THE NEWS LETTER
OF THE
BUREAU OF PUBLIC ROADS

VOL. 3, NO. 10 AUGUST, 1928 A. C. ROSE, EDITOR

CONTENTS

SIX SPANS OF ARKANSAS FEDERAL-AID BRIDGE FLOATED INTO POSITION

COMPILED FROM A REPORT SUBMITTED BY
C. T. NITTEBERG OF DISTRICT 6
(NOT FOR RELEASE)

THE FLOATING INTO PLACE OF SIX 214½-FOOT STEEL-TRUSS SPANS IN THE CONSTRUCTION OF THE FEDERAL-AID BRIDGE (F.A.P. NO. 244-A) ACROSS THE ARKANSAS RIVER AT DARDANELLE, ARK., A HAZARDOUS UNDERTAKING UNDER THE BEST OF CONDITIONS, HAS BEEN ACCOMPLISHED WITHOUT GREAT DIFFICULTY. THE SUCCESS OF THE WORK IS ATTRIBUTED TO THE HIGH DEGREE OF SKILL USED BY THE CONTRACTOR IN EXECUTING AN EXTREMELY EFFECTIVE METHOD OF FLOTATION.

THE BRIDGE, WHEN COMPLETED, WILL CONSIST OF SEVEN STEEL-TRUSS SPANS EACH 214 FEET 6 INCHES IN LENGTH, ONE 362-FOOT SWING SPAN, TWO 60-FOOT REINFORCED-CONCRETE DECK-GIRDER APPROACH SPANS AT THE NORTH END, AND ONE REINFORCED-CONCRETE DECK GIRDER OF 40-FOOT SPAN AT THE SOUTHERN EXTREMITY. THE ENTIRE STRUCTURE IS DESIGNED TO CARRY A ROADWAY 20-FEET WIDE IN THE CLEAR WITH A 5-FOOT SIDEWALK ON THE DOWNSTREAM SIDE. THE CONCRETE FLOOR OF THE SIMPLE-TRUSS SPANS IS INCREASED IN THICKNESS SUFFICIENTLY SO AS TO ACT AS A WEARING SURFACE FOR THE TRAFFIC. THE SWING SPAN IS SURFACED WITH A CREOSOTED LAMINATED FLOOR, 6 INCHES THICK, TOPPED WITH A 1½-INCH THICKNESS OF MODIFIED TOPEKA MIX. ALL OF THE MAIN PIERS, AND THE ONE PIER SUPPORTING THE NORTH APPROACH SPANS, ARE BEING CONSTRUCTED BY THE PNEUMATIC PROCESS WITH THE FOUNDATIONS SUNK WELL INTO SOLID ROCK.

IN ORDER THAT THE FLOOD HAZARD MIGHT BE REDUCED TO A MINIMUM, THE CONTRACTOR ELECTED TO ERECT SIX OF THE MAIN TRUSSES ON THE SHORE AND FLOAT THEM INTO PLACE. THE FIRST SPAN WAS PLACED IN POSITION SUCCESSFULLY IN THIS MANNER ON JUNE 11, AND THE REMAINDER FROM JUNE 30 TO JULY 4, 1928, INCLUSIVE. THE FIRST STEP IN THE OPERATION WAS THE CONSTRUCTION OF A LOADING DOCK OF SUFFICIENT LENGTH TO HOLD 6 SPANS, AND LOCATED ABOUT 400 FEET UPSTREAM FROM THE BRIDGE SITE. THIS CONSISTED OF TWO TIMBER-TRESTLE RUNWAYS EXTENDED FAR ENOUGH OUT INTO THE ARKANSAS RIVER SO AS TO PERMIT THE ENTRANCE OF TWO BARGES. THE TRUSSES WERE FABRICATED ON A SINGLE SET OF FALSE WORK, AND THEN SUCCESSIVELY MOVED OUT UPON THE LOADING DOCK AS THEY WERE COMPLETED.

Two barges, shown in Figure 1, were required to float the spans from the loading dock to the bridge site. Each of these, 40 feet wide by 90 feet long by 6 feet deep, was built and launched by the contractor at the site of the work. A 3-bent trestle was constructed on each barge so as to be capable of supporting the truss spans at panel points L-2, L-3, and L-4. The barges, by partial scuttling, were lowered into position beneath the trusses on the loading dock. The water was then pumped from the barge, thus raising the truss clear of the dock.

Probably the most interesting feature of the construction was the complete control of the barges, from aboard the barges themselves, with cables attached to pile dolphins driven at appropriate intervals across the river, upstream from the loading dock and about 400 feet above the bridge site. One barge, used as the control unit, was equipped with two boilers and two 3-drum hoists. One hoist operated the two main control cables which were crossed and attached to the inshore dolphins at the beginning of the flotation work as shown in Figure 2. As the barges supporting the span, moved out into the river, an anchorage cable was attached to the intermediate dolphin, and the cross cables were changed over to the two offshore dolphins. The second hoist, on the control barge, operated the auxiliary control cables which were attached to anchorages below the bridge site. These anchorages were used in conjunction with the main control cables to shift the position of the barges so as to bring the trusses into exactly the proper location over the piers. The barges were under perfect control at all times and no difficulty was experienced in maneuvering the spans into the correct position where the barges were again partially scuttled and the trusses lowered onto the timber blocking placed on the piers. The barges were then pumped free of water and returned to the loading dock for another truss load. The timber blocking on the piers was made necessary by the unforeseen stage of high water in the Arkansas River at the time of the flotation.

The entire operation was accomplished without any difficulty and in rapid time. It required 1½ hours to load the span and pump out the barges, 1½ hours to float the span into place, 1 hour to set the blocking on the piers, 1½ hours to partially scuttle the barges and bring the span to rest on the blocking, and two hours to bring the barges back to the loading dock.

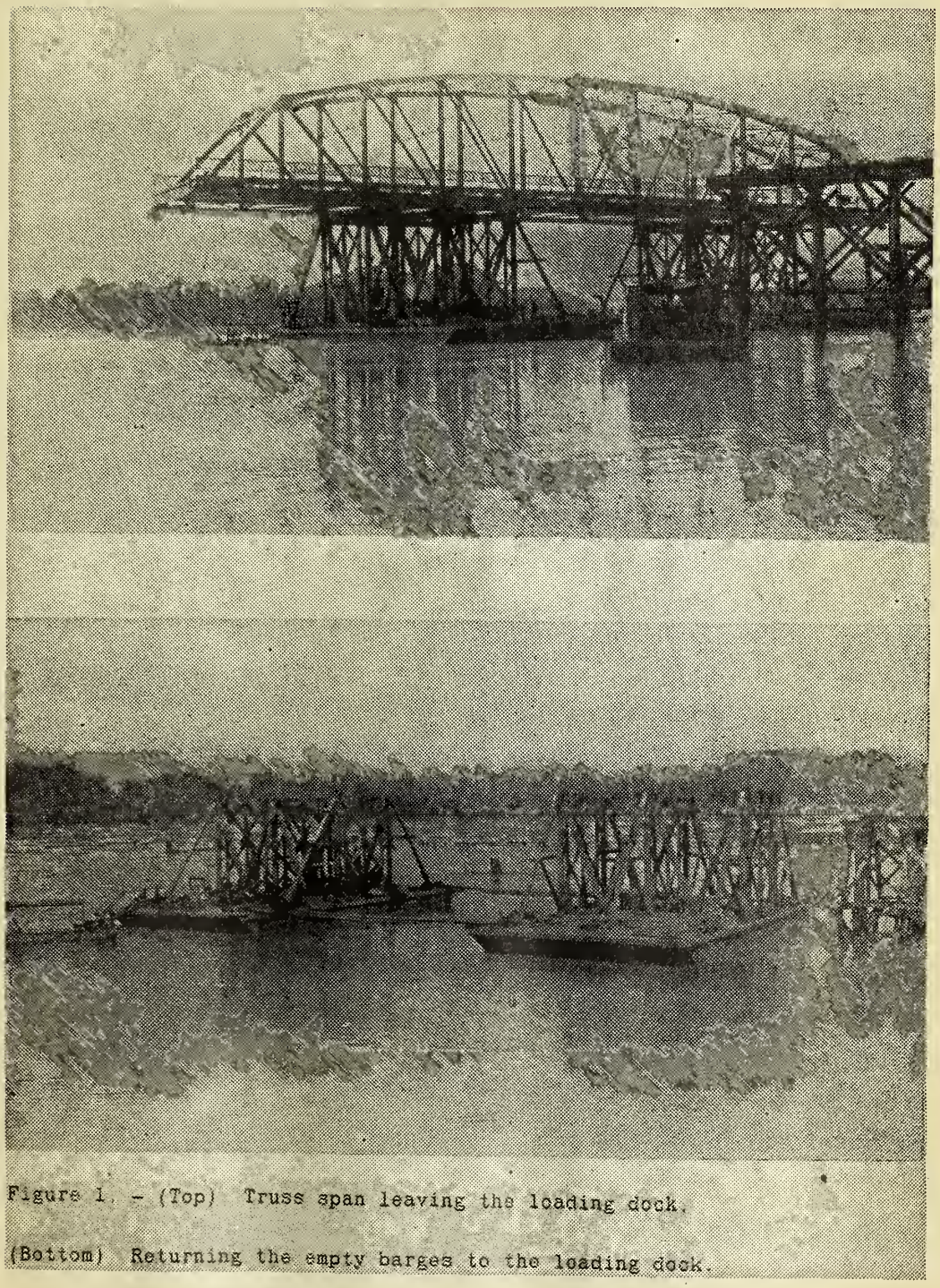


Figure 1. – (Top) Truss span leaving the loading dock.

(Bottom) Returning the empty barges to the loading dock.

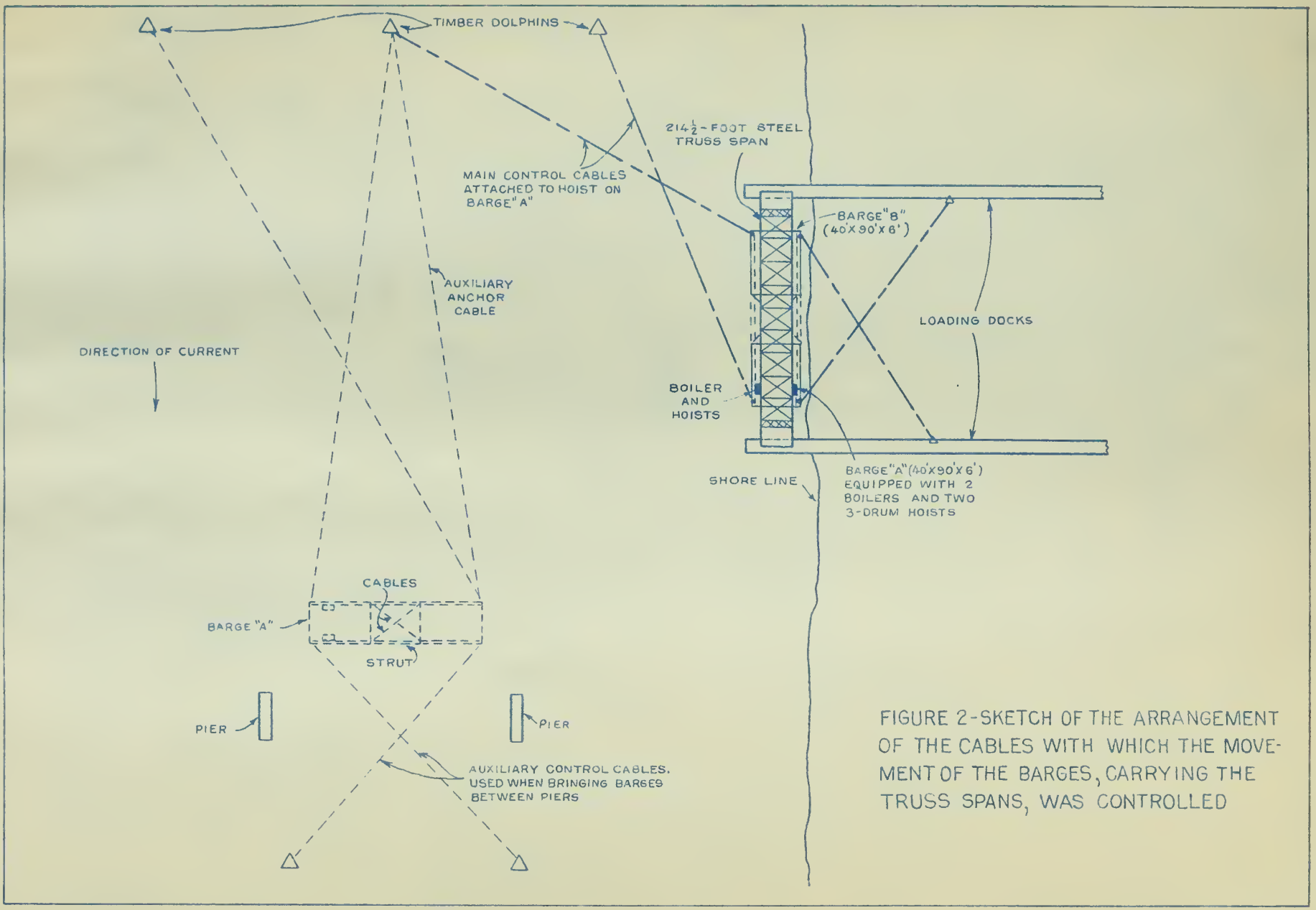


FIGURE 2-SKETCH OF THE ARRANGEMENT OF THE CABLES WITH WHICH THE MOVEMENT OF THE BARGES, CARRYING THE TRUSS SPANS, WAS CONTROLLED

The Dardanelle Federal-Aid bridge is being built by the Arkansas State Highway Commission at an estimated cost of $588,000.00 of which Federal funds are obligated to the amount of $293,775. The finished structure will replace a pontoon bridge on which tolls are now being collected.

