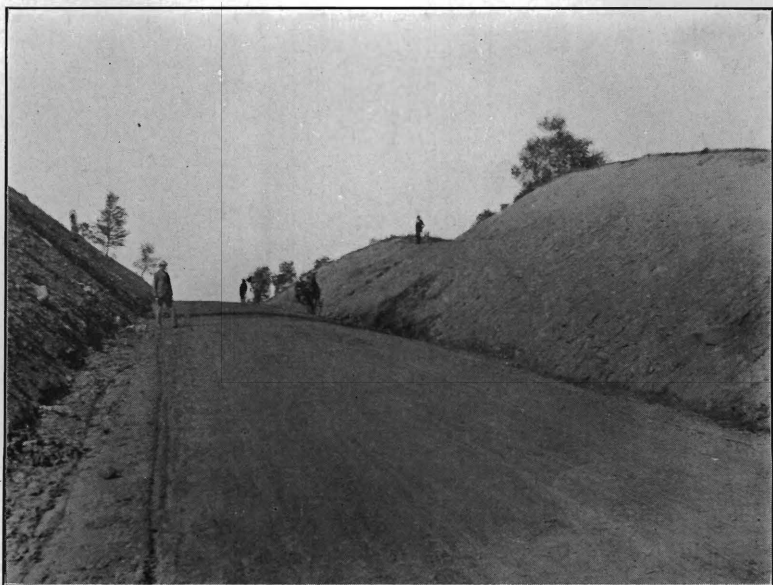




Centre Street.
Franklin township, Essex county. Before Grading. Big Cut.



Centre Street.
Essex county. After improvement. Telford, 8 inches deep. Showing 24-foot cut.

SEVENTH ANNUAL REPORT

OF THE

Commissioner of Public Roads

FOR THE YEAR ENDING OCTOBER 31ST,

Compliments of

HENRY I. BUDD,

State Commissioner of Public Roads.

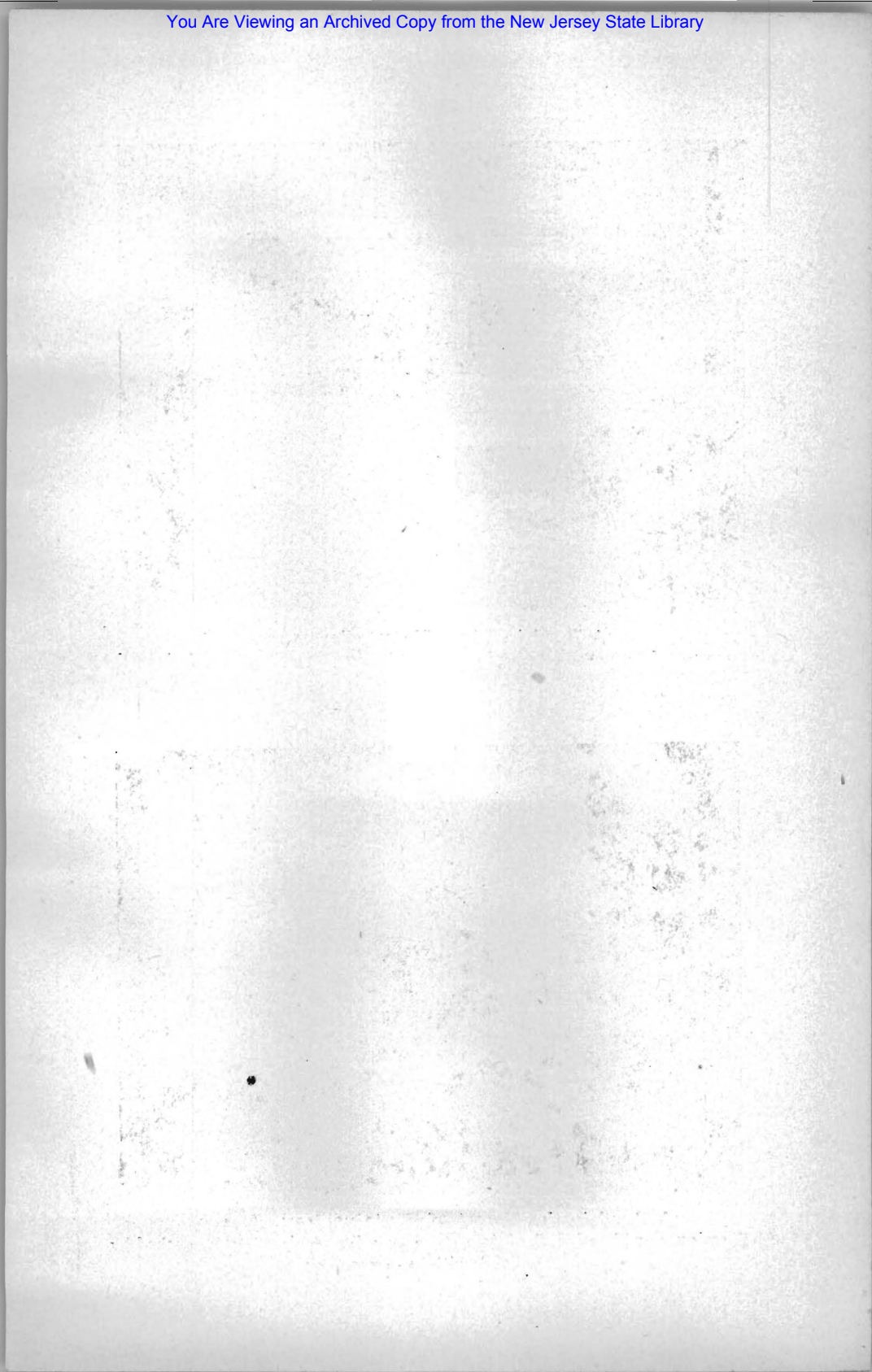
Please acknowledge receipt.

OFFICE OF COMMISSIONER OF PUBLIC ROADS,
TRENTON, NEW JERSEY., November 30th, 1900.

To the Governor and Legislature of New Jersey:

As required by the State Aid Road Law, I have the honor to submit the Seventh Annual Report of the Commissioner of Public Roads for the fiscal year ending October 31st, 1900, with such comments, quotations and suggestions as existing circumstances seem to require.

HENRY I. BUDD,
Commissioner of Public Roads.

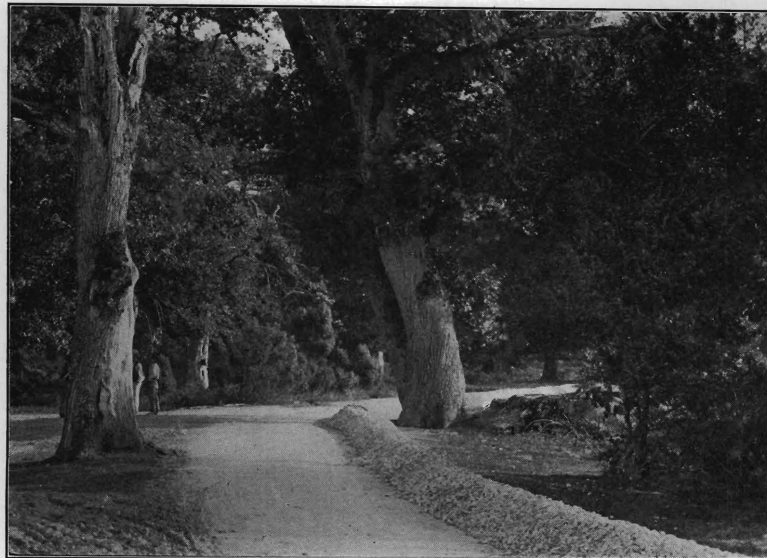




A Road in Black Forest, Germany.

Constructed for the transport of wood. This is a part of forest regulations of Germany. A German Forester's most important duty is stone road construction.

[Photo loaned by Dr. J. Gifford,]



A Road in the Forest of Fontainebleau, France.

Showing long pile of crushed lime stone rock for repairs. Rock cracked by hand, with hammers.

REPORT.

In compliance with the act of June 15th, 1895, we make a statement of cost of roads that will claim this year's appropriation, as indicated by the figures below:

COST OF ROADS.

BURLINGTON COUNTY.

Wrightstown and Bordentown road.....		4.10 miles.
Cost	\$23,977 21	
State's share	7,992 40	
Moorestown and Evesboro road.....		2.69 miles.
Cost	\$15,500 00	
State's share	5,166 67	
Fellowship road		2.14 miles.
Cost	\$11,920 00	
State's share	3,973 33	
Total number of miles.....		8.93
Total paid the County.....		\$17,132 40

CAMDEN COUNTY.

Haddonfield and Mt. Ephraim road.....		1 mile.
Cost	\$7,675 45	
State's share	2,558 48	
Total number of miles.....		1
Total paid the County.....		\$2,558 48

ESSEX COUNTY.

East Passaic avenue and Centre street.....		1.40 miles.
Cost	\$14,960 67	
State's share	4,986 89	
Elizabeth avenue		1.30 miles.
Cost	\$14,266 76	
State's share	4,755 59	

SEVENTH ANNUAL REPORT.

Roseland avenue		5.63 miles.
Cost	\$27,128 38	
State's share	9,042 79	
Fairfield road extension.....		1.27 miles.
Cost	\$5,613 84	
State's share	1,871 28	
Total number of miles.....		9.60
Total paid the County.....		\$20,656 55

GLOUCESTER COUNTY.

Woodbury and Knight's Run road.....		3.67 miles.
Cost	\$25,038 38	
State's share	8,346 13	
Cross Keys and Hurffville road.....		5.41 miles.
Cost	\$5,399 21	
State's share	1,799 74	
Total number of miles.....		9.08
Total paid the County.....		\$10,145 87

HUDSON COUNTY.

Passaic avenue, Town of Kearny.....		2.44 miles.
Cost	\$26,833 80	
State's share	8,944 60	
Total number of miles.....		2.44
Total paid the County.....		\$8,944 60

MERCER COUNTY.

Manalapan road		2.09 miles.
Cost	\$15,824 12	
State's share	5,274 71	
Trenton and Crosswicks road.....		3.83 miles.
Cost	\$26,104 40	
State's share	8,701 47	
Old York road.....		3.24 miles.
Cost	\$17,416 06	
State's share	5,805 35	
Total number of miles.....		9.16
Total paid the County.....		\$19,781 53

MIDDLESEX COUNTY.

Old Bridge road.....		4.13 miles.
Cost	\$24,577 19	
State's share	8,192 40	

.COMMISSIONER OF PUBLIC ROADS.

7

Cranbury turnpike		2.33 miles.
Cost	\$13,970 11	
State's share	4,656 70	
Cranbury turnpike, Second section.....		2.55 miles.
Cost	\$10,452 70	
State's share	3,484 23	
Total number of miles.....		9.01
Total paid the County.....		\$16,333 33

MONMOUTH COUNTY.

First avenue and Valley Drive road.....		2.85 miles.
Cost	\$16,427 71	
State's share	5,475 90	
Sweetman's Lane and Tennent Station road.....		2.64 miles.
Cost	\$9,979 36	
State's share	3,326 45	
Brighton avenue, Long Branch.....		1.15 miles.
Cost	\$12,569 73	
State's share	4,189 91	
Westwood and Cedar avenue.....		1.64 miles.
Cost	\$12,425 60	
State's share	4,141 87	
Total number of miles.....		8.28
Total paid the County.....		\$17,134 13

MORRIS COUNTY.

Budd's Lake road.....		3.32 miles.
Cost	\$14,471 18	
State's share	4,823 73	
Succasunna road .....		.81 mile.
Cost	\$4,345 71	
State's share	1,448 57	
Mendham and Somerset County Line road.....		2.40 miles.
Cost	\$11,223 76	
State's share	3,741 25	
Total number of miles.....		6.53
Total paid the County.....		\$10,013 55

PASSAIC COUNTY.

Brook avenue		1.34 miles.
Cost	\$7,175 02	
State's share	2,391 67	

SEVENTH ANNUAL REPORT.

Paterson Turnpike and Bergen County Line road.....		1.88 miles.
Cost	\$10,869 65	
State's share	3,623 22	
Union avenue		2 miles.
Cost	\$6,511 32	
State's share	2,170 44	
Tilt street and Grand Summit avenue.....		.38 mile.
Cost	\$1,165 79	
State's share	388 60	
Lakeside avenue		1.13 miles.
Cost	\$4,492 59	
State's share	1,497 53	
Total number of miles.....		6.73
Total paid the County.....		\$10,071 46

SALEM COUNTY.

Mullica Hill and Woodstown road.....		2.45 miles.
Cost	\$4,515 49	
State's share	1,505 16	
Total number of miles.....		2.45
Total paid the County.....		\$1,505 16

SOMERSET COUNTY.

Amwell road		6.65 miles.
Cost	\$32,688 24	
State's share	10,896 08	
Total number of miles.....		6.65
Total paid the County.....		\$10,896 08

UNION COUNTY.

Springfield avenue		3 miles.
Cost	\$11,393 74	
State's share	3,797 92	
Mountain avenue .....		.432 miles.
Cost	\$1,564 30	
State's share	521 43	
Total number of miles.....		3.432
Total paid the County.....		\$4,319 35

COMMISSIONER OF PUBLIC ROADS.

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Total number of miles.....	83.29
Total cost to the State.....	\$149,492 49
Amount paid to Commissioners to appraise the Camden and Marlton Turnpike and the Westfield and Camden Turnpike.....	507 51
Total	\$150,000 00
Appropriation	150,000 00

The following roads have been and are nearly completed, but will have to wait for State aid until 1901:

BURLINGTON COUNTY

	Miles.	Cost.
Hutton road	1	\$5,300 00
Wading River and Batsto road.....	9.79	9,790 00
High street or Mt. Holly road.....	.50	4,150 00
Stokes road	2.47	1,133 25
Total	13.76	\$20,373 25

ESSEX COUNTY.

Parsonage Hill road	2.82	\$26,469 30
Eagle Rock road	4.54	32,105 51
East Passaic avenue and Kingsland.....	2	15,906 04
Total	9.36	\$74,480 85

GLOUCESTER COUNTY.

Bridgeport road	6.02	\$23,700 00
Glassboro and Clayton road.....	4.88	10,000 00
Mullica Hill road	6.54	8,346 12
Total	17.44	\$42,046 12

MERCER COUNTY.

Edinburgh, Windsor and Hightstown.....	7.01	\$54,041 78
Hutchinson's Mill road.....	1.18	6,640 00
Old York extension.....	.36	3,241 34
Total	8.55	\$63,923 12

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MIDDLESEX COUNTY.

	Miles.	Cost.
Cartaret road60	\$1,000 00
Manalapan road	2.56	17,132 16
Cranbury Turnpike, portion of second section.....	4.12	27,902 50
Total	7.28	\$46,034 66

MONMOUTH COUNTY.

Bergen's Mills road.....	1.94	\$10,997 50
Lower Squankum road, second section.....	3.22	4,887 94
Total	5.16	\$15,885 44

PASSAIC COUNTY.

Echo Lake and West Milford road.....	2.66	\$16,000 00
Cannon Ball road.....	.78	2,443 06
Total	3.44	\$18,443 06

Total number of miles in process of construction. 64.99

Total cost \$281,186 50

Specifications for the following roads have been and are being prepared, some of which are under and are being placed under contract for construction, and will claim the State appropriation for the fiscal year, beginning November 1st, 1900, and ending October 31st, 1901:

ATLANTIC COUNTY.

	Miles.	Est. Cost.
Egg Harbor City and Green Bank road—gravel....	7.02	\$10,479 00
May's Landing and Pleasantville road—gravel.....	12.00	16,092 60
Total	19.02	\$26,571 60

BURLINGTON COUNTY

Mt. Holly and Jacksonville road.....	3.58	\$24,000 00
Mt. Holly and Smithville road.....	3.00	15,000 00
Medford and Tabernacle road.....	4.00	20,000 00
Total	10.58	\$59,000 00

COMMISSIONER OF PUBLIC ROADS.

II

CAMDEN COUNTY.

	Miles.	Est. Cost.
River road—stone	3.60	\$21,600 00
Ashland road—stone	2.13	14,900 00
Total	5.73	\$36,500 00

CAPE MAY COUNTY.

Asbury avenue, Ocean City—gravel.....	1.80	\$3,600 00
Cape May City to Cape May Court House.....	12.18	24,360 00
Total	13.98	\$27,960 00

ESSEX COUNTY.

West Passaic avenue—stone.....	1.00	\$7,000 00
Ridge road—stone	1.75	14,000 00
Sandford street—stone	1.00	8,000 00
Total	3.75	\$29,000 00

GLOUCESTER COUNTY.

Delaware street—stone	1.68	\$10,000 00
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HUNTERDON COUNTY.

Middle Valley to Morris County line—stone.....	2.50	\$10,000 00
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MERCER COUNTY.

Allentown Turnpike—stone	6.17	\$30,000 00
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MIDDLESEX COUNTY.

Metuchen to Stelton—stone.....	3.00	\$15,000 00
Hightstown and Cranbury—stone.....	1.33	6,000 00
South Plainfield and Plainfield—stone.....	1.60	8,000 00
Total	5.93	\$29,000 00

SEVENTH ANNUAL REPORT.

MONMOUTH COUNTY.

	Miles.	Est. Cost.
Red Bank and Oceanic road—stone.....	3.19	\$23,956 00
Holmdel and Marlboro road—stone.....	3.52	28,168 00
Sweetman's Lane and Black's Mills road—gravel....	2.95	4,500 00
Corlies road—gravel.....	4.47	9,000 00
Keyport and Keansburg road—stone.....	3.32	21,532 00
Total	17.45	\$89,156 00

MORRIS COUNTY.

Whippany and Parsippany road—stone.....	3.79	\$20,044 00
Millington and Passaic River road—stone.....	4.00	20,000 00
Morristown and Green Village road—stone.....	3.20	13,600 00
Morristown and Mt. Freedom road—stone.....	5.00	26,500 00
Total	15.99	\$80,144 00

OCEAN COUNTY.

Lakewood and Point Pleasant road—gravel.....	10.00	\$18,000 00
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PASSAIC COUNTY.

Nautchpunck road—stone	3.39	\$13,600 00
West Twenty-fifth street—stone.....	.227	1,380 00
Squaw Brook and Bergen County line—stone.....	1.46	8,800 00
Lackawanna avenue—stone	2.00	10,000 00
Total	7.077	\$33,780 00

SOMERSET COUNTY.

Somerville and Far Hills road—stone.....	8.00	\$29,000 00
Liberty School-house to Conover's Corner—stone...	3.50	16,625 00
Total	11.50	\$45,625 00

SUSSEX COUNTY.

Lakeside Boulevard—stone90	\$5,793 00
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COMMISSIONER OF PUBLIC ROADS.

13

WARREN COUNTY.

	Miles.	Est. Cost.
Hackettstown and Allamuchy road—stone.....	4.00	\$16,000 00
Total number of miles.....		136.257
Total estimated cost.....		\$546,529 60

During the years 1893 and 1894 there was built in

Middlesex county	16.09 miles.
Mercer county	12.78 "
Camden county	14.50 "
Burlington county	31.47 "
<hr/>	
Total number of miles built in 1893 and 1894.....	74.84

During the year 1895 there was built in

Burlington county	9.75 miles.
Camden county	8.25 "
Essex county	6.50 "
Gloucester county	7.75 "
Middlesex county	7.62 "
Mercer county	6.40 "
<hr/>	
Total number of miles built in 1895.....	46.27

During the year 1896 there was built in

Atlantic county	12.00 miles.
Burlington county	11.01 "
Essex county	6. "
Gloucester county	6. "
Mercer county	10.95 "
Middlesex county	9. "
Monmouth county	3.75 "
Salem county	2.67 "
<hr/>	
Total number of miles built in 1896.....	61.38

During the year 1897 there was built in

Atlantic county	10.50 miles.
Burlington county	10. "
Camden county	4.12 "

SEVENTH ANNUAL REPORT.

Essex county	5.00 miles.
Gloucester county	5.50 "
Mercer county	4.75 "
Middlesex county	4.75 "
Morris county	6.12 "
Monmouth county	5. "
Passaic county	4.75 "
Somerset county	6.20 "
Total.....	66.69

During the year 1898 there was built in

Atlantic county	6.80 miles.
Burlington county	14.91 "
Camden county	12.80 "
Essex county	9.60 "
Gloucester county	7.60 "
Mercer county	2.70 "
Middlesex county	6.17 "
Monmouth county	5.11 "
Morris county	6.10 "
Passaic county	5.88 "
Somerset county	7.25 "
Total.....	84.92

During the year 1899 there was built in

Atlantic county	3.82 miles.
Burlington county	18.50 "
Camden county	2.20 "
Essex county	12.02 "
Gloucester county	12.80 "
Mercer county	10.92 "
Middlesex county	13.87 "
Monmouth county	15.06 "
Morris county	8.00 "
Passaic county	8.67 "
Salem county	2.17 "
Somerset county	6.60 "
Warren county	0.09 "
Total	114.72

COMMISSIONER OF PUBLIC ROADS.

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During the year 1900 there was built in

Burlington county	8.93 miles.
Camden county	1.00 mile.
Essex county	9.60 miles.
Gloucester county	9.08 "
Hudson county	2.44 "
Mercer county	9.16 "
Middlesex county	9.01 "
Monmouth county	8.28 "
Morris county	6.53 "
Passaic county	6.73 "
Salem county	2.45 "
Somerset county	6.65 "
Union county	3.43 "
<hr/>	
Total	83.29 "

Names and lengths of the roads built in 1900

BURLINGTON COUNTY.

	Miles.	
Wrightstown and Bordentown road.....	4.10	
Moorestown and Evesboro road.....	2.69	
Fellowship road	2.14	
	<hr/>	8.93

CAMDEN COUNTY.

Haddonfield and Mt. Ephraim road.....	1.00	1.00
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ESSEX COUNTY.

East Passaic avenue and Centre street.....	1.40	
Elizabeth avenue	1.30	
Roseland avenue	5.63	
Fairfield road extension	1.27	
	<hr/>	9.60

GLOUCESTER COUNTY.

Woodbury and Knight's Run road.....	3.67	
Cross Keys and Hurffville.....	5.41	
	<hr/>	9.08

HUDSON COUNTY.

Passaic avenue, Town of Kearny.....	2.44	2.44
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MERCER COUNTY.

	Miles.	
Manalapan road	2.09	
Trenton and Crosswicks road.....	3.83	
Old York road.....	3.24	
	<hr/>	9.16

MIDDLESEX COUNTY.

Old Bridge road	4.13	
Cranbury Turnpike	2.33	
Cranbury Turnpike, second section.....	2.55	
	<hr/>	9.01

MONMOUTH COUNTY.

First avenue and Valley Drive road.....	2.85	
Sweetman's Lane and Tennent Station road.....	2.64	
Brighton avenue, Long Branch.....	1.15	
Westwood and Cedar avenues.....	1.64	
	<hr/>	8.28

MORRIS COUNTY.

Budd's Lake road	3.32	
Succassanna road .....	.81	
Mendham and Somerset County line road.....	2.40	
	<hr/>	6.53

PASSAIC COUNTY.

Brook avenue	1.34	
Paterson Turnpike and Bergen County line road.....	1.88	
Union avenue	2.00	
Tilt street and Grand Summit avenue.....	.38	
Lakeside avenue	1.13	
	<hr/>	6.73

SALEM COUNTY.

Mullica Hill and Woodstown.....	2.45	2.45
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SOMERSET COUNTY.

Amwell road	6.65	6.65
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UNION COUNTY.

Springfield avenue	3.00	
Mountain avenue432	
	<hr/>	3.432

Total number of miles..... 83.29

COMMISSIONER OF PUBLIC ROADS.

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During the year 1900 there was built in

		No. of miles paid for.	No. of miles not paid for.	Total No. of miles.
1	Burlington county	8.93	13.76	19.79
2	Camden county	1.00	.....	1.00
3	Essex county	9.60	9.36	18.96
4	Gloucester county	9.08	17.44	26.52
5	Hudson county	2.44	.....	2.44
6	Mercer county	9.16	8.55	17.71
7	Middlesex county	9.01	7.28	16.29
8	Monmouth county	8.28	5.16	13.44
9	Morris county	6.53	.....	6.53
10	Passaic county	6.73	3.44	10.17
11	Salem county	2.45	.....	2.45
12	Somerset county	6.65	.....	6.65
13	Union county	3.43	.....	3.43
		83.29	64.99	148.28

The total amount expended by the State and the number of miles built in each county since the passage of the State Aid Law, are as follows:

	County.	Miles.	Amount.
1	Atlantic	33.12	\$20,881 71
2	Burlington	104.57	173,585 60
3	Camden	42.87	80,714 86
4	Essex	48.72	93,420 70
5	Gloucester	48.73	60,593 05
6	Hudson	2.44	8,944 60
7	Mercer	57.66	141,386 79
8	Middlesex	66.51	114,197 45
9	Monmouth	37.20	48,373 62
10	Morris	26.75	39,039 05
11	Passaic	26.03	35,994 19
12	Salem	7.29	4,750 74
13	Somerset	26.70	38,930 17
14	Union	3.43	4,319 35
15	Warren .....	.09	186 67
		532 11	\$865,318 55

SEVENTH ANNUAL REPORT.

AMOUNT AVAILABLE FOR ROAD BUILDING IN EACH COUNTY.

Under the State Aid Law, the estimated cost of all improvements made under this act, together with the estimated cost of repairs of roads already constructed in any county in any one year, shall not exceed one-fourth of one per centum of the ratables of such county for the last preceding year.

The following table will show at a glance the limitations of expenditures in each county, also the amount that can be expended, provided the State appropriation is liberal enough to meet it. For example: Atlantic county, with ratables amounting to \$23,442,811, could expend per year, if State appropriation were sufficient, \$58,607.03; a rate, if applied to all the counties, even with the cost of repairs to roads already built deducted, would, in a few years, cover all our leading roads with stone and gravel:

County.	Abstract of Ratables for 1900.	One-fourth of one per cent.
Atlantic	\$23,442,811 00	\$58,607 03
Bergen	42,150,268 00	105,375 67
Burlington	22,416,290 00	56,040 73
Camden	38,426,305 00	96,065 76
Cape May	7,025,424 00	17,563 56
Cumberland	17,099,395 00	42,748 49
Essex	210,799,000 00	526,997 50
Gloucester	14,437,170 00	36,092 93
Hudson	169,127,890 95	422,819 73
Hunterdon	17,795,200 00	44,488 00
Mercer	45,732,805 00	114,332 01
Middlesex	28,306,679 00	70,766 70
Monmouth	48,761,719 00	121,904 05
Morris	27,791,202 00	69,478 01
Ocean	8,482,443 00	21,206 11
Passaic	65,854,164 00	164,635 41
Salem	13,965,834 00	34,914 59
Somerset	18,718,061 00	46,795 15
Sussex	11,589,721 00	28,974 30
Union	41,249,700 00	103,124 25
Warren	18,065,205 00	45,163 01

COMMISSIONER OF PUBLIC ROADS.

19

The following roads have been and are being petitioned for, to be improved under the State Aid Act:

ATLANTIC COUNTY.

