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THE NEWS LETTER
OF THE
BUREAU OF PUBLIC ROADS

VOL. 1, NO. 4. FEBRUARY 1926.

CONTENTS

MEMORANDUM OF AGREEMENT BETWEEN
THE NATIONAL PARK SERVICE
AND
THE BUREAU OF PUBLIC ROADS
RELATING TO THE SURVEY, CONSTRUCTION, AND IMPROVEMENT OF ROADS AND TRAILS IN THE NATIONAL PARKS AND NATIONAL MONUMENTS

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WHEREAS, CERTAIN ACTS OF CONGRESS HAVE AUTHORIZED THE MAKING OF APPROPRIATIONS AND HAVE MADE APPROPRIATIONS AND AUTHORIZED THE INCURRING OF OBLIGATIONS FOR THE SURVEY, CONSTRUCTION, RECONSTRUCTION AND IMPROVEMENT OF ROADS AND TRAILS IN THE NATIONAL PARKS AND NATIONAL MONUMENTS UNDER THE JURISDICTION OF THE DEPARTMENT OF THE INTERIOR; AND

WHEREAS, THE BUREAU OF PUBLIC ROADS OF THE UNITED STATES DEPARTMENT OF AGRICULTURE HAS AN ENGINEERING ORGANIZATION PERFECTED FOR THE PURPOSE OF MAKING SURVEYS AND IMPROVING HIGHWAYS; AND

WHEREAS, THE NATIONAL PARK SERVICE OF THE DEPARTMENT OF THE INTERIOR, IN THE INTEREST OF ECONOMY AND EFFICIENCY, DESIRES TO UTILIZE THE SERVICES OF THE EXISTING ROAD-BUILDING ORGANIZATION OF THE BUREAU OF PUBLIC ROADS IN THE SURVEY, CONSTRUCTION, RECONSTRUCTION, AND IMPROVEMENT OF ROADS AND TRAILS WITHIN THE NATIONAL PARKS AND NATIONAL MONUMENTS, AS AUTHORIZED BY CONGRESS;

NOW, THEREFORE, THE NATIONAL PARK SERVICE, HEREINAFTER REFERRED TO AS THE PARK SERVICE, AND THE BUREAU OF PUBLIC ROADS, HEREINAFTER REFERRED TO AS THE BUREAU, DO HEREBY MUTUALLY AGREE, AS FOLLOWS:

STANDARDIZATION OF CONSTRUCTION AND ARTICULATION OF HIGHWAYS:

ARTICLE I.

(1) THAT THE PARK SERVICE AND THE BUREAU SHALL EACH USE EVERY EFFORT TO HARMONIZE THE STANDARDS OF CONSTRUCTION OF ROADS AND TRAILS IN THE NATIONAL PARKS AND MONUMENTS WITH THE STANDARDS ADOPTED FOR THE CONSTRUCTION OF THE ROADS WHICH FORM A PART OF THE FEDERAL-AID HIGHWAY SYSTEM AND OF ROADS AND TRAILS WITHIN THE NATIONAL FORESTS AND TO SECURE THE BEST MODERN PRACTICE IN THE LOCATION, DESIGN, CONSTRUCTION AND IMPROVEMENT THEREOF.

(2) THAT FROM TIME TO TIME DULY AUTHORIZED REPRESENTATIVES OF THE PARK SERVICE AND OF THE BUREAU WILL CONFER WITH AUTHORIZED REPRESENTATIVES OF THE UNITED STATES FOREST SERVICE AND THE SEVERAL STATE HIGHWAY DEPARTMENTS WHEREIN THE NATIONAL PARKS AND MONUMENTS ARE LOCATED, FOR THE PURPOSE OF DEVELOPING A GENERAL SCHEME OF IMPROVEMENT BY

WHICH THE NATIONAL PARK HIGHWAYS, HIGHWAYS FORMING A PART OF THE FEDERAL-AID HIGHWAY SYSTEM, STATE HIGHWAYS, AND THE HIGHWAYS WITHIN THE NATIONAL FORESTS WILL SO ARTICULATE WITH AND SUPPLEMENT EACH OTHER AS TO FORM AN INTERCONNECTED SYSTEM OF HIGHWAYS.

INITIATION OF PROJECTS AND PRELIMINARY SURVEYS

ARTICLE II.

THE SERVICES OF THE BUREAU WILL BE FURNISHED ONLY UPON REQUEST IN WRITING FROM THE DIRECTOR OF THE PARK SERVICE, AND THE FOLLOWING PROCEDURE SHALL BE OBSERVED:

(1) UPON RECEIPT OF REQUEST FROM THE PARK SERVICE THE CHIEF OF THE BUREAU WILL CAUSE AN INVESTIGATION AND A PRELIMINARY ESTIMATE OF COST OF THE PROJECT TO BE MADE.

(2) SIMULTANEOUSLY WITH THE ABOVE REQUEST THE PARK SERVICE SHALL INSTRUCT ITS LANDSCAPE ENGINEER TO COOPERATE WITH THE ENGINEERS OF THE BUREAU IN MAKING THE PRELIMINARY INVESTIGATION.

(3) THE TIME FOR MAKING THE FIELD EXAMINATION OF ANY SUCH PROJECT SHALL BE AGREED UPON BY THE SUPERINTENDENT AND LANDSCAPE ENGINEER OF THE PARK SERVICE AND THE DISTRICT ENGINEER OF THE BUREAU. WHEN SAID FIELD EXAMINATION HAS BEEN COMPLETED THE FOLLOWING REPORTS SHALL BE PREPARED:

(A) REPORT TO THE CHIEF OF BUREAU BY THE BUREAU REPRESENTATIVE ON THE LOCATION AND CONSTRUCTION OF THE PROPOSED PROJECT, TOGETHER WITH AN ESTIMATE OF THE COST THEREOF. COPIES OF THIS REPORT WILL BE FURNISHED TO THE PARK SERVICE IN DUPLICATE AND TO THE PARK SUPERINTENDENT.

(B) REPORT TO THE PARK SERVICE BY THE LANDSCAPE ENGINEER ON ALL LANDSCAPE FEATURES OF THE PROPOSED PROJECT. COPIES OF THIS REPORT SHALL BE FURNISHED TO THE BUREAU IN DUPLICATE AND TO THE PARK SUPERINTENDENT.

(C) REPORT OF THE SUPERINTENDENT OF THE PARK TO THE PARK SERVICE COMMENTING ON THE REPORTS REFERRED TO IN THE NEXT PRECEDING PARAGRAPHS AND MAKING RECOMMENDATIONS WITH RESPECT TO THE PROPOSED PROJECT. COPIES OF THE SUPERINTENDENT'S REPORT AND RECOMMENDATION SHALL BE SUBMITTED TO THE CHIEF OF THE BUREAU IN DUPLICATE, THROUGH ITS DISTRICT ENGINEER, AND TO THE PARK SERVICE, IN DUPLICATE, THROUGH THE FIELD ASSISTANT, ONE COPY OF SUCH REPORTS TO BE RETAINED BY THE DISTRICT ENGINEER AND FIELD ASSISTANT, RESPECTIVELY, FOR THEIR FILES.

(4) UPON RECEIPT OF THE PRELIMINARY REPORTS REFERRED TO ABOVE, THE PARK SERVICE SHALL INFORM THE BUREAU WHETHER IT DESIRES THE WORK TO BE UNDERTAKEN BY THE BUREAU AS A MAJOR PROJECT OR WHETHER THE PARK SERVICE SHALL PROCEED WITH THE WORK AS A MINOR PROJECT WITHOUT THE SERVICES OF THE BUREAU.

EXECUTION OF MAJOR PROJECTS

ARTICLE III.

(1) IN CASE THE PROJECT IS A MAJOR ONE AND THE SERVICES OF THE BUREAU ARE DESIRED IN THE EXECUTION AND COMPLETION THEREOF, THE DIRECTOR OF THE PARK SERVICE SHALL SO NOTIFY THE CHIEF OF BUREAU IN WRITING AND MAKE REQUEST THAT THE PROJECT BE HANDLED TO COMPLETION BY THE BUREAU IN ACCORDANCE WITH THE PROCEDURE HEREIN OUTLINED.

(2) UPON RECEIPT OF SUCH NOTICE AND REQUEST THE BUREAU WILL INSTRUCT ITS DISTRICT ENGINEER TO PROCEED, IN COOPERATION WITH THE LANDSCAPE ENGINEER OF THE PARK SERVICE AND THE SUPERINTENDENT OF THE PARK, WITH THE LOCATION SURVEY, AND TO PREPARE PLANS, SPECIFICATIONS, AND ESTIMATES FOR THE PROJECT.

(3) WHEN SAID PLANS, SPECIFICATIONS AND ESTIMATES HAVE BEEN PREPARED, AND APPROVAL RECOMMENDATIONS BY THE LANDSCAPE ENGINEER OF THE PARK SERVICE AND THE SUPERINTENDENT OF THE PARK ARE SHOWN THEREON, THEY SHALL BE FORWARDED BY THE DISTRICT ENGINEER TO THE BUREAU FOR TRANSMISSION TO THE PARK SERVICE FOR APPROVAL OR DISAPPROVAL.

(4) IF THE PARK SERVICE APPROVES THE PLANS, SPECIFICATIONS AND ESTIMATES, IT SHALL SO NOTIFY THE BUREAU IN WRITING AND INSTRUCT THE SUPERINTENDENT OF THE PARK TO ADVERTISE FOR PROPOSALS FOR THE CONSTRUCTION OF THE PROJECT.

(5) THE ADVERTISEMENT FOR PROPOSALS SHALL SPECIFY THE TIME AND PLACE OF OPENING THE BIDS, AND THE BIDS SHALL BE OPENED AND TABULATED BY THE SUPERINTENDENT OF THE PARK AND THE DISTRICT ENGINEER OF THE BUREAU.

(6) THE RECOMMENDATION FOR AWARD SHALL BE MADE BY THE PARK SUPERINTENDENT, SHALL BE CONCURRED IN BY THE DISTRICT ENGINEER, AND SHALL BE FORWARDED TO THE DIRECTOR OF THE PARK SERVICE, THROUGH THE CHIEF OF THE BUREAU, ACCOMPANIED BY THE THREE LOW BIDS AND A TABULAR STATEMENT OF ALL BIDS RECEIVED. THE AWARD SHALL THEN BE MADE BY THE SECRETARY OF THE INTERIOR.

(7) IMMEDIATELY UPON NOTICE OF AWARD THE PARK SUPERINTENDENT AND THE BUREAU SHALL BE NOTIFIED AND FORMAL CONTRACT SHALL BE EXECUTED BY THE SUCCESSFUL BIDDER AND THE DEPARTMENT OF THE INTERIOR.

(8) THE PROSECUTION OF THE WORK SHALL BE UNDERTAKEN BY THE DISTRICT ENGINEER IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS APPROVED FOR THE PROJECT, IT BEING UNDERSTOOD THAT THE SPECIFICATIONS SHALL GOVERN ALL ORDINARY LANDSCAPE FEATURES OF THE WORK, AND ANY MINOR ALTERATIONS WHICH ARE AUTHORIZED UNDER THE SPECIFICATIONS

WITHOUT A MODIFICATION OF AGREEMENT, AND WHICH ARE DEEMED NECESSARY DURING THE PROGRESS OF THE WORK, MAY BE ORDERED BY THE DISTRICT ENGINEER IN WRITING, WITH THE WRITTEN CONCURRENCE OF THE LANDSCAPE ENGINEER, TO WHOM SHALL BE DELEGATED THE NECESSARY AUTHORITY SO TO DO.

PAYMENTS

ARTICLE IV.

(1) AS THE CONSTRUCTION OF A PROJECT PROGRESSES PROMPT PAYMENTS SHALL BE MADE BY THE LOCAL FISCAL OR DISBURSING AGENT OF THE NATIONAL PARK SERVICE TO THE CONTRACTOR UPON MONTHLY ESTIMATES APPROVED BY THE DISTRICT ENGINEER.

(2) THE PARK SERVICE WILL REIMBURSE THE BUREAU FOR ACTUAL EXPENSES INCURRED BY REASON OF ACTIVE WORK ON INVESTIGATING, SURVEYING, PREPARING PLANS, SPECIFICATIONS AND ESTIMATES, AND SUPERVISING PROJECTS. AN ESTIMATE OF THE ACTUAL EXPENSES TO BE INCURRED BY THE BUREAU SHALL BE MADE AND FORWARDED TO THE PARK SERVICE UPON RECEIPT OF EACH REQUEST FOR THE BUREAU'S SERVICES, AND THE PARK SERVICE SHALL, UPON RECEIPT OF SUCH ESTIMATE, SET UP A LIABILITY ON ITS BOOKS TO DEFRAY SUCH EXPENSES AGAINST EXISTING APPROPRIATIONS OR APPROPRIATIONS AUTHORIZED TO BE MADE AGAINST WHICH OBLIGATIONS MAY LEGALLY BE INCURRED.

(3) REIMBURSEMENTS FOR THE ACTUAL EXPENSES INCURRED BY THE BUREAU IN RENDERING SUCH SERVICES WILL BE MADE BY THE PARK SERVICE FROM TIME TO TIME UPON THE SUBMISSION OF VOUCHERS THEREFOR.

(4) UPON REQUEST OF THE PARK SERVICE PRELIMINARY INVESTIGATIONS, SURVEYS, AND ESTIMATES WILL BE MADE FOR MAJOR PROJECTS FOR WHICH REIMBURSEMENTS WILL BE MADE IN THE MANNER HEREINBEFORE PROVIDED.