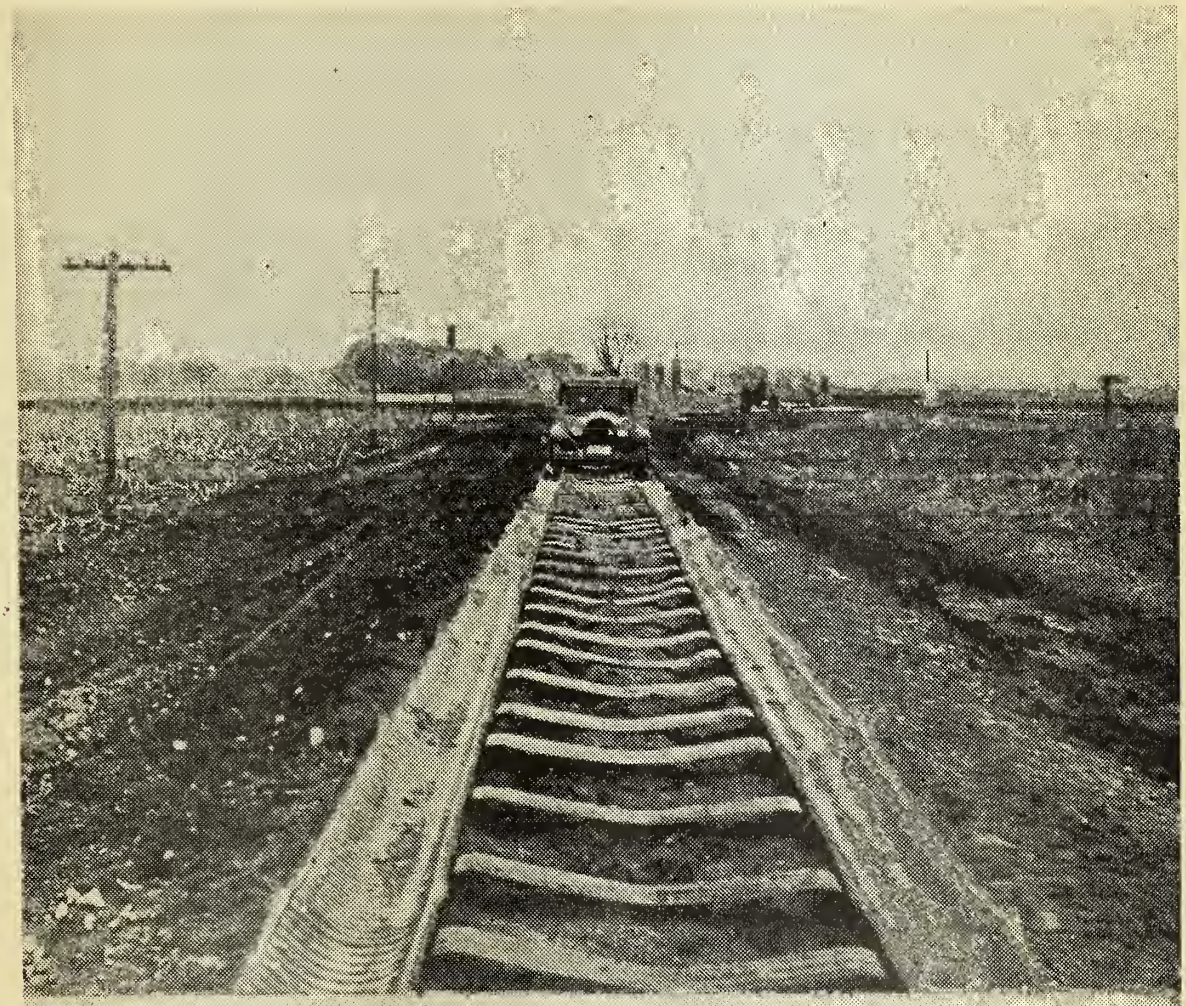
The bridge was designed under the direction of N. B. Carver, bridge engineer for the State Highway department, and is being built under the supervision of C. A. Dunn as resident engineer, assisted by R. E. Hiles. The contract is held by the Lakeside Bridge and Steel Company; the work is being carried out under the personal direction of its president - S. C. Coddington - with S. C. Waller as superintendent.

CORRUGATED METAL TRACKS FACILITATE TRUCKING OVER SOFT SUBGRADES

Compiled from a report submitted by
G. L. Campen of District 5
(Not for release)

The corrugated metal tracks used to facilitate the trucking of road-building materials, over soft portions of the subgrade on Iowa Federal-Aid project No. 276-B are illustrated by the accompanying photograph. The tracks, manufactured in St. Paul, Minn., under the trade name of "Metal Rut" are particularly useful in Iowa in the spring when all gravel roads become impassable unless the soft spots in the subgrade are planked or otherwise made travellable. The "metal rut" sections are 10 feet long and cost $19 apiece. The diameter of the semi-circular track is 15 inches and the thickness of the corrugated metal is 1/8 of an inch. Three 8-inch cross pieces hold each section together. These extend to the outside edge of each track and are held in place by 4 rivets to each tread. The treads are spaced at the standard guage of 4 feet 8½ inches from center to center. This spacing will accommodate satisfactorily all trucks except those with dual pneumatic or wide solid tires. A lap of 4 inches is made between the sections.

The main advantage of this type of temporary surfacing is the facility with which it may be installed, or removed to another location. As may be seen in the illustration, there is considerable sag in the tracks between the joints.



Corrugated metal tracks used to span soft sections in the subgrade on Federal-aid project 276-B, in Tama county, Iowa.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

CURRENT CONDITION OF FEDERAL AID ROAD WORK

As Of July 31, 1928

State	Balance of Federal aid available for new projects	P. R. & E. Recommended For Approval						Project Agreements Executed									Paid to States during fiscal year	State
		Not yet under construction			Under construction			Not yet under construction			Under construction			Final inspection made				
		Federal aid allotted	Mileage Initial	Mileage Stage	Federal aid allotted	Mileage Initial	Mileage Stage	Federal aid allotted	Mileage Initial	Mileage Stage	Federal aid allotted	Mileage Initial	Mileage Stage	Federal aid allotted	Mileage Initial	Mileage Stage		
Alabama	$1,605,326.53	$ 168,274.27	11.6	12.4	$ 382,019.48	66.4		$ 43,165.05	15.8		$ 2,337,908.86	233.0	55.9	$ 1,207,166.99	152.6		$ 308,822.38	Alabama
Arizona	2,896,024.65	8,663.32		1.8				33,361.48		2.4	1,247,575.75	66.8	0.6	616,706.80	54.0	4.3	207,049.43	Arizona
Arkansas	1,769,630.36	116,258.35	9.9	6.6	239,398.99	36.2					1,927,824.00	144.5		231,817.71	45.9		38,264.67	Arkansas
California	3,258,277.30	389,952.28	14.1		739,409.65	41.3		50,027.65	2.7		2,485,508.73	122.1	8.3	225,485.07	8.8		41,356.43	California
Colorado	2,277,348.10	297,589.85	18.2		887,331.88	61.1	14.5	45,775.43	8.2		1,708,001.05	127.9	9.1	519,188.37	41.8		269,235.67	Colorado
Connecticut	566,752.61							68,951.17	3.6		831,098.01	34.4		592,618.43	28.3			Connecticut
Delaware	149,880.44	107,957.75	7.6					88,138.05	8.0		95,739.75	5.7	3.9					Delaware
Florida	1,211,619.16	269,730.00	18.0					63,775.44	12.6		1,773,093.63	99.7	5.5	313,507.13	23.8		51,226.57	Florida
Georgia	18,200.47	877,225.45	100.6	19.2	204,644.38	4.8	20.0	157,912.31	7.3	10.0	1,736,688.77	168.2	21.6	308,043.68	33.8	13.1	240,639.70	Georgia
Idaho	94,935.97	724,246.65	112.3	11.2	141,674.60	15.4		15,836.67		1.8	992,460.63	87.9	63.4	4,815.12			175,396.64	Idaho
Illinois	67,033.69	1,826,435.15	138.1		1,953,330.48	137.8					7,326,833.60	485.1		990,894.36	73.2		130,398.37	Illinois
Indiana	250,765.41	572,109.27	44.4		656,523.56	39.8					4,500,121.30	290.4	3.5	1,052,484.36	70.9		171,224.90	Indiana
Iowa	171,307.77	64,823.20		6.2	44,417.01			713,188.32	10.3	85.2	2,466,055.51	121.0	127.7	614,712.63	35.0	18.1	105,260.96	Iowa
Kansas	658,452.77	969,841.40	262.8	6.5	82,993.34	20.7		114,017.37	17.6		1,947,150.32	234.5		2,075,844.74	266.8	0.4	110,554.54	Kansas
Kentucky	279,233.69	793,234.17	86.6		296,843.94	22.8					2,162,485.04	202.8		781,035.43	63.6	16.5	135,793.50	Kentucky
Louisiana	337,598.06	239,803.83	8.9		86,558.20	14.2					1,980,649.09	178.8		128,913.41	7.8		109,087.71	Louisiana
Maine	1,149,317.64	268,918.29	17.9					163,442.93	13.8		528,952.60	39.7		125,222.11	9.3			Maine
Maryland	39,071.23	440,845.00	39.4	7.2	77,730.00	5.5		80,800.00	8.3		191,900.00	17.1					135,200.62	Maryland
Massachusetts	1,944,710.30	139,145.72	9.4		153,795.32	8.5		84,345.00	5.5		984,612.50	63.2		717,192.21	42.2		160,093.51	Massachusetts
Michigan	529,249.95	394,050.00	23.9	6.5	1,177,316.06	69.4		84,480.00	5.6		4,495,827.02	269.2		349,012.72	20.6		481,875.50	Michigan
Minnesota	398,471.43				80,000.00	15.8		129,000.00	12.5	20.6	2,170,100.00	327.4	54.7				617,313.40	Minnesota
Mississippi	559,311.54	414,544.23	30.4	0.6	176,749.82	2.0					1,991,730.97	226.1	30.9	390,081.09	30.4	16.2	81,091.59	Mississippi
Missouri	1,419,542.68	504,932.81	35.1	12.9	173,137.01	10.5		120,834.59	4.2	5.8	1,854,661.27	134.8	39.0	1,094,806.85	76.6	9.4	95,710.98	Missouri
Montana	4,354,131.45	49,460.39	2.0	2.9				772,494.84	145.6	4.5	2,808,194.67	356.0	7.4	523,831.96	64.8		256,425.94	Montana
Nebraska	1,978,356.91	53,563.83	0.1		14,520.35	0.2		34,800.74		23.1	2,984,756.48	608.1	161.5	1,385,929.14	244.3	176.9	176,457.54	Nebraska
Nevada	514,111.19	95,921.93		33.3	28,352.98		8.5	13,980.27		7.8	1,012,597.47	137.3	28.4	422,953.13	45.4	42.9	94,177.05	Nevada
New Hampshire	65,727.25	24,135.00	1.6					144,140.78	6.2		294,415.18	20.4		161,812.38	9.7		10,483.24	New Hampshire
New Jersey	253,177.00				462,675.00	30.8					452,727.35	32.2		299,014.17	18.7		54,660.00	New Jersey
New Mexico	680,228.45	515,895.01	59.7		557,740.33	70.2		62,229.42	11.2		1,049,616.95	73.0	0.5	1,652,788.41	147.8		43,715.48	New Mexico
New York	3,677,302.65	539,850.00	36.0					1,105,747.50	70.1	8.6	7,489,393.95	483.6		700,587.50	36.6		235,530.21	New York
North Carolina	1,084,145.16	276,900.00	6.3	19.6	222,284.93	18.0		47,500.00	4.9		576,152.95	54.1	13.0	492,258.43	23.1		273,777.91	North Carolina
North Dakota	587,548.37	130,302.11	33.4	1.0	49,654.88	11.7	7.9	295,129.17	131.1	74.8	1,595,149.27	611.6	159.5	588,000.87	150.9	90.5	206,552.51	North Dakota
Ohio	2,106,977.07	1,271,916.04	83.5	12.7	684,885.00	26.9	0.1	265,240.00	19.2		3,532,958.32	223.2	5.9	917,717.81	67.3		244,336.28	Ohio
Oklahoma	409,181.44	732,386.60	100.6	15.5	456,534.11	20.6	6.4	74,000.00	6.6		1,075,528.65	148.9		1,130,584.95	175.8	12.8	54,579.40	Oklahoma
Oregon	1,226,909.14	76,680.28	14.0		31,050.54			110,182.77	4.8		816,503.65	40.7		164,566.38	10.7	9.2	42,199.19	Oregon
Pennsylvania	1,421,539.75	792,650.63	51.0		44,857.50	3.0		865,625.11	52.8		3,781,632.08	233.4		1,151,771.52	64.7		259,160.96	Pennsylvania
Rhode Island	576,046.16							80,919.55	4.0		406,914.92	25.2		24,135.00	1.6		112,009.78	Rhode Island
South Carolina	64,398.43				229,000.00	21.1	23.3	69,700.00	10.4	8.2	1,598,138.22	176.3	97.4	781,664.79	91.4	40.9	105,072.82	South Carolina
South Dakota	443,253.50	64,523.07	13.1	32.8	69,904.45			144,290.67	59.7	9.3	1,534,795.36	483.1	65.0	868,628.40	239.3	83.1	270,753.79	South Dakota
Tennessee	254,777.15	1,368,324.68	25.6	94.3	988,430.98	56.6					950,974.08	82.4		1,902,810.02	110.7	23.8	5,821.63	Tennessee
Texas	3,563,138.66	2,083,185.10	144.2	104.8	943,623.68	14.6	12.8	758,904.28	78.0	61.1	2,563,769.07	191.4	112.3	2,214,952.13	187.5	95.0	425,805.52	Texas
Utah	184,679.58	164,276.41	10.7	1.5	98,479.68	3.6	5.3	113,392.77	12.2		1,123,031.49	89.1		497,750.78	47.8		78,877.82	Utah
Vermont	38,964.23	55,000.00	6.3					92,454.36	5.6		571,487.97	48.9					31,271.33	Vermont
Virginia	57,540.67	215,475.37	33.8		282,070.42	12.6	7.8	98,424.11	22.0		1,078,901.70	86.7	13.8	515,385.82	30.1	3.9	82,033.72	Virginia
Washington	515,843.46	248,236.89	15.3	5.0	158,000.00	8.5		192,000.00	5.9		1,245,000.00	96.9	18.1	110,600.00	18.9			Washington
West Virginia	237,849.40	539,355.67	39.6	12.4	76,513.22	6.8					1,163,662.03	98.9		682,798.33	65.4	4.0		West Virginia
Wisconsin	1,450,278.65	135,362.24	9.7	7.9	737,665.03	53.6	18.5	31,263.00	4.8	2.1	2,719,133.20	244.1	12.5	879,089.21	72.1	10.7		Wisconsin
Wyoming	32,239.73	240,855.91	47.9		209,874.57	34.2					1,264,235.20	203.3	32.1	132,381.71	31.9		194,824.00	Wyoming
Hawaii	1,064,241.58							57,501.20	1.8		60,383.43	3.2		178,717.46	9.1			Hawaii
TOTALS	48,514,656.78	19,262,827.85	1,723.4	434.6	13,899,991.27	965.0	125.1	7,474,971.90	793.0	305.3	91,486,032.02	8,532.3	1,131.5	30,630,387.50	3,041.0	671.7	6,923,633.09	TOTALS

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

M-4 (1927)
R.S.A.

