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U. S. DEPARTMENT OF AGRICULTURE

# THE NEWS LETTER

OF THE  
BUREAU OF PUBLIC ROADS

VOL. 4, NO. 8 TO 11

JUNE TO SEPTEMBER, 1929

A. C. ROSE, EDITOR

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DISCUSSION OF SUGGESTED SPECIFICATIONS  
FOR "DESIGNED-MIX" CONCRETE FOR PAVEMENTS

PREPARED BY  
F. H. JACKSON, OF THE DIVISION OF TESTS  
(NOT FOR RELEASE)

THE ACCOMPANYING SPECIFICATION HAS BEEN PREPARED BY THE DIVISION OF TESTS IN AN ENDEAVOR TO PROVIDE A METHOD OF UTILIZING IN ACTUAL PRACTICE THE VARIOUS PRINCIPLES GOVERNING THE DESIGN OF CONCRETE PAVING MIXTURES WHICH HAVE BEEN ESTABLISHED AS THE RESULT OF RESEARCH IN THE BUREAU'S LABORATORIES AND ELSEWHERE.

THESE GOVERNING PRINCIPLES MAY BE STATED BRIEFLY AS FOLLOWS:

1.- THAT FLEXURAL STRENGTH IS THE MOST IMPORTANT STRENGTH CHARACTERISTIC OF PAVEMENT CONCRETE AND THAT A CONCRETE PAVING MIXTURE SHOULD THEREFORE BE DESIGNED TO MEET A DEFINITE FLEXURAL STRENGTH REQUIREMENT RATHER THAN A DEFINITE CRUSHING STRENGTH REQUIREMENT.

2.- THAT SO MANY FACTORS AFFECT THE FLEXURAL STRENGTH OF CONCRETE THAT THE STRENGTH WHICH WILL BE OBTAINED BY THE USE OF ANY GIVEN COMBINATION OF MATERIALS CAN NOT BE DETERMINED BY ANY SO-CALLED CALCULATION METHOD, SUCH AS THE FINENESS-MODULUS METHOD, BUT MUST BE DETERMINED BY ACTUAL TRIAL IN THE LABORATORY.

3.- THAT, FOR ANY GIVEN COMBINATION OF MATERIALS, THE FLEXURAL AS WELL AS THE CRUSHING STRENGTH OF CONCRETE IS GOVERNED BY THE RATIO OF WATER TO CEMENT IN THE MIX, SUBSTANTIALLY IN ACCORDANCE WITH THE WATER-CEMENT-RATIO LAW, THIS FACT MAKES IT POSSIBLE TO DESIGN CONCRETE PAVING MIXTURES BY THE SO-CALLED "WATER-CEMENT-RATIO TRIAL-METHOD" AS DESCRIBED IN PUBLIC ROADS FOR AUGUST, 1928.

EXPLANATION OF PROPOSED SPECIFICATION

THE USE OF THIS TYPE OF SPECIFICATION PRESUPPOSES THAT THE DEPARTMENT WILL HAVE AVAILABLE FOR THE USE OF PROSPECTIVE BIDDERS THE PROPORTIONS BY WEIGHT AS WELL AS THE GRADING REQUIREMENTS FOR EACH COMBINATION OF AGGREGATES COMMERCIALY AVAILABLE FOR THE JOB UNDER CONSIDERATION. BY "COMMERCIALY" AVAILABLE IS MEANT THOSE SOURCES OF SUPPLY WITHIN A PRACTICAL SHIPPING RADIUS. THIS MAY AT FIRST THOUGHT APPEAR IMPRACTICAL DUE TO THE LARGE NUMBER OF TESTS INVOLVED. IT SHOULD BE POSSIBLE, HOWEVER, FOR ANY STATE DESIRING TO USE THIS TYPE OF SPECIFICATION TO DETERMINE IN ADVANCE THE PROPER PROPORTIONS FOR EACH OF THE REGULAR COMMERCIAL SOURCES OF SUPPLY AVAILABLE. SUCH TESTS ONCE MADE WOULD NOT HAVE TO BE REPEATED EVERY TIME A GIVEN COMBINATION OF MATERIALS WAS USED BUT



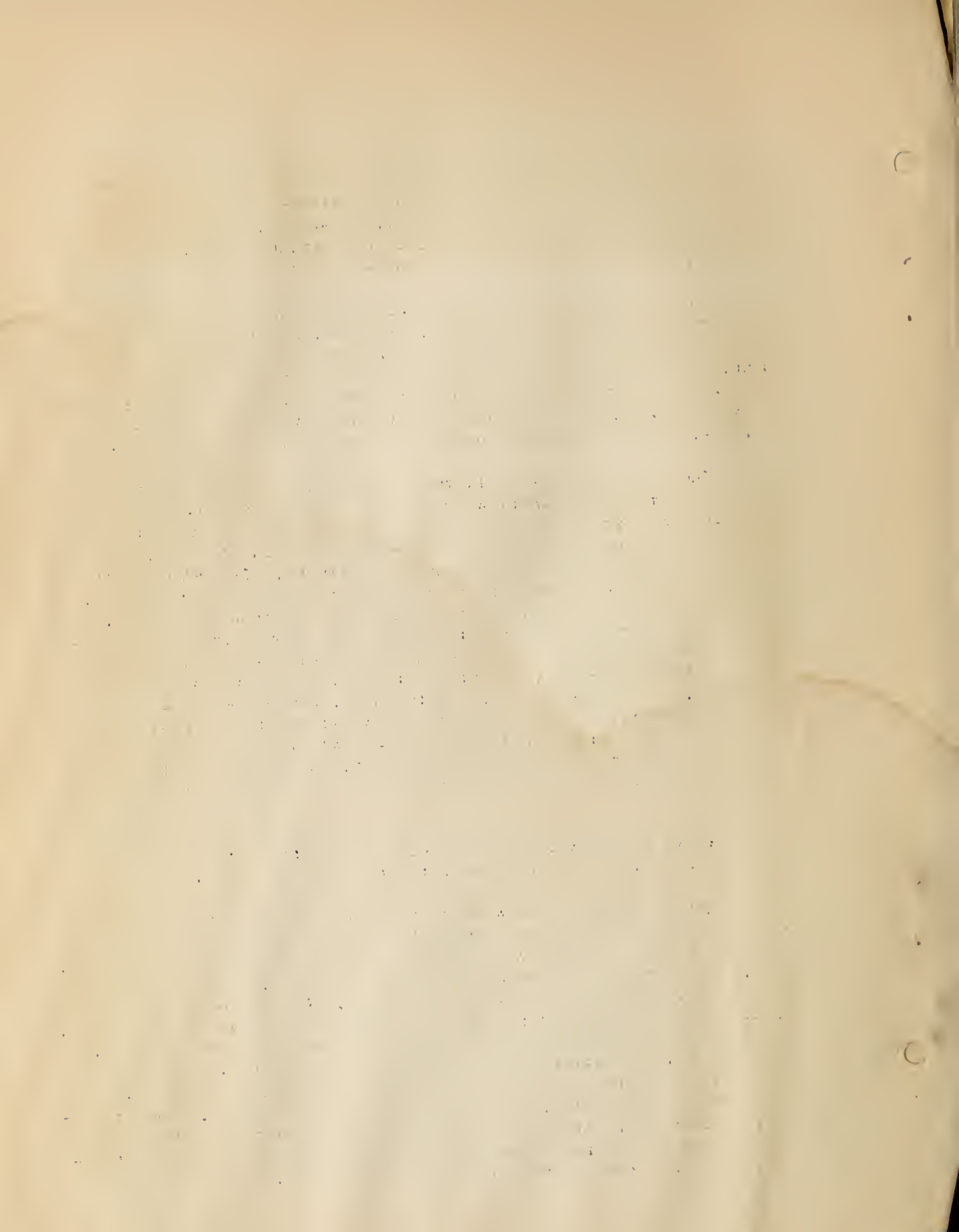
WOULD BE PART OF THE PERMANENT AVAILABLE RECORDS OF THE DEPARTMENT SUBJECT ONLY TO MODIFICATION WHEN THE CHARACTER OF EITHER ONE OR BOTH OF THE MATERIALS IN THE COMBINATION CHANGED. INVESTIGATIONS TO DETERMINE THE PROPORTIONS REQUIRED FOR VARIOUS MATERIALS COULD IN MANY STATES BE MADE PART OF A WINTER RESEARCH PROGRAM.

SIMILAR INFORMATION FROM LOCAL SOURCES OF SUPPLY WOULD BE SOMEWHAT MORE DIFFICULT TO OBTAIN. HOWEVER, A STATE DEPENDING TO ANY CONSIDERABLE EXTENT UPON LOCAL MATERIALS FOR CONCRETE AGGREGATES SHOULD, AND MANY OF THEM ALREADY DO, CONDUCT MATERIAL SURVEYS WELL IN ADVANCE OF CONSTRUCTION. THE NECESSARY TESTS COULD IN SUCH CASES BE MADE ON SAMPLES OF MATERIALS AS FAST AS OBTAINED AND THE INFORMATION FILED FOR REFERENCE WHEN IMPROVEMENTS ARE ABOUT TO BE MADE.

THE PROCEDURE SET UP IN THE ACCOMPANYING SPECIFICATION APPEARS TO BE THE MOST PRACTICAL METHOD OF RECOGNIZING THAT DIFFERENT MATERIALS MAY HAVE TO BE USED IN DIFFERENT PROPORTIONS TO OBTAIN THE SAME STRENGTH AND THAT WE MUST THEREFORE DESIGN FOR A GIVEN STRENGTH AND ADJUST OUR PROPORTIONS ACCORDINGLY. THE METHOD EVALUATES COMPETING AGGREGATES IN A FAIR AND RATIONAL MANNER; THAT IS, IN TERMS OF THEIR ABILITY TO MAKE CONCRETE OF DEFINITE STRENGTH. THIS AFTER ALL IS WHAT WE ARE INTERESTED IN - THE MATTER OF PROPORTIONS BEING ONLY A MEANS TO AN END. UNDER THIS SYSTEM, THE BIDDER KNOWS JUST HOW MUCH HE IS JUSTIFIED IN PAYING FOR EACH AVAILABLE AGGREGATE. HE MAY DETERMINE, FOR INSTANCE, WHETHER HE WILL BE JUSTIFIED IN PAYING A HIGHER PRICE FOR A SHIPPED-IN AGGREGATE, WHICH INCLUDES FREIGHT, THAN FOR A LOCAL MATERIAL OF POORER QUALITY AND CONSEQUENTLY REQUIRING MORE CEMENT. NO AGGREGATE WILL BE UNFAIRLY PENALIZED AND NO AGGREGATE WILL BE GIVEN AN UNFAIR ADVANTAGE.

AS AN ILLUSTRATION OF HOW THIS TYPE OF SPECIFICATION MIGHT WORK OUT IN PRACTICE, A HYPOTHETICAL CASE WILL BE CITED.

LET US SUPPOSE THAT A STATE ADVERTISE FOR BIDS TO CONSTRUCT A CERTAIN PIECE OF CONCRETE PAVEMENT, AND LET US FURTHER ASSUME THAT FOR THIS JOB COARSE AGGREGATES FROM THREE SOURCES ARE AVAILABLE. LET THESE BE IDENTIFIED AS AGGREGATES A, B, AND C. ALSO, THAT THERE ARE TWO FINE AGGREGATES AVAILABLE, D AND E. ALL OF THESE MATERIALS, IT WILL BE ASSUMED, MEET THE BASIC REQUIREMENTS OF THE SPECIFICATION. THE STATE HAS TESTED SAMPLES OBTAINED FROM EACH OF THESE SOURCES IN CONCRETE AND HAS AVAILABLE FOR THE USE OF BIDDERS A TABULATION OF PROPORTIONS REQUIRED FOR THE COMBINATIONS AVAILABLE TOGETHER WITH THE CORRESPONDING QUANTITIES PER CUBIC YARD OF CONCRETE. THIS INFORMATION MIGHT GO TO BIDDERS IN TABULAR FORM SOMEWHAT AS SHOWN BELOW, EXCEPT THAT THE VARIOUS SOURCES OF SUPPLY WOULD, OF COURSE, BE IDENTIFIED BY NAME AND LOCATION INSTEAD OF BY LETTER.



COMBINATION:	PROPORTIONS			QUANTITIES PER CUBIC YARD		
	COARSE			COARSE		
	CEMENT	SAND	AGGREGATE	CEMENT	SAND	AGGREGATE
	POUNDS	POUNDS	POUNDS	BAGS	TONS	TONS
A AND D	: 94	: 182	: 371	: 6.4	: .58	: 1.19
A AND E	: 94	: 139	: 349	: 6.9	: .49	: 1.19
B AND D	: 94	: 225	: 415	: 5.4	: .60	: 1.12
B AND E	: 94	: 178	: 396	: 5.8	: .51	: 1.14
C AND D	: 94	: 161	: 374	: 6.1	: .49	: 1.14
C AND E	: 94	: 119	: 353	: 6.6	: .40	: 1.16

THE ABOVE WEIGHTS AND QUANTITIES WHILE NOT ACTUALLY DERIVED FROM SPECIFIC LABORATORY TESTS REPRESENT NO GREATER RANGE IN PROPORTIONS FOR CONCRETE DESIGNED FOR A SPECIFIED STRENGTH THAN WOULD BE FOUND NECESSARY IN MANY SECTIONS WHERE AGGREGATES OF VARIABLE CHARACTER ARE AVAILABLE. THE VALUES ARE GIVEN MERELY TO INDICATE THE FORM WHICH THE INFORMATION MIGHT TAKE, AS WELL AS TO ILLUSTRATE REASONABLE VARIATIONS IN QUANTITIES WHICH MIGHT EASILY BE ENCOUNTERED. IN AN ACTUAL CASE THE GRADING REQUIREMENTS WHICH WOULD APPLY FOR EACH AGGREGATE WOULD ALSO BE FURNISHED. THIS INFORMATION IS NECESSARY IN ORDER THAT MATERIAL DEALERS MAY QUOTE INTELLIGENTLY ON REQUEST OF BIDDERS.

IT WILL BE OBSERVED FROM THE ABOVE TABLE THAT THERE IS A MAXIMUM DIFFERENCE OF 1.5 BAGS OF CEMENT PER CUBIC YARD, DEPENDING ENTIRELY UPON THE AGGREGATES SELECTED. IT WILL BE NOTED ALSO THAT SAND D IS SUFFICIENTLY HIGHER IN QUALITY TO JUSTIFY A REDUCTION IN THE CEMENT FACTOR OF ABOUT 0.5 BAGS IN THE COMBINATIONS IN WHICH IT IS USED. SAND E MAY BE ASSUMED TO BE A SOMEWHAT FINER SAND LOCALLY AVAILABLE, WHEREAS SAND D HAS TO BE SHIPPED IN. LIKEWISE COARSE AGGREGATE B IS SEEN TO BE MUCH HIGHER IN QUALITY THAN EITHER A OR C, THE DIFFERENTIAL BETWEEN A AND B BEING 1.0 BAG WHILE THAT BETWEEN B AND C IS ABOUT 0.7 BAG.

WITH THIS INFORMATION, TOGETHER WITH THE PRICES QUOTED ON THE VARIOUS MATERIALS, BEFORE HIM, EACH BIDDER IS IN A POSITION TO PREPARE AN INTELLIGENT BID ON THE WORK, IN SO FAR AS THE COST OF THE MATERIALS IS CONCERNED. HE KNOWS JUST HOW MUCH CEMENT, SAND, AND COARSE AGGREGATE HE WILL HAVE TO BUY FOR ANY COMBINATION HE MAY SELECT AS WELL AS THE UNIT COSTS IN EACH CASE DELIVERED. IT IS OBVIOUS THAT, OTHER THINGS BEING EQUAL, HE WILL BASE HIS BID ON THE COMBINATION SHOWING THE LOWEST TOTAL COST FOR ALL MATERIALS, INCLUDING THE CEMENT. THERE IS NO GUESS WORK ABOUT IT, AND FOR THIS REASON CLOSER BIDS AND THEREFORE LOWER PRICES SHOULD RESULT.





## PORTLAND CEMENT

IT IS OF COURSE REALIZED THAT THE QUALITY OF THE PORTLAND CEMENT USED IN THE CONCRETE MAY HAVE AS GREAT OR GREATER EFFECT ON STRENGTH AS THE TYPE OF AGGREGATE.

