THE NEWS LETTER
OF THE
BUREAU OF PUBLIC ROADS

VOL. 1, NO. 11 SEPTEMBER, 1926

CONTENTS

MR. MACDONALD MADE MEMBER OF COUNCIL OF INTERNATIONAL CONGRESS SESSIONS OF 1929 PROBABLY TO BE HELD IN UNITED STATES

According to cablegrams received at the Washington office the United States delegation to the International Road Congress at Milan was warmly received and Mr. MacDonald, as the chairman of the delegation, was made a member of the council.

He is reported to have announced that the United States Congress will be urged to extend an invitation to the Permanent Association to hold the 1929 sessions in the United States; and Senator Albert Mathieu, of France, president of the association, gave assurance that the invitation would be accepted.

The Congress, which opened at Milan on September 6, was attended by two thousand delegates from fifty countries and five continents and was by far the most successful ever held, indicating world-wide interest in all phases of highway development.

During the week of the Congress the American delegates entertained the Italian and other delegations and inspected roads and motor plants in and about Milan. Much of their time was spent on the historic Appian Way and other old Roman roads and the delegates were greatly interested in studying the way in which the Romans provided for the slow-moving traffic of their day.

In a private audience granted the Americans by Mussolini the premier asked them to convey a message to the United States that they had seen a disciplined and tenacious people courageously at work and desiring only peace. Nodding assent to Mr. MacDonald's statement that as a result of modern highway transportation there is a new way of living ahead for the masses, Mussolini stated his conviction that motor roads must be built everywhere as railroads and carriage roads have been built in the past.

In his address to the final session of the congress at Rome on September 13, the premier stated that Italy recognizes that modern roads are essential to agriculture and commerce as well as for international touring, and is determined to recreate her ancient system along modern lines.

In the closing hour of the congress Signor Luiggi, president of the Italian commission, declined to say goodbye, saying instead that the delegates would renew their acquaintance before long probably in the United States.

Before leaving for Vienna on September 15, the delegates were granted an audience by the Pope at the Vatican.

One subject over which considerable controversy arose during the meetings of the congress was the question of private operation of government-subsidized toll roads, a policy which has been tried out successfully in some short stretches of Italian road. This was the subject upon which Mr. MacDonald presented a paper in collaboration with John A. MacDonald, highway commissioner of Connecticut, and Wm. G. Sloane, chief engineer of the New Jersey department. Great Britain and the United States declined to adhere to a resolution commending the Italian proposal as a general policy on the ground that the construction of roads is a government function, and that the roads should be open to the use of all, except in rare cases where private construction might be expedient. In such cases, however, it was the opinion of the American and English Delegations that the roads should eventually be taken over by the public. The resolution as finally adopted provided for all view points.

All members of the American delegation were greatly pleased by their enthusiastic reception and the generous hospitality accorded them. From Vienna, their first stop after leaving Rome, the delegation will continue with a survey of traffic and road conditions throughout Western Europe, sailing from Southampton October 12 for the United States.

SUSQUEHANNA RIVER BRIDGE TO BE DOUBLE-DECKED
OLD RAILROAD STRUCTURE USED FOR HIGHWAY SINCE 1908

Contributed by the Bridge Division

The Bridge Division has recently cooperated with the State Roads Commission of Maryland in the development of interesting plans for increasing the capacity of the 3,273-foot bridge over the Susquehanna River at Havre de Grace, Maryland.

The bridge, which is on the main State highway between Philadelphia and Baltimore was built originally by the Philadelphia, Baltimore and Washington Railroad Company, now a part of the Pennsylvania System and was used as a railroad bridge until 1908. In that year, the railroad company having completed a new bridge, the old one was acquired by a private corporation which opened it in 1910 as a toll bridge for highway traffic. So great was the traffic and so high the toll charged that the company quickly recovered the purchase price and the structure came to be known as the gold-mine bridge.

In 1923 it was purchased by the State Roads Commission for $585,000 and the tolls, since collected by the State have now paid off the purchase price. It had been the intention of the State Commission to discontinue the collection of tolls this year; but in view of the decision to increase its traffic capacity it is now announced that collections will be continued for another year during which time it is anticipated that they will amount to $200,000.

The present bridge has a 13-foot roadway except on the draw span which has a width of 20 feet. The majority of the truss spans, each about 253 feet long, were built from 1870 to 1880 for a light railroad load. The draw span was built in 1910 for highway loads. The pivot pier and one of the rest piers were rebuilt at the same time.

Three possible ways of increasing the capacity of the bridge have been considered as follows:

1. Spreading the trusses of the fixed spans to provide a 20-foot roadway.

2. Making provision for hanging a single roadway outside of the trusses on both sides.

3. Double-decking the structure.

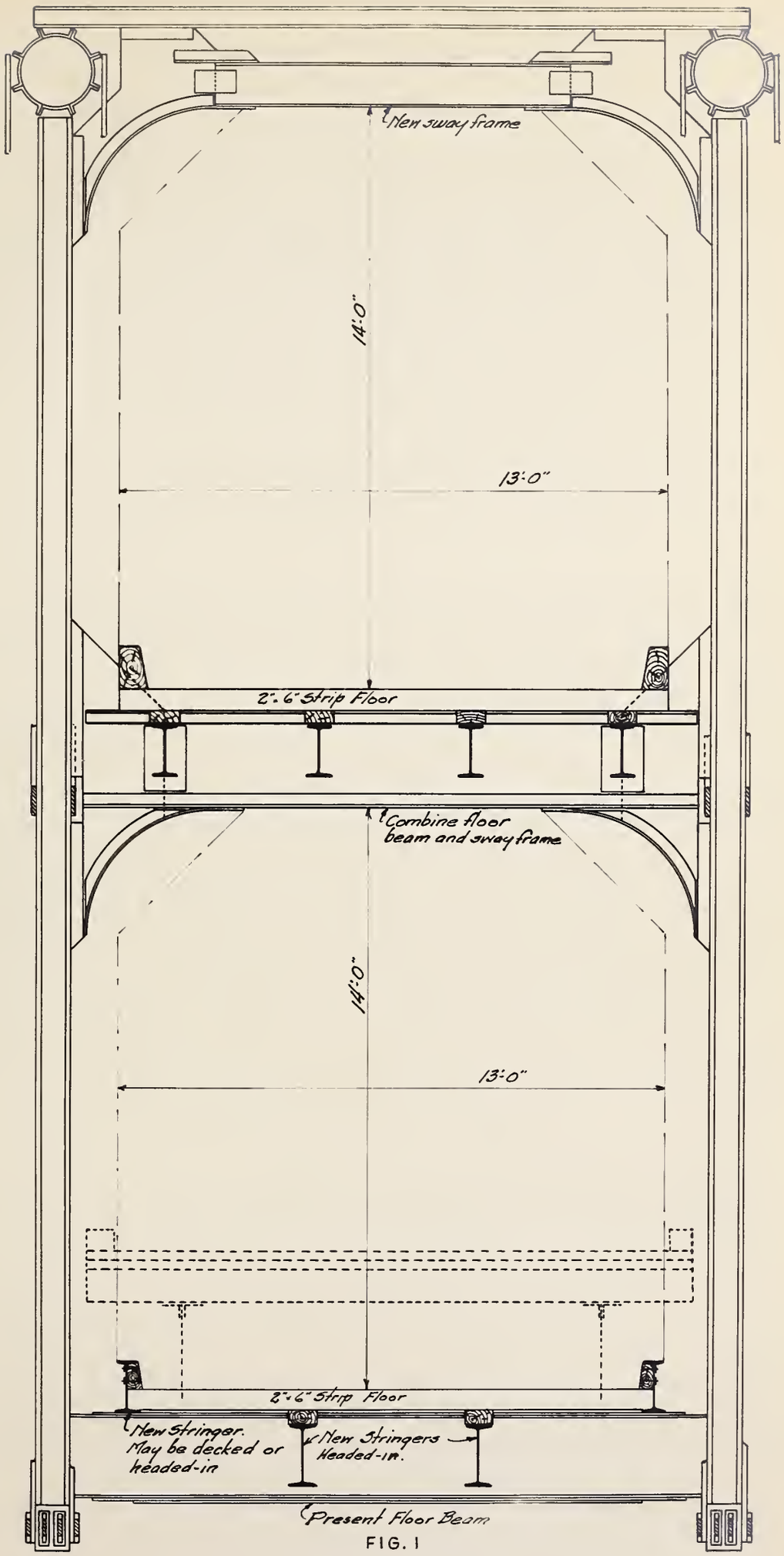

FIG. 1
SKETCH SHOWING
SUGGESTED METHOD OF DOUBLE DECKING
THE HAVRE DE GRACE BRIDGE

The third scheme, which is favored by our bridge engineers, it is thought can be executed without serious interruption of traffic. The height of the trusses center to center of pins is 35 feet. The present floor system uses 6 feet 8 inches of this height so that in order to provide sufficient headroom for two roadways it will be necessary to rearrange the present stringers and drop the roadway. With stringers headed into the present floor beams and a 6-inch floor on top of them it will be possible to lower the present floor about 3 feet 4 inches, and by introducing new combined floor beams and sway frames midway of the height of the trusses and new sway frames at the top, to provide for two roadways with 14-foot headroom, as shown in Figure 1, which is a sketch prepared by the Bureau.

As the trusses were designed to carry railroad loads the Bureau and State engineers are convinced that they will carry the increased dead load of this arrangement without serious impairment of their live-load capacity, provided the floors are both made relatively light. The construction suggested consists of 6-inch timber strip floors and steel traffic treads.