STATE HIGHWAY SYSTEMS (1)

EXISTING MILEAGE AT END OF YEAR 1927.

(COMPILED FROM REPORTS OF STATE AUTHORITIES)

STATES	1927 YEAR END8	GRAND TOTAL MILEAGE STATE HIGHWAY SYSTEMS	EARTH ROADS, NON-SURFACED			SURFACED ROADS BY TYPES											STATES
			TOTAL NON-SURFACED MILEAGE	UNIMPROVED AND PARTLY GRADED	IMPROVED, ESTABLISHED TO GRADE AND DRAINED	TOTAL SURFACED MILEAGE	SAND-CLAY AND TOP-SOIL	GRAVEL, CHERT, SHALE ETC (TREATED & UNTREATED)	WATERBOUND MACADAM (TREATED & UNTREATED)	BITUMINOUS MACADAM BY PENETRATION	SHEET ASPHALT	BITUMINOUS CONCRETE	PORTLAND CEMENT CONCRETE	BLOCK PAVEMENTS: VITRIFIED BRICK	BLOCK PAVEMENTS: ASPHALT	BLOCK PAVEMENTS: WOOD	BLOCK PAVEMENTS: STONE	
ALABAMA	9/30	3,918.9	1,535.1	1,366.5	168.6	2,383.8	739.4	1,347.8	36.8	45.0	5.7	101.4	107.5	-	-	0.2	-	ALABAMA
ARIZONA	12/31	2,041.4	675.0	325.9	249.1	1,466.4	-	1,261.9	-	23.4	15.0	39.7	136.4	-	-	-	-	ARIZONA
ARKANSAS	12/31	(2)8,506.0	4,080.0	2,534.0	1,546.0	4,426.0	-	3,617.0	144.0	156.0	-	271.0	238.0	-	-	-	-	ARKANSAS
CALIFORNIA	12/31	6,573.2	2,884.2	2,361.7	(3) 532.5	3,689.0	-	(3)1,151.4	(3) 61.0	339.2	4)357.0	109.3	1,671.1	-	-	-	-	CALIFORNIA
COLORADO	12/31	9,095.4	5,326.9	4,549.2	776.7	3,769.5	98.4	3,396.4	-	-	-	13.1	261.6	-	-	-	-	COLORADO
CONNECTICUT	6/30	1,966.4	115.4	-	115.4	1,851.0	-	363.3	764.5	242.9	-	148.2	330.5	1.6	-	-	-	CONNECTICUT
DELAWARE	12/31	629.2	-	-	-	629.2	-	23.0	4.8	23.2	5.8	3.3	562.7	6.4	-	-	-	DELAWARE
FLORIDA	12/31	(6)6,339.0	3,120.8	2,877.9	242.9	3,218.2	789.1	8.3	1,374.6	150.4	238.3	35.2	306.5	259.3	56.5	-	-	FLORIDA
GEORGIA	12/31	6,379.7	2,874.9	2,596.0	278.9	3,504.8	1,947.0	632.5	90.1	228.8	74.7	9.2	521.7	0.8	-	-	-	GEORGIA
IDAHO	12/31	4,218.8	2,060.0	1,568.9	491.1	2,158.8	63.8	1,901.4	-	15.6	5.4	131.4	51.2	-	-	-	-	IDAHO
ILLINOIS	12/31	(6)9,889.5	4,820.8	4,734.5	86.3	5,068.7	-	-	0.5	4.4	1.4	8.7	4,966.7	87.0	-	-	-	ILLINOIS
INDIANA	12/31	4,363.6	14.7	-	14.7	4,348.9	-	1,629.8	1,093.0	268.8	-	28.5	1,348.0	79.3	-	1.5	-	INDIANA
IOWA	12/31	7,078.1	2,635.8	1,200.1	1,435.7	4,442.3	-	3,434.3	-	-	-	-	974.7	33.3	-	-	-	IOWA
KANSAS	12/31	7,922.0	5,939.5	4,312.7	1,626.8	1,982.5	762.0	359.1	-	150.9	-	3.0	554.5	163.0	-	-	-	KANSAS
KENTUCKY	6/30	9,646.6	5,121.1	4,428.1	693.0	4,525.5	-	1,746.2	2,174.6	328.9	-	13.8	236.4	25.6	-	-	-	KENTUCKY
LOUISIANA	12/31	7,978.8	2,754.2	2,723.4	30.8	5,224.6	-	5,102.6	-	20.2	0.5	49.4	36.9	15.0	-	-	-	LOUISIANA
MAINE	12/31	1,788.0	293.0	293.0	-	1,495.0	4.3	1,171.3	7.5	224.2	-	-	87.7	-	-	-	-	MAINE
MARYLAND	9/30	2,519.2	-	-	-	2,619.2	-	383.5	1,106.2	-	41.9	39.5	946.6	1.5	-	-	-	MARYLAND
MASSACHUSETTS	11/30	1,590.3	25.4	11.2	14.2	1,564.9	-	110.5	284.7	711.4	-	213.8	241.8	0.1	-	0.1	2.5	MASSACHUSETTS
MICHIGAN	12/31	7,143.9	1,036.4	975.1	61.3	(7)6,107.5	90.5	3,233.5	572.2	129.5	-	236.2	1,835.0	10.6	-	-	-	MICHIGAN
MINNESOTA	12/31	6,936.3	392.8	-	392.8	6,543.5	278.5	5,331.0	-	-	-	70.3	838.8	12.5	-	12.4	-	MINNESOTA
MISSISSIPPI	12/31	6,723.1	2,594.0	2,040.4	553.6	4,129.1	6.4	3,744.5	10.7	61.1	7.0	13.9	276.8	19.7	-	-	-	MISSISSIPPI
MISSOURI	12/31	7,482.1	3,569.0	2,138.0	1,431.0	3,913.1	-	2,204.5	-	94.4	-	-	1,592.8	21.4	-	-	-	MISSOURI
MONTANA	12/31	7,967.2	6,882.6	6,568.0	314.6	1,074.6	-	1,031.7	-	5.6	-	4.3	33.1	-	-	-	-	MONTANA
NEBRASKA	12/31	6,166.5	2,826.9	2,201.5	625.4	3,339.6	131.5	3,095.5	-	-	3.1	11.3	78.7	18.5	-	-	-	NEBRASKA
NEVADA	12/31	(8)3,552.2	2,233.2	2,214.2	19.0	1,319.0	10.1	1,230.4	-	12.5	-	15.9	50.1	-	-	-	-	NEVADA
NEW HAMPSHIRE	12/31	2,309.5	239.0	142.9	96.1	2,070.6	-	1,699.0	117.3	159.3	-	70.6	24.3	-	-	-	-	NEW HAMPSHIRE
NEW JERSEY	12/31	(9)1,821.3	162.2	25.7	136.5	1,659.1	-	309.8	132.0	60.1	91.4	279.2	738.0	4.9	2.7	6.3	34.7	NEW JERSEY
NEW MEXICO	12/31	9,253.2	7,460.2	6,936.0	524.2	1,793.0	-	1,719.9	-	-	-	0.7	72.4	-	-	-	-	NEW MEXICO
NEW YORK	12/31	13,929.0	3,725.2	3,676.4	48.8	10,203.8	-	125.8	2,107.8	3,868.9	-	247.6	3,576.9	253.9	18.9	0.3	3.7	NEW YORK
NORTH CAROLINA	6/30	7,082.6	856.8	-	856.8	6,225.8	1,765.3	1,111.1	190.6	369.5	66.3	808.6	1,857.6	44.4	- (10)	12.4	-	NORTH CAROLINA
NORTH DAKOTA	12/31	7,184.7	5,457.1	3,861.9	1,595.2	1,727.6	-	1,718.0	-	-	1.2	-	8.4	-	-	-	-	NORTH DAKOTA
OHIO	12/31	11,000.0	1,104.2	297.5	806.7	9,895.8	-	3,437.6	1,450.3	1,612.6	38.9	225.5	1,652.5	1,478.4	-	-	-	OHIO
OKLAHOMA	12/31	(11) 3,141.8	4,308.0	3,132.9	1,175.1	1,833.8	-	948.9	31.3	-	20.4	122.9	694.1	36.2	-	-	-	OKLAHOMA
OREGON	12/31	4,393.4	983.7	764.2	219.6	3,409.7	-	2,505.8	-	7.5	-	-	688.6	207.8	-	-	-	OREGON
PENNSYLVANIA	12/31	12,167.0	3,340.1	-	3,340.1	8,826.9	-	1,293.6	2,225.2	403.1	192.9	313.9	4,028.6	358.8	7.2	1.1	2.5	PENNSYLVANIA
RHODE ISLAND	12/31	867.1	388.1	210.1	178.0	479.0	-	22.9	117.8	134.1	7.8	119.9	76.5	-	-	-	-	RHODE ISLAND
SOUTH CAROLINA	12/31	(12) 5,591.5	1,069.1	983.5	85.6	4,522.4	3,484.0	543.1	38.1	11.2	75.0	117.8	253.2	-	-	-	-	SOUTH CAROLINA
SOUTH DAKOTA	12/31	6,014.7	3,119.1	1,136.7	1,982.4	2,895.6	20.4	2,872.0	-	-	-	-	3.2	-	-	-	-	SOUTH DAKOTA
TENNESSEE	6/30	5,033.2	1,323.8	1,011.4	312.4	3,709.4	-	1,533.7	1,090.3	587.8	35.0	80.0	382.6	-	-	-	-	TENNESSEE
TEXAS	12/31	18,728.0	9,457.2	7,703.0	1,754.2	9,270.8	297.1	5,713.2	690.5	1,527.6	17.1	223.0	720.1	82.2	-	-	-	TEXAS
UTAH	12/31	3,436.0	2,047.6	627.9	1,419.7	1,388.4	-	1,085.3	28.1	5.1	11.9	51.2	206.2	-	-	-	-	UTAH
VERMONT	12/31	(13) 4,226.0	981.5	124.0	857.5	3,244.5	1,000.0	2,033.3	49.6	62.9	-	-	99.5	-	0.2	-	-	VERMONT
VIRGINIA	12/31	5,244.8	1,088.7	788.9	299.8	4,156.1	1,057.3	764.9	1,114.0	631.2	10.1	3.2	585.4	-	-	-	-	VIRGINIA
WASHINGTON	12/31	3,300.0	629.8	461.1	168.7	2,670.2	-	1,982.2	-	31.4	2.9	38.5	601.0	14.2	-	-	-	WASHINGTON
WEST VIRGINIA	12/31	3,820.4	1,610.5	781.1	829.4	2,209.9	-	646.4	114.5	674.5	0.7	87.3	540.6	146.9	-	-	-	WEST VIRGINIA
WISCONSIN	12/31	10,279.6	1,633.6	674.7	958.9	8,646.0	46.5	6,642.8	530.4	122.6	4.3	9.8	2,288.1	1.5	-	-	-	WISCONSIN
WYOMING	12/31	3,123.4	2,090.1	1,466.1	624.0	1,033.3	-	993.9	-	-	-	27.1	12.3	-	-	-	-	WYOMING
TOTALS	——	293,352.6	116,786.3	86,816.3	29,970.0	176,566.3	12,580.6	86,094.6	17,752.0	13,495.7	1,331.7	5,066.4	36,915.1	3,167.0	85.5	34.3	43.4	TOTALS

NOTES:
(1) HIGHWAYS UNDER CONTROL OF STATE HIGHWAY DEPARTMENT, AND DOES NOT INCLUDE ROADS UNDER COUNTY OR OTHER LOCAL CONTROL.
(2) ADDED TO SYSTEM - 147.0 MILES UNIMPROVED AND 45.0 MILES GRAVEL ROAD.
(3) APPROXIMATE, AS IMPROVED EARTH, GRAVEL AND MACADAM CLASSIFIED TOGETHER.
(4) FORMERLY REPORTED AS BITUMINOUS CONCRETE.
(6) ADDED 712.0 MILES TO SYSTEM - 405.0 MILES UNIMPROVED, 61.0 MILES IMPROVED, 208.0 MILES MACADAM, AND 38.0 MILES CEMENT CONCRETE.
(6) ADDED TO SYSTEM - 344.7 MILES UNIMPROVED AND 85.2 MILES CEMENT CONCRETE ROADS.
(7) COMPLETE REVISION OF STATE SYSTEM MILEAGE MADE RESULTING IN DECREASE OF SURFACED MILEAGE.
(8) LEGISLATURE ADDED 537 MILES OF UNIMPROVED ROADS TO SYSTEM.
(9) LEGISLATURE ADDED 350.2 MILES OF SURFACED ROADS OF VARIOUS TYPES TO SYSTEM.
(10) WOOD BRIDGE FLOORING NOT CLASSIFIED.
(11) ADDITIONS OF 763.3 MILES TO SYSTEM INCLUDES 696.6 IMPROVED ROADS, 29.9 BITUMINOUS CONCRETE, AND 26.8 CEMENT CONCRETE.
(12) ADDED TO SYSTEM 499.2 MILES, INCLUDING 94.3 UNIMPROVED, 389.3 SAND-CLAY, AND 15.1 BITUMINOUS CONCRETE.
(13) LEGISLATIVE ACT NO.63 DECREASED STATE SYSTEM MILEAGE BY DISCONTINUANCE OF 236. MILES OF UNIMPROVED EARTH ROAD AS STATE AID ROAD.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

M-1 (1927)
R.S.A.