	Miles.	Est. Cost.
Mays Landing and Pleasantville—gravel.....	12.00	\$12,000 00
Mays Landing and Tuckahoe—gravel.....	11.00	11,000 00
Egg Harbor and Green Bank—gravel.....	7.20	10,479 00
Hammonton and Atsion—gravel.....	8.00	12,000 00
	<hr/>	<hr/>
	38.20	\$45,479 00

BERGEN COUNTY.

Cherry Run—stone	1.75	\$9,000 00
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BURLINGTON COUNTY.

Masonville and Coates' Corner—stone.....	3.50	\$17,000 00
Cross Roads and Green Tree—stone.....	2.50	12,000 00
Green Tree pike—stone.....	2.00	10,000 00
Bedford and Tabernacle—stone.....	8.00	40,000 00
Indian Mills, Atsion and Batsto—gravel.....	9.50	19,000 00
Pemberton and Wrightstown—stone.....	6.00	30,000 00
Columbus and Burlington—stone.....	7.00	35,000 00
Burlington and Jacksonville—stone.....	6.00	30,000 00
Burlington and Beverly—stone.....	3.00	15,000 00
Mt. Holly and Jacksonville—stone.....	3.58	20,000 00
Rancocas and Burlington—stone.....	4.00	20,000 00
Rancocas and Beverly—stone.....	5.00	25,000 00
Recklestown and Mansfield—stone.....	1.60	8,000 00
Ballinger's Mills and Tabernacle—gravel.....	4.00	6,000 00
Ward avenue, Crosswicks—stone.....	3.50	18,000 00
Bedford and Wilkins streets—stone.....	1.50	7,000 00
Wrightstown and Rising Sun—stone.....	7.00	35,000 00
Keeler's Corner and Jacksonville—stone.....	2.00	10,000 00
Tabernacle and Chatsworth—gravel.....	10.50	21,000 00
Hartford to Bridgeboro—stone.....	3.30	16,000 00
Mt. Holly and Smithville—stone.....	3.00	15,000 00
Bordentown and Groveville—stone.....	3.00	15,000 00
Auback and Groveville Bridge—stone.....	2.00	10,000 00
Georgetown and Wrightstown—stone.....	4.00	20,000 00
Bordentown and Florence—stone.....	5.00	25,000 00
Florence station to Burlington City line—stone.....	4.00	20,000 00
Wading River to Batsto—gravel.....	9.59	9,000 00
	<hr/>	<hr/>
	124.07	\$503,000 00

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CAMDEN COUNTY.

	Miles.	Est. Cost.
River road—stone	3.60	\$25,000 00
Heading and Lawnside—stone.....	2.50	15,000 00
Sicklertown to Chew's Landing—gravel.....	8.00	9,600 00
Haddonfield and Magnolia—stone.....	3.13	15,400 00
Ashland and Coffin's Corner—stone.....	2.13	15,000 00
	<hr/> 19.36	<hr/> \$80,000 00

CAPE MAY COUNTY.

Cape May to Cape May Court House—gravel.....	12.18	\$24,360 00
Asbury avenue, Ocean City—gravel.....	1.80	3,600 00
	<hr/> 13.98	<hr/> \$27,960 00

ESSEX COUNTY.

West Passaic avenue, Bloomfield—stone.....	1.00	\$7,000 00
Fifth avenue, Montclair—stone.....	1.00	8,500 00
Ridge road, Township Verona—stone.....	1.75	14,000 00
Sandford street, Township East Orange—stone.....	1.00	8,000 00
Mountain road, Township Caldwell—stone.....	3.00	18,000 00
Little Neck or Swamp road—stone.....	5.00	24,000 00
	<hr/> 12.75	<hr/> \$79,500 00

GLOUCESTER COUNTY.

Nortonville to Swedesboro—stone.....	6.00	\$30,000 00
Delaware street—stone	1.68	10,000 00
	<hr/> 7.68	<hr/> \$40,000 00

HUNTERDON COUNTY.

Middle Valley to Morris County line—stone.....	2.50	\$10,000 00
Rockaway Valley to New Germantown—stone.....	1.50	6,000 00
	<hr/> 4.00	<hr/> \$16,000 00

MERCER COUNTY.

Ewingville School House—stone.....	2.25	\$10,000 00
Pennington and Centerville—stone.....	1.97	15,000 00
Shabbakong road—stone	1.95	10,000 00
Old River road—stone.....	1.60	8,000 00
Olden avenue—stone	2.50	12,000 00

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	Miles.	Est. Cost.
Dutch Neck and Princeton—stone.....	6.59	35,000 00
Marshall's Corner to Woodsville—stone.....	2.43	12,000 00
Hamilton avenue—stone	3.25	16,000 00
Allentown turnpike—stone	6.17	30,000 00
Joseph Reed's road—stone.....	3.00	15,000 00

31.71

\$163,000 00

MIDDLESEX COUNTY.

Metuchen and Stelton—stone.....	3.00	\$15,000 00
South River Borough road—stone.....	1.50	7,500 00
River Road, South River, to South Amboy—stone...	7.00	35,000 00
Highland Park and Bonhamtown—stone.....	4.00	20,000 00
South Plainfield and Plainfield—stone.....	1.60	8,000 00
New Brooklyn and Mt. Pleasant—stone.....	1.25	6,000 00
River Road, New Brunswick to Bound Brook—stone.	4.00	20,000 00
New Brunswick and Franklin Park—stone.....	5.50	16,500 00
New Durham and New Market—stone.....	3.25	16,000 00
Hightstown and Cranbury—stone.....	1.33	6,000 00
Milltown and Spottswood—stone.....	4.00	20,000 00
Clifton avenue and Ryder's lane—stone.....	3.00	15,000 00
Hightstown, Manalapan and Prospect Park—gravel..	4.00	6,000 00
Woodbridge and Oak Tree—stone.....	4.10	20,000 00

47.53

\$211,000 00

MONMOUTH COUNTY.

Squankum and Lakewood road—gravel.....	4.71	\$9,400 00
Red Bank and Oceanic—stone.....	3.19	23,956 00
Matawan and Frenen.....	1.50	13,480 92
Stone Church and Highland Draw.....	2.32	8,544 56
Sweetman's Lane and Black's Mill—gravel.....	2.95	4,500 00
Keyport and Middlesex County line—stone.....	2.00	10,000 00

16.67

\$69,880 48

MORRIS COUNTY.

Stirling road	2.00	\$10,000 00
Williams' Corner and Townley Bridge road.....	2.05	10,528 00
Whippany and Parsippany road.....	3.79	20,044 00
Long Hill and Gillette road.....	2.00	13,212 00
Chester to D., L. & W. R. R.....	.96	4,915 00
New Vernon (Sand Springs) road.....	2.00	10,400 00
Williams' Corner and Passaic River road.....	3.15	16,065 00
Morristown and Mt. Freedom road.....	5.00	26,500 00
Millington and Passaic River road.....	4.00	20,000 00

SEVENTH ANNUAL REPORT.

Morristown and Green Village road.....	3.20	13,566 00
Morristown and New Vernon road.....	2.03	11,767 00
Whippany and Swinefield Bridge road.....	5.00	18,000 00
Beavertown Plain and Boonton road.....	4.28	11,767 00
Landing and Lake Hopatcong road.....	.52	2,825 00
Hamburg Turnpike (Jefferson Township) road.....	.59	2,644 00
Pompton and Pequannock River road.....	4.30	17,000 00
Passaic County and Mountain View road.....	2.60	7,800 00
Morristown and Speedwell Lake road.....	2.00	6,000 00
Lower Mine Hill road.....	1.66	4,480 00

51.09 \$213,273 00

OCEAN COUNTY.

Lakewood and Point Pleasant—gravel.....	10	\$18,000 00
Long Beach—gravel	15	30,000 00
Seaside Park—gravel	12	24,000 00
Lakewood and New Egypt—gravel.....	18	27,000 00

Total 55 \$99,000 00

PASSAIC COUNTY.

Nautchpunck Road	3.39	\$13,600 00
West Twenty-fifth street.....	.23	1,380 00
Squaw Brook and Bergen County line.....	1.46	8,800 00
Lackawanna avenue	2.00	10,000 00
Mortonhouse and Bergen County line.....	2.00	10,000 00
Midvale and Greenwood Lake.....	10.00	40,000 00

Total 19.08 \$83,780 00

SOMERSET COUNTY.

New Brunswick and Franklin Park.....	5.50 ½ cost	\$13,062 50
Union avenue, Somerville to Raritan.....	2.16	10,260 00
Passaic River to Plainfield.....	3.00	14,250 00
Passaic River to Liberty Corner.....	3.00	14,250 00
Rocky Hill to Kingston.....	3.00	14,250 00
Stoutsborg to near Skillman.....	7.00	33,250 00
Neshanic to Somerville and Harlingen.....	6.00	28,500 00
Raritan River to Potts Corner.....	1.00	4,750 00
Liberty School House to Conover Corner.....	3.50	16,625 00
Franklin Park to Middlebush.....	4.00	19,000 00
Baskingridge to Van Dorn's Mill.....	2.50	11,875 00

COMMISSIONER OF PUBLIC ROADS.

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	Miles.	Est. Cost.
Somerville and Far Hills.....	8.00	38,000 00
Findern to Union avenue.....	1.00	4,750 00
Laban's Corner to Princeton.....	7.00	33,250 00
Pleasant View School House to Millstown.....	4.75	22,562 50
New Amwell Road.....	1.63	7,742 50
Total	63.04	\$286 377 50

SUSSEX COUNTY.

Lakeside Boulevard90	\$5,793 50
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WARREN COUNTY.

Hackettstown and Allamuchy.....	4.00	\$16,000 00
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Total number of miles of roads petitioned for in
all the counties..... 491.73

Total estimated cost of all the roads petitioned
for \$1,949,043 00

Number of tons in each road built in 1900, length, width and depth, cost of stone at quarry, and freight per ton.

NAME OF ROAD.	Length (Miles).	Depth and Width of Stone.	Number of tons of Stone required to build.	Cost of Stone At Quarry.	Freight per Ton.	Cartage.
Burlington County—						
Moorestown and Evesboro.....	2.69	8 in. x 10 ft..	5,885	75c.	75c.	
Fellowship	2.14	8 in. x 10 ft.	4,680	70c.	65c.	40c.
Wrightstown and Bordentown.....	4.10	8 in. x 10 ft.	8,970	75c.	65c.	40c.
Camden County—						
Haddonfield and Mt. Ephriam.....	1.00	8 in. x 15 ft.	3,320	75c.	75c.	
Essex County—						
Fairfield Road extension.....	1.23	8 in. x 16 ft.	4,310	75c.	50c.	
East Passaic avenue and Centre street.	1.40	8 in. x 16 ft.	4,900	75c.		
Roseland avenue.....	5.63	8 in. x 16 ft.	19,700	75c.		
Elizabeth avenue.....	1.29	8 in. x 16 ft.	4,515	75c.		
Hudson County—						
Passaic avenue	2.44	10 in. x 20 ft.	12,310	70c.	30c.	
Mercer County—						
Trenton and Crosswick.....	3.83	6 in. x 14 ft.	10,662	75c.		
Old York	3.24	4 to 6 in. x 12 & 14 ft.	8,950	75c.	50c. & 55c.	20c.
Manalapan	2.09	6 in. x 14 ft.	5,766	75c.	55c.	
Middlesex County—						
Old Bridge	4.13	8 in. x 12 ft.	10,840	75c.		
Cranberry Turnpike (first section)..	2.33	8 in. x 12 ft.	6,160	75c.	45c.	
Cranberry Turnpike (second section).	2.55	8 in. x 12 ft.	6,700	75c.	60c.	

Number of tons in each road built in 1900, length, width and depth, cost of stone at quarry and freight per ton—Continued.

NAME OF ROAD.	Length (Miles).	Depth and Width of Stone.	Number of tons of Stone required to build.	Cost of Stone At Quarry.	Freight per Ton.	Cartage.
Monmouth County—						
First avenue and Valley Drive.....	2.85	7 in. x 14 ft.	8,033	65c.	30c.	
Sweetman's Lane and Tennet Station.	2.64	6 in. x 10 ft.	4,450	70c.	65c.	
Brighton avenue, Long Branch.....	1.15	6 to 8 in. x 16 & 30 ft.	4,994	70c.	80c.	
Westwood, Cedar, Long Branch.....	1.64	8 in. x 16 ft.	5,804	70c.	80c.	
Morris County—						
Budd's Lake Road.....	3.32	2½ to 6 in. x 12, 16 & 20 ft.		75c.	50c.	
Succasunna Road.....	.81	6 in. x 16 ft.	2,126	75c.	50c.	
Mendham and Somerset County line..	2.40	6 in. x 12 ft.	4,725	75c.	50c.	
Passaic County—						
Brook avenue	1.34	4 in. x 18 ft.	2,640	50c.	25c.	
Paterson Turnpike and Bergen County line	1.88	4 in. x 16 ft.	3,290	50c.	35c.	
Union avenue	2.00	4 in. x 16 ft.	3,500	60c.	50c.	
Cliff street and Grand Summit.....	.38	4 in. x 16 ft.	665	60c.	50c.	
Lakeside avenue	1.13	4 in. x 16 ft.	1,975	50c.	25c.	
Somerset County—						
Amwell Road	6.65	8, to 10 & 14 in. x 12 ft.	23,431	75c.	40c.	
Union County—						
Springfield avenue	3.00	6 in x 12 ft.	5,890	75c.	30c.	
Mountain avenue .....	.432	6 in x 12 ft.	1,700	75c.	20c.	

SEVENTH ANNUAL REPORT.

The following table, compiled from the Comptroller's Report and the reports received from the various townships and boroughs throughout the State, shows the amount of money spent upon the repairs and maintenance of the local roads of the State, the greater portion of which, according to the statements received, has been wasted:

Atlantic	\$19,834 13
Bergen	129,067 47
Burlington	58,485 83
Camden	15,160 87
Cape May	15,453 89
Cumberland	16,435 83
Essex	184,141 42
Gloucester	22,672 29
Hudson	92,403 71
Hunterdon	33,731 40
Mercer	26,173 49
Middlesex	48,190 16
Monmouth	123,283 47
Morris	44,846 18
Ocean	25,048 70
Passaic	17,636 85
Salem	28,629 83
Somerset	50,151 64
Sussex	26,457 98
Union	36,116 68
Warren	32,330 44

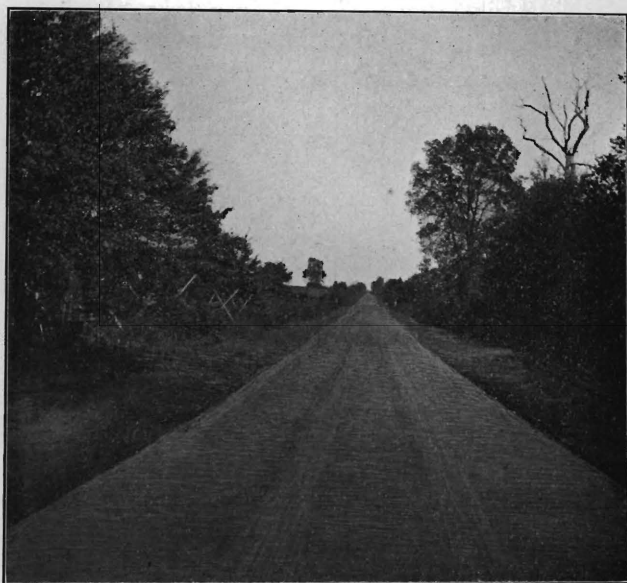
 \$1,046,252 26

Estimated, no reports.....	20,000 00
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 \$1,066,252 26



Georgetown Road,
Burlington county. Before improvement.



Georgetown Road,
Burlington county. After improvement. 8-inch macadam.

DESCRIPTION OF ROADS IMPROVED IN 1900.

BURLINGTON COUNTY.

Moorestown and Evesboro Road, 2.69 Miles Long.

This road begins at Chester Township line, in the Township of Mt. Laurel, and extends to Coles Church Road. It is built of macadam, ten feet wide and eight inches thick, of stone from the Delaware quarries. This road forms the longest portion of a continuous line from Moorestown to Marlton, two thriving villages between which there is a good deal of commerce. It passes by several nicely improved farms, the soil of which is composed of sand, sandy loam and heavy clay.

J. R. Shanley, Newark, New Jersey, was the contractor.

The maximum grade was reduced from $2\frac{1}{2}$ to $1\frac{1}{4}$ per cent.

The cost per contract, lump sum, was \$15,500.

The total cost was \$16,163.98.

Wrightstown and Bordentown Road, 4.10 Miles Long.

This road begins at the Wrightstown and Rising Sun Square Road, in the Township of Mansfield, and extends to the Old York Road, making the last link in a continuous line of improved road from Bordentown to and beyond Georgetown. It passes over a clay and sandy loam farming section, by several well improved farms which are devoted mostly to the raising of grain and cattle. It affords an easy outlet for a large farming section which lies beyond it, through which it is intended that the roads shall be at some future time extended.

It is built of macadam, ten feet wide and eight inches thick.

The cost of this road far exceeded the estimate on account of the long haul and the increased price of stone.

J. R. Shanley, Newark, New Jersey, was the contractor.

The maximum grade was reduced from 7 per cent. to 5 per cent.

The cost per contract, lump sum, was \$23,800.

The total cost was \$25,853.13.

Fellowship Road, 2.14 Miles Long.

This road begins at the north side of Coles Church Road, in the Township of Mt. Laurel, and extends to the Moorestown and Evesboro Road. It is

built of macadam, ten feet wide and eight inches thick. This road is a connecting link between the Vincenttown and Merchantville Road and the Evesboro Road. It enables the traffic from this section to pass over the direct route to the city, and thus avoid the toll road from Moorestown to Merchantville. It passes through an excellent farming section, with well improved farms on each side of it, through the village of Fellowship. The soil over which it passes is a fertile sandy loam, and is largely used for the culture of fruit, vegetable and dairy products for the Philadelphia market.

J. Walter Ireland, Philadelphia, Pa., was the contractor.

The maximum grade was reduced from $2\frac{1}{2}$ per cent. to $1\frac{1}{2}$ per cent.

The cost per contract, lump sum, was \$11,920.

The total cost was \$12,649.11.

CAMDEN COUNTY.

Haddonfield and Mt. Ephraim Road, 1.37 Miles Long.

This road begins at the borough limits, in the Borough of Haddonfield, and extends to the White Horse Road. It is built of macadam, fifteen feet wide and eight inches thick. It extends through a very pretty residential section, over a fine farming country and connects the residents of Haddonfield with the White Horse Road leading from Camden to Atlantic City.

J. F. Shanley, Philadelphia, Pa., was the contractor.

The maximum grade was reduced from 6.80 per cent to 4 per cent.

The cost per contract, lump sum, was \$6,600.00.

The total cost was \$8,092.45.

Ashland Road, 2.13 miles long, and the River Road, 3.60 miles long, have been contracted for, but will only be finished in time for next year's appropriation.

ESSEX COUNTY.

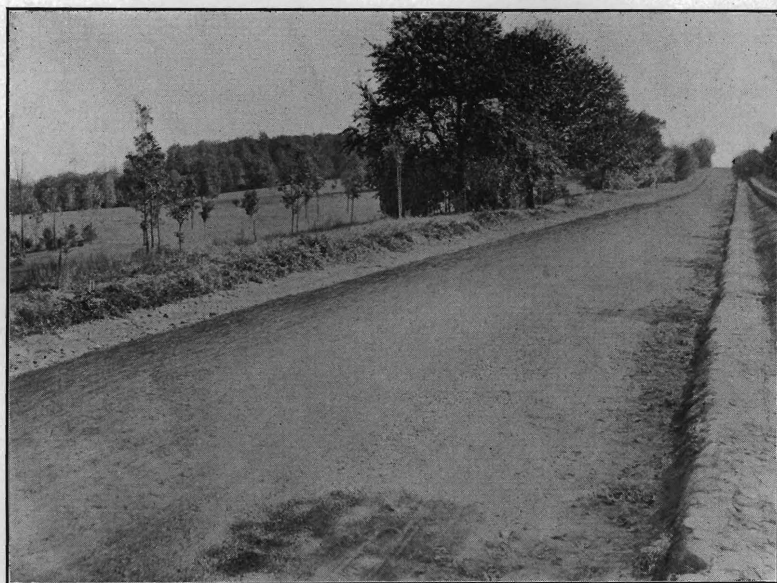
Roseland Avenue, 5.63 Miles Long.

This avenue begins at the southerly side of Bloomfield avenue, in the town of Caldwell, and runs thence southerly through the handsome collection of suburban homes, known as Essex Fells, to the Eagle Rock Road, in Roseland; thence across this road, and still in a general southerly course, through a farming region to Irvington, where it crosses the old Livingston Road and continues its winding course to the road passing in front of the Northfield Church. It is built of telford, sixteen feet wide and eight inches thick.

This avenue is one of the few north and south roads that are just beginning to be built to connect the many improved east and west highways from Newark and the Oranges to Morristown and the Lake Hopatcong region. It will serve not only as an outlet for the farmers and truck raisers of the



Roseland Avenue,
Essex county. Before improvement.



Roseland Avenue,
Essex county. After improvement. Telford, 16 feet wide and 8 inches deep.

COMMISSIONER OF PUBLIC ROADS.

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adjacent region, but will open this section to pleasure drivers, thus bringing many building sites to their notice. The ease of access afforded by this avenue will induce them to invest in and improve these sites by building thereon summer residences, thus creating an increased value for what is now only farm land, and further affording a home market for much of the produce raised on the mixed glacial drift over which this road is built.

Phineas A. Matthews, Caldwell, New Jersey, was the contractor.

The maximum grade was reduced from 9.38 per cent. to 5.42 per cent.

The cost per square yard for 8-inch telford was 41 cents.

The total cost was \$27,128.38.

Elizabeth Avenue, 1.3 Miles Long.

This avenue begins at the city line of Newark, and extends in a south-westerly direction through Clinton Township to the Union County line at Lyons Farms, where it connects with the macadam roads of Union County. It is built of telford, sixteen feet wide and eight inches thick. It forms a very important link between the city of Newark and the dairy farms of Lyons Farms.

Upon this road a short, but very steep, hill was encountered, necessitating the deepest cutting in Essex County this year, and transforming what had been for a century one of the worst pieces of road into one of the best. The soil over which this road is built consists of glacial drift and red shale.

James Seme, Newark, New Jersey, was the contractor.

The maximum grade was reduced from 7.5 per cent. to 4.8 per cent.

The cost per square yard for eight-inch telford was 69 cents.

The total cost was \$14,266.76.

Fairfield Road Extension, 1.27 Miles Long.

This road begins at the end of the macadam laid last year on Fairfield Road, and extends easterly along the Passaic River to the Passaic County line, where it connects with the macadam road to Singac and Little Falls. It is built of telford, sixteen feet wide and eight inches thick. The soil over which it is built is alluvial and consequently the road was a bed of mire during the spring.

This road forms the connecting link between the improved roads of Essex and Passaic Counties. Owing to the level nature of the country there was very little grading required.

Phineas A. Matthews, Caldwell, New Jersey, was the contractor.

The maximum grade was reduced from 4.2 per cent. to 3.3 per cent.

The cost per square yard for eight-inch telford was 42 cents.

The total cost was \$5,613.84.

SEVENTH ANNUAL REPORT.

East Passaic Avenue and Centre Street, 1.4 Miles Long.

This road begins at Franklin avenue, Bloomfield, and extends northerly along the Morris and Essex Canal to Centre street; thence easterly through a cut of twenty feet to Bloomfield avenue, in the town of Franklin. It is built of telford, sixteen feet wide and eight inches thick.

This, like the other roads of this section, runs over a glacial drift soil, but, unlike the old road, it passes through and not over the short, sharp hills in its course. The grading of these roads is one of the best features of the work done this year. This road forms a connecting link between Bloomfield and Franklin, and is a mutual benefit to both towns.

The Osborne and Marsellis Company, Montclair, New Jersey, were the contractors.

The maximum grade was reduced from 14 per cent. to 7.5 per cent.

The cost per square yard for eight-inch telford was 52 cents.

The total cost was \$16,168.11.

GLOUCESTER COUNTY.

Cross Keys and Hurffville Road, 2.38 Miles Long.

The entire length of this road is 5.41 miles, 3.03 miles of which were built last year, the remainder, 2.38 miles, this year. It extends from the village of Cross Keys to the stone road at Hurffville. It is constructed of local gravel, fourteen feet wide and seven inches thick. It passes over a sandy loam country, sand predominating, along the line of which there are some very good and very poor farms, the productions of which seek a market towards Camden. Several very fine beds of gravel were found along the line of the road, but much of it had to be carted a long distance, making the road more expensive than the estimated price.

William O. Garrison, Bridgeton, New Jersey, was the contractor.

The maximum grade was reduced from 6 1-10 per cent to 2 9-10 per cent.

The cost per cubic yard for compacted gravel, 14 feet wide, was 37½ cents.

The total cost was \$11,159.58.

The total cost of this year's construction was \$6,068.29.

Woodbury and Knight's Run Road, 5.26 Miles Long, 1.59 Miles of which were Built last Year, leaving a Remainder of 3.67 Miles, which were Built this Year.

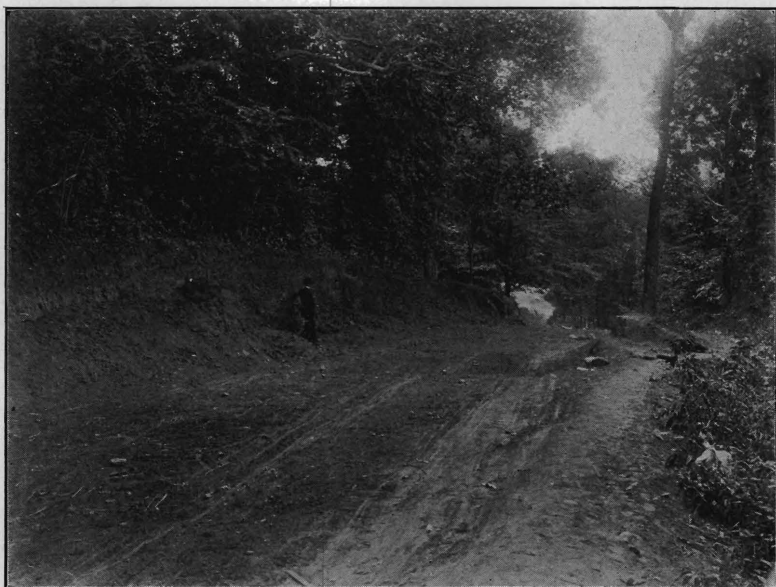
This road extends from German street, in the City of Woodbury, to Knight's Run. It was intended to be built of gravel, fourteen feet wide and eight inches thick, but on account of the inability to obtain this material, 8,700



Woodbury and Knight's Run Gravel Road,
Gloucester county. Before improvement. Greenland Hill looking north.



Woodbury and Knight's Run Gravel Road,
Gloucester county. After improvement. Roe's Hill looking north.



**Passaic Avenue,
Hudson county. Before.**



**Passaic Avenue,
Hudson county. After. Showing deep cutting 20 ft. wide. Telford 10-inch.
Macadam, 8-inch.**

COMMISSIONER OF PUBLIC ROADS.

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feet were built of stone. The grading was very heavy upon this road, and there were many overhauls for gravel, which, coupled with the excessive cost of stone on the Woodbury end, has made a very expensive road, exceeding the estimate by a large sum. The road forms a pleasant outlet for the inhabitants of this part of the country, and for those who live beyond who are largely engaged in trucking. The soil is sandy loam, with the exception of two miles, which is sandy clay.