A new double-deck draw span will be provided of a type similar to that represented in Figure 2. As shown in the photograph of the present bridge, Figure 3, the new railroad bridge is very close to the highway bridge, and when the two draws are opened it is necessary that the trusses of the highway span shall pass under those of the railroad. This necessitates the type of draw shown in Figure 2 or some similar arrangement. The arrangement suggested by the Bureau permits the simultaneous opening of the two draws by cutting down the depth of the highway trusses at the ends and providing for the dropping of the rail or rail and curb combined when the bridge is opened.

The present roadway at the east approach passes under the Pennsylvania Railroad about 300 feet from the end of the highway bridge. In order to keep the present headroom it will probably be necessary to lower the present highway bridge by dropping the east end of the east span or possibly both ends of it and the east end of the second span slightly.

At the west approach a similar lowering of the end of the bridge may be necessary although other plans more favorable for the handling of a large volume of traffic are under consideration.

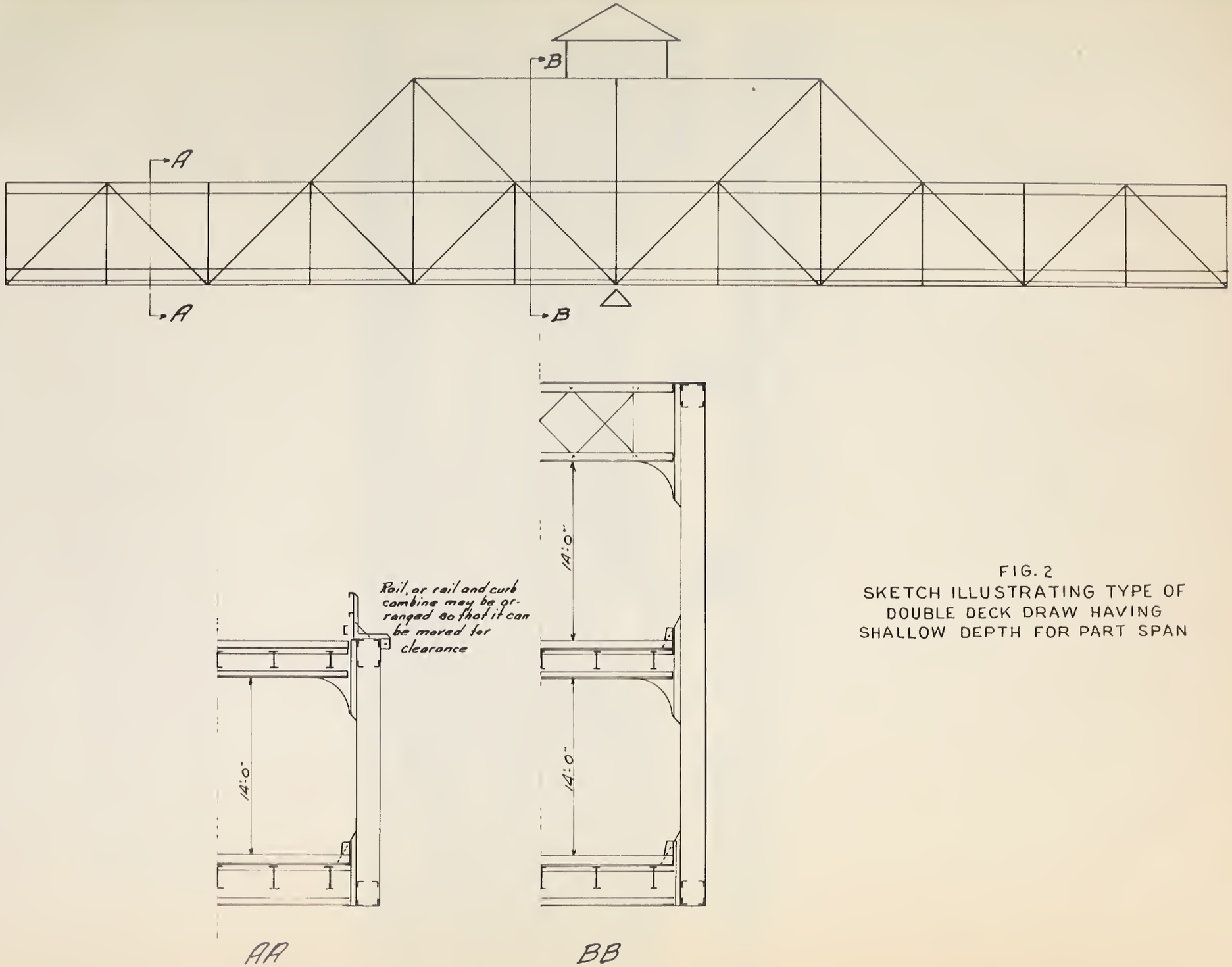

FIG. 2
SKETCH ILLUSTRATING TYPE OF DOUBLE DECK DRAW HAVING SHALLOW DEPTH FOR PART SPAN

FIG. 3. - THE PRESENT HIGHWAY BRIDGE OVER THE SUSQUEHANNA RIVER AT HAVRE DE GRACE, MD., WITH THE NEW RAILROAD BRIDGE BEHIND IT. THE NECESSITY THAT THE DRAW OF THE NEW DOUBLE-DECKED HIGHWAY BRIDGE SHALL PASS UNDER THAT OF THE RAILROAD BRIDGE WHEN BOTH ARE OPEN CONTROLS THE DESIGN OF THE NEW SPAN.

PAVING FOR RAILROAD GRADE CROSSINGS

CONTRIBUTED BY C. S. JARVIS, DIVISION OF DESIGN

A RECENT INQUIRY REFERRED TO THE DIVISION OF DESIGN HAD TO DO WITH STANDARD PAVING PRACTICE FOR RAILROAD GRADE CROSSINGS.

DUE TO THE GREAT VARIETY OF CONDITIONS TO BE ENCOUNTERED, SUCH AS CHARACTER OF SUBSOIL AND TRAFFIC, MAXIMUM WHEEL LOADS, AND CONTIGUOUS PAVING, IT IS DIFFICULT TO DEFINE JUST WHAT CONSTITUTES BEST PRACTICE. AS WELL MIGHT ONE INQUIRE CONCERNING THE PREFERABLE TYPICAL CROSS SECTION FOR A HIGHWAY. LOCAL AND TRAFFIC CONDITIONS ARE ESSENTIAL ELEMENTS OF THE PROBLEM; AND THERE ARE NUMEROUS DESIGNS FROM WHICH TO CHOOSE. CHARACTERISTICS REQUIRED FOR A SATISFACTORY PAVING AT GRADE CROSSINGS INCLUDE:

1. RESISTANCE TO VIBRATION
2. EASE OF MAINTENANCE AND RENEWAL
3. IMMUNITY TO SUDDEN FAILURE
4. SMOOTH RIDING SURFACE
5. MODERATE COST
6. MINIMUM INTERRUPTION TO TRAFFIC

THE MATERIAL MOST COMMONLY USED FOR GRADE CROSSINGS PRIOR TO THE LAST DECADE WAS TIMBER. TYPICAL SECTIONS WERE 4 BY 8 INCH OR 5 BY 10 INCH PLANKS, SPIKED TO THE CROSS-TIES. ONE OF THE CHIEF DEFECTS PROVED TO BE THEIR TENDENCY TO DECAY AND WARP. THIS SUGGESTED THE VARIOUS EXPEDIENTS OF TREATING WITH CREOSOTE OR OTHER PRESERVATIVES; ADOPTING LAMINATED FLOORING OF 2 BY 4 INCH OR 2 BY 6-INCH LAID ON EDGE AND SPIKED TOGETHER IN SECTIONS; FASTENING TO THE TIES WITH LAG-SCREWS INSTEAD OF ORDINARY SPIKES; ADDING A BITUMINOUS MAT AS A WEARING SURFACE; OR SUBSTITUTING A COMPOSITION BLOCK OR SLAB WITH A BITUMINOUS BINDER.

WITH THE ADOPTION OF HEAVIER RAIL SECTIONS AND WHEEL LOADS DURING THE PAST DECADE, THE USE OF STONE PRODUCTS HAS LARGELY DISPLACED TIMBER, ESPECIALLY WHERE THE VOLUME OF TRAFFIC IS GREAT.

IN GENERAL, EACH MUNICIPALITY HAS ITS OWN PRESCRIBED STANDARD PAVING FOR TRACK CROSSINGS. THIS MAY VARY FROM GRANITE BLOCKS OR BRICK ON A CONCRETE BASE TO BITUMINOUS MACADAM OR ROCK ASPHALT ON A COMPACTED CRUSHED-STONE BASE.

To prevent wheels or horses' hoofs from wedging in the flange groove, and to limit lateral displacement of semi-plastic pavements, it is customary to use either a patented metal strip or a medium weight of old rail section turned on its side as shown in the accompanying sketch (Fig. 1).

What are known as "concrete planks" or pre-cast reinforced concrete slabs have been used with varying degrees of success in several instances. (Concrete, March, 1919, page 114; Precast Slabs for Railway Crossings.)

Wherever the railroad or highway construction department is left to its own devices, it is observed that either a road oil, a cold-mix bituminous concrete, or a rock-asphalt wearing surface on a compacted crushed-stone base is likely to be adopted if the materials are available at moderate prices.

Special conditions may warrant the use of either concrete or timber planks, with or without a bituminous wearing surface. For exceptionally heavy duty, the use of granite block or brick on a sand cushion supported by a concrete base is warranted. Recently the high-alumina, quick-setting cement concrete has been used for patching as well as for original construction.

Present practice of several railway companies under average conditions, where left to their own choice, seems to favor either bituminous macadam, bituminous concrete, or rock asphalt on a suitable base of compacted crushed stone, or on a rigid concrete base completely enveloping the ties.