ACCEPTANCE OF PROJECTS

ARTICLE V.

(1) BEFORE APPROVING FINAL SETTLEMENT WITH THE CONTRACTOR THE DISTRICT ENGINEER SHALL OBTAIN FROM THE PARK SUPERINTENDENT AND THE LANDSCAPE ENGINEER WRITTEN RECOMMENDATIONS FOR ACCEPTANCE OF THE WORK IN WHICH HE SHALL CONCUR IN WRITING.

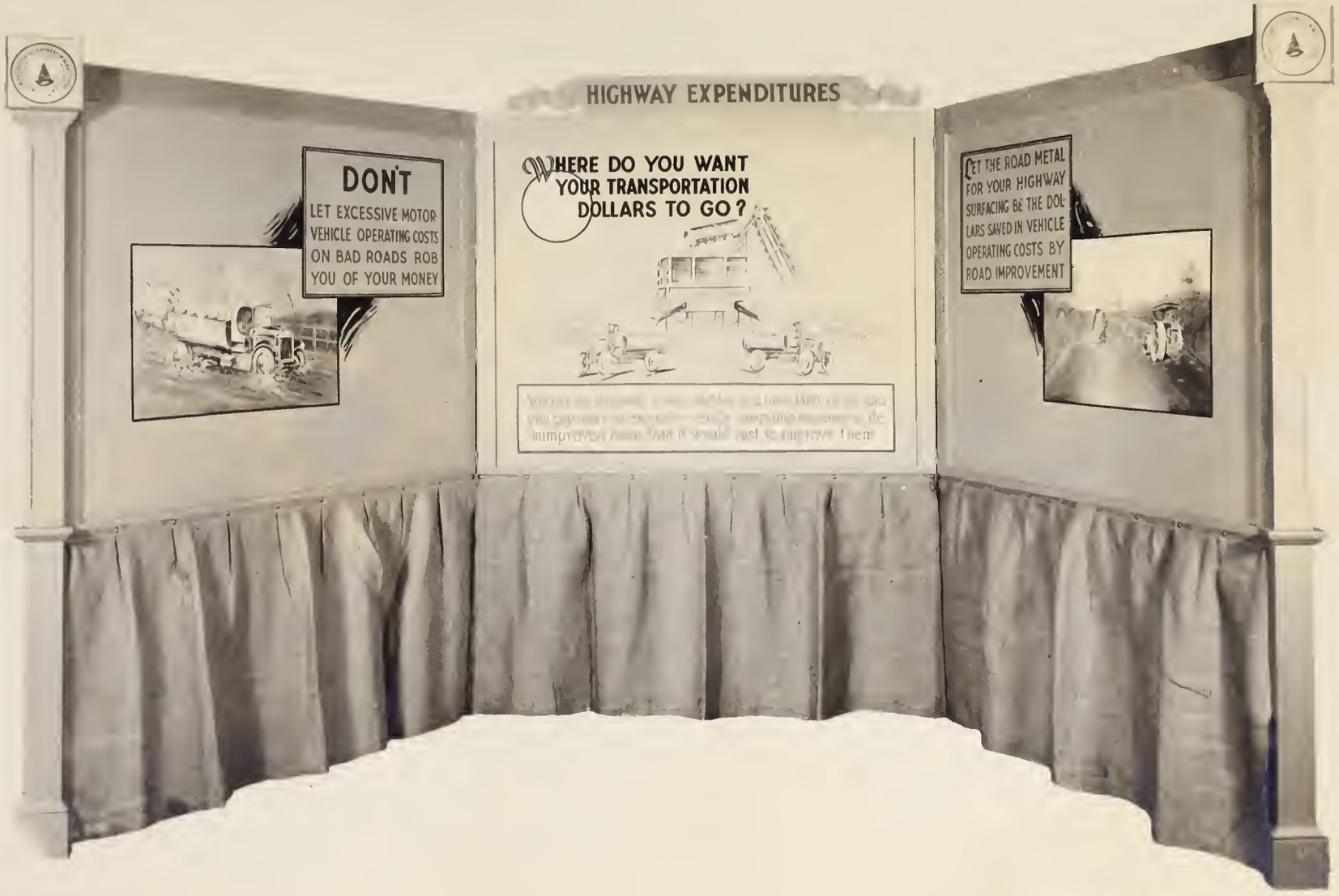
(2) The district engineer shall approve and forward the final voucher in favor of the contractor, through the Chief of Bureau, to the Park Service, accompanied by the above recommendations, for final acceptance of the Secretary of the Interior and transmission of voucher to the general accounting office for final settlement.

Signed this 18th day of January, 1926.
By STEPHEN T. MATHER,
Director, National Park Service.

Signed this 3rd day of February, 1926.
By THOS. H. MACDONALD,
Chief, Bureau of Public Roads.

APPROVED: January 22, 1926, By HUBERT WORK,
Secretary, Department of the Interior.

February 10, 1926, By W. M. JARDINE,
Secretary, Department of Agriculture.



U. S. BUREAU OF PUBLIC ROADS 31880

THICKNESS OF CONCRETE PAVEMENTS TESTED BY BORINGS

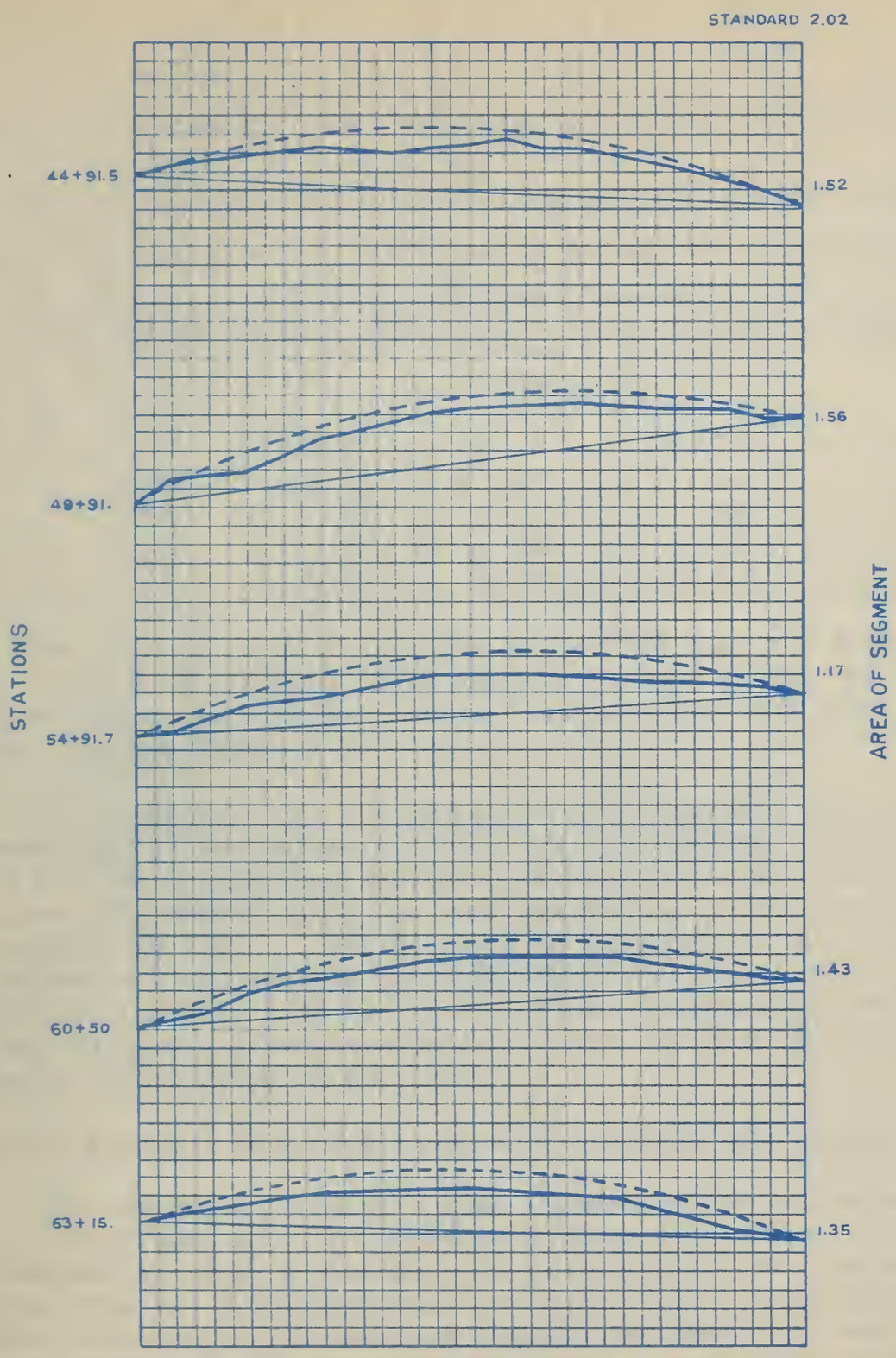
Contributed by the Division of Construction

Many of the States are now drilling cores from completed concrete pavements to determine whether the thickness and the compressive strength of the borings conform to the requirements of the specifications. These tests also determine the uniformity or lack of uniformity of the concrete. Regardless of the cost of making such measurements, a number of the States have equipped their departments with core drilling machines. The concensus of opinion appears to be that the extra cost is more than offset by the saving made possible by the detection and rejection of unsatisfactory work. The information also provides data to refute unwarranted complaints as to the character of the work.

With the modern methods of construction, concrete pavements which do not vary more than one-quarter of an inch from the required depth may be built without great difficulty. Larger variations than this have been observed on projects which have been examined to date but these differences have been due undoubtedly to a lack of care on the part of the contractor and to the lax supervision of the engineer in charge of the work. The common mistakes include: Mixing the concrete too wet, which results in a flow from the center of the pavement to the sides; neglecting to allow for the effect of shrinkage in the process of setting; omitting the proper and careful shaping of the subgrade immediately before the placing of the concrete; and the improper placing and adjustment of the side forms.

The depth of the cores, indicated by the tables which follow, show that all these conditions have existed. The diagram of cross sections (Fig. 1) illustrates the movement of the concrete from the center of the slab toward the edge. These sections were plotted from the actual elevations of the surface of the pavement taken to the nearest .001 foot at transverse intervals of one foot.

A survey was made of a number of projects in Delaware early in 1925. Cores were taken from pavements built from 1920 to 1924. The depths of the measured cores are given in Table 1.



SCALE: HORIZONTAL SMALLEST DIVISION = .5 FOOT
VERTICAL ,, ,, = .05 ,,

LEGEND

- - - - - - REQUIRED CROSS SECTION

——— ACTUAL CROSS SECTION

FIGURE 1.

THE SETTLEMENT AND TRANSVERSE FLOW OF A CONCRETE PAVEMENT IMMEDIATELY SUBSEQUENT TO THE CONSTRUCTION IS ILLUSTRATED BY THE DIFFERENCE IN ELEVATION BETWEEN THE REQUIRED AND ACTUAL CROSS SECTIONS.

TABLE 1.- DEPTH OF THE CORES MEASURED IN THE 1925 DELAWARE SURVEY

Number of cores	Thickness of the pavements as determined by the measured cores				
	Required	Average		Maximum	Minimum
	Inches	Inches	Probable error ±	Inches	Inches
22	6.00	6.07	± .06	6.70	5.24
24	6.25	6.62	± .07	7.74	5.51
24	6.50	6.93	± .10	8.65	5.59
19	7.50	7.70	± .08	8.59	6.43
20	8.00	8.15	± .08	8.95	6.99

THE AVERAGE IN EACH INSTANCE IS GREATER THAN THE REQUIRED DEPTH. THE RANGE IN SOME CASES APPEARS TO BE WIDE BUT THE VALUES OF THE PROBABLE ERROR OF THE AVERAGE INDICATE THAT THE CORES ARE OF A FAIRLY UNIFORM DEPTH.

THE APPLICATION OF THE METHOD OF LEAST SQUARES FOR THE DETERMINATION OF THE PROBABLE ERROR, SERVES TO DETERMINE THE PRECISION WITH WHICH THE WORK HAS BEEN CONSTRUCTED AS WELL AS TO ESTABLISH AN ABSOLUTE VALUE FOR THE UNCERTAINTY OF THE AVERAGE. FOR INSTANCE IN TABLE 1, THE AVERAGE FOR 22 CORES IS 6.07± .06. THIS MEANS THAT THE CHANCES ARE EVEN THAT THE AVERAGE VALUES VARY WITHIN THE LIMITS OF 6.13 AND 6.01. THIS INDICATES THAT THE PAVEMENT WAS LAID TO A REASONABLY UNIFORM DEPTH AND THAT THE VARIATION GENERALLY WAS IN FAVOR OF THE STATE.

POLICY ADOPTED FOR MAKING PAYMENTS ON FEDERAL AID VOUCHERS

THE FOLLOWING RULES HAVE BEEN ADOPTED AS THE POLICY OF THE BUREAU FOR DETERMINING THE AMOUNT OF PAYMENT TO BE MADE ON FEDERAL AID VOUCHERS RENDERED FOR THOSE PROJECTS WHICH DO NOT CONFORM STRICTLY WITH THE REQUIREMENTS OF THE SPECIFICATIONS AND WHERE THERE IS NO STIPULATION IN THE CONTRACT BETWEEN THE STATE AND THE CONTRACTOR PROVIDING FOR A DEFINITE REDUCTION IN THE PAYMENT FOR DEFICIENT WORK:

1. THE AVERAGE THICKNESS OF THE PAVEMENT SHALL EQUAL THE SPECIFIED THICKNESS WITHIN ONE-QUARTER OF AN INCH. IN OTHER WORDS THERE IS A ONE-QUARTER INCH TOLERANCE ON THE AVERAGES DEPTHS.