Quinlan and Leary, South Amboy, New Jersey, were the contractors.

The maximum grade was reduced from 10.8 to 4.3 per cent.

The cost per cubic yard for compacted gravel was 47 cents.

The total cost was \$31,003.56.

The total cost of this year's construction was \$26,151.34.

HUDSON COUNTY.

Passaic Avenue, Town of Kearny, 2.44 Miles Long.

This avenue begins at the southerly line of Kearney and extends northerly along the easterly bank of the Passaic River, through the towns of Kearny and Arlington to the Bergen county line. The lower end of this avenue, through the town of Kearny, passes the Clark Thread Works and the large plant of the Linoleum Company, and is of telford construction. Over it there is already a great deal of heavy teaming, loads of fifteen tons having been hauled over it since its completion. The upper end through the town of Arlington is of macadam construction, and forms a beautiful park like drive, with the river on one side and the rolling land on the other. As this is a very old road, there are many large elm, maple, oak and pine trees along it, which add to its beauty and will make it one of the most beautiful drives in the vicinity of Newark. The road is twenty feet wide and ten inches thick.

The maximum grade was reduced from 13 per cent. to 8.86 per cent.

James J. Harrington, Jersey City, New Jersey, was the contractor.

The cost per square yard for ten inch telford was 80 cents.

The total cost was \$30,843.75.

MERCER COUNTY.

Manalapan Road, 2.09 Miles Long.

This road begins at Hightstown and extends to the dividing line between Mercer and Middlesex counties. It is built of macadam, fourteen feet wide and six inches thick. This road forms part of a continuous line from Trenton to the seashore. It passes through a fine farming section, giving an outlet to the Trenton markets and passageway for the immense travel from Philadelphia and Trenton to the seashore. Two sections, one in Middlesex and the other in Monmouth, are being built in connection with this piece of road, helping to make through connection with the seashore.

John Sinkhorn and Company, Trenton, New Jersey, were the contractors.

The maximum grade was reduced from 1.9 per cent. to 1.2 per cent.

The cost per contract, lump sum, was \$12,800.

The total cost was \$16,441.72.

SEVENTH ANNUAL REPORT.

Trenton and Crosswicks Road, 3.83 Miles Long.

This road begins at White Horse and extends to Crosswicks. It is built of macadam, fourteen feet wide and six inches thick. It extends through a fine farming section, by some valuable mill properties and over a sandy loam soil, which is used largely for producing vegetables and fruit for the Trenton market. It gives a fine outlet for the inhabitants of Crosswicks and the surrounding country to the city of Trenton.

John Sinkhorn and Company, Trenton, New Jersey, were the contractors.

The maximum grade was reduced from 7.3 per cent. to 3.44 per cent.

The cost per contract, lump sum, was \$24,939.

The total cost was \$28,139.41.

Old York Road, 3.24 Miles Long.

This road begins at the borough line of Hightstown and extends to the dividing line between Mercer and Monmouth counties. It is built of macadam, twelve and fourteen feet wide and four and six inches thick. It gives a fine outlet for the fruit and nursery farms that line its sides. It passes over a very highly cultivated sandy loam soil. This road was made more expensive by the immense amount of underdraining done upon it.

John Sinkhorn and Company, Trenton, New Jersey, were the contractors.

The maximum grade was reduced from 5.2 per cent. to 3.7 per cent.

The cost per contract, lump sum, was \$15,995.86.

The total cost was \$18,039.21.

MIDDLESEX COUNTY.

Cranbury Turnpike, 8.01 Miles Long; 4.88 Miles of which were paid for this Year.

This road begins at the Cranbury Institute and extends to Black Horse Inn. It is built of macadam twelve feet wide and eight inches thick. This road was built under two contracts—2.1-3 miles in the first contract and 5.67 miles in the second contract. It passes through a very fine farming section, and forms a portion of a through line between New Brunswick and Trenton, which is to be completed this year.

J. Erwin Hillpot, Bound Brook, New Jersey, was the contractor for both ends.

The cost of the first section, 2.1-3 miles, as per contract, was \$13,970. The cost of the second section, 5.67 miles, as per contract, was \$39,254.88.

The maximum grade was reduced from 5 per cent. to 3 per cent.

The total cost was \$56,352.52.



Fellowship Road,
Burlington county. After improvement. 10 feet wide, 8-inch macadam.



George's Road.
Middlesex county. After improvement. 12 feet wide, 8 inches deep.

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MONMOUTH COUNTY.

Brighton Avenue, Long Branch, 1.16 Miles Long.

This road begins where the middle of Brighton avenue intersects the east side of the macadam road on Norwood avenue, and extends along the middle of said Brighton avenue to Ocean avenue. It is built of macadam, sixteen feet wide, eight and six inches thick. This road connects the different macadam roads in that section, and passes through a locality which is being rapidly built up with handsome residences. It has added very materially to the value of property along its line.

J. R. Shanley, Newark, New Jersey, was the contractor.

The maximum grade was reduced from $2\frac{1}{2}$ per cent. to $1\frac{1}{2}$ per cent.

The cost per square yard for class A macadam was 97 cents; for class B macadam, 86 cents.

The total cost was \$17,772.28.

Cedar, Norwood and Westwood Avenues, Long Branch, 1.64 Miles Long.

This road begins in the middle of Cedar avenue, and extends to the west side of the asphalt pavement on Third avenue. It is built of macadam, sixteen feet wide and eight inches thick. It opens up a very fine section for improvement and connects several macadam and asphaltum roads. Gravel wings seven feet wide were built on each side of the macadam; the construction of which was paid for by the county.

E. T. Field, Red Bank, New Jersey, was the contractor.

The maximum grade was and is 2.2 per cent.

The cost per square yard for eight inch macadam was 80 cents.

The total cost was \$15,938.70.

Sweetman's Lane and Tennent Station Road, 5.59 Miles Long.

The second section of this road, or 2.64 miles, was graded in 1899 and macadamized in 1900. The first section, or 2.95 miles, is to be built of gravel in 1901.

The first section of this road extends from Sweetman's lane to Oakland Mills road, near Millhurst; the second section begins at ending of section one and extends through Millhurst to Tennent. It is built of macadam, ten feet wide and six inches thick. It forms a fine outlet through a fine farming section for produce and for the distribution of the products of the large flouring mills at Millhurst.

William H. DuBois, Freehold, New Jersey, was the contractor.

The cost per square yard for six inch macadam was 64 cents.

The maximum grade was reduced from 3.80 per cent. to 2.60 per cent.

The total cost was \$12,298.32.

MORRIS COUNTY.

Budd's Lake Road, 3.32 Miles Long.

This road begins at Budd's Lake and extends to Netcong. It is built of macadam, ten, twelve, fourteen and sixteen feet wide and two and one-half and six inches thick. It extends over a glacial drift soil, composed of sand, clay and boulders. Along its course is some fair farm and grazing land. Budd's Lake is a very beautiful body of water and quite a large summer resort. This road is largely used for pleasure driving as well as the accommodation of the freighting done in that region. The bottom of the road is built of native rock, found along the line, and faced with a granitic trap. This road gives Budd's Lake a connection with the long line of improved roads leading to Morristown and Newark.

Salmon Brothers, Lakewood, New Jersey, were the contractors.

The maximum grade was reduced from 10.36 per cent. to 7.50 per cent.

The cost per square yard for 6 inch macadam was 51 cents; for 2½ inch macadam, 35 cents.

The total cost was \$15,955.89.

Succasunna Road, .81 of a Mile Long.

This road begins at Shaw's Corner and extends to Randolph township line through Succasunna. It is built of macadam, sixteen feet wide and six inches thick. It makes a very pretty road and brings Succasunna in contact with the outside world. Succasunna is in a deep valley, in a mountainous country. By means of this road the people are enabled to move their produce over an easy grade to the eastern markets.

John D. Smith, Rockaway, New Jersey, was the contractor.

The maximum grade was reduced from 3½ per cent. to 1 per cent.

The cost per square yard for six inch macadam was 44 cents.

The total cost was \$4,834.48.

Mendham and Somerset County Line Road, 2.40 Miles Long.

This road begins at the southerly side of the main street through Mendham and extends in a general southerly direction to the Somerset county line. It is built of macadam, twelve feet wide and six inches deep. At the southern end this improvement has been extended by the inhabitants to the town of Bernardsville, thus making a through connection from Mendham to Bernardsville; at the latter point it joins the macadamized road from Morristown to Somerville. At the Mendham end it connects with the county road to Morristown.

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This road affords a beautiful drive for the many who dwell upon the hills along its line, and renders the whole region so accessible that large tracts of land are now being occupied and improved by persons who have long sought such spots upon which to build their country homes.

The Osborne and Marsellis Company, Montclair, New Jersey, were the contractors.

The maximum grade was reduced from $12\frac{1}{2}$ per cent. to $10\frac{3}{4}$ per cent.

The cost per square yard for 6 inch macadam was 54 cents.

The total cost was \$11,910.50.

PASSAIC COUNTY.

Brook Avenue, 1.34 Miles Long.

This avenue begins at the river drive and extends to Bloomfield avenue, Passaic, New Jersey. It is built of macadam, eighteen feet wide and four inches thick. This road is the extension of a road to open out a new building section in the city of Passaic. It extends through a country composed of deposits of the glacial period.

Francis J. Marley was the contractor.

The maximum grade was reduced from 12 per cent. to 6 per cent.

The cost per square yard for four inch macadam was $28\frac{1}{2}$ cents.

The total cost was \$7,175.02.

Tilt Street and Grand Summit Avenue, .38 Mile Long.

This avenue begins at Rip Van Winkle avenue and extends to Central avenue. It forms a connecting link up a steep hillside, between the flat land along the Passaic River, in West Paterson, with the improved residential section on the hill above. The road is valuable as a link only. It is built of macadam, sixteen feet wide and four inches thick.

Peter Bailey, Mountain View, New Jersey, was the contractor.

The maximum grade was reduced from 14 per cent. to 6.75 per cent.

The cost per square yard for four inch macadam was 24 cents.

The total cost was \$1,829.45.

Lakeside Avenue, 1.13 Miles Long.

This avenue begins at the improved road just being built on the east bank of Pompton Lake, and then winds in a general westerly direction across and along the lake into Pompton, thence through the town to Wanaque avenue, previously macadamized. It is built of macadam, sixteen feet wide and four inches thick.

This avenue is another connecting link that unites the various improvements of past years, thus forming a continuous hard, smooth road for those on business or pleasure bent, and making so much more available and useful the roads already built.

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Colfax and Steele, Preakness, New Jersey, were the contractors.
 The maximum grade was reduced from 14 per cent. to 7.50 per cent.
 The cost per square yard for four inch macadam was 25½ cents.
 The total cost was \$5,160.99.

The Paterson and Hamburg Turnpike and Bergen County Line Road, 1.88 Miles Long.

This road begins at the northerly side of the Paterson and Hamburg turnpike, just west of the Norton House, and extends in a general northerly direction along Pompton Lake to the Bergen county line. Passing over a most picturesque portion of Passaic county, it forms a beautiful pleasure drive, connecting the improved roads of Passaic county with the charming Ramapo Valley. It is built of macadam, sixteen feet wide and four inches thick.

Colfax and Steele, Preakness, New Jersey, were the contractors.
 The maximum grade was reduced from 13 per cent to 9 per cent.
 The cost per square yard for four inch macadam was 34½ cents.
 The total cost was \$11,214.24.

Union Avenue, 2 Miles Long.

This avenue connects the town of Little Falls with the railway stations of both the Erie and Lackawanna railroads, and thence continues in its general northwesterly direction to Totowa avenue, which latter road completes the connection between Little Falls and the city of Paterson, at the same time joining the improved roads of Paterson with the through line from Newark to Newfoundland. It is built of macadam, sixteen feet wide and four inches thick.

This road is of especial value to the growing manufacturing town of Little Falls, as it gives it a good outlet at all seasons.

Francisco Brothers, Little Falls, New Jersey, were the contractors.
 The maximum grade was reduced from 3 per cent. to 1.25 per cent.
 The cost per square yard for four inch macadam was 19 cents.
 The total cost was \$6,640.37.

SALEM COUNTY.

The Old Mullica Hill and Woodstown Turnpike Road, 2.045 Miles Long.

This road begins at the line of the borough of Woodstown, in the township of Pilesgrove, and extends to the bridge over Oldman's Creek. It is built of gravel, fourteen feet wide and eight and six inches thick. It extends through a thickly settled farming country over a sandy loam soil. The farmers along its line are engaged in raising truck, grass, grain and milk for the Philadelphia markets.



Amwell Road.

New Brunswick, E. Millstone, Somerset county. Before improvement.



Amwell Road.

Somerset county. 10-inch rock. After improvement.

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This road forms part of an improved through line from Woodstown through several small towns, and Mullica Hill and Woodbury, to Camden. It will in time be extended to the southern limit of the State. It was constructed of a good quality of gravel, which had to be carted such long distances, it materially increased the cost of the road. The people in this country seem to prefer gravel and shell to stone roads.

B. F. Sweeten and Son, of Camden, New Jersey, were the contractors.

The maximum grade was reduced from 7.33 per cent. to 6.97 per cent.

The cost per contract, lump sum, was \$2,649.18.

The total cost was \$4,957.14.

SOMERSET COUNTY.

Amwell Road, 6.65 Miles Long.

This road begins at the New Brunswick and Millstone Railroad, near East Millstone, and extends in an easterly direction to Mile Run Brook, the city line of New Brunswick, also the county line of Middlesex county. It is built of rock bottom macadam, twelve and fourteen feet wide and ten inches thick.

This is one of the oldest roads in the county, having been the old stage road from New Brunswick to Raritan Court House, as Millstone was called at the beginning of this century, before the county seat was moved to Somerville. This has always been one of the worst roads in the county in wet weather, and in the spring of the year was practically impassable for loaded teams.

Owing to the level nature of the country it was thought necessary to raise the bed as much as possible in order to afford proper drainage for the subgrade; hence a condition of more fills than cuts was confronted, to meet which and procure the necessary dirt the road was graded for a portion of its length to a width of fifty feet.

Richards Brothers were the contractors.

The maximum grade was reduced from 7 per cent. to 5.76 per cent.

The cost per contract, lump sum, was \$32,678.33.

The total cost was \$37,668.93.

UNION COUNTY.

Springfield Avenue, 3 Miles Long.

This road begins at South street, in the town of New Providence, the end of the Union county macadam from Elizabeth, and extends to the Passaic River, at Townley's bridge, passing in its course over a mixed soil composed of glacial drift and red shale. It is built of macadam, twelve feet wide and six inches thick.

This road completes the Union county road system to the Morris county line, and converts what was one of the worst roads into one of the best. As

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an illustration of the condition of this road before improvement—a farmer was hauling a load of hay over it this spring when the front wheels of his wagon sank down to the hubs. While he was prying them out the rear wheels sank down, so that he was obliged to leave his load in the road all night. As one of them expressed it, "If you can make a good road out of this, you can make a good road out of any old wagon track."

Charles Milton Meeker, Plainfield, New Jersey, was the contractor. The maximum grade was reduced from 7.16 to 4.75 per 100 feet. The cost per contract, lump sum, was \$11,393.74. The total cost was \$12,326.08.

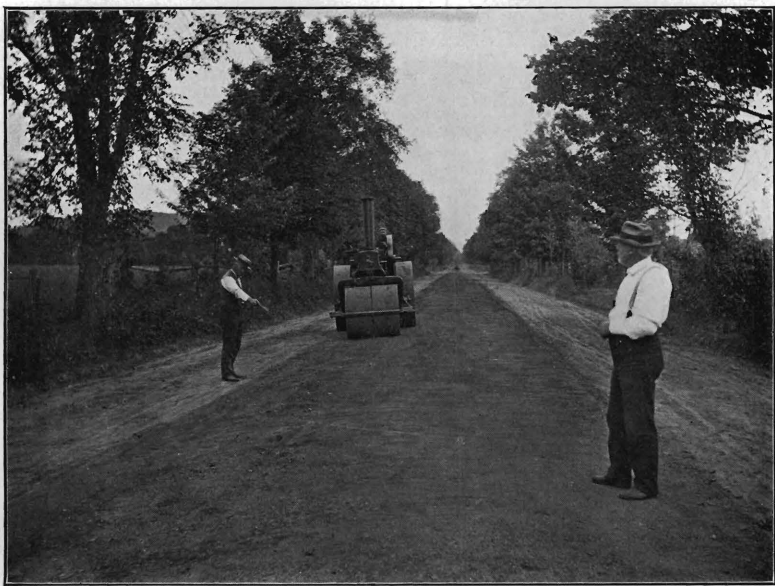
Mountain Avenue, .432 of a Mile Long.

This road begins at the southerly side of Park avenue, in Scotch Plains, and extends southwesterly to Hunter avenue; thence westerly along Hunter avenue to Green brook, the Somerset county line, where it connects with Mountain avenue, which was macadamized in 1897. It is built of macadam, twelve feet wide and six inches thick. It forms the connecting link that has long been needed between Union and Somerset county improved roads.

William H. Weldon, Rahway, New Jersey, was the contractor. The maximum grade was reduced from 1.2 per cent. to 1.2 per cent. The cost per contract, lump sum, was \$1,578.70. The total cost was \$1,825.45.



Mountain Avenue,
Union county. During construction. 12 feet wide, 6 inches deep.



Mountain Avenue.
Union county. After improvement. Macadam, 12 feet wide and 6 inches deep.

Road Improvement in New Jersey for the Year 1900.

Through the ages it has been the history of all reforms that to make them continuous it was necessary to constantly add line upon line and precept upon precept, in order to persuade the people to a high religious, moral and physical development. In the matter of road improvement in the State of New Jersey, it does not seem necessary to use any of the modern or ancient modes of persuading action in this direction. The numerous miles of hard roads that can now be seen in any portion of the State, and the enjoyment that most any citizen can have from them, is inducing all of our communities to take measures to have many more miles paved with stone or gravel. The fervor for hard roads is spreading so widely, that next year we will have several counties on our list which have not heretofore been candidates. Warren, Sussex, Cape May and Ocean counties have petitioned for and are preparing to advertise for improved roads, and there is a possibility of Hunterdon and Bergen counties being claimants for State bounty. This year, 1900, has been the first that Hudson and Union counties have enjoyed State aid, and they have been quite liberal in their expenditures. Such is the zeal of the older counties in road building, it is almost impossible to restrain them. Many of them are building up to the full limit of the law. Mercer, Monmouth, Middlesex, Morris and Burlington have this year constructed up to the full extent of the one-fourth of one per cent. of their ratables, while they, with Essex and Passaic, have built beyond the limit of the State appropriation, all showing the need of a larger revenue both from the State and county, in order that the desires and needs of the people may be more rapidly gratified.

The people seem to be so wonderfully impressed with the idea that by good roads the value of lands will be increased, trans-

portation cheapened, travel and business attracted, school houses and churches filled, and civilization advanced, that they are praying as earnestly for them as for great riches. Consequently, the pressure for new roads is so great it seems almost impossible to hold the people back. They are so anxious that they are not willing to confine themselves within the limit of the State and county appropriations. They are constantly insisting upon building ahead of the State appropriation, in order that they may enjoy them now; therefore, although the law, on account of the increased expense of construction, will not allow for the payment this year of more than eighty miles of roads, there have been and are about one hundred and forty miles under construction. Many of these roads were not completed by October 31st, the end of the State's fiscal year. These will be candidates for next year's appropriation. With this condition of things existing, it would seem proper that our State should, at least, increase its appropriation fifty thousand dollars making the total two hundred thousand dollars, and that the State Aid Law should be so amended as to allow the counties to raise one-half instead of one-quarter per cent. upon their ratables. Our last Legislature, at the urgent request of many farmers, passed this amendment, the people being willing to stand the greater taxation in order to secure what they now believe an absolute necessity; but it was thought the better part of wisdom to wait awhile before such an amendment should be approved. From numerous sources, we hear there will be pressure brought upon our Legislature the coming winter to increase the tax upon the ratables to one-half of one per cent., and to increase the State appropriation. This will be justified by the condition of our Treasury and what the census reveals of our growth, for New Jersey makes a most gratifying showing in the new census. Its rate of increase, 30.3 per cent., in the last decade, is matched by no State east of the meridian of Texas and Minnesota. The rate of increase for the entire country is less than 21 per cent., so New Jersey's increase is almost one-third above the average. Much of this increase is no doubt due to its many miles of hard roads attracting population along their lines.

In area, New Jersey is one of the least of the States of the Union, ranking forty-second—Delaware, Rhode Island and Connecticut being the only States smaller than New Jersey. By the

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census of 1880, New Jersey ranked eighteenth in population. Its gain of 438,736 people in the last decade has carried it above Virginia and Alabama, and made it the sixteenth State in point of population. In spite of its extensive pine barrens, New Jersey has ranked third in density of population since 1870, and that rank it still retains, Rhode Island and Massachusetts being the only States having more people to the square mile than New Jersey.

COST OF NEW JERSEY ROADS IN 1900.

The increased price of labor and transportation and the combination of our quarries to obtain a higher price for stone, has enhanced the cost of our roads constructed this year in the southern and middle portions of our State, where distant from stone, fully one-third. The railroads advanced their charges from ten to twenty cents per ton. The price of labor advanced about twenty per cent. The quarries increased the price of their stone from fifty to one hundred per cent., making an average advance in the cost of a ton of stone in the roadbed at least fifty cents above last year's quotations. We think that, although the quarries claimed they were losing money at old rates, it was a great mistake for them to combine to increase their prices beyond a fair profit. Twenty-five per cent. advance would have passed muster as reasonable, but fifty to one hundred per cent. will soon destroy the goose that lays the golden egg. Especially do we think the railroads have stood very much in their own light in increasing the price of transportation on stone, for they are at no expense in either loading or unloading. In the past it has been for them and for consumers a wise policy to make very low rates for all kinds of crude building material, in order that the country along their lines may rapidly improve and thus contribute larger permanent patronage for their roads. Then, all of these causes combined, have a tendency to cause the sections seeking road improvement to use local materials, such as native rock and gravel, and thus the amount of transportation for the railroads is visibly lessened. In the southern sections of the State, contractors are using water transportation in order to prevent loss from their contracts, while for other roads the petitioners who contemplated stone are contenting themselves with gravel, with the result that

carrying companies lose transportation on many thousands of tons of stone, and many miles of gravel and shell construction take the place of what would have been stone. All combinations to unduly increase prices retard development. Only those succeed that keep their prices down to a point where there is a reasonable and not an excessive profit. Intensely enhanced prices not only invite competition but lessen consumption, both of which tend, in the end, to make business more uncertain. All great trusts have only succeeded in maintaining a continuous commanding position by doing a great business upon a very small profit upon each individual unit of their product. This was strongly illustrated the past year by the great elevation to which the price of iron and steel and all their products were artificially raised; many mills closed and some are still idle for the want of orders, because consumers were unable to buy at the unwarranted prices. So broken stone, on account of the lessened demand from unnatural prices, has fallen to 65 cents per ton at some of the quarries, and promises to be lower.

In previous years we have been enabled to build many miles of roads at a rate which has excited the wonder and admiration of the outside world. This was largely because we obtained our material, transportation and labor at a reasonable cost. We hope in the future our transportation companies, quarrymen and contractors will be wise enough to make their rates sufficiently low to persuade, rather than to retard, road building. It is only the intense desire of our people to quickly obtain the use of certain hard roads that has tolerated the payment of the enhanced prices of this year.

In one county alone this year the Pennsylvania Railroad has transported for State aid roads over 47,000 tons of crushed stone, receiving for freight on same, at the rate of 55 cents a ton, about \$26,000—an increase over last year of 15 cents per ton, or about \$7,000, and the distance did not average over twenty-five miles from quarry to points of delivery; the freight charges amounted to about one-third the cost of the roads, and this is but one of the many counties in which we are building, and one in which the rates of freight were the lowest. The quarry supplying the stone received an increase of 25 cents a ton over their price in 1899, an increase of nearly \$12,000 over the previous year on same amount

of stone, and, on account of breaking with the combination, they were 25 cents a ton below the combination price of \$1.00 per ton at the quarries. For repairs, in 1899, in one county, the accepted bids for stone at depots of consumption were \$1.00 per ton; this year, 1900, \$1.55 per ton—an added cost of 15 to 20 cents per ton for transportation, and 35 to 40 cents for cost of stone at quarries. The cost of stone at quarries has been 40 to 50 cents; it is now 65 cents to \$1.00 per ton; thus instead of building as we did last year one hundred and fourteen miles by State aid, at a cost of about \$4,000 per mile, we have only been able to build eighty-three miles with this year's, the same amount of appropriation, at a cost of \$5,384 per mile, an increase of about \$1,384 per mile. In other words, the same number of miles built in 1899, at the cost of those built in 1900, would have cost \$157,776 more.

Rural populations are not able to pay extravagant prices for road construction. So if it comes to the point where they can only have expensive road-beds, their petitioning will cease. Expensive pavements will pass muster in large cities, but if such can only be obtained in the farming districts, the death knell of good road building will be rung.

To give an idea of how the increased cost of stone is creating a sentiment for gravel, we give place to the following article published in one of the counties where road building is in full tide of progress:

"The question of whether gravel is not preferable to stone as a material for the construction of improved roads in this particular county of Monmouth, has been discussed before, but, in the light of some recent developments, will stand a little more discussion.

"The gravel road from Yellow Brook to Turkey is 3.22 miles long and will cost \$4,825.42. This road has been a very satisfactory road for the county all the way through, as there were many local bidders upon it, and the contract was let at a reasonable figure. On the other hand, we have before us the price of some stone roads advertised for by the county. It is proposed to build the Holmdel and Bradevelt road of stone. This road is 3.52 miles long, or but little longer than the Yellow Brook and Turkey road, yet the price of J. R. Shanley & Co., of Newark, the lowest bidders for this road, was \$30,450—an advance of

\$25,000 upon the price of the Yellow Brook and Turkey road. Indeed, the price was so high that the Freeholders wisely refrained from awarding the contract.

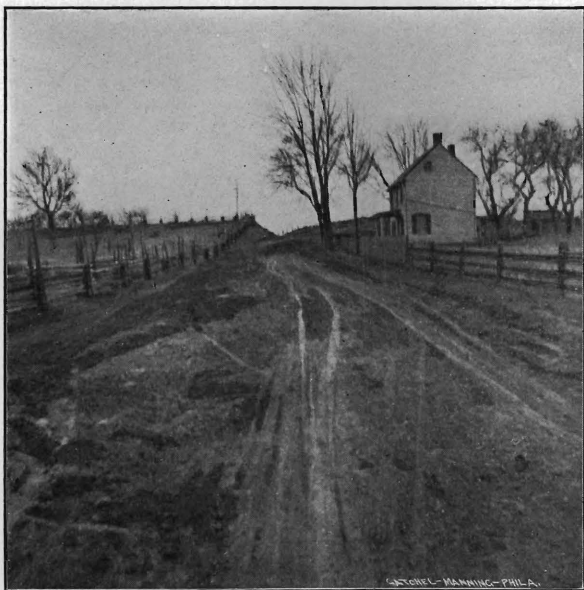
"The Westwood and Cedar avenue road, in the municipality of Long Branch is 1.75 miles in length, and E. T. Fields, of Keansburg, secured the contract for building it of stone, for \$15,000. This price, high as it is, was very reasonable when compared with the bids of some of the big stone road building companies.