It is of primary importance to have the subgrade well drained, thoroughly compacted, and stabilized before placing the pavement for a grade crossing, for the pressures transmitted by locomotives and heavy trucks are unusually frequent and severe under the intersection, due both to impact and to accommodating the two lines of traffic.

Occasionally a motorist is happily surprised by the smooth-riding qualities of a grade crossing. If his curiosity causes him to stop and examine the pavement, he will likely find that the highway grade conforms to the plane of the rail-heads even though superelevated on a curve; the grooves for the flanges of the railroad car-wheels are no larger than required, and the rails, ties, and subgrade are so well selected and placed as to allow no visible movement under the passing trains.

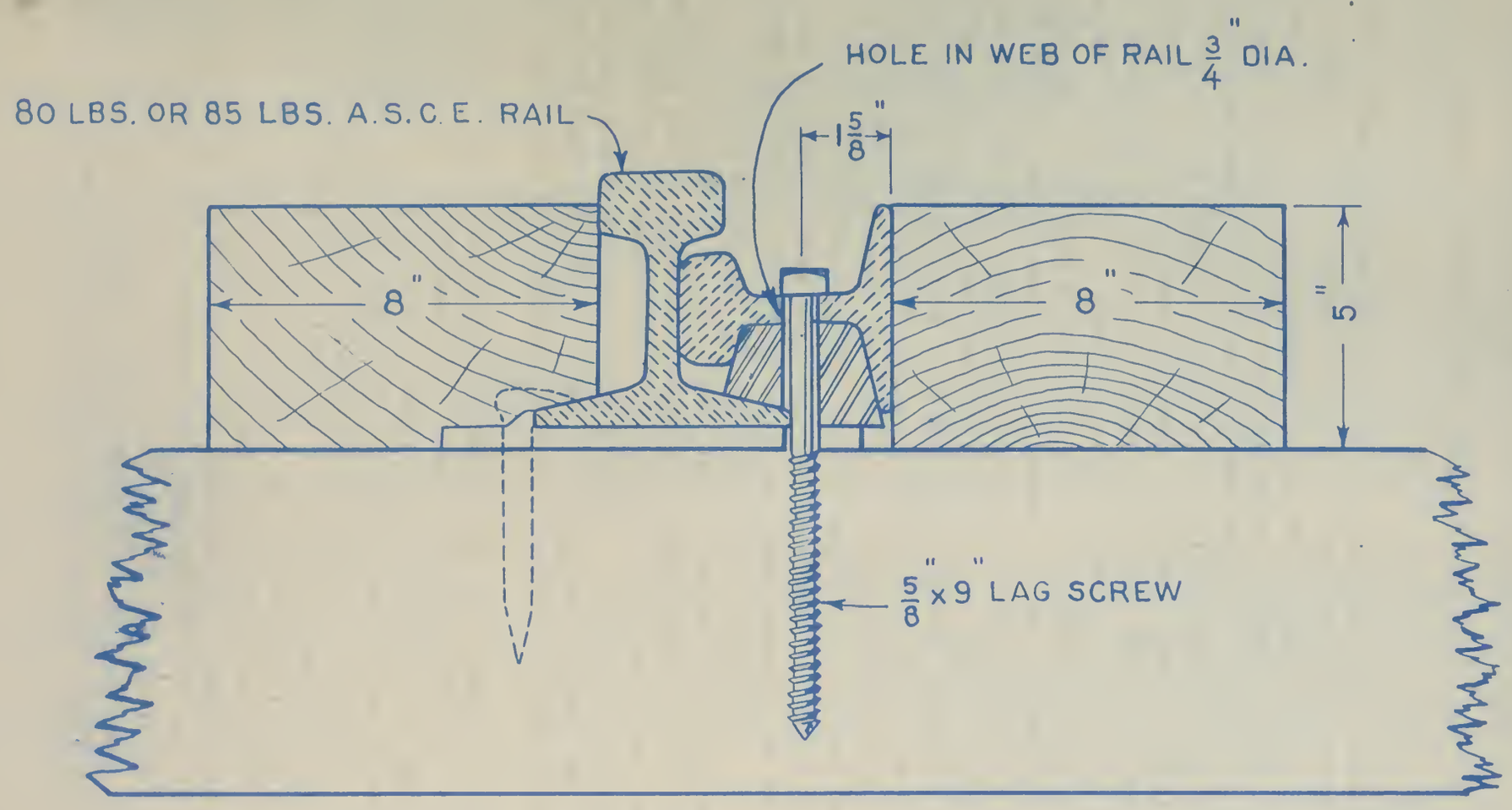

FIG. 1.

CROSS-SECTION SHOWING MANNER OF USING OLD RAIL TO FORM GROOVE AT GRADE CROSSING.

PAYMENT FOR OVERHAUL OF SURFACING MATERIAL NOT AUTHORIZED UNLESS PROVIDED FOR IN STANDARD SPECIFICATIONS.

Contributed by the Legal Division.

The standard specifications for forest road construction provide that the bid price per cubic yard for rock or gravel surfacing shall be full compensation for furnishing, hauling and placing all materials, and for equipment, tools, labor, and incidentals necessary to complete the work. No item for overhaul of surfacing material (except possibly for binder material, when specified) is included in the standard form. This is true also of a number of standard specifications issued by the States for Federal-aid work. Sometimes the drawings or plans showing the layout of a proposed project indicate sources of material, or gravel pits, which may be available to the contractor, and may also specify what government borings indicate as to quantities in gravel pits. This frequently gives rise to an assumption on the part of the contractor that the Government guarantees the indicated gravel pits to contain a sufficient quantity of acceptable material to complete the project in accordance with the requirements of the contract. The engineer in charge for the Government may feel that such is the case and verbally lead the contractor to believe that he will be compensated for overhaul in case the pits shown on the plans prove inadequate. If the contractor encounters difficulty in obtaining a sufficient supply of surfacing material under these circumstances and is required to make long hauls which were not anticipated he very likely may submit a claim for the additional haul. In such circumstances the engineer may feel that there is at least a moral obligation imposed upon the Government to make payment of such claims.

If we bear in mind the simple rule that where a contract is in writing it is presumed in legal contemplation to embody the final and entire agreement between the parties, that agents of the Government have no authority to alter the legal effect of a written instrument, much embarrassment might be saved. The standard forms require the bidder to examine carefully the site of the work and to satisfy himself as to the conditions to be encountered, the character, quality, quantities of work to be performed and the materials to be furnished. Under paragraph 2 of the forest road contract form the contractor agrees that he has obtained full information regarding the labor and materials to be furnished by personal investigation and research, and not from the estimates of the engineer, and that no claim will be

made against the United States by reason of estimates, tests, or representations of any officer or agent of the United States.

The Comptroller has held that the presence of the record of test borings on the plans can not be held to be a warranty of quantities by the Government; that under no circumstances can an executed contract legally be amended for the purpose of authorizing payment to the contractor of an amount to which he was not entitled under the terms of his original contract. It is important, therefore, in dealing with contractors, that Government agents keep in mind that difficulties in the performance of a contract, however unforeseen they may be, will not excuse the contractor, and that such difficulties will not justify a claim for the payment of an amount above that specified in the proposal. Where the contract provides for gravel in place at a price fixed by the bidder in his proposal, the exhaustion of the material sites shown on the Government plans, in the absence of express language to the contrary, can not legally form the basis of an additional claim.

HINTS FOR PHOTOGRAPHERS

Contributed by J. K. Hillers, Photographer, Editorial Division

The films received at the Bureau's photographic laboratory for development show clearly that many of the engineers who are taking photographs are falling short of the best results largely because of a failure to follow a few simple rules.

This fundamental rule may generally be followed with safety: The farther the subject is from the camera the more should the exposure be cut down; and vice versa.

Never try to hold the camera in the hand for any exposure longer than 1/25 of a second.

Remember that concrete roads and bridges reflect more light than almost any other subject; and cut down the aperture accordingly.

Remember also to adjust the lens opening to the season of the year. The opening should be smallest in summer, larger in fall and spring, and largest in winter when the light is weak and yellow.

Photographs of moving objects should never be given an exposure longer than 1/50 of a second. In summer the opening should be 16, if the sun is shining brightly, larger if the day is overcast and proportionately larger for both conditions in spring, fall and winter.

Above all remember this: The trouble with most bad photographs is the result of failure to study LIGHT. Our photographs can be much improved if every engineer whose duties require him to use a camera will make a special endeavor to develop the sense of light values, and this can be done by keeping a record of light conditions, exposures, and openings used in making photographs and studying the record in conjunction with the results obtained.

Just one more thought. If, in any negative sent to Washington, there is reason to believe the photographer will not readily perceive the central or most important object in the picture as it appears, a note concerning the purpose of the photograph will be helpful in developing the best there is in the negative. Sometimes prominent objects appear in the foreground of pictures made primarily to show some other object perhaps further removed from the camera. The photographer uses his best judgment in bringing out what he understands to be the purpose of the photograph. If there is likely to be some doubt a word from the person making the exposure will be helpful.

STATUS OF RESEARCH PROJECTS OF THE BUREAU

Contributed by the Divisions of Tests, Control, and Highway Transportation and Economics.

This listing of the status of current highway research projects conducted by the Bureau alone or in cooperation with other agencies has been compiled to acquaint members of the Bureau with the trend of the work and make known possible sources of technical data. Practically all of the projects are being carried on under the direction of the Divisions of Tests, Control, and Highway Transportation and Economics, and the list which follows is subdivided under the names of the three divisions responsible for the respective projects.

