the amounts of State road-user tax revenues available to the States for highway purposes, with the portions of such revenues allocated for debt service; i. e., for interest and redemption of bonds. Because these taxes can be pledged only for general and limited obligation bonds, there is no claim on them to service the revenue debt of the States. In computing the amount of revenues available to the States, nonhighway allocations and payments of grants-in-aid to local governments are deducted.

Thirty-four States paid debt service in 1960 from road-user tax revenues, although in 4 States (Delaware, New Jersey, New York, and Rhode Island) payments technically were made from a general revenue fund into which road-user taxes were deposited, and thence considered to be drawn on for debt service.

Nationwide, 8.58 percent of available revenues in 1960 were assigned to debt service on State obligations. Excluding the nonborrowing States, this percentage rises to 10.57. The median payment in Table 9 interpolates to 13.71 percent of revenues, with a range from a low of 0.27 percent in Tennessee to a high of 58.76 percent in Delaware. Only 6 States assigned as much as 25 percent of revenues to debt service, and in only 3 of these States did the total exceed one-third of revenues.

Figure 6 shows the geographic distribution of 1960 payments for debt service from road-user tax revenues. It is significant that of the 7 States having the greatest amounts of borrowings (Fig. 2), only three (Maryland, Massachusetts, and Michigan) also appear among those States assigning 25 percent or more of revenues to debt service (Fig. 6). Thus, the magnitude of the debt is not necessarily indicative of the relative burden such debt places on the State's resources. Table 8 and Figure 6 show that in only a few of the borrowing States has highway debt service reached significant levels, based on the magnitude of indebtedness at the end of 1960.

Constitutional Prohibitions and Limitations

The growing popularity of revenue and limited obligation bonds can be attributed in a large measure to the limitations and restrictions on general obligation bond issues which require as security a pledge of the general credit of the State. The nonguaranteed obligations require no such

TABLE 8
STATE SHARE OF ROAD-USER TAX REVENUES
AVAILABLE FOR HIGHWAYS, 1960,
COMPARED WITH PORTION
ALLOTTED FOR DEBT
SERVICE¹
(\$ × 10³)

State	State Share, Road-User Tax Revenues ²	Portion for Debt Service	
		Amount	Percent
Ala.	48,765	9,223	18.91
Alaska	4,583	-	-
Ariz.	29,256	-	-
Ark.	40,823	8,819	21.60
Calif.	340,412	2,135	0.63
Colo.	34,764	3,607	10.38
Conn.	42,375	2,045	4.83
Del.	11,642	6,841	58.76
Fla.	114,590	12,955	11.31
Ga.	75,662	10,093	13.34
Hawaii	7,948	3,876	48.77
Idaho	17,205	-	-
Ill.	131,215	-	-
Ind.	75,656	-	-
Iowa	70,214	-	-
Kans.	52,865	-	-
Ky.	78,941	3,737	4.73
La.	64,293	15,326	23.84
Me.	29,648	4,110	13.86
Md.	53,360	16,249	30.79
Mass.	86,649	39,728	45.85
Mich.	109,105	28,148	25.80
Minn.	68,052	3,367	4.95
Miss.	29,153	6,046	20.74
Mo.	83,902	803	0.96
Mont.	21,134	-	-
Neb.	30,327	-	-
Nev.	9,379	-	-
N. H.	20,529	4,687	22.83
N. J.	129,641	2,846	2.20
N. Mex.	29,222	2,849	9.75
N. Y.	271,577	24,340	8.96
N. C.	123,421	15,030	12.18
N. Dak.	14,930	-	-
Ohio	192,338	30,786	16.01
Okla.	44,558	-	-
Ore.	44,476	6,886	15.48
Pa.	210,587	8,763	4.16
R. I.	12,820	2,290	17.86
S. C.	51,947	7,042	13.56
S. Dak.	18,851	-	-
Tenn.	58,376	159	0.27
Texas	221,537	661	0.30
Utah	22,623	-	-
Vt.	10,815	2,844	26.30
Va.	94,247	-	-
Wash.	56,212	8,489	15.10
W. Va.	58,170	8,185	14.07
Wis.	61,040	339	0.65
Wyo.	13,567	-	-
D. C.	13,736	-	-
Total	3,537,138	303,544	8.58
Total, borrowing States	2,872,792	303,544	10.57

¹Data from BPR table DF in "Highway Statistics 1960."

²Excluding nonhighway allocations and amounts paid as highway grants-in-aid to local governments.

TABLE 9

LOCATION OF AUTHORITY TO BORROW FOR STATE PURPOSES AS OF JANUARY 1, 1962

In Electorate		In Legislature
By Constitutional Amendment	By Referendum	
Ala.	Alaska	Conn.
Ariz.	Ark.	Del.
Colo.	Calif.	Hawaii
Fla.	Idaho	Md.
Ga.	Ill.	Mass.
Ind.	Iowa	Miss.
La.	Kans.	N. H.
Mich.	Ky.	N. Dak.
Minn.	Me.	S. C.
Neb.	Mo. ^a	Tenn.
Nev.	Mont.	Vt.
N. Mex.	N. J.	
Ohio	N. Y.	
Ore.	N. C.	
Pa.	Okla.	
S. Dak.	R. I.	
Texas	Wash.	
Utah		
Va.		
W. Va.		
Wis.		
Wyo.		

^aAuthority may be granted either by constitutional amendment submitted by the legislature or on initiative by the people. To avoid duplication, State is listed only once.

pledge, and the courts have usually held that the issuance of such bonds does not come under the purview of general constitutional prohibitions and limitations on State borrowing.

The present restrictions on the legislatures' power to pledge the States' credit reflect the efforts of the electorate to correct the evils of capricious borrowing and the accompanying financial embarrassment that arose from time to time in the 19th century³.

The constitutional restriction on State borrowing is not, of course, an absolute ban, because it can be modified or eliminated by amendment. Its chief functions have been to provide for a delaying action when a question involving a pledge of the State's credit is concerned, and also to compel the submission of proposed loans to popular referendum.

Although the present constitutional limitations on State borrowing are extremely varied and individualistic, they can be di-

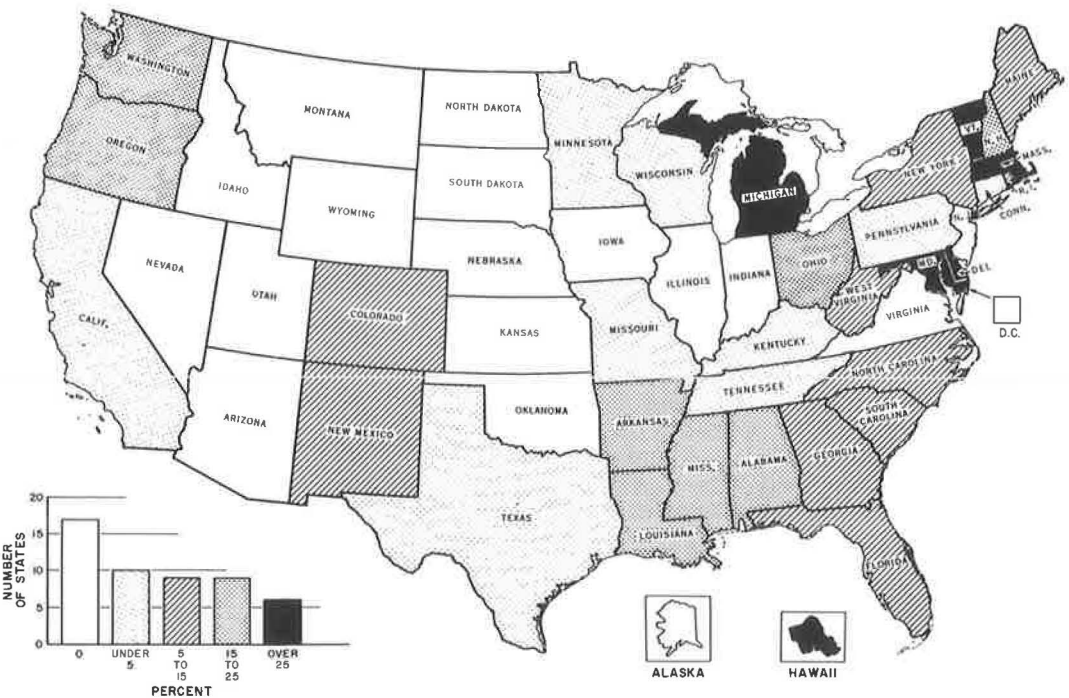


Figure 6. Road-user tax revenues allocated for debt service, 1960.

³Further discussion given elsewhere (5,6).

vided for purposes of analysis, into three groups according to the methods used to regulate borrowing. Table 9 gives the States according to those groupings.

The constitutions of 22 States flatly prohibit borrowing, with the usual exceptions for such purposes as meeting casual deficits, refunding prior debts, repelling invasion, suppressing insurrection, and defending the State. In these States each proposal involving borrowing must be authorized by a constitutional amendment approved by the electorate, under various prescribed procedures.

In the second group of States, the procedure is not as elaborate, and borrowing can be accomplished by means of a popular referendum. In these 17 States the electorate also make the final decision.

The third group consists of 11 States in which the authority to incur debt is vested in the legislature without necessity for popular approval. The legislature may assume this authority in cases where the constitution is silent regarding debt limitations, or where the limitation is so general as to impose no real restriction on the borrowing power of the legislature. South Carolina has been included in this group, although the constitution requires that any bond issue must be approved by popular referendum. In practice, the legislature in that State as early as 1929 authorized highway bond issues not to exceed \$65,000,000 without a referendum vote. Subsequent laws have raised the limits to \$70,000,000. Within this ceiling, the State may issue bonds whenever desired.

It is possible, of course, for the States in either the second or third groups to authorize borrowing by means of a constitutional amendment, if this procedure is found desirable. Similarly, the States in the third group may submit proposals to popular vote, even though such action is not required. However, in some States there is a limit on borrowing even though approved by popular vote⁴.

Table 10 compares the borrowing pattern of the States relative to the degree of constitutional limitations on borrowing. Both the lateral and vertical comparisons in this table are useful in measuring the effect of statutory restrictions on the type of bond program selected. Figure 7 also shows these comparisons.

Among the 22 States that require a constitutional amendment to issue guaranteed bonds, only 5 issued this type of highway bond, and in the modest amount of \$348 million. Yet this same group of States accounted for \$3.8 billion of all debt incurred during the period, and in the process issued 65 percent of all limited obligations, and 40 percent of all toll revenue bonds. Thus, although constitutional restrictions have had an influence on the issuance of general obligation bonds in these States, they have been largely ineffectual in restricting highway debt financing as a whole. In effect, these States have found it expedient to turn to the use of nonguaranteed bonds, despite the higher financing costs that these almost invariably entail.

Among those States that require referendum approval of bonding (technically a less stringent requirement than that of the constitutional amendment) a somewhat different pattern emerges. A much greater proportion of the borrowing in these States was by general obligation bonds; yet even here, nonguaranteed bonds accounted for nearly two-thirds of the debt incurred.

The third group of States, in which the choice of borrowing is determined by the legislature, made by far the greater use of guaranteed obligations. Here, given a somewhat greater freedom of choice, nearly one-half of all borrowings were by means of general obligation bonds.

In summary, it must be evident that the demands for highway capital funds to finance urgently-needed facilities, or even to finance Statewide accelerated highway programs, have encouraged the circumvention of constitutional barriers to State-created debt, either by the less frequent, but direct, method of the amendatory or referendum process or by the speedier, and hence more popular, device of the nonguaranteed bond which requires no approval by the electorate. The cost to the public of financing with nonguaranteed bonds is almost invariably higher than with general obligation bonds, but this may be accepted as a justifiable premium by those States that wish to avoid the consequences and delays in seeking voter approval of a guaranteed bond issue.

⁴Additional discussion given elsewhere (7, p. 38 et seq.).

TABLE 10
STATE BORROWING FOR HIGHWAYS, 1950-60, RELATIVE TO CONSTITUTIONAL
RESTRICTIONS ON GUARANTEED STATE DEBT
(\$ × 10³)

Type of Debt	To Issue Guaranteed Bonds			
	Requires Electorate to Approve		Requires Only Legislative Approval (11 States)	Total Bonds Issued
	Constitutional Amendment (22 States)	Referendum Proposal (17 States)		
Guaranteed Bonds:				
Amount issued (\$1,000)	348,100	1,352,960	1,069,015	2,770,075
Number of States	5	7	7	19
Percent of line total	12.6	48.8	38.6	100.0
Percent of column total	9.2	36.1	47.7	28.4
Limited obligation bonds:				
Amount issued (\$1,000)	1,577,827	183,753	668,979	2,430,559
Number of States	9	3	4	16
Percent of line total	64.9	7.6	27.5	100.0
Percent of column total	41.8	4.9	29.9	24.9
Toll Revenue bonds:				
Amount issued (\$1,000)	1,814,538	2,207,420	498,678	4,520,636
Number of States	9	12	8	29
Percent of line total	40.1	48.9	11.0	100.0
Percent of column total	48.0	58.9	22.2	46.3
State-assumed debt:				
Amount issued (\$1,000)	36,700	62	3,886	40,648
Number of States	4	1	2	7
Percent of line total	90.2	0.2	9.6	100.0
Percent of column total	1.0	0.1	0.2	0.4
All obligations:				
Amount issued or assumed (\$1,000)	3,777,165	3,744,195	2,240,558	9,761,918
Number of States	16	13	10	39
Percent of line total	38.7	38.3	23.0	100.0
Percent of column total	100.0	100.0	100.0	100.0

Federal Role in Borrowing

A section of the Federal Highway Act of 1950 (later codified as Section 122, Title 23, U. S. Code) provided that any State or local government that issues bonds and uses the proceeds to accelerate construction of toll-free facilities on the Federal-aid Interstate or primary systems, or extensions of Federal systems within urban areas, may apply authorized Federal funds to aid in the retirement of such bonds⁵. The Act stipulates that (a) the proceeds of such bonds must have been actually expended in the construction of the Federal-aid systems, (b) the construction is in accordance with plans and specifications approved in advance by the Bureau of Public Roads, (c) payments shall not exceed the pro rata Federal share specified by law, and (d) payments shall be made from funds authorized by Congress, and no commitment or obligation exists to provide such payments in the absence of Congressional authorizations.

Federal funds may not be claimed in reimbursement of interest payments nor for bond proceeds expended on the Federal-aid secondary system.

That the States have found this provision of Federal law useful in accelerating highway programs, is attested to by the fact that, at the end of December 1961, bond-financed programs totaled nearly \$395 million, of which the Federal fund share was over \$253 million (Table 11).

Although this program is in no sense a Federal lending device but rather results in postponing reimbursement of the Federal share of authorized Federal-aid projects, it does have two advantages to the States: (a) programs involving Federal-aid work can be planned and financed in advance of the availability of Federal funds (the expenditure

⁵P.L. 769, §5, 81st Congress. Also codified as 23 U.S.C. 122.

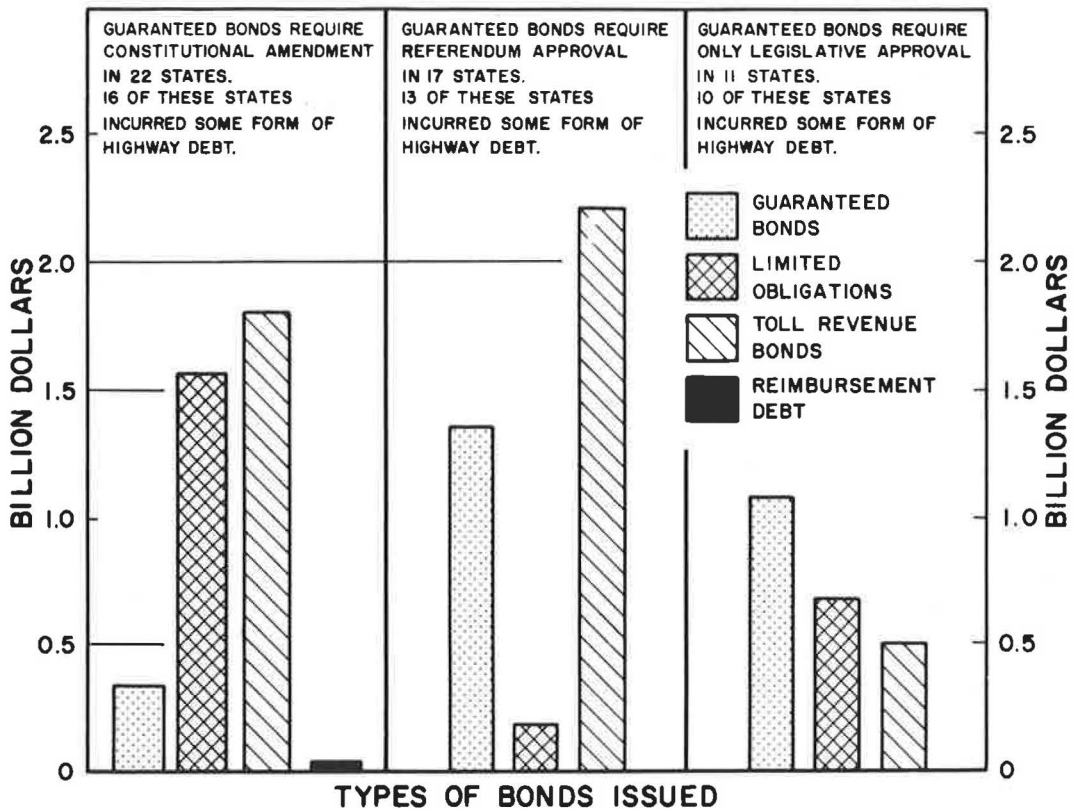


Figure 7. State borrowing for highways, 1950-60, relative to constitutional restrictions on guaranteed State debt.

TABLE 11
BOND FINANCED PROJECTS IN ANTICIPATION OF FEDERAL AID
AS OF DECEMBER 31, 1961

State	No. of Projects	Cost (\$ × 10 ⁶)		Miles	Bridges
		Total	Federal Funds		
Colo.	18	8.9	4.7	41.7	12
Fla.	2	3.8	3.5	-	-
Hawaii	16	30.9	15.0	30.9	27
Ill.	154	143.1	111.8	20.8	63
Me.	1	3.7	1.8	3.8	3
Mich.	90	110.9	55.4	207.2	110
Minn.	1	2.2	1.1	0.2	1
N. H.	5	5.4	2.6	8.5	5
Ore.	50	47.2	27.5	228.4	89
Wash.	38	38.5	29.8	83.5	36
Total	375	394.6	253.2	625.0	346

of which is governed by availability of revenues in the Federal Highway Trust Fund), thus permitting the State to accelerate its Federal-aid program where desirable and feasible to do so, and (b) Federal funds may be claimed at times, and in the amounts, determined by the maturity schedule of the bond issue, thus reducing the demand for State funds for debt service during the period that the bonds are maturing. In this manner, a minimum of current State tax revenue need be committed for the cost of financing the accelerated bond issue construction program.

Short-Term Financing

As used in this study, short-term financing has reference to obligations issued for a term of two years or less. Usually these obligations take the form of repayable advances, tax anticipation warrants, or bond anticipation notes. This form of borrowing, used rather frequently by local governments, has not been extensively employed by the States to finance highway capital expenditures. Notable exceptions to this, however, have occurred in recent years, and particularly in connection with the financing of toll projects.

The 1947 New Hampshire legislature authorized construction of a toll road from Seabrook to Portsmouth and granted the State treasurer authority to borrow \$7.5 million for this purpose. However, during the period of construction the entire cost was financed from the proceeds of 90-day renewable notes purchased by Boston banks. By this device, the State was able to effect a savings in interest expense during construction by drawing down funds only as needed. The discount rate was scaled from 0.635 percent per annum on the first sale in March 1949 to a peak of 1.04 percent on a December 1950 renewal. The average annual rate was slightly under 1 percent. In 1951, these notes were retired from the proceeds of a \$7 million general obligation serial bond issue bearing a coupon rate of 1.6 percent. Thus, the interest savings during construction was in the area of two-thirds of a percentage point.

The Delaware River Joint Toll Bridge Commission used short-term notes to supplement a regular bond sale and provide funds primarily for construction of a toll bridge between Trenton, N. J., and Morrisville, Pa. These bond anticipation notes were sold in 1949 at a coupon rate of $1\frac{3}{4}$ percent, and were funded in 1950 from proceeds of a revenue bond issue with a coupon rate of 2.3 percent. Here again, a savings of more than $\frac{1}{2}$ percent interest was realized during the initial construction period.

On a broader scale, the New Jersey Turnpike Authority obtained its original financing by means of a "forward commitment" agreement with some 50 institutional investors whereby the Authority was able to defer the immediate sale of \$220 million of $3\frac{1}{4}$ percent revenue bonds, and draw down only the amounts required to meet construction costs as they came due. The forward commitment provided for interest at a standby fee of 0.5 percent on the undrawn balance. By this device, the Authority was able to realize a considerable savings in interest cost.

The New York Thruway Authority also obtained its first financing with short-term notes; a \$10 million loan in 1950, and a \$60 million load in 1952, the latter bearing an interest cost of 1.1 percent. These were sold to a syndicate of 21 banks. In 1953, the notes were retired from proceeds of the Authority's first issue of State-guaranteed bonds, sold at a net interest cost of 2.638 percent. More recently, the Authority borrowed \$50 million in April 1959, on State-guaranteed notes at an interest cost of 2.15 percent. These were renewed one year later for an additional six months at a rate of $2\frac{3}{8}$ percent per year, and were subsequently funded in September 1960 from proceeds of a State-guaranteed bond issue sold at a net interest cost of 3.46124 percent. As a result of the short-term financing, and hence postponement of the bond issue, the Authority (8, p. 40) estimates savings of \$7 million over the life of the bond issue.