"Thus we see that the Holmdel road would have cost \$8,650 per mile had the contract been let to the lowest bidder, while the Long Branch road will cost \$8,571 per mile. As compared with these high figures the Yellow Brook and Turkey road costs only \$1,499 per mile.

"It is therefore a grave question whether it is not wise economy to build of gravel rather than stone. The gravel road from near Englishtown to Jamesburg, the Freehold and Matawan road, and other gravel roads in Middlesex county, have stood wear and tear for some time and they are as good as ever. The surface is hard and smooth, and the same is true of the iron ore roads in this county between Manalapan and Englishtown and from Perrineville to the Mercer county line.

"It is also much cheaper to keep gravel roads in repair than it is stone roads, or at least it would appear so from the present system of maintaining county roads. It costs as much each year to keep the Long Branch and Asbury Park stone road in repair as it has to build the Yellow Brook and Turkey road. The stone for repairing macadam roads has to be shipped by rail from long distances, and the quarrymen at present have the price up at a very high figure. Gravel, on the contrary, can be found anywhere in this county, and in the case of the Yellow Brook and Turkey road does not have to be carted over a quarter of a mile at certain points along this highway.

"If the big contractors for stone roads and the quarrymen persist in keeping up their prices to such exorbitant figures, it would appear to be a good thing for the county to look into this matter of gravel roads more closely. Some men, and experienced ones, too, contend that if stone roads are properly built and maintained they are much cheaper in the long run than gravel roads and last much longer. But the figures we have given above appear



Georgetown Road.
Burlington county. Before improvement.



Georgetown Road.
Burlington county. After improvement. 10 feet wide, 8-inch macadam.

to tell a different tale, and it is only in the light of such practical results as the above that we should judge.

"We have as fine gravel in this county as can be bought anywhere, and as long as the material sells at the present low figure, it would seem sheer folly to pay thousands of dollars out to greedy quarrymen."

CONTINUOUS LINES.

Although it has been at more than usual expense, we have been wonderfully successful this year in completing many of the various links that are necessary to make continuous lines north and south, east and west throughout the State. In the vicinity of Hightstown, New Jersey, which seems to be at the "crossing of the ways," there have been about twenty-five miles of roads macadamized in the counties of Mercer, Middlesex and Monmouth, at a cost of about one hundred and fifty thousand dollars. These improvements connect many of the different settlements in these and other counties, making continuous lines south to Atlantic City and north to Jersey City; also east to the seaside resorts of the Atlantic Ocean.

Having now one system virtually complete north and south, east and west across the State, we are building links in three other systems, north and south, and several other roads in many directions to act as feeders to these systems; thus nearly all the citizens of our State will soon have the use of hard roads over all or part of the distance they are forced to travel to reach their cities or market towns.

ROAD MAP.

We have prepared a map to accompany our report, upon which all the improved roads of the State are marked. The free roads are marked in red and the toll roads are dotted in the same color.

This map gives at a glance the extent of road improvement in New Jersey, and gives the intended traveller an opportunity to select his routes of travel. By means of this the owners of automobiles, bicycles and pleasure carriages of all kinds can intelligently travel through any portion of our State. No doubt it will guide many from the outside world by our beautiful farms and

magnificent scenery, and may be the means of inducing many of them to settle upon our hills and in our valleys.

We hope it will be an instructive addition to our report.

THE TENDENCY OF IMPROVED ROADS AND TROLLEYS TO SCATTER POPULATION.

In our travels through many of the medium sized cities of the different States, we have found real estate men testifying that receipts from rents of resident property near the centres of these cities had declined from one-third to one-half, while property miles out in the suburban districts was in demand and increasing in value. They have invariably attributed these results to the good roads and trolleys. These are evidently scattering population, and will, no doubt, in the future relieve the congestion of our large cities. People are finding that they can be quickly transported to these distant sections where they can have the benefit of pure air and country surroundings, with all the ennobling influences of nature. Road improvement, by which people can enjoy rapid and smooth communication, promises to be the problem that will settle many of the evils of our congested cities. The more the people who have been inhabiting the thickly settled portions of our cities, with only narrow streets and miles of brick and mortar to greet their daily vision, learn of the uplifting tendency of rural surroundings, the more they will labor to take advantage of them. They find country living much cheaper. They find they can have gardens to cultivate vegetables, fruits and flowers. They learn that their children will not be subjected to the contaminating influences of a miscellaneous population. By these aids the enervating tendencies of overcrowded populations will be arrested. The State and Nation, by the moral and mental improvement of the families, will be made very much stronger. Crime will be lessened. The expenses of government will be decreased; in fact, it is difficult to estimate the benefits that improved highways are giving to our different communities. Rural life becomes daily less and less isolated. Free Rural Mail Delivery follows the track of these hard roads, and thus the whole farm life is brought in quick touch with all our great centres.

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When improved roads become general the tendency to cluster in great cities will be arrested, and thus honest, municipal government be made possible.

HARD ROADS AND FREE RURAL MAIL DELIVERY.

The advantages of free rural mail delivery are so ably set forth in the Postmaster General's report, that we make some quotations from same, in order to show how hard roads facilitate the service and how one becomes the corollary of the other.

"The extraordinary extension of rural free delivery during the past two years has proved to be the most salient, significant and far-reaching feature of postal development in recent times. We have had other striking advances, but they have been along lines already well settled. The fast-mail service, carried to the highest attainable point, is only the logical outgrowth of the constant struggle for the quickest despatch.

"Rural free delivery has now been sufficiently tried to measure its effects. The immediate and direct results are clearly apparent. It stimulates social and business correspondence, and so swells the postal receipts. Its introduction is invariably followed by a large increase in the circulation of the press and of periodical literature. The farm is thus brought into direct daily contact with the currents and movements of the business world. A more accurate knowledge of ruling markets and varying prices is diffused, and the producer, with his quicker communication and larger information, is placed on a surer footing. The value of farms, as has been shown in many cases, is enhanced. *Good roads become indispensable, and their improvement is the essential condition of the service.* The material and measurable benefits are signal and unmistakable.

"But the movement exercises a wider and deeper influence. It becomes a factor in the social and economic tendencies of American life. The disposition to leave the farm for the town is a familiar effect of our past conditions. But this tendency is checked, and may be materially changed, by an advance which conveys many of the advantages of the town to the farm. Rural free delivery brings the farm within the daily range of the intellectual and commercial activities of the world, and the isolation and monotony which have

been the bane of agricultural life are sensibly mitigated. It proves to be one of the most effective and powerful of educational agencies. Wherever it is extended the schools improve, and the civic spirit of the community feels a new pulsation. The standard of intelligence is raised, enlightened interest in public affairs is quickened and better citizenship follows.

"The benign influences of our free institutions diffuse themselves widely and impalpably, but the arm of the Government is directly felt at few points. The mails attest the visible presence and service of the Government, and not least among the merits of the rural free delivery is its creation of the satisfying conviction in the farmer that he shares with the townsman the manifest advantages of which the Government is the direct minister. He feels that the organized and helpful agency of his country comes to his door, and the effect is to stir his conscious pride and stimulate his loyalty and patriotism.

"With all these results clearly indicated by the experiment as thus far tried, rural free delivery is plainly here to stay. It cannot be abandoned where it has been established, and it cannot be maintained without being extended. It is a service in which there can be no backward step. Those who enjoy its advantages will not consent to surrender them, and every new route creates a demand from contiguous territory for the same privilege.

"We are thus confronted with the problem of gradually extending the delivery service over the whole area of the country where it is physically feasible or where the population is not so sparse as to make it unreasonable. A project of such comprehensive and colossal character may seem formidable and deterrent, but while its difficulties are not to be underestimated, they are shown, when examined in the light of practical tests, to be far from insurmountable.

"We are now carrying the post-office to the door of 31,000,000 of people massed in towns and cities. The task before us is the more complicated work of carrying the post-office to the door of about 21,000,000, scattered over 1,000,000 square miles of territory. Its magnitude is not to be underestimated. England, France and Germany make rural free delivery, their postmen going on foot. But England contains 50,867 square miles; France, 204,092, and Germany, 208,830. We are already cover-



Georgetown Road,
Burlington county. Before improvement.



Georgetown Road,
Burlington county. After improvement. 8-inch macadam, showing heavy fill.

ing with rural delivery a larger area than England, all effected within the past two years. By the end of the current fiscal year we shall reach one-sixth of the 21,000,000 to be served. What has already been substantially accomplished is certainly capable of sixfold expansion.

"On the 1st of July, 1899, there were 391 rural delivery routes in operation. Within the fiscal year, under an appropriation of \$450,000, this number was increased to 1,214. On the 1st of July, 1900, the appropriation of \$1,750,000 became available, and on the 15th of November, 2,614 routes had been located and established, 61,979 miles in aggregate length, covering 66,842 square miles, divided among forty-four States and Territories, and serving a population of 1,801,524.

"The number of applications pending at that date and awaiting action or under investigation was more than 2,100—nearly enough to double the existing service—and every day brings more. The close of the present fiscal year will see about 4,300 routes in operation, carrying the mail daily to the doors of not less than 3,500,000 residents of the rural districts. The actual results where the experiment has been tried are eminently encouraging."

UNIFORMITY IN THE SIZE OF STONE AND MATERIAL FOR BINDER.

All the teachings of the past are that for the different courses in stone road construction there shall be uniformity in the size of the stone, in order that they may more perfectly angle together; but during the past year we have been at continual war with the crushers on account of the smallness and many different sizes of what is delivered to us as 1½-inch stone. In the construction of our road beds we demand stones for the first course 2½ and 3 inches in diameter. The stones that we receive generally approximate that size, and make very handsome and substantial foundations for the roads. But when it comes to the delivery of the 1½-inch stone for the surfacing, we have been receiving a great many different sizes mixed. This shows that the crushers are careless about the size of the meshes of their screens or that they do not pass their stone through a sufficient number of screens, or pass them so rapidly that much of the smaller material passes

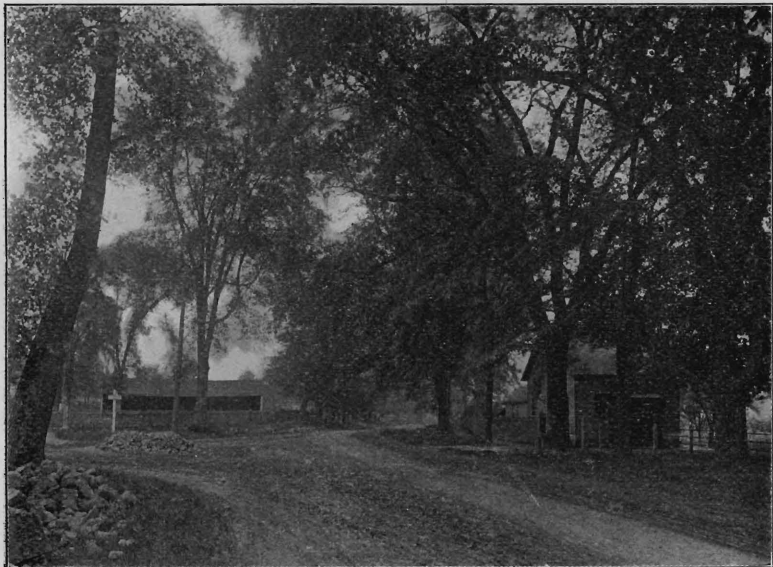
through with the one and one-half inch sizes. It has been our aim to keep the construction up to the highest standard, and in doing so we have labored to keep the sizes regular, and to eliminate from the roadbed everything but stone screenings; but the absence this year of fine dust from most of the screenings and the scarcity of water has made it almost impossible to get a bond without using a small quantity of coarse sand or ferruginous gravel. Where these have been added, construction has been very much facilitated and benefitted, and the tenacity of the bed apparently increased. Our roads have come together more quickly and the surface has not ravelled as much as where pure stone screenings alone have been used. Yet we do not consider this an argument for their universal introduction. One of the evil results of using dirt binder is that when workmen are allowed to throw in these local earths they will apply too much unless they are constantly restrained.

The merits of various materials for binders have been so often discussed and so many differing views given by engineers and contractors, we will not, in this report, venture any further opinion upon the subject.

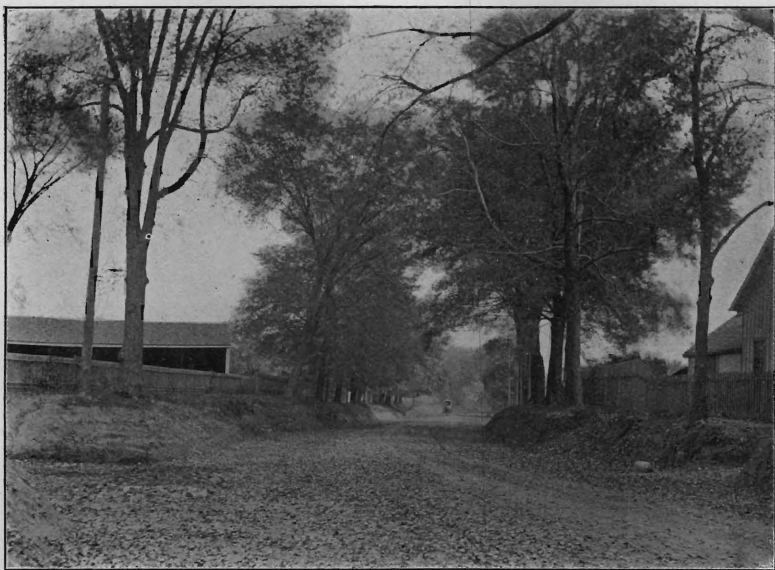
Suffice it to say, we have made many good roads without the addition of any binder other than stone screenings.

TESTING ROAD MATERIALS.

For the last few years we have been working with our State Geological Department and the New Jersey State Experimental Station to establish machinery for testing the co-efficient of wear of road stones and other road material; also their cohesive qualities and the quantity, quality and name of materials that chemically and artificially combine their different elements. The Geological Department of our State advised us to enlist the United States Geological Survey as a fitting instrument for this work, as they, on account of their large appropriations, possess sufficient means to prosecute these investigations. We succeeded in arresting the attention of this Department sufficiently to cause them to enter into a conference with the Agricultural Department. They mutually decided it was the province of the Road Inquiry Section of the Agricultural Department, at Washington, to prose-



Elizabeth Avenue.
Essex county. Before improvement.



Elizabeth Avenue.
Essex county. After improvement. 8-inch Telford. Pavement covered with fallen leaves.

cute these experiments. A like pressure was brought upon this Department from other directions, and the result has been that they have made an appropriation and are establishing machinery for testing road building material from all parts of the United States, under the guidance of Mr. Logan W. Page, Special Agent, formerly of Massachusetts Geological Survey. We think this will be of immense advantage to the different States that are entering so largely into hard road construction, and will no doubt be the means of teaching road builders how to utilize local materials by chemically and mechanically combining those found near the lines of intended improvement. Thus the cost of long transportation can be saved, and it will be possible for all communities to obtain hard roads. This service promises to be of great advantage in enabling us to cover long lines of roads through sparsely settled countries where transportation is expensive on account of long distance from railroads. These experiments, by acquainting us with a wider range of building materials, will prevent combination among our quarries to increase the price of stone. This tendency has been manifested to an unusual degree this year.

This Department will issue circulars to the different States to guide them in the selection of materials to send.

We think this a big step forward in road improvement, as we have numerous shales, gravels and other different combinations, which, when their chemical constituents are discovered and their binding and resisting qualities determined, may give us road building material at one-fourth of the cost that trap rock is now furnished for.

DEPTH OF ROADS.

Although in the different parts of the State the roads are constructed of varying depths, some of telford, most of them of macadam, our experience has been that roads constructed of six inches of macadam and fourteen feet wide are the most satisfactory for the cost, of any that we have been putting together. We would therefore advise this width and depth for all the country districts. Such roads are constructed of two layers of stone, each four inches in depth, which are supposed to be rolled down to six inches—eight inches of loose stone rolled to six inches. By this

plan roads will measure the full six inches at the end of the year when they are finally received from the hands of the contractor.

We have also adopted the system of building by blocks—by placing cubical blocks four inches in size and requiring the loose stone to be filled to the surface of the blocks.

This insures at a glance the proper depth of stone, and all roads built by these gauges have always, when plugged, measured the full depth.

MARCELLUS SHALE.

Marcellus shale is a product that lines the Delaware River from Port Jervis south for several miles, and the roads in that section are said to be the best natural driveways in the world. Several specimens of this shale have been sent to this office for examination and report. I have had occasion several times to see this material used in roadbeds, and it seems to make a hard, smooth surface. Last year a large quantity of it was used upon Central Park drives. A letter from the Secretary of the Park Board informs me that it is so satisfactory they are warranted in its adoption for general use on the park drives of that city; therefore it is proposed to use it on the drives of the Borough of Manhattan and Prospect Park, Brooklyn, during the coming year. I am informed by a contractor, and a company that is shipping large quantities to New York City, that large supplies of it can be obtained, over the Pennsylvania and Erie Railroad lines, at reasonable rates. It no doubt makes an excellent binder and a very good surface for any road. I would therefore advise experimentation with it by our different road builders.

ROAD MATERIALS.

By R. A. Meeker, New Jersey State Supervisor.

The materials used for road construction must of necessity vary greatly. The cost of transportation forms so large a part of the total cost that stone or gravel from local sources must generally be used. The best material available should be chosen, and if not very strong it will answer where the traffic is light, a greater quantity making up for lack of durability; but more labor will be re-

quired to keep the surface of the road in proper condition with a weaker material under the same traffic. Costly experience has taught us that with heavier traffic the use of the best material procurable, even at a higher price, is the most economical in the end. The stronger and more costly material may be used for the surface, the body of the road being made of inferior local stone. For surfacing the best material procurable should be used.

A good road material should be hard, tough and not affected by the weather. These three qualities are not always found together. Thus quartz, though hard, is brittle, and some of the shales and slates, though hard and tough when quarried, often disintegrate when exposed to the weather.

Another quality of importance is that of binding well, and this is rarely found in combination with extreme hardness and toughness. Materials well consolidated and united in a mass resist crushing much better than when loose, and good binding enables a stone of medium hardness to wear better than a harder stone that does not bind. The trap rocks, as a rule, have but little binding property. The detrius which is formed from their wear and in which the individual stones are bedded in the road, has no cohesion or elasticity beyond that which moisture gives it, and which it consequently loses when dry. The materials, therefore, work loose in dry weather and stones at the surface are displaced. Limestones, on the contrary, furnish a mortar-like detrius which has a strong cohesion, except when softened by excessive moisture. For heavy traffic, hardness and toughness are the prime requisites, hence the trap rocks, with the addition of proper binding material, hold unquestionably the first rank.

Granite is an inferior road material, owing to the brittleness of both the quartz and feldspar.

Gneiss, owing to its structure, is even worse.

Sandstones, with the exception of some of the Silurian group, or those containing a large percentage of iron, are generally inferior.

Gravel is extensively used in the southern portion of our State. It makes an excellent road for light traffic.

Field stones, gathered from the surface of the ground, are largely used for the foundation of the roads in the northern portion of the State. They are not used for the surface because of

their varying degrees of hardness and consequent unequal wear; hence, roads built of them alone, soon break up and lose the smooth and even surface found on those surfaced with rock of one quality.

There is but one unfailing test of the relative strength and durability of various road materials; it is that of actual wear. This test has taught us in New Jersey that trap rock is far superior to any other material we have in the State, and that whatever material may be used for the body of the road, on the score of economy, trap rock, though costly, should be used for the wearing surface.

THE MAINTENANCE OF MACADAMIZED ROADS.

By R. A. Meeker, New Jersey State Road Supervisor.

As the mileage of improved roads in our State increases, and as the years roll on, the question becomes more and more pressing: What shall we do to preserve the fine, smooth roads for which our State has gained a National reputation?

Even stone roads will wear. This wear is due to two causes, the traffic and the weather. These act together and react upon each other to such an extent that it is difficult to determine which cause produces the observed effect. Many observations and measurements have been made, by eminent engineers and road builders, of the amount and causes of wear; these results, though varying somewhat in detail, agree in the more important particulars. The causes of wear are the weather, the shoes of the horses and the wheels of the vehicles.

The weather acts to some extent directly on the materials, but to a much greater degree indirectly, by increasing the wear from traffic. Frost expands the moisture in the crust of the road, and when a thaw occurs, a general disintegration takes place, converting the surface into a stratum of loose stone into which the traffic cuts, and the surface becomes saturated with water; especially is this true where clay has been used as a binder. Wet weather, by softening the muddy binding matter, which forms, at least, twenty per cent. of the best road coverings, destroys the solidity and cohesiveness of the road, rendering it less capable of supporting the traffic, and increasing the wear from crushing and rubbing to-

gether of the stones. Rain following frost and thaw is very damaging, and alternations of these, frost returning when the disintegrated surface has been saturated by rain, will break up the thickest road-coating if the surface is once destroyed, and the drainage be defective. Violent rain on exposed situations washes out the binding and often the smaller stones as well, leaving the road rough and porous. On hills the scouring of the surface, by water overflowing from the gutters in heavy rain, causes great damage. The amount of material thus washed away from the surface, and even from the body of the neglected road, is often much greater than that worn away by traffic. Long continued drought has the effect of loosening the surface of the roads, and in many localities is even more destructive and annoying than any of the other climatic causes. The extent to which these various effects may be injurious will depend upon the nature of the road materials, on the drainage, subsoil, situation, grades and many minor or accidental circumstances.

Frost and thaw have but little effect on a dry, well-kept road, especially when built of trap.

Heavy traffic coming on a road disintegrated by frost or softened by rain increases enormously the damage originally caused by the weather.

The shoes of the horses, especially in winter, are very destructive to the surface of the road; the sharp steel caulks break up the surface, and thus permit the water to penetrate and soften the road covering.

The wheels of the vehicles passing over the road produce several effects which it is important to distinguish: First, there is the grinding and crushing action on the surface; second, the pressure throughout the whole body of the road coating. When the materials are loose and unconsolidated, either because they are newly spread or from having been disintegrated, there is the third action, namely, a displacement of them, accompanied by rubbing together of the stones among themselves. This is the cause of great wear and waste of materials spread in thick coats.

On a thick, thoroughly consolidated road there is no movement in the body, and the wear is confined to the surface. This is the most favorable condition under which road material can be subjected to wear, and it rarely occurs without the addition, to some

extent, of the third named effect; namely, a movement and rubbing among the materials, extending to the small depth to which the wheels affect the surface. In proportion, however, as it is confined to the surface will the wear be small and gradual.

Therefore, on roads of all sorts a reserve of strength, in the shape of greater thickness of materials than is absolutely necessary, is always very desirable. The wear is less under the same traffic on a stronger road, which is also better able to stand heavier traffic should it come upon it.

The amount of wear from every cause depends, of course, largely on the road material. Materials of fairly good quality, such as granite, limestone and the various hard field stones wear from three to five times as fast as trap.

Generally speaking, the wear from every cause is less in proportion as the road is kept in good condition as to surface, solidity, thickness and drainage. It is less on slight grades than on a dead level, because of the better drainage, but on hills it is increased by the effects of running water. The surface of a hill is washed clean and it looks better than the flat below on which the mud is carried down, and this often leads to the neglect of the hill until it is worn down to the rough bottom stones. There is more wear in winter than in summer, in wet situations than in dry. And last, but by no means least, when traffic follows in the same track, which it has a strong tendency to do, particularly where the surface is soft and the tracks are visible, there is a great increase of wear. In actual practice, both the wear and the thickness of roads is irregular, and if large pieces of the surface of a road on which the wear is small, and the quantity of materials to be spread is limited, are coated all over, it is certain that thickness is added to one-half or two-thirds of the surface, which is already thick enough to bear the traffic, while other parts, including weak places, must be left until their turn comes to be coated, which may be three or four years. The ordinary wear on the weak portions thus neglected is considerably greater than it would be on a stronger road, and if from the effects of heavy traffic or wet weather they break up, the extra quantity of materials required for their repair may be very large. Instead of thus always contending with a road which is in many parts too weak, the irregularity of wear and of strength in different parts of the

coating and the consequent reserve strength in some parts of the road should be taken advantage of. Materials should be spread only on the places that require them, and the whole road should be brought, as near as practicable, to a uniform strength throughout. Thus no portion of the surface is neglected, and no materials are wastefully applied to portions already thick enough to stand the traffic, while a better road is obtained with a less expenditure of materials. In spreading new stone, the old-fashioned way of waiting until the road has lost its shape and then spreading a thick coat over a large surface, and leaving it to be worked in by the traffic without farther care, should never be followed. A good deal of the new material is thus wasted by being ground up and crushed before it is consolidated, and when at length this has been effected, at great inconvenience to the traffic, the surface of the road will be left irregular and out of shape. The materials necessary to replace the wear of any ordinary traffic can be spread in comparatively small quantities, where hollows or weak places appear, or where required to keep the cross-section of the road in good form. If they are laid in small patches and with care, the inconvenience to traffic will be scarcely noticeable. It should be remembered that until the newly-spread stones are consolidated, the operation is not completed, and if the task of working them in is left to the public, it is only right that the process should be rendered as easy and speedy as possible, by good arrangement and care in spreading the materials and by attention to them after they are spread.

On a road maintained in good repair, under a good system, there are no holes, ruts or long hollows worn by the wheels or the horses' feet, but only irregular depressions or slacks in the surface which show where fresh material should be applied. They are more or less rounded, undefined in outline, less than an inch deep in the middle and shallowing gradually towards the edges. Considerable care is required in determining the size and shape of the patches of stone to be spread in these hollows, as both a good result and economy of labor and materials depend upon it. Inexperienced workmen are inclined to lay stones in rectangular patches, with more regard to the neat appearance of the newly-spread stone than to the needs of the road. Parts of round or oval-shaped hollows must thus be left uncovered, or fresh stone

must be spread where they are not required. The angles of a square patch are very liable to be knocked away, and if the stones are not wasted in this way, they do not set so quickly as if laid in a rounded form. If the ends of a patch be made in the form of an oval, more or less pointed, the traffic will wear it in from the sides, and on a hill the water will be diverted towards the sides of the road instead of running into the stone, as it does with a square-ended patch. Care should be taken to cover the whole surface of a hollow so as to leave no place where water may lodge. The object should be to give the surface, after consolidation, as nearly as possible the regular form due to the cross-section of the road. If from neglect or bad management, long ruts or large hollows have been allowed to form, they should be repaired in short lengths and one part at a time. Wagons avoid long strips of stones laid in a hollow worn by wheels, and soon make another rut alongside. Laying a long strip of materials on the middle of the road diverts the traffic to the sides, which are sure to suffer a good deal, and may be entirely cut up before the stones in the middle are worked in.

On steep hills, coating from side to side is an unnecessary inconvenience to traffic. One side should be coated first and the other left until the stones are partially consolidated by the descending vehicles. A thick coating should never be laid on; a layer one stone in thickness, the stones being laid sufficiently close to support each other, is almost always enough, and if not, one layer put down upon another when it has almost worked in will give any thickness required.