DIVISION OF TESTS

Research on Bituminous Materials and Methods of Testing.- An extensive investigation is under way which has for its object the development of apparatus for testing the stability of bituminous paving mixtures. An instrument has been devised which simulates very closely the shoving effect of heavily-loaded tires on bituminous pavements and this instrument is at present being used for the purpose of testing sections of surface mixtures taken from the circular track at Arlington.

Also under way, in cooperation with the Committee of Tests and Investigations, American Association of State Highway Officials, is a series of tests involving the testing of compressed cylindrical specimens of bituminous mixtures at 140° F., 77° F., and 39° F. In these tests the relative stability of specimens at the specified temperature is determined by measuring the deformation which takes place under statically applied loads and impacts.

Laboratory tests of certain types of bituminous materials are being carried on in connection with the development of the specifications for bituminous materials for the Federal Specifications Board.

An extensive survey of roads is in progress in the far western States, the results of which will be used in the development of an intermediate-cost bituminous surface suitable for that section

Research on Nonbituminous Road Materials and Methods of Testing.- One of the current investigations has for its object the development of an abrasion test for coarse aggregate which may be used for both broken stone and gravel. It is hoped that the present investigation will develop a test which will put the two materials on an equal basis so that identical specification requirements may be written for both types of aggregates.

The laboratory is also engaged in a study of methods for determining the quality of fine aggregate for concrete. The object is to develop a test for the quality of sands which may be substituted for the present unsatisfactory strength-ratio test. This investigation is being made in cooperation with the Committee on Tests and Investigations of the American Association of State Highway Officials.

Efforts are also being made to develop apparatus for determining the resistance of concrete to direct tension in the design of roads, a property of the material of special pertinence in the design of roads. The program of tests under way contemplates the determination of various factors which affect the tensile strength of concrete as well as the determination of the relation between tensile strength, compressive strength and modulus of rupture.

A study of various methods for determining the transverse strength of concrete is in progress for the purpose of standardizing a method of test. At present there are no standards in force governing either the dimensions of the test specimens or the method of loading in this type of test.

The Bureau is also working, both separately and in cooperation with the State highway laboratories, on tests which have for their object the establishment of the relation between the strength of Portland cement as determined by the usual routine tests and the strength of the concrete in which it is used. These tests are of special significance in view of the current agitation in favor of a high-test Portland cement for use in concrete road construction.

A very elaborate series of tests is being conducted for the purpose of studying the effect of type and quality of coarse aggregate on the resistance of concrete to repeated frost action. Concrete beams in which various types and grades of crushed stone, gravel and blast-furnace slag are used as coarse aggregate are being alternately frozen and thawed, their general condition noted, and their strength determined at various stages.

A series of field tests has been started in which several methods for curing concrete pavement surfaces will be compared. A series of concrete slabs, each 2 feet wide and 200 feet long, will be cast and cured in various ways. The effect of reinforcing on the distribution of transverse cracks in concrete pavements will also be studied. This problem is also being studied in cooperation with the States of Maryland and Virginia through the observation of experimental concrete pavements cured in various ways.

Methods of protecting concrete against the action of alkali and salt water are being studied with special reference to the use of water-gas tar.

A study of the water-cement-ratio method of proportioning concrete with particular reference to its use in concrete paving mixtures is being carried on with the State of New Jersey under a cooperative agreement. Tests for crushing strength and modulus of rupture are being made on concrete designed to have a certain strength, using crushed stone and gravel of various gradations.

Cooperative fatigue tests of mortar and concrete, and tests of the expansion and contraction of concrete subject to various moisture and temperature conditions are under way at Purdue University.

In cooperation with Iowa State College studies are being made of the strength of culvert pipe in actual fills and a study of the relative economy of various types of road improvement.

A study of the distribution of earth pressures on concrete, wrought-iron, and cast-iron pipe, including a comparison of the behavior of the pipe under fills with its behavior in the standard laboratory test, is in progress at the University of North Carolina in cooperation with the Bureau.

Field and laboratory studies of subgrades and subgrade materials are under way at Ohio State University, also under a cooperative agreement with the Bureau.

The South Carolina State Highway Department is cooperating in a study of various methods for surface treating earth roads with bituminous materials; and tests of methods of treating subgrade materials under concrete pavements, with special reference to the black waxy soil of Texas are in progress under cooperative agreement between the Texas State Highway Department and the Bureau.

Other tests now under way in cooperation with the University of Maryland look to the development of apparatus and methods for determining the tensile strength of concrete, including the modulus of elasticity in tension; and, in cooperation with the Kansas State Agricultural College, an effort is being made to determine the effect of various types of road surface on tire wear.

Research on Subgrades. - The most active investigation is that which has for its purpose the study of the relation between the critical moisture content with respect to bearing power and the lower plastic limit of the soil. This investigation also includes the study of the relation between plasticity and volume change.

Field observations of the relation between road surface condition and types of subgrade are now being carried on in cooperation with the States of Virginia and Texas, and other extensive surveys with the same purpose will probably be carried on in cooperation with the various State highway departments.

Investigations in Road Design. - The motor truck impact tests are being continued with special reference to the determination of the effect of the thickness of tread rubber on the cushioning quality of various types of tires.

A study of the instrumentation used in the impact tests is being made by both theoretical and experimental processes.

The effect of thickness of vitrified paving brick on the resistance of brick pavements to traffic has been under investigation for some time. This work has been carried on at the circular track at Arlington and the field work is completed. The data obtained have been analyzed and a report appears in the September issue of PUBLIC ROADS.

Bridge Tests. - Tests of two experimental bridge slabs constructed for the purpose of determining the value of the design used in the construction of floor slabs of the Philadelphia-Camden bridge have been completed. The experimental data obtained are now being analyzed and will shortly be reported.

Vibrolithic Concrete Tests. - The one-year tests of Vibrolithic and normal concrete slabs were completed during the first two weeks of September. As before, the tests were

ESSENTIALLY BEAM TESTS OF SLABS 3 FEET WIDE AND 6 FEET LONG, SIMPLY SUPPORTED AND LOADED AT THE THIRD POINTS. EIGHTY OF THESE SPECIMENS WERE INCLUDED IN THE ONE-YEAR TESTS, FORTY OF EACH TYPE OF CONCRETE, FOUR DIFFERENT MIXES TO EACH TYPE AND TEN SPECIMENS OF EACH MIX.

THE DATA FROM THESE TESTS HAVE NOT YET BEEN ANALYZED BUT IT IS EXPECTED THAT A COMPLETE REPORT WILL BE READY FOR PUBLICATION IN THE NEAR FUTURE.

SINCE THE PUBLICATION OF THE PROGRESS REPORT ON THESE TESTS, CORES HAVE BEEN DRILLED FROM THE TESTED SLABS. SOME OF THESE HAVE BEEN SUBJECTED TO FREEZING AND OTHERS WILL BE TESTED IN COMPRESSION AT THE AGE OF ONE YEAR.

FIELD STUDIES OF LAND SLIDES IN WEST VIRGINIA AND OHIO. - THE STUDY OF LAND SLIDES IN RELATION TO HIGHWAY LOCATION, CONSTRUCTION AND MAINTENANCE IN WEST VIRGINIA AND OHIO INCLUDES BOTH FIELD AND LABORATORY INVESTIGATIONS. A PRELIMINARY REPORT WILL BE ISSUED IN A SHORT TIME.

DIVISION OF CONTROL

UNIT COST STUDIES OF CONSTRUCTION. - THE PROGRAM OF UNIT COST STUDIES CARRIED ON BY THE DIVISION OF CONTROL MAY BE OUTLINED AS FOLLOWS:

A. GRADING.

1. FRESNO - PRELIMINARY REPORT PUBLISHED AND STUDY BEING CONTINUED.
2. WHEEL SCRAPER - PRELIMINARY REPORT PUBLISHED AND STUDY BEING CONTINUED.
3. ELEVATING GRADER - PRELIMINARY REPORT PUBLISHED AND STUDY BEING COMPLETED.
4. POWER SHOVEL - STUDY IN PROGRESS.
5. OTHER STUDIES - NOT YET UNDERTAKEN.

B. SURFACING.

1. CONCRETE PAVEMENT - PRELIMINARY REPORT PUBLISHED AND STUDY BEING CONTINUED.
2. OTHER SURFACES AND PAVEMENTS - TO FOLLOW.

C. Structures - not yet undertaken.

D. Manual labor studies - not yet undertaken.

The above can be classed under the general head of studies of unit cost. Especial emphasis is laid on the practical application of cost analysis in actual construction. Instead of using the time-honored basis of unit cost in terms of dollars and cents, these studies are practically all based on the units of time required for the performance of the various operations. Since the accomplishment of men, teams, or machines under similar conditions differs but little with place or prices, the determinations provide a basis which is applicable, first for a direct comparison and study of efficiency of operation in all of its ramifications, and second, by the application of the prevailing prices of labor, materials, etc., for rational estimating and bidding. This procedure is capable of being extended to practically all sections and conditions.

The first work, begun in 1923, was largely limited to the study of ordinary grading with fresnoes and wheelers. In course of time it was found that fairly definite standards of performance could be established for each of the various operations under any given set of conditions. Experience has since shown that, by means of these standards, the efficiency at which any given outfit is operating can readily be determined, and the causes of low efficiency in operation can be pointed out and generally remedied. This has been repeatedly demonstrated in the field where outfits operating below the standards shown to be possible elsewhere under similar conditions, have increased their daily output as a result of our suggestions by from 10 to 50 per cent with little or no addition to their daily cost of operation.