2. A TOLERANCE OF ONE-HALF INCH IS ALLOWED IN DETERMINING THE THICKNESS OF THE PAVEMENT. ALL SECTIONS OF THE PAVEMENT WHERE THE BORINGS SHOW A DEFICIENCY IN THICKNESS OF MORE THAN ONE-HALF INCH FROM THE SPECIFIED THICKNESS, SHALL BE ELIMINATED FROM THE FINAL ESTIMATE AND NO PAYMENT SHALL BE MADE THEREFOR. THE LENGTH OF THE NON-PAY SECTIONS SHALL BE CONSIDERED AS THE SUM OF THE DISTANCES FROM THE BORING WHICH SHOWS A DEFICIENCY IN EXCESS OF THE ONE-HALF INCH TOLERANCE TO THE NEXT BORINGS ON EACH SIDE, WHICH SHOW THE FULL SPECIFIED THICKNESS, WITHIN THE ONE-HALF INCH TOLERANCE.

A SUGGESTED TENTATIVE DRAFT OF SPECIFICATIONS GOVERNING FINAL PAYMENTS ON CONTRACTS WHERE A DEFICIENCY EXISTS IN THE THICKNESS OF THE PAVEMENT, FOLLOWS:

1. THE AVERAGE THICKNESS OF THE PAVEMENT SHALL BE EQUAL TO THE SPECIFIED THICKNESS. IN COMPUTING SUCH AVERAGES ALL MEASUREMENTS WHICH ARE MORE THAN ONE-HALF INCH GREATER THAN THE SPECIFIED THICKNESS SHALL BE COUNTED AS THE SPECIFIED THICKNESS PLUS ONE-HALF INCH.

2. NO PAYMENT SHALL BE MADE FOR ANY PAVEMENT THE THICKNESS OF WHICH IS MORE THAN ONE-HALF OF ONE INCH LESS THAN THE THICKNESS REQUIRED BY THE PLANS AND SPECIFICATIONS.

3. AN ADDITIONAL DEDUCTION SHALL BE MADE FOR ALL PAVEMENT DEFICIENT IN THICKNESS WITHIN THE LIMITS OF THE ONE-HALF OF ONE-INCH TOLERANCE. SUCH DEDUCTION FROM THE CONTRACT PRICE PER SQUARE YARD OF PAVEMENT SHALL BE MADE ON THE BASIS OF THE RATIO OF THE SQUARE OF THE ACTUAL THICKNESS TO THE SQUARE OF THE REQUIRED THICKNESS. FOR EXAMPLE, IF THE SPECIFIED THICKNESS IS SEVEN INCHES AND THE ACTUAL THICKNESS SIX AND ONE-HALF INCHES, THE PAYMENT TO THE CONTRACTOR SHALL BE $\frac{42.25}{49.00}$ OF THE CONTRACT PRICE PER SQUARE YARD OF DEFICIENT PAVEMENT AREA.

4. WHERE A SECTION SHOWS ONE MEASUREMENT TO BE DEFICIENT, DEDUCTION SHALL BE MADE AS FOLLOWS: FOR A DEFICIENCY AT THE EDGE, A DEDUCTION SHALL BE MADE FOR ONE-HALF THE WIDTH OF THE PAVEMENT; AND FOR A DEFICIENCY IN THE CENTER THE ENTIRE WIDTH OF THE PAVEMENT SHALL BE DISCARDED. THE LENGTH OF PAVEMENT DEDUCTED IN BOTH CASES SHALL BE THE SUM OF THE

DISTANCES FROM THE DEFICIENT BORING TO THE BORINGS ON EACH SIDE WHICH MEASURE UP TO THE REQUIRED TOLERATED THICKNESS.

5. THE BORINGS SHALL BE TAKEN AT LEAST EVERY 1,000 FEET AND AS MUCH OFTENER AS THE CONDITIONS WARRANT. THE FIRST BORING SHALL BE TAKEN AT RANDOM IN THE FIRST ONE-THOUSAND FEET. THE CONTRACTOR SHALL HAVE THE PRIVILEGE OF REQUIRING ADDITIONAL BORINGS WHERE A DEFICIENCY IN THICKNESS IS FOUND BUT THE COST OF SUCH ADDITIONAL BORINGS SHALL BE PAID BY THE CONTRACTOR.

THESE TENTATIVE SPECIFICATIONS ARE MORE STRINGENT THAN THE PRESENT POLICY OF THE BUREAU. THE SERIOUSNESS OF PERMITTING A DEFICIENCY IN PAVEMENT THICKNESS TO OCCUR AND BE PAID FOR IS APPARENT. SCRUPULOUS CARE SHOULD BE USED IN THE FINAL APPROVAL OF FEDERAL-AID CONCRETE PAVEMENTS TO DETECT DEFICIENCIES IN THICKNESS. IT IS THE CONCENSUS OF OPINION THAT IT IS PRACTICAL TO WORK WITHIN THE ONE-HALF INCH TOLERANCE LIMIT AND THAT SUCH A LIMIT IS REASONABLE AND FALLS WITHIN THE FACTOR OF SAFETY PROVIDED FOR IN THE DESIGN.

ANALYSIS OF CORE DEPTHS IN SIX STATES

IN THE ANALYSIS OF THE DEPTHS OF CORES WHICH FOLLOWS, THE VARIATION IN LENGTH OF THE INDIVIDUAL CORES FROM THE ARITHMETICAL MEAN DEPTH HAS BEEN ASSUMED TO CONFORM TO THE GENERAL LAWS OF THE PROBABILITY OF ERROR AS FOLLOWS: SMALL VARIATIONS ARE MORE FREQUENT THAN LARGE ONES; POSITIVE AND NEGATIVE VARIATIONS ARE NEARLY EQUAL IN NUMBER; AND LARGE VARIATIONS DO NOT OCCUR. IN THE RECORDS OF DEPTHS ON WHICH THIS ANALYSIS IS BASED, THERE ARE SOME THAT WOULD BE REJECTED FROM THE SERIES OF OBSERVATIONS BEFORE THE PROBABLE ERROR IS DETERMINED. CHAUVENET'S CRITERION MAY BE APPLIED TO EACH MEASUREMENT AND THE EXCESSIVE VARIATIONS MAY BE REJECTED. IN THIS ANALYSIS NO REJECTIONS HAVE BEEN MADE BECAUSE A CONSIDERATION OF ALL THE VARIATIONS WILL INCREASE THE PROBABLE ERROR BY ONLY A SMALL AMOUNT.

TABLE 2 SHOWS A SUMMARY OF THE CORE SURVEYS MADE BY THE STATES OF INDIANA, KENTUCKY, NORTH CAROLINA, OHIO, TEXAS AND VIRGINIA. THE PROBABLE ERROR INDICATES THE CALCULATED POSITIVE OR NEGATIVE VARIATIONS OF THE ARITHMETIC MEAN OR AVERAGE DEPTHS FROM THE REQUIRED DEPTHS. THE MAXIMUM AND MINIMUM DEPTHS AND THE PLUS AND MINUS VARIATION OF THESE FROM THE REQUIRED DEPTH, ARE ALSO SHOWN.

TABLE 2.- SUMMARY OF CONCRETE PAVEMENT CORE SURVEYS IN SIX STATES

State	Project number	Number of cores	Thicknesses of the pavements as determined by the measured cores: Required	Average	Probable error ℄	Maximum	Minimum	Range: Plus	Minus
			Inches	Inches	Inches	Inches	Inches	Inches	
Indiana	17-A	60	7.50	7.44	.08	9.62	5.38	2.12	2.12
Kentucky	29	8	6.00	5.97	.04	6.25	5.75	.25	.25
N. Car.	15	45	6.00	6.62	.06	9.31	5.80	3.31	.20
"	38	37	8.00	8.24	.06	9.15	7.20	1.15	.80
"	38	41	7.50	7.64	.05	9.10	6.40	1.60	1.10
"	78-B	12	8.00	7.85	.05	8.30	7.35	0.30	.65
"	78-B	11	7.50	7.25	.04	7.70	7.00	.20	.50
"	140	48	8.00	8.01	.04	8.90	7.10	.90	.90
"	140	46	7.50	7.90	.04	8.85	6.90	1.35	.60
"	143	71	5.00	5.61	.05	7.20	3.93	2.20	1.07
"	145	36	5.00	5.10	.06	6.06	4.62	1.06	.48
"	146	19	8.00	8.30	.07	9.10	7.55	1.10	.45
"	146	21	7.50	7.82	.06	8.75	7.15	1.25	.35
"	147	29	5.00	5.36	.07	6.50	4.50	1.50	.50
"	163	40	8.00	8.20	.04	9.20	7.30	1.20	.90
"	163	40	7.50	7.67	.04	8.90	6.90	1.40	.60
Ohio	288	39	9.00	8.94	.10	10.50	7.00	1.50	2.00
"	379	43	7.00	7.24	.07	8.90	6.30	1.90	.70
"	395-A	54	7.00	7.20	.05	9.40	5.80	2.40	1.20
"	402-A	32	8.00	8.25	.05	9.00	7.50	1.00	.50
"	402-B	31	8.00	8.18	.05	9.50	7.50	1.50	.50
"	406-A	29	5.50	5.69	.03	6.10	5.10	.60	.40
"	409-A	85	7.00	6.88	.03	8.70	6.20	1.70	.80
"	426-A	30	7.50	7.19	.08	8.50	6.00	1.00	1.50
"	427-A	56	7.00	7.26	.02	8.10	6.00	1.10	1.00
"	428-A	34	7.00	7.24	.07	8.75	6.50	1.75	.74
"	430-A	27	8.00	8.31	.07	9.50	7.00	1.50	1.00
Texas	122	20	6.00	5.74	.09	7.00	4.25	1.00	1.75
"	312	20	6.00	5.74	.12	7.87	4.00	1.87	2.00
"	349	8	6.00	6.08	.17	7.00	4.50	1.00	1.50
Virginia	157-B	69	6.00	5.94	.04	7.00	4.50	1.00	1.50
"	166-C	53	6.00	5.74	.07	7.70	4.00	1.70	2.00
"	166-D	72	6.00	5.66	.05	7.40	4.00	1.40	2.00
"	173	91	8.00	7.30	.05	8.80	5.50	.80	2.50
"	180-A	69	6.00	5.57	.04	6.70	4.30	.70	1.70
"	205	123	8.00	7.45	.05	9.29	5.25	1.29	2.75
"	247	123	6.00	5.31	.05	7.10	2.50	1.10	3.50
"	260-B	74	6.00	5.49	.05	7.10	3.70	1.10	2.30
"	295-A	62	6.00	5.90	.06	7.50	4.00	1.50	2.00
"	304-B	22	6.00	5.58	.09	6.80	4.60	.80	1.40
"	312-A	21	6.00	6.58	.09	7.75	5.75	1.75	0.25
"	325-B	29	6.00	5.70	.08	7.80	4.30	1.80	1.70

℄ Probable error of the arithmetic mean or average.

THE FILES OF THE BUREAU CONTAIN ONLY ONE RECORD OF PROJECT BORINGS MADE IN INDIANA. OF THE SIX CORES, THE ARITHMETICAL MEAN OR AVERAGE IS REASONABLY CLOSE TO THE REQUIRED DEPTH. THE PROBABLE ERROR OF ±.08 INCH WOULD SEEM TO INDICATE THAT THE CONCRETE WAS OF A RATHER IRREGULAR DEPTH. THE EXTREMES OF 2.12 INCHES PLUS AND MINUS SHOWS A LARGE DEVIATION FROM THE REQUIRED DEPTH.

THE ONE KENTUCKY PROJECT ON RECORD IN THE BUREAU FILES HAS AN AVERAGE VALUE WHICH IS VERY CLOSE TO THE REQUIRED DEPTH. THE PROBABLE ERROR OF ±.04 AND THE PLUS AND MINUS RANGE OF 0.25 INDICATES THAT THE CONCRETE WAS PLACED TO A UNIFORM DEPTH.

THE NINE NORTH CAROLINA PROJECT RECORDS IN THE POSSESSION OF THE BUREAU INCLUDE ONE JOB ON WHICH THE AVERAGE IS LESS THAN THE REQUIRED DEPTH. THE PROBABLE ERROR ON ALL THE PROJECTS VARIES FROM ±.04 TO ±.07 AND ONLY TWO PROJECTS ARE REPRESENTED BY THE LATTER FIGURE. THE SMALL PROBABLE ERROR IN THE MAJORITY OF THE CASES INDICATES THAT, IN GENERAL, THE CONCRETE IS CAREFULLY PLACED. THIS IS CONFIRMED BY THE REASONABLY SMALL MAXIMUM MINUS RANGE OF 1.10 INCHES.

THREE OHIO PROJECTS OF THE TEN TABULATED, SHOW AVERAGES LESS THAN THAT REQUIRED. THE DEFICIENCY VARIES FROM .06 TO 0.31 INCH. THE PROBABLE ERROR OF THE AVERAGE VARIES FROM ±.02 TO ±.10. THE VARIATION OF THE PROBABLE ERROR FROM A SMALL TO A LARGE VALUE COMBINED WITH THE HIGH MAXIMUM MINUS RANGE OF 2.00, SEEMS TO INDICATE ERRATIC CONSTRUCTION WORK ON SOME OF THE PROJECTS.