STATE HIGHWAY SYSTEMS (1)

MILEAGE BUILT TO GRADE AND SURFACED DURING 1927 (2) (COMPILED FROM REPORTS OF STATE AUTHORITIES)

STATES (YEAR ENDS DECEMBER 31 EXCEPT AS NOTED)	TOTAL MILEAGE GRADED AND SURFACED	EARTH IMPROVED GRADED AND DRAINED (4)	NEW SURFACING PLACED (3) TOTAL (6)	ON EARTH ROADS (5)	ON WORN OUT OTHER TYPES	ON WORN OUT SAME TYPE (RECON)	SAND-CLAY AND TOP-SOIL NEW	SAND-CLAY AND TOP-SOIL RECON	GRAVEL, ETC. TREATED AND UNTREATED NEW	GRAVEL, ETC. TREATED AND UNTREATED RECON	WATERBOUND MACADAM TREATED AND UNTREATED NEW	WATERBOUND MACADAM TREATED AND UNTREATED RECON	BITUMINOUS MACADAM BY PENETRATION NEW	BITUMINOUS MACADAM BY PENETRATION RECON	SHEET ASPHALT NEW	SHEET ASPHALT RECON	BITUMINOUS CONCRETE NEW	BITUMINOUS CONCRETE RECON	PORTLAND CEMENT CONCRETE NEW	PORTLAND CEMENT CONCRETE RECON	VITRIFIED BRICK NEW	VITRIFIED BRICK RECON	BLOCK: ASPHALT WOOD & STONE NEW	REVISION OF SURFACED MILEAGE (6)	STATES
ALABAMA (7)	440.7	138.0	302.7	236.3	29.9	36.5	144.6	0.3	100.1	38.2	-	-	0.3	-	-	-	7.5	-	13.7	-	-	-	-	- 25.0	ALABAMA
ARIZONA	66.0	17.1	48.9	25.5	10.6	12.8	-	-	20.6	12.8	-	-	13.9	-	-	-	-	-	1.6	-	-	-	-	+ 19.4	ARIZONA
ARKANSAS	940.0	650.0	290.0	260.0	30.0	-	-	-	260.0	-	-	-	-	-	-	-	-	-	30.0	-	-	-	-	+ 13.0	ARKANSAS
CALIFORNIA	232.6	-	232.6	126.2	66.1	41.3	-	-	129.6	6.7	-	-	6.3	6.3	43.3	-	1.8	-	10.3	29.3	-	-	-	+ 26.9	CALIFORNIA
COLORADO	141.7	63.6	88.1	71.0	17.1	-	1.3	-	58.0	-	-	-	-	-	-	-	2.0	-	26.8	-	-	-	-	+1,99.2	COLORADO
CONNECTICUT (8)	119.8	-	119.8	35.0	68.5	16.3	-	-	3.7	2.1	38.5	5.3	13.5	-	-	-	10.8	1.6	37.0	7.3	-	-	-	- 3.3	CONNECTICUT
DELAWARE	38.7	-	38.7	38.7	-	-	-	-	-	-	3.5	-	5.1	-	-	-	-	-	30.1	-	-	-	-	- -	DELAWARE
FLORIDA	1,013.3	251.2	762.1	471.3	122.9	167.9	93.0	135.9	-	-	311.8	32.0	14.2	-	39.3	-	1.3	-	120.6	-	-	-	(9)14.0	+ 21.6	FLORIDA
GEORGIA	926.8	152.2	774.6	432.9	267.6	74.2	154.3	-	114.9	74.2	48.2	-	82.8	-	27.9	-	-	-	272.3	-	-	-	-	+407.4	GEORGIA
IDAHO	456.7	27.8	428.9	201.0	47.3	180.6	-	-	226.5	180.6	-	-	15.6	-	-	-	5.1	-	1.1	-	-	-	-	-479.8	IDAHO
ILLINOIS	611.5	90.1	521.4	489.4	3.3	28.7	-	-	-	-	-	-	-	-	-	-	-	-	481.8	28.7	10.9	-	-	+ 83.8	ILLINOIS
INDIANA	537.9	25.2	512.7	125.9	187.4	199.4	-	-	18.6	99.1	6.2	100.3	60.0	-	-	-	0.5	-	228.0	-	-	-	-	+ 67.7	INDIANA
IOWA	1,211.0	213.9	997.1	979.5	17.6	-	-	-	636.6	-	-	-	-	-	-	-	-	-	360.5	-	-	-	-	- 6.8	IOWA
KANSAS	1,351.0	707.0	644.0	644.0	-	-	426.0	-	120.0	-	-	-	46.0	-	-	-	-	-	47.0	-	5.0	-	-	-	KANSAS
KENTUCKY (8)	1,079.0	426.5	653.5	333.4	103.4	216.7	-	-	238.0	24.8	47.6	191.9	88.2	-	-	-	-	-	63.0	-	-	-	-	-	KENTUCKY
LOUISIANA	611.8	48.2	563.6	517.4	43.1	3.1	-	-	516.4	3.1	-	-	-	-	-	-	23.7	-	21.4	-	-	-	-	-	LOUISIANA
MAINE	85.4	-	85.4	55.9	13.0	15.5	-	-	60.5	14.8	-	-	4.0	1.7	-	-	-	-	14.4	-	-	-	-	+133.0	MAINE
MARYLAND (7)	102.9	-	102.9	82.8	18.2	1.9	-	-	24.9	-	11.7	1.9	-	-	6.3	-	4.5	-	54.6	-	-	-	-	+ 16.6	MARYLAND
MASSACHUSETTS (10)	72.8	-	72.8	1.6	54.6	16.6	-	-	-	-	-	-	33.0	15.0	-	-	11.3	1.6	11.9	-	-	-	-	+ 12.4	MASSACHUSETTS
MICHIGAN	336.9	23.0	312.9	145.6	155.2	12.1	-	-	69.8	-	3.2	-	-	-	-	-	24.6	-	203.2	12.1	-	-	-	-267.4	MICHIGAN
MINNESOTA	1,105.8	349.1	756.7	573.8	14.8	163.1	171.0	-	308.7	163.1	-	-	-	-	-	-	1.8	-	112.1	-	-	-	-	-388.8	MINNESOTA
MISSISSIPPI	257.0	78.8	178.2	123.2	9.2	45.8	-	-	80.1	45.8	-	-	-	-	-	-	-	-	51.8	-	0.5	-	-	+166.9	MISSISSIPPI
MISSOURI	637.3	-	537.3	479.3	48.0	10.0	-	-	370.4	10.0	-	-	-	-	-	-	-	-	152.4	-	4.5	-	-	+ 68.0	MISSOURI
MONTANA	136.5	19.0	117.5	92.4	-	25.1	-	-	91.4	25.1	-	-	-	-	-	-	-	-	1.0	-	-	-	-	+ 55.3	MONTANA
NEBRASKA	1,629.6	493.1	1,136.5	618.0	316.8	201.7	30.0	-	896.0	201.7	-	-	-	-	-	-	1.2	-	7.6	-	-	-	-	- 42.5	NEBRASKA
NEVADA	117.9	-	117.9	117.9	-	-	-	-	114.0	-	-	-	-	-	-	-	-	-	3.9	-	-	-	-	+178.5	NEVADA
NEW HAMPSHIRE	152.1	1.0	151.1	107.1	22.5	21.5	-	-	93.9	19.3	7.0	-	18.8	1.4	-	-	0.9	0.8	9.0	-	-	-	-	-	NEW HAMPSHIRE
NEW JERSEY	119.1	8.2	110.9	12.1	98.7	0.1	-	-	1.1	0.1	-	-	1.9	-	-	-	-	-	107.8	-	-	-	-	+350.1	NEW JERSEY
NEW MEXICO	656.1	479.1	177.0	176.8	-	0.2	-	-	175.7	0.2	-	-	-	-	-	-	-	-	1.1	-	-	-	-	- 68.6	NEW MEXICO
NEW YORK	726.1	28.3	696.8	350.0	299.1	47.7	-	-	28.4	-	0.6	6.1	41.0	18.2	-	-	11.4	-	567.6	23.4	0.1	-	-	-	NEW YORK
NORTH CAROLINA(8)	1,108.8	314.2	794.6	206.3	588.3	-	178.5	-	25.4	-	27.9	-	77.7	-	-	-	31.3	-	453.8	-	-	-	-	+555.6	NORTH CAROLINA
NORTH DAKOTA	1,072.0	585.4	486.6	411.6	1.6	73.4	-	-	413.2	73.4	-	-	-	-	-	-	-	-	-	-	-	-	-	- 19.4	NORTH DAKOTA
OHIO	1,063.2	55.9	1,007.3	278.4	-	728.9	-	-	2.9	345.3	59.4	317.0	63.3	23.4	-	0.2	2.5	-	134.8	33.3	16.5	9.7	-	+ 26.4	OHIO
OKLAHOMA	554.6	387.1	167.5	167.5	-	-	-	-	32.9	-	-	-	-	-	20.4	-	-	-	110.3	-	3.9	-	-	+ 81.8	OKLAHOMA
OREGON	287.4	78.4	209.0	136.0	0.9	72.1	-	-	136.0	68.6	-	-	-	-	-	-	-	3.5	0.9	-	-	-	-	+ 63.3	OREGON
PENNSYLVANIA	680.4	-	680.4	439.6	208.2	32.6	-	-	47.6	14.4	167.2	16.7	11.1	-	0.5	0.8	16.0	-	405.2	0.7	0.2	-	-	- 52.3	PENNSYLVANIA
RHODE ISLAND	40.2	-	40.2	27.6	12.6	-	-	-	0.4	-	2.0	-	20.7	-	1.3	-	-	-	15.8	-	-	-	-	- 0.1	RHODE ISLAND
SOUTH CAROLINA	613.3	58.1	555.2	345.7	182.2	27.3	304.5	10.8	113.1	16.5	10.8	-	-	-	-	-	15.5	-	84.0	-	-	-	-	+306.8	SOUTH CAROLINA
SOUTH DAKOTA	852.5	388.1	464.4	464.4	-	-	-	-	464.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	- 36.6	SOUTH DAKOTA
TENNESSEE (8)	388.7	133.4	265.3	192.4	34.5	28.4	-	-	21.7	19.4	59.0	9.0	40.1	-	-	-	5.2	-	100.9	-	-	-	-	- 38.5	TENNESSEE
TEXAS	962.8	389.5	573.3	284.5	288.8	-	-	-	101.5	-	-	-	188.8	-	-	-	176.6	-	107.5	-	-	-	-	-270.0	TEXAS
UTAH	169.2	-	169.2	116.9	32.6	19.7	-	-	116.9	16.7	28.1	-	4.5	-	-	-	-	-	-	4.0	-	-	-	+ 81.7	UTAH
VERMONT	155.5	-	165.5	105.5	50.0	-	-	-	105.5	-	-	-	15.8	-	-	-	-	-	34.2	-	-	-	-	-	VERMONT
VIRGINIA	234.6	13.4	221.2	168.7	52.5	-	39.9	-	-	-	13.5	-	83.6	-	-	-	-	-	84.3	-	-	-	-	+148.4	VIRGINIA
WASHINGTON	212.0	98.1	113.9	63.0	50.9	-	-	-	63.0	-	-	-	-	-	-	-	-	-	50.9	-	-	-	-	- 0.1	WASHINGTON
WEST VIRGINIA	734.7	239.8	494.9	477.5	7.7	9.7	-	-	314.9	-	80.5	-	82.1	4.8	-	-	-	-	67.7	-	-	4.9	-	- 0.1	WEST VIRGINIA
WISCONSIN	1,572.4	36.8	1,535.6	555.3	158.5	821.8	2.0	-	326.3	821.8	159.7	-	3.0	-	-	-	-	-	223.8	-	-	-	-	-329.7	WISCONSIN
WYOMING	208.2	93.2	115.0	104.7	-	10.3	-	-	103.6	10.3	-	-	-	-	-	-	-	-	1.1	-	-	-	-	- 0.5	WYOMING
TOTALS	26,722.5	7,150.8	19,571.7	12,473.6	3,734.1	3,364.0	1,545.1	147.0	7,135.2	2,305.1	1,026.4	680.2	1,035.2	69.8	138.0	1.0	354.4	7.5	4,918.8	138.8	40.6	14.6	14.0	+1,033.4	TOTALS

NOTES: (1) HIGHWAYS UNDER CONTROL OF STATE HIGHWAY DEPARTMENTS ONLY.
(2) MILEAGE OF NEW SURFACING PLACED AND RECONSTRUCTED SURFACES SHOWN.
(3) THE FOUR COLUMNS BELOW SHOW TOTAL SURFACING PLACED DURING YEAR: MADE UP OF NEW SURFACE ON EARTH ROADS AND REPLACEMENT OF WORN OUT SURFACES, PART OF LATTER ON OTHER TYPE SURFACES AND PART AS RECONSTRUCTION OF SAME TYPE.
(4) ROADS FULLY IMPROVED TO AN ESTABLISHED GRADE AND DRAINED, READY TO SURFACE.
(5) THE NET INCREASE OF SYSTEM SURFACED MILEAGE IS REPRESENTED BY THE NEW SURFACING PLACED ON EARTH ROADS WITH ADDITIONS OR DEDUCTIONS SHOWN IN THE LAST COLUMN.
(6) THESE REVISIONS ARE COMBINATIONS OF SURFACED MILEAGE RESULTING FROM (a) LEGAL ADDITIONS TO SYSTEM (b) RELOCATION OF ROADS IN CONSTRUCTION AND (c) CORRECTIONS DUE TO RESURVEY.
(7) MILEAGE AS OF SEPTEMBER 30, 1927.
(8) MILEAGE AS OF JUNE 30, 1927.
(9) ASPHALT BLOCK PAVEMENT.
(10) MILEAGE AS OF NOVEMBER 30, 1927.