These cost studies are therefore being extended so as to cover practically all the present general methods of earth moving, such as power scrapers, elevating graders and power shovels, together with their auxiliary equipment. Such studies and the application of the results in developing production are now in progress or have recently been under way in New York, Pennsylvania, Michigan, Missouri, Oklahoma and Texas, thus covering an area sufficient to prevent undue stress being placed on local conditions and making possible a more exact determination of the actual effect of local conditions and peculiarities.

Early last year similar studies were extended to concrete road construction with equally gratifying results. Standards of performance have been found for many of the operations and the performance limits of many types of equipment have been determined, as well as the effect of various methods of operation, their possibilities and limitations. Methods for the practical application of the results thus found toward increasing the output under varied operating conditions are now being developed in Michigan, Missouri, Oklahoma and Texas. In connection with this work further studies are also being carried on to determine the relative effect on standards of production of various auxiliary or associated equipments and methods, such as the effect on the unit cost of concrete pavement, of the use of light and heavy trucks, or industrial railways for hauling aggregates, and the various methods of handling such equipment and materials.

The unit cost studies relating to earth moving and concrete road construction will be continued during the remainder of this year and by next season the work will be extended so as to include several other types of surfacing as well as structures and rock work.

DIVISION OF HIGHWAY TRANSPORTATION AND ECONOMICS

State Highway Transport Surveys. - The first general purpose of the State highway transport surveys is to secure the traffic data necessary to establish a definite plan of highway improvement based on the present and expected future traffic significance of the various highways in the State. The second major purpose is to establish a classification of all the highways on the basis of their relative traffic importance. From this may be determined the order of improvement and the distribution of construction and maintenance funds over the system. The third major purpose has for its objective the selection of the most economical type of improvement for each highway.

Status of Highway Transportation Surveys Now in Progress. -

Pennsylvania -	90 per cent completed
Ohio -	75 per cent completed
Vermont -	5 per cent completed
New Hampshire -	5 per cent completed

Studies of the Effect of Highway Improvements on Rural Land Values. - A series of three investigations is being carried on to measure the net value of the various types of highway improvement per acre of rural land. The land evaluation report in Iowa is 95 per cent completed, and that for Wisconsin half finished.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

STATUS OF FEDERAL AID ROAD CONSTRUCTION FUNDS

AS OF AUGUST 31, 1926.

B.P.R. - F.A. - A - I
M - Aug. 1926 A

STATES	1 APPORTIONMENT FROM JULY 11, 1916 TO DATE	2 ALLOTTED TO PROJECTS (SEE COLUMN 6 FOR DETAILS)		3 PLACED UNDER CONSTRUCTION		4 PAID TO STATES	5 BALANCE OF APPORTIONMENTS		6 ALLOTMENTS TO PROJECTS (SUBDIVISION OF AMOUNTS SHOWN IN COLUMN 2)						STATES
							NOT ALLOTTED TO PROJECTS (COLUMN 1-2)	NOT YET PLACED UNDER CONSTRUCTION (COLUMN 1-3)	COMPLETED AND PAID		AGREEMENT STAGE		P.S.&E. STAGE RECOMMENDED BY DISTRICT ENGINEER		
		FEDERAL AID	MILES	FEDERAL AID	MILES				FEDERAL AID	MILES	FEDERAL AID	MILES	FEDERAL AID	MILES	
ALABAMA	$ 14,349,456.00	$ 11,237,864.62	1626.3	$ 11,084,287.26	1505.4	$ 10,131,341.16	$ 3,111,590.48	$ 3,265,167.75	$ 9,218,301.44	1374.0	$ 1,739,648.06	122.1	$ 274,315.03	29.2	ALABAMA
ARIZONA	9,617,243.00	7,030,545.30	837.5	6,980,319.31	826.3	6,311,164.81	2,585,703.70	2,636,929.69	6,035,777.09	756.5	972,337.49	80.7	22,430.72	0.3	ARIZONA
ARKANSAS	11,606,804.00	10,355,300.26	1719.6	9,911,468.32	1631.7	9,255,993.24	1,250,503.74	1,694,335.68	7,845,702.07	1349.7	2,090,591.26	283.7	419,006.94	86.2	ARKANSAS
CALIFORNIA	22,072,815.00	19,429,539.49	1403.1	19,013,301.60	1390.8	16,623,883.66	2,643,275.51	3,059,513.40	13,090,613.82	1060.5	5,438,757.55	211.6	900,168.12	42.0	CALIFORNIA
COLORADO	12,325,812.00	9,918,826.39	1018.3	9,642,482.05	983.2	8,270,687.53	2,406,985.61	2,683,329.95	7,363,403.53	753.2	1,889,147.72	209.1	675,275.14	56.0	COLORADO
CONNECTICUT	4,333,681.00	3,447,675.08	180.5	3,168,283.83	176.3	2,352,862.75	886,005.92	1,165,397.17	2,100,565.80	117.1	1,142,762.91	58.0	204,306.37	6.4	CONNECTICUT
DELAWARE	2,474,058.00	2,470,554.40	168.2	2,252,243.50	152.5	1,991,084.21	3,503.60	221,814.50	1,781,666.60	134.3	582,829.50	35.4	106,559.30	8.5	DELAWARE
FLORIDA	8,084,254.00	6,467,661.44	412.7	6,347,863.19	412.7	5,113,253.91	1,617,292.56	1,737,390.81	2,313,421.61	164.8	4,034,437.58	247.9	119,738.25		FLORIDA
GEORGIA	18,431,953.00	18,324,415.60	2479.3	17,967,844.43	2459.1	16,053,488.28	107,537.40	464,108.57	12,014,068.63	1833.4	5,345,203.48	525.6	765,143.49	20.1	GEORGIA
IDAHO	8,559,627.00	8,292,585.41	981.8	7,832,766.03	910.3	6,893,415.77	267,041.59	726,860.97	6,032,011.03	732.5	1,291,235.49	151.4	969,338.29	97.9	IDAHO
ILLINOIS	29,832,198.00	25,531,294.31	1739.1	25,228,415.28	1709.1	22,758,187.46	4,300,903.69	4,603,782.72	21,600,456.40	1445.6	1,547,178.62	108.0	2,363,159.29	176.3	ILLINOIS
INDIANA	18,204,355.00	17,392,849.66	1094.9	17,262,340.82	1087.7	13,784,557.69	811,455.34	942,014.18	8,963,188.14	882.1	6,795,475.92	390.8	1,634,235.60	182.0	INDIANA
IOWA	19,485,563.00	19,177,489.62	2392.5	17,850,822.30	2873.6	14,024,621.59	308,074.38	1,634,740.70	12,113,109.15	2140.4	5,642,986.68	756.8	1,421,392.79	95.3	IOWA
KANSAS	19,464,411.00	18,626,991.05	2011.6	17,617,071.82	1867.1	14,985,875.08	837,419.95	1,847,339.18	12,792,893.32	1200.2	4,403,141.83	621.5	1,430,955.90	189.9	KANSAS
KENTUCKY	13,212,809.00	12,097,518.13	1124.6	11,817,772.51	1101.0	10,143,371.30	1,115,290.87	1,395,036.49	8,598,469.08	764.6	2,601,058.37	277.4	897,390.68	82.6	KENTUCKY
LOUISIANA	9,272,408.00	8,461,422.67	1264.5	7,842,307.73	1217.2	7,146,989.16	810,985.33	1,430,100.27	6,144,739.93	1055.2	1,803,147.51	163.1	513,535.17	45.5	LOUISIANA
MAINE	6,464,828.00	5,657,724.61	421.1	5,047,356.63	370.9	4,568,682.71	807,103.39	1,417,471.37	4,182,507.39	303.6	1,374,638.93	103.9	90,518.29	7.5	MAINE
MARYLAND	5,925,057.00	5,925,055.51	511.8	5,365,634.65	454.1	5,146,096.37	1.49	559,422.35	5,112,991.22	423.3	455,453.91	43.2	356,661.08	39.3	MARYLAND
MASSACHUSETTS	10,108,726.00	8,276,521.49	459.8	7,964,592.94	440.8	6,810,838.67	1,832,204.51	2,144,133.06	6,679,370.67	374.7	1,164,629.79	55.0	431,321.03	26.1	MASSACHUSETTS
MICHIGAN	20,342,365.00	17,788,940.70	1318.3	17,348,702.51	1294.7	15,209,163.88	2,553,424.30	2,993,662.49	12,915,769.34	976.6	4,532,649.68	250.5	1,340,521.68	91.2	MICHIGAN
MINNESOTA	19,591,780.00	19,446,975.63	3789.2	19,410,975.63	3773.1	17,682,650.91	144,804.37	180,804.37	16,407,875.63	3385.9	2,547,600.00	398.1	491,500.00	5.2	MINNESOTA
MISSISSIPPI	12,128,016.00	11,702,612.42	1593.9	11,109,897.50	1544.8	9,408,551.59	425,405.58	1,018,120.50	7,702,565.66	1165.8	2,961,136.42	316.6	1,032,850.34	111.5	MISSISSIPPI
MISSOURI	22,760,436.00	22,431,667.16	2136.0	22,229,550.75	2117.5	17,824,849.35	354,778.84	556,885.25	14,939,082.21	1622.0	6,641,323.30	466.3	791,251.65	46.7	MISSOURI
MONTANA	13,424,885.00	8,904,620.44	1369.7	8,324,189.46	1247.5	7,095,499.66	4,520,264.56	5,100,695.54	6,469,418.28	1086.8	2,372,888.14	259.8	115,814.02	13.1	MONTANA
NEBRASKA	14,635,235.00	12,735,531.60	3329.6	12,324,961.51	3208.4	9,375,214.73	1,899,703.40	2,310,273.49	5,680,413.06	1610.5	6,219,502.07	1302.0	835,616.47	217.1	NEBRASKA
NEVADA	8,795,215.00	8,124,611.78	927.3	8,086,018.87	927.9	7,598,123.15	670,603.22	707,196.13	6,193,703.38	653.8	1,699,287.54	231.3	231,620.86	42.8	NEVADA
NEW HAMPSHIRE	3,169,492.00	3,006,328.70	277.0	2,979,235.77	276.9	2,493,263.44	161,163.30	190,256.23	2,377,450.07	237.6	475,258.74	31.6	155,612.89	7.8	NEW HAMPSHIRE
NEW JERSEY	8,467,420.00	8,215,103.81	360.5	7,925,314.64	342.4	6,774,686.41	252,316.19	542,105.36	5,161,827.97	294.3	2,534,121.67	32.8	519,154.17	33.4	NEW JERSEY
NEW MEXICO	10,972,366.00	8,994,257.33	1606.0	8,580,942.34	1550.0	7,674,860.93	1,976,128.67	2,391,443.66	7,339,657.38	1427.0	884,732.78	104.5	763,867.17	74.5	NEW MEXICO
NEW YORK	34,045,195.00	29,935,308.57	1954.2	28,035,308.57	1836.2	21,856,645.17	4,109,886.43	6,009,886.43	16,588,353.37	1239.0	10,699,405.20	674.5	647,550.00	40.7	NEW YORK
NORTH CAROLINA	15,717,206.00	15,315,270.31	1504.3	14,859,081.21	1463.8	13,497,176.52	401,935.69	858,124.79	12,590,929.71	1331.2	1,804,683.85	101.0	920,350.76	72.1	NORTH CAROLINA
NORTH DAKOTA	10,748,659.00	10,746,880.09	3372.6	10,159,214.46	3194.4	7,209,452.73	1,778.91	589,444.54	6,114,757.46	2215.3	3,344,545.28	810.4	1,287,577.35	346.9	NORTH DAKOTA
OHIO	25,731,796.00	23,688,174.61	1854.7	22,509,292.48	1758.6	19,701,646.27	2,043,621.39	3,222,503.52	17,836,638.90	1404.8	3,875,897.19	305.9	1,975,638.52	144.0	OHIO
OKLAHOMA	16,059,787.00	15,194,354.54	1397.0	14,587,599.87	1300.3	13,927,135.08	865,432.46	1,472,187.13	13,370,293.27	1198.5	1,092,606.81	119.8	729,454.46	78.7	OKLAHOMA
OREGON	10,879,347.00	10,708,035.24	1087.7	10,564,654.03	1074.4	9,596,113.31	171,311.76	314,692.97	8,794,514.41	961.2	1,759,912.10	113.3	153,608.73	13.2	OREGON
PENNSYLVANIA	31,336,781.00	30,003,817.58	1786.5	29,272,604.57	1738.9	26,178,518.18	1,334,963.42	2,066,176.43	21,560,732.04	1188.8	7,778,957.43	560.6	664,128.05	37.1	PENNSYLVANIA
RHODE ISLAND	2,667,569.00	2,187,179.06	128.5	1,986,984.06	116.1	1,645,004.06	480,389.94	681,584.94	1,645,004.06	92.4	465,345.00	31.0	76,830.00	5.1	RHODE ISLAND
SOUTH CAROLINA	9,801,524.00	9,791,731.94	1744.3	9,740,810.36	1724.4	8,504,064.74	9,792.06	60,713.64	7,014,111.21	1520.0	2,563,037.77	202.0	214,582.96	22.3	SOUTH CAROLINA
SOUTH DAKOTA	11,166,790.00	10,996,678.02	2998.6	10,683,633.83	2839.0	9,597,434.23	170,111.98	483,256.17	8,746,697.98	2269.9	1,904,899.88	634.4	345,080.16	104.3	SOUTH DAKOTA
TENNESSEE	15,280,591.00	14,585,693.07	1053.0	14,256,915.90	1034.0	12,567,941.99	694,897.93	1,023,67[illegible].10	10,304,567.62	780.9	3,721,638.41	247.5	559,587.04	24.6	TENNESSEE
TEXAS	40,606,431.00	37,022,033.01	5894.2	35,891,996.09	5832.7	31,881,736.81	3,584,397.99	4,714,434.31	27,709,220.19	4368.6	7,564,561.68	851.1	1,748,251.14	74.6	TEXAS
UTAH	7,818,779.00	7,140,587.06	767.1	6,482,044.41	713.6	6,113,843.92	678,191.94	1,336,734.59	5,151,726.56	565.6	1,369,513.35	163.5	619,348.16	48.1	UTAH
VERMONT	3,268,507.00	2,844,028.06	174.3	2,830,123.05	173.5	2,238,799.22	424,478.94	438,383.95	2,017,699.61	134.6	745,011.63	36.2	81,316.92	3.6	VERMONT
VIRGINIA	13,501,514.00	13,443,010.06	1209.4	13,374,837.86	1205.8	12,095,462.71	58,503.94	126,676.14	10,623,856.72	1020.4	2,618,944.09	171.8	200,209.25	17.2	VIRGINIA
WASHINGTON	10,145,776.00	9,889,161.95	760.1	9,515,151.96	716.4	8,517,710.98	256,624.05	630,624.06	7,884,551.96	672.9	2,003,600.00	87.2	1,000.00		WASHINGTON
WEST VIRGINIA	7,352,611.00	6,914,140.86	592.9	6,204,448.73	530.1	6,509,676.09	438,370.14	1,148,062.27	4,334,759.06	405.4	1,941,427.85	133.7	637,953.95	63.8	WEST VIRGINIA
WISCONSIN	17,438,815.00	14,710,557.06	2002.8	14,371,316.06	1977.6	11,323,475.52	2,728,257.84	3,067,498.94	10,443,370.44	1601.4	2,685,097.19	246.8	1,582,089.43	154.6	WISCONSIN
WYOMING	8,566,274.00	8,139,144.39	1419.5	8,064,984.58	1395.8	7,329,273.91	427,129.61	611,289.42	6,259,076.06	1181.4	1,500,882.02	173.2	379,186.32	64.9	WYOMING
HAWAII	1,100,153.00	312,635.18	16.9	312,635.18	15.9	83,516.16	787,617.82	787,517.82			312,635.18	16.9			HAWAII
TOTALS	$ 671,375,000.00	$613,042,934.17	70751.9	$592,221,520.42	68552.8	$513,039,892.10	$ 68,332,066.83	$ 79,153,479.58	$439,339,403.06	53967.9	$141,474,817.19	13714.7	$ 32,228,713.92	3079.3	TOTALS