Several States have recently sold notes in anticipation of the receipt of Federal-aid funds or in anticipation of the sale of bonds to finance Federal-aid construction. Typical of these is Rhode Island where the legislature in 1960 authorized, subject to referendum approval, issuance of State-guaranteed notes during the fiscal years 1960-72⁶. These

⁶Ch. 86, P.L. 1960, ratified May 24, 1960.

notes are issued in anticipation of receiving reimbursement from the Federal Government for the Federal share of the cost of the Interstate System in Rhode Island. The Act stipulates the principal amount of notes that can be outstanding at any one time, with a maximum of \$63 million for the 1965-66 fiscal year. The notes may be sold at public auction or private sale, or to the State board of commissioners of sinking funds. Each Interstate note may be issued for a period of no more than two years, but may be refunded or renewed for additional two-year terms. Final maturity, however, must occur not later than eight years from the date of original issue. Proceeds from the sale of notes are placed in a special account, the "interstate reimbursement fund," and expended only for the purposes of financing the Federal share of the cost of the Interstate System. All receipts of the Federal Interstate highway monies are deposited in the fund, and are used to discharge the notes.

Companion bills approved by the electorate of Rhode Island grant authority for the State to issue bonds and bond anticipation notes, and to finance the State's share of the cost of the Interstate System and of the Federal-aid primary and secondary systems⁷.

Under these statutes, the State issued Interstate and bond anticipation notes in 1960-61 (Table 12) at interest rates of 1.5 to 1.8 percent. As an illustration of the interest rate differential, Rhode Island sold \$6 million of highway improvement loan bonds in April 1961 at a coupon rate of 3½ percent. Thus for interim financing purposes, the State has been able to realize substantial interest savings from its short-term loan program.

Both Connecticut and Delaware have authorized issuance of highway bond anticipation notes in connection with bond-financing programs⁸. Connecticut, for example, sold on October 28, 1959, two series of one-year bond anticipation notes: Series A in the amount of \$15 million, at a rate of 2.9256 percent, and Series AA for \$10 million, at a rate of 2.94 percent. However, when these notes were retired in 1960 from proceeds of definitive bonds, the latter carried a coupon rate of only 2.90 percent. In this instance, there seems to have been no advantage in short-term financing, and the State has not subsequently sold anticipation notes of this type.

Two other methods of anticipatory borrowing have been used by the States to a varying degree. The first of these comprise appropriation advances or repayable advances from State sources other than regular highway funds. New York, for example, has for many years made annual "first instance" appropriations out of State general funds, for the purpose of providing the anticipated Federal share of the cost of Interstate and other Federal-aid system projects. The fiscal year 1963 budget (9, pp. 705-908), for example, recommends an appropriation of \$177 million as an advance of the Federal-aid apportionment expected to be made in August 1962. Because the apportionment to be made at approximately that time will be for fiscal 1964 and must be obligated not later than the end of fiscal 1966, with final reimbursements of Federal funds probably extending beyond that date, the effect of the "first instance" appropriation by the legislature is to make available an interest-free loan in anticipation of the receipt of Federal funds. Because of the interest-free feature, this method of financing offers a savings in highway costs compared to interest-bearing anticipation notes.

The other method used rather extensively during the 1950's, stems from a provision in Federal highway statutes, permitting advances to the States of the Federal share of the cost of projects on any of the Federal-aid systems, including the Interstate system⁹. Following adoption in 1956 of the accelerated Federal-aid highway programs, a number of States applied for and were granted advances to expedite financing of the program.

During the 3-year period 1956-58, advances totaling \$43,375,000 were made to 16 States. However, in subsequent years, the Bureau of Public Roads has discouraged further advances in order to provide better control of available Federal-aid funds and avoid possible deficits from occurring in the Federal Highway Trust Fund. Nonetheless, this method has been useful to many States in meeting the impact of an expanded highway program.

⁷Chs. 85 and 88, Public Laws 1960.

⁸Conn., P.A. No. 132, 1959 Session; Del. H.B. 221, ch. 40, vol. 53, Laws of Delaware, approved 1961.

⁹§6, Federal-Aid Highway Act of 1944 (58 Stat. 838) codified as 23 U.S.C. 124.

TABLE 12
RHODE ISLAND SHORT-TERM FINANCING, 1960-61

Type	Purchaser	Interest Rate (%)	Par Value (\$1,000)	Issued	Matures
Interstate notes	Morgan Guaranty Trust Co., N. Y.	1.625 & 1.75	4,000	12/9/60	6/9/61
	Industrial National Bank, Providence, R. I.	1.70	1,000	12/9/60	6/9/61
	First Boston Corp., N. Y.	1.55	500	12/9/60	6/9/61
Bond anticipation notes	Morgan Guaranty Trust Co., N. Y.	1.70	2,000	12/9/60	6/9/61
Interstate notes	Morgan Guaranty Trust Co., N. Y.	1.50	1,500	6/9/61	2/9/62
	Morgan Guaranty Trust Co., N. Y.	1.55	8,500	6/9/61	2/9/62
	Solomon Bros., & Hutzler, N. Y.	1.65 & 1.70	7,750	2/9/62	11/9/62
		1.80	7,000	2/9/62	5/9/63
	Morgan Guaranty Trust Co., N. Y.	1.65 & 1.80	1,250 2,000	2/9/62 2/9/62	11/9/62 5/9/63

Local governments, both counties and municipalities, make proportionately greater use of short-term financing than do the States. Table 13 compares the reported amounts of short-term road and street obligations issued by local governments during the four years 1956-59, with the amounts of long-term debt issued.

The large increase noted in sales by municipalities in 1959 was the result of issues totaling \$100 million by the Triborough Bridge Authority of New York. This Authority's definitive bonds, issued in 1952 in the amount of \$215 million, carry maximum coupon rates of $2\frac{1}{8}$ percent, whereas the 1959 notes were sold at $2\frac{1}{2}$ and 3 percent interest, reflecting, of course, the rising cost of borrowing during this period. The 3 percent notes, incidentally, were retired in 1960 from the proceeds of a \$100 million bond issue sold at a net interest cost of 4.033408 percent.

Authority Device

The use of the public corporation, or authority, as a device to build and operate public enterprises is not new, even in the highway field, but its widespread development and acceptance during the 1950's has been an economic phenomenon. According to Preston (10), the number of State and local authorities reached a total of approximately 1,800 by the beginning of 1959, exclusive of housing and redevelopment authorities.

TABLE 13
A COMPARISON OF SHORT-TERM NOTE AND LONG-TERM
BOND ISSUES BY LOCAL GOVERNMENTS FOR ROADS
AND STREETS, 1956-59
(\$ × 10³)

Year	Counties and Townships			Municipalities		
	Bonds	Notes	Percent Notes Are of Bonds	Bonds	Notes	Percent Notes Are of Bonds
1956	101,891	22,989	22.6	313,312	51,047	16.3
1957	122,941	17,759	14.4	365,494	59,792	16.3
1958	140,108	25,180	18.0	299,407	46,212	15.4
1959	152,845	28,156	18.4	336,204	165,712 ¹	49.3

¹Including \$100 million by Triborough Bridge Authority of New York.

As of January 1, 1961, some 75 authorities were active in the highway field (Table 14), and of this number, 45 were created in the postwar period, 1946-60. Several others are in existence, but were not active during the study period. Moreover, a number of additional authorities have appeared, and subsequently disappeared, during the 40-year period since creation of the archetypal Port of New York Authority in 1921. Some of these, like the Michigan Turnpike Authority, have been established and later abolished when it was found that the project for which it was created was not feasible; others, like the Cairo Bridge Commission, have gone out of existence when bonds issued to finance construction had been amortized; still others have been merged with authorities having similar or broader functions, such as the Mystic River Bridge Authority which was integrated with the Massachusetts Port Authority.

TABLE 14
STATUS OF HIGHWAY AND BRIDGE AUTHORITIES AS OF JANUARY 1, 1961

State	Authority	Year Created	Type of Facilities ¹	Bonds Issued 1950-60* (\$1,000)			
				General Obligations	Limited Obligations	Revenue Bonds	Total
Ala.	Alabama Highway Authority	1955	F		95,000		95,000
	Alabama Highway Finance Corporation	1943	F		4,000		4,000
Calif.	California Toll Bridge Authority	1929	TX			167,374	167,374
Colo.	State Highway Department Office Building Authority	1951	F ²		2,388		2,388
Fla.	Florida Development Commission	1955	T&F	146,662		20,880	167,542
	Ocean Highway and Port Authority	1951	TR	4,600			4,600
	Santa Rosa Island Authority	1947	TX				
	Jacksonville Expressway Authority	1955	T&F	70,000			70,000
	Florida State Turnpike Authority	1953	TR			74,000	74,000
Ga.	State Highway Authority	1955	F		36,835		36,835
	State Toll Bridge Authority	1953	TX			6,650	6,650
	Rural Roads Authority	1955	F		103,500		103,500
	Coastal Highway District	1950	TX			12,500	12,500
Ill.	State Toll Highway Commission	1953	TR			479,000	479,000
	White County Bridge Commission ³	1941	TX				
Ind.	Indiana Toll Road Commission	1951	TR			260,000	260,000
	The Turnpike Authority of Kentucky	1960	TR				
	Indiana Toll Bridge Commission ⁴	1939	TX				
	Sullivan County Bridge Commission	1948	TX				
Iowa	Clinton Bridge Commission ⁵	1944	TX			7,445	7,445
	Davenport Bridge Commission ⁶	1929	TX			4,200	4,200
	Maquokette Bridge Commission ⁷	1956	TX				
Kans.	Kansas Turnpike Authority	1953	TR	19,500		160,000	179,500
	Leavenworth Bridge Commission ⁸	1953	TX			3,000	3,000
Ky.	The Turnpike Authority of Kentucky	1960	TR				
La.	Mississippi River Bridge Authority	1952	TR			65,000	65,000
	Greater New Orleans Expressway Commission	1954	TX			45,963	45,963
	Aceves-Six James Bridge and Ferry Authority	1960	TX				
Me.	Maine Turnpike Authority	1941	TR			58,806	58,806
	Maine Port Authority	1929	TR	2,500			2,500
Md.	Baltimore County Revenue Authority	1955	TX			5,400	5,400
Mass.	Massachusetts Turnpike Authority	1952	TR			291,800	291,800
	Massachusetts Port Authority	1956	TX			981	981
Mich.	Macomb Bridge Authority	1950	TX			99,850	99,850
	International Bridge Authority of Michigan ⁹	1954	TX			16,250	16,250
	State Bridge Commission of Michigan ¹⁰	1935	TX				
	Bellevue Bridge Commission ¹¹	1943	TX			2,800	2,800
	Dart County Bridge Commission ¹²	1943	TX			2,195	2,195
	North Omaha Bridge Commission ¹³	1943	TX			3,450	3,450
	Richardson County Parkway Authority ¹⁴	1943	TX				
N.H.	Maine-New Hampshire Interstate Bridge Authority ¹⁵	1937	TX			899	899
N.J.	New Jersey Turnpike Authority	1948	TR			466,200	466,200
	New Jersey Highway Authority	1952	TR	265,000		49,000	300,000
	Delaware River Joint Toll Bridge Commission ¹⁶	1934	T&F			25,500	25,500
	Burlington County Bridge Commission ¹⁷	1946	TX				
	Cape May County Bridge Commission	1939	TX				
N.Y.	Jones Beach State Parkway Authority	1933	TR			40,000	40,000
	Nassau County Bridge Authority	1945	TR			6,300	6,300
	New York State Bridge Authority	1932	TX			21,900	21,900
	New York State Thruway Authority	1950	TR	500,000		400,000	900,000
	Niagara Falls Bridge Commission ¹⁸	1939	TX			20,000	20,000
	Port of New York Authority ¹⁹	1921	TX			85,344	85,344
	Thousand Islands Bridge Authority ²⁰	1939	TX				
	Triborough Bridge and Tunnel Authority ²¹	1946	TX			301,705	301,705
	Lake Champlain Bridge Authority	1927	TX				
	Duffalo and Fort Erie Public Bridge Authority ²²	1933	TX			878	878
	Opferburg Bridge and Port Authority ²³	1960	TX				
	Adirondack Mountain Authority	1928	TR				
	St. Lawrence Seaway Development Corporation ²⁴	1954	TX				
	East Hudson Parkway Authority	1960	T&F				
Ohio	Ohio Turnpike Commission	1949	TR			326,000	326,000
	Ohio State Bridge Commission	1935	TX			3,500	3,500
Okla.	Oklahoma Turnpike Authority	1947	TR			106,000	106,000
Ore.	Port of Hood River Commission	1950	TX			1,192	1,192
Pa.	State Highway and Bridge Authority	1949	F		105,000		105,000
	Pennsylvania Turnpike Commission	1937	TR			236,000	236,000
	Delaware River Port Authority ²⁵	1931	TX			89,157	89,157
R.I.	Jameson Bridge Commission	1937	TX				
	Mount Hope Bridge Authority	1954	TX			3,100	3,100
Texas	Texas Turnpike Authority	1953	TR			56,500	56,500
Va.	Elizabeth River Tunnel Commission	1942	TX			48,857	48,857
	Richmond-Petersburg Turnpike Authority	1954	TR			75,150	75,150
	Chesapeake Bay Bridge and Tunnel Commission	1954	TX			199,991	199,991
Wash.	Washington Toll Bridge Authority ²⁶	1937	TX			103,257	103,257
W.Va.	West Virginia Turnpike Commission	1947	TR			133,000	133,000
	Dunbar City Bridge Commission	1947	TX			4,450	4,450
Summary	Authorities operating toll crossing facilities (46)			2,500	110,963	1,222,575	1,336,038
	Authorities operating toll roads (18)			765,000	24,100	3,291,456	4,100,556
	Authorities operating both toll and free facilities (4)				218,662	46,380	265,042
	Authorities operating free highway facilities (6)				346,723		346,723
	Total (75)			787,500	700,448	4,560,411	6,048,359

¹TX = toll crossing (bridges, tunnels, and ferries); TR = toll road; F = free roads and bridges; T&F = both toll and free facilities. ²Excluding refunding issues, where possible. ³Office building (included with free roads and bridges). ⁴Interstate or international in operation.

Table 14 shows that 46 authorities operate toll crossing facilities (i. e., bridges, ferries, or tunnels), and of this number, 26 are Interstate or international in character, if not in organization. The seven international authorities include two in Michigan and five in New York.

Of the 19 Interstate agencies, only 5 are true Interstate authorities; that is, created by Interstate compact: the Delaware River Joint Toll Bridge Commission, and the Delaware River Port Authority (Pennsylvania and New Jersey); the Lake Champlain Bridge Commission (New York and Vermont); the Maine-New Hampshire Interstate Bridge Authority; and the Port of New York Authority (New Jersey and New York).

Although the three bridge authorities are concerned solely with highway crossing facilities, the two port authorities are not so limited. The Port of New York Authority in particular is concerned with the financing and operation of a variety of transportation and terminal facilities in addition to six toll highway bridge and tunnel structures.

Although the "youngest" of these five authorities was created in 1937, this is not necessarily indicative of the potential of the Interstate authority device in the future. It is significant that the two Interstate port authorities serve heavily-populated metropolitan areas, and such areas have been increasing rapidly in numbers and size the past two decades. Because many of them encompass a bi-State area, or border closely to State boundary lines, it seems probable that the Interstate authority device may prove to be the solution to many complex metropolitan problems, including, but not necessarily limited to, highway and other transportation problems. In summarizing the future prospects of Interstate authorities, Leach (11) states:

The efficiency with which the few existing interstate authorities are now meeting their assigned responsibilities, and the increasing number of interstate problems which demand cooperative action for their solution both seem to suggest...that far greater use may be made of the device in the years ahead.

The remaining 14 Interstate authorities were established as agencies of only one of two contiguous States, but operate highway toll bridges crossing State boundaries. Most of these are located in Illinois, Indiana, Iowa, Kansas, and Nebraska. Three of the agencies (the White County Bridge Commission, the Clinton Bridge Commission, and the Muscatine Bridge Commission) were created by act of Congress, and are subject to certain Federal audit controls. Although included with this group, the Washington Toll Bridge Authority also has financed and operates a number of intrastate bridge and ferry facilities in addition to two Interstate bridges across the Columbia River.

Of the 19 toll road authorities, 15 were created since 1945, and 10 of these between 1951 and 1960, thus indicating the great popularity of this financing device during the 1950's. It was also during this period that most of the nontoll authorities were created.

During the 11-year span of this study, 57 of the 75 authorities sold bonds for highway projects in an aggregate amount of \$6 billion, as shown in Table 13. Because highway bonds issued by all governmental agencies during these years totaled \$14.1 billion (Table 7), the authorities thus accounted for 43 percent of all highway issues. It would appear that authorities are firmly entrenched in the field of highway finance.

Seventeen of the 19 toll road authorities sold bonds during the 1950-60 period, in the amount of \$4.1 billion, or two-thirds of all debt incurred by authorities. One of the 2 remaining road authorities (the Turnpike Authority of Kentucky) entered the bond market in 1961, and by early 1962 had sold \$186 million of turnpike revenue bonds.

The features that distinguish highway financing by the authority device from those by traditional methods are not always clear cut. For example, a number of State highway departments and local governments finance and operate toll projects. However, this is not the primary function of a highway or public works department, and hence for purposes of this paper, authorities are restricted to those instrumentalities whose primary responsibility is the financing of highway facilities by means of revenue or limited obligation bonds, and which do not rely on general tax support nor have the power to levy taxes.

The authority concept (12, p. 1) has flourished because it has proven successful in

most instances in meeting three basic needs: (a) a means of financing capital projects that would not conflict with constitutional limitations on creation of debt; (b) a flexible instrument to manage commercial or "self-supporting" enterprises; and (c) an effective agency to administer international, interstate, or intercommunity projects¹⁰.

Preston (10, p. 206) classifies authorities in four basic categories, in terms of their administrative powers: (a) "standard" authorities, having all the necessary powers to plan, finance through revenue bonds, construct or purchase, maintain, operate or lease, and support through rates, tolls, rentals, or other charges any project that can be made to pay its way (for example, the Port of New York Authority); (b) "building" authorities, which may plan, finance, and construct, but which derive their revenues from a rental contract with the State or highway department, at rates sufficient to cover only annual debt service and reserve requirements; further, these authorities rarely maintain or operate the facilities (for example the Georgia Rural Roads Authority and the Pennsylvania State Highway and Bridge Authority); (c) "financing" authorities, which do not plan, construct, or operate facilities, but serve merely as financing vehicles (for example, the Alabama Highway Authority, which sold \$95,000,000 of bonds between 1955-60, the proceeds of which were turned over to the State Highway Department for construction of State highways and which are secured by a pledge of a portion of State gasoline tax revenue); and (d) "managing" authorities, which may be responsible for operating, and possibly constructing, a facility, but which do not provide the financing (for example, the Greater New Orleans Expressway Commission, created as an instrumentality of Jefferson and St. Tammany Parishes, in whose names the bonds were issued).

Although examples of each type in its "pure" form are found in the highway field, the highway authority is in many respects an anomaly. For example, two of the "standard" authorities (most common device for financing major toll road projects) have financed both with revenue bonds and with general obligation bonds guaranteed by the State—the New York State Thruway Authority and the New Jersey Highway Authority. In other instances, authorities have received direct or contingent support for their bonds by a pledge of certain State tax revenues. For example, to enhance marketability of bonds to finance the Southwestern Turnpike, the Oklahoma legislature in 1959 created a Turnpike Trust Fund to receive no more than \$1,000,000 annually from taxes levied on motor fuel consumed on turnpike projects. An amount equivalent to three years' interest can be accumulated in the Fund and drawn if needed by the Oklahoma Turnpike Authority to meet interest requirements on the Southwestern Turnpike bonds.

The Kansas Turnpike Authority has a contract with the State Highway Commission whereby the Commission will advance as a loan from the State Highway Fund any amount required to meet deficiencies in meeting debt service payments on bonds issued for the Kansas City Expressway.

The Turnpike Authority of Kentucky receives lease-rental payments from the Highway Department equal to the principal and interest requirements on its bonds; in Louisiana, each of three authorities (the Mississippi River Bridge Authority, the Greater New Orleans Expressway Commission, and the Ascension-St. James Bridge and Ferry Authority) receives contributions from State highway funds to augment toll revenues.

In Washington, the Toll Bridge Authority has agreements with Pierce and King Counties whereby Pierce County sold \$1.5 million of bonds and placed the proceeds in a trust fund for use in the event tolls on the Authority's Tacoma Narrows Bridge were insufficient to cover bond interest; King County has pledged up to \$9 million over a 19-year period out of its share of State road-user taxes as added security for the Authority's Second Lake Washington Bridge project. The 1961 legislature placed \$0.0025 of a gasoline tax increase into the Puget Sound Reserve Account to serve as added security for the Authority's refunding bonds for the Puget Sound ferry system, and Hood Canal Bridge.

The Florida Development Commission in financing a toll causeway to Cape Canaveral pledges not only tolls as security for the Causeway bonds, but also Brevard County's

¹⁰For a later symposium on public authorities (11).

share of surplus (20%) gas tax revenues; if these prove insufficient, it pledges the full faith and credit of the Canaveral Causeway Special Road and Bridge District. If required, an ad valorem tax may be levied on all property in the District.

Because of the relatively late appearance of the Authority in governmental financing and operation, most of the State constitutions are silent concerning the legal status of such institutions. For this reason it has been necessary, particularly where bonded indebtedness is involved, to test constitutionality of these agencies in courts. The courts have generally held that the "special-fund doctrine" applies to bonds issued by special State authorities; i. e., that indebtedness repaid from proceeds of special taxes or fees, levied for that express purpose, are not in violation of constitutional provisions regarding the creation of State indebtedness. This interpretation has undoubtedly contributed to the success and modern prominence of limited and revenue bond financing, and particularly the creation of the separate authority.

Critics of this type of financing are quick to comment that these are but devices to circumvent the prudent and precautionary safeguards written into the State constitutions for the purpose of preventing creation of an overburdening State debt. They also point out that the authority is frequently a "synthetic" organization, and that its operations are in many instances integrated with those of existing State highway departments, and this being the case, the need for a separate authority is not self-evident.