On roads of considerable thickness, where the surface is hard and the materials tough, picking up of the surface is sometimes useful, the object being to secure a quicker consolidation. Loosening to about one-half an inch in depth is sufficient. The tendency of workmen is to pick up too deeply.

The use of a binding material in road maintenance, when the stones are applied in thin coats and small patches, is seldom necessary or desirable. The road has in it already more than enough small stones and detritus to fill up all interstices, and in the damp weather in which stones should be laid, there is generally little difficulty in getting a layer one stone thick to work in without any binding.

When large quantities of stone have to be laid on a road carrying a large traffic, the use of binding will ease the traffic and cause the new material to consolidate more quickly. A good, clean binding material must be used, evenly spread, and in dry weather watered. Too much binding, or a material of a muddy character, will make the road soft and weak. On roads with light traffic, exposed to heavy rain, sweeping winds or long continued drought, a binding material may be used with advantage. The consolidation of the stones after they are laid can be greatly aided by attention on the part of the supervisor. The sooner they are consolidated the better they will wear, and a little care bestowed on newly-laid patches will save much work and material afterwards. Ruts, which always have a tendency to form in newly-spread materials, especially if more than one stone thick, should be effaced by raking across, backwards and forwards. However carefully patches are laid, stones, especially around the edges, will be displaced; they should be put back, as single, loose stones are dangerous to the traffic, hurtful to the surface of the road and liable to be crushed and wasted. If consolidation does not appear to commence, a little small stuff scraped from the surface of the road may be applied as a binding material, especially around the edges of the patch, where the old surface may also be slightly loosened with the pick. The proper season for laying the bulk of the fresh materials is in the autumn and early winter, as soon as the surface of the road becomes softened by the fall rains. Materials laid at this season consolidate more quickly and become more thoroughly incorporated with the body of the road, and hence are less liable to become loosened in dry weather.

There is one other point of great importance in the maintenance of a road—that is, the removal of the detritus resulting from the wear of the materials. This wear may be increased two or three times on a badly drained road; in fact, other work and care are almost thrown away on a road upon which the drainage is neglected. The good drainage of the surface depends upon the preservation of the cross-section with sufficient and regular fall towards the sides, so that the water may not stand in puddles. A smooth and even surface is of greater importance than any particular form of cross-section; the latter may be varied, within certain limits, to suit the situation, and the degree of convexity will

always be changed more or less as the maintenance goes on, but a smooth surface to throw off the water is essential. The water should reach the gutters on the sides as quickly as possible, without gullyng the shoulders. On a level or very light grade, the wash from the surface of the best kept road will settle in the gutters and afford a soil for the growth of grass and weeds, and obstruct the flow of water. On steep grades the gutters often become stopped; when this happens, the water overflows the surface of the road and damages it. Slight but frequent attention is therefore required to maintain the flow of the water from every portion of the road, by removing obstructions from the shoulders and gutters. The scouring of the surface on hills, which is often the cause of great damage, must be guarded against beforehand. Every beginning of a water course or gully must be checked, and all points where water usually breaks out from the gutters, or where outlets or drains get stopped, should be watched and receive attention at once in heavy rains. Outlets and drains should always be cleaned after a storm, for, if another storm finds them unopened, great damage often results from the neglect. A thorough clearing out of all gutters, culverts and bridges should take place in the fall, as soon as the dry weather is passed. If all silt and road dirt are then removed down to the hard bottom, leaving nothing to give a hold to grass or weeds, this will, in the majority of cases, be enough for a general cleaning up. All ditches and lateral drains should be carefully cleaned out and opened, every precaution being taken to remove all water from the line of the road as soon as possible. No water should be allowed to stand in any gutter along the road, as the injury caused by it to the foundation is very great.

The pith of the matter is—good roads require constant attention or they will cease to be. This fact can not be too often repeated or too strongly dwelt upon.



Woodbury and Knight's Run Gravel Road,
Gloucester county. Before improvement. Sinking water pipe. Clark's Hill
looking north.



Woodbury and Knight's Run Gravel Road,
Gloucester county. After improvement. Clark's Hill looking north.

COMMISSIONER OF PUBLIC ROADS.

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SOME STATISTICS OF CROSSWICKS ROAD.

How it was Macadamized.

The following data by a daily observer will describe to the inquirer somewhat of the minutiae of road building:

"The Crosswicks stone road is four miles long and took four months, or 109 working days to build. The roadbed, on hard gravel, was levelled and well rolled down with a fourteen-ton steam and a four-ton horse roller. It was well shouldered, and four layers of stone of different sizes, ten inches in all, were pressed down to six inches, making a substantial and good job.

"There were two water tanks, holding 1,700 gallons each, which made three trips each per day, and about 457,800 gallons of water were used in soaking in the two layers of very fine stone. There were 21,325,600 pounds, or 10,662 net tons of stone used. This required 355 railroad cars to haul it to the station, and 5,325 wagon loads of two tons each, to distribute it on the road. The contract price was \$24,836; the whole cost to the county was about \$28,000.

"The steam roller was hired at \$15 per day and consumed thirty-four and a half tons of coal."

SOME POINTS IN STONE ROAD CONSTRUCTION.

By Wm. R. Lippincott, Civil Engineer, Mt. Laurel, Burlington County, N. J.

Nearly all the improvements that have lightened the toil of the human race, and conferred lasting benefits upon mankind, have been coldly received at their beginning, and the stone road has been no exception, even in the county of Burlington. Now that the stone road has become a permanent thing, no farmer who uses it would be any more willing to go back to the old road system than he would be to exchange the mowing machine for the scythe, or the self-binder for the sickle. The Arabs have a saying "that he who drinks of the Nile must ever after thirst; that no other water can ever again quench or satisfy." So, whoever

has enjoyed travelling over the improved roads can never again be content to plod through mud and sand. With many of the roads first constructed under the stone road law, straightening crooked places and grading down the hills was not deemed so important as at present. Stone roads are a permanent improvement, and the money spent in proper grading at the start may remedy what might seem a great defect in the finished road. The heavily loaded teams appreciate the reduced grade, and no driver ever wishes the hills could be restored. Engineers, to avoid contention with property owners, who are unwilling to make the least sacrifice for the public good, have made little crooks or ascended little hills, thus in some cases have left defects to forever mar what might otherwise have been beautiful roads.

The roadbed and its preparation form a study, and in the process of excavation many changes in the ground and drains are frequently found necessary that were not contemplated by the engineer in making his survey. In rolling the roadbed, depressions are sometimes made in apparently solid ground through the cuts, while the fills will form a solid roadbed, owing to the loose dirt being closely packed by continuous driving over it during the process of filling. Much of our Jersey soil forms an excellent foundation for improved roads, and it is surprising how well even the loosest sand answers for that purpose. One of the most satisfactory sections of road completed last summer in Mount Laurel township, was built upon sand *so loose that no shape* could be kept to it when a team to unload ballast was driven over it, and yet that very part became more solid, and, when raised to the required height, retained its position better than the road upon firmer ground. In filling low sections where sand can be obtained from grading the hills, it seems desirable to utilize it as far as possible next to the roadbed, thereby making a dry foundation for the stone. On the question of material for binder: Pure stone screening has been solely recommended, but our experience and that of many road builders is that good gravelly loam mixed with screenings gives more satisfactory results. This combination when moistened and rolled, seems to possess strong welding qualities for the broken stone. Good gravel for this purpose is found along many of our Jersey roads, and where it is not contiguous to the work, can generally be obtained by hauling a short distance.



High Street,
Burlington city, Burlington county. Before improvement.



High Street,
Burlington city, Burlington county. 6-inch macadam. After improvement.

For the first rolling of the ballast stone, light-horse rollers seem most desirable, as they are more easily managed on the loose stone and the required slope is more readily maintained, leaving the road in better shape for the second course of stone. On the second course the steam roller comes in admirably, and, when properly managed, seems to be the right thing in the right place, but unskillfully handled, soon obliterates every line of symmetry and beauty, and leaves the new road almost as flat as the old roadbed. This sometimes occurs when the ground happens to be too wet, or when the roller is not properly run from side to centre.

The roller and the sprinkler play an important part in stone road construction, and light summer showers often mean dollars to the contractor in the amount of labor saved. Last summer we had many such showers in our section, just enough to wet the road nicely and not enough to stop the work, and the portion of our roads built during that period maintained their height, and readily knit together and became hard, forming a striking contrast with the portions built later on during the wet weather of the fall, when an equal amount of rolling failed to produce such satisfactory results in hardening the road.

During the past summer I was frequently called to notice important points by the supervisors who gave their work such constant attention and such watchful care that most excellent construction was the result on all the roads built the past season in Mount Laurel township.

Coating the finished road with gravel appears to be an excellent method to prevent ravelling; in fact, gravel appears to play an important part in road preservation, as well as in road construction. In resurfacing roads it is very desirable to get the best quality of gravel, even if it has to be hauled quite a distance, in preference to using poor quality that may be near at hand. Avoid gravel with too much clay, for in wet weather the wagon wheels pick up the clay, carrying the loose stones with it. When sandy, gravel is used during a continuous dry spell of weather it is ground into dust and carried off by the wind. There is a kind of red-colored gravel, sometimes used on the roads in Chester township, and in other places, which seems to pack very hard and remains a long time on the surface, sustaining a great amount of wear.

While an advocate of stone roads, I think there are many localities in our State, distant from railways, where short gravel roads could be built at small expense that would afford good facilities for farmers to reach the stone roads that lead to important towns and cities. The gravel road from Ballinger's Mill to Piper's Corner is a good illustration. This road is an outlet for a good farming section in Shamong township, and forms a connection with the macadam road to the city. Before this gravel road was built the old highway was a hilly, sandy one; now the cuts range from six to ten feet deep. This grading was done gratuitously by the farmers of Shamong, in order to secure better means of communication, and they well deserve whatever aid they have received from the county and State in constructing a road of which they may justly feel proud.

A certain writer has said, "The history of the road is the history of civilization," and it is well to consider how New Jersey's interests may be further advanced by her improved system of roads. Many farmers will contend that these roads have not increased the value of farm property, but have been the indirect cause of the low price of farmers' produce. A careful review of all the circumstances in the case indicates that these roads are bringing about a more prosperous condition. Take, for instance, the road from Merchantville to Vincentown, perhaps the longest continuous stone road in the State. It has been built about six years, and has become a great artery of travel for a wide extent of very good country. If you were to take Vincentown as a centre, and with a radius of ten miles describe a circle, you would include but a small amount of the territory for which this road is the outlet. A large area is made tributary to the main roads running in on each side as it runs its course to Merchantville. Sum up the number of square miles in this area and it will embrace acres enough for a Principality, and include wealth enough for a Prince. Then take your station on this road, near Merchantville, some afternoon in trucking season when teams are coming down in a continuous line, and ask yourself the question, do the teams and their loads indicate poverty or prosperity throughout the section whence they came? You would solve the problem by answering to yourself that the owners must certainly get money somehow from the farms for the poor teams in the line

are exceptions, the good ones a marvel in numbers. Some of the horses, gaily decked out in beautiful heavy harness draw heavily loaded truck shelvings that glisten with varnish and gilt and look more like the car of State of some East Indian nabob than the every-day outfit of some unpretending farmer. The teams and their loads look as if they came from a land where crops were as bounteous as those spoken of in Genesis, where Joseph gathered corn in Egypt during the seven years of plenty to fill the granaries of Pharaoh. Remember that stone roads have not had an existence of many years in this section of the country yet many improvements are following in their train. Free mail delivery and trolley lines are the accomplishments of stone roads. Increase in population and easy facilities of communication extend the circle of improvement and a gradual rise in real estate must be the consequence. Strangers who come to Moorestown speak of the improved roads that extend in almost every direction and express surprise that farm lands sell so reasonable in a neighborhood offering so many advantages. New Jersey lands need booming. If they were advertised like those in some of the Western States they would command large prices.

John J. Ingalls, late United States Senator from Kansas, in an article published in 1893, says, "Much of the prominence of Kansas is due to the novel and startling methods employed by its journalists to invite public attention to the opportunities found there for success and happiness." The same advantages might be more truthfully advertised in New Jersey. Much of the success of Atlantic City is due to its easy and rapid communication with almost every part of the country, not omitting the road for carriages, bicycles, automobiles, etc., that extends from Camden, and land along the ocean front could hardly be exceeded in value by Sinbad's famous valley of diamonds.

It would not be surprising to see the automobile become an important factor in transportation, the stone road being at once its cause and its consequence, and the horseless carriage for public accommodation will soon be a connecting link from town to town.

History tells us that the old Roman roads were one of the strongest ties that held the Roman Empire together for so many generations, and in later years were of great benefit to the com-

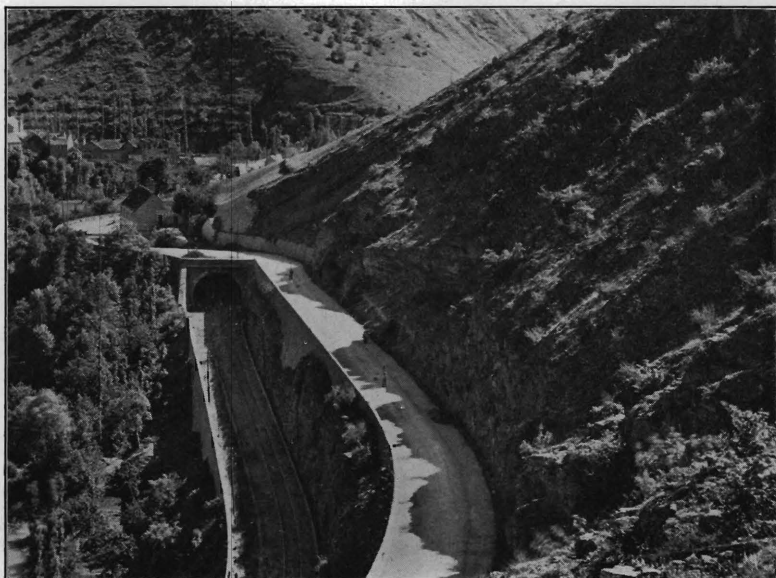
mercial interests of Rome. We can only wish that the stone roads of our country may stand like those of Rome, and that our nation, unlike Rome, may never fall.

LOCATING COUNTRY ROADS.

It may be safely stated, without any exaggeration, that a large proportion of all our roads are *poorly* located, that very many are *badly* located, and that a small portion follow about the worst courses that could be chosen for them. Such a condition of affairs of course is not always due to the deliberate choice of the villages, hamlets and towns through which they pass, but is the result of circumstances. The roads have, in fact, grown up with the communities, to form connecting links between farms and growing settlements, and hence they curve and bend and twist, this way and that, and are older than the large towns which have grown up along them.

In other cases, however, roads have been formally laid out under some official form of procedure, and are still but little, if any, better than the ones which "just grewed." The "viewers" who select and recommend the routes are moved frequently by personal considerations, by friendly feeling for neighbors who will be affected, and other local influences, and very easily, and all too frequently, divert the roads from their proper courses. They seem to feel that their immediate local influences are the only ones concerned; they have little regard for the rights and needs of the traveling public, and entirely fail to realize that not only they, but all who use the roads, will be obliged to travel circuitous routes and clamber up and down hills, at an enormous loss of time and energy, *for all time to come*, as the result of their mistaken and shortsighted policy.

The importance of locating a road correctly at the outset, by means of thorough examination of all the considerations involved, and according to competent surveys, can hardly be over-estimated. Of a truth, "time is money," and grades and square corners constitute heavy and perpetual taxes on all who use the roads. Whenever a road climbs directly up a steep hill, where it would be possible to skirt its edges or follow the valleys, or make a gradual, winding ascent, it imposes a perpetual *hill tax* on the



A Fine Piece of Road in France.

[Photo loaned by Dr. J. Gifford.]



A Brick Road in Holland.

This kind is very common, bricks of large sizes laid edge up. Woman with white head collects toll.

[Photo loaned by Dr. J. Gifford.]

public and whenever roads cross each other at nearly right angles, as is usually the case, they add largely, often 20 per cent., to the actual distance to any point situated in a diagonal direction. This is perpetual *square corner tax*.

When roads are improved it is often entirely practicable to relocate them, or at least such portions of them as are most objectionable, and yet it is extremely difficult to induce those interested, or those in charge, to make such desirable improvements. So many persons are always to be found who imagine that their interests would be affected adversely, and so many more are doubtful of the advisability of doing differently from the way they have always done, that nothing is apt to be accomplished. In Northern New Jersey the roads of one of the finest counties illustrate excellently the disadvantages of hosts of country roads. Before the work of macadamizing was begun on a large scale General Stone inspected the ground, and found that many roads ran over hill after hill, when often they could have skirted the hills and followed the valleys, saving both distance and grade, while one principal road, connecting a village with the county seat, seven miles distant, and *in the same valley*, ran over four great hills. He figured that this township, "at the low estimate of half a ton per acre carried annually, out and in, and at the rate of one dollar per ton extra for the hills, pays a hill tax of \$7,000 per year on its 14,000 acres. At the same rate for the other hill townships, the total tax is over \$100,000 a year."

WASTE OF POWER ON GRADES.

In nearly all of the older parts of the country it is common to find the roads wending their way from place to place in what seems to be an utterly haphazard manner, bending and twisting, in order to reach certain points, and yet often climbing straight up and over steep hills, which could be wholly avoided. When a hill is reached it is usually attacked in the most direct manner, much as if the shortest way would always prove to be the best way. But this is far from being true in road building. It does not appear to have occurred to our road builders that it is harder to raise a team and load one foot than to move it three feet on the level, and that consequently, less power is expended in going

three miles around a hill than one mile up it. Moreover, it is much harder and more expensive to keep hilly roads in good repair than level ones, and not only is energy wasted by all persons who use such a road, but energy will continue to be wasted by all who use it for years, and perhaps centuries, to come. Then, too, every wagon must load for the steepest hill on its route, and, hence, only half loads can be carried. The waste of power and energy that results from all these causes is simply *enormous*.

In England and on the Continent, notably in France and Germany, great attention has been paid to road construction and maintenance, especially during the present century, and experience has shown what is best in these particulars. It has been found that the maximum grade that can be used economically is what is called 4 per cent., and strenuous efforts are made not to exceed such a grade. A 4 per cent. grade is one that has a rise of one foot in twenty-five, or four feet in a hundred. Of course, in very hilly and in mountainous districts this grade is necessarily exceeded, and in the most extreme cases may reach one foot in ten, or be 10 per cent. But if a grade is only 2 per cent., the power required to haul a load is twice as great as when the road is level; when it is 4 per cent., the necessary power is three times as great; when it is 6 per cent., it is four times as great, and when it is 10 per cent. it is six times as great, and the size of the load is always proportionately less.

The following table, from Shaler's "American Highways," shows plainly the effect of hills, the power required for hauling on different grades, the equivalent length of hill roads in level roads, and the load which a horse can haul on each grade. It deserves careful study:

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Rate of Grade in feet per 100 feet in length.	Power Re- quired in pounds to haul one ton on Grade.	Equivalent Length of level road for same expenditure of power in miles.	Maximum Load in pounds which a horse can haul up the given grade.
0.00	45.00	1.000	6,270
0.25	50.60	1.121	5,376
0.50	56.20	1.242	4,973
0.75	61.80	1.373	4,490
1.00	67.40	1.500	4,145
1.25	73.00	1.622	3,830
1.50	78.60	1.746	3,584
1.75	84.26	1.871	3,290
2.00	90.00	2.000	3,114
3.00	112.20	2.484	2,486
4.00	134.20	2.982	2,083
5.00	157.00	3.444	1,800
6.00	179.40	3.986	1,568
7.00	201.80	4.844	1,367
8.00	224.20	4.982	1,235
9.00	246.60	5.480	1,125
10.00	269.00	5.977	1,036

In this country so little attention has been paid to this subject that the roads lead over many steep hills, when they could readily wind around them at much saving of power. In fact, 10 per cent. grades, on which but one-sixth of a level load can be carried, are common on main roads, which are used by heavy traffic, and even 12 and 15 per cent. grades are not uncommon. It is very difficult to secure the re-locating of old roads, but they can generally be thoroughly graded, using the earth from the ridges to fill up the depressions, and new roads should always be located and constructed by competent engineers. In these ways, much improvement can be made, and a saving effected by the entire community.

TOWNSHIP STATE AID LAW.

The people are slowly beginnig to understand the advantage of the Township State Aid Law. By it two small pieces of road have been constructed in Mercer county, one in Sussex county and some small pieces in other counties are being prepared for construction under this law.

In my last fall inspection of roads through the northern and southern portions of the State, I was accompanied by a celebrated Massachusetts road man, and he was continually expressing his surprise at the numerous improved roads that he saw at every turn. He frequently expressed himself in this way: "Why, you seem to have all your roads improved; you cannot drive in any direction without striking improved roads; surely New Jersey's reputation for good roads is not misplaced, for one has but to make continuous journeys to see that the people are wonderfully blessed in that direction." And so it is. Nearly all the cities and towns are now connected, and it is possible for the majority of our market teams to have much of the toil of their journey lightened by the hard roads over which they may travel. But when we consider that there are still eighteen thousand miles of roads in the State that would be benefitted by enlightened treatment, it will be some time before the mission of the State Aid Law will be consummated.

NATIONAL HIGHWAY.

By General Roy Stone, for a Number of Years the Head of the Road Inquiry Department of the United States.

Suggestions for Broadening Road Improvements.

"I would be glad if I could trust myself to advise you as to the line of action you should take in promoting road improvement. It would seem as though you might wisely take up some of the larger problems which we have considered, but which were beyond the means at our control. In this great country it is often easier to do big things than small ones. You have only to catch the public fancy and stir up public sentiment, and unlimited means are placed at your disposal.

"There are three great enterprises in connection with the good roads work, any one of which is worthy of your consideration.

"Three years ago, when the price of steel rails was below a cent a pound, we were on the point of success in introducing the general use of steel tracks, but for the lack of \$2,000 or \$3,000 to pay for the new rolls to make special shapes of rails we were

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compelled to patch up our specimen tracks from shapes already in the market and thus failed to make them succesful and attractive. When steel comes down again to normal value, it becomes the logical and necessary road material. All the considerations of easy traction, cheap maintenance and even of moderate first cost are in its favor.

"A second great departure which many of us have advocated looks to the provision of vast sums of money at very low rates of interest for the general construction of highways throughout the country. It involves the establishment of postal savings banks and the loan of their funds, or on county bonds issued exclusively for road improvement and guaranteed by the State, the rate of interest to be no more than that paid by the government on deposits—possibly 2 per cent.—the government gaining its compensation in the improvement of the highways and the better and cheaper transportation of the mails.

"The campaign for postal savings banks is already half won, and the only serious drawback to it is the difficulty of a lack of the proper investment of the funds. No investment could be safer than that in public roads, which add at least tenfold their cost to the value of the property which is pledged for the debt. The small interest charged could in most cases be taken out of the present amount of road taxation and still leave enough to keep good roads in order, so that the great result of good roads everywhere would be brought about without a perceptible increase in taxation, while their benefits would be accompanied by that increase of rural thrift and economy which would result from an extension to all the agricultural regions of convenient savings institutions and the saving habit.

"There are two or three minor measures of great practical value in the gradual development of road improvement such as strengthening and broadening the work which the department of agriculture is doing through the division of road inquiry, in order that the larger educational work may be done both in the literary department of the office and in the object lesson work of road construction; such again as developing the employment of convict labor in the preparation of road materials in quarry camps, where the convicts can be guarded and secluded as well as in prisons and where they can have a healthful occupation,

non-competitive with free labor, and such finally as the promotion of State aid to road building under which the most substantial progress in road construction has so far been made.

"But the third of the grand undertakings which I would like to commend to you is the construction of a great national object lesson in road improvement and in the advance of value due to good roads. It is the building of a national highway across the continent and along both its shores. Such a highway extending for instance, through all the great coast cities of the continent, branching north and south along the Pacific, would traverse or touch two-thirds of the States of the Union. It need not be built by the general government except through Indian reservations and public lands, where the government itself would reap the profit in the advanced values. Each State could build its portion as a part of its own system and its own object lesson in road construction. The national supervision would insure the proper location and connection of the different State sections in order to form a continuous and well located through line. Such a highway would be the great thoroughfare of business and pleasure travel for vehicles of all kinds. It would soon be lined with villages, villas and model farms throughout its entire length, and the advance in property values would be so plain that 'he who runs may read.'

"A project so vast may seem like a vision of dreamland, but in all its vastness it is only a fraction of what already has been done in the construction of our continental railways, and it is no more than a fitting adjunct or sequence of the great transformation of travel which the successful advent of the automobile has wrought for the future. Such a field for your vehicles would multiply their use a hundred-fold. Road and vehicle would fit each other, and together they would worthily signalize the advent of the twentieth century."

ADVANTAGES OF GOOD ROADS AND LOSSES FROM POOR ONES.

The splendid road conditions existing on the continent of Europe can be duplicated here. The question is one for the people themselves to solve, and it is actually being solved in the United States to-day by the voluntary action of communities in various sections of the country.

For example, I heard that there were some especially good stone roads being constructed in the State of New York, so I went there myself, and to make sure that I should make a thorough test I went in the midst of a January thaw. I got a pair of horses and a light buggy to test other roads around the country and I found that with a great deal of difficulty I could drive over them.

But in the section where the farmers had been building the stone roads I found that two tons of hay were being hauled with two ordinary horses on a common narrow-tired wagon. I said to the farmers: "How did you get started in this business of building roads?"

They said: "We started it ourselves. We thought we could do something as our fields are full of stone, with stone fences along the road, so we scraped together enough money to buy a rock crusher, hired an engine to run it and arranged to bring in the stones and haul back the crushed stone."

They have actually gone so far as to petition the Legislature for the privilege of increasing their taxation beyond what the law allowed, and the result is that all the farmers in that township are anxiously waiting for the roads to be extended into their particular neighborhoods.

I said to them: "Doesn't this pile up your taxes?" "Why," one farmer said, "in this one week, by the advantage of having these stone roads and getting to market with my hay, when it sells at a good price, my teams have earned \$5 every day, while my neighbors' teams on the other roads are eating their heads off. We could not afford not to have these roads; we do not care anything about the taxation."

Taking the proper cost to be the present cost to the farmers in the good-roads district of New Jersey, where there are actually as good roads as are found in any part of Europe, I found that the cost of hauling over the ordinary roads of the country is just about three times as much as the cost of hauling over good stone roads. Where a load is three tons on good roads it is one ton on the average farm roads.

The actual cost of moving products is not the only loss by bad roads by any means. Farmers lose by not being able to get to market when the market is good, by the waste of products that

cannot be marketed at all on account of bad roads, by not being encouraged to cultivate things that require a speedy market, and in a great many other ways.

One reason why the boards of trade and the commercial bodies in the United States are getting interested in good roads is the fact that the whole business of the country is suffering for the want of them.

Take the State of New York, where agriculture ought to be more prosperous than in any other State of the Union. The great cities and towns of the State would make a home market for more than its farms can produce; but for the want of good roads, reliable all the year round, the New York farmers have no command of their own markets, and the produce dealers, even in the interior cities and towns, have no certainty of a regular supply from the surrounding farms and are therefore obliged to have recourse to other States and Canada for their supplies.