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
Division of Control.

GASOLINE TAX RATES, BY STATES
As of August 1, 1926

Tax Rate Per Gallon and Dates Rate Shown Was Effective.

5 cents (2 States)

3/23/25	South Carolina
2/21/26	Kentucky

4-1/2 cents (1 State)

3/10/26	Virginia

4 cents (5 States)

1/1/24	Arkansas
6/6/25	Florida
4/1/26	Mississippi
2/21/25	North Carolina
4/1/25	Nevada

3-1/2 cents (3 States)

8/26/25	Georgia
4/1/25	Utah
7/1/25	West Virginia

3 cents (9 States)

6/9/23	Arizona
3/1/25	Idaho
4/1/25	Indiana
7/11/25	Maine
3/17/25	New Mexico
3/23/25	Oklahoma
5/24/23	Oregon
3/10/25	South Dakota
2/9/25	Tennessee

2-1/2 cents (1 State)

4/1/25	Wyoming

2 cents (21 States & D. C.)

3/1/23	Alabama
9/30/23	California
7/30/23	Colorado
7/1/25	Connecticut
1/1/24	Delaware
5/23/24	District of Columbia
4/16/25	Iowa
5/1/25	Kansas
8/1/24	Louisiana
1/1/24	Maryland
1/29/25	Michigan
5/1/25	Minnesota
1/1/25	Missouri
4/1/23	Montana
4/1/25	Nebraska
1/1/24	New Hampshire
7/30/26	North Dakota
4/18/25	Ohio
7/1/23	Pennsylvania
2/26/25	Vermont
4/1/25	Wisconsin
1/1/24	Washington

1 cent (2 States)

5/30/25	Rhode Island
6/14/23	Texas

No tax (4 States)

-	Illinois
-	Massachusetts
-	New Jersey
-	New York.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

G-1/2 (1ST HALF, 1926)
R. 6. A.