It is also argued that if a separate authority is warranted, it does not justify the pledge of the credit of the State government in support of the authority's obligations as was done, for example, in the case of the New York Thruway and the Garden State Parkway (N. J.). Stated in reverse, if a public improvement justifies support of the State's credit, it does not require creation of an Authority. The critics would further use this argument in support of the contention that creation of a separate authority does not absolve the State of responsibility for any indebtedness incurred. Not only is there a mutual interest in the objectives to be achieved but also the State has a moral responsibility to insure that its credit rating will not be impaired by any potential default of the authority's bonds.

Although, fortunately, the States have faced this dilemma only rarely in modern times, when the occasion has arisen, action has usually been prompt. For example, Florida quickly took steps to refund the debt of the Fernandina Port Authority in 1951 following default in payment of a semiannual interest coupon, and in 1961, the State of Illinois approved an ordinance of the City of Chicago to advance \$2 million out of road-user tax revenues to meet interest requirements on the revenue bonds of the Calumet Skyway and avoid a default in payment of the January 1962 coupon. West Virginia, however, has not as yet found a means to improve the earnings of the Turnpike Authority (which defaulted on the June 1958 interest coupon, and presently is running about two years behind schedule in meeting these semiannual payments). Any long-term solution will probably have to await improvement of connecting highways that may help generate additional traffic for the turnpike, but these benefits are still in the future.

Perhaps the most compelling argument against authority financing, particularly that of toll authorities, is the almost inevitable higher financing cost of revenue bonds—often at interest rates from one to two percentage points higher than for general obligation bonds.

The advocates of authority financing point out the flexibility of this method over that of the general obligation bond, authority for which frequently must be obtained both through the legislature and from the electorate with the attending uncertainties. It has been particularly effective where large capital programs are involved, and the need is urgent.

Many authorities, as was seen, have been created where the scope of the program extends into two political jurisdictions, or where international boundaries are involved. In these situations, an authority is undoubtedly the most logical organization and may well be the only feasible one.

It is also claimed that the Authority is as subject to public control and policy as any other State agency, inasmuch as it is a creature of the legislature which can (and does) limit the powers and duties of the Authority, require public audit of accounts, and set debt limitations, among other things. Furthermore, elaborate safeguards as to man-

agement of funds are usually written into the trust agreements or indentures under which bonds are sold to the public.

Although the experience is limited, the non-toll authorities have demonstrated an ability to borrow funds at interest rates not unfavorable in comparison with those the central government can obtain for general financing. Interest costs on bonds of the Georgia and Pennsylvania Bridge and Highway Authorities have been considerably lower than interest costs on the bonds sold by the toll Authorities in those States. Moreover, to strengthen the security back of the Georgia road authority bonds, the voters in November 1960 ratified a constitutional amendment, making it obligatory for the legislature to appropriate the amounts necessary to meet the lease rental payments on the authority bonds¹¹. The State Attorney General subsequently ruled that by such action, the bonds have become general obligations of the State.

Other States have been studying the experience of the Pennsylvania "free road" Authority, and it is likely that similar agencies will make an appearance in other areas, particularly where the machinery for meeting the problem of modern highway financing is cumbersome and outmoded.

Interest Rates

The earlier study of bond financing (2) ended at a time (1951) that bond interest rates were near their lowest point during this century. During the period of this study, bond interest rates have shown a steady upward trend, reflecting a general tightening of the money market.

As measured by the Bond Buyer's monthly index of the State-local government bond market, the average yield of 20 selected bond issues rose from a low of 1.58 percent in early 1951 to a high of 3.81 percent during 1959. Thereafter, the index declined slightly, but remained at 3.51 percent at the end of 1961.

The values of this index are given by years in Table 15 and the monthly values are shown graphically in Figure 8. This index of calculated yields is obtained by averaging the market value of general obligation bond issues of selected States and local governments. According to the "Bond Buyer" (13), the bonds selected are those having a maturity of about 20 years and selling at a price close to par, with few exceptions. Although the same bond issues are not used year after year (because of trading inactivity or other factors, the selection is changed to make the index more representative of the market), the average rating of the 20 bonds used in the index falls midway between the four top groups as classified by recognized rating agencies.

The value of this index to the highway administrator is evident, even though it is not indicative of the rates at which specific State and local highway bonds are sold. It does measure a trend in the financing cost of borrowing, and can be useful in planning the timing of bond sales programs.

Just as the yield rate is an indicator of the rate of return to the investor, the "net interest cost" is the factor typically used in measuring the cost of a bond issue to the borrower. Prospective bidders for highway bond issues usually express their bid in terms of an effective interest rate, which is computed by determining at the interest coupon rate or multiple rates specified by the bidder (or by the

TABLE 15

THE BOND BUYER'S INDEX OF THE MUNICIPAL BOND MARKET (20 BONDS)

Year	Index of Yield ¹
1950	2.07
1951	1.66
1952	2.11
1953	2.40
1954	2.54
1955	2.38
1956	2.56
1957	3.23
1958	2.97
1959	3.40
1960	3.78
1961	3.39

¹¹ Georgia Constitution; Art. VII, §VI, paragraph I (a).

¹ January of years 1950-61.

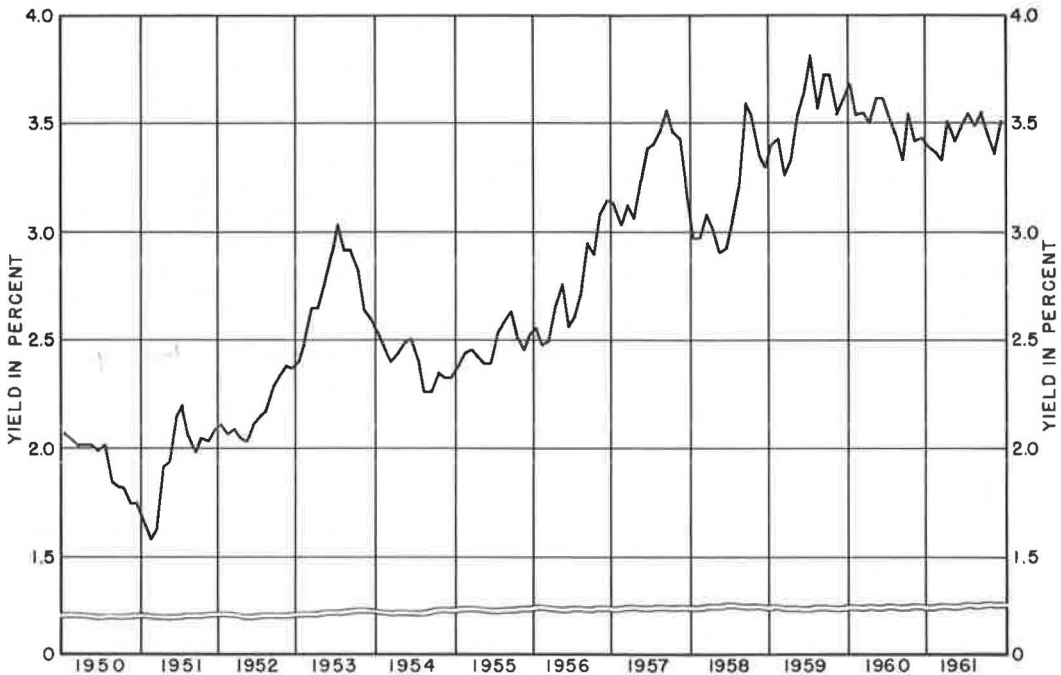


Figure 8. Bond buyer's index of municipal bond market, 1950-61.

borrower, in some instances) the cumulative total dollar value of all interest on the bonds from date of issue, or from date of settlement, to their maturity and deducting therefrom any premium (or adding thereto any discount). The resulting net interest cost is then expressed in terms of an effective rate of interest to the borrower. In reality, it is the weighted average interest rate of a bond issue. Under competitive bidding, the banking institution, investment house, or bond syndicate offering the lowest net interest cost is awarded the sale.

The net interest cost has been computed for nearly all highway bond issues of State agencies during the 11-year period of this study, with the costs identified separately for toll revenue bond issues, for general obligations, and for limited obligation bonds. Table 16 gives the bond sales by net interest cost class intervals. From the frequency distribution in the table, the average net interest cost has been computed for each year for each major class of bonds and shown in Figure 9 as the value of the weighted arithmetic mean.

As the figure shows, the sales of general obligation bonds have followed reasonably well the trend shown by the Bond Buyer's index of yields, with the average of sales during 1950-52 falling below 2 percent, those during the next 4 years falling mostly in the 2½ percent range, and those in 1957-60 pushing beyond the 3 percent mark.

Except for convergence in 1953, the net cost of limited obligation bonds has consistently exceeded that of the guaranteed bond, and since 1956 the average differential has been about one-half a percentage point.

It is interesting to compare the interest cost of general and limited bonds with the cost of issuing toll revenue bonds which for the most part during the years 1950-55 sold at average net interest costs within the 3 to 3½ percent range, then increased beyond the 4 percent range, and by 1960 had reached the 4½ percent level. During the 11-year span covered by this study, the average interest cost of toll revenue bonds was in the range of 1¼ to 1½ percentage points higher than for general obligation bonds, and as much as 1 percentage point higher than for limited obligations. Although such general comparisons are hazardous because the differential in costs is influenced by many

factors (such as the condition of the money market at the time of sale, size of issue, and magnitude of prior debt of the issuing agency), the inherent factor of risk cannot be overlooked. The unhappy earnings record of some revenue bond facilities has undoubtedly had an effect in establishing an interest rate differential for this class of bond.

Although a comparison of the net interest cost of various bond sales must be weighed carefully in the light of the preceding factors, it has been possible to select a few illustrations of sales occurring closely together in point of time and, in most instances, within the same State, which emphasize the differential in cost of revenue bond financing versus that of general or limited obligations.

On July 1, 1953, the New Jersey Highway Authority sold \$150,000,000 of State-guaranteed bonds with serial maturities to 1988 at a net interest cost of 2.997 percent. On the same date, the New Jersey Turnpike Authority also sold \$150,000,000 of nonguaranteed toll revenue bonds, maturing as a term issue in 1988 at a net interest cost of 3.4923 percent.

On January 1, 1958, Connecticut sold \$77 million of general obligation expressway bonds with serial maturities to 1997 at a net interest cost of 3.258 percent. On the same date, the Illinois Toll Highway Commission sold \$64 million of revenue bonds, with a term maturity in 1998 at a net cost of 4.970 percent.

On September 21, 1960, the State of Michigan sold \$25,000,000 of Trunk Line Highway Bonds as limited obligations secured by road-user tax revenues. These bonds mature serially over a 25-year period and were sold at a net interest cost of 3.78 percent. On August 11, 1960, the International Bridge Authority of Michigan floated a \$16,250,000 revenue bond issue comprising a Series A issue of \$8,400,000 sold at a net interest cost of 5.125 percent and a \$7,850,000 Series B issue at 6.0 percent. Both series are 40-year term bonds maturing in the year 2000.

The State of Kentucky sold \$15,000,000 of general obligation highway bonds on June 14, 1961, at a net interest cost of 3.6042 percent. These are 30-year serial bonds. On June 23, 1961, the Kentucky Turnpike Authority issued \$118,000,000 of limited obligation bonds (secured by

TABLE 16
STATE OBLIGATIONS FOR HIGHWAYS ISSUED 1950-60 IN TERMS OF NET INTEREST COST
(\$ x 10⁶)

Type of Bond	Interest Cost Interest Rate (9)	1950		1951		1952		1953		1954		1955		1956		1957		1958		1959		1960		
		Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	
General obligation	Less than 1 1/2%	103,300	32.3	76,500	35.2	10,450	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1 1/2% and less than 2%	84,000	47.7	152,000	66.4	116,500	91.4	133,205	23.9	99,395	41.1	52,159	51.1	185,941	65.7	6,000	2.6	81,000	174.6	-	-	-	-	-
	2% and less than 3 1/2%	-	-	-	-	416,500	74.8	142,500	58.9	-	-	-	-	34,000	33.3	140,010	62.2	379,925	85.4	154,200	75.0	124,300	80.6	-
	3 1/2% and less than 4 1/2%	-	-	1,000	0.4	500	0.4	7,900	1.3	-	-	-	-	-	-	79,179	35.2	-	-	60,000	28.0	30,000	19.4	-
	4 1/2% and over	-	-	230,500	100.0	137,450	100.0	537,205	100.0	242,095	100.0	102,159	100.0	278,941	100.0	233,185	100.0	460,925	100.0	214,200	100.0	154,300	100.0	-
Total Limited obligation	Less than 1 1/2%	197,300	100.0	64,975	98.8	84,600	85.4	40,000	31.4	56,525	22.0	76,900	46.0	33,000	10.9	2,000	0.4	-	-	-	-	-	-	-
	1 1/2% and less than 2%	25,000	37.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2% and less than 3 1/2%	34,300	51.9	184	1.2	16,800	16.6	87,250	66.6	140,536	46.2	83,394	50.4	297,867	88.4	156,500	38.1	278,772	78.8	51,450	16.6	52,344	23.0	-
	3 1/2% and less than 4 1/2%	4,800	7.0	-	-	-	-	-	-	66,750	21.9	5,000	3.6	2,200	0.7	250,439	63.1	74,170	20.9	247,666	63.4	147,495	64.9	-
	4 1/2% and over	66,120	100.0	63,559	100.0	101,400	100.0	127,250	100.0	394,213	100.0	185,294	100.0	303,067	100.0	460,682	100.0	353,842	100.0	209,438	100.0	227,289	100.0	-
Total Toll revenue	Less than 1 1/2%	24,300	17.1	34,281	15.0	30,000	5.2	3,000	0.7	5,450	0.3	2,100	0.5	-	-	-	-	-	-	-	-	-	-	-
	1 1/2% and less than 2%	119,000	62.9	175,700	72.5	425,000	79.4	270,278	63.9	1,389,350	76.4	208,100	82.7	9,300	1.9	-	-	13,666	13.9	500	0.3	300	0.1	-
	2% and less than 3 1/2%	-	-	29,650	12.2	124,000	21.4	149,670	35.4	484,350	23.3	181,000	46.4	474,975	98.1	4,900	1.2	84,100	85.6	118,800	51.7	12,750	9.0	-
	3 1/2% and less than 4 1/2%	-	-	-	-	-	-	-	-	-	-	-	-	-	34,900	87.7	84,100	85.6	57,553	44.0	316,950	95.0	-	
	4 1/2% and over	143,340	100.0	245,335	100.0	579,000	100.0	422,646	100.0	1,512,590	100.0	394,800	100.0	464,275	100.0	39,600	100.0	99,286	100.0	198,193	100.0	330,000	100.0	-

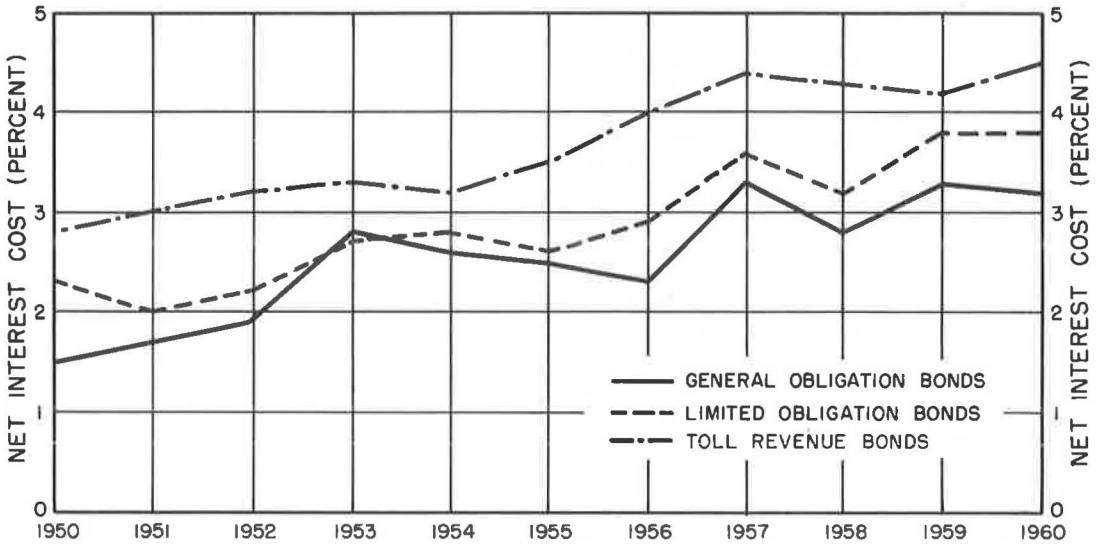


Figure 9. State obligations for highways, by weighted average net interest costs.

tolls and/or State lease-rental payments) at a net interest cost of 4.928 percent. The issue comprises \$20,000,000 of 25-year serial bonds and \$98,000,000 of 40-year term bonds.

Also during 1961, the State of Ohio sold on November 22 \$30,000,000 of limited obligation highway bonds (secured by road-user taxes) at a net cost of 2.88 percent, and three weeks earlier (November 3) the Oklahoma Turnpike Authority sold \$56,500,000 of bonds secured by tolls and a pledge of gas tax earnings at a net interest cost of 4.85 percent.

On February 1, 1962, Delaware sold \$10,000,000 of general obligation highway bonds at a net interest cost of 2.83 percent. On February 21, the State sold \$28,000,000 of turnpike revenue bonds at a net cost of 4.1875 percent.

It would be hazardous to draw too positive conclusions based on the differentials illustrated by these examples, yet all evidence points to the fact that the cost to the public of revenue bond financing, and even of limited obligation bonds that are dependent to some extent on earnings of the facility, is consistently higher than that of the guaranteed bond issue.

Maturity Schedules

Another factor that influences the cost of borrowing is the length of maturity of the bond issues. Table 17 and the weighted averages in Figure 10 show the span of years to maturity of the various State highway bond issues sold during the period 1950-60. Because the maturity features are not dissimilar, general and limited obligations are treated as one group. Here again, the maturities for toll revenue bond issues are consistently for longer terms than are those for general and limited bonds. Except in 1953, 1957, and 1959 when the differential was less than 10 years, Figure 10 shows that the average revenue bonds issue carries a 10- to 15-year longer term to maturity than do general and limited obligation bonds.

Toll revenue obligations are usually issued as term bonds; that is, they mature on a fixed future date and will be redeemed from the accumulations of a sinking fund. The term may vary from 10 to 50 years, but most bonds of this type in recent years have been for terms of 35 to 40 years. Interest on term bonds remains constant, of course, so long as the bonds are outstanding. The sinking fund is accumulated by annual contributions out of current revenues expected to be sufficient to meet current interest charges and, together with investment earnings, to redeem the bonds at maturity. The

earnings estimates on which the sale of revenue bonds are predicated, are usually so favorable as to anticipate call and redemption of the obligations well in advance of stated maturities. However, only time will prove the validity of these estimates for many toll-financed projects.

General and limited obligations are usually issued as serial bonds; that is, the principal is retired on an annual schedule, and interest payments decline as the loan is amortized. No sinking fund is required, because the annual debt service payments are met from current revenues. For purposes of Table 17, serial bond issues are grouped according to their longest maturities to make them as comparable as possible with term bond maturities. The bond-financing policies of State agencies have been so varied, however, as virtually to eliminate in many instances the features that distinguish term from serial bonds. Some States, for example, issue serial bonds by name, but schedule maturities in such a manner that redemptions are relatively light, or even deferred, in early years and are concentrated heavily in the final 4 or 5 years. In other States, term issues are being called for redemption on an annual basis, and sinking fund requirements are minimized or eliminated.

Debt Refunding

For this study, bond issue and redemption as results of refunding operations have been excluded for the most part from the tabulations and analyses. This has been done to avoid giving a misleading picture of the magnitude of borrowing as a device to raise capital funds, which would result if both original and refunding bonds were to be included.

The use of refunding bonds, however, has been a time-honored device for the States as well as local governments to take advantage of lowered interest rates or adjust the maturities of bond issues. This usually requires, of course, the inclusion of a call feature in the original bond issue that will permit the bonds to be redeemed in advance of maturity.