IT IS, HOWEVER, NOT QUITE SO SIMPLE TO CLOSELY CONTROL THE CEMENT ON A PUBLIC-WORKS JOB, ESPECIALLY WHERE THE CONTRACTOR BUYS HIS OWN CEMENT. ATTEMPTS TO CONTROL THE QUALITY OF THE CEMENT OTHER THAN TO REQUIRE THAT IT PASS THE AMERICAN SOCIETY FOR TESTING MATERIALS REQUIREMENTS ARE SELDOM MADE. SOME PROCEDURE WHICH WOULD ENABLE THE DEPARTMENT TO DESIGNATE NOT ONLY THE BRAND BUT THE ACTUAL MILL FROM WHICH THE CEMENT IS TO BE SHIPPED WOULD BE NECESSARY TO ACCOMPLISH MORE THAN THIS.

CLOSER CONTROL MAY BE OBTAINED WHERE THE STATE FURNISHES THE CEMENT. IN SUCH A CASE, HOWEVER, THE SCHEME OUTLINED ABOVE, WHICH REQUIRES VARYING AMOUNTS OF CEMENT, DEPENDING ON THE AGGREGATES USED, WOULD NOT OPERATE UNLESS SOME METHOD OF CHARGING THE CONTRACTOR FOR THE AMOUNT OF CEMENT HE USED WAS ADOPTED. SUCH A SCHEME WAS TRIED BY AT LEAST ONE STATE LAST YEAR.

BIDS UNDER THE ACCOMPANYING TYPE OF SPECIFICATION WOULD BE TAKEN IN THE USUAL MANNER; THAT IS, PRICE PER SQUARE YARD OF PAVEMENT IN PLACE. UPON NOTICE OF AWARD, THE SUCCESSFUL BIDDER WOULD BE REQUIRED TO IMMEDIATELY DESIGNATE THE PARTICULAR COMBINATION WHICH HE PROPOSES TO USE, UPON WHICH THE PROPORTIONS ARE OFFICIALLY DESIGNATED BY THE DEPARTMENT, AND THESE PROPORTIONS WILL GOVERN JUST SO LONG AS MATERIALS FROM THE SAME SOURCES AND OF THE SAME GRADINGS AS THOSE USED IN ESTABLISHING THE MIX ARE SUPPLIED.

THIS SPECIFICATION IT WILL BE OBSERVED PLACES THE RESPONSIBILITY OF SECURING CONCRETE OF THE REQUIRED QUALITY UPON THE DEPARTMENT, WHERE IT BELONGS. THE CONTRACTOR IS RELIEVED OF ANY RESPONSIBILITY AS TO THE STRENGTH OF THE CONCRETE OBTAINED, JUST SO LONG AS HE COMPLIES WITH ALL THE DETAILS OF THE SPECIFICATION AS REGARDS MATERIALS, MIXING, PLACING, FINISHING, AND CURING OF THE CONCRETE. TO HOLD THE CONTRACTOR RESPONSIBLE FOR THE STRENGTH OF THE CONCRETE AND AT THE SAME TIME SPECIFY THE PROPORTIONS AND OTHER DETAILS OF MANUFACTURE IS NOT AN EQUABLE CONTRACT. IF IT IS FOUND NECESSARY DURING CONSTRUCTION TO MODIFY THE PROPORTIONS TO OBTAIN THE DESIGN STRENGTH, PROVISIONS SHOULD BE MADE TO COMPENSATE THE CONTRACTOR FOR ANY ADDITIONAL COST. IT IS BELIEVED, HOWEVER, THAT IF THE ORIGINAL TESTS UPON WHICH THE DESIGN IS BASED HAVE BEEN CAREFULLY CONDUCTED IN THE LABORATORY THE NECESSITY FOR SUCH CHANGES WILL ONLY OCCASIONALLY OCCUR.

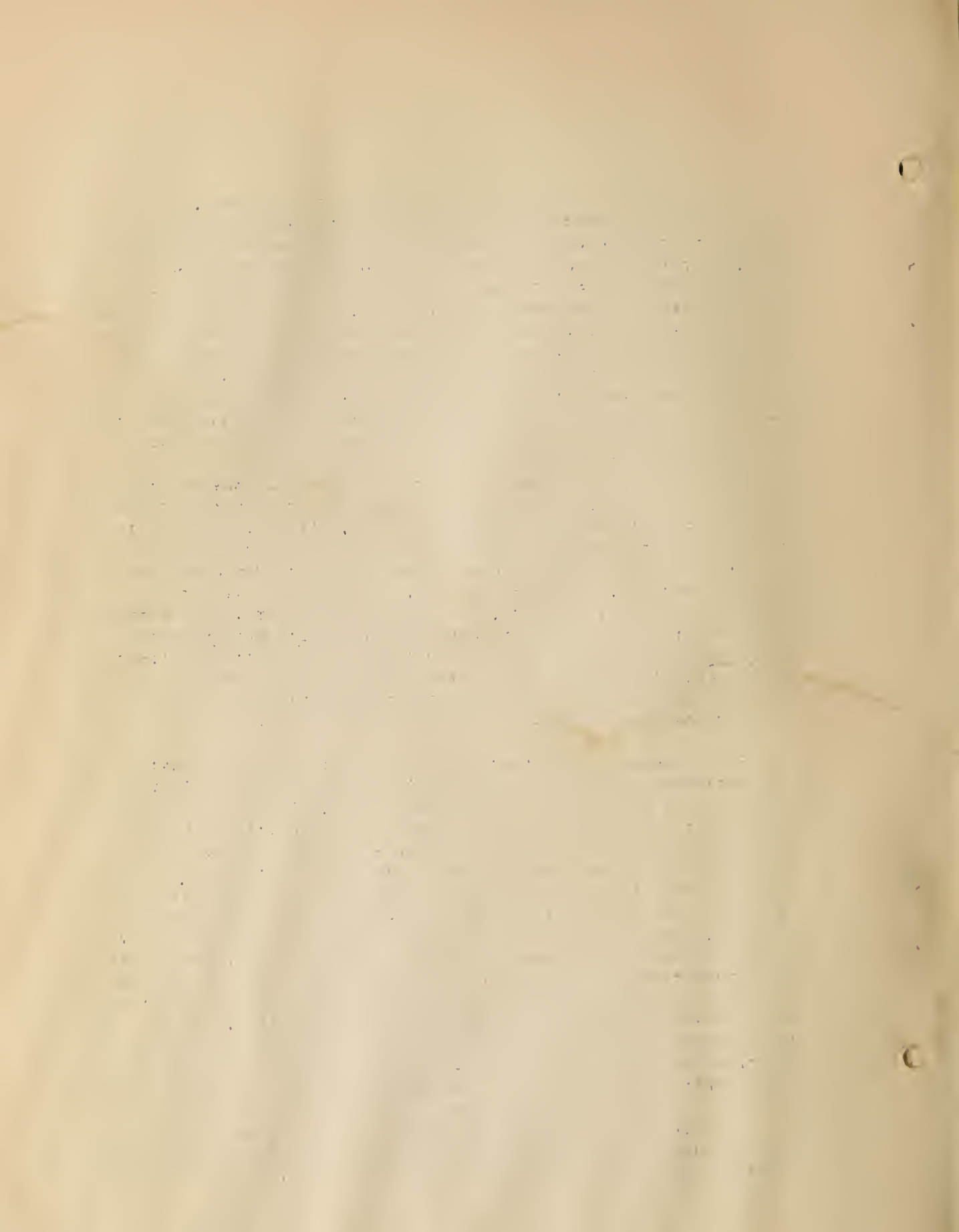
The first part of the document  
 discusses the importance of  
 maintaining accurate records  
 and the role of the  
 committee in this regard.

The second part of the document  
 outlines the proposed  
 changes to the  
 regulations governing  
 the committee's operations.

IT MUST BE REMEMBERED, OF COURSE, THAT THE PROPORTIONS WHICH HAVE BEEN DESIGNATED HAVE BEEN DETERMINED ON THE BASIS OF LABORATORY TESTS MADE UNDER STANDARD TEMPERATURE AND HUMIDITY CONDITIONS. LET IT BE ASSUMED FOR INSTANCE THAT THE CONCRETE HAS BEEN DESIGNED TO GIVE A MODULUS OF RUPTURE OF 600 POUNDS PER SQUARE INCH AT 28 DAYS UNDER LABORATORY CONDITIONS. IT IS WELL KNOWN THAT THE TEMPERATURE AND HUMIDITY CONDITIONS WHICH OBTAIN ON THE JOB WILL INFLUENCE THE RATE AT WHICH THE CONCRETE DEVELOPS STRENGTH UNDER JOB CONDITIONS. IN OTHER WORDS, THE DESIGN STRENGTH, SAY 600 POUNDS PER SQUARE INCH, MAY BE ATTAINED UNDER CERTAIN FAVORABLE WEATHER CONDITIONS IN MUCH LESS THAN 28 DAYS, WHEREAS IN OTHER CASES IT MAY TAKE MORE THAN 28 DAYS. IN ORDER TO DETERMINE THE RATE AT WHICH THE PAVEMENT GAINS IN STRENGTH, WHICH IN TURN FIXES THE DATE ON WHICH IT MAY BE SAFELY OPENED TO TRAFFIC, IT IS NECESSARY TO MAKE BEAM TESTS ON THE JOB, USING SPECIMENS CURED UNDER AS NEARLY IDENTICAL CONDITIONS TO THE PAVEMENT AS POSSIBLE. FIELD TESTS OF THIS NATURE SHOULD NOT, HOWEVER, BE USED TO VERIFY THE CORRECTNESS OF THE ORIGINAL DESIGN BECAUSE THE SPECIMENS HAVE NOT BEEN CURED UNDER STANDARD CONDITIONS. IT IS A MISTAKE TO ATTEMPT TO VERIFY THE DESIGN BY MEANS OF FIELD TESTS. IF FOR ANY REASON IT IS SUSPECTED THAT THE ORIGINAL DESIGN IS AT FAULT ADDITIONAL LABORATORY TESTS UNDER STANDARD CONDITIONS SHOULD BE MADE, USING MATERIALS OBTAINED FROM THE JOB. IF UNDER THESE CONDITIONS THE PROPORTIONS ARE FOUND TO BE INCORRECT THEY SHOULD BE CHANGED, THE ADDITIONAL COST, IF ANY, BEING BORNE BY THE STATE AND NOT BY THE CONTRACTOR.

THE AGGREGATE SPECIFICATIONS CONTAINED IN THE ACCOMPANYING SPECIFICATION-DRAFT FOLLOW THE LATEST AMERICAN SOCIETY FOR TESTING MATERIALS AND AMERICAN CONCRETE INSTITUTE FORM. THE MOST INTERESTING FEATURE IS THE PROVISION FOR INSERTING INTERMEDIATE SIZE REQUIREMENTS, AFTER THE SOURCE OF MATERIAL HAS BEEN DESIGNATED, SO AS TO CONTROL THE UNIFORMITY OF THE GRADING. THE INTERMEDIATE SIZE REQUIREMENTS SHOULD, OF COURSE, BE SET SO AS TO INSURE MATERIAL OF ESSENTIALLY THE SAME GRADING AS THE SAMPLES USED IN ESTABLISHING THE DESIGN. IT WILL BE OBSERVED THAT TWO SIZES OF COARSE AGGREGATE ARE REQUIRED WHERE THE MAXIMUM SIZE IS GREATER THAN  $1\frac{1}{2}$  INCHES. IT IS FELT THAT THIS IS NECESSARY IN THE CASE OF THE COARSER AGGREGATES IN ORDER TO PREVENT SEGREGATION AND CONSEQUENT DANGER OF VARIATIONS FROM THE GRADATION USED IN ESTABLISHING THE PROPORTIONS. THE MATERIAL OVER  $1\frac{1}{2}$  INCHES IS DESIGNATED AS A SEPARATE SIZE AND THE PROPORTIONS GIVEN THE BIDDERS FOR ALL SUCH MATERIALS WILL SHOW THE TOTAL QUANTITIES OF MATERIALS OF EACH SIZE PER CUBIC YARD OF CONCRETE.

COMMENTS AND SUGGESTIONS REGARDING THIS SPECIFICATION ARE REQUESTED AND SHOULD BE ADDRESSED TO E. F. KELLEY, CHIEF, DIVISION OF TESTS, BUREAU OF PUBLIC ROADS, WASHINGTON, D. C.



## SUGGESTED SPECIFICATION FOR CONCRETE PAVEMENT

- 1.- DESCRIPTION: THIS ITEM SHALL CONSIST OF A WEARING COURSE COMPOSED OF PORTLAND-CEMENT CONCRETE, WITH OR WITHOUT REINFORCING STEEL AS REQUIRED, AND SHALL BE CONSTRUCTED ON THE PREPARED SUBGRADE OR COMPLETED AND ACCEPTED BASE COURSE IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN CONFORMITY WITH THE LINES, GRADES, THICKNESS, AND TYPICAL CROSS SECTION SHOWN ON PLANS.
- 2.- COMPOSITION OF CONCRETE: (A) THE PROPORTION OF CEMENT, AGGREGATES, AND WATER WILL BE FIXED BY THE DEPARTMENT ON THE BASIS OF LABORATORY TESTS OF CONCRETE, USING AGGREGATES FROM THE SAME SOURCES AND OF THE SAME GRADINGS AS WILL BE EMPLOYED ON THE WORK.

(B) THE MIXTURE WILL BE DESIGNED TO PRODUCE CONCRETE OF THE REQUIRED WORKABILITY HAVING A MODULUS OF RUPTURE OF AT LEAST \_\_\_\_\_ POUNDS PER SQUARE INCH AT 28 DAYS WHEN TESTED BY MEANS OF STANDARD LABORATORY METHODS.

NOTE TO BIDDERS: THE DEPARTMENT WILL FURNISH PROSPECTIVE BIDDERS, UPON REQUEST, THE PROPORTIONS BY WEIGHT WHICH WILL BE REQUIRED FOR ALL AGGREGATES FROM SUCH REGULAR ESTABLISHED COMMERCIAL SOURCES AS ARE AVAILABLE FOR USE ON THE PROJECT. THIS INFORMATION WILL ALSO INCLUDE THE GRADING REQUIREMENTS WHICH APPLY IN EACH CASE.

IN THE EVENT THAT ANY PROSPECTIVE BIDDER DESIRES TO USE LOCAL MATERIALS, THE DEPARTMENT WILL FURNISH THE ABOVE INFORMATION IN CASES WHERE PRELIMINARY TESTS TO ESTABLISH THE PROPORTIONS HAVE BEEN MADE. IN CASES WHERE NO PRELIMINARY TESTS HAVE BEEN MADE AND THERE IS NOT SUFFICIENT TIME TO CONDUCT THE NECESSARY TESTS BEFORE BIDS ARE RECEIVED, THE DEPARTMENT WILL FURNISH A PRELIMINARY ESTIMATE AS TO THE PROPORTIONS REQUIRED, SUBJECT TO MODIFICATION WITHOUT ADDITIONAL COMPENSATION TO THE CONTRACTOR SHOULD TESTS LATER INDICATE THAT THE PRELIMINARY PROPORTIONS WERE INCORRECT.

(C) IMMEDIATELY UPON NOTICE OF AWARD, THE CONTRACTOR SHALL FURNISH THE DEPARTMENT WITH THE EXACT LOCATION OF THE SOURCE OR SOURCES OF AGGREGATES WHICH HE PROPOSES TO USE. THE PROPORTIONS WILL THEN BE OFFICIALLY DESIGNATED BY THE DEPARTMENT IN ACCORDANCE WITH THE PROVISIONS OF SECTION 2 (A) ABOVE. SUCH PROPORTIONS WILL GOVERN SO LONG AS MATERIALS



ARE FURNISHED FROM THE SOURCES ORIGINALLY DESIGNATED AND SO LONG AS THEY CONTINUE TO MEET THE REQUIREMENTS HEREINAFTER SPECIFIED, SUBJECT ONLY TO SLIGHT VARIATIONS IN THE RELATIVE QUANTITIES OF FINE AND COARSE AGGREGATE FOR THE PURPOSE OF SECURING MAXIMUM WORKABILITY.

(D) IN THE EVENT THE CONTRACTOR WISHES TO USE AGGREGATES FROM SOURCES OTHER THAN THOSE ORIGINALLY DESIGNATED BY HIM, THE DEPARTMENT RESERVES THE RIGHT TO CHANGE THE PROPORTIONS TO MEET THE STRENGTH REQUIREMENTS GIVEN UNDER SECTION 2 (B) WITH THE AGGREGATES ACTUALLY FURNISHED.