GRINDING MACHINE DEVELOPED IN KANSAS FOR SMOOTHING UNEVEN CONCRETE-PAVEMENT SURFACE

Compiled from a report submitted by
D. D. Mickey of District 5
(Not for release)

A unique grinding machine for removing the undulations from the uneven surface of a recently constructed concrete pavement was developed by the contractor for use on Kansas Federal-Aid project No. 334-A. Four-tenths of a mile of the project, which consisted in all of 2.3 miles of concrete pavement of a 9-6-9 cross section and 18 feet wide, was reported unsatisfactory on October 14, 1927 because of the uneven surface between Stations 103 and 124.

The machine is constituted essentially of a rotary drum, with attached cutters, mounted on a movable frame which is in turn fixed to an outside framework. The rotary drum was made of a 19-inch length of oil-well casing 12 inches in diameter. The 2-inch steel shaft which served as an axle for the drum was passed through appropriate holes in two round plates $1\frac{1}{2}$ inches thick by 11 inches in diameter which were fixed on the inside of each end of the casing. Ten plates, 19 inches in diameter and $1\frac{1}{2}$ inches thick were then cut from plate steel. After the central area (12 inches in diameter) was removed, three sets of holes ($\frac{1}{4}$, 3/8, and $1\frac{1}{2}$-inch) were drilled near the outer edge of the plates. The three sizes of holes were made to permit the use of three different diameters of cutter axles, but in the subsequent use of the machine on project No. 334-A only the 3/8-inch holes were used. Each plate was next cut on a radial line and then sprung approximately 1 inch, giving them the appearance of large lock washers. The plates were then welded successively to the drum and to each other in such a manner that when they were all in position, they formed a continuous spiral about the drum.

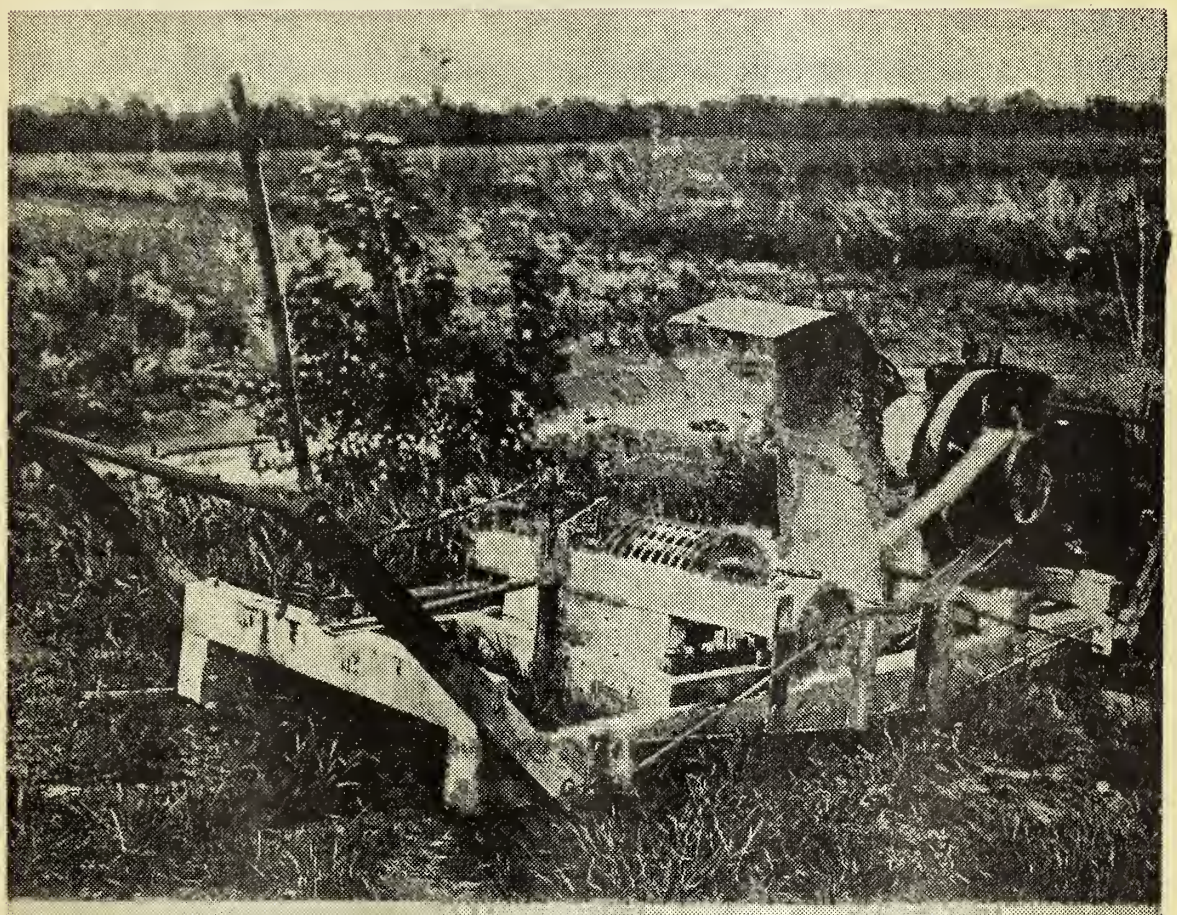
The cutters consisted of cast steel wheels 3/8 inches thick by $2\frac{1}{2}$ inches in diameter, of the kind ordinarily used to dress emery wheels. A total of 342 cutters were attached to the drum, 18 cutters being mounted on each 3/8-inch axle.

It was found that one cutter would wear off to 1-5/8 inches in diameter, and become unserviceable, for every 2 square feet of pavement ground 1 inch deep. The average depth of the pavement cut was about $\frac{1}{3}$ inch. A guard, shown lifted in the accompanying photograph, was placed over the cutting drum as a protection for the workmen against dust and broken cutters.

The outside frame of the grinding machine was 11 feet long and 4 feet wide, and was built of 6 by 4-inch oak timbers, stiffened on each side by 3/4-inch steel truss rods. The inner frame, carrying the cutting drum, 4 feet long by 2 feet wide, was constructed of 4 by 4-inch oak members. This inner frame was hinged to the outer one, by a pipe hinge fixed to a 4 by 4-inch cross brace supporting the engine. Twelve-inch pulley wheels were used on the drum and the engine. The drum was raised by a lifting lever at one end of the inside frame. T-shaped adjusting screws, at this end of the frame, regulated the depth of cut. The power was delivered by a 6 horse-power Fairbanks-Morse gasoline engine operating at a speed of 450 revolutions per minute.

The machine was moved along the pavement on four 3-inch castors, mounted near the ends of the outer frame. For the purpose of oiling the cutter axles, a number of pin holes were drilled in the drum, and the drum was filled with waste and engine oil. The two men required for the operation of the mechanism, moved the device along the pavement.

The pavement, ground down by the machine, consisted of a sand-rock mix from which cylinders, at the end of 28 days, tested 4,000 pounds per square inch in compression.



The grinding machine used for smoothing the uneven sections in the surface of the concrete pavement on Kansas Federal-aid project No. 334-A.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

LOCAL ROAD INCOME AND FUNDS AVAILABLE, 1926.

F-4 (1926)
R.8.A

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

(COMPILED FROM REPORTS 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 FOR LOCAL ROADS	MISCELLANEOUS INCOME	STATES
ALABAMA	$ 9,672,115	$ 811,945	$ 8,860,170	$ 152,625	$ 3,673,761	$ 1,589,959	$ 209,996	$ 2,648,899	$ 81,875	$ 503,055	ALABAMA
ARIZONA	1,917,030	147,646	1,769,384	-	924,696	296,069	-	453,234	6,532	88,853	ARIZONA
ARKANSAS	9,292,075	117,946	9,174,129	55,495	5,726,448	165,242	84,000	262,593	2,630,708	249,643	ARKANSAS
CALIFORNIA	41,599,033	10,703,394	30,895,639	1,556,699	14,148,760	4,628,177	2,888,516	6,905,779	58,162	709,546	CALIFORNIA
COLORADO	5,687,949	488,828	5,099,121	-	2,675,522	120,426	495,361	903,202	675,498	229,112	COLORADO
CONNECTICUT	3,137,661	-	3,137,681	244,482	-	2,889,501	-	-	-	3,698	CONNECTICUT
DELAWARE	2,711,482	88,491	2,622,991	1,013,845	374,298	1,214,848	-	-	20,000	-	DELAWARE
FLORIDA	80,650,276	31,978,336	48,671,940	25,668,054	14,529,793	152,002	1,572,845	2,614,195	6,025	4,129,026	FLORIDA
GEORGIA	15,868,497	817,549	15,050,948	2,781,503	7,503,765	2,863,412	-	1,555,975	78,064	268,229	GEORGIA
IDAHO	5,417,337	1,278,774	4,138,563	266,037	2,545,795	173,352	642,230	-	163,396	347,753	IDAHO
ILLINOIS	28,785,531	1,036,873	27,748,658	1,434,669	24,007,339	1,698,967	-	-	469,222	138,461	ILLINOIS
INDIANA	48,241,924	9,467,286	38,774,638	10,869,678	24,508,845	1,537,545	-	1,855,864	-	2,706	INDIANA
IOWA	23,184,975	4,083,276	19,101,700	194,672	14,226,188	544,212	-	1,620,787	215,633	2,300,308	IOWA
KANSAS	29,240,223	6,211,120	23,029,103	1,296,866	13,278,194	640,013	311,160	6,877,734	-	625,136	KANSAS
KENTUCKY	10,294,106	642,253	9,651,853	3,243,537	5,090,632	641,755	422,392	-	88,608	164,929	KENTUCKY
LOUISIANA	17,115,142	2,566,634	14,549,508	8,307,235	5,826,819	99,000	-	-	226,363	90,092	LOUISIANA
MAINE	2,558,235	42,705	2,515,530	43,242	848,292	1,583,152	-	-	-	40,844	MAINE
MARYLAND	4,700,356	-	4,700,356	918,716	2,138,243	833,264	-	-	140,381	669,753	MARYLAND
MASSACHUSETTS	14,350,000	-	14,350,000	-	-	14,100,000	-	-	-	250,000	MASSACHUSETTS
MICHIGAN	48,561,864	8,353,711	40,208,153	6,658,480	23,630,981	120,513	6,609,741	-	1,993,443	1,194,895	MICHIGAN
MINNESOTA	19,118,412	1,114,411	18,004,001	1,010,682	11,702,409	1,312,195	372	180	2,142,839	1,835,324	MINNESOTA
MISSISSIPPI	36,424,789	13,595,713	22,829,076	5,747,814	10,802,585	1,428,873	1,982,776	1,747,738	36,288	1,082,999	MISSISSIPPI
MISSOURI	11,220,109	903,029	10,317,080	370,807	7,163,368	897,122	-	-	43,478	1,852,305	MISSOURI
MONTANA	6,035,095	1,134,036	4,901,059	122,292	2,571,026	306,089	1,246,672	366,234	77,747	210,999	MONTANA
NEBRASKA	9,169,872	1,296,465	7,874,407	191,588	4,528,372	292,044	2,488,815	29,277	46,248	238,063	NEBRASKA
NEVADA	878,542	263,989	614,553	-	448,046	160,298	30	-	-	6,179	NEVADA
NEW HAMPSHIRE	1,951,031	-	1,951,031	-	1,889,732	-	-	-	61,299	-	NEW HAMPSHIRE
NEW JERSEY	28,081,435	742,827	27,338,608	13,018,033	1,693,139	8,322,975	1,941,397	-	1,907,053	456,011	NEW JERSEY
NEW MEXICO	674,921	149,656	525,265	22,560	285,101	46,861	161,283	-	-	9,460	NEW MEXICO
NEW YORK	32,604,185	2,701,882	29,902,303	1,696,514	12,976,420	3,170,950	3,958,749	-	5,538,664	2,661,006	NEW YORK
NORTH CAROLINA	36,927,352	735,736	36,191,616	10,764,179	11,556,264	2,270,979	3,358	-	118,395	11,479,441	NORTH CAROLINA
NORTH DAKOTA	5,943,658	1,291,662	4,651,996	95,492	3,566,615	271,311	622,474	54,204	-	42,000	NORTH DAKOTA
OHIO	78,608,237	17,343,042	61,265,195	20,143,755	26,530,180	1,930,665	2,263,368	3,566,288	582,257	6,248,692	OHIO
OKLAHOMA	19,090,716	1,332,171	18,758,545	1,918,843	6,896,717	1,184,034	2,879,943	1,745,907	536,685	1,596,416	OKLAHOMA
OREGON	14,811,136	1,734,483	13,076,663	3,788,549	4,909,418	788,277	1,424,620	213,833	1,078,271	873,685	OREGON
PENNSYLVANIA	82,434,398	11,567,075	70,867,323	25,853,134	18,902,744	14,057,529	-	2,380,002	2,883,452	6,790,462	PENNSYLVANIA
RHODE ISLAND	1,010,642	83,731	926,911	-	-	841,772	-	-	49,273	35,866	RHODE ISLAND
SOUTH CAROLINA	12,557,186	2,718,025	9,839,161	848,291	719,606	3,189,143	11,535	1,741,568	583,719	2,745,299	SOUTH CAROLINA
SOUTH DAKOTA	7,132,415	-	7,132,415	85,401	6,507,883	165,631	1,215,651	-	-	157,849	SOUTH DAKOTA
TENNESSEE	17,568,261	4,957,728	12,610,533	3,882,044	6,610,323	1,432,716	48,469	-	32,785	704,196	TENNESSEE
TEXAS	33,992,240	5,755,721	28,236,619	6,845,608	15,498,573	573,759	3,744,719	11,573	148,055	1,414,232	TEXAS
UTAH	1,543,994	215,722	1,328,272	79,306	1,155,927	14,161	31,000	-	565	48,313	UTAH
VERMONT	1,076,866	14,261	1,062,605	-	496,220	284,569	-	-	267,310	14,506	VERMONT
VIRGINIA	14,780,962	3,011,982	11,768,980	985,012	4,968,539	346,404	5,802	1,502,987	2,514,277	1,445,959	VIRGINIA
WASHINGTON	10,719,364	779,289	9,940,076	81,894	6,386,643	944,288	593,656	500,153	769,148	664,313	WASHINGTON
WEST VIRGINIA	17,396,018	3,654,815	14,241,203	4,075,851	9,886,779	241,210	-	-	-	37,363	WEST VIRGINIA
WISCONSIN	28,665,204	2,311,297	26,353,907	2,230,987	13,928,415	4,876,842	98	175,021	3,653,481	1,489,063	WISCONSIN
WYOMING	899,033	34,708	864,325	12,053	134,042	541,217	-	-	39,370	137,643	WYOMING
TOTALS	$933,701,905	$159,278,223	$775,423,682	$168,575,423	$357,263,356	$85,783,406	$37,861,018	$39,733,227	$29,964,569	$56,242,683	TOTALS

REMARK: DATA SECURED FROM COUNTY AND LOCAL RECORDS AND MAY BE COMPARED TO 1921 DATA.
DATA FOR INTERVENING YEARS CONTAIN ESTIMATES, AND DETAILS ARE NOT ACCURATE.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

LOCAL ROAD AND BRIDGE DISBURSEMENTS, 1926

F-5 (1926)
R.B.A.