During the decade of the 1930's, State agencies sold or assumed \$2,049 million of highway obligations, of which \$550 million (27 percent) were refunding bonds. During this depression period, most re-

TABLE 17
STATE OBLIGATIONS FOR HIGHWAYS, 1930-60, ACCORDING TO MATURITIES IN YEARS¹
(8 x 10⁶)

Type of Bond	Maturities (yr)	1950		1951		1952		1953		1954		1955		1956		1957		1958		1959		1960							
		Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent	Bonds Sold	Percent						
General and limited obligation	Less than 10	-	-	4,000	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
	10 and less than 15	62,600	23.6	73,764	25.1	48,950	17.4	84,000	29.4	30,000	10.6	115,154	40.8	22,800	7.9	11,000	3.8	11,000	3.8	11,000	3.8	11,000	3.8	46,640	12.5				
	15 and less than 20	82,000	29.6	113,500	37.9	36,000	12.6	18,250	6.2	84,243	28.4	84,243	28.4	137,844	46.7	233,100	79.3	207,673	69.9	176,700	57.4	124,650	32.7	124,650	32.7				
	20 and less than 25	2,000	0.7	19,000	6.4	2,000	0.7	2,000	0.7	17,250	5.8	2,000	0.7	15,200	5.1	15,200	5.1	10,000	3.3	71,750	23.1	74,800	19.6	74,800	19.6				
	25 and less than 30	24,000	8.6	21,400	7.4	250,500	86.6	149,800	50.3	149,800	50.3	25,650	8.6	25,650	8.6	31,000	10.3	31,000	10.3	134,500	38.1	50,000	13.1	50,000	13.1				
	30 and less than 35	24,000	8.6	21,400	7.4	250,500	86.6	149,800	50.3	149,800	50.3	25,650	8.6	25,650	8.6	31,000	10.3	31,000	10.3	134,500	38.1	50,000	13.1	50,000	13.1				
	35 and less than 40	24,000	8.6	21,400	7.4	250,500	86.6	149,800	50.3	149,800	50.3	25,650	8.6	25,650	8.6	31,000	10.3	31,000	10.3	134,500	38.1	50,000	13.1	50,000	13.1				
	40 years and over	-	-	-	-	2,500	0.8	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1	169,000	57.1
	Total		265,400	100.0	304,138	100.0	278,450	100.0	464,435	100.0	346,308	100.0	387,365	100.0	532,108	100.0	665,166	100.0	614,667	100.0	523,695	100.0	381,589	100.0	381,589	100.0			
	Total revenue	Less than 10	10,000	7.0	8,725	6.2	21,500	15.1	31,000	7.7	1,210	0.3	5,400	1.4	9,300	1.9	1,500	0.3	1,500	0.3	1,500	0.3	1,500	0.3	2,050	0.6			
10 and less than 15		-	-	-	-	21,500	7.7	1,210	0.3	2,500	0.7	10,000	2.5	10,000	2.5	34,875	11.4	34,800	6.4	6,986	1.1	26,800	7.1	5,600	1.1				
15 and less than 20		-	-	-	-	8,800	2.8	1,210	0.3	2,500	0.7	10,000	2.5	10,000	2.5	34,875	11.4	34,800	6.4	6,986	1.1	26,800	7.1	11,000	2.9				
20 and less than 25		-	-	-	-	2,500	0.7	700	0.2	16,850	4.2	16,850	4.2	16,850	4.2	16,850	4.2	16,850	4.2	16,850	4.2	16,850	4.2	16,850	4.2	16,850	4.2		
25 and less than 30		22,000	18.0	34,450	11.0	64,000	22.8	130,978	31.0	130,978	31.0	130,978	31.0	130,978	31.0	130,978	31.0	130,978	31.0	130,978	31.0	130,978	31.0	130,978	31.0	130,978	31.0		
30 and less than 35		70,000	55.4	35,000	11.0	130,000	46.7	225,000	51.2	142,500	39.5	142,500	39.5	142,500	39.5	142,500	39.5	142,500	39.5	142,500	39.5	142,500	39.5	142,500	39.5	142,500	39.5		
35 and less than 40		21,000	16.2	18,500	5.7	18,500	6.6	73,100	16.2	73,100	16.2	73,100	16.2	73,100	16.2	73,100	16.2	73,100	16.2	73,100	16.2	73,100	16.2	73,100	16.2	73,100	16.2		
40 years and over		147,000	100.0	242,338	100.0	579,000	100.0	423,448	100.0	1,419,990	100.0	1,419,990	100.0	394,900	100.0	484,875	100.0	389,800	100.0	389,800	100.0	198,266	100.0	330,000	100.0				
Total			265,400	100.0	304,138	100.0	278,450	100.0	464,435	100.0	346,308	100.0	387,365	100.0	532,108	100.0	665,166	100.0	614,667	100.0	523,695	100.0	381,589	100.0	381,589	100.0			

¹Serial bond issues grouped according to their longest maturities as far as on a comparable basis with term bonds.

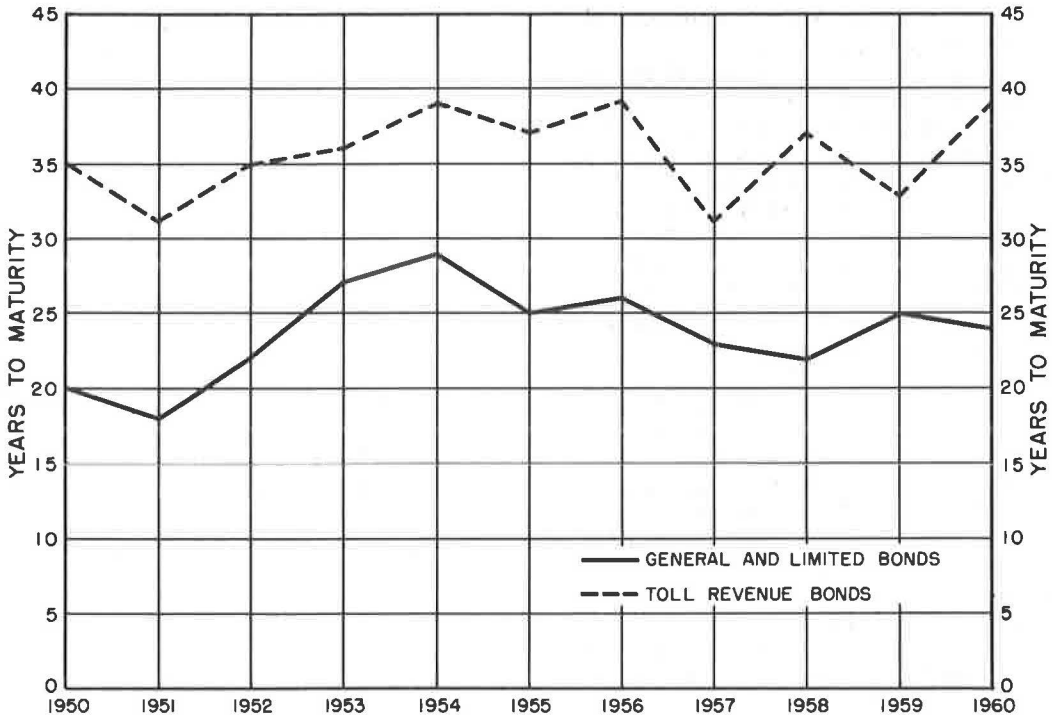


Figure 10. State obligations for highways, by average maturities in years.

funding was dictated by economic necessity to avoid or correct for default in meeting interest and maturity requirements, and had little relevance to interest rates, which by the mid-1930's had reached the highest levels since 1900.

Between 1940 and 1949, the States sold \$1,579 million of highway obligations, of which \$708 million were refunding bonds (nearly one-half). Most of this refunding was to take advantage of declining interest rates which, according to the Bond Buyer's index (13), dropped from a yield rate of 5.48 percent in 1934 to 1.42 percent by 1946.

From 1950 to 1960, the States sold only \$268 million of refunding bonds in addition to the \$9,764 million of original issues, or 2.7 percent of all bond sales. Virtually all the refunding was in connection with toll facility financing, and interestingly enough, the refunding issues in nearly all instances bore a higher rate of interest than the bonds that were retired from the proceeds. For example, the New Jersey Turnpike Authority redeemed \$30 million of $1\frac{7}{8}$ percent revenue bonds sold in 1952 from the proceeds of a \$150 million revenue bond issue sold in 1953 at $3\frac{3}{8}$ percent interest. In 1959, from the proceeds of $4\frac{3}{4}$ percent bonds, the Massachusetts Port Authority redeemed the remaining \$21,620,000 debt of the Mystic River Bridge originally issued in 1947 at $2\frac{7}{8}$ percent interest rate.

In 1946, the Maine Turnpike Authority sold \$20 million of toll road revenue bonds bearing coupon rates of $2\frac{1}{2}$ and $2\frac{3}{4}$ percent, and maturing as term bonds in 1976. In 1953, the Authority sold \$75 million of revenue refunding and extension bonds bearing an interest rate of 4 percent and maturing in 1989. From the proceeds of the 1953 sale, the 1946 issue was retired. Thus, the users of the original turnpike section must now bear an added interest expense of at least $1\frac{1}{4}$ percent yearly, extended over an additional 13 years.

Much the same thing occurred more recently in Florida, where the Turnpike Authority in 1961 sold $4\frac{3}{4}$ percent revenue bonds to extend the present turnpike an additional 158 miles and to redeem the remaining bonds outstanding on the original toll road project, issued in 1955 at an interest rate of $3\frac{1}{4}$ percent. In addition to providing for the

increased interest cost of $1\frac{1}{2}$ percent, the toll road user finds that the refunding bonds have moved the final maturity date six years further into the future.

Most of these refunding operations have in reality been consolidations, whereby the authorities have sought to improve marketability of bonds issued to finance new ventures by pledging the resources of established facilities. This could not be done, of course, where indebtedness existed on prior facilities unless the underlying debt could first be retired or a majority of the bondholders would agree to a diminution of their security.

In contrast to this, the Pennsylvania Turnpike Commission financed its East-West turnpike system under a 1948 "closed-end" indenture. As a result, bonds to finance the later northeast extension from Philadelphia to Scranton had to be issued under a 1952 indenture that could not pledge as security revenues of the east-west system until all the 1948 indenture bonds were retired. The Commission has since found to its embarrassment that revenues on the northeast extension have been inadequate to meet debt service requirements, whereas those on the east-west system far surpass needs. As a result, the 1948 indenture bonds are being retired in advance of maturity as rapidly as possible so that tolls may be pledged to the 1952 indenture bonds before default can occur. The timing may be very close.

Perhaps the classic example of debt consolidation by means of refunding relates to the bond issues of the Port of New York Authority. Between 1926 and 1938, this Agency sold a total of \$131.3 million of revenue bonds to construct three Staten Island toll bridges and the George Washington Bridge and to acquire the Holland Tunnel. All these early issues were serial bonds secured by a pledge of the revenues from each specific facility. The effects of the depression and of a general lowering of interest rates after 1934 led the Authority to issue general and refunding bonds as term bonds and to apply the proceeds to retire all of the original serial bonds, and to provide funds for construction of the Lincoln Tunnel and certain other facilities. Under this plan, revenues of all facilities were pooled as security for the entire debt.

The postwar period saw a great increase in the Port Authority's activities. Truck and bus terminal facilities were constructed, and the Authority took over operation of the Port Newark marine terminal and the four major airports in the New York area. General and refunding bonds were issued to finance the inland terminals, but special marine and air terminal bonds were issued to finance improvements at Port Newark and the four airports.

Beginning in 1952, the Authority adopted a plan to unify the debt structure further. All future financing was to be by means of consolidated bonds, to be secured by revenues of all facilities not otherwise pledged. By the end of 1961, through refunding and new financing ventures, including major improvements to the George Washington Bridge and to other facilities, some 82 percent of the Authority's outstanding debt was represented by consolidated bonds.

Between 1950 and 1960, an estimated \$85 million of consolidated bonds were issued to finance improvements and expansion of the bridge and tunnel facilities. Thus, there is no longer any identity of debt structure as it applies to specific facilities, and the highway user will be expected to continue paying tolls on the crossing facilities so long as any consolidated debt is outstanding.

CURRENT DEVELOPMENTS IN HIGHWAY BOND FINANCING

The remainder of this study is concerned with an examination of some of the more prominent and perhaps novel State highway bond-financing programs. Although this study generally covers the period 1950-60, some bond programs initiated in 1961 and during the early months of 1962 are included because of their significance or timeliness. A review is made of general, limited, and revenue bond financing.

General Obligation Issues by Constitutional Amendment

As mentioned previously, 22 States constitutionally prohibit borrowing, except by means of an amendment. During the 1950's, 5 States among this group sold general obligation bonds.

Alabama. —Alabama voters in December 1951 approved a constitutional amendment

authorizing a \$25 million bond issue. These guaranteed bonds were issued in 1952 at a coupon rate of 1 $\frac{5}{8}$ percent, and the proceeds applied to match Federal-aid highway funds. Since then, the State has sold nearly \$100 million of limited obligation highway bonds, but has not again resorted to the amendatory process.

Louisiana.—Between 1950 and 1960, Louisiana issued \$100 million of general obligation bonds under 3 separate constitutional amendments. Under an Act of the 1946 legislature¹², the State sold \$10 million of highway bonds in 1950, payable from \$0.04 of the gasoline tax. In 1953, 1954, and 1958, the State sold an aggregate amount of \$30 million under a second amendment¹³. These bonds are also payable from gasoline taxes.

By an act of the 1955 legislature¹⁴, the State adopted a 10-year, long-range highway program, with an initial authorization of \$60 million in bonds. Under this authorization, \$30 million of long-range highway bonds were issued in each of the years 1959-60, at net interest costs ranging from 3.4973 percent on a 1959 sale, to 3.79 percent on a 1960 sale. As security for these bonds, the State pledged proceeds of certain motor-fuel taxes, vehicle license fees, and mineral leases on State-owned lands. No additional bonds may be issued unless the pledged revenues for the preceding year are equal to twice the maximum annual principal and interest requirements of the outstanding bonds.

All highway bonds issued under the provisions of these three constitutional amendments carry the further pledge of the full faith and credit of the State of Louisiana.

Minnesota.—For a 20-year span between 1936 and 1956, Minnesota issued no highway bonds. In 1956, a constitutional amendment¹⁵ was adopted which, among other things, created a trunk highway fund to receive certain road-user taxes, and from which debt service would be paid, and which authorizes issuance of trunk highway bonds, with not more than \$150 million to be outstanding at any one time. The amendment further stipulated that bonds must mature not later than 20 years after issue, be sold at not less than par, and not bear interest in excess of 5 percent. The bonds will be full-faith obligations of Minnesota.

During the years 1956-59, the State issued a total of \$46 million of trunk highway bonds under enactments specifying the purpose for which the proceeds would be used, as follows:

Purpose	Amount (\$)
Highway office building	6,000,000
Trunk highway bridges	20,000,000
Right-of-way acquisition	20,000,000

These bonds were sold at net interest costs ranging from a low of 2.326 percent on 1956 sales to 3.0323 percent on 1959 sales.

Under a 1959 Act¹⁶, the State is authorized to finance construction of trunk highways within the city limits of St. Paul by issuing to the city non-interest-bearing trunk highway bonds in repayment of advances by the city of cash and/or engineering services. The city elected to sell its own interest-bearing bonds to provide funds to advance to the State, and during 1961, it sold \$4,750,000 of 3.1 and 3.2 percent serial bonds. The State, in turn, deposited with the city a like amount of trunk highway bonds having approximately the same maturities.

¹² Adopted as amendment to Art. VI, §22, Louisiana State Constitution.

¹³ Louisiana Constitution, Art. VI-A, §5, adopted November 4, 1952.

¹⁴ Act 141, 1955 Session, adopted April 17, 1956 as Art. VI, §23 of Louisiana Constitution.

¹⁵ Minnesota Constitution, Art. XVI, §12, amended November 6, 1956, effective July 1, 1957.

¹⁶ Ch. 538, 1959 Session Laws of Minnesota.

By earmarking bond proceeds for specific purposes and within specific areas, Minnesota has departed somewhat from the usual practice of issuing general obligation highway bonds for unspecified highway projects. In the case of the St. Paul bonds, the State has, in effect, shared the financing costs with the city, in that the State will meet the principal and the city the interest requirements of the bonds.

Oregon.—Oregon adopted a constitutional amendment¹⁷ in 1920 permitting borrowing for highways not to exceed 4 percent of the assessed valuation of all property of the State. Within this limitation, the legislature may authorize borrowing without voter ratification. During the years 1951-53, the State issued \$72 million of highway bonds as general obligation and pledged road-user tax revenues for debt service. In 1957, the State sold an additional \$20.6 million of bonds, of which \$12.6 million was earmarked for construction of a scenic coastal highway on US 101 between Gold Beach and Brookings. At the end of 1961, the State had slightly over \$55 million of bonds outstanding. Under its limitation and based on a 1961 assessed valuation of approximately \$3 billion, the State can issue up to a ceiling of \$120 million of highway bonds.

West Virginia.—West Virginia issued \$84.5 million of general obligation bonds between 1950 and 1960, pursuant to constitutional amendments. A 1920 amendment authorized the issuance of not to exceed \$50 million of State highway bonds. A unique feature of this amendment was the specification that the State may issue bonds, "the aggregate outstanding amount of which, at any one time, shall not exceed fifty million dollars." Under this provision the State may "reissue" bonds from time to time, as the outstanding debt authorized under this amendment falls below \$50 million. During the period 1950-60, the State "reissued" \$39 million of these bonds, represented by sales in 9 of the 11 years, and at the end of 1960 had outstanding \$49.6 million of bonds under this authorization, consisting entirely of reissues. This type of amendment is somewhat similar to that in Oregon.

The limitation is expressed in dollars in West Virginia, whereas, in Oregon it is expressed as a percentage.

West Virginia's practice of reissuing bonds has the effect of funding a perpetual revolving debt of \$50 million with interest (at present reissue rates) of about 3½ percent per year. Because the annual sales are approximately the same amount of annual retirements, the State is creating no additional capital funds through this method of financing and, as interest rates have risen, has in effect refunded low interest-bearing obligations by the substitution of bonds carrying higher rates. Moreover, the 1961 legislature appropriated \$6,345,000 from general revenues to aid in payment of principal and interest on outstanding road bonds, although these bonds are a first charge against the State road fund which receives proceeds of road-user taxes.

A West Virginia constitutional amendment ratified in 1948 authorized an issue of \$50 million of bonds to build secondary and farm-to-market roads. Under terms of the enactment, these bonds cannot be reissued. Between 1950 and 1953, inclusive, \$45.5 million of these bonds were sold, all with 15-year maturities, with final retirement scheduled for 1968.

The West Virginia general obligations carry a Moody's rating of "A," sharing with Louisiana's bonds the lowest rating for State-guaranteed obligations sold during the period of this study.

General Obligation Issues by Referendum

Among the 17 States that require referendum approval of general obligation bonds, 7 (Arkansas, Kentucky, Maine, New Jersey, New York, North Carolina, and Rhode Island) undertook this method of borrowing during the 1950-60 period. The following discussion concerns some of the more significant of these.

Maine.—From 1952 through 1959, Maine issued a total of \$52.5 million of voter-approved general obligation bonds, of which \$39.5 million financed statewide construction of road and bridge projects, and \$13 million were for specific crossing facilities, including the Bangor-Brewer and Jonesport Reach toll bridges, as well as toll ferries

¹⁷Oregon Constitution, Art. XI, §7.

operated by Maine Port Authority. By virtue of the State guarantee, bonds in the amount of \$2.5 million for the Bangor-Brewer bridge were sold in 1952 at a net interest cost of 1.639 percent; those for the Jonesport Reach bridge in 1956 at 2.499 percent net cost, and those for the ferry service for 2.928 and 3.0726 percent in 1958 and 1959, respectively. In contrast to this, nonguaranteed bonds of the Maine Turnpike Authority were sold in 1953 at a net interest cost of 4.114 percent.

New Jersey. —New Jersey voters in November 1952 ratified an Act¹⁸ that authorized the pledge of the State's full faith and credit back of an issue of bonds not to exceed \$285 million to finance portions of a 164-mile toll highway from Paterson to Cape May, known as the Garden State Parkway. The act also specified that the bonds would have to mature within 35 years and would bear interest at not to exceed 3 percent per annum.

As early as 1945, the State Highway Department had begun construction of sections of this route, known as the Route 4 Parkway, as part of the State highway system. Funds appropriated were sufficient to complete only 22 miles of the parkway in 6 years, and it became apparent that if the parkway was to be completed within the foreseeable future, either legislative appropriations would have to be increased considerably or credit financing would be required.

Studies of the toll potentiality of this route were made, and it was concluded that a closed-type toll road, similar in design to the New Jersey Turnpike, would not be feasible because of the heavily urbanized area extending some 30 miles north of the Raritan River which the parkway would traverse. It was therefore planned to build the parkway as a barrier-type facility (with toll-free entrance and departure between barriers); i. e., the vehicle would pay a predetermined toll at each gate through which it passed, without regard to the distance traveled between gates.

Although this barrier system of toll collections had been used earlier in Connecticut on the Merritt and Wilbur Cross Parkways, and on the Westchester County, N. Y., parkways, it had not previously been used on any road that was planned to be entirely self-liquidating from tolls. There was, therefore, some doubt that investors would be willing to finance a venture of this kind, requiring so great an outlay. It was this factor that prompted the legislature to call for a referendum to place the State's guarantee back of the bond issue. It was felt that this would assure a market for the bonds, and that lower interest rates could be obtained.

It was decided that the parkway would be made free of tolls on the sections built by the State Highway Department. The original plan for a road on which commercial vehicles would be banned was modified to permit use by buses and to allow truck traffic south of the Ocean County line (near Lakewood)—approximately three-fifths of the parkway length.

Initial financing of the parkway by the Highway Authority was undertaken in the summer of 1952 when invitations were tendered to New Jersey banks and trust companies to subscribe to \$10,000,000 of Series A notes. This plan was modified within a week when Federal Reserve Bank officials indicated these short-term notes or bonds would be speculative and therefore might not be acceptable in any bank that was a member of the Federal Reserve System. The Authority then proposed to obtain \$10,000,000 to \$20,000,000 in loans from New Jersey banks at 2 percent interest. In August 1952, 138 New Jersey banks made a short-term loan of \$17,000,000 maturing July 1, 1953, and the first construction contracts were awarded by the Authority.

In September 1952, the State Department of Law ruled that the Authority had sufficient legal power to extend the parkway from its northern terminus at Paramus to the New York State line. The Authority had sought such a ruling in order to increase use of the road and expand its revenues.

In November, the voters approved by nearly 2 to 1 the referendum authorizing a State guarantee of the Authority bonds, but plans for permanent financing were delayed when constitutionality of the act was challenged. By January 1953, an additional \$11,000,000 temporary loan had been negotiated with New York and Philadelphia banks, as the Authority marked time while the question of State guarantee of Authority bonds

¹⁸Ch. 17, New Jersey Laws of 1952.

was being decided in the courts. In May, the New Jersey Supreme Court upheld the constitutionality of the statute, and plans for issuing permanent bonds were quickly completed.

In July, \$150,000,000 of Series A serial bonds were sold at a net interest cost of 2.997 percent. In November, the remaining \$135,000,000 of bonds authorized was sold at a net interest cost of 2.7652 percent. Final maturity of these bonds is scheduled for 1988.

From proceeds of the Series A bonds, the \$28,000,000 of temporary loans was redeemed. Reinvestment of these loans had reduced the net interest cost to less than 1 percent during the period of temporary financing.

As construction proceeded, the Authority adopted the policy of opening sections of the parkway as soon as completed. The first section on which tolls were levied was opened in January 1954, and other sections followed. On July 1, 1955, the parkway began full operation.

In May 1954, the Authority announced plans for a \$25,000,000 extension to the New York line to be completed by 1955, and for construction later of a ferry to link the Cape May end of the parkway with Lewes, Delaware, across the Delaware Bay. Legislation was enacted in July authorizing tolls on the northern extension. It was also determined that an additional \$15,000,000 to \$25,000,000 would be needed to complete the original parkway. Because the State guarantee had been exhausted, additional funds had to come from revenue bond financing.