GASOLINE TAXES FOR FIRST HALF YEAR, 1926

TOTAL TAXES EARNED ON MOTOR VEHICLE FUEL, REFUNDS ON GROSS TAX, DISPOSITION OF FUND, RATES, AND GALLONS OF GASOLINE CONSUMED BY MOTOR VEHICLES TAXED

STATES AND DISTRICT OF COLUMBIA	GROSS TAX ASSESSED, PRIOR TO DEDUCTION OF REFUNDS	EXEMPTION REFUNDS: (DEDUCT FROM GROSS TAX)	TOTAL TAX EARNINGS ON FUEL FOR MOTOR VEHICLES	DISPOSITION OF TOTAL TAX EARNINGS					TAX RATES, 1926			NET GALLONS OF GASOLINE TAXED, AND USED BY MOTOR VEHICLES	ESTIMATED ADDITIONAL GALLONS (NOT TAXED) USED BY MOTOR VEHICLES	STATES AND DISTRICT OF COLUMBIA
				COLLECTION COSTS	CONSTRUCTION & MAINTENANCE ON RURAL ROADS		STATE AND COUNTY ROAD BOND PAYMENTS	FOR MISCELLANEOUS PURPOSES	CENTS PER GALLON		DATE OF RATE CHANGE			
					STATE HIGHWAYS	LOCAL ROADS			JAN 1ST	JUNE 30TH				
ALABAMA	$1,175,152	-	$ 1,175,152	$ 4,940	-	$ 1,170,212	-	-	2	2	-	58,757,602	-	ALABAMA
ARIZONA	563,377	$ 107,043	456,334	-	$ 228,167	228,167	-	-	3	3	-	15,211,118	-	ARIZONA
ARKANSAS	1,963,280	102,000	1,861,280	-	961,280	386,656	$(1) 513,344	-	4	4	-	46,532,011	-	ARKANSAS
CALIFORNIA	8,076,701	663,077	7,413,624	-	3,706,812	3,706,812	-	-	2	2	-	370,681,200	-	CALIFORNIA
COLORADO	983,210	61,783	921,426	1,200	460,113	460,113	-	-	2	2	-	46,071,315	-	COLORADO
CONNECTICUT	1,150,617	10,184	1,140,433	-	1,140,433	-	-	-	2	2	-	57,021,628	-	CONNECTICUT
DELAWARE	177,186	3,972	173,214	-	173,214	-	-	-	2	2	-	8,660,708	-	DELAWARE
FLORIDA	6,197,421	-	6,197,421	3,000	4,645,816	1,548,605	-	-	4	4	-	154,935,544	-	FLORIDA
GEORGIA	2,559,217	-	2,559,217	2,100	1,095,907	730,605	-	$ 2/ 730,605	3½	3½	-	73,120,469	-	GEORGIA
IDAHO	494,835	17,712	477,123	3,218	473,905	-	-	-	3	3	-	15,904,104	-	IDAHO
ILLINOIS	-	-	-	-	-	-	-	-	0	0	No tax	-	255,625,000	ILLINOIS
INDIANA	4,117,320	95,056	4,022,264	4,947	2,678,211	1,339,106	-	-	3	3	-	134,972,117	-	INDIANA
IOWA	2,262,756	69,122	2,193,634	4,956	729,559	1,459,119	-	-	2	2	-	109,681,700	-	IOWA
KANSAS	1,929,712	90,000	1,839,712	-	1,591,770	247,942	-	-	2	2	-	91,985,662	-	KANSAS
KENTUCKY	2,448,809	-	2,448,809	-	2,448,809	-	-	-	3	5	2/21	58,881,817	-	KENTUCKY
LOUISIANA	1,253,859	-	1,253,859	7,500	1,246,359	-	-	-	2	2	-	62,692,962*	-	LOUISIANA
MAINE	574,551	12,760	561,791	4,583	557,208	-	-	-	3	3	-	18,513,723	-	MAINE
MARYLAND	1,042,986	23,598	1,019,388	1,250	814,510	-	-	3/ 203,628	2	2	-	50,969,390	-	MARYLAND
MASSACHUSETTS	-	-	-	-	-	-	-	-	0	0	No tax	-	133,400,000	MASSACHUSETTS
MICHIGAN	4,671,968	298,370	4,373,598	14,192	1,859,406	1,000,000	4/ 1,500,000	-	2	2	-	218,679,899	-	MICHIGAN
MINNESOTA	2,230,123	81,783	2,148,340	-	2,148,340	-	-	-	2	2	-	107,416,991	-	MINNESOTA
MISSISSIPPI	1,722,707	-	1,722,707	1,200	817,995	796,066	-	5/ 107,446	3	4	4/1	47,484,450	-	MISSISSIPPI
MISSOURI	2,610,641	49,030	2,561,611	20,018	2,541,593	-	-	-	2	2	-	128,080,515	-	MISSOURI
MONTANA	388,946	-	388,946	-	58,342	213,920	-	6/ 116,684	2	2	-	19,447,306	-	MONTANA
NEBRASKA	1,407,808	4,867	1,402,941	5,401	1,397,540	-	-	-	2	2	-	70,147,059	-	NEBRASKA
NEVADA	186,477	12,758	173,719	-	86,860	86,859	-	-	4	4	-	4,343,102	-	NEVADA
NEW HAMPSHIRE	269,661	5,717	263,944	-	263,944	-	-	-	2	2	-	13,204,529	-	NEW HAMPSHIRE
NEW JERSEY	-	-	-	-	-	-	-	-	0	0	No tax	-	123,675,000	NEW JERSEY
NEW MEXICO	332,536	-	332,536	12,739	319,797	-	-	-	3	3	-	11,084,525	-	NEW MEXICO
NEW YORK	-	-	-	-	-	-	-	-	0	0	No tax	-	343,750,000	NEW YORK
NORTH CAROLINA	3,726,274	127,862	3,598,412	7/ 15,000	7/ 1,242,343	-	7/ 2,216,069	8/ 125,000	4	4	-	89,960,308	-	NORTH CAROLINA
NORTH DAKOTA	344,233	4,726	339,507	-	339,507	-	-	-	1	1	9/	33,950,724	-	NORTH DAKOTA
OHIO	6,093,598	125,366	5,968,232	-	2,685,704	1,492,058	-	10/1,790,470	2	2	-	298,411,597	-	OHIO
OKLAHOMA	2,786,932	11,917	2,775,015	-	1,850,010	925,005	-	-	3	3	-	95,770,850	-	OKLAHOMA
OREGON	1,557,957	91,753	1,466,204	3,613	462,591	-	11/1,000,000	-	3	3	-	52,248,946	-	OREGON
PENNSYLVANIA	5,252,410	-	5,252,410	-	3,501,607	1,750,803	-	-	2	2	-	262,620,510	-	PENNSYLVANIA
RHODE ISLAND	275,011	50,318	224,693	-	224,693	-	-	-	1	1	-	22,469,267	-	RHODE ISLAND
SOUTH CAROLINA	2,459,591	5,558	2,454,033	-	1,472,420	981,613	-	-	5	5	-	49,080,663	-	SOUTH CAROLINA
SOUTH DAKOTA	1,018,663	170,000	848,663	6,520	842,143	-	-	-	3	3	-	28,288,762	-	SOUTH DAKOTA
TENNESSEE	1,700,601	-	1,700,601	16,838	1,683,763	-	-	-	3	3	-	56,686,673	-	TENNESSEE
TEXAS	2,356,421	629	2,355,792	-	1,766,844	-	-	12/ 588,948	1	1	-	235,642,173	-	TEXAS
UTAH	568,724	-	568,724	1,875	416,849	-	13/ 150,000	-	3½	3½	-	16,247,411	-	UTAH
VERMONT	179,468	-	179,468	-	179,468	-	-	-	2	2	-	8,973,379	-	VERMONT
VIRGINIA	2,572,744	126,101	2,446,643	14/ 697	1,630,631	815,315	-	-	3	4½	3/10	60,037,374	-	VIRGINIA
WASHINGTON	1,688,731	93,429	1,595,302	-	1,595,302	-	-	-	2	2	-	79,765,053	-	WASHINGTON
WEST VIRGINIA	1,222,799	28,777	1,194,022	7,500	236,522	-	13/ 950,000	-	3½	3½	-	34,114,914	-	WEST VIRGINIA
WISCONSIN	2,224,503	34,924	2,189,579	5,000	2,184,579	-	-	-	2	2	-	109,478,930	-	WISCONSIN
WYOMING	221,194	361	220,833	22	220,811	-	-	-	2½	2½	-	8,847,759	-	WYOMING
DIST. OF COL.	480,243	2,026	478,217	-	-	-	-	15/ 478,217	2	2	-	23,910,847	-	DIST. OF COL.
TOTALS	———	———	$84,939,373	$148,309	$54,981,677	$19,338,976	$6,329,413	$4,140,998	AVER.	2.39	-	3,560,987,586	856,450,000	TOTALS

REMARKS: TOTAL TAX EARNINGS ON FUEL FOR MOTOR VEHICLES (IN THIRD COLUMN) REPRESENT THE ACTUAL TAXES AVAILABLE FOR DISPOSAL. THE FIRST TWO COLUMNS SHOW THE PROCEDURE FOR OBTAINING TOTAL TAX, AND BEING OF MINOR IMPORTANCE ARE NOT TOTALED. COLLECTION COSTS IN MANY STATES ARE PAID FROM OTHER STATE FUNDS.

NOTES: 1/ FOR PAYMENTS ON DISTRICT ROAD IMPROVEMENT BONDS. 2/ FOR STATE GENERAL FUNDS: PARTLY ASSIGNED TO PAY DISCOUNTS ON WESTERN AND ATLANTIC RAILROAD RENTALS. 3/ FOR MAINTENANCE OF BALTIMORE STREETS. 4/ FOR PAYMENTS ON COUNTY BONDS ASSUMED AS OBLIGATIONS BY STATE. 5/ FOR HARRISON COUNTY SEA-WALL TO PROTECT STATE HIGHWAY, INCLUDES SPECIAL COUNTY 2-CENT GASOLINE TAX LEVY OF $45,257. 6/ FOR STATE GENERAL FUND. 7/ ESTIMATED. 8/ FOR STATE HIGHWAY COMMISSION ADMINISTRATION EXPENSES. 9/ TAX RATE CHANGED FROM 1 TO 2 CENTS ON JULY 30TH. 10/ FOR MAINTENANCE OF MUNICIPAL STREETS. 11/ ESTIMATED AMOUNT ASSIGNED FOR PAYMENT OF INTEREST AND RETIREMENTS ON STATE HIGHWAY BONDS. 12/ FOR FREE SCHOOL FUND. 13/ FOR PAYMENTS ON STATE HIGHWAY BONDS. 14/ FEBRUARY COLLECTION COST ONLY, AFTER MARCH 1 COLLECTION COST TAKEN FROM STATE REVENUES. 15/ FOR USE ON WASHINGTON STREETS.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

G-2 (1925)
R. S. A.