BY LOCAL AUTHORITIES (COUNTY, TOWN AND DISTRICT)
ON LOCAL ROADS AND BRIDGES; AND FUNDS FOR STATE ROADS ALSO SHOWN

(COMPILED FROM REPORTS OF LOCAL AUTHORITIES)

STATES	TOTAL DISBURSEMENTS	CONSTRUCTION	MAINTENANCE	OVERHEAD	PAYMENTS ON BONDS: INTEREST	PAYMENTS ON BONDS: RETIREMENTS & SINKING FUNDS	MISCELLANEOUS PAYMENTS	COUNTY FUNDS TRANSFERRED TO STATE 1/	UNEXPENDED BALANCE END OF YEAR	STATES
ALABAMA	$ 8,716,426	$ 1,266,083	$ 4,896,621	$ 76,841	$ 896,920	$ 1,270,501	$ 219,460	$ 160,611	$ 796,178	ALABAMA
ARIZONA	1,794,034	410,599	849,048	68,882	224,409	170,947	79,149	7,250	116,746	ARIZONA
ARKANSAS	8,876,558	881,656	1,922,816	24,804	3,313,472	2,704,200	48,710	185,600	230,917	ARKANSAS
CALIFORNIA	28,689,864	8,482,624	12,485,976	683,064	2,668,762	2,356,208	2,113,230	47,235	12,861,934	CALIFORNIA
COLORADO	4,978,398	1,420,257	2,917,148	203,938	24,691	46,900	366,464	296,163	314,388	COLORADO
CONNECTICUT	3,055,725	709,940	2,146,377	-	121,666	73,000	4,842	-	81,956	CONNECTICUT
DELAWARE	1,607,696	403,673	438,434	26,704	480,760	180,000	78,126	1,061,231	42,655	DELAWARE
FLORIDA	46,337,672	27,376,383	6,333,771	1,706,783	6,867,865	2,300,776	1,763,104	2,760,046	32,662,558	FLORIDA
GEORGIA	11,010,850	3,239,619	6,234,763	349,285	1,081,332	678,405	527,646	2,567,923	2,299,724	GEORGIA
IDAHO	3,768,544	1,113,972	1,116,880	140,842	687,672	576,944	133,234	646,189	1,002,604	IDAHO
ILLINOIS	26,185,526	7,692,854	16,072,010	746,203	987,206	1,763,998	34,255	-	2,600,006	ILLINOIS
INDIANA	37,381,697	10,274,866	11,067,742	703,792	3,724,489	11,676,895	35,024	39,203	10,821,124	INDIANA
IOWA	19,248,463	7,274,739	9,263,106	492,659	-	1,090,197	1,127,762	-	3,936,613	IOWA
KANSAS	13,636,024	7,376,848	3,441,493	584,839	131,676	726,904	1,374,264	7,011,507	8,692,692	KANSAS
KENTUCKY	6,463,833	964,604	3,119,876	182,663	869,949	916,415	420,326	2,164,976	1,665,298	KENTUCKY
LOUISIANA	9,347,833	4,281,398	1,301,018	73,716	2,144,240	1,613,306	34,166	1,154,172	6,613,137	LOUISIANA
MAINE	2,643,762	352,569	2,012,937	194	50,894	62,435	154,733	-	D. -86,527	MAINE
MARYLAND	3,615,650	1,208,666	1,627,809	26,494	369,490	261,249	121,943	1,136,466	D. -61,769	MARYLAND
MASSACHUSETTS	14,350,000	7,700,000	6,650,000	-	-	-	-	-	-	MASSACHUSETTS
MICHIGAN	36,519,684	14,636,238	8,962,051	1,401,179	2,409,208	6,856,667	2,255,261	1,545,611	10,496,669	MICHIGAN
MINNESOTA	19,836,437	10,658,864	4,853,491	844,192	1,181,010	983,912	1,314,968	92,509	D. -810,634	MINNESOTA
MISSISSIPPI	17,693,945	3,711,901	8,240,472	117,842	3,365,214	2,038,834	219,682	5,037,749	13,693,095	MISSISSIPPI
MISSOURI	10,216,733	1,217,402	6,702,083	322,011	744,714	1,216,877	13,646	-	1,003,376	MISSOURI
MONTANA	4,805,871	1,163,636	2,052,633	124,636	683,990	733,667	147,310	96,834	1,133,390	MONTANA
NEBRASKA	8,048,940	4,996,168	2,394,932	187,415	191,914	97,695	181,926	227,132	893,800	NEBRASKA
NEVADA	655,484	126,300	324,313	33,327	73,940	86,600	11,004	1,647	221,411	NEVADA
NEW HAMPSHIRE	1,951,031	223,260	1,505,004	78,254	-	-	144,513	-	-	NEW HAMPSHIRE
NEW JERSEY	26,338,881	9,135,548	7,018,009	440,805	2,349,486	7,029,066	365,967	733,760	1,008,794	NEW JERSEY
NEW MEXICO	462,995	64,911	310,894	20,508	14,816	4,277	47,589	126,007	86,919	NEW MEXICO
NEW YORK	27,761,965	20,374,502	4,336,983	634,979	168,408	160,310	2,197,773	695,616	4,246,614	NEW YORK
NORTH CAROLINA	22,401,603	6,623,216	4,833,746	436,157	4,867,053	4,644,904	1,006,427	10,876,807	3,649,042	NORTH CAROLINA
NORTH DAKOTA	4,361,837	3,715,087	560,909	73,841	-	-	12,000	-	1,581,821	NORTH DAKOTA
OHIO	63,647,598	18,679,611	9,639,794	1,604,245	6,714,133	17,483,913	425,902	11,862,963	13,197,676	OHIO
OKLAHOMA	14,147,963	4,275,876	6,971,228	293,154	1,239,810	934,136	433,760	1,891,072	2,051,681	OKLAHOMA
OREGON	13,059,917	7,956,314	2,165,827	163,231	1,089,281	1,429,263	256,001	203,877	1,547,342	OREGON
PENNSYLVANIA	54,926,649	23,745,303	11,401,482	2,706,868	6,174,915	8,344,947	3,663,134	8,663,736	18,844,013	PENNSYLVANIA
RHODE ISLAND	1,011,986	361,816	491,003	-	48,141	94,600	16,527	-	D. -1,344	RHODE ISLAND
SOUTH CAROLINA	7,214,861	2,623,522	1,962,510	137,535	1,489,276	1,047,077	54,941	3,622,412	1,719,913	SOUTH CAROLINA
SOUTH DAKOTA	7,476,540	3,669,311	3,648,790	167,439	-	-	-	1,409,277	D.-1,752,402	SOUTH DAKOTA
TENNESSEE	9,316,626	2,228,800	3,342,008	185,075	2,198,137	973,452	389,164	2,412,284	6,839,351	TENNESSEE
TEXAS	24,665,637	4,679,700	8,783,919	307,965	5,525,500	4,700,752	667,711	1,034,383	8,292,320	TEXAS
UTAH	1,345,202	424,679	563,310	63,099	108,837	83,123	112,154	36,197	162,695	UTAH
VERMONT	992,382	381,022	607,979	-	-	-	3,391	69,933	14,551	VERMONT
VIRGINIA	10,216,613	2,872,867	3,916,203	-	1,265,226	2,008,357	153,961	454,226	4,110,123	VIRGINIA
WASHINGTON	9,995,778	4,026,948	3,961,705	292,177	798,034	833,169	83,745	8,469	715,097	WASHINGTON
WEST VIRGINIA	14,537,874	7,789,051	3,146,709	94,153	1,807,920	1,469,178	210,863	-	3,358,144	WEST VIRGINIA
WISCONSIN	23,687,560	12,918,501	7,061,816	1,001,439	610,304	648,453	1,547,047	2,541,239	2,436,406	WISCONSIN
WYOMING	897,786	241,039	679,441	27,266	40,500	-	9,539	-	1,248	WYOMING
TOTALS	$678,801,422 2/	$265,718,219	$213,236,069	$17,620,484	$68,685,149	$91,070,298	$24,471,203	$72,769,230	184,832,819 D.-2,701,566 $182,131,253	

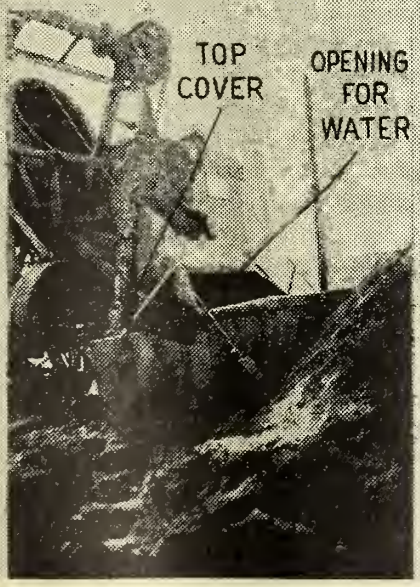
REMARK: DATA SECURED FROM COUNTY AND LOCAL RECORDS AND MAY BE COMPARED TO 1921 DATA.
DATA FOR INTERVENING YEARS CONTAIN ESTIMATES, AND DETAILS ARE NOT ACCURATE.

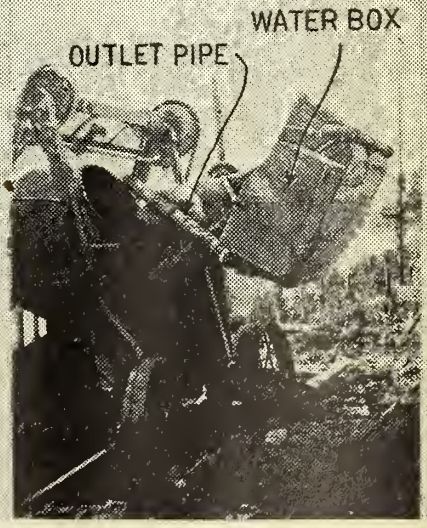
NOTE 1/: TRANSFERRED TO STATE FOR STATE ROADS AND BRIDGES, AND DO NOT APPLY TO DISBURSEMENTS ON LOCAL ROADS AND BRIDGES BY LOCAL AUTHORITIES.
2/: TOTAL OF NEXT SIX COLUMNS AND EXCLUDES COUNTY FUNDS TRANSFERRED TO STATE.

INGENIOUS WATER-SUPPLY DEVICE USED ON SMALL CONCRETE MIXER IN KANSAS

CONTRIBUTED BY THE DIVISION OF CONSTRUCTION,
AND COMPILED FROM A REPORT
SUBMITTED BY H. B. WRIGHT OF DISTRICT 5
(NOT FOR RELEASE)

AN INGENIOUS AND SIMPLE DEVICE FOR SUPPLYING A UNIFORM QUANTITY OF WATER TO THE DRUM OF A SMALL CONCRETE MIXER WAS PERFECTED BY THE FOREMAN IN CHARGE OF CULVERT CONSTRUCTION ON KANSAS FEDERAL-AID PROJECT NO. 260-A. THIS WATER-MEASURING EQUIPMENT, WHICH HAS BEEN PATENTED, CONSISTS ESSENTIALLY OF A STEEL BOX BOLTED TO THE SIDE OF THE HOPPER. AN OUTLET PIPE LEADING FROM THE WATER BOX, AS SHOWN IN THE ACCOMPANYING ILLUSTRATIONS, CONVEYS THE WATER INTO THE DRUM WHEN THE MIXER HOPPER HAS BEEN ELEVATED TO A SUFFICIENT HEIGHT. THE DIAMETER OF THE OUTLET PIPE IS MADE LARGE ENOUGH TO PERMIT THE EMPTYING OF THE BOX BY THE TIME THE LAST OF THE AGGREGATE HAS PASSED INTO THE DRUM. THE TOP OF THE BOX, TOWARDS THE MIXER, IS COVERED WITH A STEEL PLATE TO PREVENT THE OVERFLOW OF THE WATER WHEN THE HOPPER IS RAISED. THE DEVICE SEEMS TO BE MUCH SIMPLER THAN THE USUAL ARRANGEMENT FOR SMALL MIXERS WHEREBY THE WATER IS SUPPLIED DIRECTLY TO THE DRUM.