3.- MATERIALS: (A) CEMENT: PORTLAND CEMENT SHALL CONFORM IN ALL RESPECTS TO THE REQUIREMENTS OF THE AMERICAN SOCIETY FOR TESTING MATERIALS STANDARD SPECIFICATIONS C 9 - 26, WITH AMENDMENTS TO DATE OF CONTRACT.

(B) MIXING WATER: WATER SHALL BE CLEAN, CLEAR, FREE FROM OIL, ACID, ALKALI OR VEGETABLE MATTER AND SHALL NOT BE USED UNTIL THE SOURCE OF SUPPLY HAS BEEN APPROVED. IF AT ANY TIME THE WATER FROM THIS SOURCE SHALL BECOME OF UNSATISFACTORY QUALITY, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE SATISFACTORY WATER FROM SOME OTHER SOURCE. WATER OF DOUBTFUL QUALITY SHALL BE TESTED IN ACCORDANCE WITH THE METHOD PRESCRIBED IN U. S. DEPARTMENT OF AGRICULTURE BULLETIN No. 1216

(C) FINE AGGREGATE: (1) GENERAL CHARACTERISTICS: FINE AGGREGATE SHALL CONSIST OF NATURAL SAND OR OTHER APPROVED INERT MATERIALS WITH SIMILAR CHARACTERISTICS, OR A COMBINATION THEREOF, HAVING HARD, STRONG, DURABLE PARTICLES, AND SHALL CONFORM TO THE REQUIREMENTS OF THESE SPECIFICATIONS.

(2) DELETERIOUS SUBSTANCES: THE MAXIMUM PERCENTAGES OF DELETERIOUS SUBSTANCES SHALL NOT EXCEED THE FOLLOWING VALUES:

	PER CENT BY WEIGHT
REMOVED BY DECANTATION _____	3
SHALE _____	1
COAL _____	1
CLAY LUMPS _____	1
OTHER LOCAL DELETERIOUS SUBSTANCES (SUCH AS ALKALI, MICA, COATED GRAINS, SOFT AND FLAKY PARTICLES) _____	-

THE SUM OF THE PERCENTAGES OF SHALE, COAL, CLAY LUMPS, SOFT FRAGMENTS, AND OTHER DELETERIOUS SUBSTANCES SHALL NOT EXCEED 5 PER CENT BY WEIGHT.





ALL FINE AGGREGATE SHALL BE FREE FROM INJURIOUS AMOUNTS OF ORGANIC IMPURITIES. AGGREGATES SUBJECTED TO THE COLORIMETRIC TEST FOR ORGANIC IMPURITIES AND PRODUCING A COLOR DARKER THAN THE STANDARD SHALL BE REJECTED UNLESS TESTS OF THE MATERIAL IN CONCRETE INDICATE THAT THE ORGANIC IMPURITIES ARE NOT OF A DELETERIOUS NATURE.

(3) GRADING: FINE AGGREGATE SHALL BE WELL GRADED FROM COARSE TO FINE AND SHALL MEET THE FOLLOWING REQUIREMENTS:

PASSING 3/8-INCH SIEVE	-----	PER CENT	100
Do No. _____	DO ----- TO		--
Do No. 50	DO NOT MORE THAN -----		35
Do No. 100	DO DO DO -----		5

THE INTERMEDIATE GRADING REQUIREMENTS ABOVE INDICATED ARE FOR THE PURPOSE OF CONTROLLING THE UNIFORMITY OF DELIVERIES OF MATERIALS. THEY SHOULD BE INSERTED AFTER THE CONTRACTOR HAS NOTIFIED THE DEPARTMENT AS TO THE SOURCE OF MATERIAL HE INTENDS TO FURNISH AND WILL BE SO SELECTED THAT MATERIAL WILL BE FURNISHED WHICH HAS THE SAME GRADATION AS THE SAMPLES USED IN ESTABLISHING THE PROPORTIONS.

(d) COARSE AGGREGATES: (1) GENERAL CHARACTERISTICS: COARSE AGGREGATE SHALL CONSIST OF CRUSHED STONE, GRAVEL, ELAST-FURNACE SLAG, OR OTHER APPROVED INERT MATERIALS OF SIMILAR CHARACTERISTICS, OR COMBINATIONS THEREOF, HAVING HARD, STRONG, DURABLE PIECES, FREE FROM ADHERENT COATINGS AND CONFORMING TO THE REQUIREMENTS OF THESE SPECIFICATIONS.

(2) DELETERIOUS SUBSTANCES: THE MAXIMUM PERCENTAGES OF DELETERIOUS SUBSTANCES SHALL NOT EXCEED THE FOLLOWING VALUES:

	PER CENT BY WEIGHT
REMOVED BY DECANTATION -----	1
SHALES -----	1
COAL -----	1
CLAY LUMPS -----	1/4
SOFT FRAGMENTS -----	5
OTHER LOCAL DELETERIOUS SUBSTANCES (SUCH AS ALKALI, FRIABLE, THIN, ELONGATED, OR LAMINATED PIECES) -----	-

THE SUM OF THE PERCENTAGES OF SHALE, COAL, CLAY LUMPS, AND SOFT FRAGMENTS SHALL NOT EXCEED 5 PER CENT BY WEIGHT.



(3) QUALITY: COARSE AGGREGATES SHALL MEET THE FOLLOWING REQUIREMENTS:

CRUSHED STONE	
PER CENT OF WEAR, NOT MORE THAN	7
GRAVEL	
PER CENT OF WEAR, NOT MORE THAN	15
BLAST-FURNACE SLAG	
WEIGHT PER CUBIC FOOT, NOT LESS THAN	70 LBS.

ALL COARSE AGGREGATES SHALL BE SUBJECTED TO FIVE ALTERNATIONS IN THE SODIUM SULPHATE TEST FOR SOUNDNESS AND THOSE SHOWING EVIDENCE OF MARKED CHECKING, CRACKING, OR DISINTEGRATION IN THIS TEST SHALL BE REJECTED UNLESS IT CAN BE SHOWN TO THE SATISFACTION OF THE DEPARTMENT THAT SUCH AGGREGATES HAVE PROVEN ENTIRELY SOUND IN SERVICE.

4.- GRADING: COARSE AGGREGATE SHALL BE WELL GRADED FROM COARSE TO FINE, AND SHALL MEET THE FOLLOWING REQUIREMENTS:

(A) WHEN THE COARSE AGGREGATE HAS A MAXIMUM SIZE OF  $1\frac{1}{2}$  INCHES OR LESS:

				PER CENT
PASSING A $1\frac{1}{2}$ -INCH SIEVE	-----			100
Do DO	-----	DO	----- TO	--
Do DO	$\frac{3}{8}$ -INCH	DO	----- NOT MORE THAN	--

(B) WHEN THE COARSE AGGREGATE HAS A MAXIMUM SIZE GREATER THAN  $1\frac{1}{2}$  INCHES THE MATERIAL LESS THAN  $1\frac{1}{2}$  INCHES IN SIZE SHALL BE FURNISHED IN THE GRADING GIVEN UNDER (A) ABOVE AND THE MATERIAL LARGER THAN  $1\frac{1}{2}$  INCHES SHALL BE FURNISHED AS A SEPARATE SIZE CONFORMING TO THE FOLLOWING REQUIREMENTS:

				PER CENT
PASSING A 3-INCH SIEVE	-----			100
Do DO	$2\frac{1}{2}$ -INCH	DO	----- 95 TO	100
Do DO	$1\frac{1}{2}$ -INCH	DO	----- NOT MORE THAN	15

THE INTERMEDIATE GRADING REQUIREMENTS INDICATED UNDER (A) ABOVE ARE FOR THE PURPOSE OF CONTROLLING THE UNIFORMITY OF DELIVERIES. THEY SHALL BE INSERTED AFTER THE CONTRACTOR HAS NOTIFIED THE DEPARTMENT AS TO THE SOURCE OF MATERIAL HE INTENDS TO USE AND WILL BE SO SELECTED THAT MATERIAL WILL BE FURNISHED WHICH WILL HAVE THE SAME GRADATION AS THE SAMPLE USED IN ESTABLISHING THE PROPORTION.

The first part of the document  
 discusses the general principles  
 of the system and its  
 objectives. It is intended to  
 provide a clear understanding  
 of the scope and purpose of  
 the project. The following  
 sections will describe the  
 various components and  
 the implementation process.

The second part of the document  
 details the specific methods  
 and techniques used in the  
 study. This includes a  
 description of the data  
 collection process, the  
 analysis tools, and the  
 results of the experiments.

The final part of the document  
 discusses the conclusions  
 drawn from the study and  
 the implications for future  
 research. It also includes  
 a list of references and  
 an appendix containing  
 additional data and figures.

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PUBLIC ROADS

F-4 (1927)  
R. B. A.

LOCAL ROAD INCOME AND FUNDS AVAILABLE, 1927.

FOR USE OF LOCAL AUTHORITIES (COUNTY, TOWN AND DISTRICT)  
ON LOCAL ROADS AND BRIDGES DURING YEAR.

COMPILED (IN SOME CASES ESTIMATED)  
FROM RECORDS OF LOCAL AUTHORITIES.

STATES	TOTAL FUNDS AVAILABLE	BALANCE FROM PREVIOUS YEAR	TOTAL INCOME DURING YEAR	BOND SALE RECEIPTS	LOCAL ROAD TAX LEVY	APPROPRIATIONS FROM GENERAL FUND	MOTOR VEHICLE LICENSES	GASOLINE TAX RECEIPTS	FUNDS FROM STATE LOCAL ROADS	MISCELLANEOUS INCOME	STATES
ALABAMA	\$ 12,347,378	\$ 1,240,185	\$ 11,107,193	\$ 122,469	\$ 3,855,452	\$ 1,592,251	\$ 42,069	\$ 3,227,680	\$	\$ 2,257,272	ALABAMA
ARIZONA	1,785,669	126,079	1,659,590	---	529,713	210,825	163,476	529,544	93,950	132,072	ARIZONA
ARKANSAS	9,686,000	425,283	9,260,717	---	2,280,000	149,500	---	6,661,217	6,661,217	200,000	ARKANSAS
CALIFORNIA	45,285,289	14,453,816	30,831,473	1,722,756	12,182,852	5,157,615	2,900,699	7,821,574	135,109	910,878	CALIFORNIA
COLORADO	5,533,946	269,239	5,324,707	---	2,750,187	131,850	494,341	1,173,059	551,953	223,337	COLORADO
CONNECTICUT	2,811,345	81,956	2,799,389	310,431	---	2,799,389	---	---	283,800	---	CONNECTICUT
DELAWARE	2,173,523	265,337	1,908,186	37,763,651	230,054	1,081,229	---	3,104,991	---	4,086,316	DELAWARE
FLORIDA	93,329,153	33,226,007	60,103,146	1,585,593	9,705,067	2,277,177	1,108,076	2,078,790	---	1,061,984	FLORIDA
GEORGIA	19,171,888	2,483,271	16,688,617	1,585,593	3,073,034	---	---	---	153,062	313,008	GEORGIA
IDAHO	6,906,797	2,079,131	4,827,666	85,500	27,504,879	559,543	---	3,628,727	---	641,933	IDAHO
ILLINOIS	29,312,568	---	29,312,568	1,185,756	24,405,904	---	---	7,054,320	---	24,694	ILLINOIS
INDIANA	48,039,300	9,427,514	38,611,786	10,824,028	24,405,904	1,531,086	---	1,648,074	722,303	3,868,032	INDIANA
IOWA	27,153,964	4,501,214	22,652,750	782,128	13,091,917	559,543	---	3,628,727	---	500,000	IOWA
KANSAS	32,174,706	8,593,685	23,581,021	2,708,067	12,733,634	585,000	---	7,054,320	---	262,333	KANSAS
KENTUCKY	10,289,975	---	10,289,975	3,461,503	6,101,879	464,261	---	---	101,600	1,138,982	KENTUCKY
LOUISIANA	15,810,767	6,341,693	10,469,074	820,781	6,790,495	1,617,218	---	---	---	100,000	LOUISIANA
MAINE	2,661,054	0	2,746,581	40,000	800,000	1,806,581	---	---	---	329,063	MAINE
MARYLAND	4,915,603	---	4,915,603	1,309,682	2,478,367	798,491	---	---	6,475,000	345,000	MARYLAND
MASSACHUSETTS	15,209,500	149,500	15,060,000	140,000	600,000	7,500,000	---	---	2,024,355	1,536,304	MASSACHUSETTS
MICHIGAN	54,937,455	10,452,076	44,485,380	7,423,536	26,480,709	---	7,080,476	---	1,673,255	---	MICHIGAN
MINNESOTA	23,452,459	873,000	22,579,459	1,060,000	17,430,104	980,500	---	---	---	1,475,600	MINNESOTA
MISSISSIPPI	37,072,625	9,477,938	27,595,327	9,112,103	10,351,462	2,556,089	2,085,038	2,164,256	10,000	1,326,379	MISSISSIPPI
MISSOURI	12,676,000	1,003,379	11,672,621	455,855	187,477	759,260	---	---	75,000	1,260,028	MISSOURI
MONTANA	5,835,000	1,200,000	4,635,000	120,000	2,650,000	320,000	1,250,000	---	52,135	425,313	MONTANA
NEBRASKA	10,251,351	878,109	9,373,252	---	5,640,108	716,697	2,539,999	---	1,586	57,120	NEBRASKA
NEVADA	1,588,954	510,353	1,078,601	35,000	630,385	113,207	5,581	235,812	66,606	360	NEVADA
NEW HAMPSHIRE	3,786,930	---	3,786,930	---	2,140,050	1,579,914	---	---	837,439	---	NEW HAMPSHIRE
NEW JERSEY	29,571,947	1,124,433	28,447,514	16,222,037	---	8,536,550	2,851,488	---	---	---	NEW JERSEY
NEW MEXICO	731,858	70,325	661,533	221,086	209,217	67,731	150,691	200	3,727	8,881	NEW MEXICO
NEW YORK	44,291,174	4,291,174	40,000,000	---	29,966,761	1,463,000	4,743,169	---	5,290,070	---	NEW YORK
NORTH CAROLINA	35,364,000	1,198,000	34,206,000	9,642,000	12,123,000	275,000	---	---	---	---	NORTH CAROLINA
NORTH DAKOTA	5,939,145	1,350,000	4,589,145	---	3,728,835	---	---	---	---	---	NORTH DAKOTA
OHIO	86,170,000	13,198,000	72,972,000	17,680,000	44,128,000	---	2,400,000	3,620,000	5,250,000	---	OHIO
OKLAHOMA	17,288,300	2,049,722	15,238,578	1,500,000	6,750,000	1,200,000	2,589,260	2,399,318	800,000	800,000	OKLAHOMA
OREGON	14,430,000	1,500,000	12,930,000	4,000,000	4,500,000	800,000	1,450,000	180,000	1,150,000	---	OREGON
PENNSYLVANIA	77,602,800	17,241,000	60,368,800	10,832,250	21,051,000	15,546,000	---	2,494,000	1,501,650	8,944,000	PENNSYLVANIA
RHODE ISLAND	986,954	27,649	959,305	60,000	---	821,829	---	---	12,200	47,376	RHODE ISLAND
SOUTH CAROLINA	20,665,856	720,176	19,946,680	13,657,844	1,798,246	1,135,235	---	1,903,049	161,753	1,452,306	SOUTH CAROLINA
SOUTH DAKOTA	5,565,179	---	5,565,179	---	3,901,260	156,900	1,187,519	---	---	157,747	SOUTH DAKOTA
TENNESSEE	23,760,358	8,180,345	15,580,013	5,340,869	6,468,642	778,998	---	110,572	---	2,893,032	TENNESSEE
TEXAS	41,355,000	3,120,000	38,235,000	10,500,000	16,700,000	600,000	4,143,000	---	150,000	950,000	TEXAS
UTAH	2,054,211	574,980	1,479,231	---	1,292,783	119,500	---	---	---	56,948	UTAH
VERMONT	1,200,000	15,000	1,185,000	---	4,058,000	285,000	---	---	300,000	---	VERMONT
VIRGINIA	14,312,000	4,110,000	10,202,000	1,558,000	---	---	---	1,882,000	---	2,704,000	VIRGINIA
WASHINGTON	10,450,000	750,000	9,700,000	95,000	6,300,000	820,000	780,000	115,000	780,000	810,000	WASHINGTON
WEST VIRGINIA	16,870,000	3,600,000	13,270,000	3,500,000	9,680,000	---	---	---	---	90,000	WEST VIRGINIA
WISCONSIN	34,016,924	1,861,258	32,155,666	5,313,021	14,325,321	4,695,612	---	1,389,502	3,456,537	2,975,675	WISCONSIN
WYOMING	726,625	1,061	725,564	---	87,583	498,247	---	---	8,635	131,099	WYOMING
TOTALS	\$ 1,018,721,541	\$ 178,107,618	\$ 840,613,923	\$ 181,080,953	\$ 405,219,774	\$ 72,692,737	\$ 40,239,856	\$ 46,860,508	\$ 37,984,371	\$ 56,535,744	TOTALS

NOTES: 1/ LARGELY SHORT TERM NOTES.