ONLY THREE PROJECTS ARE RECORDED FOR TEXAS. THE AVERAGE FOR TWO OF THESE IS 0.26 INCH LESS THAN THE REQUIRED DEPTH. THE PROBABLE ERROR VARIES FROM ±.09 TO ±.17 INCH AND THE MINUS RANGE FROM 1.50 TO 2.00 INCHES. THESE VALUES INDICATE A LACK OF UNIFORMITY IN PLACING THE CONCRETE.

THE BUREAU FILES CONTAIN THE RECORDS OF THE BORINGS ON TWELVE VIRGINIA PROJECTS. ONLY ONE OF THESE HAS AN AVERAGE DEPTH AS GREAT AS THE REQUIRED DEPTH. THE DEFICIENCY VARIES FROM .06 TO 0.69 OF AN INCH. THE PROBABLE ERROR VARIES FROM ±.04 TO ±.09 OF AN INCH. THE MINUS RANGES ARE HIGH AND VARY FROM 0.25 TO 3.50 INCHES. THESE FIGURES INDICATE A GRADATION FROM UNIFORM CONSTRUCTION TO IRREGULAR CONSTRUCTION. THE BORINGS CLEARLY INDICATE THE NECESSITY FOR BETTER SUPERVISION AND MORE CARE ON THE PART OF THE CONTRACTOR IN PREPARING THE SUBGRADE, IN ORDER TO PREVENT THE SETTLEMENT OF THE FORMS AND THE FLOW OF THE CONCRETE FROM THE PRESCRIBED CROSS SECTION.

Analysis of Unit Compressive Stresses

An analysis of the unit compressive strengths of the concrete cores, as given in Table 3, affords an interesting study. The $1:1\frac{1}{2}:3$ Ohio cores showed a unit compressive strength, at the age of 1 to $2\frac{1}{2}$ months, of from 3,797 $\pm$ 100 to 5,000 $\pm$ 83 pounds per square inch. The figures indicate a fairly uniform strength for concrete in the early period of setting. One project with the value of 4,773 $\pm$ 163 pounds per square inch as judged from the relatively large probable error, seems to lack the uniformity of the balance of the work. Although the compressive strength of 4,773 $\pm$ 163 pounds per square inch is sufficiently high to conform to the specifications, the uniformity of the product is unsatisfactory. This latter feature is as much to be desired as a relatively high unit compressive strength, because it determines the maximum resistance of the concrete to temperature, static load and impact stresses.

Table 4 gives some interesting data showing the increase of the unit compressive strength with the age of the concrete. In all but two instances the strength and the age increase in the same direction. Ohio 379 with approximately the same number of cores in each group, showed considerably less strength at six months than at two months. This should not be considered as a loss of strength of the concrete with age since the tests were made on different samples of the same project at various ages. The only similarity between the cores lies in the fact that they were made under the same specifications and, therefore, should be of relatively uniform strength. Probably the best interpretation of this case would be that the quality of the concrete improved with the progress of the project and that the last concrete laid was better than the first.

TABLE 3.- SUMMARY OF THE UNIT COMPRESSIVE STRENGTH OF CORES IN SIX STATES

State-Project number	Number of cores	Compressive strength (lbs. per sq. in.) Average	P.E.	Max.	Min.	Range Plus	Range Minus	Age (Months)	Mix	Aggregate
INDIANA:										
17-A	60	3862	56	5050	2090	1188	1772		6:1:2:3	SLAG
N. CAR.:										
15	6	2063	209	3225	1175	1162	888	4 TO 6	1:2:4	GRANITE
15	39	2513	72	3425	1525	912	988	6 " 12	1:2:4	"
38	6	2589	91	3000	2060	411	529	1 " 2	1:2:4	GRAVEL
38	12	3147	85	4275	2650	1128	497	4½ " 6	1:2:4	"
38	59	3305	40	4350	2450	1045	855	6 " 9½	1:2:4	"
78-B	13	3513	119	4625	2350	1112	1163	3 " 5½	1:2:4	LIMESTONE
78-B	7	4443	172	5300	3400	857	1043	6 " 8	1:2:4	"
140	101	3021	37	4275	1575	1254	1446	8½ " 19½	1:1½:3	GRAVEL
143	7	1355	17	1660	1050	325	305	1 " 2	1:2½:5	
143	17	1462	49	1850	850	388	612	2 " 3	1:2½:5	
143	37	1952	50	2850	1450	898	502	3 " 6	1:2½:5	
143	11	2287	87	3125	1550	838	737	6 " 7	1:2½:5	
145	36	1725	29	2250	950	525	775	7 " 13	1:2½:5	
146	42	3117	67	4800	1720	1683	1397	11 " 23	1:2:4	GRANITE
147	30	1742	34	2325	1100	583	642	8 " 16	1:2½:5	"
163	15	3009	77	3875	2290	866	719	3 " 6	1:2:4	
163	69	2936	43	3875	1075	939	1861	6 " 12	1:2:4	
OHIO										
288	19	3620	172	5760	1770	2140	1850	1 " 3	1:1½:3	LIMESTONE
288	16	4653	123	6600	3650	1947	1003	9 " 12	1:1½:3	"
379	11	3662	94	4410	3140	748	522		2:1:1½:3	GRAVEL
379	13	3240	141	4450	1600	1110	1640	7 " 9	1:1½:3	"
395	30	3775	89	4900	2310	1125	1465	2 " 3	1:1½:3	LIMESTONE
395	14	4626	132	5580	3470	954	1156	3 " 3½	1:1½:3	"
402-A	12	3797	100	4470	2920	673	877	1 " 2	1:1½:3	GRAVEL
402-A	12	3848	109	4800	3040	952	808	2 " 3	1:1½:3	"
402-B	18	4773	163	7240	2960	2467	1813	1 " 2	1:1½:3	"
402-B	07	6387	152	7350	5430	963	957	2 " 3	1:1½:3	"
406-A	25	2390	73	3580	1320	1190	1070	1 " 2	1:2½:5	"
409-A	20	3836	49	4680	3180	844	656	1 " 2	1:1½:3	LIMESTONE
409-A	18	4892	79	5780	3880	888	1012	2 " 3	1:1½:3	"
409-A	14	5750	163	6930	3940	1180	1810	3 " 4	1:1½:3	"
426-A	28	3630	79	4720	2480	1090	1150	1½ " 3	1:1½:3	GRAVEL
427-A	43	5000	83	6730	3210	1730	1790	1 " 2½	1:1½:3	"
428-A	30	4345	79	5590	2410	1245	1935	1 " 2½	1:1½:3	"
430-A	27	3637	124	5280	1550	1643	2087	9 " 10	1:1½:3	"

TABLE 3.- SUMMARY OF THE UNIT COMPRESSIVE STRENGTH OF CORES IN SIX STATES (CONTINUED)

STATE-PROJECT NUMBER	NUMBER OF CORES	COMPRESSIVE STRENGTH (LBS. PER SQ. IN.) AVERAGE	P.E.	MAX.	MIN.	RANGE PLUS	RANGE MINUS	AGE (MONTHS)	MIX	AGGREGATE
TEXAS										
312	19	4390	181	5630	1915	1240	2475		1:2:3½	L.S.& G.
VA.										
157-B	44	2900	61	4350	1620	1450	1280	8 TO -	1:2:4	GRAVEL
173	79	3600	79	5980	1490	2380	4490	24 " -	1:2:4	
180-A	48	4577	63	5590	3280	1013	1297	6 " 13	1:2:4	
205	14	3250	73	4230	2733	980	517	3 " 5	1:2:4	"
205	100	3349	51	5250	1570	1901	1779	6 " 19	1:2:4	"
260-B	97	3102	36	4300	1440	1198	1662	3½ " 4½	1:2:4	-
295-A	21	2795	97	3720	1100	925	1695	3 " 6	1:2:4	GRAVEL
295-A	58	3038	56	4355	1625	1317	1413	6 " 7½	1:2:4	"
304-B	8	2836	169	3650	1540	814	1296		1:2:4	
325-B	15	3722	152	5210	2490	1488	1232		1:2:4	GRAVEL

TABLE 4.- RELATION BETWEEN UNIT COMPRESSIVE STRENGTH AND AGE OF CONCRETE PAVEMENT CORES

State	Project Number	Compressive strengths of concrete cores at various ages in months: 1 to 2 months ± Probable error	2 to 3 months ± Probable error	3 to 6 months ± Probable error	over 6 months ± Probable error
		Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.
			1:1½:3 Mix		
Ohio	402-A	3793 ± 100	3848 ± 109		
"	402-B	4773 ± 163	6387 ± 152		
"	409-A	3836 ± 49	4892 ± 79	5750 ± 163	
"	427-A	5000 ± 83			
"	428-A	4345 ± 79			
"	288		3620 ± 172		4653 ± 123
"	395		3775 ± 89	4626 ± 132	
"	379	3662 ± 94			3240 ± 141
"	426-A		3630 ± 79		
"	430				3637 ± 124
N. Car.	140				3021 ± 37
			1:2:4 Mix		
N. Car.	15			2063 ± 209	2513 ± 72
"	38	2589 ± 91		3147 ± 85	3305 ± 40
"	78-B			3513 ± 119	4443 ± 172
"	146				3117 ± 67
"	163			3009 ± 77	2936 ± 43
Virginia	157-B				2900 ± 61
"	173				3600 ± 79
"	180-A				4577 ± 63
"	205			3250 ± 73	3349 ± 51
"	260-B			3102 ± 36	
"	295-A			2795 ± 97	3038 ± 36

CABLE GUARD RAIL BRACKETS

CONTRIBUTED BY THE DIVISION OF CONSTRUCTION

IN THE JANUARY ISSUE OF THE NEWS LETTER THE CABLE GUARD RAIL BRACKET INFORMATION WAS ACCREDITED TO MR. PURCELL. THIS WAS A TYPOGRAPHICAL ERROR. THE DESIGNS WERE ORIGINATED AND THE DATA WAS SUBMITTED BY MR. VOSHELL. THE LATTER CLAIMS THAT THE PRINCIPAL FEATURE OF HIS DESIGN CONSISTS OF THE IRON PEDESTALS WHICH HOLD THE CABLE ABOUT FOUR INCHES FROM THE FACE OF THE POST. THESE PEDESTALS ARE ILLUSTRATED BY THE FOLLOWING PICTURE WHICH SHOWS THE EYE-BOLT DESIGN OF BRACKET USED IN MR. VOSHELL'S DISTRICT ON MICHIGAN FEDERAL-AID PROJECT NO. 146 NEAR THE TOWN OF HOLT.

IT IS BELIEVED THAT THIS MODIFICATION WILL TEND TO REDUCE THE NUMBER OF POSTS DESTROYED BY VEHICLES COLLIDING WITH THE GUARD RAIL AS WELL AS TO LESSEN THE DAMAGE TO THE VEHICLE. MR. VOSHELL STATES, "OUR OBSERVATIONS CONVINCE US THAT VEHICLES STRIKE A GUARD RAIL AT A RELATIVELY SLIGHT ANGLE AND SLIDE ALONG THE GUARD RAIL UNTIL ONE OF THE WHEELS, GENERALLY THE FRONT WHEEL, STRIKES A POST. IF THE VEHICLE IS MOVING AT A FAIR SPEED THE POST IS BROKEN OFF AND THE VEHICLE DAMAGED TO A CONSIDERABLE EXTENT. WITH THE DESIGN OF THE GUARD RAIL SHOWN IN THE ILLUSTRATION, WE BELIEVE THE WHEELS OF THE VEHICLE IN A MAJORITY OF CASES WILL BE PREVENTED FROM STRIKING THE POST AND CONSEQUENTLY RESULT IN NO DAMAGE TO THE GUARD RAIL AND COMPARATIVELY SLIGHT DAMAGE TO THE VEHICLE."

BUREAU ACTIVE IN RAILROAD GRADE CROSSING ELIMINATION

CONTRIBUTED BY THE DIVISION OF DESIGN

THE BUREAU HAS TAKEN AN ACTIVE INTEREST IN THE WORK OF ELIMINATING RAILROAD GRADE CROSSINGS EVER SINCE THE FEDERAL-AID ROAD WORK WAS BEGUN. THE SUCCESS OF OUR EFFORTS IS ILLUSTRATED BY A RECENT COMPILATION OF DATA FROM THE FILES. THE RESULTS WERE AS FOLLOWS:

ON THE FEDERAL-AID PROJECTS SUBMITTED TO DATE, THERE ARE 4,315 RAILROAD GRADE CROSSINGS. THIS NUMBER INCLUDES ONLY THE CROSSINGS ON PROJECTS THE PLANS FOR WHICH HAVE BEEN REVIEWED BY THE HEADQUARTERS OFFICE. WHEN THE LOGGING OF THE FEDERAL-AID SYSTEM IS COMPLETED, IT IS EXPECTED THAT THE TOTAL NUMBER OF GRADE CROSSINGS AND THEIR CLASSIFICATION WILL BE AVAILABLE IN THE SEVERAL STATES.