Accordingly, in November 1954, the Authority sold \$20 million of Series C revenue bonds maturing in 1988, at a net interest cost of 3.236 percent. In July 1956, financing was completed with the sale of \$25 million of Series D and E revenue bonds to extend the parkway to the New York line. These bonds were sold at a net interest cost of 4.4534 percent.

The financing of the facility illustrates quite forcefully the interest cost differential in general vs revenue bond financing. Indicative of the security features, Moody ratings were "Aaa" for the general obligation of the the Authority and "Baa" for the revenue bonds even though the earnings of the facility since its opening have been adequate to meet all debt service requirements, and the State has not had to draw on other resources (motor fuel or property taxes) to supplement them.

New York. —The New York electorate in November 1951 ratified an amendment to the State constitution¹⁹ authorizing the guarantee by the State of a maximum of \$500 million of bonds to be issued by the New York Thruway Authority. This action, and that taken by New Jersey with respect to the Garden State Parkway bonds, are the only instances where voters have pledged the faith and credit of the State back of toll road Authority bonds. This has led some critics to question whether, under the circumstances, the creation of an independent State Authority is justified. The use of the authority device has been frequently used in conjunction with the financing of highway projects, both toll and toll free, where the use of limited or revenue bonds was indicated because of constitutional limitations. In retrospect, it appears that both New Jersey and New York could have successfully undertaken their toll highway programs under sponsorship of the existing highway department organizations, and thus avoided, or at least minimized, some of the administrative costs necessarily incurred by a separate authority.

The New York Thruway system, a network of 559 miles of highway, was in 1951 expected to be completed at a cost that could be financed within the limits of the guaranteed bond authorization. It soon became apparent that costs of the initial Thruway and subsequent additions would far surpass these limits, and in 1954 the legislature granted the Authority power to issue revenue bonds to finance completion. Accordingly, the Authority sold \$350 million of revenue bonds in 1954 and an additional \$50 million in 1959.

From 1953 through 1960, the Authority sold a total of \$900 million of general and revenue bonds (Table 18).

The \$400 million of revenue bonds have first claim on toll and other revenues of the Authority, even before that of the guaranteed bonds. This may have played an im-

¹⁹New York Constitution, Art. X, §6.

TABLE 18
BOND STATUS OF NEW YORK THRUWAY AUTHORITY¹

Type	Date Sold	Par Value (\$)	Net Interest Cost (%)
State guaranteed:			
1st	5/5/53	125,000,000	2.6382
2nd	9/15/53	125,000,000	2.6981
3rd	10/11/55	50,000,000	2.51464
4th	12/7/55	50,000,000	2.7370
5th	2/15/56	50,000,000	2.41836
6th	2/6/58	50,000,000	3.12365
7th	9/8/60	50,000,000	3.46124
Subtotal		500,000,000	2.765542
Revenue:			
Series A	6/16/54	300,000,000	3.0716
Series B	12/7/54	50,000,000	2.6828
Series C	8/12/59	50,000,000	4.1996
Subtotal		400,000,000	3.1519
Total		900,000,000	2.9567

¹ Source: (14, p. 34).

portant part in holding the net interest cost spread to an average of 0.4 percentage points.

During the period covered by this study, New York also issued a total of \$213 million of highway and grade-crossing elimination bonds as guaranteed obligations of the State.

Following defeat by the voters in 1955 of a proposed \$750 million highway bond authorization coupled with an increase in motor fuel taxes, a new proposal was drafted in 1956 and ratified by the voters in November of that year²⁰. It authorized issuance of \$500 million of guaranteed highway bonds, but did not provide for a tax increase (this was to come 2 years later). Under this authorization, the State sold during 1958 and 1959 a total of \$90 million of bonds, maturing serially over a 20-year period, and at net interest costs ranging from 2.368 percent on a 1958 sale to 2.9527 percent on a 1959 sale. No subsequent sales have been made, and \$410 million of authorized bonds remain unissued.

The State also sold \$77 million of grade-crossing elimination bonds in 1950-51, and an additional \$46 million in 1957-59, to comprise the remainder of the guaranteed obligations.

General Obligation Issues by Legislative Enactment

Seven (Connecticut, Delaware, Massachusetts, New Hampshire, South Carolina, Tennessee, and Vermont) of the 11 States that require only legislative approval of borrowing, sold general obligation bonds during the period 1950-60. (If limited and revenue bonds are included, all but one State—North Dakota—in this group sold bonds.) Some of these States are reviewed later in connection with revenue bond financing. Suf-
fice it here to limit study to one State (Connecticut) that has financed highway work from the proceeds of bonds of each of the three major types. Connecticut's record of sales is given in Table 19.

²⁰ Ch. 761, Laws of 1956, State of New York.

TABLE 19
CONNECTICUT BOND ISSUES
(\$ × 10³)

Year Sold	General Obligations		Limited Obligations		Revenue Bonds	
	Amount	Net Interest Cost	Amount	Net Interest Cost	Amount	Net Interest Cost
1954			100,000	2.857		
1956			100,000	2.8798		
1957	35,000	3.6	50,000	3.689	30,000 ¹	4.75
1958	77,000	3.258	35,000	3.99		
1959	38,000 ¹	3.72998	62,500	4.2998		
1960	35,440	2.89				
Total	185,440		347,500		30,000	

¹1957 revenue bond issue of \$30 million retired from proceeds of \$38 million general obligation bonds of 1959.

Connecticut Turnpike Bonds.—The 1957 and 1958 sales of general obligations, and all of the limited obligations given in Table 19 comprise the \$459.5 million total of bonds authorized to finance the Connecticut Turnpike, a 127-mile expressway from Greenwich to Killingly, that was opened to traffic January 2, 1958. Although tolls are collected at 8 barrier points, only 23 miles of the route are considered to be toll sections (i. e., sections on which the toll cannot be avoided); on the remaining 104 miles, vehicles are permitted ingress and egress without payment of toll. Connecticut chose to place responsibility for financing, maintaining, and operating this facility under the existing State Highway Department, rather than to create an independent authority. The Department covenants to meet all maintenance and operating expenses from other than turnpike revenues, thus permitting gross tolls and other income of the facility to be applied to debt service. Should these be inadequate, the Act provides a lien on motor fuel tax revenues, and in the case of the two general obligation issues, the further pledge of the State's full faith and credit.

Because of the difficulties encountered by the State in obtaining financing for this project, more than a superficial review of the bond issues is warranted. The 1953 legislature authorized²¹ the State highway commissioner to construct the expressway and to issue bonds secured not only by toll earnings but also by a firmly indented claim on the State's gasoline tax revenues. The comprehensive Act also created an expressway bond committee to consist of the Governor, State Treasurer, Comptroller, Attorney General, Commissioner of Finance and Control, and the Public Works Commissioner. The functions of the committee, included providing financial management for the project, prescribing bond issue terms, conditions, and interest rates, and approving toll schedules.

In April 1954, the committee adopted a bond declaration authorizing the issue of \$398 million of expressway bonds, based on the then estimated cost of completing the project. Limitations were placed on annual debt service requirements, annual maturities of the serial bond issues, redemption premiums for advance retirements, and interest rates. The last was set at a maximum of 4 percent.

The first \$100 million bond issue was sold in May 1954. A second sale of \$100 million was scheduled for December 1955, but was postponed because of market conditions until February 1956. Meanwhile, the 1955 legislature had amended the expressway Act²² to provide that the first bond issue should have prior claim on motor fuel taxes (if needed) and that subsequent issues should be subordinate in that respect. The

²¹Connecticut, Public Act 411, 1953 Session.

²²Connecticut, Public Act 52, 1955 Session.

1955 Act also authorized the State to finance free roads through issuance of bonds payable from gasoline taxes and other highway fund revenues, but restricted all further bond issues to those for which debt service would not exceed 50 percent of the gasoline tax receipts from the preceding year at a rate of \$0.04 per gallon then covenanted for benefit of bondholders. This Act also authorized the sale of not to exceed \$50 million of 1-year bond anticipation notes.

Despite the subordinate security pledged for the second series bonds, they sold at about the same net interest cost as the first series. In October 1956, however, the State scheduled sale of a third series of bonds in amount of \$75 million, but found a reluctance on the part of banking groups to accept the issue. Although the issue was then scaled to \$54 million in hopes of attracting a better bid, and reoffered in November 1956, no bids were received. It was reported that the 4 percent interest rate limitation was unrealistic in the light of market conditions. To provide stop-gap financing, the bond committee in January 1957 sold \$16 million of 9-month notes at 2.18 percent, and shortly thereafter obtained approval from the 1957 legislature to increase the amount of bond anticipation notes that could be issued from \$50 to \$100 million. The statute²³ also pledged the full faith and credit of the State to these notes.

A third issue of bonds in the amount of \$50 million was successfully marketed in April 1957, after the bond committee had taken steps to improve terms of the issue. The committee assigned priority of financing to the western part of the expressway from the Connecticut River to the New York State line (estimated to account for 88 percent of costs and 94 percent of revenues), and provided that no expressway bonds would be issued for the eastern section until all costs of the western section had been permanently financed and until it could be verified that the entire expressway would be self-supporting from revenues. Provision was made to finance completion of the eastern section from proceeds of short-term notes. Despite these terms, the third series bonds sold at a net interest cost of 3.689 percent, substantially above the cost of the 1956 issue but not out of line with then current market rates.

To provide financing for the added cost of the expressway, the second 1957 Act raised the limit on short-term notes from \$100 to \$150 million, and also authorized the State to issue \$150 million of general obligation bonds to complete the financing.

The fourth definitive bond issue, and the first to carry the State's guarantee, was sold in August 1957 in amount of \$35 million as 40-year serial bonds. This issue was sold at a net interest cost of 3.6 percent. As the bond market was improving, the State offered a fifth series of limited obligations in November 1957 in the amount of \$35 million, and these were sold at a net interest cost of 3.99 percent, just under the 4 percent self-imposed limitation.

When the expressway was opened on January 2, 1958, the State had outstanding \$79.5 million of short-term notes, of which \$31.1 million had financed the western section, in addition to \$320 million of bonds. In February of that year, the State sold its sixth series of bonds, and the last increment of general obligations, with a \$77 million issue, which sold at a net cost of 3.258 percent. The proceeds were applied to complete financing of the western section, including retirement of the \$31.1 million of notes.

Financing the expressway was completed more than a year later when in June 1959 the seventh, and final, series of limited obligations was issued in amount of \$62.5 million to fund the cost of the eastern section, including retirement of \$57 million of general obligation notes. This issue bore the highest net interest cost (4.2998 percent) of any of the sales.

Although beset with financial difficulties, the State exercised prudent management in financing this important expressway facility (some 87 miles of which are on Interstate 95). By borrowing funds as needed, and making extensive use of short-term notes, interest costs were held to a minimum during the four-year construction and six-year financing period. However, had the State chosen to make use of general obligation bonds exclusively, the interest costs to final maturity in 1997 of the present bond series would undoubtedly have been substantially reduced (the cost of the 1958 general obligation issue

²³Connecticut, Public Act 2, 1957 Session.

was a full percentage point below the 1959 limited bond issue), and the State would have had less difficulty in marketing its securities.

Other Connecticut Bond Issues.—The \$73,440,000 of general obligation bonds sold in 1959 and 1960 (Table 19) were the first increments of a \$346 million, 4-year highway bonding program approved by the 1959 legislature²⁴. In 1961, the State sold an additional \$28,980,000 of bonds under this authorization at a net cost of 2.83 percent. As contemplated in the program, bonds would be supplemented with State and Federal-aid funds to bring the total financing to \$522 million. Of the total bond issues, \$222 million are to be grant anticipation bonds; i. e., bonds to finance the Federal share of Interstate projects for which the State will receive reimbursement after 1963. By this method the State will be able to accelerate Federal-aid Interstate system construction beyond the pace governed by the amount of Federal funds available annually to the State.

The 1961 legislature increased the borrowing authority by an additional \$125 million to build 24 specific highway projects, permitted issuance of grant anticipation notes and made optional the issue of bonds as general or limited obligations of the State²⁵. The Act also created a highway debt service fund to receive all State motor-vehicle registrations and license fees after July 1, 1961.

Limited Obligation Bonds

As explained previously, this class of bonds comprises those issues secured wholly or in part from the proceeds of highway funds, but which do not carry the further guarantee of the full faith and credit of the State. During the period, 1950-60 covered by this study, the amount of limited bonds issued for highways (\$2,433 million) was almost as great as the amount of general obligation bonds (\$2,770 million), indicating the popularity of this type of bond.

According to the nature of the security, limited bonds can be divided into two groups: (a) those secured entirely from the proceeds of State tax revenues and highway funds, and (b) those secured partly from such revenues and partly from toll and other earnings of the specific facilities to be financed. Examples of financing through the use of the authority device are found in both groups. Some of the more prominent examples of each type are described.

Road-User Tax Bonds in Ohio.—The Ohio voters in November 1953 approved a constitutional amendment authorizing the issuance of tax revenue bonds up to \$500 million. Under terms of the resolution, not more than \$125 million could be issued in any one year, and none after 1962. All bonds must mature by 1972. The bond authorization was part of a \$1 billion highway construction program to cover an 8-year period, and to be financed, in addition to the bond proceeds, by revenues from an added \$0.01 per gallon motor fuel tax, and a highway use (axle-mile) tax, both of which were enacted in 1953. Remaining funds would be derived from other highway and Federal-aid funds.

Ohio's constitution prohibits borrowing, and before adoption of the bond amendment, the State's only experience with bond financing had been in connection with the revenue bond financing of Ohio River toll bridges by the State Bridge Commission during the 1930's, and the sale in 1952 of \$326 million of toll road revenue bonds by the Ohio Turnpike Commission. Thus, the financing of major toll-free highways by means of tax revenue bonds represented a departure in the State's highway financing policies. Under the amendatory device, the State could have sought voter approval for a general obligation bond issue, and this might have further reduced the cost of borrowing, because Ohio's guaranteed debt is rated "Aaa," whereas the tax revenue bonds are rated only "Aa" by bond-rating houses.

The \$500 million of major thoroughfare construction bonds, as the tax revenue bonds were called, were issued over an 8-year period (Table 20). The State has managed its bond program wisely. The spacing of sales in small increments, and only as required to meet construction commitments, has resulted in financial savings, both as to initial interest costs as well as interest rates. The reasonably short serial maturity schedule will also result in interest savings over the life of the bond issues. The total cost to

²⁴ Connecticut, Public Act 132, 1959 Session.

²⁵ Connecticut, Public Act 605, 1961 Session.

road users for this bond program is computed as follows:

Bond principal	\$500,000,000
Interest, 1954-72	108,474,000
Total	\$608,474,000

Interest is thus found to equal 22 percent of the bond principal. This is in sharp contrast to the cost to the users of financing the Ohio Turnpike. The \$326 million turnpike revenue bond issue sold in 1952 at a 3¼ percent coupon, matures in 1992, and according to the Official Statement (15, p. 16) interest and principal requirements would be as follows, assuming advance retirements from revenues during the years 1957-1992:

Bond principal	\$326,000,000
Interest, 1956-92	245,246,000
Total	\$571,246,000

For this issue, interest will equal 75 percent of bond principal. Actually, the first retirement of turnpike bonds occurred in 1961, rather than 1957, so that the estimated cost may well prove to be conservative.

The debt service on major thoroughfare construction bonds in 1960 totaled \$41.2 million, and during that year the proceeds of the pledged \$0.01 motor fuel tax, and the highway use tax were \$30.7 million, and \$17.6 million, respectively, and in addition, the State had built a reserve fund by the end of the year of \$41.5 million. Thus, the State at present has ample security to meet all debt requirements. Ohio's accelerated program has moved it to the vanguard among States in meeting highway needs envisioned by the Federal-aid Interstate program. According to records of the Bureau of Public Roads, as of May 31, 1962, Ohio had obligated 65 percent of its fiscal 1963 Federal Interstate funds, and also 71 percent of 1963 ABC funds, to rank among the top 4 States in this respect.

Road-User Tax Bonds in Michigan.—Michigan, like Ohio, has a constitutional prohibition against borrowing but, unlike Ohio, has chosen to use limited obligation bonds without submitting the question to the electorate. During the early 1920's, the State

TABLE 20
OHIO MAJOR THOROUGHFARE CONSTRUCTION BOND ISSUES

Year Sold	Issue	Par Value (\$ × 10 ⁶)	Coupon	Net Interest Cost	Maturities
1954	Series A	30	1.0 -6.0	1.381	1956-64
1955	Series B	52	2.0 -6.0	2.308	1956-72
1956	Series C	50	3.0 -3.5	3.0932	1956-72
	Series D	25	3.0 -6.0	3.1106	1957-72
1957	Series E	32	2.5 -6.0	2.906	
	Series F	32	3.6 -6.0	3.754	
	Series G	31	3.0 -6.0	3.324	
	Series H	30	3.0 -6.0	3.345	
1958	Series I	32	2.0 -6.0	2.559	1958-72
	Series J	32	2.0 -6.0	2.673	
	Series K	31	2.5 -6.0	3.881	
	Series L	30	3.25 -6.0	3.373	
1959	Series M	31	3.0 -6.0	3.537	1960-72
1961	Series N	32	2.5 -5.0	2.92	1962-72
	Series O	30	2.5 -6.0	2.88	1962-72

issued \$50 million of general obligation highway bonds under a constitutional amendment²⁶ ratified in 1919, but over a span of nearly 30 years, the State did not borrow for highway purposes, except for small amounts of toll bridge revenue bonds issued during the late 1930's by the Michigan State Bridge Commission.

In 1945, the State entered into a contract with Wayne County and the city of Detroit to finance jointly construction of the John C. Lodge and the Edsel Ford Expressways within the city of Detroit. The three participating units contributed a total of \$5 million annually which, together with Federal-aid funds, had reached an aggregate of \$42 million by the end of 1950. However, at that rate of progress it had become evident that an additional 15 years would be required to complete the projects, and the 1950 legislature accordingly enacted a statute²⁷ authorizing the State to enter into a contract with any county, city, or village, for the construction of limited-access highways to be financed with proceeds of bonds secured by a pledge of the road-user tax revenues accruing to each of the participants from the State (motor vehicle) highway fund. The legality of these proposed bonds was challenged in the courts, and the Michigan Supreme Court held them not to be in contravention of the constitutional prohibition on borrowing.²⁸ The court, in explaining the special fund doctrine, quoted the following from a California decision²⁹:

The overwhelming weight of judicial opinion in this country is to the effect that bonds, ...issued by states, cities, counties,...if such particular bonds or obligations are secured by and payable only from the revenues to be realized from a particular utility or property, acquired with the proceeds of the bonds or obligations, do not constitute debts of the particular state, ...within the definitions of "debts" as used in the constitutional provisions of the states having limitations as to the incurring of indebtedness.

This describes, in most succinct terms, the distinctive features of nonguaranteed bonds.

Following this decision, the State sold late in 1951 the first of a series of limited-access highway revenue bonds to provide additional financing for the Lodge-Ford expressways. Later, bonds were issued under the 1950 statute for the construction of a number of other expressway projects, such as the Detroit-Toledo and Grand Rapids expressways, and by 1957 when the last of this series was issued, the State had sold a total of \$203 million of bonds, out of an authorized total of \$300 million. The 1950 Act limited the annual expenditure by the State from its share of highway funds to \$3,500,000. Later Acts raised this limit to \$12 million, although the maximum annual pledge as of September 30, 1961, was \$9,953,935.

The net interest cost of the limited-access bonds ranged from a low of 2.032 percent on \$20 million sold in December 1952, to a high of 3.3772 percent on \$17 million sold in January 1957.

Under the 1950 Act, as amended, the State could issue an additional \$97 million of bonds, and pledge an additional \$2,046,065 of State highway funds annually. It appears doubtful, however, that any additional debt will be created under the provisions of this statute because of the limiting feature of the State's pledge.

In 1955, Public Act 87 authorized the issuance of highway construction bonds to expedite financing and construction of necessary highways, and also increased the gasoline tax by \$0.015 per gallon and imposed some additional fees on commercial vehicles. Under this authorization, bonds in the amount of \$25,000,000 were sold in September 1956 at a net interest cost of 3.042 percent to provide the State's share of cost of 184 miles of Interstate highways and 36 miles of trunkline highways. The bonds were secured by a second lien against the State Highway Department's total allocations from the Motor Vehicle Highway Fund. No additional bonds may be issued under the provisions of Act 87, as bonding provisions of this act have been repealed.

²⁶ Michigan Constitution, Art. X, §10.

²⁷ Public Act 22, 1950 Extra Session, amending Act 205, Public Acts of Michigan, 1941.

²⁸ Ziegler v. Witherspoon, 49 N.W.2d 318.

²⁹ California Toll Bridge Authority v. Wentworth, 212 Cal. 298, 298 P. 485.

Faced with the need for additional borrowing authority to accelerate highway construction, the 1957 legislature by amending Act 51 of the 1951 Public Acts³⁰, broadened the basis for bond financing and at the same time provided certain limits on the bond interest rates and maturities of future sales.

Under Section 18(b) of this Act, the State Highway Commissioner, subject to approval by the State Administrative Board, may issue limited obligations to pay all or any portion of the cost of construction or reconstruction of highways, including limited-access highways, which he is authorized to construct either with or without participation by other governmental units. In authorizing each issue, the Administrative Board must, by resolution, describe the contemplated project and estimate the cost thereof, as well as stipulate the amount, maximum interest rate, and maturity dates of the bonds.

Under Section 18(d) of Act 51, as amended, the Commissioner may enter into contracts with counties, cities, and villages to finance highway construction on a participating basis, by which each of the contracting parties may make an irrevocable pledge of its annual share of Motor Vehicle Highway Fund receipts for periods not in excess of 30 years. Bonds may be issued by any governmental unit that is a party to the contract, subject only to the limitation that the annual pledges for these bonds, or any other bonds paid from the same funds, cannot exceed 50 percent of the participants' annual share of Motor Vehicle Highway Fund receipts. The State's limitation applies after first deducting the pledges for bonds issued under the 1950 and 1955 statutes.