COMPILED (IN SOME CASES ESTIMATED)  
FROM RECORDS OF LOCAL AUTHORITIES,

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PUBLIC ROADS

LOCAL ROADS AND BRIDGE DISBURSEMENTS, 1927

BY LOCAL AUTHORITIES (COUNTY, TOWN AND DISTRICT)

STATES	TOTAL DISBURSEMENTS	CONSTRUCTION	MAINTENANCE	MISCELLANEOUS PURPOSES	INTEREST	PAYMENTS ON BONDS RETIREMENTS & SINKING FUNDS	COUNTY FUNDS TRANSFERRED TO STATE	UNEXPENDED BALANCE END OF YEAR	STATES
ALABAMA	\$ 10,506,979	\$ 1,367,174	\$ 6,031,774	\$ 220,263	\$ 1,540,679	\$ 1,346,089	\$ 34,239	\$ 1,807,160	ALABAMA
ARIZONA	1,610,484	278,931	978,349	213,676	76,398	53,130	---	175,186	ARIZONA
ARKANSAS	8,900,000	2,176,000	2,176,000	75,000	3,250,000	2,650,000	---	786,000	ARKANSAS
CALIFORNIA	30,737,210	9,963,444	12,936,036	2,692,191	2,520,766	2,624,773	1,480,997	13,067,082	CALIFORNIA
COLORADO	6,040,541	1,096,961	3,333,881	603,013	2,766	14,920	99,188	454,217	COLORADO
CONNECTICUT	2,961,557	636,062	2,326,506	---	467,560	266,500	---	0.	CONNECTICUT
DELAWARE	1,688,854	421,203	473,479	40,092	6,863,440	1,936,346	338,319	166,350	DELAWARE
FLORIDA	53,792,548	31,991,462	7,988,682	5,022,676	1,676,215	747,938	3,613,579	36,923,089	FLORIDA
GEORGIA	14,336,913	6,034,796	6,385,598	693,367	1,676,215	747,938	2,683,439	2,161,536	GEORGIA
IDAHO	4,470,362	819,882	1,252,068	629,538	958,677	810,207	580,033	1,918,402	IDAHO
ILLINOIS	27,661,336	8,017,619	15,932,539	824,867	3,056,311	1,831,000	---	1,851,232	ILLINOIS
INDIANA	37,224,587	10,217,013	11,036,743	736,710	3,708,845	11,527,276	39,039	10,775,674	INDIANA
IOWA	24,274,660	9,193,549	11,806,006	1,161,081	975,000	1,140,015	---	2,879,314	IOWA
KANSAS	17,687,467	8,003,806	6,495,726	1,678,961	917,406	1,591,881	7,181,665	7,305,574	KANSAS
KENTUCKY	6,898,225	1,075,656	3,478,262	448,672	3,708,845	1,976,000	2,201,976	1,189,775	KENTUCKY
LOUISIANA	11,806,189	3,066,674	2,864,886	527,321	2,784,408	2,563,900	653,335	4,451,243	LOUISIANA
MAINE	2,700,000	350,000	2,100,000	128,000	60,000	62,000	---	D.	MAINE
MARYLAND	3,957,872	1,283,954	1,868,649	172,950	384,863	857,788	1,019,870	- 72,139	MARYLAND
MASSACHUSETTS	14,882,100	7,934,000	6,491,500	84,600	32,000	340,000	103,400	224,000	MASSACHUSETTS
MICHIGAN	40,692,818	18,495,989	12,981,241	---	2,672,608	6,543,000	---	14,244,637	MICHIGAN
MINNESOTA	23,446,860	14,701,450	4,715,800	1,959,000	1,140,000	890,000	---	5,609	MINNESOTA
MISSISSIPPI	18,130,260	2,247,454	8,733,022	282,642	3,702,856	3,194,286	6,789,427	13,152,938	MISSISSIPPI
MISSOURI	11,176,000	3,800,000	6,366,000	984,600	825,000	750,000	55,000	1,500,000	MISSOURI
MONTANA	4,765,000	1,000,000	2,200,000	275,000	540,000	750,000	---	1,005,000	MONTANA
NEBRASKA	8,904,301	4,603,338	3,381,896	630,508	190,453	98,112	84,939	1,262,121	NEBRASKA
NEVADA	678,814	90,842	337,886	81,679	71,407	97,110	---	523,738	NEVADA
NEW HAMPSHIRE	2,207,018	214,692	1,706,217	286,207	---	---	1,579,914	---	NEW HAMPSHIRE
NEW JERSEY	27,188,078	8,811,426	4,918,146	475,138	2,676,816	10,306,653	27,687	2,383,869	NEW JERSEY
NEW MEXICO	492,159	123,634	280,616	58,451	21,969	7,589	---	212,012	NEW MEXICO
NEW YORK	40,000,000	29,000,000	4,000,000	2,800,000	2,700,000	1,500,000	---	4,291,174	NEW YORK
NORTH CAROLINA	26,721,000	6,306,000	6,181,000	1,244,000	5,208,000	7,848,000	6,996,000	3,647,000	NORTH CAROLINA
NORTH DAKOTA	4,229,550	3,642,300	496,250	91,000	---	---	---	1,769,595	NORTH DAKOTA
OHIO	62,366,000	22,191,000	13,553,000	2,240,000	5,517,000	18,865,000	11,713,000	12,091,000	OHIO
OKLAHOMA	12,726,000	2,675,000	7,200,000	800,000	1,100,000	950,000	3,132,000	1,431,300	OKLAHOMA
OREGON	12,710,000	7,200,000	2,760,000	410,000	1,100,000	1,250,000	---	1,720,000	OREGON
PENNSYLVANIA	54,715,400	22,024,700	12,794,500	6,304,700	5,134,500	8,457,000	8,893,600	14,000,800	PENNSYLVANIA
RHODE ISLAND	953,706	283,219	527,084	34,688	34,115	74,600	---	5,248	RHODE ISLAND
SOUTH CAROLINA	6,356,840	1,909,166	2,040,819	131,248	1,365,612	889,996	11,372,580	2,937,436	SOUTH CAROLINA
SOUTH DAKOTA	6,122,827	3,251,782	2,777,645	156,900	7,500	29,000	584,777	0.-	SOUTH DAKOTA
TENNESSEE	11,143,351	3,722,286	3,159,529	360,114	2,271,067	1,226,255	4,756,713	7,654,294	TENNESSEE
TEXAS	28,170,000	6,225,000	9,320,000	1,065,000	8,360,000	5,200,000	1,817,000	11,368,000	TEXAS
UTAH	1,276,964	356,909	608,261	86,908	155,896	69,000	222,486	654,761	UTAH
VERMONT	1,000,000	400,000	600,000	---	---	---	200,000	---	VERMONT
VIRGINIA	10,654,000	2,124,000	5,654,000	---	1,307,000	1,569,000	---	3,658,000	VIRGINIA
WASHINGTON	9,694,000	3,800,000	3,900,000	400,000	794,000	800,000	---	756,000	WASHINGTON
WEST VIRGINIA	13,370,000	7,220,000	3,000,000	200,000	1,300,000	800,000	---	3,500,000	WEST VIRGINIA
WISCONSIN	27,387,481	11,599,254	10,119,190	4,040,697	682,653	945,647	4,463,792	2,165,651	WISCONSIN
WYOMING	736,449	262,261	366,664	42,024	40,500	25,000	7,314	0.-	WYOMING
TOTALS	\$748,245,735	\$289,180,355	\$237,970,467	\$41,282,865	\$76,015,780	\$104,796,266	\$80,931,710	\$189,544,096	TOTALS

NOTES: 1/ INCLUDES "OVERHEAD" (ADMINISTRATION AND ENGINEERING) FORMERLY SHOWN ON F-5 TABLES.  
2/ NOT APPLICABLE TO LOCAL ROAD AND BRIDGE DISBURSEMENTS.  
3/ TOTAL PAYMENTS ON BONDS HAVE BEEN APPROXIMATELY ALLOCATED AS SHOWN.  
4/ TOTAL OF NEXT-FIVE COLUMNS ONLY.





UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PUBLIC ROADS

F-1 (1928)  
R.S.A.

STATE HIGHWAY INCOME AND FUND AVAILABLE DURING 1928.  
FOR STATE HIGHWAY AND BRIDGE WORK UNDER SUPERVISION OF STATE HIGHWAY DEPARTMENTS  
(COMPILED FROM REPORTS OF STATE AUTHORITIES)

STATE	FISCAL YEAR ENDS	TOTAL FUND AVAILABLE FOR USE OF STATE HIGHWAY DEPARTMENT	BALANCE AT BEGINNING OF FISCAL YEAR	TOTAL INCOME FOR STATE HIGHWAYS DURING FISCAL YEAR	STATE TAX LEVIED FOR STATE HIGHWAYS	APPROPRIATION BY STATE FOR STATE HIGHWAYS	MOTOR VEHICLE FEES, ETC. ALLOTTED TO STATE HIGHWAYS	GASOLINE TAX RECEIPTS, ETC. ALLOTTED TO STATE HIGHWAYS	MISCELLANEOUS INCOME FOR STATE HIGHWAYS	STATE BONDS AND NOTES ISSUED FOR STATE HIGHWAYS	FEDERAL AID FOR ROAD AND PORT FUND ALLOTMENTS USED	FUND TRANSFERS FROM LOCAL AUTHORITIES FOR STATE HIGHWAYS	STATE
ALABAMA	9/30	\$21,022,743	\$1,933,783	\$19,088,960	-	-	\$2,635,140	\$3,194,150	\$58,410	\$10,084,375	\$2,977,232	\$129,013	ALABAMA
ARIZONA	5/30	3,168,611	-	3,340,700	\$151,972	\$1,234,246	4,787,352	1,038,964	30	-	482,435	5,700	ARIZONA
ARKANSAS	12/31	35,313,665	2,632,108	29,881,756	-	-	3,788,504	5,382,782	45,842	18,173,149	1,118,578	174,601	ARKANSAS
CALIFORNIA	12/31	39,635,114	7,069,549	31,465,485	-	4,754,102	3,694,541	19,339,325	818,258	-	2,457,794	391,434	CALIFORNIA
COLORADO	11/30	8,478,010	1,844,570	6,533,440	1,359,837	-	835,935	2,685,355	39,763	-	1,730,450	-	COLORADO
CONNECTICUT	9/30	22,953,484	12,778,451	10,214,033	-	1,683,290	3,106,833	3,106,833	875,686	-	415,293	-	CONNECTICUT
DELAWARE	12/31	3,512,067	251,760	3,350,307	4,849	-	928,162	798,963	55,086	985,567	210,464	379,955	DELAWARE
FLORIDA	12/31	14,586,540	592,015	14,094,525	-	-	3,423,340	6,770,508	43,351	-	872,514	2,973,858	FLORIDA
GEORGIA	12/31	13,169,349	250,988	12,918,363	-	-	3,810,119	5,151,315	23,205	-	1,900,251	1,933,773	GEORGIA
IOWA	12/31	5,447,374	750,444	4,726,530	2/ 308,487	-	1,188,687	2,006,055	25,634	-	1,244,887	953,179	IOWA
ILLINOIS	12/31	57,387,727	8,439,589	54,689,188	-	289,532	15,089,830	4,054,552	180,627	35,115,287	4,054,552	-	ILLINOIS
INDIANA	9/30	18,498,314	2,414,305	16,073,168	-	-	5,435,135	7,287,318	483,640	-	2,565,735	241,381	INDIANA
IOWA	11/30	43,639,837	5,059,587	37,981,250	-	-	10,037,392	4,785,387	45,651	20,189,205	2,831,580	92,424	IOWA
KANSAS	12/31	13,803,615	2,187	13,901,423	906,335	150,000	3,151,016	4,268,228	-	-	2,287,595	1,355,475	KANSAS
KENTUCKY	3/31	14,871,014	857,823	14,213,091	-	-	3,699,431	4,575,427	208,487	-	2,007,818	2,717,693	KENTUCKY
LOUISIANA	12/31	12,753,454	2,243,385	10,510,069	-	-	4,382,710	3,277,555	483,697	-	953,937	1,412,180	LOUISIANA
MAINE	12/31	13,431,801	1,282,396	12,189,405	1,024,938	1,559,000	2,714,581	3,209,128	456,317	874,029	241,492	2,096,320	MAINE
MARYLAND	9/30	12,645,957	2,112,410	10,433,457	998,943	49,918	1,982,051	4,359,981	736,354	1,239,185	730,485	1,355,475	MARYLAND
MASSACHUSETTS	11/30	17,509,783	569,119	18,640,644	-	87	12,178,301	4,675,427	25,686	-	2,565,420	2,877,308	MASSACHUSETTS
MICHIGAN	5/30	40,854,352	1,535,374	39,419,006	-	-	10,676,327	15,359,854	1,157,406	-	2,356,936	947,468	MICHIGAN
MINNESOTA	12/31	29,564,142	8,902,698	20,751,244	1,921,949	-	10,066,726	5,599,973	841,675	-	2,841,090	-	MINNESOTA
MISSISSIPPI	7/31	7,301,916	1,079,219	5,224,296	-	-	1,931,074	2,559,773	115,354	-	1,510,583	1,800,684	MISSISSIPPI
MISSOURI	9/30	23,386,956	4,584,274	18,689,552	95,955	-	8,791,070	6,784,350	531,352	-	2,382,985	-	MISSOURI
MONTANA	5/30	4,082,414	251,573	3,830,741	-	-	-	1,743,878	41,440	-	1,746,846	300,180	MONTANA
NEBRASKA	12/31	7,394,151	244,877	7,139,474	-	100,000	1,149,787	3,932,083	-	-	1,816,034	141,550	NEBRASKA
NEVADA	11/30	2,191,348	-	2,235,262	8,647	-	249,111	259,731	275,682	100,000	1,040,934	301,157	NEVADA
NEW HAMPSHIRE	12/31	8,887,516	1,318,184	5,569,392	-	-	1,906,427	1,412,601	372,580	-	372,580	1,646,222	NEW HAMPSHIRE
NEW JERSEY	12/31	39,728,695	10,135,215	29,592,581	2,624,827	-	12,247,354	8,352,255	2,068	5,010,077	732,184	513,975	NEW JERSEY
NEW MEXICO	12/31	7,598,074	307,441	7,290,633	715,751	-	371,533	1,959,714	31,434	2,153,424	1,819,449	238,229	NEW MEXICO
NORTH CAROLINA	5/30	105,824,633	44,586,290	62,255,343	-	5/29 465,169	80,000,000	9,375,988	72,791	10,000,000	3,535,217	9,075,185	NORTH CAROLINA
NORTH DAKOTA	12/31	42,293,334	9,812,428	32,580,906	-	170,000	9,566,719	1,460,081	277,624	-	1,715,910	194,655	NORTH DAKOTA
OHIO	12/31	37,684,317	954,584	35,309,752	-	175,364	6,078,757	16,472,006	583,210	-	3,347,314	10,555,073	OHIO
OKLAHOMA	12/31	31,029,697	1,024,697	29,990,999	-	-	2,925,609	3,887,989	1,111,874	-	1,597,995	3,875,513	OKLAHOMA
OREGON	11/30	1,037,883	84,019	953,864	-	-	2,925,609	3,887,989	15,872	-	522,440	5,883,526	OREGON
PENNSYLVANIA	12/31	80,053,951	24,148,595	55,907,355	-	15,110	27,212,913	18,789,882	204,597	-	3,620,595	5,893,850	PENNSYLVANIA
RHODE ISLAND	11/30	7,724,415	3,342,874	4,381,600	-	9,498	2,295,951	1,299,972	5,000	255,092	425,280	70,000	RHODE ISLAND
SOUTH CAROLINA	12/31	27,800,358	9,194,115	18,506,237	-	-	2,366,954	3,285,686	143,988	-	1,134,182	11,575,525	SOUTH CAROLINA
SOUTH DAKOTA	5/30	5,000,568	6,250	5,994,318	33,686	600,000	1,455,724	2,272,031	61,391	-	1,586,487	-	SOUTH DAKOTA
TENNESSEE	5/30	24,837,771	-	25,002,853	1,705	-	3,957,464	4,638,134	135,019	8,010,608	1,151,092	7,099,027	TENNESSEE
TEXAS	9/31	39,290,288	5,850,201	33,430,087	-	-	9,958,824	14,408,319	225,346	-	4,277,455	4,559,352	TEXAS
UTAH	12/31	4,719,618	7/ 91,770	4,685,048	-	-	413,000	2,215,500	264,553	-	1,106,418	624,467	UTAH
VERMONT	6/30	10,005,200	85,704	8,909,496	355,999	344,608	2,034,333	971,983	254,531	5,000,000	594,118	243,924	VERMONT
VIRGINIA	5/30	15,400,832	994,398	15,428,436	1,337,850	719,560	5,080,969	5,546,184	1,210,425	-	1,439,050	124,748	VIRGINIA
WASHINGTON	12/31	13,653,175	13,653,175	-	-	-	5,251,011	4,172,568	-	-	1,379,931	2,059,575	WASHINGTON
WEST VIRGINIA	5/30	18,246,146	4,593,918	13,652,228	-	-	4,355,371	4,248,396	26,672	4,250,000	2,681,264	3,375	WEST VIRGINIA
WISCONSIN	6/30	28,521,445	4,003,440	22,260,795	-	-	10,624,916	5,567,316	950,650	-	1,569,100	2,357,600	WISCONSIN
WYOMING	12/31	4,058,689	525,482	3,533,407	98,639	-	555,578	351,944	497,721	-	1,350,516	29,007	WYOMING
TOTAL		1,035,485,474	186,159,875	849,325,598	11,955,782	42,468,396	259,134,250	234,163,806	12,511,916	121,483,599	80,798,355	86,709,904	TOTAL