OF THESE 4,315 REPORTED GRADE CROSSINGS 1,380 OR 32 PER CENT HAVE BEEN ELIMINATED. IT IS INTERESTING TO NOTE THAT 874 OF THESE SEPARATIONS WERE BROUGHT ABOUT BY RE-LOCATING THE HIGHWAY TO AVOID THE RAILROAD. THIS IS A CREDITABLE SHOWING WHEN IT IS CONSIDERED THAT THOSE WERE GENERALLY THE CROSSINGS WHERE THE GREATEST DANGER EXISTED. DURING THE CALENDAR YEAR 1925, THERE WERE ELIMINATED ON FEDERAL-AID ROAD PROJECTS 259 RAILROAD GRADE CROSSINGS. THIS NUMBER WAS ACCOMPLISHED BY 172 HIGHWAY RELOCATIONS, 41 OVERPASSES AND 46 UNDERPASSES.

Table F-4 (1924)

United States Department of Agriculture
Bureau of Public Roads

Rural Road Status Survey

LOCAL FUNDS AVAILABLE FOR ROAD AND BRIDGE PURPOSES, 1924
For Local Authorities (County, Town and District)

States	Total Funds Available	Balance from Previous Year	Receipts from Bonds and Notes	Taxes and Appropriations	Motor Vehicle License Fees (Share)	Gasoline Tax (Share)	Miscellaneous Income	States
Alabama	$ 7,984,532	-	$ 300,563	$ 3,451,250	$ 3,151	$ 1,635,924	$ 2,593,644	Alabama
Arizona	1,949,794	$ 413,662	-	1,205,728	-	261,385	69,019	Arizona
Arkansas	13,228,400	-	2,676,500	8,552,000	1,000,000	999,900	-	Arkansas
California	27,973,576	-	2,462,152	17,286,214	3,010,000	5,000,000	215,210	California
Colorado	5,513,107	-	50,986	3,670,672	340,541	641,533	809,375	Colorado
Connecticut	2,589,068	-	-	2,589,068	-	-	-	Connecticut
Delaware	1,362,931	65,052	37,419	1,260,460	-	-	-	Delaware
Florida	25,275,764	-	16,158,212	6,418,007	445,264	1,114,028	1,140,253	Florida
Georgia	16,628,625	-	3,662,341	9,593,744	-	1,188,447	2,184,093	Georgia
Idaho	1/ 3,000,000							Idaho
Illinois	10,712,600	545,500	25,000	8,929,200	-	-	1,212,900	Illinois
Indiana	58,364,900	13,897,200	15,322,000	28,645,700	-	500,000	-	Indiana
Iowa	22,225,531	3,929,799	483,938	14,723,867	525,756	-	2,562,171	Iowa
Kansas	21,269,253	4,383,347	2,178,768	10,670,201	4,036,937	-	-	Kansas
Kentucky	9,604,075	1,467,170	1,187,500	6,545,090	-	-	404,315	Kentucky
Louisiana	12,580,113	-	7,292,584	5,087,529	-	-	200,000	Louisiana
Maine	2/ 3,500,000							Maine
Maryland	3,628,000	-	500,000	3,128,000	-	-	-	Maryland
Massachusetts	3/ 1,500,000							Massachusetts
Michigan	29,605,450	-	4,470,000	19,042,540	5,422,780	-	670,170	Michigan
Minnesota	26,904,527	-	10,750,888	15,850,698	-	-	302,941	Minnesota
Mississippi	11,604,204	-	660,535	7,321,064	697,344	398,460	2,526,801	Mississippi
Missouri	18,546,084	1,314,386	562,500	14,944,591	-	-	1,724,607	Missouri
Montana	2,977,406	-	-	1,855,087	810,156	229,825	82,338	Montana
Nebraska	14,962,885	3,344,708	161,879	11,456,298	-	-	-	Nebraska
Nevada	531,417	-	32,000	441,390	-	48,027	10,000	Nevada
New Hampshire	1,463,344	-	1,463,344	-	-	-	-	New Hampshire
New Jersey	5,136,500	-	5,079,959	56,541	-	-	-	New Jersey
New Mexico	667,525	117,561	100,000	419,310	8,965	-	21,689	New Mexico
New York	26,500,000	2,463,419	16,300,000	7,736,581	-	-	-	New York
North Carolina	16,050,000	-	5,350,000	10,700,000	-	-	-	North Carolina
North Dakota	4,354,526	-	-	3,474,526	280,000	-	600,000	North Dakota
Ohio	48,955,000	-	10,000,000	38,955,000	-	-	-	Ohio
Oklahoma	17,750,580	-	4,000,000	8,573,400	3,728,679	1,448,501	-	Oklahoma
Oregon	2/ 11,000,000							Oregon
Pennsylvania	1/ 35,000,000							Pennsylvania
Rhode Island	2/ 312,000							Rhode Island
South Carolina	12,696,941	-	7,897,748	2,313,452	-	715,864	1,769,877	South Carolina
South Dakota	6,978,661	-	150,000	6,152,168	676,493	-	-	South Dakota
Tennessee	7,541,559	-	989,857	5,324,015	-	-	1,227,687	Tennessee
Texas	28,648,006	-	10,000,000	15,500,000	3,148,006	-	-	Texas
Utah	2/ 1,500,000							Utah
Vermont	1,074,000	-	-	1,074,000	-	-	-	Vermont
Virginia	8,047,074	-	2,822,136	3,241,940	-	1,104,396	878,602	Virginia
Washington	2/ 9,000,000							Washington
West Virginia	17,254,200	7,568,300	1,865,500	7,611,700	-	-	208,700	West Virginia
Wisconsin	31,409,029	-	6,679,022	24,730,007	-	-	-	Wisconsin
Wyoming	923,035	-	49,485	471,427	-	-	402,123	Wyoming
Total Detailed	581,472,262	39,510,104	141,722,816	339,002,465	24,134,072	15,286,290	21,816,515	Total Detailed
Total Non-Detailed	64,812,000	4,407,216	15,814,128	37,785,396	2,722,104	1,685,112	2,398,044	Total Non-Detailed
Grand Total	4/ 646,284,262	5/ 43,917,320	157,536,944	376,787,861	26,856,176	16,971,402	24,214,559	Grand Total

REMARKS: Above data are partly estimates and approximations, but are the only available figures obtainable by this Bureau.

NOTES: 1/ Estimates based on 1923 data 2/ Estimated from 1924 road program 3/ Estimated from mileage built. 4/ Made up from detailed data and non-detailed estimates. 5/ This balance is probably understated, as most counties do not record balances or deficits: the balances being added to general fund and the deficits being covered from same fund.

A.A.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

TABLE F-5 (1924)

RURAL ROAD STATUS SURVEY

LOCAL DISBURSEMENTS FOR ROAD AND BRIDGE PURPOSES, 1924
BY LOCAL AUTHORITIES (COUNTY, TOWN AND DISTRICT)

STATES	TOTAL DISBURSEMENTS, COUNTY, TOWN & LOCAL ROADS	CONSTRUCTION, LOCAL ROADS TOWN ROADS & COUNTY ROADS	MAINTENANCE, LOCAL ROADS TOWN ROADS & COUNTY ROADS	OVERHEAD EXPENSES (WHEN REPORTED)	BOND AND NOTE PAYMENTS PRINCIPAL 1/	BOND AND NOTE PAYMENTS INTEREST 1/	MISCELLANEOUS EXPENSES	UNEXPENDED BALANCE AT END OF YEAR	STATES
ALABAMA	$ 7,984,532	$ 2,120,745	$ 5,863,787	-	-	-	-	-	ALABAMA
ARIZONA	1,771,876	789,596	745,892	$ 90,547	-	-	$ 145,841	$ 177,918	ARIZONA
ARKANSAS	9,260,000	1,300,000	2,100,000	-	$ 5,860,000	- 1/	-	3,968,400	ARKANSAS
CALIFORNIA	27,973,576	8,000,000	14,834,408	675,000	1,645,770	$ 2,078,069	740,329	-	CALIFORNIA
COLORADO	5,148,611	1,550,221	2,566,164	95,385	-	-	936,841	364,496	COLORADO
CONNECTICUT	2,569,068	466,350	2,102,718	-	-	-		20,000	CONNECTICUT
DELAWARE	1,233,353	340,876	491,734	18,611	10,000	326,055	46,077	129,578	DELAWARE
FLORIDA	18,725,552	10,153,889	3,195,434	-	-	-	5,376,229	6,550,212	FLORIDA
GEORGIA	11,602,244	2,175,631	5,772,189	-	-	-	3,654,424	5,026,381	GEORGIA
IDAHO	2/ 3,000,000							-	IDAHO
ILLINOIS	10,580,000	3,486,300	5,464,500	262,500	432,600	- 1/	884,100	132,600	ILLINOIS
INDIANA	47,582,300	19,847,600	10,951,400	-	16,758,500	- 1/	24,800	10,782,600	INDIANA
IOWA	19,035,072	8,215,483	9,083,579	490,268	874,570	- 1/	371,172	3,190,459	IOWA
KANSAS	16,361,684	12,670,607	2,998,059	-	481,490	- 1/	211,528	4,907,569	KANSAS
KENTUCKY	8,927,340	1,066,200	3,369,750	255,100	1,164,350	- 1/	3,071,940	676,735	KENTUCKY
LOUISIANA	9,234,499	4,985,743	1,317,334	-	-	-	2,930,922	3,345,614	LOUISIANA
MAINE	3/ 3,500,000								MAINE
MARYLAND	3,628,000	1,150,000	2,100,000	-	137,000	241,000	-	-	MARYLAND
MASSACHUSETTS	4/ 1,500,000								MASSACHUSETTS
MICHIGAN	28,344,270	12,955,560	4,807,480	1,164,690	6,731,360	- 1/	2,685,180	1,261,220	MICHIGAN
MINNESOTA	26,222,415	12,286,510	10,037,485	1,047,483	-	-	2,950,937	682,112	MINNESOTA
MISSISSIPPI	11,735,023	877,024	7,449,743	-	-	-	3,408,256	(130,819)	MISSISSIPPI
MISSOURI	16,609,802	10,769,223	2,140,373	462,466	2,643,461	- 1/	594,279	1,936,232	MISSOURI
MONTANA	1,804,444	-	1,804,444	-	-	-	-	1,172,962	MONTANA
NEBRASKA	12,229,046	8,570,488	2,627,735	264,418	-	-	766,405	2,733,839	NEBRASKA
NEVADA	472,634	175,517	278,654	15,000	-	-	3,463	53,783	NEVADA
NEW HAMPSHIRE	1,463,344	309,853	1,140,577	-	-	-	12,914	-	NEW HAMPSHIRE
NEW JERSEY	5,136,500	5,136,500	-	-	-	-	-	-	NEW JERSEY
NEW MEXICO	563,860	166,096	252,230	21,497	-	-	124,037	103,665	NEW MEXICO
NEW YORK	24,400,000	16,500,000	5,900,000	-	-	-	2,000,000	2,100,000	NEW YORK
NORTH CAROLINA	16,050,000	6,990,000	3,940,000	940,000	970,000	3,210,000	-	-	NORTH CAROLINA
NORTH DAKOTA	4,235,766	2,250,000	1,826,281	94,185	-	-	65,300	118,760	NORTH DAKOTA
OHIO	48,955,000	19,970,000	15,815,000	-	13,170,000	- 1/	-	-	OHIO
OKLAHOMA	12,211,000	500,000	10,000,000	-	-	-	1,711,000	5,539,580	OKLAHOMA
OREGON	3/ 6,000,000							5,000,000	OREGON
PENNSYLVANIA	2/35,000,000	13,500,000	12,000,000	800,000	6,000,000	- 1/	2,700,000	-	PENNSYLVANIA
RHODE ISLAND	3/ 312,000								RHODE ISLAND
SOUTH CAROLINA	6,220,999	2,285,972	1,914,116	-	-	-	2,020,911	6,475,942	SOUTH CAROLINA
SOUTH DAKOTA	7,751,527	4,721,599	2,878,121	151,807	-	-	-	(772,866)	SOUTH DAKOTA
TENNESSEE	6,761,646	3,478,860	3,232,786	-	-	-	-	779,913	TENNESSEE
TEXAS	26,160,000	13,160,000	5,000,000	-	-	-	8,000,000	2,438,006	TEXAS
UTAH	3/ 1,500,000								UTAH
VERMONT	670,000	535,000	135,000	-	-	-	-	404,000	VERMONT
VIRGINIA	9,675,446	8,259,431		-	1,286,967	- 1/	129,048	(1,628,372)	VIRGINIA
WASHINGTON	3/ 9,000,000								WASHINGTON
WEST VIRGINIA	12,959,400	6,477,700	3,532,500	-	1,647,300	1,301,900	-	4,294,800	WEST VIRGINIA
WISCONSIN	32,814,669	16,095,048	14,004,402	515,219	-	-	2,200,000	(1,405,640)	WISCONSIN
WYOMING	979,410	618,841	360,569	-	-	-	-	(56,375)	WYOMING
TOTAL DETAILED	551,043,908	244,908,463	134,084,944	7,364,176	59,863,368	7,157,024	47,665,933	5/	TOTAL DETAILED
TOTAL NON-DETAILED	24,812,000	11,041,340	8,287,208	322,556	2,704,508	322,556	2,133,832	5/	TOTAL NON-DETAILED
GRAND TOTAL	6/575,855,908	255,949,803	192,372,152	7/ 7,686,732	62,567,876	1/7,479,580	49,799,765	5/70,428,354	GRAND TOTAL

REMARKS: ABOVE DATA ARE PARTLY ESTIMATES AND APPROXIMATIONS, BUT ARE ONLY AVAILABLE FIGURES OBTAINABLE BY THIS BUREAU.