Bonds issued under either Section 18 (b) or 18 (d) shall be serial bonds, with 25-year maximum maturities; bear interest at not to exceed 5 percent; and be redeemable before maturity.

Between 1958, when the first bonds were issued under Act 51, as amended, and December 31, 1961, the State issued a total of \$363 million of trunk line highway bonds under Section 18 (b) and Expressway Bonds under Section 18(d) at net interest cost ranging from 3.307 percent for \$100 million sold in May 1958 to 4.2861 percent for \$50 million sold in July 1959.

Thus, in summary, the State of Michigan has issued a total of \$591 million of road-user tax revenue bonds between 1951 and 1961. Of this total, the State is responsible for debt service on \$514,190,000 and \$76,810,000 is the responsibility of local units of government (16, p. 23). Based on its share of fiscal 1961 receipts, the State has utilized nearly two-thirds of its annual funds available for debt pledge computed as follows on the basis of fiscal 1961 receipts (in millions of dollars):

Motor vehicle highway fund receipts (State share)	99.7
Pledges for Act 205 and Act 87 bonds	11.5
Balance of funds	88.2
50% available for §§ 18(b) and 18(d) bonds	44.1
Pledges for §§ 18(b) and 18(d) bonds	24.6
Balance available for pledge	19.5

Michigan's accomplishment under its bond financing program has been impressive in recent years. In 1957, the State launched a \$1.25 billion 5-year construction program, covering the fiscal years 1958-62 to be financed by an estimated \$505 million in Federal aid, \$330 million in current State funds, and \$415 million in bonds. By the end of the fourth year of the program, the State (17, p. 16) could announce, with justifiable pride:

During the past four years, Michigan has moved from 35th to first place among all states in the construction of Interstate Highways, leading the nation for the calendar year of 1960, and for the first six months of 1961, in the amount of Interstate construction placed under contract. Michigan currently ranks second in the nation in the amount of toll-free Interstate Highways open to traffic and built to standards adequate for 1975 traffic. At the end of fiscal 1961, Michigan had 372 miles of such highways open for travel.

Although Michigan has been highly successful in managing its highway bond program, it is probable that a pledge of the State's credit would have resulted in reduced interest costs. According to the State Auditor's 1961 report (16), the average interest rate on

³⁰Public Act 262, 1957 Laws, amending Act 51, 1951 Laws of Michigan.

\$355 million of general obligation bonds for veteran's bonuses and hospital buildings sold by the State during the years 1947-54 ranged from 1.44 to 1.84 percent. The average rate for expressway bonds has been 2.84 percent; for highway construction (Act 87), bonds 3.04 percent; and for Trunkline highway bonds, 3.74 percent.

Nonetheless, the interest cost of highway bonds has been far lower than the toll revenue bonds sold by the Mackinac Bridge Authority or the International Bridge Authority of Michigan. Bonds of the former, in amount of \$99,800,000, were sold in 1954 at a net interest cost of 4.349 percent, whereas those of the latter, in aggregate amount of \$16,250,000, sold in 1960 at 5.0 and 6.0 percent net interest cost.

Alabama Highway Authority.—As discussed earlier, Alabama issued \$25 million of general obligation bonds in 1952 to match Federal-aid funds. This issue had been required to take up the slack in tax revenues as a result of the State's reducing registration tag fees in 1952 to \$3, one of the lowest rates in the Nation. Faced with the need for additional capital funds, the legislature in 1955 increased the motor-fuel tax from \$0.06 to \$0.07 per gallon and created the Alabama Highway Authority³¹. The enabling statute authorized \$50 million of bonds, and subsequently in 1959, the legislature authorized an additional \$60 million³². The proceeds were used to continue a large road-building program and to match Federal funds.

Between 1955 and 1961, the Authority sold \$110 million of bonds in eight separate sales, ranging in amounts from \$6 to \$20 million, and at net interest costs from 2.903 percent on the 1955 sale to 3.83 percent on a 1960 sale. All issued are callable; were issued at par or at a slight premium, mature serially over a 20-year period, and carry an A rating.

Security for the bonds is a pledge of the following portions of the State gasoline tax.

1. Remainder of \$0.02 of gas tax (after amount required to service general obligation highway bonds) pledged first for service of 1955 Act bonds, with remainder for 1959 Act bonds.

2. Two-thirds of \$0.01 of gas tax pledged first to the 1955 Act bonds, with remainder for 1959 Act bonds.

3. One-third of \$0.01 of gas tax all to the 1959 Act bonds.

The Authority is one of the "financing" type, inasmuch as it is merely a vehicle by which the bonds are issued. Its membership consists of the Director of Finance, the Highway Director, Attorney General, State Treasurer, and Executive Secretary to the Governor. Except for small amounts charged for travel expenses, legal services, and bond issue expenses, the proceeds of the bond sales are transferred to the Highway Department as required.

By use of the authority device, the State has avoided the need for a constitutional amendment to authorize additional borrowing and has carried out a 7-year improvement program by means of limited obligation bonds. However, indications are that the State may have overextended its resources by reducing taxes and by using bond financing as a substitute for tax revenue in financing current highway needs, rather than as an auxiliary means of financing an accelerated "catch up" program.

Pennsylvania State Highway And Bridge Authority.—Although Pennsylvania adopted constitutional amendments in the 1920's and 1930's authorizing highway borrowing, the amendatory procedure in that State has been complicated by two factors. First, the constitution requires action of two consecutive legislatures before an amendment can be submitted to the electorate. Second, a particular section of the constitution may not be amended more often than once in five years. Undoubtedly, these factors have had an important bearing on the decision by the legislature to create special authorities such as the Turnpike Commission, the State Highway and Bridge Authority, and others with power to issue bonds not subject to constitutional restriction.

The Pennsylvania State Highway and Bridge Authority was organized in 1949 as a public corporation and the enabling legislation was written in such a way that, although legally an independent agency, the Authority has no actual existence outside the Depart-

³¹ Act 43, §§9 and 10, Laws of Alabama, Special Session 1955.

³² Act 45, Laws of Alabama, Special Session 1959.

ment of Highways. Its function is solely to provide a legal means for borrowing money on the security of a portion of State highway-user revenues.

The enabling legislation gave the Authority the power to borrow \$40,000,000. The Act provided that the Authority has no power to pledge the full faith and credit of the State but only its own resources.

Under the Act, the Highway and Bridge Authority can undertake any type of highway project, but not until plans and specifications have been "submitted to and approved by the Department of Highways." Further provisions enable the Authority to cooperate with the Department of Highways in the use of its equipment, personnel, and other facilities. In practice, the Authority employs no personnel save legal counsel and all its work is done by the Department of Highways.

The following procedures are necessary to assure compliance with the legal and constitutional provisions involved in the establishment of the Authority: All highway projects financed with funds borrowed by the Authority are designed, contracted for, and constructed under the supervision of the Department of Highways acting as agent of the Authority. The Authority and the Department of Highways, before the construction of the project, sign an agreement whereby the Authority leases the facility to the Department for a specified rental. The rentals are to be derived from the highway user taxes and other State moneys deposited in the Motor License Fund, and are applied to principal and interest on the Authority's bonds. In fact, the rentals will equal the debt service requirements plus the administrative costs of the agency.

Subsequent legislation raised the borrowing power of the Authority to \$80 million in 1951 and to \$120 million in 1955. The 1961 legislature added an additional \$300 million borrowing authority, under which bonds can be issued at a rate not to exceed \$50 million per year. This latest increment is designated to finance an accelerated interstate system construction program.

As of the end of 1961, the Authority had issued a total of \$120 million of bonds at net interest costs from 1.2534 percent for \$15 million sold in 1949 to 3.5545 percent for \$10 million issued in 1959.

The Authority is evidently destined to play a major part in the State's highway-financing program. On November 30, 1961, construction contracts had been awarded for the Authority in the aggregate amount of \$125 million, and the Authority had financed or shared in financing numerous major projects, such as the Penn Lincoln Parkway in the Pittsburgh area and the Schuylkill Expressway into Philadelphia. Rental had been fixed on 97 completed projects at a total annual rate of \$10 million at the end of 1961 (18).

Florida Limited Obligations Secured by Tolls and Road-User Taxes.—Financing by means of limited obligations secured by a pledge of tolls and road-user taxes has been discussed in connection with Connecticut bonds. A variation of this method is also used by Florida. The constitution of Florida prohibits the issuance of State bonds (with the usual exceptions for wars and emergencies). However, State funds are used to service a large volume of highway debt through various boards and commissions and, in addition, several authorities have been created to finance specific toll projects. At the end of 1960, \$293,812,000 of highway debt was being serviced by State agencies—none of it a direct obligation of the State.

In general, debt management is vested in five agencies: the Florida State Board of Administration, the State Road Department, the Florida Development Commission, the Jacksonville Expressway Authority, and the Florida State Turnpike Authority. (The last mentioned is discussed later, in the section on revenue bond financing.)

State Board of Administration.—The State Board of Administration (whose members are the Governor, State Treasurer, and State Comptroller) acts as the fiscal agent for the State, administers all county highway debt incurred before 1931, with the power to refund same, and receives, beginning in 1943 and for 50 years thereafter, the annual proceeds of \$0.02 per gallon motor fuel tax as a fund to service the county debt. The share of this fund that accrues to the benefit of each county is determined by a formula that gives equal weight to (a) area, (b) population, and (c) the counties' contributions to the cost of State road construction before 1931. The remaining county road indebtedness chargeable to this fund was \$27,451,000 as of June 30, 1960, and 39 of the 67

counties are now free of this class of indebtedness. Out of each county's share, surplus funds not required for debt service are allotted 80 percent to the State Road Department and 20 percent to the county. These surplus funds must be used for highway purposes within the county, but may be pledged and applied for debt service on new bond issues.

State Road Department. —The State Road Department has entered into "lease-purchase" agreements with a number of counties, cities, special districts, and toll authorities whereby it acquires title to various road and bridge projects on the State system by payment of an annual rental generally equal to debt service requirements on the lessor's bonds issued to finance the projects. For payment of these rentals, it pledges all or a portion of its "80 percent surplus" funds accruing for use in the respective counties.

The Department presently has agreements with lessors in 10 counties, covering 17 facilities on which the debt outstanding at the end of 1960 totaled \$29,877,000. Two of the leases are with toll authorities: the Ocean Highway and Port Authority (formerly known as the Fernandina Port Authority) operating a toll road-ferry project in Duval and Nassau Counties, and the Santa Rosa Island Authority operating a toll bridge in Escambia County. Outstanding debt for these two facilities totaled \$5,559,000 at the end of 1960, carrying coupon rates of 3 to 3¼ percent.

The Department supplies debt service funds to the Board of Administration which applies them as provided under terms of the lease-purchase agreements. The Department's remittance to the Board consists of a part of the "80 percent surplus" gasoline tax funds allotted to the respective counties, in which the leased facilities are located, together with tolls from the two toll facilities.

Florida Development Commission. —The Development Commission is composed of nine members, one from each of the eight congressional districts, and one at large. The Commission was created in 1955 as a successor to the Florida State Improvement Commission. It is empowered by law, on application of any county, to construct roads or bridges connecting State highways, and to issue revenue bonds paid from and secured by a lien on the Road Department's 80 percent surplus gas tax, under lease-purchase agreements. A 1959 law permitted issuance of certificates of indebtedness to be secured by a lien on the counties' 20 percent surplus tax.

As of the end of 1960, the Commission had \$66,637,000 of county road revenue bonds outstanding on behalf of 40 counties, secured by a pledge of surplus gas tax funds.

The Commission has also issued revenue bonds to finance construction of the Lower Tampa Bay Bridge, a toll facility. There is no pledge of surplus gas tax revenues for this project, but the Road Department provides for maintenance and repair costs under lease-purchase agreement, and the bridge tolls, after deducting operating costs, are pledged for debt service. Callable revenue bonds having a par value of \$21,250,000 were issued in 1951, bearing a coupon rate of 3.75 percent, and maturing in 1981. They carry a Moody's rating of Baa. At the end of 1960, \$12,348,000 of these bonds remained outstanding, the remainder having been called and retired from earnings.

The Commission has also financed toll projects in five counties from proceeds of bonds that are secured, under lease-purchase agreements, by a pledge of tolls and 80 percent surplus gas tax funds. In three of the counties, bond proceeds were applied to construct a series of projects, both toll and toll free. In 1953, \$6,000,000 of bonds were sold at a net cost of 3.555 percent to finance the Palma Sola and Cortez toll bridges, and three free bridges at or near Bradenton in Manatee County. A \$2,200,000 bond issue was sold in 1956 at 3.698 percent net interest cost to finance the St. Lucie River, Jensen River, and Indian River toll bridges and other free bridges in Martin County. In 1959, the Commission sold \$25,000,000 at 4.104 net cost to finance a number of road projects in Dade County, including the 36th Street Expressway, a toll road in Miami.

In Pinellas and Santa Rosa Counties, bond funds were applied only for toll projects. A \$16,800,000 issue was sold in 1960 at 4.84 percent net interest to finance a series of causeways and bridges in Pinellas County in the vicinity of St. Petersburg; and in 1958, a \$2,000,000 issue was sold at 4.4316 percent net interest to construct the Navarre Bridge in Santa Rosa County.

Jacksonville Expressway Authority. —The Authority was created in 1955 for the purpose of financing and completing a system of limited-access routes through the city of

Jacksonville. The Authority consists of three citizens of Duval County appointed by the Governor, and two ex-officio members: the Chairman of the Board of Duval County Commissioners, and a member of the State Road Department from the district that includes Duval County.

The Jacksonville Expressway System was begun in 1950 when the Florida State Improvement Commission sold \$28 million of bonds which, together with \$13.8 million to be provided from Road Department and Federal-aid funds, was expected to complete the system. In addition to an expressway system, the program provided for two toll bridges across the St. Johns River (the John E. Mathews and Fuller Warren Bridges).

In 1957, the Authority sold \$70 million of bonds to retire the 1950 issue and to finance completion of the system, including a third toll bridge across Trout River. These bonds were sold at a net interest cost of 4.322 percent and consisted of a \$60 million term issue maturing in 1992, and \$10 million maturing serially to 1976. At the end of 1960, \$68,826,000 was outstanding.

Under a lease-purchase agreement, the Department will operate the System and will pay the Authority as rental for, and purchase of, said System the following amounts:

1. All gross tolls from operation of the three toll bridges.
2. All 80 percent surplus gasoline tax funds accruing to the State for use in Duval County, subject to a prior lien for service of Ocean Highway and Port Authority bonds.

Thus, under the aegis of several State agencies, Florida has financed a large volume of highway work throughout the State, from the proceeds of limited obligation or State-assumed bonds, for which gasoline tax revenues have been pledged for debt service. To service the \$228.5 million of highway debt outstanding at the end of 1960 (excluding Florida Turnpike debt, and pre-1931 county debt) required an allotment of \$12.9 million of motor-fuel tax revenues. As Table 8 shows, this is about 11 percent of available 1960 revenues—well below the median payment. Undoubtedly, the State will continue to make use of this borrowing authority.

Revenue Bond Financing

As discussed previously, the highway revenue bond device (usually employed in conjunction with creation of an authority) gained widespread usage during the period of this study. Reaching a peak in 1954 when slightly over \$1.8 billion of such bonds were issued, the sale of revenue bonds declined in the late 1950's following enactment in 1956 of an accelerated Federal-aid highway program. Since 1960, however, interest in toll road financing has revived and several States (notably Delaware, Florida, Kentucky, Maryland, Massachusetts, and Oklahoma) have successfully floated revenue bond issues to finance new toll road sections, whereas Virginia and other States have recently marketed large toll bridge and tunnel bond issues. Because of the financing features of these newer issues, several of them are examined here in some depth.

Massachusetts Turnpike Authority.—This authority was created by chapter 354 of the Acts of 1952 to finance and build toll roads within Massachusetts. In 1954, the authority sold \$239 million of turnpike revenue bonds to finance the "initial turnpike" which would extend from an intersection with Route 128 in the environs of Boston westwardly 123 miles to the New York State line. The bonds were sold as 40-year terms, bearing a coupon rate of 3.3 percent, at a net interest cost of 3.356 percent. Construction began in January 1955, and the road was opened to traffic 28 months later in May 1957. Since that time, the turnpike has shown a steadily improving earnings-to-debt ratio, although the legislature saw fit, shortly after the turnpike was opened, to grant refunds for the tax paid on motor fuel consumed on the turnpike as an encouragement for greater patronage.

In 1958, the Authority was authorized to acquire the existing 2-lane Sumner Tunnel between Boston and East Boston, and to construct an adjacent new two-lane tunnel. Accordingly, in 1959 the Authority sold \$52,800,000 of tunnel revenue bonds as 40-year, 4³/₄ percent term bonds, at a net interest cost of 4.84 percent. Under terms of the enabling act, this is a closed indentured project, and all funds relative thereto must be held and administered separately from those of the "initial turnpike."

Meanwhile, studies continued to be made of the feasibility of extending the "initial turnpike" from its terminus at Route 128, near Boston, into the center of the city in the vicinity of the South Station rail terminal, a distance of about 12 miles. Base on traffic and engineering studies made in 1958 and 1960, the Authority attempted unsuccessfully to obtain financing for this project. In 1962, however, an acceptable bond-financing plan was devised, and the Authority in February was successful in selling a \$180 million revenue bond issue to finance the Boston extension. Several novel features account for the success of this financing plan, and bear examination.

Although indentured as a distinct project, the Boston extension will be linked with the "initial turnpike" in several respects. The new bond issue consists of \$100 million of Series A bonds with a coupon rate of 4.75 percent, and \$80 million of Series B bonds with a 4 percent coupon. The bonds were sold with a 40-year term maturity, at a combined net interest cost of 4.48 percent. A unique feature of the Series B bonds is that they will bear two different rates of interest at different periods of time. So long as any of the \$239 million of bonds to finance the "initial turnpike" are outstanding, the new Series B bonds will bear a 4 percent interest rate.

As soon as the 1954 issue is retired, the 4 percent Series B bonds will be refunded with 5 percent bonds, plus a retroactive premium of 1 percent for each year that has elapsed since issue of the Series B bonds, making them, in effect, 5 percent bonds throughout their life. If the Series B bonds are refunded at any time before January 1, 1972, the Authority must pay an additional call penalty of 10 percent, or in other words purchase the Series B bonds at 110 percent of par. For each year that refunding of the Series B bonds is deferred beyond 1972, the call penalty increases by $\frac{1}{2}$ percent, to a maximum of $12\frac{1}{2}$ percent.

Series A bonds are also callable after January 1, 1972, at 106 percent of par, and this same call penalty applies to the Series B refunding bonds if retired 5 years after issuance. Revenues of the "initial turnpike," after retirement of the 1954 bonds, shall be applied toward retirement of the Boston extension bonds. To hasten retirement of the 1954 issue, net revenues of the Boston extension will be applied toward their redemption.

The financing plan outlined here is not only highly complex but also proves to be costly. According to Table 21, the Authority (and hence the public via the toll road user) will have paid a total of nearly \$327 million to finance a project having an initial capital cost of \$152 million. All the data in Table 21 are derived from the Authority's Official Statement (19) issued to prospective buyers of the Series A and B bonds.

Of course, some of the added costs of financing this project are inherent in any program of bond financing, but it is interesting and perhaps informative to speculate on the differential in cost of financing this project with general obligation of the State rather than toll revenue bonds.

Massachusetts is particularly well suited for this type of comparison, because the State has managed a well-planned program of general obligation highway bond financing for several years. Between 1950 and 1960 the State sold \$590 million of highway bonds, the proceeds of which were used to finance such major projects as Route 128 (the circumferential highway around Boston), the Boston Central Artery, and many other expressway projects throughout the State. These general obligation bonds have found a ready market, and the State has managed the sales wisely, by the device of advance appropriation of capital funds, replenished from time to time from the proceeds of bond issues. This has afforded the State an opportunity to select a time to sell its bonds when bond market conditions are advantageous.

Assuming that the State could have financed the Boston turnpike extension with guaranteed bonds, and accepting the \$152 million construction cost as a base, the following postulates can be made:

1. Construction bonds totaling \$152 million, would be issued at par over a 3-year construction period in three approximately equal annual installments.
2. Interest would be computed at 3.1 percent, the rate at which other Massachusetts highway bonds were selling in 1960-62.
3. Maturities would be scheduled as equal annual serial retirements over a 20-year period, again typical of guaranteed bonds.

TABLE 21

COST OF FINANCING MASSACHUSETTS TURNPIKE EXTENSION

Factor	Amount (\$)
Cost to build extension:	
Construction	95,883,000
Right-of-way	33,000,000
Engineering	9,350,000
Administration	1,617,000
Maintenance, toll, and other equipment	2,150,000
Contingencies	<u>5,000,000</u>
Subtotal	147,000,000
Improvements	<u>5,000,000</u>
Total	152,000,000
Source of funds:	
Par value of Series A and B bonds sold for extension	180,000,000
Less discount on bonds sold	-4,300,000
Less capitalized interest to March 1, 1966	-31,800,000
Plus investment earnings on construction funds	<u>8,100,000</u>
Total	152,000,000
Cost to motorist to amortize investment:	
Interest paid on Series A and B bonds until retirement of original 1954 turnpike bonds—assumed to be on July 1, 1976 (March 1, 1966—July 1, 1976)	81,487,500
Cost of refunding Series B bonds, if redeemed on July 1, 1976 at 112% call premium plus 1% per year for 14 years—(based on consulting engineer's estimate)	21,467,000
Interest on Series A and B refunding bonds until retired (based on retirement of Series A bonds by 1980 and Series B refunding bonds by 1982)	31,820,500
Call premium on Series A and B refunding	12,088,000
Retirement of Series A and B refunding (excluding amount of Series B refunding bonds shown as cost in item 2)	<u>180,000,000</u>
Total	<u>326,863,000</u>

Computed on the preceding factors, the cost of financing with general obligation bonds (interest plus redemption) would be \$203,615,000 over the life of the issue. This would be a savings of 38 percent of the \$326,863,000 probable cost of revenue bond financing.