REMARK: ABOVE FUNDS GENERALLY APPLICABLE TO STATE HIGHWAY FINANCING

1/ APPROPRIATION FOR STATE HIGHWAY BOND INTEREST AND RETIREMENTS.  
2/ TAX LEVY FOR BOND PAYMENTS.  
3/ COUNTY BOND SALE PROCEEDS FOR USE ON STATE HIGHWAYS.  
4/ DATA FOR 9 MONTHS ONLY, JULY 1 TO MAR. 31, AS FISCAL YEAR WAS CHANGED.

5/ INCLUDES \$35,409 FROM U.S. GOVERNMENT OIL ROYALTIES.  
6/ INCLUDES \$6,485,400 FOR COUNTIES AND TOWNS.  
7/ LOAN SURPLUS BALANCE SHOWN IN 1927 UNEXPENDED BALANCE, EXCLUDED HERE.  
8/ INCLUDES \$418,944 FROM U.S. GOVERNMENT OIL ROYALTIES.



STATE HIGHWAY OMBURSEMENTS DURING 1958,  
FOR STATE HIGHWAY AND BRIDGE WORK UNDER SUPERVISION OF STATE HIGHWAY DEPARTMENTS  
INCLUDING PRINCIPAL PAYMENTS ON BONDS AND NOTES, AND TRANSFERS TO LOCAL AUTHORITIES  
(COMPILED FROM REPORTS OF STATE AUTHORITIES)

F-2 (1958)  
R. S. A.

STATE	FISCAL YEAR ENDS	EXPENDITURE FOR STATE HIGHWAY PURPOSES										OTHER OMBURSEMENTS BY STATE HIGHWAY DEPARTMENT			STATE
		GRAND TOTAL OMBURSEMENT BY STATE HIGHWAY DEPARTMENT	TOTAL EXPENDITURE FOR STATE HIGHWAYS	CONSTRUCTION AND RIGHT-OF-WAY	MAINTENANCE	MISCELLANEOUS EXPENSES	EQUIPMENT AND MACHINERY	INTEREST ON BONDS AND NOTES OUTSTANDING	PRINCIPAL PAYMENT ON BONDS AND NOTES	TRANSFERS TO COUNTY OR TOWN FOR LOCAL ROADS	UNEXPENDED BALANCE AT THE END OF FISCAL YEAR				
ALABAMA	9/30	\$20,110,222	\$19,291,159	\$15,081,550	\$759,383	\$39,154	\$2,153,708	\$1,257,364	\$819,063	-	8912,521	ALABAMA			
ARIZONA	6/30	2,442,934	2,442,934	1,001,307	869,197	243,463	243,463	-	-	-	755,577	ARIZONA			
ARKANSAS	12/31	31,783,516	23,812,065	20,267,558	2,173,454	325,346	2,173,454	861,250	6,503,614	\$1,468,237	4,559,949	ARKANSAS			
CALIFORNIA	12/31	24,964,977	23,189,977	14,507,866	5,127,537	565,673	565,673	2,989,102	2,177,500	-	13,570,137	CALIFORNIA			
COLORADO	11/30	6,957,124	6,367,124	4,443,369	945,393	6,164	615,886	441,122	600,000	-	1,516,886	COLORADO			
CONNECTICUT	9/30	15,171,364	15,171,364	10,089,216	3,869,705	93,690	3,869,705	-	-	-	6,574,966	CONNECTICUT			
DELAWARE	12/31	14,342,749	14,342,749	11,685,556	1,206,472	185,420	1,206,472	4	288,260	-	6,574,966	DELAWARE			
FLORIDA	12/31	14,342,749	14,342,749	12,427,815	1,536,023	131,269	225,642	841,663	-	-	234,603	FLORIDA			
GEORGIA	12/31	12,728,478	12,728,478	10,863,916	1,284,720	13,807	565,055	137,822	139,600	-	440,871	GEORGIA			
IDAHO	12/31	5,412,824	6,273,324	4,095,674	796,017	155,841	87,770	1,378,822	-	-	34,550	IDAHO			
ILLINOIS	12/31	63,471,582	61,472,562	44,278,615	2,409,341	428,025	2,065,885	4,150,016	1,959,000	-	3,926,145	ILLINOIS			
INDIANA	9/30	16,643,882	16,643,882	12,495,075	3,217,930	-	8,30,817	-	-	-	1,944,432	INDIANA			
IOWA	11/30	37,264,891	34,398,120	29,508,750	3,809,985	220,469	3,809,985	858,916	637,500	2,219,271	6,384,946	IOWA			
KANSAS	12/31	13,903,616	13,903,616	10,960,772	2,384,522	558,322	2,384,522	137,047	-	505,004	105,422	KANSAS			
KENTUCKY	3/31	14,755,592	14,260,580	12,207,460	1,515,381	16,326	384,374	124,000	457,311	13,432	1,596,903	KENTUCKY			
LOUISIANA	12/31	11,195,551	10,685,808	7,137,584	2,505,852	248,858	2,505,852	124,000	-	-	1,054,567	LOUISIANA			
MAINE	11/30	11,052,237	10,571,937	7,453,482	1,702,586	245,277	1,702,586	563,566	481,000	-	1,314,146	MAINE			
MARYLAND	9/30	10,569,237	10,659,237	5,689,205	4,869,736	119,413	4,869,736	924,529	-	2,677,308	1,877,614	MARYLAND			
MASSACHUSETTS	12/31	16,477,614	13,800,305	10,744,205	1,906,516	80,196	1,906,516	2,248,637	2,686,844	9,812,734	1,032,919	MASSACHUSETTS			
MICHIGAN	6/30	36,577,754	24,098,176	15,232,315	5,518,937	654,653	5,518,937	1,594,455	160,886	-	4,376,628	MICHIGAN			
MINNESOTA	12/31	18,411,393	18,251,107	11,052,839	4,724,172	-	879,591	1,594,455	-	-	11,252,149	MINNESOTA			
MISSISSIPPI	1/31	6,281,170	6,281,170	3,395,154	2,547,641	127,140	211,235	-	1,000,000	-	1,020,348	MISSISSIPPI			
MISSOURI	12/31	18,981,065	17,981,065	9,12,693,190	2,571,695	132,626	471,264	2,112,500	1,000,000	-	4,358,501	MISSOURI			
MONTANA	6/30	3,863,324	3,863,324	3,327,570	410,485	-	125,869	-	-	-	219,090	MONTANA			
NEBRASKA	12/31	6,984,161	6,984,161	4,970,623	1,906,167	-	1,906,167	-	-	-	400,000	NEBRASKA			
NEVADA	11/30	2,167,329	2,057,329	1,362,542	390,146	52,008	234,798	27,835	100,000	-	54,019	NEVADA			
NEW HAMPSHIRE	12/31	5,552,969	5,469,432	2,534,249	2,609,064	54,882	271,237	405,016	83,487	60,000	1,334,587	NEW HAMPSHIRE			
NEW JERSEY	3/31	32,479,196	31,700,305	26,144,318	5,125,783	22,035	3,154	-	718,891	-	7,249,700	NEW JERSEY			
NEW MEXICO	12/31	6,603,106	5,946,005	4,139,841	1,082,842	26,964	565,234	98,989	555,500	6,485,400	984,968	NEW MEXICO			
NEW YORK	12/31	62,503,413	56,616,013	42,512,769	9,878,290	868,646	9,878,290	4,200,000	400,000	3,626,338	44,324,260	NEW YORK			
NORTH CAROLINA	6/30	28,301,350	24,675,012	14,579,570	4,505,948	868,646	4,505,948	4,730,848	-	-	17,951,166	NORTH CAROLINA			
NORTH DAKOTA	12/31	3,564,110	3,564,110	2,680,155	748,934	38,441	96,580	-	-	-	211,395	NORTH DAKOTA			
OHIO	12/31	33,963,211	33,953,211	21,216,768	11,624,672	890,705	222,066	-	-	-	3,311,105	OHIO			
OKLAHOMA	12/31	13,250,526	13,250,526	10,205,627	2,779,988	241,601	22,310	-	-	-	237,832	OKLAHOMA			
OREGON	11/30	10,268,246	8,618,245	3,421,039	3,323,086	188,049	3,323,086	1,586,061	1,750,000	-	769,268	OREGON			
PENNSYLVANIA	12/31	56,615,590	51,850,356	22,075,765	17,570,406	9/3,733,207	4,179,578	4,291,420	2,746,627	2,019,607	21,788,857	PENNSYLVANIA			
RHODE ISLAND	11/30	4,548,137	4,453,686	2,111,488	1,817,698	56,748	281,731	186,020	64,053	30,399	3,176,279	RHODE ISLAND			
SOUTH CAROLINA	12/31	21,038,868	18,975,851	16,294,047	2,151,658	568	539,678	4,100	-	2,123,017	6,701,484	SOUTH CAROLINA			
SOUTH DAKOTA	12/31	5,492,738	5,952,738	3,551,334	1,972,470	357,314	6,720	4,100	-	-	107,830	SOUTH DAKOTA			
TENNESSEE	6/30	19,171,577	19,171,577	12,815,005	4,699,109	97,779	1,198,114	161,570	-	-	5,666,194	TENNESSEE			
TEXAS	8/31	28,710,177	28,710,177	14,433,793	12,327,195	358,919	1,680,280	325,000	412,500	-	10,580,121	TEXAS			
UTAH	12/31	3,932,354	3,579,854	2,081,636	814,991	100,500	823,478	157,945	-	210,000	4,234,256	UTAH			
VERMONT	6/30	5,751,972	5,751,972	3,913,435	1,525,478	-	323,478	-	-	-	1,962,366	VERMONT			
VIRGINIA	6/30	14,448,466	14,238,465	10,487,488	3,513,706	79,417	3,513,706	-	-	-	4,234,256	VIRGINIA			
WASHINGTON	12/31	13,893,176	11,833,500	8,952,661	2,866,481	507,297	388,473	2,136,038	2,640,000	2,053,676	4,444,458	WASHINGTON			
WEST VIRGINIA	12/31	16,223,856	13,566,758	7,539,298	2,995,652	143,470	18,523	94,325	-	-	6,237,348	WEST VIRGINIA			
WISCONSIN	6/30	20,016,758	16,541,465	12,637,159	3,742,314	-	18,523	-	-	-	5,666,194	WISCONSIN			
WYOMING	12/31	3,599,947	3,599,947	2,516,562	979,107	-	9,953	-	-	-	489,942	WYOMING			
TOTALS		827,649,983	784,646,134	536,234,303	159,878,573	11,332,741	20,505,483	37,637,034	27,016,493	35,885,350	205,221,665	TOTALS			

1/ INCLUDES PRO RATA SHARE OF ADMINISTRATION, ENGINEERING, MATERIALS AND SUPPLIES.  
2/ INTEREST AND RETIREMENT PAYMENTS ON BONDS, NOT THROUGH STATE HIGHWAY DEPARTMENT.  
3/ EQUIPMENT AND MACHINERY EXPENDITURES INCLUDED IN MAINTENANCE.  
4/ EXPENSES ON COUNTY BONDS REGISTERED IN STATE.  
5/ COUNTY BOND INTEREST EXCLUDED FROM STATE.  
6/ DATA FOR 9 MONTHS ONLY; JULY 1 TO MARCH 31, AS FISCAL YEAR WAS CHANGED.  
7/ EXCLUDES OMBURSEMENTS OF \$1,065,422 IN OILTES UNDER SUPERVISION OF STATE HIGHWAY DEPARTMENT.  
8/ EXCLUDES \$924,049 OF MAINTENANCE RECONSTRUCTION.  
9/ EXCLUDES \$1,649,504 FOR REGISTRATION OF MOTOR VEHICLES.



M-2 (1927)  
R-8-A.

MILES OF COUNTY AND OTHER LOCAL RURAL ROADS  
BUILT TO GRADE, AND MILES SURFACED DURING 1927  
(ROADS NOT ON STATE HIGHWAY SYSTEMS)

(FROM RECORDS AND REPORTS OF COUNTY AUTHORITIES)