NOTES: 1/ BOND INTEREST OFTEN INCLUDED WITH PAYMENTS ON PRINCIPAL. 2/ ESTIMATE BASED ON 1923 DATA. 3/ ESTIMATED FROM 1924 ROAD PROGRAM. 4/ ESTIMATED FROM MILEAGE BUILT. 5/ IN ONLY A FEW STATES ARE BALANCES DEPENDABLE. THE FIGURES BRACKETED ARE APPARENT DEFICITS AND THE TOTAL IS A NET UNEXPENDED BALANCE. 6/ MADE UP FROM DETAILED DATA AND NON-DETAILED ESTIMATES. 7/ ONLY 20 STATES SHOW COUNTY OVERHEAD EXPENSES.

L.A.A

PROPER METHOD OF MAKING REQUESTS FOR SUPPLIES

CONTRIBUTED BY THE DIVISION OF CONTROL

SUPPLIES FOR THE VARIOUS FIELD OFFICES ARE FURNISHED UPON REQUEST BY THE PROPERTY SECTION OF THE WASHINGTON OFFICE. IN THE PAST THERE HAS BEEN SOME DELAY AND INCONVENIENCE CAUSED BY THE FAILURE ON THE PART OF SOME OF THE FIELD MEN TO FILL OUT ACCURATELY OR COMPLETELY THE REQUEST FORMS. IN ORDER TO EXPEDITE THE RECEIPT OF SUPPLIES THE FIELD OFFICES SHOULD OBSERVE CLOSELY THE FOLLOWING PROCEDURE:

1. FORM 119-REVISED-REQUEST FOR SUPPLIES- SHOULD BE USED FOR MAKING ALL REQUESTS. IF SO DESIRED IT MAY BE ACCOMPANIED BY A LETTER OF EXPLANATION.

2. THE FORM SHOULD BE FILLED IN COMPLETELY. THIS INCLUDES A FULL DESCRIPTION OF THE DESIRED ITEMS, THE METHOD OF SHIPMENT, AND THE CHARGE SYMBOL. LACKING THIS INFORMATION IT IS NECESSARY EITHER TO RETURN THE FORM OR FILL IT IN BY GUESS. EITHER MAY CAUSE CONSIDERABLE DELAY.

3. SYMBOL NUMBERS OR AMOUNTS CHARGEABLE TO EACH SHOULD NOT BE CHANGED AFTER THE ORDER HAS BEEN PLACED. SUCH CHANGES INVOLVE ADDITIONAL WORK AND THE POSSIBILITY OF MISTAKES. TRANSFER OF SUCH CHARGES AT HEADQUARTERS COULD POSSIBLY BE ELIMINATED IN THE WESTERN DISTRICTS BY HAVING THE ACCOUNTS SECTION NOTE THE ORIGINAL REQUISITION BEFORE IT IS FORWARDED TO WASHINGTON.

4. IT IS DESIRABLE TO REDUCE THE NUMBER OF "RUSH" ORDERS TO A MINIMUM. ALL ORDERS ARE EXPEDITED AS MUCH AS POSSIBLE IN THE REGULAR PROCEDURE, AND "RUSH" ORDERS ARE GIVEN SPECIAL ATTENTION. AN EXCESSIVE NUMBER OF "RUSH" ORDERS, HOWEVER, WILL TEND TO SLOW UP MERITORIOUS REQUESTS.

5. THE INVOICE SHOULD BE EXECUTED IMMEDIATELY UPON RECEIPT OF THE GOODS AND RETURNED TO THE WASHINGTON OFFICE. VOUCHERS WILL NOT BE CERTIFIED UNTIL EVIDENCE OF THE RECEIPT OF THE GOODS HAS BEEN RECORDED. ANY DELAY, THEREFORE, IN THE EXECUTION OF THE INVOICE CAUSES A CORRESPONDING DELAY IN THE PAYMENT OF THE BILL. DELAYS OFTHIS CHARACTER SUBJECT THE BUREAU TO CRITICISM AND ULTIMATELY MAY RESULT IN HIGHER PRICES.

6. Government property should be handled by the members of the Bureau with even greater care than that accorded their own personal property. The use of government property is in the nature of a trust. An excessive amount of lost property may make a thorough investigation necessary.

PROJECT STATEMENT DATA

Contributed by the Division of Design

From time to time the Washington office has issued memoranda to district engineers describing the proper information desired to be submitted on the standard project statement forms. Mr. Toms has compiled the subject matter of these various memoranda in a single letter of instructions which he has issued to his field engineers. These instructions are general in application and should be useful to field men in other districts. They are quoted as follows:

"June 30, 1925.

To Each Highway Engineer in Charge of States:

"A considerable lack of uniformity exists among the field engineers relative to the submission of route reports to accompany project statements and sketch maps submitted by the States.

"A sample route report and sketch map illustrating the features to be included in these reports was furnished you last year, but it is noted in many instances that route reports do not cover all of the features, or follow the procedure outlined in this sample report. This is particularly true with reference to the paragraph in route report covering the length of the project, the selection of intermediate control points, and the indication on the sketch map of the beginning and ending of the project, together with notations identifying railroad and stream crossing data. In many cases the sketch maps being submitted by the States to accompany their project statements are incomplete in this respect. This fact, however, is no justification for the field men to forward these sketch maps to the district office in this incomplete state. Necessary data not contained on the sketch maps when received at the State offices should be supplied by the State representatives before being forwarded to the district office.

"THERE ARE THREE DISTINCT PHASES TO THE PROPER SUBMISSION OF A PROJECT STATEMENT AND ITS ACCOMPANYING DOCUMENTS. THESE CONSIST OF (1) THE PROJECT STATEMENT ITSELF, (2) THE ROUTE REPORT ACCOMPANYING THE PROJECT STATEMENT, AND (3) THE SKETCH MAP ACCOMPANYING THE PROJECT STATEMENT. IN THE INTEREST OF UNIFORMITY REGARDING THE SUBMISSION OF THESE DOCUMENTS, IT IS HOPED THAT THE FOLLOWING INSTRUCTIONS WILL SERVE TO CLARIFY A NUMBER OF THE POINTS ON WHICH VARYING INTERPRETATIONS HAVE HERETOFORE BEEN MADE BY OUR FIELD MEN:

PROJECT STATEMENTS

"(A) THE OFFICIAL CONTROL POINTS SHOULD ALWAYS BE SHOWN IN PARAGRAPH 2 OF THE PROJECT STATEMENT.

(B) IF AN INTERMEDIATE CONTROL POINT, OR POINTS, IS TAKEN SUCH INTERMEDIATE CONTROL POINT SHOULD BE INDICATED IN PARAGRAPH 3 OF THE PROJECT STATEMENT.

"IT FREQUENTLY HAPPENS THAT PROJECT STATEMENTS SUBMITTED BY THE STATES COVER THE ENTIRE DISTANCE BETWEEN OFFICIAL CONTROL POINTS AND THAT OUR ROUTE INVESTIGATIONS INDICATE THAT FOR A PORTION OF THE DISTANCE BETWEEN OFFICIAL CONTROL POINTS A NUMBER OF ALTERNATE ROUTES ARE AVAILABLE ON WHICH THE STATE IS NOT PREPARED TO MAKE A DECISION REGARDING LOCATION, INASMUCH AS THE AFFECTED PORTIONS OF THE ROUTE ARE BEYOND THE LIMITS OF THE SECTION FIRST PROPOSED FOR CONSTRUCTION UNDER THE PROJECT. WHERE THIS CONDITION OBTAINS AN INTERMEDIATE CONTROL POINT SHOULD BE SELECTED BY OUR FIELD ENGINEERS AND THE PROJECT ENDED AT THIS POINT, LEAVING THE MATTER OF THE LOCATION BETWEEN THE INTERMEDIATE CONTROL POINTS SELECTED AND THE OTHER OFFICIAL CONTROL POINT OPEN TO FURTHER INVESTIGATION AND AGREEMENT BETWEEN THE STATE AND THE BUREAU WHEN THE STATE IS READY TO SUBMIT ANOTHER PROJECT STATEMENT AND UNDERTAKE WORK ON THE AFFECTED PORTION OF THE ROUTE. WHEN IT IS NECESSARY TO DESIGNATE AN INTERMEDIATE CONTROL POINT FOR A PROJECT WHICH HAS BEEN SUBMITTED BY THE STATE, EXTENDING BETWEEN OFFICIAL CONTROL POINTS, THE GROSS AND NET LENGTH OF THE PROJECT AS GIVEN IN THE PROJECT STATEMENT BY THE STATE FOR THE ENTIRE ROUTE SHOULD BE CORRECTED BY OUR FIELD ENGINEERS TO COVER ONLY THE GROSS AND NET LENGTH OF THE PROJECT BETWEEN THE INTERMEDIATE CONTROL POINTS SELECTED. REASONS FOR THE CORRECTIONS IN GROSS AND NET MILEAGE OF THE PROJECT SHOULD BE EXPLAINED IN THE ACCOMPANYING ROUTE REPORT.

"THE LENGTH OF ROUTE EMBRACED IN THE PROJECT STATEMENT SHOULD NOT EXTEND IN ANY CASE BEYOND THE POINT AT WHICH THE STATE AND BUREAU ENGINEERS ARE ABLE TO REACH AN AGREEMENT ON THE ROUTE TO BE RECOMMENDED. IF AN AGREEMENT CANNOT BE REACHED ON THE ROUTE, A FULL REPORT SHOULD BE MADE.

"(c) THE PRELIMINARY ESTIMATE OF COST GIVEN IN PARAGRAPH 5 OF THE PROJECT STATEMENT SHOULD COVER THE LENGTH OF THE PROJECT ONLY. IN CASE IT IS NECESSARY TO SELECT AN INTERMEDIATE CONTROL POINT FOR THE ENDING OF THE PROJECT, THEREBY REDUCING THE GROSS AND NET MILEAGE OF THE PROJECT AS SUBMITTED BY THE STATE, A CORRESPONDING CORRECTION OF THE PRELIMINARY ESTIMATE OF COST OF THE PROJECT AS GIVEN BY THE STATE, COVERING THE COST BETWEEN OFFICIAL CONTROL POINTS, SHOULD BE MADE BY OUR FIELD MEN SO AS TO HAVE THIS PRELIMINARY ESTIMATE OF COST COVER ONLY THE MILEAGE FOR WHICH THE PROJECT IS ACTUALLY SUBMITTED.

"(D) THE PRELIMINARY ESTIMATE OF COST OF THE SECTION OF ROAD TO BE FIRST IMPROVED DOES NOT REQUIRE ANY FURTHER INTERPRETATION AS THERE HAS NOT BEEN A LACK OF UNIFORMITY AMONG THE FIELD MEN IN INTERPRETING THE INFORMATION REQUIRED UNDER THIS ITEM.

ROUTE REPORTS

"(A) THE GREATEST LACK OF UNIFORMITY IN THE SUBMISSION OF ROUTE REPORTS HAS BEEN IN DETERMINING THE LENGTH OF THE PROJECT AND THE SELECTION OF INTERMEDIATE CONTROL POINTS IN CASES IN WHICH A PREVIOUSLY APPROVED PROJECT ENDS AT AN OFFICIAL CONTROL POINT. WE ALSO HAVE TO CONSIDER THE CASE IN WHICH IT IS DESIRABLE TO HAVE THE ROUTE REPORT COVER THE ENTIRE DISTANCE BETWEEN CONTROL POINTS, EVEN THOUGH FOR REASONS OF THEIR OWN THE STATE MAY DESIRE TO SELECT INTERMEDIATE CONTROL POINTS FOR THE ENDING OF A PARTICULAR PROJECT. IT IS BELIEVED THAT THE FOLLOWING INSTRUCTIONS WILL COVER THESE SITUATIONS:

"(A) WHEN THE PROJECT STATEMENT SUBMITTED BY THE STATE COVERS THE ENTIRE DISTANCE BETWEEN OFFICIAL CONTROL POINTS AND THE STATE AND BUREAU ENGINEERS ARE IN AGREEMENT REGARDING THE ROUTE SUBMITTED, THE TABLE OF GROSS AND NET MILEAGE SHOULD INCLUDE THE ENTIRE DISTANCE BETWEEN CONTROL POINTS.

"(B) WHEN THE PROJECT STATEMENT SUBMITTED BY THE STATE COVERS THE ENTIRE DISTANCE BETWEEN CONTROL POINTS AND THE STATE AND BUREAU ENGINEERS ARE NOT ABLE TO REACH AN AGREEMENT ON A PORTION OF THE ROUTE, AN INTERMEDIATE CONTROL POINT SHOULD BE SELECTED SO AS TO INCLUDE IN THE PROJECT ONLY THAT PORTION OF THE ROUTE ON WHICH THE STATE AND BUREAU ENGINEERS ARE IN AGREEMENT. WHENEVER AN INTERMEDIATE CONTROL POINT IS SELECTED BETWEEN OFFICIAL CONTROL POINTS THE PROJECT SHOULD END AT THE INTERMEDIATE CONTROL POINT AND THE TABLE OF GROSS AND NET MILEAGES SHOULD COVER THE DISTANCE TO THE INTERMEDIATE CONTROL POINTS AND NOT BEYOND.