The farmer, when he is able to get to market, generally finds it forestalled and himself obliged to ship to some distant point, while the farmers along the railroads of the Far West or on the good wagon roads of Ohio, Indiana, New Jersey and Canada are supplying his home market.

TAR MACADAM.

Mr. William L. Dickinson, President of the Connecticut Valley Road Association, Springfield, Massachusetts, has been making a tour over New Jersey and other parts of the country. Among other experiences obtained in a three thousand mile trip in Canada, he learned of a system of road building in Hamilton, Ontario, which seems to promise great things, and which he believes could be employed to immense advantage in any city. It is a process of using coal tar as a binder, and it has proved so satisfactory that many miles of streets have been thus treated. Mr. Dickinson says such streets have the general appearance of an asphalt pavement, are nearly smooth, cost only eighty-five cents a square yard, remain in a perfect condition for years, are never dusty or muddy, and the foundation stones never work to the surface. He made a close examination of

these streets and interviewed the men who made them, and was pretty well convinced that the experiment could be tried in any city with success and economy. This method has been in practical use in England for several years, but Hamilton is the first city on this continent to successfully lay a large mileage of this form of roadway.

This city commenced to experiment with coal tar as a binder fifteen years ago, and this year the first extensive repairs were made on the original streets laid. However, the officials in charge of the work have profited by the experience of the past, and the method employed at the present time is a great improvement over the old.

Experience has taught them that in order to do perfect work and have a uniformity in the coal tar used, it must be refined properly. The tar must be pure coal tar, free from all foreign substances and containing not more than 5 per cent. of water, and shall contain an analysis not less than 55 per cent. of pitch. Great care must be taken when mixing the tar with the broken stone and placing the stone in position; also, with the rolling and the final mixture for binding on the surface. In fact, the successful construction of this form of roadway calls for expert work. Cities and towns that contemplate doing this work will regret it if they allow inexperienced road builders to experiment with it. The cost of new construction in Hamilton is 85 cents per square yard. The cost of material and ordinary labor for this work is as follows: Broken stone, 95 cents per cubic yard; coal tar, \$2.60 per barrel delivered on the work; labor, 18 cents per hour.

The advantages of this form of roadway are its low cost, its durability, the fact that the use of coal tar as a binder renders the roadway impervious to water, frost proof in winter and prevents mud and dust and loose stones in summer. It makes a smooth, clean, comparatively noiseless, attractive roadway, while the ordinary stone and sand binder in general use in this country soon wears badly under traffic, making mud or dust, and soon allows the larger stones to loosen.

Without a doubt the experience of Hamilton with coal tar as a binder for macadam roadways furnishes conclusive evidence that it is well adapted for the residential section of a city when the

travel is moderate and not confined, but it should not be used where the traffic is heavy or where there is a car track in the center of a street of ordinary width.

The successful use of this form of roadway in Hamilton is attracting attention from far and near. Hardly a day passes without the city being visited by expert road builders seeking information.

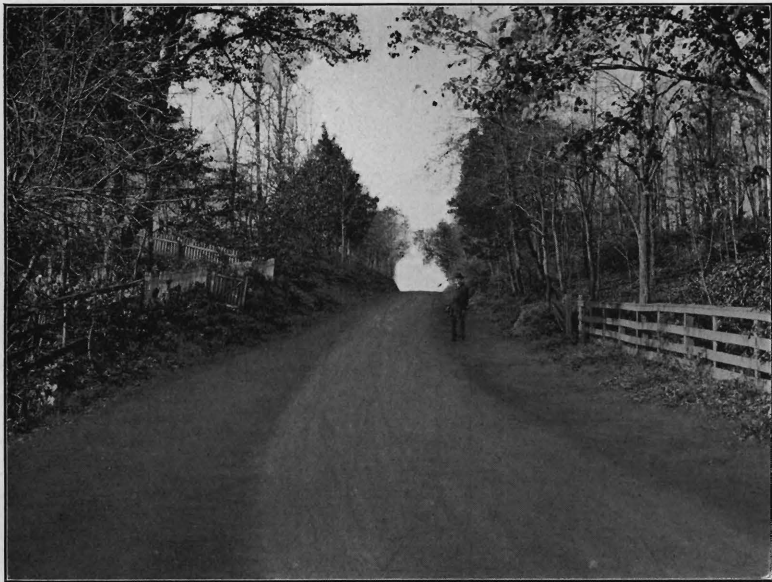
HISTORY OF EARLY TRANSPORTATION.

Packsaddling Across the Allegheny Mountains.

Fifteen Miles a Day Were Made by a Horse Carrying Two Hundred Pounds Burden.

Time was when naught but Indian trails led from the East across the Alleghenies to the "Forks of the Ohio," says the Pittsburgh Dispatch. Then these trails became the paths over which passed the packhorse trains, which in the pioneer days of Pittsburgh supplied the few settlers here with the necessities of life and kept them in communication with the outside world. In view of the wide contrast between this early method of traffic and that of to-day it may be interesting to know that a train of packhorses consisted of from five to a dozen and even more, tethered by a hitching rope one behind the other. The master of the train rode before or followed after the horses and directed their movements by his voice. About fifteen miles per day were traveled in this manner, and each horse carried about two hundred pounds burden. The harness consisted of a packsaddle and a halter, and the lead horse often, in addition, a circling band of iron over his withers from the saddle and to which were hung several bells, whose tinkling in a way relieved the monotony of the journey and kept the horses from going astray and also furnished a sound that called the young towheads to the door of the cabin when it came within hearing.

The packsaddle then in use was a piece of mechanism difficult to describe, but quite easily constructed. It was made of four pieces of wood, two being notched, the notches fitting along the horse's back, with the front part resting upon the animal's with-



Sweetman's Lane,
Monmouth county. After improvement. Macadam, 10 feet wide, 6 inches deep.



Tenant Station Road,
Monmouth county. After improvement. Macadam, 10 feet wide, 6 inches deep.

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ers. The other two were flat pieces about the length and breadth of a lap shingle, perhaps eighteen inches by five. They extended along the sides and were fastened to the ends of the notched pieces. Upon these saddles were packed all kinds of merchandise. Bars of iron were bent in the middle and hung across; large creels of wickerwork containing babies, bedclothing and farm implements, as well as kegs of powder, caddies of spice, bags of salt, sacks of charcoal and boxes of glass, were thus carried over the mountains.

Shopkeepers from Pittsburg went to Philadelphia in squads of eight or ten to lay in their yearly supply of goods and brought them to this city in this manner. Members of Congress thus traveled to the seat of government, and every traveler had a pair of saddlebags, wherein were carried money, clothing and other necessities. This mode of travel was in general use until near the close of the last century, for even east of the mountains carriages did not come into general use until about 1785.

It can scarcely be said that roads were established in this section until some years after the close of the Revolution, although the old military roads, those constructed by the armies of Braddock and Forbes, gave this section some advantage in this direction. However, the fact remains that the packhorse was the pioneer in transportation from the standpoint of commerce, and even after the construction of the early roads which connected Pittsburg with the East this primitive system did not at once die out. By 1789 the old military roads had become almost impassable, and finally about 1790 the old State road was completed between Pittsburg and Philadelphia. Although the old artery of travel and traffic has long ago gone into disuse, its tortuous windings are to this day discernible along the rich hillsides and through the valleys of Allegheny and Westmoreland counties, and in the woodlands of the mountains farther east. It was on this road that packhorses, strong wagons and mail hacks first ran with anything like regularity. Roads were soon built between different points in Western Pennsylvania, and villages began to spring up at various points.

About the opening of the present century the old Pittsburg and Philadelphia turnpike was opened, and soon the "Northern Route," as the turnpike by way of New Alexandria and Ebens-

burg was known, was opened. For the construction of all of these roads funds were appropriated by the State, and they were maintained by means of toll. About this time the question of a national highway from Cumberland to the Ohio began to receive attention, and such men as Henry Clay advocated the idea in Congress. The result was that the national road was built, and it proved a great boon to the Upper Ohio Valley.

In these days of cheap travel and cheap freight rates, now as low as one-half cent per ton per mile, it may be interesting to know that in 1784 the rate from Philadelphia to Pittsburg by packsaddle was twelve and a half cents per pound, while in 1786 a rate of \$10.50 per hundredweight was charged for the same distance. The rates in vogue on the old pikes and on the National road were, of course, not so high, but considerable as compared with this latter day economy.

SOME OLD TIME ROADS.

How the Taxes Were Collected to Maintain Them.

Previous to 1675 and 1676, when the Legislature adopted some general regulations for the opening of roads, the only road laid out by Europeans, within the limits of New Jersey, appears to have been that by which the Dutch at New Amsterdam communicated with the settlements on the Delaware. It ran from Elizabethtown Point, or its neighborhood, to where New Brunswick now stands, and was probably the same as that now (widened and improved) known as the "old road" between those places.

At New Brunswick the river was forded at low water and the roads thence ran almost in a straight line to the Delaware (above where Trenton is now situated), which was also forded. This was called the "upper road," to distinguish it from the "lower road," which branched off about five or six miles from the Raritan, took a sweep toward the east, and arrived at the Delaware at the site of the present Burlington. These roads, however, were very little more than footpaths through the woods, and so continued for many years, affording facilities to horsemen and pedestrians principally. Even as late as 1716, when a ferry had

been established at New Brunswick, for twenty years, provision was only made in the rates allowed by the Assembly for "horse and man" and "single person."

Previous to that time, however, the road had been improved, and was considered the main thoroughfare to Pennsylvania, for in 1695 the innkeepers at Piscataway, Woodbridge and Elizabethtown were made subjects to taxation for five years to prevent its "falling into decay." The sum required annually to keep the road in repair at that time was only ten pounds. An opposition road was attempted between Burlington and Perthtown (Perth Amboy) but shortly proved unsuccessful. The first advertisement respecting transportation on this route was published in Andrew Bradford's Philadelphia Mercury, in March, 1732, as follows:

"This is to give notice unto Gentlemen, Merchants, Tradesmen, Travellers and others that Solomon Smith and James Moore, of Burlington, keepeth two stage wagons intending to go from Burlington to Amboy, and back from Amboy to Burlington again, once every week or oftener if that business presents. They have also a very good storehouse, very commodious for the storing of any sort of merchant's goods, free from any charges, where good care will be taken of all sorts of goods."

About this time, also, a line ran by way of New Brunswick, and in 1734 the first line via Bordentown was established, running from South River, the proprietor of which would be at New York once a week if wind and weather permitted, and come to the Old Slip.

In 1744 the stage wagons between New Brunswick and Trenton ran twice a week.

In October, 1750, a new line was established, the owner of which resided at Perth Amboy. He informed all gentlemen and ladies "who have occasion to transport themselves, goods, wares or merchandise from New York to Philadelphia," that he had a stage boat well fitted for the purpose, which, wind and weather permitting, would leave New York every Wednesday for the ferry at Amboy, arriving there on Thursday, where, on Friday, a stage wagon would be ready to proceed immediately to Bordentown, where they would take another stage boat to Philadelphia, nothing being said (very wisely) of the time when they

might expect to arrive there. This route was so well patronized that in 1752 they carried passengers twice a week instead of once, only keeping them from five to seven days on the way.

The success of this line seems to have led to an opposition in 1751, originating in Philadelphia, which professed to go through in twenty-four or thirty hours, but which nevertheless appears to have required the same number of days as the other. Great dependence was placed upon the attractions of the passage boat between Amboy and New York, described as having a fine, commodious cabin, "fitted up with a tea table" and sundry other articles.

In 1756 a stage line between Philadelphia and New York, via Trenton and Perth Amboy, was established, intending to run through in three days. This was followed in 1765 by another, to start twice a week. But nine years had worked no increase of speed. The following year a third line of "good stage wagons," with the seats on springs, was set up to go through in two days in Summer and three in Winter. These wagons were modestly called "flying machines," and that title soon became a favorite with all the stage proprietors.

From 1765 to 1768 attempts were made by the Legislature to raise funds by lottery for shortening and improving the great thoroughfares, but without success. Gov. Franklin, alluding to them in a speech to the Assembly in 1768, states that "even those which lie between the two principal trading cities in North America are seldom passable without danger or difficulty."

The mails were carried on horseback, and moved at this time with rather greater speed than passengers, but they had been a long time acquiring it. Post offices were established about the year 1694. Col. John Hamilton, son of Gov. Andrew Hamilton, of New Jersey, devised the scheme by which post offices were established, obtained a patent for it, and afterward sold his right to the Crown.

In 1717 advices from Boston to Williamsburg, Va., were completed in four weeks, from March to December, and in double that time during the other months of the year.

About 1720 the post set out from Philadelphia every Friday, left letters at Burlington and Perth Amboy, and arrived in New York on Sunday night.

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In 1791 there were only six post offices in New Jersey—Newark, Elizabethtown, Bridgetown (Rahway), Brunswick, Princeton and Trenton. The total of their receipts for the year ending October 5, 1791, was \$530, of which the postmasters received \$108.20, leaving \$421.80 net revenue.

INSIDE HISTORY OF THE STATE AID ROAD LAW.

By Clayton Conrow, President of the New Jersey State Road Improvement Association.

As there was a desire expressed at the last annual meeting of the "State Road Improvement Association," at Trenton, for a history of the movement from its inception, I was reminded that if one page, at least, of its history is ever written, I would have to furnish the data, as I am the only person who has an intimate knowledge of the facts.

Ten years ago there seemed to be a public demand, not only by the citizens of New Jersey but of many other States, for a more comprehensive road law than any then extant.

The Hon. A. J. Cassatt, at this time President of the Pennsylvania Railroad Company, had rendered valuable service to his countrymen in the early part of the previous decade, in building roads which were excellent object lessons to the neighboring country around, but his operations did not extend beyond the limits of his own township, and the citizens of an impecunious township could not utilize the lessons thus learned. The great question turned more upon the methods of paying for a road than upon its construction.

American tourists in Europe were frequent contributors to their home newspapers and magazines, making odious comparisons between the roads of Europe and those of America, and it seemed that while Americans could outstrip the world in every other line of thought, here was our great stumbling block, here was the rock upon which our civilization was to split. Some of these writers had the audacity to say that in journeying through a country they did not need to hold any conversation with the inhabitants thereof, but that the public highways were a true index of the civilization of that country. This was a severe arraignment, and measured by that standard American civilization was at a very low ebb.

It was evident this great problem must be solved if we ever expected to attain our true station in the sisterhood of nations. Rome had solved the problem over two thousand years ago, France and England more recently, but their systems of government were so unlike our own that we could not profit by their example; therefore it seemed necessary that we should work out a plan which could be adapted to our own form of government. It is an old saying that "those who dance must pay the piper," so, also, primarily, those who travel must pay for the maintenance of the road. It occurred to me to observe the travelers upon a certain section of a leading highway, endeavoring to ascertain their starting point and their destination. I soon discovered that not only the teams of the local township, but those also from the adjoining township and the township beyond, and so on and on they came until a score of townships were represented on this section of road, from which I concluded that the citizens of the local township should not be required to maintain roads for the use of these score of townships, but that the whole county should assist in building this road. Nor does the travel stop at the confines of the county; a little later in the procession we discovered teams from the adjoining county and still later from the county next beyond, and so on until the experience with the townships was repeated with the countites, to a lesser extent, hence we must broaden our plan; a county law would not meet the requirements of the situation; it would fall short of the purpose in view.

We have taken only one section of many in the same road which is fairly representative of hundreds of sections of hundreds of roads permeating every nook and corner of the State, from which comes the inevitable conclusion that every public road in the State is a State road, and every citizen of the State is entitled to the free use thereof, and, therefore, the State should aid in their construction.

This is the origin and basis of the "State Aid Road Law" that the State, the county, the township and the citizen whose property is particularly benefited, should co-operate in some harmonious manner in building the roads. The proportion of expense that each should bear was a matter of further consideration and calculation, so that each should pay its just share.

This occurred in 1890. At the ensuing annual meeting of the

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State Board of Agriculture, held in the winter of '90 and '91, with a number of other gentlemen, I was appointed a member of the road committee of that organization. Soon after this appointment I had a consultation with the Hon. Edward Burrough, the president thereof, informing him that I had worked out a scheme for a road law which I thought would revolutionize road building in our commonwealth, but that I had struck a snag which I was unable to surmount. It may be noted here that Mr. Burrough was also ex-officio a member of the road committee, and I deemed him, as such, the proper official to whom to report. I gave him the outlines of my plan for a proposed State Aid Road Law, with which he was very highly pleased, and he entered into the work with a great deal of zest. I desired his assistance in overcoming the obstacles, which were, that a great many turnpike companies had obtained charters from the legislature giving them the right to build roads and charge toll for traveling thereon, over many of the leading highways of the State. This condition of affairs prevailed in a pre-eminent degree in his own county, that of Camden, nearly all the prominent roads leading out of that city being controlled by these charters.

What were we to do? These corporations were the legitimate creations of the legislature; they were fostered and nurtured by the State; they had rights which must be respected; they were pioneers of road improvement in their respective localities; they had deserved, but had not always received, the gratitude of an ungrateful public for rescuing the State from its downward course at a critical period of its history. I was unwilling, therefore, without some guarantee, to be a party to formulate an act which would, virtually, legislate them out of existence by indirect methods. How were we to get around these difficult questions without working an injustice to some of our citizens?

The Hon. Thomas H. Dudley, ex-president of the State Board of Agriculture, also a resident of Camden county, was called into subsequent consultations. He, also, was in favor of treating the turnpike companies fairly and honorably.

We considered the subject from every possible standpoint in all its phases. The questions whether it would be feasible to embody in the general act a provision for the purchase of said roads, or whether a separate act should be prepared for that purpose, which

should take effect prior to the general act, were duly considered. It was contended that the adoption of the first proposition would hamper and encumber the general act to such an extent that it would embarrass its acceptance by the people and complicate its execution in its practical application, inasmuch as the general act itself embodied many new features in road legislation, involving principles which had never before been tried, and which in all probability would require much missionary labor to educate the people up to the required standard. In this dilemma, not knowing what step to take next, Mr. Burrough, having a great deal of faith in the integrity of the people, rose to the occasion and said that if we would go on and perfect the general act and present it to the legislature for its enactment into law, he would assure us that the turnpike companies should be fairly treated, and that within three years there would not be a turnpike in the State. (I have been careful here to quote his exact language.) With this understanding the "act" was perfected. The original draft contained a provision requiring the townships through which the road to be improved ran to pay twenty-four per centum of the cost thereof; it also provided for the use of "gravel, oyster shells and bog iron ore" in the construction of roads in certain cases. The committee of the State Board of Agriculture before referred to, by a majority vote, struck out the township and added its share of the expense to the county. With this slight change the details of the "bill" were thoroughly discussed and finally agreed to.

The members of the committee, being all laymen, were unwilling to trust themselves to draft the "bill" for presentation to the legislature then in session. It was deemed best, therefore, to invite Judge William M. Lanning to put the "bill" in "legal form," which duty he performed to the satisfaction of the committee.

It was then taken to Governor Abbett for his approval or disapproval, as we did not care to encounter his veto if a slight change of form would reconcile him to its provisions.

Upon hearing it read he severely criticised it, saying, among other things, that "it savored too much of red tape," but finally consented to sign it if we would strike out "gravel, oyster shells and bog iron ore," as he would not sign a bill which contemplated the use of any material less durable than stone. These materials were duly eliminated and the "bill" redrafted to conform with his views.

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It may be said here parenthetically that a few years after the "act" was placed upon the statute books the people demanded with such unanimity that those items to which the Governor so vigorously objected should be restored, that two of them at least have been reinserted and are now part of the law.

The "bill" was offered to the legislature then sitting and was duly passed, and it became known as the "Davidson Road Law," because a member by that name from Gloucester county presented it.

As it was first enacted it provided for an expenditure of a sum not exceeding twenty thousand dollars per annum by the State, and that a "Commissioner of Agriculture" was to supervise its disbursement, but as the office of "Commissioner of Agriculture" was unknown to our laws and the legislative department of the State was averse to creating any more offices, the "act" remained on the statute books in an inoperative form until the meeting of the succeeding legislature, when, at the suggestion of Governor Albett, the President of the State Board of Agriculture was authorized to perform the duties required of the Commissioner of Agriculture, which he did until the office of "Commissioner of Public Roads" was duly created and a commissioner appointed to perform that service.

The after history of the "act" is familiar, I apprehend, to the public. Its preparation encountered continual objections which had to be met and satisfied. The Board of Freeholders of Burlington county refused, by a vote of eighteen to eight, to build roads under it until they were compelled by a "mandamus" from the Supreme Court to do so.

I regret to observe that there is a disposition on the part of some officials to ignore the aforesaid understanding, and are endeavoring to obtain the turnpikes by surreptitious methods.

There can be no just reason advanced why the State and counties should not pay for roads already built as well as for roads to be built.

The first have been as economically built and as well built as the latter can be.

The State and counties should treat all their citizens alike, with absolute impartiality. They should not give one class of citizens

a free road to market and another class, equally deserving, "pay roads." Let all the roads be free or all toll. Let there be no discrimination in favor of one or against another.

QUARRIES IN NEW JERSEY PRODUCING ROAD METAL.

BERGEN COUNTY.

Location of Quarry.	Owners.	P. O. Address.
Edgewater.....	Cody Bros.....	Edgewater, N. J.
Linwood.....	Carpenter Bros.....	Linwood, N. J.
Englewood.....	Brown & Fleming.....	Englewood, N. J.

ESSEX COUNTY.

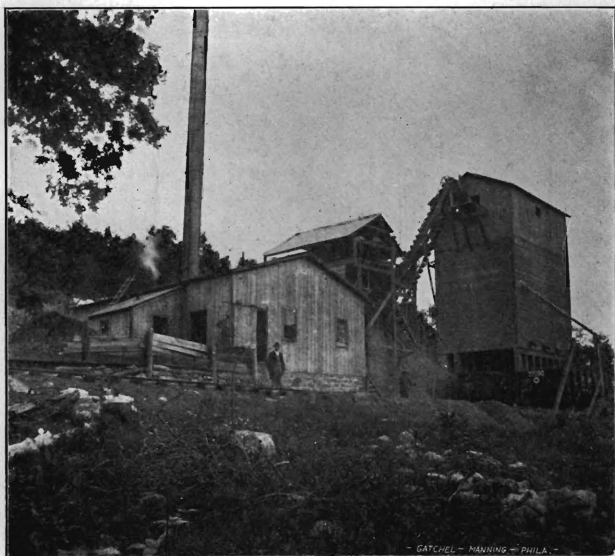
Location of Quarry.	Owners.	P. O. Address.
Montclair.....	Osborne & Marcellis.....	Montclair, N. J.
Montclair.....	F. J. Marley.....	Little Falls, N. J.
Orange.....	George Spottiswoode & Co.....	Orange, N. J.
Millburn.....	G. A. Lighthipe & Son.....	Millburn, N. J.
Cedar Grove.....	F. J. Marley.....	Little Falls, N. J.

HUDSON COUNTY.

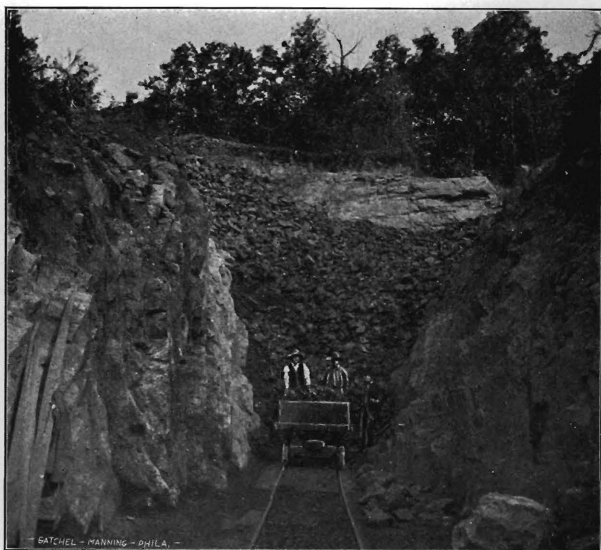
Location of Quarry.	Owners.	P. O. Address.
Bergen Hill.....	B. M. & J. F. Shanley.....	Newark, N. J.
Palisades	Palisade Construction Co., No. 1 Montgomery St., Jersey City, N. J.	
Palisades	Hudson County Contracting Co., No. 367 Communipaw Ave., Jersey City, N. J.	
Guttenberg.....	Meeks.....	Guttenberg, N. J.
Granton.....	Wagner & Duff.....	Granton, N. J.
Granton.....	F. J. Marley.....	Little Falls, N. J.
Guttenberg.....	John S. Lane & Sons.....	Guttenberg, N. J.

HUNTERDON COUNTY.

Location of Quarry.	Owners.	P. O. Address.
Byram Station.....	M. F. Berber.....	Byram Station, N. J.
Byram Station.....	B. M. & J. F. Shanley.....	Newark, N. J.
Middle Valley.....	Middle Valley Trap Rock Co., Middle Valley, N. J.	



Trap Rock Crusher.
Middle Valley, Morris county.



Trap Rock Quarry.
Middle Valley, Morris county.

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MERCER COUNTY.

Location of Quarry.	Owners.	P. O. Address.
Moores.....	Del. River Quarry and Construction Co.,	Lambertville, N. J.
Lambertville.....	Barbour & Ireland,	No. 1241 Filbert St., Phila., Pa.
Goat Hill.....	B. M. & J. F. Shanley,	No. 14 S. Broad St., Phila.
Hopewell.....	Hopewell Quarry Co.....	Hopewell, N. J.
Titusville.....	Trenton Stone and Cons. Co..	Trenton, N. J.
Byram Station.....	Trenton Stone and Cons. Co..	Trenton, N. J.

MORRIS COUNTY.

Nearly all road-building material in this county is of native rock, gneiss, granite and shale. The traps are mostly imported from other counties.

Location of Quarry.	Owners.	P. O. Address.
Millington.....	Morris County Crushed Stone Co.,	Morristown, N. J.

PASSAIC COUNTY.

Location of Quarry.	Owners.	P. O. Address.
Cedar Grove	Francisco Bros.....	Cedar Grove, N. J.
Paterson.....	F. J. Marley.....	Little Falls, N. J.
Paterson.....	Berger & Wolf.....	Paterson, N. J.
Paterson.....	E. T. Galloway.....	Paterson, N. J.
Paterson.....	McKiernan & Bergen.....	Paterson, N. J.
Great Notch	F. J. Marley.....	Great Notch, N. J.
Great Notch	Edward Doulan.....	Great Notch, N. J.
Haledon	R. M. Torbet.....	Haledon, N. J.
Hawthorne.....	Daniel & D. Stanley.....	Hawthorne, N. J.
Preakness.....	Colfax & Steele.....	Preakness, N. J.
Paterson.....	Munson & Co.....	Rockaway, N. J.
Great Notch.....	Wright & Lindsley.....	Orange, N. J.

SOMERSET COUNTY.

Location of Quarry.	Owners.	P. O. Address.
Mountain View	Standard Paving Co....	Mountain View, N. J.
Dunellen.....	Garretson & Gray.....	Dunellen, N. J.
North Plainfield.....	A. I. & N. B. Smalley..	North Plainfield, N. J.