STATES	TOTAL MILES GRADED, & MILES SURFACED	EARTH IMPROVED, GRADED & RAINED	TOTAL MILES OF ROAD SURFACED	SAND-CLAY AND TOP-SOIL	GRAVEL, TREATED AND UNTREATED	WATERGOUND, MACADAM, TREATED AND UNTREATED	BITUMINOUS BY ASPHALT PENETRATION	BITUMINOUS CONCRETE	PORTLAND CEMENT CONCRETE	VITRIFIED BRICK	BLOCK: ASPHALT, WOOD, STONE	STATES
ALABAMA	719.3	168.0	680.3	269.4	240.8	19.0	6.6	13.1	11.6	1.0	-	ALABAMA
ARIZONA	169.6	99.0	70.6	-	70.6	-	-	-	-	-	-	ARIZONA
ARKANSAS	215.0	200.0	16.0	-	15.0	-	-	-	-	-	-	ARKANSAS
CALIFORNIA	5,455.0	1,666.0	3,890.0	500.0	2,912.0	44.0	177.0	104.0	153.0	-	-	CALIFORNIA
COLORADO	623.0	404.0	219.0	7.0	812.0	-	-	-	-	-	-	COLORADO
CONNECTICUT	26.0	-	26.0	-	14.1	1.0	6.0	0.5	3.9	0.5	-	CONNECTICUT
DELAWARE	13.0	-	13.0	-	4.0	4.2	0.3	4.0	0.5	-	-	DELAWARE
FLORIDA	1,952.3	841.7	1,110.6	59.6	13.0	959.0	15.3	26.7	48.4	24.5	8.0 (ASPHALT)	FLORIDA
GEORGIA	1,622.1	724.9	897.2	788.3	0.7	-	-	-	-	-	-	GEORGIA
IOWA	1,141.0	597.0	544.0	84.0	458.0	11.0	2.2	2.0	92.8	0.5	-	IOWA
ILLINOIS	769.9	44.0	711.9	-	681.1	49.9	25.5	3.2	147.8	2.3	-	ILLINOIS
INDIANA	812.7	-	812.7	-	681.1	-	-	-	-	-	-	INDIANA
IOWA	2,497.7	633.0	1,864.7	-	1,860.8	-	-	-	3.9	-	-	IOWA
KANSAS	1,097.1	678.0	619.1	239.2	255.9	10.8	10.0	1.0	2.2	0.8	-	KANSAS
KENTUCKY	624.3	101.6	522.8	4.3	240.5	271.1	6.1	-	0.8	-	-	KENTUCKY
LOUISIANA	1,302.3	607.5	694.8	6.4	683.3	3.4	-	1.7	-	-	-	LOUISIANA
MAINE	363.6	0.9	362.6	-	361.4	-	0.6	-	0.7	-	-	MAINE
MARYLAND	262.8	60.0	202.8	-	136.5	49.8	1.0	2.8	12.7	-	-	MARYLAND
MASSACHUSETTS	314.4	100.0	214.4	11.4	140.8	5.3	40.1	16.8	12.7	-	-	MASSACHUSETTS
MICHIGAN	1,159.5	74.8	1,083.7	-	814.4	76.5	21.3	-	166.0	-	-	MICHIGAN
MINNESOTA	4,697.3	1,260.1	3,437.2	655.4	2,774.9	-	-	1.8	5.1	-	-	MINNESOTA
MISSISSIPPI	1,147.4	136.9	1,010.5	-	1,010.5	-	-	-	-	-	-	MISSISSIPPI
MISSOURI	542.5	363.0	189.5	-	160.0	21.2	5.0	-	3.3	-	-	MISSOURI
MONTANA	144.8	-	144.8	-	143.8	-	-	-	-	-	-	MONTANA
NEBRASKA	1,786.6	1,500.0	286.6	165.5	117.0	-	1.6	-	2.6	-	-	NEBRASKA
NEVADA	101.5	58.5	43.0	13.0	30.0	-	0.6	0.6	-	-	-	NEVADA
NEW HAMPSHIRE	26.9	2.0	24.9	-	23.6	-	0.2	-	-	-	-	NEW HAMPSHIRE
NEW JERSEY	414.9	-	414.9	-	132.8	39.3	95.3	29.8	97.2	-	2.6 (STONE)	NEW JERSEY
NEW MEXICO	207.6	125.5	82.1	-	82.1	-	-	-	-	-	-	NEW MEXICO
NEW YORK	1,441.2	576.0	1,441.2	644.0	396.2	273.7	685.8	-	146.5	-	-	NEW YORK
NORTH CAROLINA	1,520.0	576.0	944.0	644.0	186.0	29.0	40.0	11.0	34.0	-	-	NORTH CAROLINA
NORTH DAKOTA	79.8	-	79.8	-	79.8	-	-	-	-	-	-	NORTH DAKOTA
OHIO	3,112.0	921.0	2,191.0	-	1,639.0	269.0	192.0	1.0	69.0	19.0	-	OHIO
OKLAHOMA	678.0	550.0	128.0	-	180.0	-	-	-	8.0	-	-	OKLAHOMA
OREGON	188.0	94.8	93.4	-	79.2	-	-	-	14.2	-	-	OREGON
PENNSYLVANIA	958.5	130.6	827.9	-	519.9	125.5	50.5	70.1	63.1	6.7	-	PENNSYLVANIA
RHODE ISLAND	49.1	34.4	14.8	-	14.8	13.1	6.6	-	-	-	-	RHODE ISLAND
SOUTH CAROLINA	704.8	38.1	666.7	651.1	5.3	7.0	-	-	-	-	-	SOUTH CAROLINA
SOUTH DAKOTA	5,260.6	4,960.8	299.8	-	269.8	-	-	-	-	-	-	SOUTH DAKOTA
TENNESSEE	1,754.0	794.8	959.2	-	469.9	473.4	12.0	1.0	1.8	-	-	TENNESSEE
TEXAS	1,065.0	615.0	440.0	-	426.0	-	-	-	15.0	-	-	TEXAS
UTAH	203.3	-	203.3	-	203.3	-	-	-	-	-	-	UTAH
VERMONT	150.0	210.0	100.0	170.0	100.0	-	-	-	20.0	-	-	VERMONT
VIRGINIA	715.0	505.0	505.0	170.0	125.0	130.0	60.0	-	-	-	-	VIRGINIA
WASHINGTON	3,154.8	2,449.1	705.7	108.6	550.0	-	0.2	2.6	46.9	-	-	WASHINGTON
WEST VIRGINIA	433.7	235.7	198.0	-	80.8	49.9	30.3	-	150.0	0.4	-	WEST VIRGINIA
WISCONSIN	7,835.3	3,731.8	4,103.5	656.2	3,034.1	263.2	-	-	-	-	-	WISCONSIN
WYOMING	255.9	242.7	13.2	-	13.2	-	-	-	-	-	-	WYOMING
TOTALS	59,732.0	25,880.2	33,851.8	5,024.3	22,399.3	3,196.9	1,476.8	84.5	1,343.8	54.9	13.6	TOTALS

NOTES: 1/ READY FOR SURFACING  
2/ INCLUDED NEW ORIGINAL SURFACING AND RECONSTRUCTED SURFACING  
3/ STONE BLOCK SURFACED WITH 1-1/2" OF BITUMINOUS MACADAM



UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PUBLIC ROADS

MILEAGE OF EXISTING LOCAL RURAL ROADS, 1927  
(LOCAL ROADS INCLUDE COUNTY AND TOWNSHIP ROADS, AND EXCLUDE STATE HIGHWAYS)

(FROM RECORDS AND REPORTS OF COUNTY AUTHORITIES)

STATES	TOTAL LOCAL MILEAGE	EARTH ROADS - TOTAL NON-SURFACED LOCAL MILEAGE	TOTAL SURFACED LOCAL MILEAGE	SAND-CLAY AND TOP-SOIL	GRAVEL, CHERT, ETC.	TREATED & UNTREATED WATERBOUND MACADAM	SURFACED LOCAL ROADS, BY TYPE				BLOCK PAVEMENTS			STATES
							BITUMINOUS MACADAM, BY PENETRATION	SHEET ASPHALT	BITUMINOUS CONCRETE	PORTLAND CEMENT CONCRETE	VITRIFIED BRICK	ASPHALT	WOOD	
ALABAMA	59,787	43,887	15,920	8,282	7,111	259	44	2	47	70	5	-	-	ALABAMA
ARIZONA	19,625	17,941	1,684	250	1,079	25	-	64	13	263	-	-	-	ARIZONA
ARKANSAS	66,033	64,196	1,843	210	1,574	46	7	1	1	6	-	-	-	ARKANSAS
CALIFORNIA	78,633	58,607	19,975	1,607	11,932	1,114	2,152	9	1,044	2,058	-	-	-	CALIFORNIA
COLORADO	59,184	56,671	2,613	1,315	1,292	-	-	-	2	4	-	-	-	COLORADO
CONNECTICUT	12,021	10,493	1,528	-	986	378	74	7	7	83	-	-	-	CONNECTICUT
DELAWARE	2,869	2,869	298	-	79	160	21	-	-	7	1	-	-	DELAWARE
FLORIDA	23,244	12,727	10,517	3,417	988	4,652	175	636	68	78	248	265	-	FLORIDA
GEORGIA	92,082	82,672	9,610	7,692	73	288	288	38	38	188	2	-	-	GEORGIA
IDAHO	33,130	27,349	5,781	2,112	3,668	439	78	23	41	1,186	117	-	-	IDAHO
ILLINOIS	87,740	74,681	13,049	11,205	1,844	1,623	237	18	177	1,093	154	-	-	ILLINOIS
INDIANA	69,245	23,310	45,935	-	42,675	1,623	297	-	-	-	-	-	-	INDIANA
IOWA	96,566	89,197	7,369	-	7,363	-	-	-	-	6	-	-	-	IOWA
KANSAS	119,698	119,698	1,622	680	807	76	35	7	1	39	2	-	-	KANSAS
KENTUCKY	51,614	40,581	11,093	159	3,966	6,886	55	2	6	20	-	-	-	KENTUCKY
LOUISIANA	25,141	20,865	4,275	22	4,254	13	5	-	6	1	-	-	-	LOUISIANA
MAINE	19,214	16,877	3,337	9	3,298	15	14	-	-	-	-	-	-	MAINE
MARYLAND	12,192	9,404	2,788	143	1,647	896	7	4	-	-	-	-	-	MARYLAND
MASSACHUSETTS	17,768	10,838	6,920	19	4,362	375	1,077	4	409	91	5	2	10	MASSACHUSETTS
MICHIGAN	73,872	67,487	16,385	19	13,758	1,312	139	7	70	1,076	5	-	-	MICHIGAN
MINNESOTA	103,313	77,468	26,866	5,578	20,084	72	-	11	18	98	-	-	-	MINNESOTA
MISSISSIPPI	50,052	41,594	8,458	204	8,010	32	50	7	71	79	5	-	-	MISSISSIPPI
MISSOURI	103,066	95,239	7,825	1,462	4,955	1,810	92	-	61	56	-	-	-	MISSOURI
MONTANA	58,984	67,200	1,724	120	1,600	2	2	-	-	24	3	-	-	MONTANA
NEBRASKA	87,736	87,037	639	196	401	-	-	-	9	-	-	-	-	NEBRASKA
NEVADA	20,107	19,630	477	16	461	-	-	-	-	-	-	-	-	NEVADA
NEW HAMPSHIRE	9,715	9,394	321	23	265	22	10	-	3	-	-	-	-	NEW HAMPSHIRE
NEW JERSEY	14,856	8,468	6,398	74	3,446	1,022	398	354	465	576	4	6	1	NEW JERSEY
NEW MEXICO	39,584	39,584	351	66	266	-	-	-	-	-	-	-	-	NEW MEXICO
NORTH CAROLINA	25,560	46,263	19,277	17,960	6,693	7,084	4,668	-	-	842	-	-	-	NEW YORK
NORTH CAROLINA	84,447	42,862	21,585	2,730	2,600	1,855	518	90	30	250	25	-	-	NORTH CAROLINA
NORTH DAKOTA	99,609	96,971	638	-	638	-	-	-	-	-	-	-	-	NORTH DAKOTA
OHIO	73,753	59,672	34,081	-	25,012	6,926	2,145	49	47	634	268	-	-	OHIO
OKLAHOMA	117,485	116,019	1,466	219	1,124	2	11	8	6	96	-	-	-	OKLAHOMA
OREGON	47,265	38,860	8,405	234	6,594	1,050	9	-	362	156	-	-	-	OREGON
PENNSYLVANIA	79,074	63,358	15,706	-	11,878	1,955	518	67	430	530	417	3	8	PENNSYLVANIA
RHODE ISLAND	1,671	1,287	374	-	174	101	56	20	20	1	-	-	-	RHODE ISLAND
SOUTH CAROLINA	50,537	41,218	9,319	9,062	189	-	-	-	46	12	-	-	-	SOUTH CAROLINA
SOUTH DAKOTA	114,250	113,059	60,645	-	1,181	3,662	38	8	7	64	-	-	-	SOUTH DAKOTA
TENNESSEE	159,836	155,930	13,846	2,634	10,450	467	40	26	20	169	-	-	-	TENNESSEE
TEXAS	19,980	18,367	1,613	25	1,614	-	-	-	24	41	-	-	-	TEXAS
UTAH	10,810	9,363	1,447	143	1,300	-	-	3	24	185	-	-	-	UTAH
VIRGINIA	52,890	45,254	7,035	3,710	1,691	1,280	330	-	-	125	-	-	-	VIRGINIA
WASHINGTON	43,635	39,550	4,085	933	10,348	1,654	44	-	124	780	42	-	-	WASHINGTON
WEST VIRGINIA	30,979	29,476	1,503	601	2,154	214	374	4	37	222	49	-	2	WEST VIRGINIA
WISCONSIN	69,248	52,108	17,145	2,874	13,175	739	-	-	-	368	-	-	-	WISCONSIN
WYOMING	42,205	41,877	328	97	231	-	-	-	-	-	-	-	-	WYOMING
TOTALS	2,760,231	2,308,076	412,155	71,770	263,088	45,600	13,686	1,454	3,680	11,438	1,362	265	4	TOTALS





# STATE HIGHWAY SYSTEMS - MILEAGE BUILT DURING 1928

(COMPILED FROM REPORTS OF STATE AUTHORITIES)

STATES (YEAR ENDS DECEMBER 31 EXCEPT AS NOTED)	TOTAL MILEAGE GRADED AND SURFACED	EARTH IMPROVED GRADED AND DRAINED	NEW SURFACING PLACED			SAND-CLAY AND TOP-SOIL NEW	GRAVEL, ETC. (TREATED AND UNTREATED)		WATERBOUND MACADAM (TREATED AND UNTREATED)		BITUMINOUS MACADAM BY PENETRATION		SHEET ASPHALT		BITUMINOUS CONCRETE		PORTLAND CEMENT CONCRETE		VITRIFIED BRICK		BLOCK- ASPHALT, WOOD, STONE(S) NEW	STATES	
			TOTAL	ON EARTH ROADS			OTHER TYPES (RECON- STRUCTION)	NEW	RECON	NEW	RECON	NEW	RECON	NEW	RECON	NEW	RECON	NEW	RECON	NEW			RECON
				ON WORN-OUT SAME TYPE	TYPE - SAME																		
ALABAMA	680	79	407	185	49	98	259	48	9	18	17	132	-	-	11	132	-	-	-	-	ALABAMA		
ARIZONA	135	10	700	32	13	27	594	13	-	-	11	60	-	-	1	60	-	-	-	-	ARIZONA		
ARKANSAS	1,573	83	700	36	13	27	594	13	-	-	11	60	-	-	1	60	-	-	-	-	ARKANSAS		
CALIFORNIA	598	85	249	466	229	-	258	202	-	19	49	24	-	-	30	24	-	-	-	-	CALIFORNIA		
COLORADO	146	8	109	28	1	77	-	-	-	-	7	81	-	-	11	81	-	-	-	-	COLORADO		
CONNECTICUT	184	-	63	110	81	-	3	1	47	31	18	41	-	-	3	41	-	-	-	-	CONNECTICUT		
DELAWARE	61	-	69	1	1	-	-	-	147	8	39	28	-	-	17	28	-	-	-	-	DELAWARE		
FLORIDA	670	382	196	62	-	11	-	-	-	-	41	-	-	-	-	-	-	-	-	-	FLORIDA		
GEORGIA	709	162	432	90	35	106	178	33	81	48	7	65	-	-	7	65	-	-	-	-	GEORGIA		
IDAH0	701	90	214	33	364	2	235	364	-	6	-	6	-	-	-	6	-	-	-	-	IDAH0		
ILLINOIS	1,344	274	1,068	2	-	-	-	-	-	-	-	1,043	-	-	-	1,043	-	-	-	-	ILLINOIS		
INDIANA	669	245	414	78	61	-	43	37	-	16	24	235	-	-	-	235	-	-	-	-	INDIANA		
IOWA	1,346	307	741	287	-	-	298	-	-	-	-	740	-	-	-	740	-	-	-	-	IOWA		
KANSAS	1,726	1,032	745	697	464	646	74	18	-	8	-	94	-	-	-	94	-	-	-	-	KANSAS		
KENTUCKY	1,082	46	200	19	23	-	200	23	220	43	6	59	-	-	6	59	-	-	-	-	KENTUCKY		
LOUISIANA	988	-	84	11	13	-	71	4	-	-	-	12	-	-	-	12	-	-	-	-	LOUISIANA		
MAINE	108	-	149	128	87	16	24	-	-	-	4	95	-	-	8	95	-	-	-	-	MAINE		
MARYLAND	148	-	149	25	37	37	-	1	6	7	4	6	-	-	13	6	-	-	-	-	MARYLAND		
MASSACHUSETTS	148	-	286	178	214	-	45	91	87	30	-	339	-	-	31	339	-	-	-	-	MASSACHUSETTS		
MICHIGAN	763	85	678	178	214	-	45	91	87	30	-	339	-	-	31	339	-	-	-	-	MICHIGAN		
MINNESOTA	1,243	204	63	261	726	3	208	726	-	-	7	96	-	-	7	96	-	-	-	-	MINNESOTA		
MISSISSIPPI	366	183	220	21	2	-	165	2	-	1	-	84	-	-	-	84	-	-	-	-	MISSISSIPPI		
MISSOURI	571	216	365	-	-	-	216	4	-	-	-	140	-	-	-	140	-	-	-	-	MISSOURI		
MONTANA	352	38	280	-	4	-	273	4	-	-	-	4	-	-	-	4	-	-	-	-	MONTANA		
NEBRASKA	657	213	438	6	16	22	431	-	-	-	-	107	-	-	-	107	-	-	-	-	NEBRASKA		
NEVADA	218	2	118	94	42	7	86	19	4	-	-	12	-	-	3	12	-	-	-	-	NEVADA		
NEW HAMPSHIRE	136	84	22	61	7	-	2	1	-	-	-	2	-	-	-	2	-	-	-	-	NEW HAMPSHIRE		
NEW JERSEY	84	4	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NEW JERSEY		
NEW MEXICO	1,062	788	264	-	47	-	216	46	-	-	-	42	-	-	40	42	-	-	-	-	NEW MEXICO		
NEW YORK	743	38	706	351	304	50	22	22	1	42	11	661	-	-	39	661	-	-	-	-	NEW YORK		
NORTH CAROLINA	463	-	447	-	447	6	60	-	-	90	-	297	-	-	6	297	-	-	-	-	NORTH CAROLINA		
NORTH DAKOTA	1,230	668	518	-	163	-	618	163	-	-	-	-	-	-	-	-	-	-	-	-	NORTH DAKOTA		
OHIO	988	73	791	-	64	-	400	3	29	4	79	219	-	-	18	219	-	-	-	-	OHIO		
OKLAHOMA	598	396	202	208	-	-	73	86	-	-	-	118	-	-	84	118	-	-	-	-	OKLAHOMA		
OREGON	333	70	263	73	104	86	104	86	2	-	104	27	-	-	20	27	-	-	-	-	OREGON		
PENNSYLVANIA	30	-	30	16	3	-	-	-	1	6	2	-	-	-	-	-	-	-	-	-	PENNSYLVANIA		
RHODE ISLAND	49	-	32	17	-	-	-	-	2	-	31	13	-	-	-	13	-	-	-	-	RHODE ISLAND		
SOUTH CAROLINA	668	73	587	221	167	116	590	21	-	-	81	187	-	-	81	187	-	-	-	-	SOUTH CAROLINA		
SOUTH DAKOTA	812	280	516	16	6	-	74	6	116	34	8	82	-	-	-	82	-	-	-	-	SOUTH DAKOTA		
TENNESSEE	516	196	320	240	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	TENNESSEE		
TEXAS	2,356	648	1,708	230	-	-	408	9	39	-	878	421	-	-	421	421	-	-	-	-	TEXAS		
UTAH	305	28	277	220	48	9	119	7	-	-	5	10	-	-	10	10	-	-	-	-	UTAH		
VERMONT	183	-	183	140	36	7	18	-	-	-	57	62	-	-	62	62	-	-	-	-	VERMONT		
VIRGINIA	217	63	154	-	-	14	-	-	-	-	-	65	-	-	-	65	-	-	-	-	VIRGINIA		
WASHINGTON	239	102	68	18	51	-	37	51	-	-	49	49	-	-	49	49	-	-	-	-	WASHINGTON		
WEST VIRGINIA	368	154	182	22	-	-	62	44	43	-	49	44	-	-	44	44	-	-	-	-	WEST VIRGINIA		
WISCONSIN	830	31	799	96	182	631	64	444	21	87	-	183	-	-	183	183	-	-	-	-	WISCONSIN		
WYOMING	596	278	308	-	35	-	273	35	-	-	-	273	-	-	-	273	-	-	-	-	WYOMING		
TOTAL	29,262	8,676	20,677	13,843	3,567	1,919	47,170	2,453	776	230	1,866	111	220	6	353	5,908	147	113	-	3	TOTAL		