"(c) Pertinent information regarding the selection of control points should be covered in the second paragraph of the route report. The reasons for the selection of intermediate control points, when no intermediate control points have been selected by the State in submitting the project statement, should be clearly stated in this paragraph.

"In case it is desired to have the route report cover the entire distance between control points, even though an intermediate control point has been selected by the State, the reasons for so doing should be clearly indicated. The procedure to be followed in this case will be discussed further on.

"(d) In all cases in which a previously approved project begins or ends at an official control point, the beginning or ending of the previously approved project must be taken as an intermediate control point in considering the length of the new project. In all such cases a table of gross and net mileages should be computed, using as an intermediate control point the beginning or ending of the previously approved project, even though the route report should include a brief description of the previously approved project which begins or ends at the official control point.

"(e) The length of previously approved Federal-aid project lying entirely within the limits of a new project should be deducted in determining the net length of the project submitted.

"(f) Some States in the district do not desire to have the same project number apply to work in two different counties. It frequently happens, therefore, that project statements are submitted in these States in which intermediate control points are taken at the county line and the project ended at these intermediate control points, even though there is no lack of agreement between the State and the Bureau engineers relative to the routing between the intermediate control point selected and the next official control point. In all such cases, if the field engineers desire, the route report accompanying such project statements may cover the entire route between the official control points. A statement of the reasons for having the route report cover the entire distance between official control points should be given in the second paragraph of the route report. The table of gross and net mileages, however, should cover only the length of the project as submitted. If the route report covers the entire distance between official control points and there is no question regarding the agreement of the State and Bureau engineers relative to the route to be selected, the information contained in this route report can be used whenever the State submits a project statement for any portion of the route

BETWEEN OFFICIAL CONTROL POINTS NOT COVERED BY THEIR PREVIOUS SUBMISSION.

* * * * * *

"(G) WHEN THE ROUTE REPORT COVERS THE ENTIRE DISTANCE BETWEEN OFFICIAL CONTROL POINTS, COMPLETE INFORMATION FOR RAILROAD INTERSECTION DATA AND DATA FOR BRIDGES OVER 20 FOOT SPAN SHOULD ACCOMPANY THE ROUTE REPORT FOR THE ENTIRE DISTANCE BETWEEN CONTROL POINTS AND NOT BE LIMITED TO THE SECTION OF ROUTE FIRST TO BE IMPROVED UNDER THE PROJECT.

"(H) IN FILLING OUT THE SHEETS FOR RAILROAD INTERSECTION DATA AND DATA FOR BRIDGES OVER 20 FOOT SPAN THE INFORMATION GIVEN UNDER LOCATION SHOULD BE BOTH A PHYSICAL DESCRIPTION AND CONTAIN THE NUMERICAL DESIGNATION INDICATED ON SKETCH MAP. FOR EXAMPLE, A RAILROAD CROSSING AT FOXVILLE WOULD BE DESCRIBED AS

LOCATION AT FOXVILLE : CROSSING NO. 4.

"IT IS IMPORTANT THAT THE DATA CONTAINED IN THESE SHEETS BE IDENTIFIED BY NUMBER AS WELL AS LOCATION IN ORDER THAT IT MAY BE EASILY REFERRED TO IN THE SKETCH MAP.

SKETCH MAPS

"A CONSIDERABLE LACK OF UNIFORMITY EXISTS IN THE SUBMISSION OF SKETCH MAPS WITH THE PROJECT STATEMENTS. ON SOME SKETCH MAPS THE BEGINNING AND ENDING OF THE PROJECT ARE NOT EVEN SHOWN. ON OTHERS THE RAILROAD CROSSINGS AND BRIDGES OF OVER 20 FOOT SPAN ARE NOT EVEN NUMBERED, AND ON STILL OTHERS THE COLOR SCHEME TO INDICATE PRIMARY AND SECONDARY DESIGNATION HAS NOT BEEN FOLLOWED OUT, NOR HAS THE DASH SCHEME OF COLORING BEEN USED TO INDICATE PRESENT IMPROVEMENTS ON THE ROUTE SUBMITTED FOR THE PROJECT. IF THIS INFORMATION IS NOT CONTAINED ON THE SKETCH MAPS WHEN THE PROJECT STATEMENT IS SUBMITTED BY THE STATE THERE IS NO REASON WHATEVER WHY THESE SKETCH MAPS SHOULD BE SUBMITTED TO THE DISTRICT OFFICE WITHOUT THIS NECESSARY INFORMATION BEING ADDED BY THE FIELD MEN. THE FOLLOWING INFORMATION SHOULD INVARIABLY BE CARRIED ON THE SKETCH MAPS:

"(A) POINTS OF BEGINNING AND ENDING OF THE PROJECT SHOULD BE CLEARLY INDICATED BY THE WORDS: "BEGINNING OF PROJECT" AND "ENDING OF PROJECT," WITH ARROWS EXTENDING FROM THEM TO THE POINTS OF BEGINNING AND ENDING OF THE ROUTE AS INDICATED ON THE SKETCH MAP.

"(B) RAILROAD CROSSINGS SHOULD BE PLAINLY INDICATED AND NUMBERED IN THE SEQUENCE IN WHICH THEY OCCUR FROM THE BEGINNING OF THE PROJECT. BRIDGES OVER 20 FOOT SPAN SHOULD ALSO BE CLEARLY

INDICATED ON THE SKETCH MAP AND LIKEWISE NUMBERED IN SEQUENCE IN THE ORDER IN WHICH THEY OCCUR FROM THE BEGINNING OF THE PROJECT.

"(C) ON THE SKETCH MAP ONLY THE PORTION INCLUDED IN THE PROJECT SHOULD BE SHOWN IN SOLID COLORS. RED, IF PRIMARY AND GREEN, IF SECONDARY. IF IT IS NECESSARY FOR OUR FIELD ENGINEERS TO SELECT AN INTERMEDIATE CONTROL POINT WHICH WILL RESULT IN THE SHORTENING OF THE PROJECT AS SUBMITTED BY THE STATE THE COLOR ON THE SKETCH MAP SHOULD BE CORRECTED BY THE MEN IN THE FIELD TO CONFORM TO THE LENGTH OF PROJECT AS DETERMINED BY THE INTERMEDIATE CONTROL POINT.

"PRESENT IMPROVEMENTS ON THE FEDERAL-AID ROUTE SHOULD BE INDICATED BY DASH COLORED LINE, AS ILLUSTRATED IN THE SKETCH MAP ACCOMPANYING THE SAMPLE ROUTE REPORT.

"WE HAVE HAD SOME ADVERSE CRITICISM FROM THE WASHINGTON OFFICE REGARDING THE MANNER IN WHICH PROJECT STATEMENTS AND ROUTE REPORTS HAVE BEEN SUBMITTED BY THIS DISTRICT. I HAVE GONE TO CONSIDERABLE DETAIL IN ORDER TO OUTLINE THE INFORMATION WHICH MUST BE CONTAINED IN THESE REPORTS IN ORDER THAT THEY MAY SERVE THE PURPOSE FOR WHICH THEY WERE INTENDED. YOUR ATTENTION TO THESE DETAILS IS REQUESTED AND IT IS FURTHER REQUESTED THAT THIS MEMORANDUM BE BROUGHT TO THE ATTENTION OF YOUR ASSISTANTS.

YOURS VERY TRULY,

(SIGNED) R. E. TOMS,
DISTRICT ENGINEER."