IRON MULES PROVE THEIR USEFULNESS ON GRAND CANYON NATIONAL PARK PROJECT

COMPILED FROM A REPORT SUBMITTED BY
WILLIAM L. EAGER OF THE DIVISION OF MANAGEMENT
(NOT FOR RELEASE)

"IRON MULES" - FORDSON TRACTORS EQUIPPED WITH STEEL DUMP BODIES, AS SHOWN IN FIGURE 1 - PROVED TO BE A USEFUL TYPE OF EQUIPMENT FOR MAKING SHORT HAULS FROM A GASOLINE SHOVEL ON THE CAPE ROYAL ROAD IN THE GRAND CANYON NATIONAL PARK, ARIZ. THE SLOW SPEED ATTAINABLE UNDER AVERAGE CONDITIONS IS SUCH AS TO PLACE THIS TYPE OF EQUIPMENT IN COMPETITION ONLY WITH HORSE-DRAWN DUMP WAGONS FOR SHORT HAULS ON GRADING WORK. EVEN IN THIS CASE, AS SHOWN BY THE GRAPH IN FIGURE 2, IT IS CHEAPER TO USE DUMP WAGONS. THERE ARE OTHER FACTORS, HOWEVER, THAT ARE NOT INDICATED BY THE COSTS WHICH SEEM TO FAVOR THE IRON MULES. FOR EXAMPLE WITH THIS TYPE OF HAULING EQUIPMENT, MATERIAL CAN BE DUMPED OVER THE END OF THE FILL WHERE WAGONS COULD NOT BE USED. PROVIDED THE DUMP BODIES ARE SUITABLY REINFORCED, LARGE ROCKS MAY BE HANDLED BY THE IRON MULES THAT COULD NOT BE ACCOMMODATED IN DUMP WAGONS. ALSO, BECAUSE NO TURNING IS REQUIRED, THE IRON MULES REQUIRE LESS SPACE THAN ANY OTHER TYPE OF HAULING EQUIPMENT, AND, THEREFORE, MAY BE USED IN CRAMPED QUARTERS WHERE THERE WOULD NOT BE SUFFICIENT ROOM FOR WAGONS. FOR LONG HAULS, HOWEVER, THE HORSE-DRAWN DUMP WAGON, THE MOTOR TRUCK, AND THE TRACTOR ATTACHED TO DUMP WAGONS, ALL TRANSPORT THE MATERIAL AT A COST CONSIDERABLY BELOW THAT POSSIBLE WITH IRON MULES.

A TIME STUDY WAS MADE ON THE GRADING OF THE CAPE ROYAL ROAD ON TWO IRON MULES HAULING MATERIAL FOR A DISTANCE OF 95 FEET FROM A KOEHRING 3/4-CUBIC-YARD GASOLINE SHOVEL. THE ACTUAL DISTANCE THE MATERIAL WAS HAULED WAS, IN REALITY, 125 FEET BECAUSE THE SHOVEL WAS SWINGING THROUGH AN ANGLE OF APPROXIMATELY 180 DEGREES. THE ENTIRE OUTFIT SEEMED TO BE WORKING AT NEARLY MAXIMUM EFFICIENCY, WITH LITTLE DELAY TO EITHER THE SHOVEL OR THE IRON MULES.

THE IRON MULES ARE DESIGNED TO TRAVEL WHEN LOADED IN WHAT IS NORMALLY THE REVERSE GEAR FOR A FORDSON TRACTOR, AND TO MAKE THE RETURN TRIP IN LOW OR POSSIBLY HIGH GEAR. THE

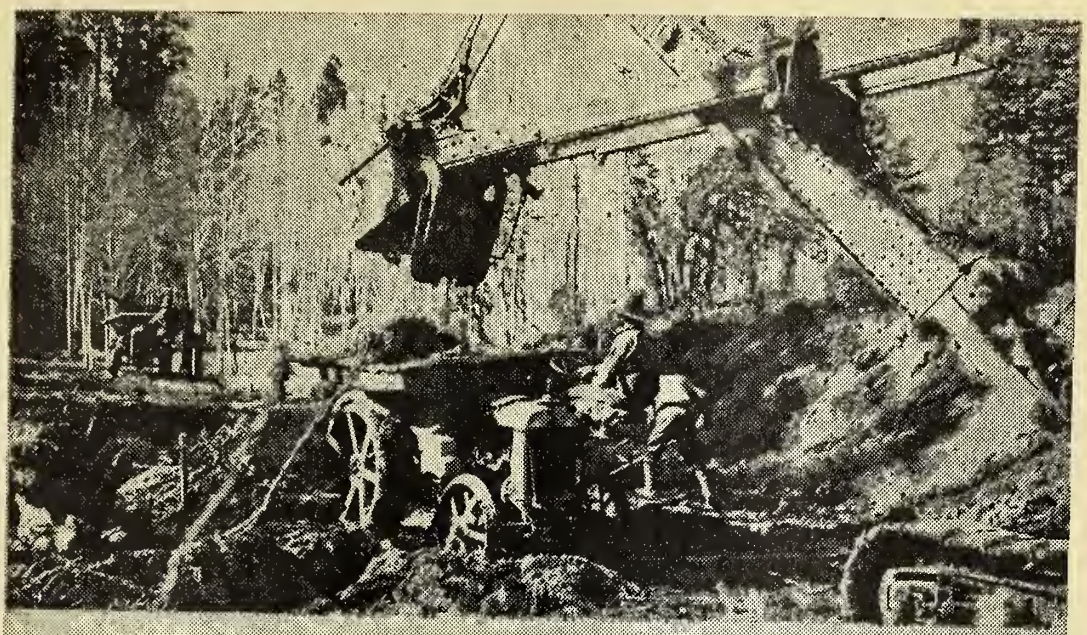


Figure 1. – (Top) The iron mules, because they are low and small, were loaded easily without being turned around at the gasoline shovel.

(Bottom) Preparing to dump the load.

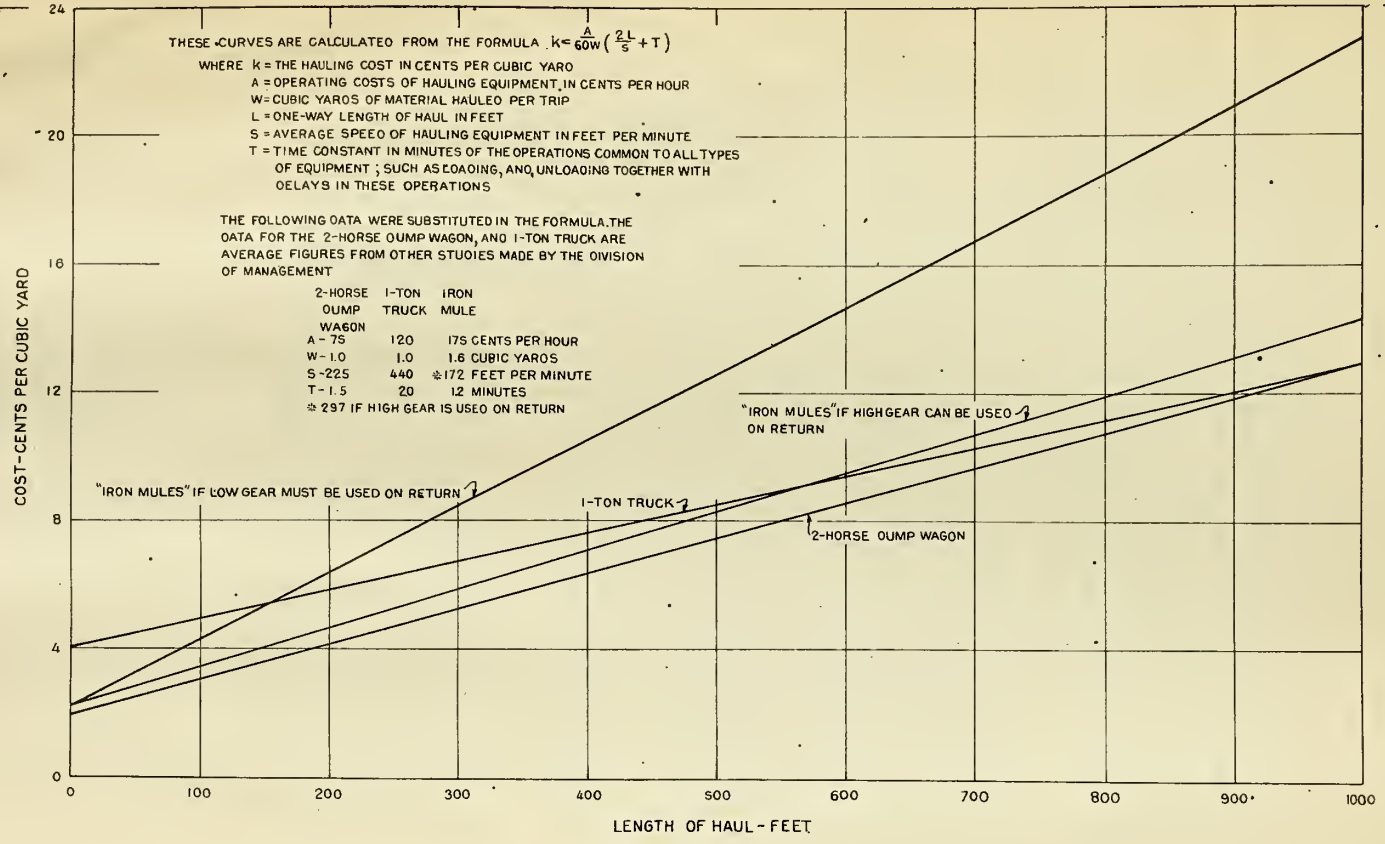


FIGURE 2- (TOP) COMPARISON OF HAULING COSTS OF IRON MULES WITH OTHER TYPES OF EQUIPMENT. (BOTTOM) DIAGRAMS OF METHOD OF OPERATION OF THE IRON MULES

DRIVER IS SEATED BESIDE THE MOTOR AND FACES THE LOAD, AN ARRANGEMENT WHICH HAS SEVERAL ADVANTAGES BECAUSE THE DRIVER IS ABLE TO SEE WHERE TO DUMP THE LOAD, AND THEN MAY CONTINUE AHEAD IF NECESSARY, USING THE DUMP BODY AS A BULLDOZER TO PUSH THE MATERIAL OVER THE EDGE OF THE FILL. ALSO, WITH THE POWER APPLIED TO THE FORWARD AXLE, THE STEERING OF THE UNIT IS MADE EASIER, ESPECIALLY ON THE HARD PULLS. ANOTHER ADVANTAGE IS THAT THE HIGH SPEED IS IN THE DIRECTION WHERE IT IS OF THE GREATEST VALUE - THAT IS ON THE UNLOADED RETURN TRIP. HOWEVER, DURING THE TIME THAT THE STUDY WAS MADE THE RETURN TRIP WAS MADE ALWAYS IN THE NORMAL LOW GEAR SO THAT THE OPPORTUNITY OF DETERMINING THE REDUCTION IN COSTS MADE POSSIBLE WITH THE HIGH GEAR, WAS LACKING.

THE IRON MULES WERE LOADED WITH 2 HEAPING DIPPERS FROM THE 3/4-CUBIC-YARD KOEHRING SHOVEL, MAKING AN AVERAGE TOTAL LOAD OF 1.6 CUBIC YARDS. THE AVERAGE SPEED OF THE LOADED IRON MULES (IN REVERSE GEAR) WAS 154 FEET PER MINUTE, AND THE AVERAGE RETURNING SPEED (IN LOW GEAR) 199 FEET PER MINUTE, MAKING AN AVERAGE SPEED THROUGHOUT THE ROUND TRIP OF 176 FEET PER MINUTE. ON LONG HAULS, WHERE THE ROAD IS IN FAIR CONDITION, IT IS BELIEVED THAT A RETURN SPEED OF 5 MILES PER HOUR, IN HIGH GEAR, MIGHT BE EXPECTED. THIS CORRESPONDS TO A SPEED OF 440 FEET PER MINUTE, AND UNDER THESE CONDITIONS, FOR THE GIVEN LENGTH OF HAUL, THE AVERAGE ROUND TRIP SPEED WOULD BE 297 FEET PER MINUTE.

AN ESTIMATE OF THE COST PER WORKING HOUR OF EACH IRON MULE FOLLOWS:

DRIVER AT $4.00 PER 8-HOUR DAY	$0.50
GASOLINE - 1.9 GALLONS AT $0.25	0.48
OIL AND GREASE - $1.00 PER DAY	0.13
DEPRECIATION - $1,150 IN 2 YEARS	0.30
REPAIRS - $2.00 PER DAY	0.25
INTEREST AT 6 PER CENT	0.09
TOTAL PER ONE WORKING HOUR	$1.75

An estimate of the cost of the entire outfit per 8-hour day follows:

Shovel	$30.00
Operator	10.00
Pitman	3.50
Dumpman - 2 @ $3.50	7.00
Iron mules - 2 @ $14.00	28.00
Overhead at 10 per cent	7.85
Total estimated cost per 8-hour day	$86.35 or $90
in round numbers.	

The shovel observations indicated an average of 98 dipper loads per hour or a total of 626 cubic yards of material moved per 8-hour day. The entire cost per cubic yard of the material (as measured in the dippers) is estimated at $\frac{\$90}{626} = \$0.14$ per cubic yard. The contract price of the unclassified material (in excavation) was $1.35 per cubic yard. At the time of the study the contractor seemed, therefore, to average a profit on the entire outfit of over $700 per day.

As indicated in Figure 1, the subgrade was rather soft, but in spite of this adverse condition, the iron mules lacked, apparently neither power nor tractive force.

MODERN EQUIPMENT FACILITATES CONSTRUCTION OF OIL-PROCESSED FEDERAL-AID PROJECT IN NEW MEXICO

CONTRIBUTED BY THE DIVISION OF CONSTRUCTION
AND COMPILED FROM A REPORT SUBMITTED BY
A. V. WILLIAMSON OF DISTRICT 3
(NOT FOR RELEASE)

MODERN EQUIPMENT, AS SHOWN IN FIGURES 1 AND 2, FACILITATED THE OIL PROCESSING OF THE 11.2 MILES OF GRAVEL SURFACING ON FEDERAL-AID PROJECT NO. 150, BETWEEN LOS LUNAS AND ISLETA, N. MEX. THE EQUIPMENT CONSISTED OF A 1,259-GALLON-CAPACITY GILMORE DISTRIBUTOR, 2 SPEARWELL ROAD MAINTAINERS, ONE DOUBLE-DISC HARROW PULLED BY A CLETRAC TRACTOR, AND ONE LIGHT GRADER FOR SMOOTHING AND FINISHING THE SURFACE. C. C. CASH, SUPERINTENDENT OF OIL-SURFACE CONSTRUCTION FOR THE STATE HIGHWAY DEPARTMENT WAS IN CHARGE OF THE WORK WHICH WAS ACCOMPLISHED APPARENTLY IN A VERY SATISFACTORY MANNER. THE OIL WAS FURNISHED AND SPREAD AT A CONTRACT PRICE OF 7 CENTS PER GALLON BY THE GILMORE OIL COMPANY AND THE PROCESSING OF THE SURFACE AND THE FINAL FINISHING OF THE SHOULDERS WAS ACCOMPLISHED BY THE STATE FORCES.