NOTES: 1/ MILEAGE OF NEW SURFACING PLACED AND RECONSTRUCTED SURFACES SHOWN SEPARATELY.  
2/ FOR 3 MONTHS ONLY, JANUARY 1 TO MAY 15, 28 FISCAL YEAR CHANGED TO MAY 15.



STATE HIGHWAY SYSTEMS-EXISTING MILEAGE AT END OF 1928

(COMPILED FROM REPORTS OF STATE AUTHORITIES)

STATE	1928 YEAR ENDS	GRAND TOTAL			EARTH ROAD, NON-SURFACE				SURFACE ROAD BY TYPE					REVISIONS OF SYSTEM DURING YEAR		STATE			
		MILEAGE	STATE HIGHWAY SYSTEM	TOTAL SURFACE MILEAGE	TOTAL SURFACE MILEAGE	UNIMPROVED PARTLY GRADED	IMPROVED TO GRADE AND DRAINAGE	TOTAL SURFACE MILEAGE	SAND-CLAY AND TOP-BOIL	GRAVEL CHERT SHALE ETC. (TREATED & UNTREATED)	WATERBOUND BITUMINOUS MACADAM (TREATED & UNTREATED)	BY MACADAM & BITUMINOUS PENETRATION	SHEET ASPHALT	BITUMINOUS CONCRETE	PORTLAND CEMENT CONCRETE		BRICK	VITRIFIED BLOCK	ASPHALT
ALABAMA	9/30	5,590	2,450	2,850	2,740	800	1,468	46	63	6	118	239	239	1,671					
ARIZONA	12/31	2,213	335	627	1,586	27	1,355	137	51	15	51	137	137	171					
ARKANSAS	12/31	3,802	1,499	3,802	4,916	4,072	188	157	34	238	238	238	238	212					
CALIFORNIA	12/31	6,572	2,067	2,645	3,927	586	3,151	51	345	397	138	1,687	1,687	-1					
COLORADO	12/31	3,120	4,223	4,965	4,155	82	3,730	774	268	13	13	330	330	25					
CONNECTICUT	6/30	2,013	107	1,906	1,906	-	319	5	268	19	13	392	392	47					
DELAWARE	12/31	2,713	-	3,190	703	-	23	5	149	19	13	507	507	74					
FLORIDA	12/31	8,414	3,190	2,767	3,234	715	8	1,494	149	204	52	232	232	75					
GEORGIA	12/31	6,853	2,477	2,977	3,776	1,844	772	171	274	116	17	681	681	-127					
IOWA	12/31	4,259	1,987	1,419	2,372	1,419	2,126	5	132	5	132	56	56	40					
KANSAS	12/31	9,889	3,637	3,637	8,252	274	1,969	2,398	428	1	21	295	295	40					
KENTUCKY	12/31	11,500	6,521	842	6,137	842	5,082	16	123	1	123	60	60	246					
LOUISIANA	12/31	9,053	2,509	2,766	8,297	-	6,082	-	16	1	123	60	60	1,074					
MAINE	12/31	1,911	230	230	1,681	4	1,335	7	235	-	-	100	100	123					
MARYLAND	9/30	2,666	-	8	2,666	-	398	-	1,131	43	53	125	125	137					
MASSACHUSETTS	12/30	1,597	-	843	1,579	86	1,479	91	265	71	23	259	259	137					
MICHIGAN	12/31	7,613	738	738	6,770	86	3,479	589	128	-	266	2,421	2,421	469					
MINNESOTA	12/31	6,947	331	331	6,616	281	5,298	-	77	77	77	935	935	11					
MISSISSIPPI	12/31	6,839	2,403	1,794	4,535	1	4,071	11	51	8	14	360	360	40					
MISSOURI	12/31	7,527	3,259	2,000	4,268	1	2,480	94	112	112	14	1,373	1,373	50					
MONTANA	12/31	8,007	6,404	6,653	1,354	-	1,305	-	5	-	7	1	1	45					
NEBRASKA	12/31	8,012	4,135	4,135	3,677	154	3,334	-	154	3	13	95	95	1,845					
NEVADA	12/31	3,564	2,123	1,992	1,431	-	1,431	-	147	-	2	51	51	2					
NEW HAMPSHIRE	12/31	2,365	201	103	2,161	-	1,769	112	167	-	71	55	55	55					
NEW JERSEY	12/31	1,821	140	5	1,681	-	286	131	30	91	278	814	814	46					
NEW MEXICO	12/31	9,354	7,344	3,455	2,010	-	1,936	-	1	1	1	73	73	101					
NEW YORK	12/31	13,917	3,356	3,331	10,561	25	126	1,989	3,794	66	266	4,115	4,115	12					
NORTH CAROLINA	12/31	7,137	747	4,960	6,390	2,262	359	205	459	23	884	2,165	2,165	94					
NORTH DAKOTA	12/31	7,205	3,342	1,618	2,245	-	2,235	-	1	-	1	9	9	20					
OHIO	9/10, 9/31	8,100, 8,633	456	250	10,487	-	3,837	1,496	1,716	39	174	1,812	1,812	47					
OKLAHOMA	12/31	6,178	2,737	4,178	3,290	-	2,483	-	21	21	197	812	812	-25					
OREGON	12/31	3,388	644	876	3,166	-	1,513	-	112	133	687	208	208	20					
PENNSYLVANIA	5/15	13,359	4,164	4,164	9,166	-	3,166	-	410	193	327	4,068	4,068	1,163					
RHODE ISLAND	12/31	920	408	225	512	-	23	116	157	11	115	90	90	53					
SOUTH CAROLINA	12/31	6,810	1,153	1,042	4,657	3,322	529	38	11	136	179	442	442	218					
SOUTH DAKOTA	12/31	5,975	2,562	995	3,413	20	3,378	6	6	9	9	9	9	40					
TENNESSEE	6/30	5,870	1,336	940	4,534	-	2,133	-	596	35	80	465	465	837					
TEXAS	12/31	18,728	7,979	6,855	10,749	237	6,122	581	2,405	17	223	1,141	1,141	22					
UTAH	12/31	3,458	1,815	591	1,643	-	1,291	68	12	52	215	215	215	22					
VERMONT	12/31	820	62	758	3,384	1,000	2,116	49	68	-	-	151	151	-22					
VIRGINIA	12/31	4,204	2,210	1,655	4,722	1,279	845	1,206	713	10	3	686	686	1,687					
WASHINGTON	12/31	3,262	528	334	2,734	-	1,983	-	32	2	43	662	662	38					
WEST VIRGINIA	12/31	1,428	1,428	589	2,392	-	703	149	149	1	90	535	535	-59					
WISCONSIN	12/31	10,221	1,579	643	8,642	46	5,360	552	125	4	2	2,541	2,541	-59					
WYOMING	12/31	3,118	1,178	551	1,306	-	1,257	-	-	-	27	12	12	-9					
TOTAL		306,442	113,304	81,549	183,139	13,499	93,124	19,112	15,600	1,498	5,392	42,957	42,957	13,089					

NOTES: 1/ HIGHWAYS UNDER CONTROL OF STATE HIGHWAY DEPARTMENTS, AND DO NOT INCLUDE ROADS UNDER CONTROL OF COUNTY AND LOCAL AUTHORITY.  
2/ OILED TOP-BOIL.  
3/ APPROXIMATE, AS IMPROVED EARTH, SAND-CLAY, GRAVEL AND MACADAM REPORTED TOGETHER BY STATE.  
4/ DECREASE OF 111 MILES BY REVISION OF SYSTEM.  
5/ INCLUDES 378 MILES HAVING 9 FOOT WIDTH OF CONCRETE.  
6/ INCLUDES 108 MILES OF SAND ASPHALT.  
7/ BRIDGE FLOORING.  
8/ DECREASE IN TOTAL MILEAGE DUE TO ANNEXTION BY EXTENSION OF CORPORATE LIMITS.  
9/ INCLUDES 48 MILES OF KENTUCKY ROCK ASPHALT.  
10/ ESTIMATED FROM PREVIOUS YEARS' DATA.



UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PUBLIC ROADS

ML-2(1928)  
R. B. A.

MOTOR VEHICLE REGISTRATION FEES, LICENSES, PERMITS, FINES, ETC., 1928  
ALSO GROSS RECEIPTS AND DISPOSITION OF FUND 1/  
FOR CALENDAR YEAR 1928

(COMPILED FROM REPORTS OF STATE AUTHORITIES)

STATES 2/	REGISTRATION RECEIPTS 2/				MISCELLANEOUS RECEIPTS 2/				COLLECTION AND DISTRIBUTION			DISPOSITION OF GROSS RECEIPTS			STATES 2/
	TOTAL MOTOR VEHICLE PASSENGER CARS AND BUSES	TRUCKS AND TRACTORS	OTHER VEHICLES	TOTAL	FEES FOR LICENSES	FEES FOR PERMITS	FEES FOR MISCELLANEOUS	OTHER	STATE HIGHWAYS	STATE AND COUNTY ROADS	FOR OTHER PURPOSES	STATE HIGHWAYS	STATE AND COUNTY ROADS	FOR OTHER PURPOSES	
ALABAMA 2/	\$3,474,066	\$433,848	\$3,078	\$3,911,912	\$3,617	\$12,608	\$111,690	\$151,721	\$1,076,601	\$677,443	\$1,653,400	\$1,076,601	\$677,443	\$1,653,400	ALABAMA 2/
ARIZONA	565,808	3,706,281	3,810	4,275,900	6,194	21,356	800,548	76,720	832,921	3,910,311	2,309,482	832,921	3,910,311	2,309,482	ARIZONA
ARKANSAS	3,786,004	1,657,658	2,504	5,446,166	28,350	16,871	82,296	168,313	7,938,935	811,935	-	7,938,935	811,935	-	ARKANSAS
CALIFORNIA	1,790,183	1,331,484	1,427,447	4,549,114	1,452	1,452	609,197	609,197	1,048,949	1,938,919	-	1,048,949	1,938,919	-	CALIFORNIA
COLORADO	1,327,931	1,359,206	4,641	2,691,778	25,884	4,357	24,926	621,968	3,201,159	1,165,449	-	3,201,159	1,165,449	-	COLORADO
CONNECTICUT	1,730,813	1,377,447	2,067,210	5,115,470	5,457	9,367	9,367	143,968	3,898,679	-	-	3,898,679	-	-	CONNECTICUT
DELAWARE	4,935,595	4,873,613	3,811,324	13,610,532	3,151	3,151	4,357	143,968	3,898,679	-	-	3,898,679	-	-	DELAWARE
FLORIDA	4,041,761	3,975,763	3,811,324	11,828,848	5,457	9,367	9,367	143,968	3,898,679	-	-	3,898,679	-	-	FLORIDA
GEORGIA	1,626,949	1,578,391	2,067,210	5,272,550	3,151	3,151	4,357	143,968	3,898,679	-	-	3,898,679	-	-	GEORGIA
ILLINOIS	15,521,530	14,578,770	11,771,192	41,871,492	89,186	331,292	438,380	249,533	9,337,237	1,460,400	-	9,337,237	1,460,400	-	ILLINOIS
INDIANA	5,731,741	5,133,705	4,163,145	15,028,591	54,800	38,552	289,054	249,533	5,902,548	-	-	5,902,548	-	-	INDIANA
IOWA	1,394,448	6,376,893	4,163,145	11,934,486	91,196	351,126	17,760	283,946	3,213,611	1,894,091	-	3,213,611	1,894,091	-	IOWA
KANSAS	5,394,448	6,376,893	4,163,145	11,934,486	91,196	351,126	17,760	283,946	3,213,611	1,894,091	-	3,213,611	1,894,091	-	KANSAS
KENTUCKY	4,726,249	4,582,043	3,805,292	13,113,584	32,877	22,486	82,378	195,198	4,041,685	486,376	-	4,041,685	486,376	-	KENTUCKY
LOUISIANA	4,383,634	4,303,807	-	8,687,441	80,146	80,146	282	282	4,383,634	-	-	4,383,634	-	-	LOUISIANA
MAINE	2,763,998	2,147,118	1,642,849	6,553,965	44,750	426,017	135,321	220,513	1,354,883	-	-	1,354,883	-	-	MAINE
MARYLAND	3,044,621	2,930,885	2,593,384	8,568,890	54,701	196,137	333,608	303,462	2,194,234	-	-	2,194,234	-	-	MARYLAND
MASSACHUSETTS	2,052,848	1,857,187	1,346,513	5,256,548	85,765	1,400,380	968,998	1,382,012	11,643,077	-	-	11,643,077	-	-	MASSACHUSETTS
MINNESOTA	10,101,788	10,010,861	8,360,128	28,472,777	5,771	871,162	1,837,162	1,729,093	6,507,236	-	-	6,507,236	-	-	MINNESOTA
MISSISSIPPI 2/	2,814,150	1,650,733	15,181	4,480,064	38,472	-	-	-	140,707	2,479,281	-	140,707	2,479,281	-	MISSISSIPPI 2/
MISSOURI 2/	1,299,628	3,166,298	5,649	4,471,575	-	-	-	-	370,000	6,288,109	-	370,000	6,288,109	-	MISSOURI 2/
MONTANA 2/	3,950,788	3,126,512	5,649	7,082,959	49,349	-	-	-	118,131	1,149,797	-	118,131	1,149,797	-	MONTANA 2/
NEBRASKA	2,070,957	1,673,914	-	3,744,871	79,205	276,233	84,130	11,486	1,093,750	-	-	1,093,750	-	-	NEBRASKA
NEW HAMPSHIRE	13,589,029	9,933,554	3,168,674	26,691,257	10,700	2,797,312	673,636	849,669	7,882,354	-	-	7,882,354	-	-	NEW HAMPSHIRE
NEW JERSEY	827,761	530,407	88,374	1,446,542	2,797,312	2,797,312	13,673	70,068	371,633	186,712	-	371,633	186,712	-	NEW JERSEY
NEW MEXICO	34,306,706	31,084,438	22,301,399	87,692,543	63,981	204,728	2,819,842	3,706	1,785,572	23,989,877	-	1,785,572	23,989,877	-	NEW MEXICO
NORTH CAROLINA 2/	9,089,140	1,780,006	1,431,389	12,300,535	13,360	-	-	474	300,000	3,976,334	-	300,000	3,976,334	-	NORTH CAROLINA 2/
NORTH DAKOTA	1,775,146	1,268,591	6,404,466	7,448,203	79,340	11,362	389,309	386,503	5,693,431	737,672	-	5,693,431	737,672	-	NORTH DAKOTA
OHIO 2/	8,950,610	11,268,591	6,404,466	26,623,667	13,360	-	-	474	300,000	3,976,334	-	300,000	3,976,334	-	OHIO 2/
OKLAHOMA 2/	8,720,469	6,741,931	978,539	16,440,939	88,213	59,880	149,755	300,000	1,655,855	1,657,306	-	1,655,855	1,657,306	-	OKLAHOMA 2/
OREGON	6,989,291	20,150,327	14,382,318	41,521,936	86,000	2,396,656	3,791,048	1,783,688	20,609,165	187,914	-	20,609,165	187,914	-	OREGON
PENNSYLVANIA	2,273,819	1,832,157	1,388,895	5,494,871	3,776	3,776	131,925	211,906	2,031,516	30,348	-	2,031,516	30,348	-	PENNSYLVANIA
RHODE ISLAND	2,440,539	2,281,672	1,941,501	6,663,712	289,762	-	-	102,907	25,398	2,416,141	-	25,398	2,416,141	-	RHODE ISLAND
SOUTH CAROLINA	2,901,968	2,872,391	391,870	6,166,229	26,640	-	-	1,901	1,460,002	1,392,002	-	1,460,002	1,392,002	-	SOUTH CAROLINA
SOUTH DAKOTA	4,087,317	15,860,630	14,117,670	34,065,617	50,095	30,263	474,107	139,200	10,343,370	7,188,985	-	10,343,370	7,188,985	-	SOUTH DAKOTA
TENNESSEE 2/	11,151,340	1,487,625	288,112	13,927,077	28,847	230,842	43,945	260,000	2,090,960	281,970	-	2,090,960	281,970	-	TENNESSEE 2/
UTAH 2/	2,094,960	5,169,554	4,342,248	11,606,762	87,276	33,654	287,152	260,000	5,312,045	-	-	5,312,045	-	-	UTAH 2/
VERMONT	6,672,048	6,368,405	4,961,338	17,999,791	7,497	5,913	7,497	285,454	4,201,591	-	-	4,201,591	-	-	VERMONT
VIRGINIA	1,029,281	3,606,997	2,985,549	7,621,827	6,011	119,432	195,096	239,913	1,262,682	2,640,000	-	1,262,682	2,640,000	-	VIRGINIA
WASHINGTON	4,142,599	10,468,621	8,348,964	22,959,184	1,388	332,057	1,388	639,497	5,762,810	-	-	5,762,810	-	-	WASHINGTON
WEST VIRGINIA	10,774,707	113,856	21,928	10,909,491	1,635	102,076	233,563	132,927	-	-	-	132,927	-	-	WEST VIRGINIA
WISCONSIN	513,981	289,893,894	258,587,941	791,462,716	1,704,344	14,726,415	12,127,096	15,133,998	208,880,272	50,399,169	-	208,880,272	50,399,169	-	WISCONSIN
WYOMING	322,630,025	-	-	322,630,025	-	-	-	-	-	-	-	-	-	-	WYOMING
DISTRICT OF COLUMBIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	DISTRICT OF COLUMBIA
GRAND TOTALS	289,893,894	258,587,941	1,402,181	548,883,916	1,704,344	14,726,415	12,127,096	15,133,998	208,880,272	50,399,169	-	208,880,272	50,399,169	-	GRAND TOTALS