Excluding the \$152 million construction cost from both figures leaves \$52 million as the added cost of financing with guaranteed bonds, compared with \$175 million for revenue bonds. On this basis of comparison, over 70 percent of the financing costs of the revenue bond issue could be saved by the use of guaranteed bonds.

Financing this project with general obligation bonds would have been feasible, even though tolls were to be imposed. The experience in Connecticut and other States has shown that the levy of tolls has not precluded the use of the guaranteed or limited obligation bond as a means of raising the necessary capital, and of holding the financing costs to a minimum.

Florida State Turnpike Authority.—The Florida legislature by a 1953 Act (Ch. 28128) created the Turnpike Authority with powers to finance and construct such turnpike proj-

ects as might be designated by the legislature. The first such project so stipulated was a toll road from Miami to Ft. Pierce, a distance of about 110 miles.

In 1955, the Authority sold \$74 million of 3¼ percent revenue bonds to finance project No. 1 (the Sunshine State Parkway). The bonds were to mature in 1995, were callable, and were sold at a net interest cost of 3.32 percent. The bonds are secured solely by tolls, and no direct or contingent pledge of State funds is involved. By November 1, 1961, \$10,183,000 of bonds had been called for redemption, of which approximately two-thirds had been retired from revenues, and the remainder from surplus bond proceeds and interest income. Under terms of the enabling act, the Authority may in its discretion designate the turnpike as part of the State road system when it becomes debt-free, and the State Road Department shall then maintain sufficient tolls to defray the cost of maintenance and operation.

Subsequent enactments authorized extension of the turnpike northerly to Jacksonville, and from the Miami terminus westward to Fort Myers and Tampa. Late in 1961, the Authority sold \$157 million of bonds to refund the 1955 series, and to provide funds to finance construction of project No. 2, extending the turnpike from Ft. Pierce to Orlando and Wildwood, a distance of approximately 158 miles. These bonds were sold as 40-year terms, at a coupon rate of 4.75 percent, and were purchased at 95.75 percent of par, or a 4.86 percent net interest cost.

To obtain a maximum feasibility ratio for this project (ratio of net earnings to debt service requirements), agreements have been made with the State Road Department to defer construction until 1972 of any parallel or competing routes within the general north-south corridor that would adversely affect the traffic and revenues of turnpike projects 1 and 2. Although the northern 40 miles of turnpike project No. 1 is located on Interstate 95, (which extends along the east coast of Florida), project No. 2 is not, veering inland instead to a terminus in the central area of the State. The State, however, plans to defer construction of I-95 between Daytona Beach and Ft. Pierce (competing with turnpike project No. 2), as well as between Ft. Lauderdale and West Palm Beach (competing with turnpike project No. 1) until 1972. The Authority's traffic consultants estimate that completion of these two sections of I-95 will reduce turnpike revenues by about 36 percent (20, p. 65). However, the consultants assume completion by 1964 of I-75 from the Florida-Georgia line to Wildwood, and I-4 between Daytona Beach and Orlando, both of which will channel traffic into the turnpike system (20, p. 43).

Unlike Massachusetts, where the debt underlying the first turnpike was left undisturbed at the time the extension was financed, the Florida Turnpike Authority chose to indenture both of its projects under a single bond issue. As a result, the 3¼ percent bonds issued for project No. 1 were refunded in 1961 with proceeds of 4¾ percent bonds. At the time of refunding, \$63,817,000 of the 1955 bond issue was outstanding. Had this issue been amortized in accordance with the original schedule (21, p. 18), final maturity would have occurred in 1993, and the remaining cost to the Authority would have been \$103,447,000 including redemption of the bonds, interest at 3¼ percent, and small amounts of redemption premiums. However, to refund these bonds, the Authority was required to capitalize a total of \$67,142,621 to cover one semiannual interest payment on the 1955 bonds, and a redemption (call) premium of 3½ percent, in addition to the par value of the bonds to be refunded. Based on the 1961 official statement (20, p. 70), the cost to the Authority to amortize \$67 million of bonds at 4¾ percent interest plus redemption premiums will be \$137,021,000 or an added financing expense of \$33,574,000 for project No. 1. The financial transactions involved in the 1961 sale of bonds are given in Table 22.

Undoubtedly the Authority would have found it difficult if not impossible to finance project No. 2 with revenue bonds had not this refunding plan been included. The pledging of over \$15 million of toll revenues and reserves of project No. 1 toward construction of project No. 2 (Table 22) comprises 20 percent of the cost of project No. 2, thus reducing materially the amount of new bonds required.

The Turnpike Authority of Kentucky.—As early as 1930, Kentucky began issuing revenue bonds to finance construction of toll bridges across the Ohio River. The last of such bonds were issued in 1953 and 1954 when the State purchased a private bridge at Covington, and constructed a new facility at Shawneetown. The State pays all costs of

TABLE 22

COST OF FINANCING FLORIDA SUNSHINE STATE PARKWAY PROJECT NO. 2

Factor	Amount (\$)
Cost to build project:	
Construction	54,341,000
Right-of-way	5,761,000
Maintenance and office equipment	277,000
Administration	279,000
Engineering	4,891,000
Contingencies (12.5 %)	<u>8,151,000</u>
Subtotal	73,700,000
Golden Glades Improvement, including \$316,000 (13.2 %) for contingencies	<u>2,698,000</u>
Total	76,398,000
Source of funds:	
Par value of bonds sold for project	157,000,000
Plus accrued interest on bonds sold	1,325,777
Less discount on bonds sold	-6,672,500
Less redemption of 1955 bonds (including 6 months interest and call penalty on these bonds)	-67,142,621
Less capitalized interest on 1961 bonds to November 1, 1964	-22,372,500
Less payments to operating and maintenance funds	-1,500,000
Less repayments of advances from State Road Department and Arvida Corporation for preliminary engineering and construction expenditures	<u>-1,750,000</u>
Remainder of bond proceeds available for construction of project and Golden Glades improvement	58,888,156
Additional moneys to be used for construction funds held under 1955 Trust Agreement	7,311,000
Estimated net revenues from operation of Miami to Ft. Pierce section of turnpike	7,907,000
Estimated interest income during construction	<u>2,280,000</u>
Total	76,386,156
Cost to motorist if bonds are retired by 1992, in accordance with engineer's estimates:	
Interest paid on bonds through 1992	79,672,000
Call premium	1,048,000
Redemption of bonds	<u>89,857,000¹</u>
Total	170,577,000

¹That portion of total bond issue allocated to project after deducting amount applied to redemption of 1955 bonds; \$157,000,000 - \$67,143,000 = \$89,857,000.

operating, maintenance, and repair of these bridges from other highway funds, thus permitting all toll revenues to be applied for debt service.

An Act³³ of the 1950 legislature authorized the Department of Highways to construct a system of toll roads, at such locations "as may be determined by the Department and

³³K.R.S., §§177.390-.570.

approved by the Governor." Pursuant to this authorization, the Department in 1954 issued \$38,500,000 of 3.4 percent term revenue bonds maturing in 1994 to finance construction of a 40-mile toll road from Louisville to Elizabethtown. The bonds (which are not obligations of the State) were sold at 98.35 percent of par, resulting in a net interest cost of 3.440 percent. Under terms of the indenture, bond interest and principal requirements are a charge on tolls and revenues before operating and maintenance costs and, if revenues are insufficient to meet the latter, the Department covenants to advance from other highway funds such amounts as are necessary to meet operating and maintenance costs, which advances may be repaid in future years from surplus toll revenues. The legality of such a covenant has been sustained by the Court of Appeals of Kentucky³⁴.

Although the 1950 Act permitted construction of additional turnpikes, none have been financed under this statute, and in 1960 the legislature created the Turnpike Authority of Kentucky³⁵, composed of the Governor, the Lieutenant Governor, the Commissioner of Highways, the State Highway Engineer, and the Attorney General. The statute authorizes the Authority to finance, construct, and operate turnpike projects and to lease such projects to the Department of Highways. Under this enactment, the Authority has sold \$39 million of toll road revenue bonds to finance a toll road extending 43 miles from a junction with Interstate 64 east of Winchester to a point near Campton, in east-central Kentucky, and has sold \$118 million of revenue bonds for a 127-mile turnpike extending westward from Elizabethtown to Princeton.

The \$39 million Eastern Turnpike issue was sold in February 1961, and consists of \$17,800,000 of serial bonds maturing 1965-85 in annual amounts increasing from \$600,000 to \$1,200,000 with interest coupon rates from 4¼ to 4¾ percent; and a \$21,200,000 term issue with a 4.8 interest coupon rate, maturing in the year 2000. The issue was sold at 97 percent of par, at a net interest cost of 4.86 percent.

The \$118 million issue of Western Turnpike bonds was sold in June 1961 at a net interest cost of 4.928 percent. The issue consists of \$20,000,000 of serial bonds maturing in amounts from \$900,000 in 1967 to \$1,200,000 in 1985, with coupon rates from 4¼ to 4.7 percent, and a \$98,000,000 term issue due in 2000 at a 4.85 percent coupon rate.

Both the Eastern and Western turnpike bonds are callable as a whole in 1971 at 105 percent of par, or in part, beginning in 1966, at 103 percent of par. The terms of the lease agreement (22, 23) between the Authority and the Department of Highways are rather novel, and contain the following provisions:

1. The Department shall pay the costs of maintaining, repairing, and operating the turnpike for the entire period of years until the final maturity of the bonds.
2. The Department shall pay to the Authority the sum of \$5,000,000 per biennium beginning July 1, 1962, and ending June 30, 2000, to meet the principal and interest requirements of the Eastern Turnpike bonds, and \$14,450,000 each biennium beginning July 1, 1964, and ending June 30, 2000, for similar requirements of the Western Turnpike bonds. These payments are also to cover administrative costs of the Authority.
3. The lease shall be renewed each biennium at the option of the Department, and shall be automatic unless the Department by written notice to the Authority before the last working day in April elects not to renew.
4. At such time as the lease is not in effect, the Department shall set aside and pay over to the Authority all tolls and other revenues of the toll roads, including five-sevenths of all motor-fuel taxes collected by the Department on gasoline and other motor fuels consumed on the toll roads.
5. While the lease is in effect, the Department may use all tolls and other revenues of the toll roads, including the motor-fuel taxes, for such highway purposes as are authorized by law.
6. At any time the lease is not renewed or the Department shall fail to perform its obligations in full, the Department's option to renew the lease for all future bienniums shall be forfeited.

³⁴Guthrie v. Curlin, 263 S.W.2d 240.

³⁵Ch. 173, Kentucky Acts of 1960 (§§175.410 to 175.990 K.R.S.).

It would appear to be to the Department's advantage to renew its options so long as the tolls and computed fuel tax earnings are in excess of the biennial lease payments. Even in the event that revenues fall below the lease payments, however, it is doubtful that the Department would elect to terminate the lease because of the implications of possible default. In the event the lease were to be terminated, the indenture provides that the Authority may adjust tolls to produce sufficient funds for debt service, but failing in this, the covenant merely provides that the Authority will adjust tolls to provide the maximum amount of revenues obtainable.

A more fundamental reason for including the renewable lease option, however, stems from an unsuccessful attempt in 1954 to create a highway authority to finance construction of free highways, with bonds to be secured by yearly rentals from the State Road Fund. The Act provided that, as security for the rentals, the lease agreement would contain a pledge of the current resources of the Department of Highways for each biennium³⁶ for the full term of the lease (not to exceed 40 years). The Court of Appeals³⁷ declared the Act unconstitutional on the grounds that the nonrenewable lease created an irrevocable obligation, and hence a debt subject to constitutional prohibitions.

Although the Authority's bonds are classed as revenue bonds for purposes of this discussion, it is obvious that so long as the lease is in effect, the issues are in reality limited obligations, and become revenue bonds only in the event that the lease expires.

In January 1962 the Authority sold an additional \$29 million of bonds to finance a 33-mile, two-lane toll road extending the eastern turnpike from Campton to Salyersville. This issue comprises \$10 million of serial 4 and 4 $\frac{1}{4}$ percent bonds maturing 1967-85, and \$19 million of 4.30 percent term bonds, maturing in 2000. This issue was purchased by negotiation at 97 percent of par.

Thus, the Authority now has outstanding a total of \$186 million of bonds to finance construction of 203 miles of toll roads within Kentucky, none of which is located on the Interstate System.

Table 23 gives the financing aspects of the eastern and western Kentucky turnpikes

TABLE 23
COST OF FINANCING EASTERN AND WESTERN KENTUCKY TURNPIKES

Factor	Eastern Turnpike (\$)	Western Turnpike (\$)
Project cost:		
Construction	27,633,745	75,238,438
Right-of-way	1,726,000	6,572,143
Engineering	2,665,630	6,752,516
Administration and legal	250,000	507,200
Toll collection facilities	245,000	482,000
Contingencies	2,267,625	6,229,653
Total	34,788,000	95,781,950
Source of funds to build project:		
Par value of bonds sold	39,000,000	118,000,000
Less discount on sale	-1,170,000	-4,130,000
Less capitalized interest	-6,092,000	-25,438,050
Less authority administrative cost	- 200,000	- 150,000
Plus investment earnings	+ 750,000	+4,000,000
Plus State highway fund contributions	+2,500,000	+3,500,000
Total	34,788,000	95,781,950
Cost to motorist to amortize investment:		
Interest requirements	40,811,120	127,051,061
Call premium	148,900	1,080,550
Redemption of bonds	39,000,000	118,000,000
Total	79,960,020	246,131,611

³⁶Ch. 39, Kentucky Acts of 1954.

³⁷Curlin v. Wetherby, 275 S.W.2d 934.

(excluding the 1962 sale). The cost of constructing these two projects will be \$130.6 million for which the user will pay a total of \$326 million in interest and amortization charges. Data for this table are derived from schedules contained in the Authority's Official Statement (22, 23).

Here again, a comparison of the cost of financing these projects with general obligation bonds is of interest. Kentucky voters at the November 1956 election approved an Act³⁸ authorizing \$100 million of general obligation bonds to provide funds to match Federal funds for construction and reconstruction of highways, tunnels, and bridges. This was the first such authorization in Kentucky's history. In 1957, the Court of Appeals validated the bonds and held that no single bond could be sold at more than 3 percent, and that the bonds could not be sold at less than par, nor in blocks of less than \$5 million. They must be retired within 30 years.

Under this authorization, the State issued \$35 million in 1957, \$35 million in 1958, and the remaining \$30 million in 1960. All the bonds were issued with serial maturities, and final redemption is scheduled for 1986. Carrying coupon rates of 2.9 and 3 percent, the bonds were sold at net interest costs ranging from 2.94 to 3 percent.

A second authorization of \$90 million, as provided by a 1960 Act³⁹, was approved at the November 1960 election. The interest rate limitation was removed from this authorization, and accordingly, the first sale of \$15 million of bonds in 1961 carried 3.60 and 3³/₄ percent coupon rates and was sold at a net interest cost of 3.60 percent.

If the State were to have financed the construction cost of the turnpike with general obligation bonds, the total debt service could have been held to \$204.8 million, or less than two-thirds of the cost of the present method of bond financing. This would be based, of course, on the assumption that general obligation bonds could have been sold as needed over a three-year period, with increments of \$45 million in 1961, \$45 million in 1962, and the remaining \$40 million in 1963; and that they could have been marketed as 30-year serial bonds at a net interest cost of 3.6 percent, the rate carried by the actual 1961 bond issue. Although these are assumptions, they are not inconsistent with the State's experience in marketing general obligation bonds and would therefore appear reasonable.

Northeastern Expressway and Delaware Turnpike.—In what was perhaps the first such joint action on record, the States of Delaware and Maryland simultaneously sold toll road revenue bonds in February 1962 to finance a joint toll road project linking the Delaware Memorial Bridge with the metropolitan environs of Baltimore. Specifically, the project comprises a controlled-access toll highway. It extends approximately 11 miles laterally across the State of Delaware from the western approaches of the Delaware Memorial Bridge to the Delaware-Maryland line. The project then continues within Maryland approximately 42 miles to the Whitmarsh Boulevard interchange, near Baltimore, where a 6-mile, toll-free section will link the project to the approaches of the Baltimore Harbor (Patapsco) Tunnel. The Delaware section will be known as the Delaware Turnpike, the Maryland section as the Northeastern Expressway.

Construction of this highway as a toll project had been proposed for some time. The Maryland legislature⁴⁰ in 1955 authorized the State Roads Commission to construct a toll road in this corridor, and the Delaware legislature⁴¹ followed suit in the same year, and again in 1961. The location of the project followed Interstate 95; in fact, State and Federal funds had been expended on some sections at the time the toll road proposal was adopted. For this reason, it was necessary to obtain Congressional approval for repayment of Federal funds on the included sections before the project could be built as a toll facility. Accordingly, legislation was included in the Federal Highway Act⁴² of 1960 authorizing repayment by the States of some \$1,400,000 of Federal funds that had been expended on the Delaware and Maryland sections (24, p. 119).

³⁸Ch. 3, Kentucky Acts of 1956, 2nd Extraordinary Session.

³⁹Ch. 106, Kentucky Acts of 1960 (Regular Session).

⁴⁰§§141 to 162, Art. 89B, Annotated Code of Maryland, 1957 Ed.

⁴¹Ch. 176, Vol. 53, Laws of Delaware. A 1955 Act permitted refinancing of the Delaware Memorial Bridge to permit construction of a new highway to the Maryland line from bridge revenues.

⁴²P.L. 86-657, 86th Congress, H.R. 10495, July 14, 1960.

The reason advanced by the States for withdrawing this project from the Federal-aid program was that traffic demands were so great as to warrant prompt construction of the highway, and that the availability of Federal Interstate funds would not permit completion short of 8 to 10 years.

The two States agreed to seek concurrent toll financing to insure that traffic and earnings on each section could take mutual advantage of this simultaneous completion of the sections.

On February 21, 1962, the two States were successful in selling \$102 million of revenue bonds—\$74 million by Maryland and \$28 million by Delaware. Both issues carry a $4\frac{1}{8}$ percent coupon rate, are dated January 1, 1962, are callable at 104 percent of par after January 1, 1972, and mature January 1, 2002. They were sold at $97\frac{1}{2}$ percent of par, at a net interest cost of 4.1875 percent.

As with the other turnpike issues under study, it is interesting to compare the cost of financing these projects with revenue bonds versus the customary type of borrowing used by these States.

Delaware.—This State had traditionally financed major capital projects from proceeds of general obligation bonds. During the 1950-60 period, the State issued \$91,225,000 of guaranteed bonds to finance highway improvements. The only exceptions have been the Delaware Memorial Bridge, which was financed in 1948 by proceeds of a revenue bond issue, and a few county road bonds that were assumed by the State and now have been largely retired. Recent highway general obligations have carried interest and maturity features as given in Table 24.

All these issues have had 20-year serial maturities, and the average coupon rate has been 3.13 percent, although each of the last three sales has carried a lower rate than the preceding issue. It might be fairly assumed, however, that guaranteed bonds to finance the Delaware Turnpike could have been marketed at 3.20 percent. The cost of the project as estimated by the consulting engineers will be \$23,957,250, including reimbursement of State and Federal funds (25). Assuming that all project costs were funded with general obligation bonds to the par value of \$24 million, the cost of amortizing such bonds at 3.20 percent interest for 20 years would be \$32,064,000. This compares with \$55,474,000 for the revenue bond issue, excluding any redemption premium, as estimated in the official statement (25, p. 28). A savings of as much as 42 percent could thus have been realized in the cost of financing this project.

Maryland.—Although the Maryland legislature can authorize issuance of general obligation bonds, the practice in recent years in that State has been to issue limited obligations highway bonds secured by road-user tax revenues. The legislature⁴³ in 1953 directed the State Roads Commission to carry out a 12-year highway improvement

TABLE 24
DELAWARE GENERAL OBLIGATION HIGHWAY BONDS

Year Sold	Issue	Par Value (\$1,000)	Interest (%)		Maturity
			Coupon	Cost	
1959	Highway Improvement - 1957, Series D	1,500	3.0	2.957	1960-79
	Highway Improvement - 1959, Series A	6,700	3.3	3.293	1960-79
1960	Highway Improvement - 1959, Series B	7,300	3.25	3.24	1961-80
1961	Highway Improvement - 1961, Series A	5,000	3.20	3.12	1962-81
1962	Highway Improvement - 1961, Series B	10,000	2.90	2.83	1963-82

⁴³Act 657, 1953 Acts of the Maryland General Assembly.

program, and authorized the issuance of \$330 million of State Highway Construction bonds during the period July 1, 1954, to June 30, 1968. Security for these bonds is a pledge of proceeds of the 2 percent excise tax on motor vehicle titles, and the Commission's 50 percent share of motor-fuel tax revenue.

By the end of 1961, the Roads Commission had issued \$220 million of these bonds. Features of the 1958-61 sales are given in Table 25. The average net interest cost for these recent issues is 3.44 percent. A coupon rate of 3½ percent is therefore indicated as reasonable for this type of bond.

According to the Official Statement of the Roads Commission, the cost of the Maryland toll road is estimated to be \$64,200,000 (26, p. 7). Because the Commission has scheduled a two-year construction program, it is reasonable to assume that limited obligation bonds in two annual installments of \$32 million could have provided the financing. Following the State's pattern of 15-year maturities, the State could have amortized a \$64 million limited obligation bond issue with interest at 3½ percent for a total cost of \$81,920,000. This compares with \$146,419,000 as the estimated cost of debt service for the \$74 million revenue bond issue (26, p. 27). In this case the savings would have amounted to about 44 percent. Moreover, if constructed as a free road, the State could then have claimed Federal reimbursement up to 90 percent of the value of the bond issue as it matured, as could have Delaware.