INCLOSURE.
RET/GA

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

STATUS OF FEDERAL AID ROAD CONSTRUCTION FUNDS

AS OF JANUARY 31, 1926

B.P.R. - F.A. - A - 1
M - JAN. 1926 - A

STATES	1	2		3		4	5		6						STATES
	APPORTIONMENT FROM JULY 11, 1916 TO DATE	ALLOTTED TO PROJECTS (SEE COLUMN 6 FOR DETAILS)		PLACED UNDER CONSTRUCTION		PAID TO STATES	BALANCE OF APPORTIONMENTS		ALLOTMENTS TO PROJECTS (SUBDIVISION OF AMOUNTS SHOWN IN COLUMN 2)						
							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	$ 14,349,455.00	$ 10,883,249.11	1469.3	$ 10,384,756.69	1441.1	$ 9,454,447.00	$ 3,466,205.89	$ 3,964,698.31	$ 6,833,930.84	1085.5	$ 3,499,516.58	355.6	$ 549,741.69	28.2	ALABAMA
ARIZONA	9,617,249.00	6,566,157.17	821.4	6,458,006.47	794.7	6,135,880.08	3,051,091.83	3,159,242.53	5,652,823.21	706.0	864,577.01	107.6	48,756.95	7.8	ARIZONA
ARKANSAS	11,605,804.00	10,067,127.74	1654.9	9,772,413.12	1610.0	8,658,496.88	1,538,676.26	1,833,390.88	6,320,714.84	1238.4	2,860,444.03	369.4	285,968.87	47.1	ARKANSAS
CALIFORNIA	22,072,815.00	17,932,616.61	1329.5	17,799,276.35	1323.2	14,864,570.10	4,140,198.39	4,273,538.65	11,926,224.24	967.2	5,510,831.99	317.7	495,560.38	44.6	CALIFORNIA
COLORADO	12,325,812.00	9,052,169.23	952.2	8,791,820.89	927.0	7,787,616.60	3,273,642.77	3,533,991.11	6,538,016.60	692.9	2,144,111.22	217.7	310,041.41	41.6	COLORADO
CONNECTICUT	4,333,681.00	2,722,618.43	147.8	2,689,840.48	144.1	2,283,683.42	1,611,062.57	1,673,840.52	2,069,580.80	115.0	590,259.68	29.1	62,777.95	3.7	CONNECTICUT
DELAWARE	2,474,068.00	2,106,520.36	152.6	2,097,520.36	142.1	1,847,333.72	367,537.65	376,537.65	1,708,735.60	113.4	388,784.76	22.7	9,000.00	10.5	DELAWARE
FLORIDA	8,084,954.00	6,684,043.26	405.6	6,476,788.26	391.8	4,557,955.70	1,400,910.74	1,608,165.74	1,405,487.37	36.3	4,370,709.60	251.7	907,845.69	57.6	FLORIDA
GEORGIA	18,431,963.00	16,5[illegible],187.17	2423.0	16,094,040.62	2351.5	14,404,718.64	1,878,765.83	2,337,912.38	10,853,901.49	1659.8	4,833,106.42	691.9	806,180.26	111.3	GEORGIA
IDAHO	8,559,627.00	7,188,351.67	847.6	6,932,347.22	830.6	6,344,055.85	1,371,275.33	1,626,679.78	5,239,593.33	647.2	1,355,681.65	176.2	532,970.03	24.2	IDAHO
ILLINOIS	29,832,198.00	23,164,639.26	1553.6	23,164,639.26	1553.6	21,836,104.55	6,667,558.74	6,667,558.74	19,087,947.67	1268.3	4,057,417.03	282.8	19,274.56	2.5	ILLINOIS
INDIANA	18,204,366.00	15,821,364.45	972.7	16,562,017.93	956.1	13,129,267.86	2,382,990.55	2,652,337.07	7,136,275.22	463.1	8,662,560.22	503.6	22,529.01		INDIANA
IOWA	19,485,563.00	15,527,131.54	2650.5	14,964,727.54	2610.2	13,506,611.42	3,958,431.46	4,520,835.36	11,427,868.05	2033.4	3,886,952.24	583.0	212,321.25	28.1	IOWA
KANSAS	19,464,411.00	16,509,933.99	1718.1	15,793,101.70	1566.6	14,159,479.79	2,954,477.01	3,665,309.30	11,516,010.34	1065.3	4,149,675.05	460.7	844,250.60	192.1	KANSAS
KENTUCKY	13,212,809.00	10,944,783.09	992.1	10,825,314.93	983.1	9,514,312.43	2,268,025.91	2,387,494.07	7,424,836.57	669.5	3,293,733.20	309.9	220,213.32	13.7	KENTUCKY
LOUISIANA	9,272,408.00	7,683,638.83	1182.4	7,374,982.28	1156.9	6,737,155.29	1,588,769.17	1,897,425.72	5,783,405.72	936.5	1,699,454.53	142.8	270,778.58	43.1	LOUISIANA
MAINE	6,464,828.00	4,951,349.62	365.7	4,856,963.20	357.4	4,304,570.77	1,513,478.38	1,607,868.80	4,031,472.38	291.2	919,877.24	74.5			MAINE
MARYLAND	6,925,057.00	5,264,331.92	435.4	5,264,331.92	435.4	4,613,474.12	660,725.08	660,725.08	4,425,709.92	336.2	838,622.00	99.2			MARYLAND
MASSACHUSETTS	10,108,726.00	7,574,665.06	416.0	7,330,625.06	401.4	6,157,743.54	2,534,060.94	2,778,200.94	5,738,772.39	321.0	1,631,151.60	83.5	204,741.07	11.5	MASSACHUSETTS
MICHIGAN	20,342,365.00	15,800,458.90	1178.2	15,591,683.33	1166.3	14,261,024.10	4,541,906.10	4,750,675.67	10,612,896.25	884.7	4,818,531.30	270.9	368,971.35	22.6	MICHIGAN
MINNESOTA	19,691,780.00	17,579,916.56	3679.5	17,456,916.56	3640.6	16,702,013.95	2,011,863.44	2,134,863.44	15,023,616.56	3118.2	2,306,900.00	512.9	250,400.00	47.4	MINNESOTA
MISSISSIPPI	12,128,018.00	10,528,407.70	1453.1	10,224,628.76	1388.1	8,646,461.95	1,599,610.30	1,903,389.25	5,973,019.31	960.3	3,702,370.74	363.4	853,017.65	129.4	MISSISSIPPI
MISSOURI	22,786,436.00	20,170,861.06	2036.9	20,133,186.63	2007.9	15,584,315.90	2,615,874.94	2,647,250.37	10,285,952.99	1303.2	3,741,740.20	695.5	142,867.87	32.2	MISSOURI
MONTANA	13,424,885.00	7,718,410.01	1287.0	7,163,334.07	1168.0	6,702,444.25	5,706,474.99	6,271,490.93	5,846,428.82	992.8	1,830,215.04	230.9	41,766.15	3.3	MONTANA
NEBRASKA	14,636,235.00	10,753,390.77	2811.2	10,537,310.69	2770.5	8,251,891.43	3,881,844.23	4,097,924.31	5,126,315.75	1690.9	5,466,625.61	1104.6	160,548.51	15.3	NEBRASKA
NEVADA	8,735,215.00	7,741,903.48	850.8	7,741,903.48	850.9	7,158,333.10	1,053,311.52	1,053,311.52	4,234,256.31	482.9	3,462,664.82	366.4	44,982.35	1.5	NEVADA
NEW HAMPSHIRE	3,169,492.00	2,656,693.82	255.7	2,651,704.26	255.2	2,448,011.00	512,798.18	517,787.74	2,347,601.80	235.7	308,223.80	20.0	968.22		NEW HAMPSHIRE
NEW JERSEY	8,467,420.00	7,481,739.17	310.6	7,481,739.17	310.6	6,235,404.85	985,680.83	985,680.83	4,402,083.45	254.2	3,049,655.72	52.8	30,000.00	3.6	NEW JERSEY
NEW MEXICO	10,972,386.00	8,247,111.77	1532.6	8,200,353.87	1527.2	7,514,470.54	2,725,274.23	2,772,032.13	7,228,012.10	1410.3	755,048.63	100.7	264,051.04	21.6	NEW MEXICO
NEW YORK	34,045,195.00	27,106,921.89	1777.3	24,884,081.89	1628.7	19,829,077.87	6,938,273.11	9,161,113.11	15,075,816.59	1007.0	11,834,305.30	761.3	136,200.00	9.1	NEW YORK
NORTH CAROLINA	15,717,206.00	14,002,068.01	1424.5	13,404,814.44	1389.5	12,352,035.96	1,715,137.99	2,312,391.56	9,990,079.53	1199.4	3,857,911.36	224.5	154,077.13	0.6	NORTH CAROLINA
NORTH DAKOTA	10,748,563.00	8,264,201.99	2746.0	7,801,049.33	2615.0	6,555,696.04	2,484,457.01	2,947,609.67	5,657,904.34	2082.0	1,994,616.92	524.9	611,680.13	139.1	NORTH DAKOTA
OHIO	25,731,796.00	21,332,674.77	1684.6	20,662,766.80	1627.1	18,837,985.02	4,399,121.23	5,069,029.20	16,819,684.41	1320.8	3,835,940.04	309.2	617,050.32	54.6	OHIO
OKLAHOMA	15,059,787.00	14,108,373.83	1275.7	13,880,626.38	1255.5	12,976,063.29	1,951,413.17	2,179,160.02	10,867,829.52	964.5	2,890,378.45	290.9	343,565.96	20.4	OKLAHOMA
OREGON	10,873,347.00	9,672,379.53	1056.9	9,554,403.26	1014.1	8,740,621.92	1,200,967.47	1,324,943.74	7,909,700.99	863.9	1,593,174.59	139.9	170,103.95	47.1	OREGON
PENNSYLVANIA	31,338,781.00	27,886,108.01	1639.6	27,285,822.33	1594.9	24,535,288.25	3,452,672.99	4,052,958.61	17,541,763.42	931.2	9,918,282.56	676.6	426,092.03	31.8	PENNSYLVANIA
RHODE ISLAND	2,667,569.00	1,391,815.35	115.2	1,928,680.36	111.0	1,371,223.50	675,753.65	738,888.65	1,274,676.72	70.8	717,138.63	44.4			RHODE ISLAND
SOUTH CAROLINA	9,801,524.00	8,340,437.48	1717.8	8,360,634.56	1639.7	7,602,450.25	861,086.52	1,440,689.44	5,533,828.79	1294.5	2,835,589.96	348.0	671,018.74	75.3	SOUTH CAROLINA
SOUTH DAKOTA	11,166,730.00	9,897,231.12	2599.9	9,897,231.12	2599.9	9,000,415.10	1,269,558.88	1,269,558.88	7,470,708.11	1835.5	2,371,718.66	764.4	64,810.35		SOUTH DAKOTA
TENNESSEE	15,280,591.00	13,342,836.71	996.1	12,721,224.71	937.4	11,410,608.92	1,937,754.29	2,559,366.29	8,248,275.97	620.6	4,192,826.44	304.0	901,734.30	71.5	TENNESSEE
TEXAS	40,606,431.00	35,819,365.32	5864.5	33,621,281.76	5616.0	29,854,858.29	4,787,065.68	6,985,149.25	24,735,903.88	4447.6	8,831,385.12	1233.0	2,252,076.92	183.9	TEXAS
UTAH	7,618,779.00	6,340,434.23	701.5	6,127,723.64	685.5	5,608,846.39	1,478,344.77	1,691,055.36	4,113,211.38	433.6	2,037,696.32	252.1	189,526.53	15.8	UTAH
VERMONT	3,268,507.00	2,467,921.17	157.6	2,438,326.12	157.5	2,029,583.55	800,585.83	830,181.88	1,562,976.48	111.3	839,761.02	46.3	15,133.67		VERMONT
VIRGINIA	13,501,514.00	12,875,803.96	1164.8	11,904,077.02	1112.7	10,702,133.80	625,710.04	1,597,436.98	9,880,512.98	917.6	2,533,005.63	197.4	1,002,285.35	49.9	VIRGINIA
WASHINGTON	10,146,776.00	8,852,150.23	691.6	8,591,150.23	690.4	7,828,118.47	1,293,625.77	1,554,625.77	7,627,750.23	663.7	993,400.00	27.9	235,000.00		WASHINGTON
WEST VIRGINIA	7,352,611.00	6,275,098.01	536.5	6,141,141.22	525.2	5,064,002.08	1,077,412.99	1,211,369.78	3,353,307.22	339.5	2,921,790.79	197.0			WEST VIRGINIA
WISCONSIN	17,438,815.00	12,366,836.69	1797.5	12,135,491.69	1778.3	10,440,751.41	5,071,978.31	5,243,323.31	9,466,856.27	1506.2	2,352,820.42	234.0	547,160.00	57.3	WISCONSIN
WYOMING	8,566,274.00	7,542,996.84	1293.7	7,524,648.84	1293.6	7,000,726.61	1,023,277.16	1,041,625.16	5,646,700.48	1084.8	1,871,170.01	208.8	25,126.35	0.1	WYOMING
HAWAII	1,100,153.00	97,440.00	6.5	97,440.00	6.5	39,293.62	1,002,713.00	1,002,713.00			97,440.00	6.5			HAWAII
TOTALS	$ 671,375,000.00	$555,060,166.88	65132.8	$538,791,651.62	63239.4	$475,581,528.97	$116,314,833.12	$132,583,348.48	$379,083,035.49	47818.4	$ 159,751,305.00	15607.5	$ 16,213,226.39	1706.9	TOTALS

PROGRESS OF FEDERAL HIGHWAY LEGISLATION

H. R. 8264 - PASSED BY THE HOUSE ON FEBRUARY 2, 1926.

MAKES APPROPRIATIONS FOR THE DEPARTMENT OF AGRICULTURE FOR THE FISCAL YEAR ENDING JUNE 30, 1927 AND FOR OTHER PURPOSES.

$5,000,000 IS APPROPRIATED FOR FOREST ROADS AND TRAILS FOR THE FISCAL YEAR 1926, OF THE $7,500,000 AUTHORIZED.

$75,000,000 IS APPROPRIATED FOR FEDERAL-AID ROADS. $28,300,000 OF THIS IS A PORTION OF THE 1926 AUTHORIZATION. THE BALANCE IS THE UNAPPROPRIATED REMAINDER OF THE $75,000,000 AUTHORIZED FOR THE FISCAL YEAR 1925.

H. R. 8722 - PASSED BY THE HOUSE ON FEBRUARY 4, 1926.

MAKES APPROPRIATIONS TO SUPPLY URGENT DEFICIENCES IN CERTAIN APPROPRIATIONS FOR THE FISCAL YEAR ENDING JUNE 30, 1926, AND PRIOR FISCAL YEARS.

$3,775,000 APPROPRIATED FOR FOREST ROADS AND TRAILS OF THE $7,500,000 AUTHORIZED FOR THE FISCAL YEAR 1926.

$22,900,000 APPROPRIATED FOR FEDERAL-AID ROADS, BEING PART OF THE $75,000,000 AUTHORIZED FOR THE FISCAL YEAR 1925.

H. R. 8769 - INTRODUCED IN THE HOUSE FEBRUARY 2, 1926, BY W. P. HOLADAY OF ILLINOIS.

RELATING TO THE CONSTRUCTION, MAINTENANCE AND REGULATION OF A NATION-WIDE SYSTEM OF DURABLE HARD-SURFACED POST ROADS AND THE PROVISION OF MEANS FOR THE PAYMENT OF THE COST THEREOF.

AUTHORIZES A FEDERAL BOND ISSUE OF THREE BILLION DOLLARS, FOR THE CONSTRUCTION BY THE GOVERNMENT OF A SPECIFIED NUMBERED SYSTEM OF HIGHWAYS. WORK TO BE DONE UNDER THE GENERAL SUPERVISION AND CONTROL OF THE SECRETARY OF AGRICULTURE. SUPERINTENDING ENGINEER TO BE APPOINTED BY THE PRESIDENT WITH THE ADVICE AND CONSENT OF THE SENATE.

H. R. 8902 - INTRODUCED IN THE HOUSE FEBRUARY 4, 1926, BY G. E. CAMPBELL OF PENNSYLVANIA.

TO REGULATE, CONTROL, AND SAFEGUARD THE DISBURSEMENTS OF FEDERAL FUNDS EXPENDED FOR THE CREATION, CONSTRUCTION, EXTENSION, REPAIR, OR ORNAMENTATION OF ANY PUBLIC BUILDING, HIGHWAY, DAM, EXCAVATION, DREDGING, DRAINAGE, OR OTHER CONSTRUCTION PROJECT AND FOR OTHER PURPOSES.

PROVIDES THAT COMPLETE PLANS SHALL BE PREPARED FOR THE CONSTRUCTION OF ALL SUCH FEDERAL PROJECTS, NOT CONSTITUTING MAINTENANCE AND REPAIR, WHICH ARE ESTIMATED TO COST MORE THAN $5,000.

ROBERT F. EASTHAM

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DIED FEBRUARY 10, 1926

ROBERT F. EASTHAM, HIGHWAY ENGINEER OF DISTRICT 10 DIED SUDDENLY AT HIS HOME AT WASHINGTON IN THE EARLY MORNING OF FEBRUARY 10. A CHRONIC SUFFERER FROM INSOMNIA MR. EASTHAM HAD BEEN GIVEN A PRESCRIPTION BY HIS FAMILY PHYSICIAN OF WHICH HE TOOK DOSES FROM TIME TO TIME TO INDUCE SLEEP, AND IT IS PROBABLE THAT THIS, ACTING AS A HEART DEPRESSANT, WAS THE CAUSE OF HIS UNTIMELY DEATH.

MR. EASTHAM WAS BORN AT FLINT HILL, VIRGINIA, ON AUGUST 24, 1882. HE WAS EDUCATED AT THE VIRGINIA MILITARY INSTITUTE FROM WHICH HE GRADUATED IN 1902 WITH THE DEGREE OF CIVIL ENGINEER.

FOR THREE YEARS FOLLOWING HIS GRADUATION HE WAS EMPLOYED IN RAILROAD LOCATION AND FROM 1905 TO 1909 HE WAS IN CHARGE OF THE CONSTRUCTION OF THE GRAND TRUNK RAILWAY SHOPS AT BATTLE CREEK, MICHIGAN, AND STRATFORD, ONTARIO. ATTRACTED BY HIGHWAY WORK IN 1909 HE SERVED FROM THAT YEAR UNTIL 1914 WITH THE VIRGINIA STATE HIGHWAY COMMISSION, A POSITION WHICH HE RESIGNED TO ENTER THE SERVICE OF THE BUREAU AS A HIGHWAY ENGINEER. PRACTICALLY FROM THE BEGINNING OF THE FEDERAL-AID ROAD WORK HE HAD BEEN THE BUREAU'S REPRESENTATIVE IN MARYLAND AND DELAWARE.

HE WAS A MEMBER OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS; A HIGHWAY ENGINEER OF LONG EXPERIENCE AND MARKED ABILITY; AND HIS HEARTY AND LOVABLE PERSONALITY HAD ENDEARED HIM TO HIS MANY FRIENDS IN THE BUREAU. MR. EASTHAM IS SURVIVED BY HIS WIFE, MRS. MARY B. EASTHAM, AND FOUR YOUNG CHILDREN, ROBERT, WILLIAM J., LUCY BEAL, AND FRANCES, THE OLDEST SCARCELY 10 YEARS OF AGE.