NOTES:

- 1/ FINANCIAL DATA ONLY ON THIS TABLE FOR NUMBER OF REGISTRATIONS, ETC. SEE TABLE ML-1(1928).
- 2/ REGULAR STATES DO NOT REPORT COMPLETE DETAILS AND RECEIPTS ARE NOT INCLUDED IN "DETAIL TOTALS".
- 3/ INCLUDES \$340,740 ON STATE BONDS AND \$1,966,726 ON COUNTY BONDS.
- 4/ INCLUDING FINANCE RESERVE.
- 5/ UNDISTRIBUTED.
- 6/ IN STATE GENERAL FUND.
- 7/ BALANCE FOR REFUNDS.
- 8/ APPROPRIATION \$46,000 FROM STATE GENERAL FUND.
- 9/ BALANCE FOR REFUNDS.
- 10/ FOR BALTIMORE CITY STREETS.
- 11/ ON COUNTY BOND OBLIGATIONS ASSUMED BY STATE.
- 12/ ON COUNTY BOND OBLIGATIONS ASSUMED BY STATE.
- 13/ AUTO-THEFT FUND.
- 14/ INCLUDED IN MISCELLANEOUS.
- 15/ FOR STATE HIGHWAY OFFICE BUILDING.
- 16/ TO NEW YORK CITY GENERAL FUND.
- 17/ INCLUDES \$130,000 FOR STATE BRIDGE FUND.
- 18/ ON STATE BONDS, ALLOTTED FROM STATE HIGHWAY FUND.
- 19/ HIGHWAY MOTOR PATROL.
- 20/ ONLY EXPENSES OF LAW ENFORCEMENT REPORTED; OTHER EXPENSES FROM HIGHWAY FUND.
- 21/ APPROPRIATION FROM STATE GENERAL FUND.
- 22/ STATE HIGHWAY PATROL.
- 23/ FOR TRAFFIC CONTROL AND STREETS, IF SO APPROPRIATED BY CONGRESS.



(COMPILED FROM REPORTS OF STATE AUTHORITIES)

MOTOR VEHICLE REGISTRATIONS, 1928, 1  
(CALENDAR YEAR)

STATES	1928-REGISTERED MOTOR VEHICLES <sup>1</sup> INDIVIDUALLY & COMMERCIALY OWNED			OTHER REGISTERED VEHICLES			TAX-EXEMPT OFFICIALS' MOTOR CARS AND MOTORCYCLES			NUMBER OF LICENSES, OR PERMITS AND OPERATORS			1927 GRAND TOTAL: VEHICLE REGISTRATIONS REGISTERED : NUMBER : MOTOR CARS : INCREASE OR : PER CENT AND TRUCKS : DECREASE (-) :			STATES
	GRAND TOTAL :	PASSENGER REGISTERED :	MOTOR TRUCKS & AUTOMOBILE, TAXIS, AND ROAD TRACTORS :	TRAILERS :	MOTOR- CYCLES :	BUSES :	U.S. CARS :	AND LOCAL CARS :	MOTOR- CYCLES (OFFIC.) :	DEALERS :	OPERATORS AND CHAUFFEURS :	REGISTERED :	INCREASE OR DECREASE (-) :	PER CENT		
ALABAMA	269,618	236,026	34,493	1,952	611	167	666	-	586	1,097	243,539	26,980	10.7	ALABAMA		
ARIZONA	94,372	86,036	8,336	809	281	176	985	-	1,039	12,342	81,047	13,326	16.4	ARIZONA		
ARKANSAS	214,931	181,880	33,651	2,054	342	39	861	27	508	4,085	206,568	8,363	4.0	ARKANSAS		
CALIFORNIA	1,799,890	1,682,477	217,413	37,073	9,449	1,217	13,826	149	-	263,346	1,693,196	106,695	6.3	CALIFORNIA		
COLORADO	284,887	260,908	23,961	85	1,234	283	1,443	-	3,647	7,977	268,192	16,376	6.1	COLORADO		
CONNECTICUT	308,792	261,091	48,701	224	2,497	71	1,923	168	3,751	337,623	281,521	26,271	10.0	CONNECTICUT		
DELAWARE	352,961	41,195	10,015	301	345	44	-	-	610	56,923	47,124	4,086	8.7	DELAWARE		
FLORIDA	296,961	296,961	68,270	1,000	1,127	76	3,662	233	2,047	2,953	394,734	-41,773	-10.6	FLORIDA		
GEORGIA	318,866	277,881	40,975	816	1,078	934	-	-	1,156	2,301	300,635	18,221	6.1	GEORGIA		
IDAHO	108,154	96,960	11,194	264	406	103	1,231	18	458	396	101,338	6,818	6.7	IDAHO		
ILLINOIS	1,504,369	1,314,003	190,356	3,742	6,826	979	6,884	-	4,548	94,169	1,438,985	65,374	4.6	ILLINOIS		
INDIANA	823,806	706,713	117,093	7,884	3,184	3,184	4,531	-	2,716	39,021	813,637	10,169	1.2	INDIANA		
IOWA	733,466	672,447	61,019	230	1,728	44	3,200	-	2,439	16,563	704,203	29,263	4.2	IOWA		
KANSAS	533,799	471,887	61,902	359	1,199	192	2,463	60	2,676	9,146	501,901	31,898	6.4	KANSAS		
KENTUCKY	304,231	272,636	31,595	4,000	858	209	1,910	66	1,138	9,146	289,621	18,610	6.5	KENTUCKY		
LOUISIANA	253,446	253,446	40,848	4,000	558	-	-	-	489	16,029	255,000	9,293	3.6	LOUISIANA		
MARYLAND	172,538	139,460	33,178	1,068	1,219	64	1,326	76	1,156	203,353	163,623	9,016	5.5	MARYLAND		
MASSACHUSETTS	285,311	276,221	10,090	683	2,232	1,969	1,500	-	5,853	76,669	276,863	8,448	3.1	MASSACHUSETTS		
MICHIGAN	726,295	637,153	89,142	547	6,856	656	5,000	-	2,370	870,160	694,107	32,188	4.6	MICHIGAN		
MINNESOTA	1,249,221	1,084,618	164,606	23,198	3,686	371	6,666	-	2,192	311,413	1,154,773	94,448	8.2	MINNESOTA		
MISSISSIPPI	673,573	683,789	69,784	3,894	2,083	252	1,153	-	2,144	-	646,682	26,091	4.2	MISSISSIPPI		
MISSOURI	246,842	214,754	31,888	2,919	69	74	-	4	660	29,222	218,043	28,199	12.9	MISSOURI		
MONTANA	712,965	636,717	76,248	2,004	1,821	311	1,472	3	2,572	210	682,418	30,546	4.5	MONTANA		
NEBRASKA	126,036	104,231	21,804	1,815	1,242	229	1,242	-	512	-	112,735	13,300	11.8	NEBRASKA		
NEVADA	391,356	358,173	33,182	2,976	1,026	226	1,288	-	3,344	-	373,912	17,443	4.7	NEVADA		
NEW HAMPSHIRE	27,376	21,733	6,643	178	94	42	442	-	115	-	26,776	1,600	6.2	NEW HAMPSHIRE		
NEW JERSEY	108,644	88,594	14,080	545	1,330	22	653	-	1,138	-	96,009	6,635	6.9	NEW JERSEY		
NEW MEXICO	789,450	689,749	109,699	1,996	6,533	709	6,363	846	3,178	1,186,736	719,396	46,034	6.5	NEW MEXICO		
NEW YORK	66,737	53,743	1,994	740	248	166	746	2	801	-	59,291	6,446	10.9	NEW YORK		
NORTH CAROLINA	2,083,942	1,760,649	323,393	3,448	14,594	1,666	14,153	1,208	4,852	2,494,156	1,937,918	146,024	7.6	NORTH CAROLINA		
NORTH DAKOTA	464,376	418,864	46,512	1,944	1,244	429	6,200	-	1,103	-	430,499	33,877	7.9	NORTH DAKOTA		
OHIO	173,525	161,778	21,747	-	236	3	-	-	-	-	160,701	12,824	8.1	OHIO		
OKLAHOMA	1,649,699	1,450,994	198,706	14,506	9,472	2,362	10,097	-	3,987	4,419	1,670,734	78,965	5.0	OKLAHOMA		
OREGON	529,843	468,650	64,293	1,238	2,012	530	1,384	34	1,384	-	503,128	26,717	5.3	OREGON		
PENNSYLVANIA	248,118	227,404	20,714	4,286	13,807	1,383	943	-	4,300	1,983,455	244,572	3,546	1.4	PENNSYLVANIA		
RHODE ISLAND	1,642,207	1,420,967	221,260	61	1,071	56	696	95	318	144,876	1,564,915	87,292	5.6	RHODE ISLAND		
SOUTH CAROLINA	125,698	106,158	19,543	1,637	432	91	2,684	-	658	-	118,014	7,684	6.5	SOUTH CAROLINA		
SOUTH DAKOTA	218,806	194,267	22,538	1,637	230	86	945	-	1,061	-	199,635	17,170	8.6	SOUTH DAKOTA		
TENNESSEE	191,374	171,067	20,307	-	432	132	3,289	-	693	-	169,652	21,822	12.9	TENNESSEE		
TEXAS	322,137	294,305	27,832	7	1,059	152	3,289	-	3,881	10,178	284,567	27,570	9.4	TEXAS		
UTAH	1,214,297	1,060,068	154,269	11,965	3,481	2,503	3,481	-	3,881	-	1,111,407	102,890	9.3	UTAH		
VERMONT	98,541	84,260	14,381	248	580	173	580	-	376	69,606	93,974	4,567	4.9	VERMONT		
VIRGINIA	86,231	78,695	7,546	646	2,158	1,141	3,082	143	3,584	7,746	79,547	6,704	8.4	VIRGINIA		
WASHINGTON	402,876	344,977	57,898	2,279	2,598	637	3,081	139	4,783	499,149	384,683	18,292	4.8	WASHINGTON		
WEST VIRGINIA	251,556	215,787	36,769	600	1,356	33	2,094	124	1,088	73,468	245,919	6,717	2.3	WEST VIRGINIA		
WISCONSIN	742,136	648,747	95,388	412	2,746	92	1,268	180	4	-	898,289	43,846	6.3	WISCONSIN		
WYOMING	56,336	48,760	7,576	-	128	208	296	-	329	-	61,956	4,381	8.4	WYOMING		
DIST. OF COL.	126,356	112,505	14,051	-	1,092	837	2,188	200	1,835	34,026	111,660	14,876	13.3	DIST. OF COL.		
TOTALS	24,493,124	21,379,126	3,113,999	148,169	117,946	8/33,179	103,618	3,710	9/86,734	9,941,861	23,133,241	1,359,883	6.9	TOTALS		

NOTES: 1 THIS TABLE LISTS ONLY THE NUMBER OF REGISTRATIONS, LICENSES, AND PERMITS:  
FOR FINANCIAL STATEMENT (SEE TABLE W-2 (1928)).  
2 THE FIRST THREE COLUMNS SHOW REGULARLY REGISTERED MOTOR CARS AND TRUCKS WHICH  
PAY REGULAR LICENSE FEES, ELIMINATING REREGISTRATIONS, NONRESIDENT  
REGISTRATIONS, ETC. FEES ARE INCLUDED WITH PASSENGER CARS EXCEPT AS NOTED.  
3 SOME STATES INCLUDE TRAILERS WITH TRUCKS, OTHERS DO NOT REGISTER SAME.  
4 ESTIMATED.  
5 REPORTED WITH TRACTORS, BUT HERE SEPARATED AS PER SEMI-ANNUAL REPORT.  
6 BUSES REGISTERED WITH TRUCKS.  
7 TRAILERS REGISTERED AS TRUCKS.  
8 AS REPORTED BY BUREAU OF BUDGET IN 1926, AND INCLUDES 7,859 "DURE-AT-LARGE"  
NOT ALLOCATED TO ANY STATE.  
9 DECREASE COMPARED TO PREVIOUS YEARS DUE TO ELIMINATED DEALERS' PLATES  
FORMERLY REPORTED BY SOME STATES.