WHEN THE OILING OPERATIONS WERE BEGUN, ONLY ONE SPEARWELL MAINTAINER, AND ONE RUSSEL 10-FOOT BLADE GRADER PULLED BY A MONARCH TRACTOR, WERE BEING USED FOR THE PROCESSING. IT WAS FOUND THAT BETTER WORK COULD BE DONE WITH THE SPEARWELL MAINTAINER WHICH, BECAUSE OF ITS HIGHER SPEED, MIXED THE MATERIAL BETTER, AND IN LESS TIME. MR. CASH STATED THAT THE DEPARTMENT PLANNED TO OBTAIN ANOTHER SPEARWELL MAINTAINER, AND ONE MORE HARROWING UNIT. THIS ADDITIONAL EQUIPMENT WOULD MAKE IT POSSIBLE FOR THE OILING FORCE TO PROCESS ON THE SAME DAY PRACTICALLY THE ENTIRE LENGTH OF SURFACE OVER WHICH OIL COULD BE SPREAD CONVENIENTLY BY THE CONTRACTOR.

ACCORDING TO MR. CASH, FROM 5 TO 6 HOURS WERE REQUIRED TO HEAT PROPERLY A RAILROAD TANK CAR OF OIL, ALTHOUGH THE FIRST 2 CARS DELIVERED HAD TO BE HEATED FOR 12 HOURS BECAUSE THE STEAM COILS WERE BROKEN. THE LOADING OF THE DISTRIBUTOR TRUCK FROM THE TANK CAR AVERAGED A TOTAL TIME OF FROM 4 TO 5 MINUTES.

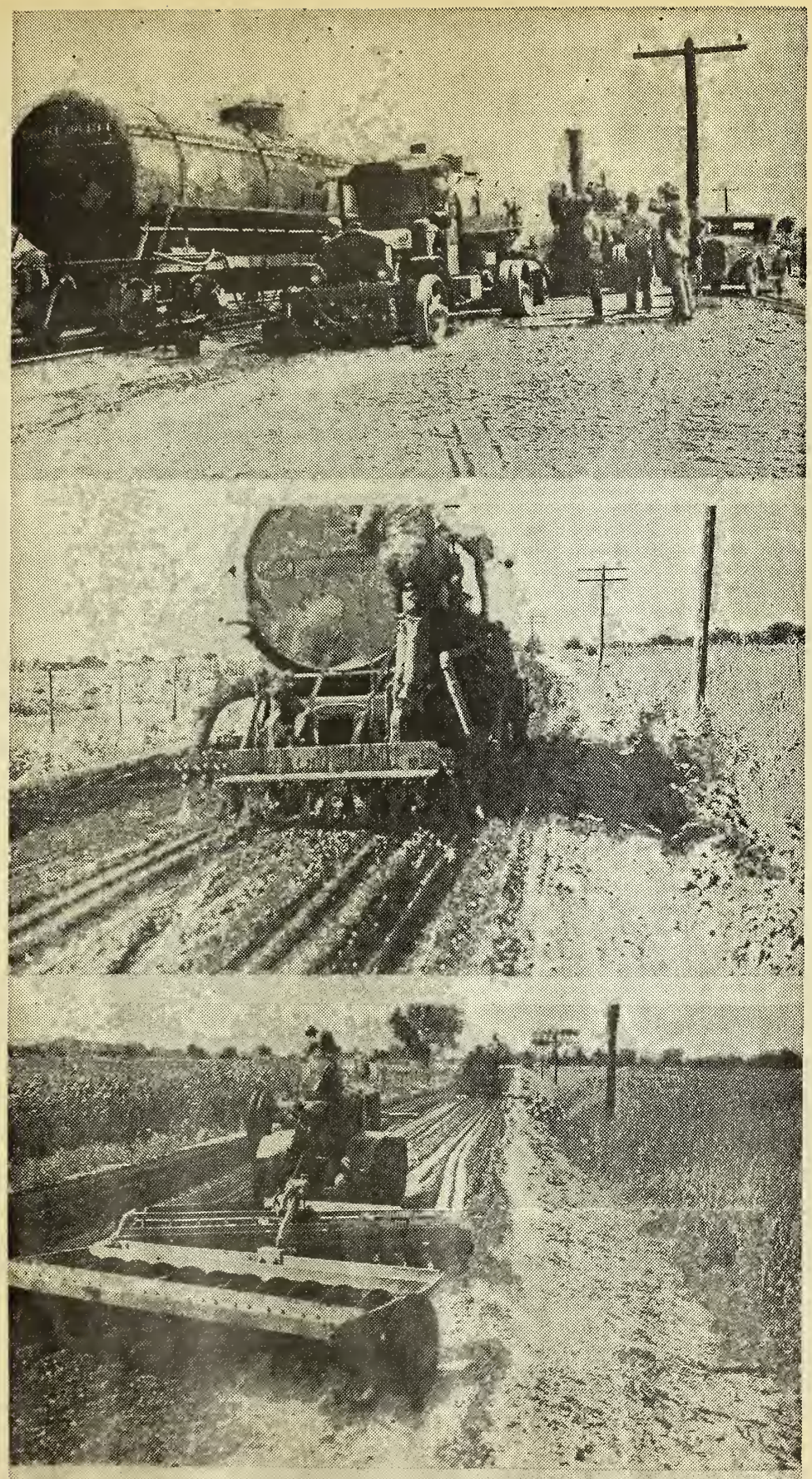


Figure 1. - (Top) Unloading the oil from the railroad tank car into the motor distributor truck.
(Middle) Spraying the oil upon the scarified surface.
(Bottom) Disc-harrowing the oil-treated gravel.

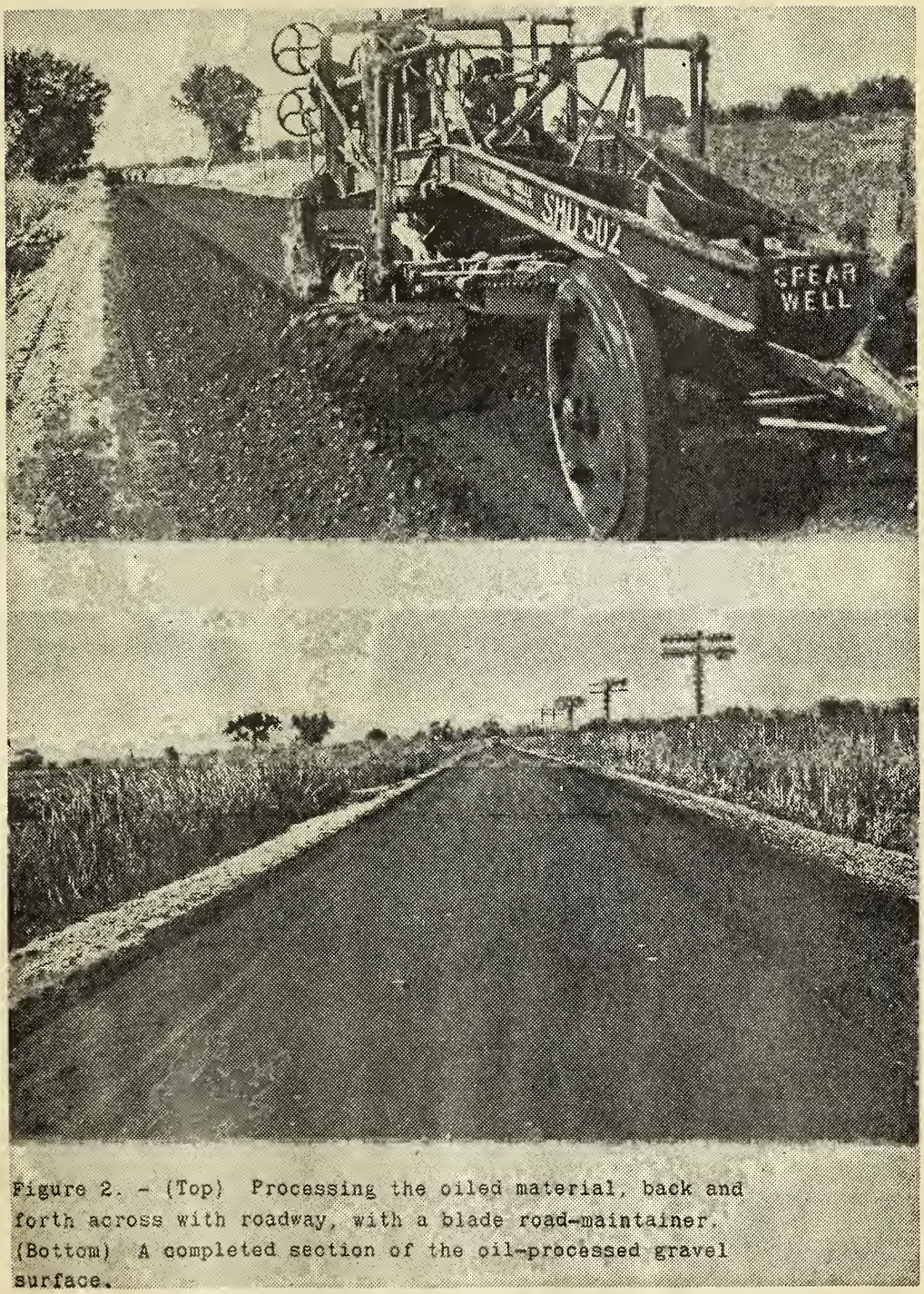


Figure 2. - (Top) Processing the oiled material, back and forth across with roadway, with a blade road-maintainer. (Bottom) A completed section of the oil-processed gravel surface.

THE ORIGINAL GRAVEL SURFACING ON THIS PROJECT CONTAINED A VERY HIGH PERCENTAGE OF FINE MATERIAL BUT, BECAUSE OF THE EXTREMELY DRY CLIMATE AND THE HIGH WINDS, MUCH OF THIS MATERIAL HAD BEEN LOST; SO THAT THE TESTS MADE BY THE STATE INSPECTOR, DURING THE PROCESSING, SHOWED 6 TO 12 PER CENT OF THE SURFACING PASSING A 200-MESH SIEVE. A MINIMUM OF 6 INCHES OF GRAVEL WAS ORIGINALLY PLACED ON THE ENTIRE PROJECT, BUT DURING THE PROCESSING, THE SURFACING AT A FEW PLACES WAS SCARIFIED CLEAR THROUGH TO THE SUBGRADE - THE GRAVEL AT THESE LOCATIONS BEING APPROXIMATELY 4 INCHES THICK, LOOSE MEASUREMENT.

THE WORKING FORCE AT THE TIME OF THE INSPECTION OF THE PROJECT CONSISTED OF 12 MEN. THE USUAL ROUTINE OF OIL-PROCESSING WORK WAS FOLLOWED. THE ORIGINAL GRAVEL SURFACING WAS SCARIFIED TO THE DEPTH ESTIMATED NECESSARY TO OBTAIN THE REQUIRED THICKNESS OF THE SCARIFIED GRAVEL AT THE RATE OF APPROXIMATELY ONE-HALF GALLON PER SQUARE YARD. THE DISTRIBUTION WAS FOLLOWED IMMEDIATELY BY THE DISC-HARROWING, AND THIS OPERATION WAS CONTINUED UNTIL THE SECOND APPLICATION OF THE OIL. THIS SECOND COATING OF OIL WAS MIXED WITH THE HARROW, AND A THIRD APPLICATION WAS FOLLOWED BY A REPETITION OF THE SAME PROCESS. THE FINAL PROCESSING WITH THE BLADE GRADERS WAS CONTINUED UNTIL THE DESIRED COLOR OF THE SURFACING WAS OBTAINED, WHEN A STAIN TEST WAS MADE ON A SELECTED SAMPLE OF THE PROCESSED GRAVEL TO DETERMINE WHETHER THE PROPER AMOUNT OF OIL HAD BEEN ADDED.

AT THE BEGINNING OF THE WORK, THROUGH THE TOWN OF LOS LUNAS, 1-3/8 GALLONS OF OIL WERE USED PER SQUARE YARD OF SURFACING AND A 4-INCH DEPTH OF TREATED ROADWAY WAS OBTAINED. THIS AMOUNT OF OIL WAS REDUCED LATER ON TO PROVIDE ONLY FOR A 3-INCH COMPACTED THICKNESS OF SURFACE. THIS TREATMENT REQUIRED APPROXIMATELY 1.3 GALLONS PER SQUARE YARD. IN GENERAL, AT THE TIME OF THE INSPECTION, THAT PORTION OF THE PROJECT ALREADY PROCESSED SEEMED TO HAVE AN EXCESS OF OIL, ALTHOUGH THE STATE'S SUPERINTENDENT OF CONSTRUCTION WAS OF THE OPINION THAT THE MIX WAS JUST ABOUT RIGHT, WITH THE EXCEPTION OF A FEW SHORT STRETCHES. THE STAIN TESTS, HOWEVER, INDICATED A SLIGHT EXCESS OF OIL. THE OIL FOR THE PROJECT WAS KNOWN AS GILMORE 60-70, MEDIUM GRADE.

It was observed that the narrow-tired vehicles of the local Mexican population were cutting up the edges of the uncompacted surface. The superintendent of construction signified his intention of halting this ravelling by compacting the edges of the surfacing with a light roller.

At the time the project was inspected it was estimated that the cost of the work would average from 12 to 13 cents per square yard.