Virginia Toll Authorities.—Highway construction in Virginia has traditionally been on a "pay-as-you-go" basis. The State has issued no general or limited obligation bonds to finance highways since the mid-1920's. However, during the period of this study, Virginia incurred \$403,801,000 of highway toll revenue debt, of which \$75,150,000 financed the Richmond-Petersburg Turnpike, and the remainder financed bridge, ferry, and tunnel projects in the reaches and estuaries of Chesapeake Bay. Bond financing has been used by four agencies: the State Highway Commission, the Elizabeth River Tunnel Commission, the Richmond-Petersburg Turnpike Authority, and the Chesapeake Bay Bridge and Tunnel Commission.

State Highway Commission.—Pursuant to the State revenue bond act⁴⁴, the State Highway Commission sold \$19 million of revenue bonds in 1949 to acquire the privately-owned properties of the Chesapeake Ferry Company, and the James River Bridge System, and to construct a bridge across the York River. In 1954, the Commission sold \$95 million of revenue bonds under an indenture that combined the resources of the previous facilities with those to be derived from construction of a Rappahannock River Bridge and a combination bridge and tunnel project across Hampton Roads. This issue sold at a net interest cost of 3.063 percent and matures in 1994. Part of the proceeds were used to retire the remainder of the 1949 series bond.

TABLE 25

MARYLAND ROADS COMMISSION BOND SALES, 1958-61

Year Sold	Issues (series)	Par Value (\$1,000)	Interest (%)		Maturity
			Coupon	Cost	
1958	L	25,000	2.4-5.0	3.099	1959-73
1959	M	25,000	3⅞-5.0	4.0202	1960-74
1960	N	20,000	3.1-5.0	3.51	1961-75
1961	O	12,500	2¾-5.0	3.29	1962-76
1961	P	15,000	3.0-5.0	3.40	1962-76
1961	Q	12,500	2.7-5.0	3.31	1962-76

⁴⁴Virginia Code, §§33-227 to 33-255, inclusive.

Elizabeth River Tunnel Commission.—This commission was created⁴⁵ in 1942 as the governing body of the Elizabeth River Tunnel District, comprising the cities of Norfolk and Portsmouth, and Norfolk County. In 1950, the Commission sold \$23 million of revenue bonds to finance construction of a bridge and tunnel connecting Norfolk and Portsmouth. These bonds carried a coupon rate of 3½ percent and were to mature in 1980. In addition to providing the crossing facility, the Commission also established its own bus service transporting passengers over the bridge and tunnel. In 1955, three years after the project was opened to traffic, the competing Norfolk County ferries discontinued operations, thus increasing patronage of the tunnel and the Commission-owned buses. Although tolls were levied on users of the tunnel from its opening, no tolls were levied for use of the bridge. Under a unique agreement with the city of Norfolk, the city agreed to pay the Commission, based on treadle counts on the bridge ramps, a rate of \$.05 per axle for the first 2,250,000 axle counts, diminishing as the count went higher, to \$.0005 per axle over 16,000,000 counts, in lieu of a direct user toll levy.

In 1960, the Commission sold \$41,700,000 of revenue bonds to finance construction of a second tunnel across the Elizabeth River, together with connecting highways, and to retire some \$15.7 million principal amount remaining of the 1950 bond issue. The 1960 sale carried a coupon rate of 4½ percent and matures as a term issue in the year 2000. The net interest cost was 4.55 percent. Also from the proceeds of these bonds, the Commission paid \$2,211,236 to the city of Portsmouth and to Norfolk County (as owners of the Norfolk County ferries) for loss of income due to construction of the bridge and first tunnel, and an additional amount of \$573,386 to the cities of Norfolk and Portsmouth for loss of taxable income and incidental costs and damages to utilities due to such construction.

A new agreement was drawn in 1960 between the Commission and the city of Norfolk whereby in lieu of charging tolls on the bridge, the city will pay the Commission annually, for a 20-year period, \$197,936 plus approximately 53 percent of the Commission's cost of maintaining, repairing, and operating the bridge each year.

Richmond-Petersburg Turnpike Authority.—The legislature in 1954 created⁴⁶ this Authority to finance and operate a toll road between and through the cities of Richmond and Petersburg. The Act contains the restrictive proviso that no competing project that would substantially reduce traffic may be constructed within 25 miles of the turnpike until bonds have been retired. In 1955, \$69 million of revenue bonds were sold as 40-year terms at a net interest cost of 3.52 percent. Additional funds were found to be necessary to complete construction, and in 1958, a final increment of \$6,150,000 of bonds were sold at a net cost of 4.67 percent. This 35-mile toll road was opened to traffic in 1958.

Chesapeake Bay Bridge and Tunnel Commission.—One of the most complex highway financing and construction projects on record was brought to fruition in 1960 with the sale by the Commission in August of \$200 million of revenue bonds to finance a bridge-tunnel crossing of lower Chesapeake Bay which, together with approach roads, will be approximately 23 miles long.

Organized in 1954, the Chesapeake Bay Ferry Commission was authorized⁴⁷ to acquire and operate a ferry service within a District comprising four counties and seven cities and towns that surround the mouth of Chesapeake Bay. In 1956, the Commission sold \$20 million of toll revenue bonds and applied the proceeds to acquire and construct ferry properties. These bonds were sold as 30-year terms, at a net interest cost of 4.404 percent. In the same year, the Commission's functions were extended⁴⁸ to permit financing of the bridge-tunnel crossing from the proceeds of toll revenue bonds.

In seeking a means of financing this project which will link for the first time the eastern shore of Virginia on the Delmarva peninsula with the remainder of the State, the Commission and their underwriting syndicate devised a plan whereby primary and

⁴⁵ Ch. 130, Acts of Virginia of 1942, as amended.

⁴⁶ Ch. 705, 1954 Laws of Virginia.

⁴⁷ Ch. 693, 1954 Laws of Virginia.

⁴⁸ Ch. 462 and 714, 1956 Laws of Virginia.

subordinate lien bonds would be sold. Accordingly, the \$200 million revenue bond issue consists of \$70 million of $4\frac{7}{8}$ percent Series A First Pledge Revenue Bonds, \$30 million of $5\frac{1}{2}$ percent Series B Second Pledge Revenue Bonds, and \$100 million of $5\frac{3}{4}$ percent Series C Third Pledge Revenue Bonds, all due July 1, 2000. The issue was sold at 96.25 percent of par at a net interest cost of 5.61766 percent. With respect to payment of interest and principal, the Series A bonds have priority over the Series B bonds, and the latter have priority over the Series C bonds.

Despite the junior nature of the lien on the Series B and C bonds, the issue was promptly sold. The fact that interest was capitalized for a period of $4\frac{1}{2}$ years (i. e., bonds proceeds were set aside in a reserve for that purpose) undoubtedly was a favorable factor in marketing the bonds, as was the high tax-exempt interest rate on the Series B and C bonds.

The financing of this project, as well as of the Massachusetts Turnpike Extension described previously, has been hailed in financial circles as a brilliant solution to a most difficult financing problem, which undoubtedly it was. However, as in Massachusetts, the users of the facility will bear a heavy financing burden. The cost of constructing the bridge-tunnel project is estimated to be \$139,200,000 for which the

TABLE 26
COST OF FINANCING CHESAPEAKE BAY
BRIDGE AND TUNNEL

Factor	Amount (\$)
Cost of project:	
Construction	122,333,800
Right-of-way	1,000,000
Engineering	7,625,000
Administration	2,120,000
Contingencies	<u>6,121,200</u>
Total	139,200,000
Source of funds to build project:	
Par value of bonds sold	200,000,000
Less discount	-6,700,000
Less capitalized interest for $4\frac{1}{2}$ years	-48,405,600
Plus estimated investment earnings	+8,355,600
Plus income from ferry operations (three years)	+3,750,000
Less redemption of 1956 bonds	<u>-17,800,000</u>
Total	139,200,000
Cost to motorist to amortize investment:	
Interest requirements ¹	283,760,794
Redemption of bonds	<u>200,000,000</u>
Total	483,760,794

¹Excluding capitalized interest; assuming redemption of \$100,000,000 of Series A and B bonds between 1970 and 1999 according to amortization schedule on page 25 of bond prospectus leaving \$100,000,000 of Series C bonds to be redeemed at maturity (July 1, 2000).

user must pay in bond interest and redemption charges a scheduled \$483,761,000 (Table 26). In other words, for every \$1.00 in initial cost, the users must provide \$3.48 to discharge the obligation.

Summary

In this study, it has been impossible, of course, to review all of the bond financing programs of the States. However, a representative selection has been made to permit comparison of the features, significance, and costs of guaranteed and nonguaranteed highway bond programs.

Table 27 summarizes the amortization costs of a number of these bond issue programs. It serves two purposes: (a) it illustrates the variety in the type and selection of bond-financing programs, and (b) it compares the differential in financing costs with particular reference to States that have financed both with toll revenue bonds and with general or limited obligations.

The ratios of financing to capital costs, given in Table 27, are derived by comparing the capital costs (i. e., right-of-way, engineering, construction, and other roadway costs) paid from bond proceeds, with the costs to final maturity of debt service on the bond issues; i. e., bond interest, bond discounts, call penalties, etc.

TABLE 27
COMPARATIVE COSTS OF SELECTED STATE HIGHWAY BOND FINANCING PROGRAMS

Description of Bond Issue	Toll or Free Facilities	Years of Issue	Scheduled Redemption Dates	Capital Costs Funded ¹ (\$1,000)	Added Financing Costs ² (\$1,000)	Ratio of Financing to Capital Costs
General obligation:						
Connecticut highway system	Free	1959-61	1961-87	102,420	48,985	0.48
Greenwich-Killingly expressway (Conn.)	Toll	1957-58	1963-97	112,000	117,932	1.05
Delaware highway improvement	Free	1959-62	1960-82	30,500	10,010	0.33
Kentucky highway	Free	1957-61	1959-90	115,000	49,434	0.43
Louisiana long-range highway	Free	1959-60	1960-84	60,000	29,431	0.49
Massachusetts highway improvement loan	Free	1957-60	1958-80	189,000	66,344	0.35
New Jersey Highway Authority, Garden State Parkway	Toll	1953-54	1955-87	285,000	216,991	0.76
New York highway construction	Free	1958-59	1959-79	90,000	25,350	0.28
New York Thruway Authority	Toll	1953-60	1958-95	500,000	380,552	0.76
Limited obligation:						
Alabama Highway Authority	Free	1955-61	1962-81	110,000	44,650	0.41
Greenwich-Killingly expressway (Conn.)	Toll	1954-59	1962-97	347,500	315,233	0.91
Jacksonville Expressway Authority (Fla.)	Both	1957	1961-92	46,300	46,616	1.01
Maryland State highway construction	Free	1958-61	1959-76	110,000	49,073	0.45
Michigan trunk line and expressway	Free	1958-61	1959-86	363,000	195,575	0.54
Ohio major thoroughfare	Free	1954-61	1956-72	500,000	108,474	0.22
Pennsylvania State Highway and Bridge Authority	Free	1949-61	1953-80	120,000	30,809	0.26
Toll revenue:						
Delaware turnpike	Toll	1962	1966-2001	23,957	31,517	1.32
Florida Turnpike Authority (Proj. 2)	Toll	1961	1967-92	76,398	94,179	1.23
Kentucky Turnpike Authority	Toll	1961	1965-2000	130,570	195,522	1.50
Maryland northeastern expressway	Toll	1962	1966-2001	64,200	82,219	1.28
Massachusetts Turnpike Authority (Boston extension)	Toll	1962	1976-82	152,000	174,863	1.15
New Jersey Highway Authority, Garden State Parkway	Toll	1954-56	1961-88	45,000	35,838	0.80
New York Thruway Authority	Toll	1954-59	1964-96	400,000	339,251	0.85
Ohio Turnpike Authority	Toll	1952	1957-92	283,356	291,031	1.03
Chesapeake Bay Bridge and Tunnel	Toll	1960	1970-2000	139,200	344,561	2.48
Commission bonds (Va.)	Toll	1960	1970-2000	139,200	344,561	2.48

¹Project costs (i. e., right-of-way, engineering, and construction) paid from bond proceeds; for most free road facilities, amount shown is par value of bond issues; for most toll facilities, bond proceeds used to meet interest payments are excluded, as are bond discounts. ²Includes total bond interest to final maturity, bond discounts, and redemption (call) premiums on bonds expected to be retired in advance of maturity. ³Redemption dates are those contemplated by bond consultants at time of sale.

All but two of the revenue bond issues carry a ratio in excess of 1.0, and this despite the assumption that these term bond issues will be redeemed in advance of maturity. General and limited obligation bonds have ratios as low as 0.33 and 0.22, respectively, among those selected, and in only two cases do the ratios equal or exceed 1.0--in each case, for toll facilities. The effects of both higher interest rates, and longer maturities of toll revenue bonds are apparent in these comparisons.

Figure 11 compares the bond-financing programs of five States (Delaware, Kentucky, Maryland, Massachusetts, and Ohio) among those that have chosen to issue both revenue bonds and general or limited obligations for highways.

For each State, the first bar shows the amount of capital costs funded with general or limited obligations, as the case may be, with an extension of the bar to show the added costs of bond financing. The second bar shows similar facts for the revenue bond issues. The third bar shows the cost of funding with general or limited bonds a capital cost equivalent to that of the toll road project. The difference in the height of the second and third bars is thus a measure of the added cost of revenue bond financing. Obviously, the differential is a function of both interest rates and length of maturity schedules.

Although such comparisons are hypothetical, the bond issues are not; and the fact that these State could and did use general or limited bond financing during or near the same period that revenue bonds were sold, lends more than a superficial validity to the comparisons. Although the interest and other financing costs might have been greater or lesser under actual market conditions, the range in savings from 65 to 78 percent is an impressive indicator of the differential attributable to the selection of the borrowing device.

CONCLUSIONS

This study has not attempted to debate the merits of "pay-as-you-go" versus credit financing of highways. Others (27) have probed this area in depth, and the previous study (2), of which this is a sequel, reviewed the case for highway bond financing. The present study, rather, sheds some light on the significance of the type of bond program selected, and measures its cost to the public.

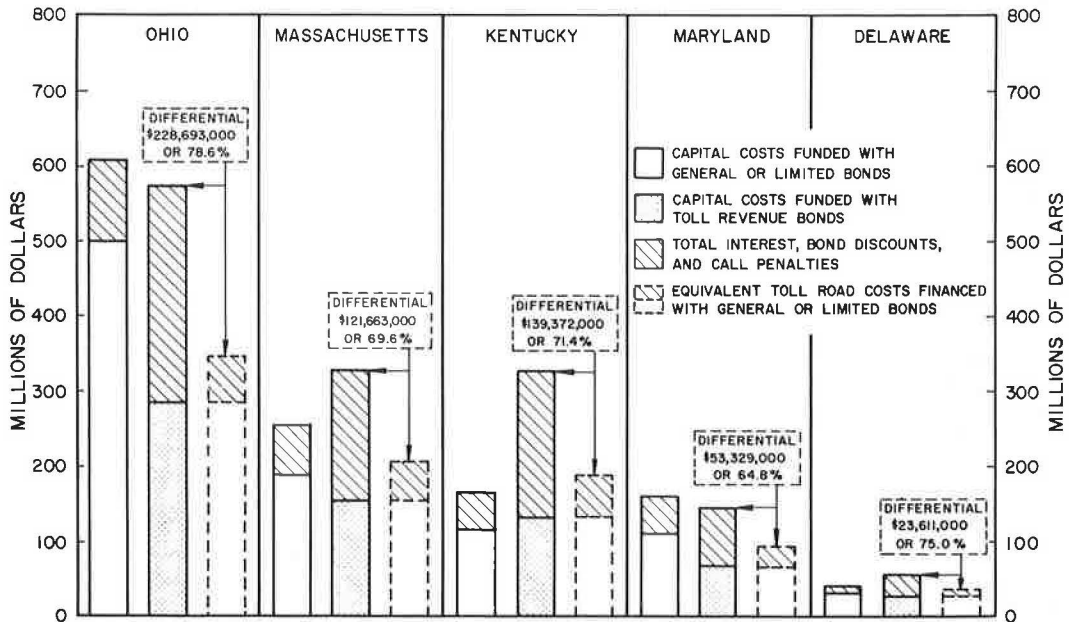


Figure 11. Cost differential of selected toll and free bond-financing programs.

It can be firmly concluded that, if borrowing is justified to finance major accelerated highway programs, the public interest is best served by selecting general obligation bonds. The cost of borrowing to the highway user (who, being almost everyone, surely represents the public interest) will be held to a minimum, and by means of the amendatory or referendum process he is given the opportunity in most States to express his decision as to the merits of an accelerated bond-financed highway program versus the two alternatives of a slower program financed from current revenues or of one that could be speeded by means of increased taxes.

When this solution is unfeasible, a clear case can be made for the use of limited obligation bonds, with or without the authority device, for purposes of financing a toll-free highway program. With adequate pledge of road-user tax revenues as security for the bond issue either directly or by means of a lease-purchase contract in the event an authority is established, the costs of borrowing can be held to levels that compare favorably with those of general obligation bonds.

In conjunction with either a general or limited bond-financing program, the judicious use of short-term note financing may be warranted. Notes issued in anticipation of Federal-aid reimbursements, or preliminary to later highway bond issues, can provide a means of program acceleration through credit financing at a minimum of cost.

Revenue bond financing is peculiarly well adapted for interstate or international crossing facilities where joint financing and ownership make it necessary to establish a commission or authority to coordinate the project. However, the toll road authority device, with its concomitant use of revenue bonds, has been demonstrated to be a costly excursion in the area of highway finance. There has been, unfortunately, a widespread impression that the only high-class road is a toll road and that the only way to obtain high-class roads promptly is by the use of toll revenue bonds. It is thus forgotten that construction of the Interstate System and a large mileage of similar high-type roads is being financed in many States, and by the Federal Government, from tax revenues without benefit of borrowing of any type; and that in many other States it is being accelerated by the use of credit financing without resort to the toll revenue bond. Revenue bond financing should thus be viewed in its proper perspective: it is merely one of several alternative methods of borrowing highway capital funds that must be repaid from future income.

Proponents of the toll facility concept, however, seem at times to find no satisfactory alternatives in sight. According to Lindman (28):

State and local officials, confronted with ever worsening traffic congestion in metropolitan areas, may well decide to build their Interstate System highways immediately as toll facilities rather than wait for long-term Federal aid financing. They may have other high-cost metropolitan highways for which toll financing will prove to be the only feasible solution.

Dearing (29) states:

...the true capital costs of the tollway, even though financed at a higher interest rate, may prove to be lower than those of a similar facility financed under the so-called pay-as-you-go basis.

According to Funk (30), Chairman-Director of the State Roads Commission, "Toll financing of Maryland's Northeastern Expressway is enabling the State to open the road in November, 1963, a full ten years ahead of the date it could be completed as a free road."

The ability of a State to develop rapidly an adequate system of highways (in other words, to accelerate its highway program) may well rest on the decision to raise road-user tax rates (or to reallocate the revenues from existing taxes) or to employ bond financing. The choice is not solely one of "pay-as-you-go" and stagnation versus toll roads and progress; rather, if the decision is made to utilize bond financing, the real concern should be the selection of the borrowing device that most economically serves the public interest.

Too often the explanation is heard, in justification of toll revenue bond financing, that "this will not cost the taxpayer a cent." Dearing (29), for example, says:

The contention that the cost of revenue-bond financing is high points to an apparent disadvantage inherent in this method of providing highway facilities. Nevertheless, (the) additional cost of providing roads through revenue-bond financing is not borne by the taxpayers, nor even indirectly by the State, but only by those individuals who voluntarily choose to use the toll roads.

The implication here is that, somehow, the users of a toll facility are not taxpayers or, even more subtly, that to a large extent they may not be taxpayers of the home State. Undeniably some toll facilities are so located as to attract large proportionate volumes of out-of-State traffic (such as the Delaware Memorial Bridge connecting the States of Delaware and New Jersey), but this would not be true of, say, the San Francisco-Oakland Bay Bridge.

Thus, the burden of financing such projects cannot be dismissed as being a problem for the nonresident motorist. It may become a domestic problem as well. It is thus essential that the methods of financing revenue-producing facilities be examined with great care, so as to select that which best meets the public interest.

The toll road user may be surprised to learn that he is not considered to be a taxpayer. But if he is not, then neither is the user of free roads financed with general or limited obligation bonds. Because the user in either case provides the revenue from which the debt is amortized, and such revenue may be collected in the first instance as "toll" or in the second as a levy on his motor-fuel purchases, the distinction is merely one of degree. The payment of a gasoline tax or a toll for the use of highways is in either instance assessed in proportion to highway use. In fact, the toll road user is assessed for free roads whether he uses them or not.

The levy of tolls should not be confused with the use of toll revenue bonds. There is merit in the contention that corridor States, in particular, must provide high-class highway service, but that a large percentage of the users are nonresidents who would otherwise make little or no contribution to the cost of the roads they use. New Hampshire, faced with this problem, constructed a 14-mile toll road that collects revenue largely from Interstate vehicles, but New Hampshire financed this road by means of general obligation bonds at a net interest cost of only 1.6 percent. Both New Jersey and New York also financed major toll road projects by means of general obligation bonds, and although this choice may have been dictated by necessity to insure marketability of the bond issues, it nevertheless resulted in a savings in financing costs and indicates an awareness of the advantages of the guaranteed bond.

Although levying tolls on its costly expressway project, Connecticut has also avoided using revenue bonds and secured the needed capital both from guaranteed bonds and from limited obligations secured by tolls and gasoline tax revenues.

The contention can be dispelled that bond financing of toll-free highways can neither win public acceptance nor provide the priority routes when needed. The magnitude of toll-free borrowing within the past decade speaks for itself. The experience in Michigan in financing specific expressway projects or of the Pennsylvania State Highway and Bridge Authority among others attest to the fact that the pressures for balancing sectional benefits at the expense of priority needs can be overcome.

Bond financing is not a panacea, but where it is justified, the exercise of sound judgment and financial acumen must lead to selection of the borrowing procedure best designed to meet the needs at the most economical cost to the public; namely, the high-user.

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