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Location of Quarry.	Owners.	P. O. Address.
Chimney Rock.....	William Haelig.....	Bound Brook, N. J.
Bound Brook.....	J. E. Hillpot.....	Bound Brook, N. J.
Somerville.....	William Hardgrove.....	Somerville, N. J.
Rocky Hill.....	Rocky Hill Stone Storage Co.,	Rocky Hill, N. J.
Bernardsville.....	Frank S. Tainter.....	Morristown, N. J.
Far Hills.....	Grand Schley.....	Far Hills, N. J.
Bernardsville.....	Mine Brook Stone Co....	Bernardsville, N. J.

SUSSEX COUNTY.

Location of Quarry.	Owners.	P. O. Address.
Newton.....	Newton State Quarry.....	Newton, N. J.

UNION COUNTY.

Location of Quarry.	Owners.	P. O. Address.
Scotch Plains.....	Hetfield & Weldon.....	Scotch Plains, N. J.
Scotch Plains.....	John G. Cook.....	Scotch Plains, N. J.
Murray Hill.....	A. A. Potter.....	Murray Hill, N. J.
Summit.....	A. A. Potter.....	Summit, N. J.
West Summit.....	Victor G. Smythe.....	West Summit, N. J.
Springfield.....	Stewart Hartshorn.....	Springfield, N. J.

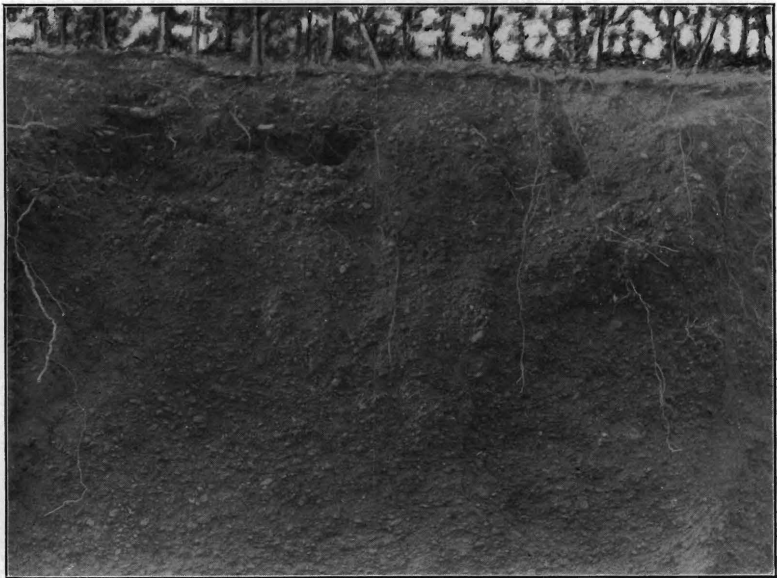
GRAVEL PITS IN NEW JERSEY USED FOR ROAD-BUILDING.

ATLANTIC COUNTY.

Location of Pits.	Owners.	P. O. Address.
Tuckahoe.....	Henry D. Moore and William G. Moore, Haddonfield and 931 Chestnut St., Phila., Pa., Room 401.	
Mays Landing.....	J. E. P. Abbott.....	Mays Landing, N. J.
Pleasantville.....	West Jersey & Seashore R. R., Camden, N. J.	
Pleasantville.....	P. & A. C. R. R.....	Pleasantville, N. J.
Mays Landing.....	Samuel Champion.....	Mays Landing, N. J.

BURLINGTON COUNTY.

Location of Pits.	Owners.	P. O. Address.
Riverton.....	Lewis Connor.....	Riverton, N. J.
Westfield.....	Enoch Evans.....	Westfield, N. J.
Westfield.....	Wm. R. Lippincott's estate....	Westfield, N. J.
Palmyra.....	Isaac Evaul.....	Palmyra, N. J.
Palmyra.....	Wm. F. Morgan.....	Palmyra, N. J.



Rock Stone Gravel Pits,
Tuckahoe, Atlantic county.



Rock Stone Gravel Pits,
Tuckahoe, Atlantic county. Shipping gravel.

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Location of Pits	Owners.	P. O. Address.
Riverton.....	Franklin T. Hunter.....	Riverton, N. J.
Bridgeboro.....	Edwin M. Brock.....	Bridgeboro, N. J.
Moorestown.....	John S. Collins.....	Moorestown, N. J.
Hartford.....	John Warrick	Hartford, N. J.
Rancocas.....	James W. Stokes.....	Rancocas, N. J.
Columbus.....	Thomas A. Bunting.....	Columbus, N. J.
Columbus.....	Thomas H. Rogers.....	Columbus, N. J.
Kinkora.....	C. G. Kinsley.....	Kinkora, N. J.
Columbus.....	Edward Wilson	Columbus, N. J.
Columbus.....	Charles Sharp	Columbus, N. J.
Florence.....	George Bowne	Florence, N. J.
Jacksonville.....	Garnee Estate	Jacksonville, N. J.
Georgetown.....	John B. Hutchinson.....	Georgetown, N. J.
Jobstown.....	Charles Black	Jobstown, N. J.
Centerton.....	Allen Austin	Centerton, N. J.
Willingboro.....	Mrs. John Buzby.....	Willingboro, N. J.
Beverly.....	J. H. Coomb.....	Beverly, N. J.
Burlington.....	Samuel Johnson	Burlington, N. J.
Beverly.....	William Baggs	Beverly, N. J.
Beverly.....	Joshua Fenimore	Beverly, N. J.

CAPE MAY COUNTY.

Location of Pits.	Owners.	P. O. Address.
Belle Plain.....	West Jersey & Seashore R. R.,	Camden, N. J.

CUMBERLAND COUNTY.

Location of Pits.	Owners.	P. O. Address.
Millville.....	John Golder.....	Millville, N. J.

MIDDLESEX COUNTY.

Location of Pits.	Owners.	P. O. Address.
Old Bridge.....	I. Biddle Herbert.....	Old Bridge, N. J.
Helmetta.....	George W. Helme.....	Helmetta, N. J.
Jamesburg.....	James Buckelew's Sons.....	Jamesburg, N. J.
Englishtown.....	Charles Hoffman	Englishtown, N. J.

MONMOUTH COUNTY.

Location of Pits.	Owners.	P. O. Address.
Farmingdale.....	Asbury Park Gravel Co....	Asbury Park, N. J.
Allenwood.....	Asbury Park Gravel Co....	Ocean Grove, N. J.
Navesink.....	Webster Swan.....	Navesink, N. J.
Holmdel.....	Wm. Crawford.....	Holmdel, N. J.
Keyport.....	Keyport Gravel Co.....	Keyport, N. J.
Red Bank.....	Red Bank Gravel Co.....	Red Bank, N. J.

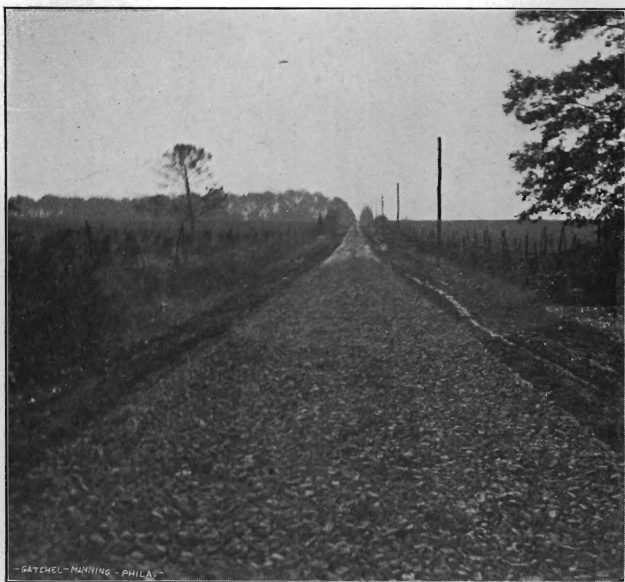
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PITS IN MIDDLETON TOWNSHIP, MONMOUTH COUNTY.

Dr. R. G. Andrew,
Walter Swan,
Peter Conover,
John T. Hopping,
Garrett Luyster,
Henry Field,
James Hubbard,
George K. Hopping,
John West,
John Evans,
John T. Applegate.

OCEAN COUNTY.

Location of Pits.	Owners.	P. O. Address.
Lakewood.....	Wm. Harrison.....	Lakewood, N. J.
Lakewood.....	John Sherman.....	Lakewood, N. J.
Staffordville.....	Staffordville Gravel Co....	Staffordville, N. J.



Georgetown Road,
Burlington county. Showing ballast in front.



Georgetown Road,
Burlington county, 8-inch macadam. Showing deep fill.

Statements by Engineers and Supervisors.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find and exact detailed statement of the cost of the Fellowship road, townships of Mount Laurel and Chester, county of Burlington, State of New Jersey. Total length, 11,300 feet. Total length, 2.14 miles.

Width of stone bed, 10 feet.

Length of stone-bed, 11,292.4 feet.

Depth of stone-bed, 8 inches.

Macadam, 12,540 8-9 square yards, at 95 cents; total, including wings and deducting bridges.....	
Earth excavation, 525 cubic yards, at expense of townships.....	\$156 70
Wings at end of road, 40 square yards, at 95 cents.....	38 00
Tile drain, 1,901½ lineal feet, at 10 cents.....	190 15
Lump sum, contract price.....	11,920 00
Supervisor's salary	258 00
Engineering expenses	242 96
Total.....	\$12,649 11

Maximum grade before.....	2½ per cent.
Maximum grade now.....	1½ per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of the finished pavement was 8 inches.

Respectfully yours,

WM. R. LIPPINCOTT,

Engineer.

CHAS. ANDREWS,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Moorestown and Evesboro road, township of Mount Laurel, county of Burlington, State of New Jersey. Total length, 14,175.9 feet. Total length, 2.69 miles.

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Width of stone-bed, 10 feet.

Length of stone-bed, 14,122.7 feet.

Depth of stone-bed, 8 inches.

Macadam, 15,673 8-9 square yards, at 98 cents; total, including wings and deducting bridges (54 lineal feet).....	
Earth excavation, 2,216 cubic yards, at expense of township, including cutting trees and filling through a swamp.....	\$743 63
Wings at end of road, 42 square yards, at 98 cents.....	41 16
Lump sum, contract price.....	15,500 00
Supervisor's salary	312 00
Engineering expenses	310 82
Total	\$16,163 98

Maximum grade before..... $2\frac{1}{2}$ per cent.

Maximum grade now..... $1\frac{1}{4}$ per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

WM. R. LIPPINCOTT,

Engineer.

ALLEN H. ROBERTS,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Wrightstown and Bordentown road, townships of Mansfield and Chesterfield, county of Burlington, State of New Jersey. Total length, 21,763 feet. Total length, 4 1-10 miles.

Width of stone-bed, 10 feet.

Length of stone-bed, 21,673 feet.

Depth of stone-bed, 8 inches.

Macadam, 24,051.9 square yards, at 99 cents; total.....	
Macadam, 179 square yards, Y, at 99 cents; total, extra.....	\$177 21
Earth excavation, 2,928 cubic yards, at 22 cents.....	644 16
Earth excavation, 749 cubic yards, at 19 cents.....	142 31
Earth excavation, 333 cubic yards, 2,359 cubic yards, at...cents..	55 50
Tile drain, 3,800 lineal feet, at 12 cents.....	
Lump sum, contract price.....	23,800 00
Supervisor's salary	594 00
Engineering expenses	439 95
Total.....	\$25,853 13



Haddonfield and Mt. Ephraim Road,
Camden county. After improvement. 8-inch macadam.



Haddonfield and Mt. Ephraim Road,
Camden county. After improvement.

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Maximum grade before.....	7 per cent.
Maximum grade now.....	5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JOHN H. HUTCHINSON,

Engineer.

CHARLES E. WOODWARD,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Haddonfield and Mt. Ephraim road, township of Haddon, county of Camden, State of New Jersey. Total length, 1.37 miles.

Width of stone-bed, 15 feet, with 7½ feet gravel shoulder.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 3,320 tons.

Preparation of road-bed (cost).....	\$465 14
Macadam, 8,847 2-3 square yards, including approaches, at 79 cents; total	6,989 65
Earth excavation, 882 2-3 cubic yards, at 25 cents.....	220 66
Supervisor's salary	177 00
Engineering expenses	240 00
Total.....	\$8,092 45

Maximum grade before.....	6.80 per cent.
Maximum grade now.....	4.00 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

J. J. ALBERTSON,

Engineer.

WILLIAM C. WOOD,

Supervisor.

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Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Fairfield road extension, Township of Caldwell, county of Essex, State of New Jersey. Total length, 1.27 miles.

Width of stone-bed, 16 feet.

Depth of stone-bed, 8 inches.

Telford, 11,710 square yards, at 42 cents; total.....	\$4,918 20
Earth excavation, 3,162 cubic yards, at 22 cents.....	695 64
Total.....	<u>\$5,613 84</u>

Maximum grade before..... 4.2 per cent.

Maximum grade now..... 2.3 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,

Engineer.

THEODORE B. KANOUSE,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Elizabeth avenue, township of Clinton, county of Essex, State of New Jersey. Total length, 1.3 miles.

Width of stone-bed, 16 feet.

Depth of stone-bed, 8 inches.

Telford, 12,154 square yards, at 69 cents; total.....	\$8,386 26
Earth excavation, 23,522 cubic yards, at 25 cents.....	5,880 50
Total.....	<u>\$14,266 76</u>

Maximum grade before..... 7.5 per cent.

Maximum grade now..... 4.8 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAS. OWEN,

Engineer.

JOS. B. WARD,

Supervisor.



Elizabeth Avenue,
Essex county. 27-foot cut, 8-inch Telford.



Valley Drive, Atlantic Highlands,
Monmouth county. After. 7-inch macadam.

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Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Roseland avenue, townships of Caldwell and Livingston, borough of Caldwell, county of Essex, State of New Jersey. Total length, 5.63 miles.

Width of stone-bed, 16 feet.

Depth of stone-bed, 8 inches.

Telford, 51,926 square yards, at 41 cents; total.....	\$21,289 66
Earth excavation, 24,328 cubic yards, at 24 cents.....	5,838 72
Total.....	<u>\$27,128 38</u>

Maximum grade before.....	9.38 per cent.
Maximum grade now.....	5.42 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,

Engineer

P. T. COLLINS,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of East Passaic avenue and Centre street, townships of Bloomfield and Franklin, county of Essex, State of New Jersey. Total length, 7,334 feet. Total length, 1.4 miles.

Width of stone-bed, 16 feet.

Length of stone-bed, 7,334 feet.

Depth of stone-bed, 8 inches.

Telford, 13,251 square yards, at 52 cents; total.....	\$6,890 52
Cobble Gutter, 1,677 square yards, at 72 cents; total.....	1,207 44
Earth excavation, 24,455 cubic yards, at 33 cents.....	8,070 15
Total.....	<u>\$16,168 11</u>

Maximum grade before.....	14 per cent.
Maximum grade now.....	7.5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,

Engineer.

SAMUEL E. BLAIR,

TUNIS GARRABRANT,

Supervisors.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find exact detailed statement of cost of road from Woodbury to Knight's Run in the city of Woodbury, and townships of Deptford and Mantua, Gloucester county, New Jersey.

Length of gravel bed.....	19,068 feet.
Length of macadam bed.....	8,700 feet.

Total length of road.....	27,768 feet.
Width of gravel bed.....	14 feet.

Depth of gravel bed, 10 inches in centre, 6 inches on sides.

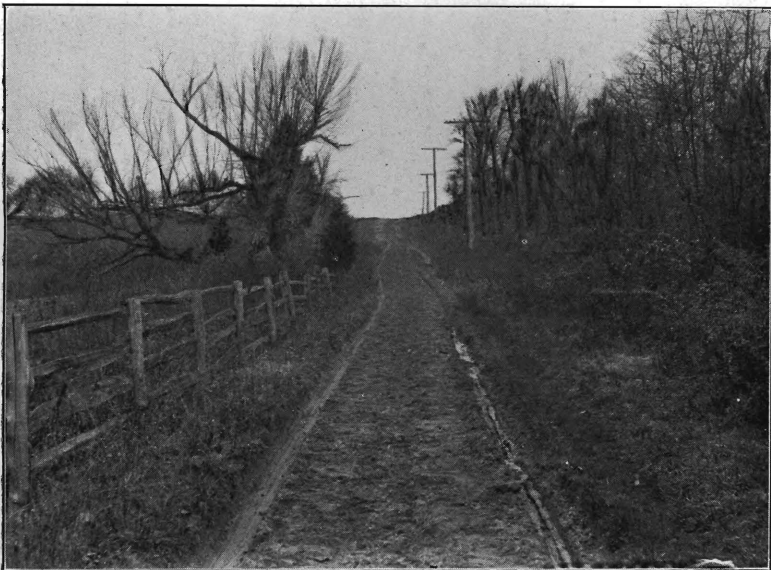
Width of macadam bed, 12 feet in city, 10 feet in township.

Depth of macadam bed, 8 inches.

CONSTRUCTION.

27,768 feet road bed, prepared at 10c.....	\$2,776 80
1.01 acres grubbing, at \$50.....	50 50
14,429 feet of tile drain, at 15c.....	2,164 35
20,311 cubic yards extra excavation, at 25c.....	5,077 75
7,014 cubic yards compacted gravel, at 47c.....	3,296 58
2,071 cubic yards overhauls, at 25c.....	517 75
1,197 cubic yards overhauls, at 50c.....	598 50
1,019 cubic yards overhauls, at 75c.....	764 25
258 cubic yards overhauls, at \$1.00.....	258 00
2,932 cubic yards stripping, at 25c.....	733 00
10,268 square yards macadam, at 42c.....	4,312 56

\$20,550 04



Woodbury and Knights Run Gravel Road,
Gloucester county. Before improvement. North of Woodbury Pumping
Station.



Woodbury and Knight's Run Gravel Road,
Gloucester county. After improvement. North of pumping station.

COMMISSIONER OF PUBLIC ROADS.

97

MATERIAL.

5,874 cubic yards compacted gravel, at 10c.....	\$587 40	
5,468-8.10 tons stone, at \$1.55.....	\$8,476 64	
Discount allowed	100 00	
	<hr/>	8,376 64
		<hr/>
Committee expenses	\$83 50	\$8,964 04
Advertising and printing.....	33 80	
Supervisor's salary	666 00	
Engineering expenses	706 18	
	<hr/>	1,489 48
		<hr/>
		\$31,003 56
Amount finished and reported last year.....		4,852 22
		<hr/>
Balance		\$26,151 34

Maximum grade before.....	10 8-10 per cent.
Maximum grade now.....	4 3-10 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of the finished macadam was 9.58 inches, and that the depth of the finished gravel was 12.69 inches in the centre and 8.25 inches on the sides.

WILLIAM C. CATTELL,

Engineer.

FRANK T. HENDRICKSON,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find exact detailed statement of cost of road from Hurffville to Cross Keys, township of Washington, county of Gloucester, State of New Jersey. Total length of road, 28,588 feet.

Width of gravel bed, 14 feet.

Depth of gravel bed, 8 inches in centre, 6 inches on the sides.

CONSTRUCTION.

28,588 feet of road bed prepared at 4 cents.....	\$1,143 42
1.08 acres grubbing at \$100.....	108 00
2,611 feet tile drain at 15 cents.....	391 65
214 cubic yards, open ditches, at 20 cents.....	42 80

10,007 cubic yards, extra excavation, at 22½ cents,	\$2,251 57	
9,024 cubic yards, compacted gravel, at 37½ cents.	3,384 00	
13,168 square yards, extra depth, at 1 cent.....	131 68	
3,596 cubic yards, over hauls, at 15 cents.....	539 40	
1,616 cubic yards, over hauls, at 30 cents.....	484 80	
414 cubic yards, over hauls, at 45 cents.....	186 30	
31 cubic yards, over hauls, at 60 cents.....	18 60	
3,108 cubic yards, stripping, at 20 cents.....	621 60	
		<hr/>
		\$9,303 82

MATERIAL.

9,024 cubic yards, compacted gravel.....	\$769 20	
Committee expenses	85 50	
Advertising and printing.....	29 60	
Supervisor's salary	648 00	
Engineering expenses	323 46	
		<hr/>
		1,086 56
		<hr/>
		\$11,159 58
Amount finished and reported last year.....		5,091 29
		<hr/>
Balance		\$6,068 29
Maximum grade before.....	6 1-10 per cent.	
Maximum grade now.....	2 9-10 per cent.	

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of the finished gravel pavement was 13.66 inches in the centre and 9.39 inches on the sides.

WILLIAM C. CATTELL,
Engineer.
SAMUEL J. EVANS,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Passaic avenue, town of Kearney, county of Hudson, State of New Jersey. Total length, 12,900 feet. Total length, 2.44 miles.

Width of stone-bed, 20 feet.

Length of stone-bed, 12,900 feet.

Depth of stone-bed, 10 inches.

Number of tons of stone used in construction, 12,310.

COMMISSIONER OF PUBLIC ROADS. 99

Macadam, 21,144 square yards, at 80 cents; total.....	\$16,915 20
Telford, 7,556 square yards, at 80 cents; total.....	6,044 80
Earth excavation, 24,250 cubic yards, at 24 cents.....	5,820 00
Tile drain, 150 lineal feet, at 50 cents.....	75 00
Supervisor's salary	546 00
Engineering expenses	1,442 75

Total..... \$30,843 75

Maximum grade before.....	13 per cent.
Maximum grade now.....	8.86 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 10 inches.

Respectfully yours,

WILLIAM S. LOGAN,
Engineer.

ALFRED KING,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Manalapan road, township of East Windsor, county of Mercer, State of New Jersey. Total length, 11,018 feet. Total length, 2.09 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 11,018 feet.

Depth of stone-bed, Class B or 6 inches.

Macadam, 17,494 square yards.

Earth excavation, 3,950 cubic yards.

Tile drain, 13,746 lineal feet, at 22 cents.....	\$3,024 12
Lump sum, contract price.....	12,800 00
Supervisor's salary	222 00
Engineering expenses	395 60

Total..... \$16,441 72

Maximum grade before.....	1.9 per cent.
Maximum grade now.....	1.2 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was six inches.

Respectfully yours,

FRANK J. EPPELE,
County Engineer.

R. H. ELY, Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Trenton and Crosswicks road, township of Hamilton, county of Mercer, State of New Jersey. Total length, 20,250 feet. Total length, 3.83+ miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 20,250 feet.

Depth of stone-bed, Class B or 6 inches.

Macadam, 32,574 square yards.

Earth excavation, 7,250 cubic yards.

Tile drain, 9,911 lineal feet, at 22 cents.....	\$2,180 42
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Lump sum, contract price.....	24,939 00
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Supervisor's salary	342 00
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Engineering expenses	677 99
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Total.....	\$28,139 41
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Maximum grade before.....	7.3 per cent.
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Maximum grade now.....	3.44 per cent.
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We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

FRANK J. EPPELE,

County Engineer.

J. LACY,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Old York road, township of East Windsor, county of Mercer, State of New Jersey. Total length, 17,123.4 feet. Total length, 3.24 miles.

Width of stone-bed, 14 and 12 feet.

Length of stone-bed, 17,123.4 feet.

Depth of stone-bed, 6 and 4 inches.

Macadam, 7,763 square yards of 4-inch macadam

Macadam, 18,432 square yards of 6-inch macadam

Earth excavation, 6,975 cubic yards, including
shortage

Lump sum, \$15,995 86



Traction Engine,
Old York road, Mercer county, drawing twelve wagon loads of stone of
two tons each.



Three Steam Rollers, Water Carts and Teams
At work on Old York Road, Mercer county.

COMMISSIONER OF PUBLIC ROADS. 101

Tile drain, 6,410 lineal feet, at 22 cents.....	1,410 20
Supervisor's salary	198 00
Engineering expenses	435 15
Total.....	<hr/> \$18,039 21

Maximum grade before.....	5.2 per cent.
Maximum grade now.....	3.7 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 and 4 inches.

Respectfully yours,

FRANK J. EPPELE,
Engineer.
W. N. CUNNINGHAM,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the second section of Cranbury turnpike, township of Cranbury, county of Middlesex, State of New Jersey. Total length, 29,965 feet. Total length, 5.67 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 29,965 feet.
Depth of stone-bed, 8 inches.

Macadam, 39,953 1-3 square yards, at 96 cents.....	
Earth excavation, 3,000 cubic yards, at 30 cents.....	\$900 00
Rock excavation, 220 cubic yards.....	44 00
Lump sum, contract price.....	39,254 88
Supervisor's salary	456 00
Engineering expenses	785 10
Total.....	<hr/> \$41,835 98

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,
Engineer.
E. D. RIGHTMIRE,
Supervisor.

SEVENTH ANNUAL REPORT

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the first section of Cranbury turnpike road, townships of Cranbury and South Brunswick, county of Middlesex, State of New Jersey. Total length, 12,320 feet. Total length, 2.33 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 12,320 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 6,160.

Preparation of road-bed (cost), \$500.

Macadam, 16,427 square yards, at 82 cents.....	
Earth excavation, 2,000 cubic yards, at 25 cents.....	
Lump sum, contract price.....	\$13,970 14
Supervisor's salary	267 00
Engineering expenses	279 40
Total.....	<hr/> \$14,516 54

Maximum grade before..... 1.40 per cent.

Maximum grade now..... 1.20 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

ROBT. J. DOUGHERTY,

Engineer.

DAVID C. LEWIS,

Supervisor.

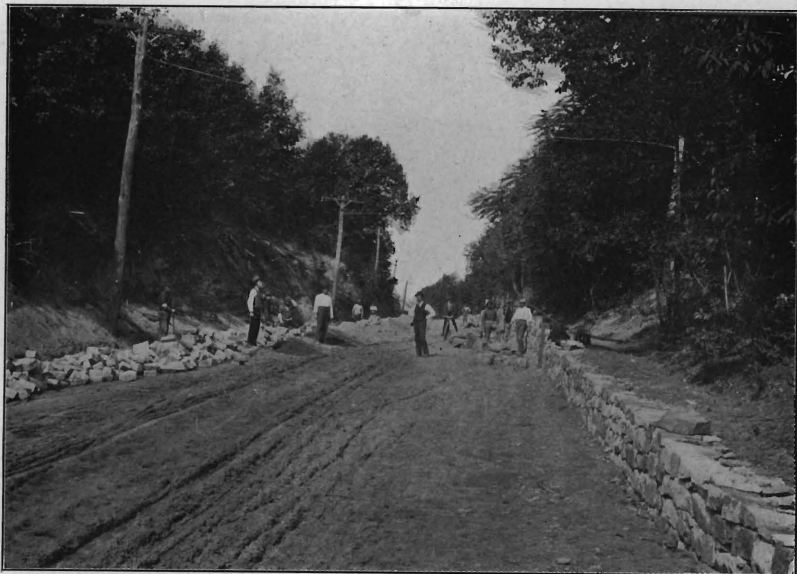
Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the Old Bridge road, township of East Brunswick, county of Middlesex, State of New Jersey. Total length, 38,155 feet. Total length, 7.13 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 38,155 feet.

Depth of stone-bed, 8 inches.



Old Bridge and New Brunswick Road,
Middlesex county. Before improvement. While building, showing erection of
stone wall to protect embankment.



Old Bridge and New Brunswick Road,
Middlesex county. After improvement. 8 inch macadam. Showing
heavy cut.