TOTAL GASOLINE TAX EARNINGS, 1919-1925

ALSO SHOWING TAX RATES PER GALLON, AND DATES TAX (OR NEW RATES) BECAME EFFECTIVE

(1ST YEAR OF GAS TAX)

CALENDAR YEARS.

STATES, AND DISTRICT OF COLUMBIA	1919			1920			1921			1922			1923			1924			1925			1919-1925	1926		STATES, AND DISTRICT OF COLUMBIA
	DATE TAX BEGAN	RATE IN CENTS	TOTAL TAX EARNED	DATE NEW RATE	RATE IN CENTS	TOTAL TAX EARNED	DATE NEW RATE	RATE IN CENTS	TOTAL TAX EARNED	DATE NEW RATE	RATE IN CENTS	TOTAL TAX EARNED	DATE NEW RATE	RATE IN CENTS	TOTAL TAX EARNED	DATE NEW RATE	RATE IN CENTS	TOTAL TAX EARNED	DATE NEW RATE	RATE IN CENTS	TOTAL TAX EARNED	ACCUMULATED TOTAL TAXES	DATE NEW RATE	RATE IN CENTS	
ALABAMA													3/1	2	$ 754,129	-	2	$ 1,738,661	-	2	$ 2,140,802	$ 4,633,592			ALABAMA
ARIZONA							6/9	1	$ 37,928	-	1	$ 174,606	6/9	1-3	422,673	-	3	730,846	-	3	855,951	2,272,004			ARIZONA
ARKANSAS 1/							4/1	1	104,289	-	1	218,205	4/1	1-3	1,149,555	1/1	4	2,283,491	-	4	2,950,360	6,705,900			ARKANSAS
CALIFORNIA													9/30	2	3,018,366	-	2	13,413,542	-	2	14,956,789	31,388,697			CALIFORNIA
COLORADO 2/	4/9	1	$ 294,573	-	1	$ 458,395	-	1	644,912	-	1	693,372	7/30	1-2	1,075,739	-	2	1,843,023	-	2	1,935,329	6,945,343			COLORADO
CONNECTICUT							9/1	1	222,784	-	1	734,049	-	1	880,416	-	1	1,072,433	7/1	1-2	1,908,809	4,818,490			CONNECTICUT
DELAWARE													9/22	1	105,233	1/1	2	317,925	-	2	349,950	773,108			DELAWARE
FLORIDA							6/20	1	279,995	-	1	635,671	7/1	1-3	1,846,217	-	3	3,769,367	6/6	3-4	7,667,713	14,199,423			FLORIDA
GEORGIA							3/10	1	302,507	-	1	763,827	10/1	1-3	1,544,020	-	3	3,661,652	3/26	3-3½	4,418,824	10,682,860			GEORGIA
IDAHO													4/1	2	396,487	-	2	646,347	3/1	2-3	895,443	1,837,277			IDAHO
ILLINOIS																			-	0	-	-	(NO TAX)		ILLINOIS
INDIANA													6/1	2	2,832,788	-	2	4,838,307	4/1	2-3	7,653,049	15,374,145			INDIANA
IOWA																			4/16	0-2	3,505,115	3,505,115			IOWA
KANSAS																			5/1	0-2	2,905,194	2,905,194			KANSAS
KENTUCKY				6/21	1	168,353	-	1	441,052	-	1	521,036	-	1	580,235	6/19	1-3	1,840,513	-	3	3,041,560	6,692,749	2/21	3-5	KENTUCKY
LOUISIANA							12/9	1	41,373	-	1	566,037	-	1	766,752	8/1	1-2	1,455,986	-	2	2,339,543	5,169,690			LOUISIANA
MAINE													7/7	1	236,019	-	1	521,673	7/11	1-3	1,268,348	2,076,040			MAINE
MARYLAND										6/1	1	395,548	-	1	737,896	1/1	2	1,641,994	-	2	2,003,632	4,779,068			MARYLAND
MASSACHUSETTS																			-	0	-	-	(NO TAX)		MASSACHUSETTS
MICHIGAN																			1/29	0-2	8,236,078	8,236,078			MICHIGAN
MINNESOTA																			5/1	0-2	3,863,940	3,863,940			MINNESOTA
MISSISSIPPI										3/25	1	298,543	-	1	492,837	5/9	1-3	1,535,068	-	3	2,494,274	4,870,712	4/1	3-4	MISSISSIPPI
MISSOURI																			1/1	2	4,159,115	4,159,115			MISSOURI
MONTANA							3/5	1	173,168	-	1	247,907	4/1	1-2	529,784	-	2	812,067	-	2	2/ 688,070	2,301,976			MONTANA
NEBRASKA																			4/1	0-2	2,193,302	2,193,302			NEBRASKA
NEVADA													3/20	2	116,840	-	2	154,263	4/1	2-4	318,705	588,808			NEVADA
NEW HAMPSHIRE													7/1	1	192,743	1/1	2	614,226	-	2	707,072	1,504,046			NEW HAMPSHIRE
NEW JERSEY																			-	0	-	-	(NO TAX)		NEW JERSEY
NEW MEXICO	3/17	2	86,139	-	2	114,852	3/12	2-1	136,009	-	1	158,159	-	1	158,972	-	1	187,099	3/17	1-3	3/ 526,908	1,368,139			NEW MEXICO
NEW YORK																			-	0	-	-	(NO TAX)		NEW YORK
NORTH CAROLINA							3/3	1	506,018	-	1	808,035	4/1	1-3	3,036,981	-	3	4,904,768	2/21	3-4	6,032,378	15,088,230			NORTH CAROLINA
NORTH DAKOTA	3/6	1/4	351,006	-	1/4	178,927	-	1/4	148,705	-	1/4	158,300	3/8	1	401,063	-	1	504,020	-	1	649,416	2,389,937	7/30	1-2	NORTH DAKOTA
OHIO																			4/18	0-2	9,009,950	9,009,950			OHIO
OKLAHOMA													7/1	1	599,000	3/8	1-2½	3,164,701	3/23	2½-3	5,143,517	8,907,218			OKLAHOMA
OREGON	2/25	1	230,796	-	1	443,375	3/1	1-2	983,247	-	2	1,147,556	5/24	2-3	1,882,013	-	3	2,570,654	-	3	2,909,095	10,241,736			OREGON
PENNSYLVANIA							9/1	1	835,323	-	1	3,111,670	7/1	1-2	4/ 5,254,336	-	2	4/ 9,039,540	-	2	4/ 10,501,547	28,782,916			PENNSYLVANIA
RHODE ISLAND																			5/30	0-1	318,357	318,357			RHODE ISLAND
SOUTH CAROLINA										3/1	2	767,712	3/23	2-3	1,600,611	-	3	2,224,212	3/23	3-5	3,865,403	8,457,938			SOUTH CAROLINA
SOUTH DAKOTA										1/1	1	369,702	7/1	1-2	624,592	-	2	1,144,042	3/10	2-3	1,847,698	3,984,934			SOUTH DAKOTA
TENNESSEE													4/1	2	1,227,655	-	2	1,312,235	2/8	2-3	3,407,886	6,447,776			TENNESSEE
TEXAS													6/14	1	1,682,567	-	1	3,776,715	-	1	4,641,784	10,101,066			TEXAS
UTAH													3/8	2½	492,467	-	2½	704,586	4/1	2½-3½	2/ 1,063,594	2,260,647			UTAH
VERMONT													4/1	1	176,883	-	1	232,966	2/26	1-2	502,272	912,121			VERMONT
VIRGINIA													6/27	3	1,536,679	-	3	3,197,525	-	3	3,701,951	8,436,155	3/10	3-4½	VIRGINIA
WASHINGTON 2/							7/1	1	471,841	-	1	953,606	-	1	1,225,945	1/1	2	2,720,875	-	2	3,073,654	8,445,921			WASHINGTON
WEST VIRGINIA													7/27	2	538,880	-	2	1,277,102	7/1	2-3½	2,186,759	4,002,721			WEST VIRGINIA
WISCONSIN																			4/1	0-2	4,031,676	4,031,676			WISCONSIN
WYOMING													4/1	1	148,479	-	1	202,624	4/1	1-2½	456,297	808,400			WYOMING
DIST. OF COL.																6/23	2	485,728	-	2	889,598	1,375,326			DIST. OF COL.
GRAND TOTALS	4 STATES		$1,022,514	5 STATES		$1,363,902	15 STATES		$5,382,111	19 STATES		$12,703,088	35 STATES		$38,566,339	35 STATES & D. C.		$80,422,295	44 STATES & D.C.		$148,258,087	$287,738,335			GRAND TOTALS

REMARKS: ABOVE FIGURES, IN SOME INSTANCES, DO NOT AGREE WITH PREVIOUSLY PUBLISHED DATA OWING TO LATER REVISIONS, TO EXCLUSION OF CERTAIN AMOUNTS AS NOTED, AND ALSO THAT TAX EARNED (OR ASSESSED) ON ACTUAL GASOLINE SOLD DURING THE YEAR IS SHOWN, AFTER DEDUCTING REFUNDS, AND NOT THE TAX COLLECTED IN THE CALENDAR YEAR WHICH LAGS A MONTH OR TWO AFTER THE TAX IS LEVIED.

NOTES: (1) MOTOR OIL TAX EXCLUDED. (2) REVISED DATA. (3) DEALER'S LICENSE FEES EXCLUDED. (4) DELINQUENT 1 CENT TAXES OF FORMER YEARS EXCLUDED IN 1923, 1924 AND 1925 DATA, BUT ADDED TO 1922 TAX.