COMMISSIONER OF PUBLIC ROADS. 103

Ret. Wall, Old Bridge Hill, 147 cubic yards, at \$5.00.....	\$735 00
Macadam, 50,873 square yards, at 73 cents; total.....	37,137 29
Wings, 1,337 square yards, at 73 cents; total.....	976 01
Gravel, 81 square yards, at 10 cents; total.....	8 10
Earth excavation, 8,850 cubic yards, at 25 cents.....	2,212 50
Block stone gutter, 455 square yards, at \$2.25.....	1,023 75
Rubble stone gutter, 43 square yards, at \$1.75.....	75 25
Overhaulage, 3,500 cubic yards, at 17 cents.....	595 00
Tile drain, 5,725 lineal feet, at 18 cents.....	1,030 50
Supervisor's salary	733 50
Engineering expenses	875 87
<hr/>	
Total.....	\$45,402 77

Maximum grade before.....	11 per cent.
Maximum grade now.....	6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,
Engineer.
DANIEL DAVISON,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of the road on Westwood and Cedar avenues, township of Ocean, county of Monmouth, State of New Jersey. Total length, 8,676 feet. Total length, 1.64 miles.

Width of stone-bed, 16 feet; width of gravel-bed, 20 and 24 feet.
Length of stone-bed, 8,676 feet; length of gravel-bed, 8,676 feet.
Depth of stone-bed, 8 inches; depth of gravel-bed, 5 inches.
Number of tons of stone used in construction, 5,804.

Macadam, 15,532 square yards, at 80 cents; total.....	\$12,425 60
Gravel, 1,720 cubic yards, at \$1.50; total.....	2,580 00
Tile drain, 1,434 feet, at 15 cents.....	215 10
Supervisor's salary	162 00
Engineering expenses	556 00
<hr/>	
Total.....	\$15,938 70

SEVENTH ANNUAL REPORT

Maximum grade before.....	2.2 per cent.
Maximum grade now.....	2.2 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

W. H. DENYSE,
Engineer.
JOHN A. EATON,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Brighton avenue, township of Ocean, county of Monmouth, State of New Jersey. Total length, 6,061 feet. Total length, 1.16 miles.

Width of stone-bed, 16 and 30 feet. Width of gravel-bed, 24 feet.
Length of stone-bed, 6,061 feet. Length of gravel-bed, 4,456 feet.
Depth of stone-bed, 6 and 8 inches. Depth of gravel-bed, 5 inches.
Number of tons of stone used in construction, 4,494.

8-inch macadam, 6,223 square yards, at 97 cents; total.....	\$6,036 31
6-inch macadam, 7,597 square yards, at 86 cents; total.....	6,533 42
Gravel, 1,628 cubic yards, at \$1.45; total.....	2,360 60
Stone block gutters, 1,225 square yards, at \$1.75.....	2,143 75
Supervisor's salary	186 00
Engineering expenses	512 20
Total.....	<hr/> \$17,772 28

Maximum grade before.....	2.50 per cent.
Maximum grade now.....	1.50 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of the finished pavement was 6 and 8 inches.

Respectfully yours,

W. H. DENYSE,
Engineer.
JOHN A. EATON,
Supervisor.



Brighton Avenue,
Long Branch, Monmouth county. 8-inch macadam. 8-inch stone centre
and gravel sides.



Brighton Avenue,
Long Branch, Monmouth county. 8-inch macadam.

COMMISSIONER OF PUBLIC ROADS. 105

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Sweetman's lane and Tennent Station road, township of Manalapan, county of Monmouth, State of New Jersey. Total length, 13,949 feet. Total length, 2.64 miles.

Width of stone-bed, 10 feet.

Length of stone-bed, 13,949 feet.

Depth of stone-bed, 6 inches.

Number of tons of stone used in construction, about 4,450.

Macadam, 15,498 8-9 square yards, at 64 cents.....	
Earth excavation, 6,666 1-4 cubic yards, at 20 cents.....	
Tile drain, 5,335 lineal feet, at 8 cents.....	
Lump sum, contract price.....	\$11,679 34
Supervisor's salary	327 00
Engineering expenses	291 98
	<hr/>
Total.....	\$12,298 32

Maximum grade before.....	3.80 per cent.
Maximum grade now.....	2.60 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

PETER FORMAN,

Engineer.

TUNIS D. PROBASCO,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of First Avenue and Valley Drive road, township of Middletown, county of Monmouth, State of New Jersey. Total length, 15,044 feet. Total length, 2.85 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 14,637 feet.

Depth of stone-bed, 7 inches.

Number of tons of stone used in construction, 8,033.

SEVENTH ANNUAL REPORT

Extra macadam, 235 square yards, at 69½ cents; total.....	\$163 32
Lump sum, contract price.....	16,264 39
Supervisor's salary	291 00
Engineering expenses	487 93

Total.....	\$17,206 64
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Maximum grade before.....	8.10 per cent.
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Maximum grade now.....	6.50 per cent.
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We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was seven inches.

Respectfully yours,

FRANK OSBORN,
Engineer.

FRED. SICKLES,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Budd's Lake road, township of Mount Olive and Netcong borough, county of Morris, State of New Jersey. Total length, 17,510 feet. Total length, 3.32 miles.

Width of stone-bed, 12, 16 and 20 feet.

Length of stone-bed, 17,426.5 feet.

Depth of stone-bed, 2½ and 6 inches.

2½-inch macadam, 2,715.07 square yards, at 35 cents; total...	\$950 27
6-inch macadam, 21,347.33 square yards, at 51 cents; total.....	10,887 14
Earth excavation, 5,988.46 cubic yards, at 28 cents.....	1,676 77
Rock excavation, 638 cubic yards, at \$1.50.....	957 00
Iron drain, 580 lineal feet, at \$1.50.....	870 00
Supervisor's salary	276 00
Engineering expenses	338 71

Total.....	\$15,955 89
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Maximum grade before.....	10.36 per cent.
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Maximum grade now.....	7.50 per cent.
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We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 2½ and 6 inches.

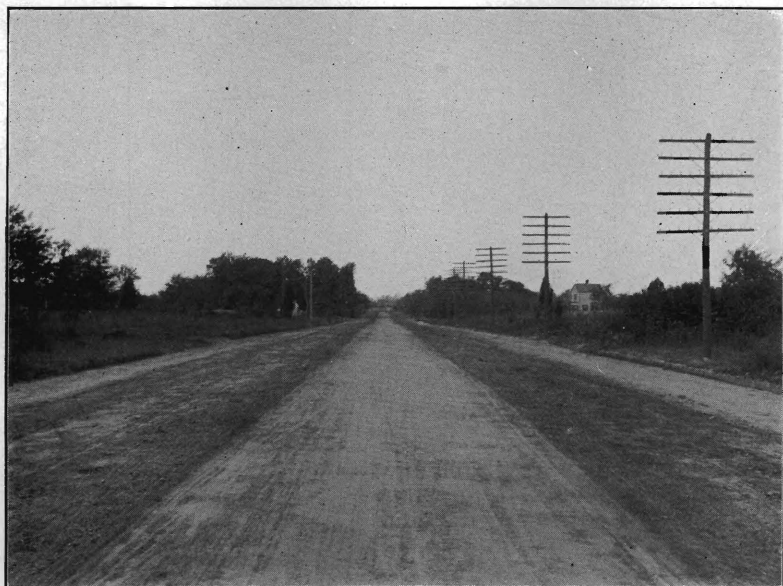
Respectfully yours,

WM. E. KING,
County Engineer.

J. D. BUDD,
Supervisor.



Valley Drive,
Atlantic Highlands, Monmouth county. Before improvement.



Valley Drive,
Atlantic Highlands, Monmouth county. After improvement. 14 feet wide,
7 inches deep.

COMMISSIONER OF PUBLIC ROADS. 107

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Succasunna road, township of Roxbury, county of Morris, State of New Jersey. Total length, 4,264.8 feet. Total length, 0.81 miles.

Width of stone-bed, 16 feet.
Length of stone-bed, 4,264.8 feet.
Depth of stone-bed, 6 inches.

6-inch macadam, 7,680 square yards, at 44 cents; total.....	\$3,379 20
4-inch macadam, 486 square yards, at 38 cents; total.....	184 68
Earth excavation, 2,597 cubic yards, at 24 cents.....	623 28
Rock excavation, 25 cubic yards, at \$1.00.....	25 00
Overhaulage, 1,308 cubic yards, at 10.21 averaged cents.....	133 55
Iron drain, 55 lineal feet, at \$1.60.....	88 00
Supervisor's salary	129 00
Engineering expenses	271 77
Total	<hr/> \$4,834 48

Maximum grade before..... 3.5 per cent.
Maximum grade now..... 1 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

WM. E. KING,

County Engineer.

WM. LANTERMAN,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Mendham and Somerset County Line road, township of Mendham, county of Morris, State of New Jersey. Total length, 2.40 miles.

Width of stone-bed, 12 feet.
Depth of stone-bed, 6-inches.

Macadam, 16,933.33 square yards, at 54 cents; total.....	\$9,144 00
Earth excavation, 6,892 cubic yards, at 28 cents.....	1,929 76
Rock excavation, 100 cubic yards, at \$1.50.....	150 00
Iron drain, 56.25 feet, at \$1.25.....	70 31
Tile drain, 30 lineal feet, at 35 cents.....	10 50
Supervisor's salary	235 50
Engineering expenses	370 43
Total.....	<hr/> \$11,910 50

Maximum grade before.....	12.50 per cent.
Maximum grade now.....	10.75 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was six inches.

Respectfully yours,

WM. E. KING,
County Engineer.
GEORGE GUNTHER,
Supervisor.

Henry I. Budd, Esq., State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below please find detailed statements of the roads constructed in Passaic county during the fiscal year ending October 31, 1900.

UNION AVENUE.

9,664.61 square yards 4-inch macadam, at 24 cents per square yard	\$2,319 50
4,000 cubic yards earth, at 10 cents per cubic yard.....	400 00
8,617.77 square yards macadam and bottom stone, at 44 cents per square yard.....	3,791 82
Relaying drain	8 75
22 lineal feet 6-inch cement pipe, at 50 cents per lineal ft.....	11.00
88 lineal feet 8-inch cement pipe, at 70 cents per lineal ft....	61 60
36 lineal feet 16-inch vitrified pipe at \$1.20 per lineal ft.....	43 20
Repairing culvert	4 50
Total cost.....	\$6,640 37

WILLIAM L. WHITMORE,
County Engineer.
HENRY V. WILSON,
Supervisor.

LAKE-SIDE AVENUE.

11,062 square yards 4-inch macadam, at 25½ cents per square yard	\$2,820 81
6,832 cubic yards earth, at 24 cents per cubic yard.....	1,639 68
54.42 cubic yards solid rock, at 59 cents per cubic yard.....	32 10
18.11 cubic yards rubble masonry, at \$1.90 per cubic yard....	34 41
28 lineal feet 8-inch vitrified pipe, at 50 cents per lineal ft.....	14 00
38 lineal feet 12-inch vitrified pipe, at 80 cents per lineal ft....	30 40

COMMISSIONER OF PUBLIC ROADS. 109

104 lineal feet 12-inch cast iron pipe, at \$1.95 per lineal ft.	202 80
77.55 cubic yards dry wall, at \$1.50 per cubic yard.	116 32
3 catch basins, at \$3.33 1-3 each.	10 00
325.33 square yards paving, at 60 cents per square yard.	195 20
235½ lineal feet railing, at 10 cents per lineal ft.	23 55
336 lineal feet fence reset, at 2 cents per lineal ft.	6 72
Total.	<hr/> \$5,160 99

WILLIAM L. WHITMORE,
County Engineer.
JOHN J. BARTHOLF,
Supervisor.

BROOK AVENUE.

13,194½ square yards 4-inch macadam, at 28½ cents per square yard	\$3,760 43
4,000 cubic yards earth excavation, at 23 cents per cubic yard..	920 00
5,091 cubic yards rock excavation, at 49 cents per cubic yard..	2,494 59
Total cost.	<hr/> \$7,175 02

WILLIAM L. WHITMORE,
County Engineer.
PETER SEARS,
Supervisor.

TILT STREET AND GRAND SUMMIT AVENUE.

3,786.07 square yards 4-inch macadam, at 24 cents per square yard	\$908 65
1,118 cubic yards earth, at 23 cents per cubic yard.	257 14
2 catch basins and grates.	34 00
64 lineal feet 12-inch vitrified pipe relaid, at 40 cents per lin. ft.	25 60
8c lineal feet 12-inch cast pipe, at \$1.25 per lineal ft.	100 00
114 lineal feet 12-inch vitrified pipe, at 70 cents per lineal ft..	79 80
178 lineal feet 18-inch vitrified pipe, at \$1.20 per lineal ft.	213 60
351.11 square yards paved gutters, at 60 cents per square yard.	210 66
Total cost.	<hr/> \$1,829 45

WILLIAM L. WHITMORE,
County Engineer.
JAMES MARTIN,
Supervisor.

THE PATERSON AND HAMBURG TURNPIKE AND BERGEN COUNTY LINE ROAD.

17,340.44 square yards 4-inch macadam, at 34½ cents per square yard	\$5,982 45
9,370 cubic yards earth, at 29 cents per cubic yard.....	2,717 30
1,607.59 cubic yards solid rock, at \$1.30 per cubic yard.....	2,089 86
276 cubic yards loose rock, at 29 cents per cubic yard.....	80 04
12.33 cubic yards dry wall, at \$1.50 per cubic yard.....	18 49
16 cubic yards rubble masonry, at \$1.75 per cubic yard.....	28.00
93 lineal feet 12-inch cast iron pipe, at \$1.50 per lineal ft.....	139 50
6 lineal feet 12-inch vitrified pipe, at 80 cents per lineal ft.....	4 80
94 lineal feet 18-inch vitrified pipe, at \$1.10 per lineal ft.....	103 40
5 square yards paved gutters, at 60 cents per square yard.....	3 00
137 square feet coping, at 20 cents per square ft.....	27 40
Basins	20 00
Total cost.....	<hr/> \$11,214 24

WILLIAM L. WHITMORE,
County Engineer.
FRED. ANDERSON,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Old Mullica Hill and Woodstown Turnpike road, township of Pilesgrove, county of Salem, State of New Jersey. Total length, 10,802 feet. Total length, 2.045 miles.

Width of gravel-bed, 14 feet.

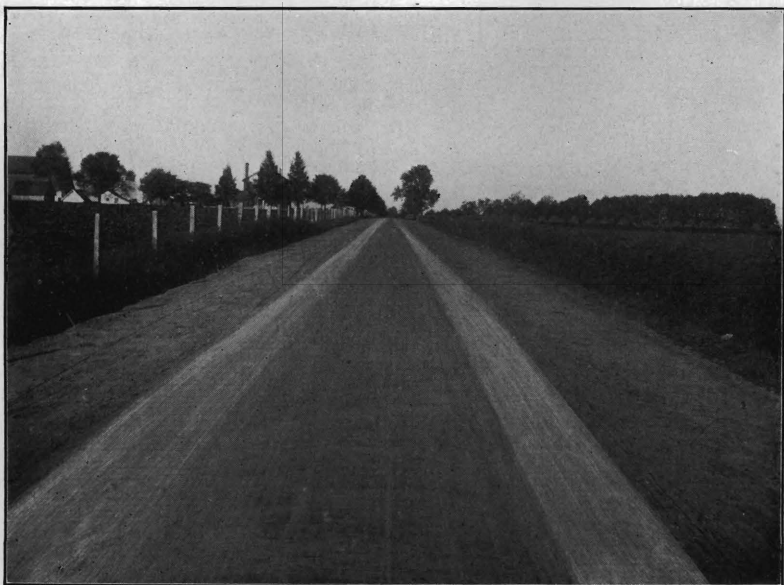
Length of gravel-bed, 10,788.5 feet.

Depth of gravel-bed, 8 and 6 inches.

Total cost of gravel purchased in the bank.....	\$265 82
Preparation of road-bed (cost).....	755 19
Compact gravel, 3,263.1 cubic yards, at intersections, at 39 cents; total	1,272 60
Earth excavation, 520 cubic yards, at 25 cents.....	130 00
Overhauls, 1,263.6 cubic yards, at 56 cents.....	707 62
Overhauls, 1,390.6 cubic yards, at 84 cents.....	1,168 10
Overhauls, 193 cubic yards, at \$1.12.....	216 16
Open drain, 610.4 cubic yards, at 25 cents.....	152 60
Supervisor's salary, 58 days, at \$3.....	174 00
Engineering expenses	115 05
Total.....	<hr/> \$4,957 14



Old Mullica Hill and Woodstown Turnpike,
Salem county. Gravel. Before improvement.



Old Mullica Hill and Woodstown Turnpike,
Salem county. Gravel. After improvement. 14 feet wide, 8 inches deep.

COMMISSIONER OF PUBLIC ROADS.

III

Maximum grade before.....	7.33 per cent.
Maximum grade now.....	6.97 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 and 6 inches.

Respectfully yours,

JOSIAH MILLER,

Engineer.

W. H. REEVES,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find on exact detailed statement of the cost of the Amwell road, township of Franklin, county of Somerset, State of New Jersey. Total length, 35,125 feet. Total length, 6.65 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 35,125 feet.

Depth of stone-bed, 8, 10 and 14 inches.

Number of tons of stone used in construction, 23,431.

30,000 feet side ditches, as per contract, at 3 cents.....	\$900 00
Building addition to road.....	155 16
Macadam, 13,033 square yards, at 66½ cents; total.....	8,666 95
Telford, 33,800 square yards, at 67 cents; total.....	22,646 00
3,600 square yards 4-inch extra bottom, at 26 8-10 cents.....	964 80
Ditches leading from road.....	150 63
Earth excavation, 7,994.4 cubic yards.....	
Clay, furnishing, carting and spreading.....	746 25
Vitrified pipe, 200 feet, at 37¼ cents.....	74 50
Extra stone near church.....	25 00
Extra excavation, 8,181.5 cubic yards, at 12 cents.....	981 78
Tile drain, 4,000 lineal feet, at 9¾ cents.....	390 00
Lump sum, contract price.....	32,630 33
Supervisor's salary	480 00
Engineering expenses	1,487 86
Total.....	<hr/> \$37,668 93

Maximum grade before.....	7 per cent.
Maximum grade now.....	5.76 per cent.

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We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8, 10 and 14 inches.

Respectfully yours,

JOSHUA DOUGHTY, JR.,
Engineer.

JOHN STOTHOFF,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Springfield avenue, township of New Providence, county of Union, State of New Jersey. Total length, 15,910 feet. Total length, 3 miles.

Width of stone bed, 12 feet.

Length of stone-bed, 15,910 feet.

Depth of stone-bed, 6 inches.

Number of tons of stone used in construction, 5,890.

Macadam, 21,211 square yards at 40 cents.....	
Earth excavation, 13,854 cubic yards; extra contract, 128 cubic yards, 21 cents.....	
Tile, 1,050 lineal feet, at 5 cents.....	
Lump sum, contract price.....	\$11,393 74
Supervisor's salary	300 00
Engineering expenses	632 34
Total.....	<hr/> \$12,326 08

Maximum grade before.....	7.16 per cent.
Maximum grade now.....	4.75 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

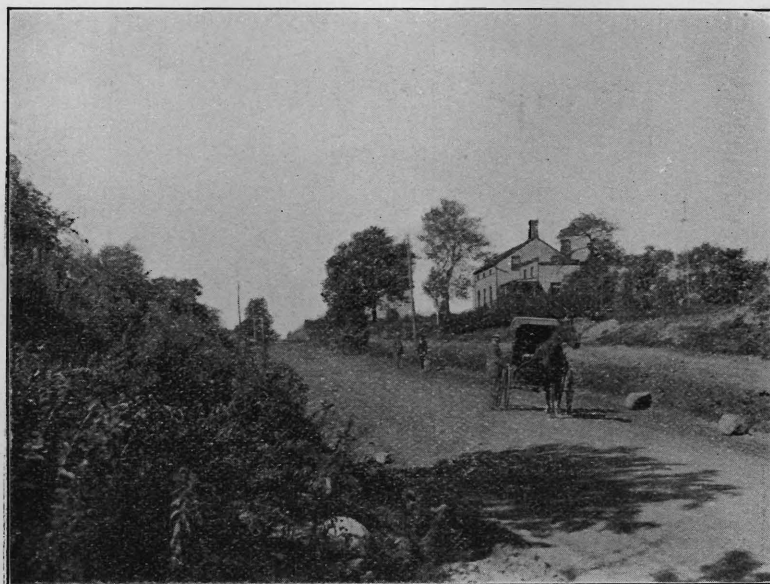
Respectfully yours,

F. J. HUBBARD,
Engineer.

ANTHONY WAHL,
Supervisor.



Centre Street,
Franklin Township, Essex county. Showing deep cut. Telford 16 feet
wide and 8 inches deep.



Centre Street,
Franklin township, Essex county. 16 feet wide and 8-inch Telford.

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Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Below find an exact detailed statement of the cost of Mountain avenue, township of Fanwood, county of Union, State of New Jersey. Total length, 2,280 feet. Total length 0.432 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 2,280 feet.

Depth of stone-bed, 6 inches.

Macadam, 3,040 square yards, at 42 cents; total.....	\$1,276 80
Earth excavation, 1,150 cubic yards, at 25 cents.....	287 50
24 lineal feet cast iron pipe, at 60 cents.....	14 40
Lump sum, contract price.....	1,578 70
Additional excavation in gutters, 151 cubic yards, at 25 cents..	37 75
Supervisor's salary	99 00
Engineering expenses	110 00
<hr/>	
Total.....	\$1,825 45

Maximum grade before.....	1.2 per cent.
Maximum grade now.....	1.2 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

J. L. BAUER,

Engineer.

L. W. MILLER,

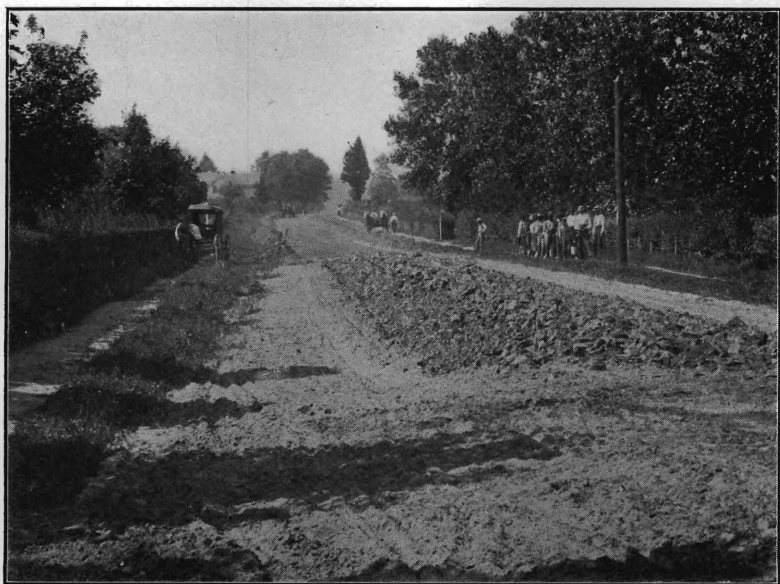
Supervisor.

APPENDICES.

(115)



Brighton Avenue,
Long Branch, Monmouth county. Finished roadway, stone centre 16 feet wide, and gravel sides. 8 inch macadam.



Westwood Avenue.
Long Branch, Monmouth county. In course of construction. Stone centre, 16 feet wide, gravel wings 7 feet wide, each side of stone.

APPENDIX A.

Standard State Aid Specifications for Stone Roads as Amended by the State and County Road Engineers, February 1st, 1901.

SPECIFICATIONS

*For a ROAD in.....County, New Jersey, known as
.....beginning at.....
and extending to.....a distance of
.....feet, or.....miles,
.....feet wide.*

WORK TO BE PERFORMED.

1. The work to be performed will consist in furnishing all materials, tools, machinery and labor necessary for the efficient and proper grading of roadway, side ditches and side banks; laying, spreading, rolling of road metal, and leaving the roadway complete in every manner ready for immediate use.

PLANS AND DRAWINGS.

2. The plan, profile and cross-sections on file in the office of the State Commissioner of Public Roads and at the office of.....
.....County Engineer,.....
New Jersey, show general location, profile, details and dimensions. The work will be constructed in all respects according to the above-mentioned plans, profile and cross-sections, which form part of these specifications.

3. Any variation of location, profile, size and dimensions from that shown on the plans, as may be required by the exigencies of construction, will, in all cases, be determined by the Engineer; but the contractor shall not, on any pretense, save that of the written order of the contracting parties, deviate from the intent of the plans or specifications.

4. On all drawings, figured dimensions are to govern in cases of discrepancy between scale and figures.

GRADING.

5. Under this head will be included all excavation and embankment required for the formation of the highway; cutting all ditches or drains about or contiguous to the road; removing all fences, walls, buildings, trees, poles or other incumbrances, the excavation and embankment necessary for reconstructing cross or branch roads in cases where they are destroyed or inter-

ferred with in the formation of the roadway, and all other excavations and embankments connected with or incidental to the construction of the said road.

EXCAVATION.

6. The roadway to the width of.....as shown on plan must be excavated or built to the same curvature as that of the surface of the road when finished; the grade, from center to sides, must be as shown on plans.

7. The earth taken away from any cut or ditch shall be deposited where the Engineer may direct, either within or without the lines of the road, but no earth shall be removed from the line of the road without the order of the Engineer.

EMBANKMENT.

8. Material taken from the excavations, except when otherwise directed by the Engineer, shall be deposited in the embankments, either on the roadway or sidewalks.

9. When there is not sufficient material in the excavations of the road to form the embankments, the deficiency must be supplied by the contractor from without the road. The character of said material and place of excavation must be approved by the Engineer. Said material is to be paid for at the same price per cubic yard as specified in the contract for other excavation.

10. The embankments will be formed in layers of such depth, generally twelve (12) inches, and the material deposited and distributed in such manner as the Engineer may direct, the required allowance for settling being added.

SLOPES.

11. Slopes in both embankments and excavations shall be one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical, unless otherwise ordered by Engineer.

ROADWAY.

Sub-Foundations.

12. When the excavations and embankments have been brought to a proper depth below the intended surface of the roadway, the cross-section thereof conforming in every respect to the cross-section of the road when finished, the same shall be rolled with a.....ton.....roller until approved by the Engineer and Supervisor. If any depressions form under such rolling, owing to improper material or vegetable matter, the same shall be removed and good earth substituted, and the whole re-rolled until thoroughly solid and to above-mentioned grade. Water must be applied in advance of the roller, when, in the opinion of the Engineer and Supervisor, it is necessary.

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STONE CONSTRUCTION.

Telford Foundations.

13. After the road-bed has been formed and rolled, as above specified, and has passed the inspection of the Engineer and Supervisor, a bottom course of stone, of an average depth of.....inches, is to be set by hand as a close, firm pavement, the stones to be placed on their broadest edges lengthwise across the road in such manner as to break joints as much as possible, the breadth of the upper edge not to exceed four (4) inches. The interstices are then to be filled with stone chips, firmly wedged by hand with a hammer, and projecting points broken off. No stone of greater length than ten (10) inches or width of four (4) inches shall be used, except each alternate stone on outer edge, which shall be double the length of the others and well tied into the bed of the road; all stones with a flat, smooth surface, must be broken; the whole surface of this pavement to be subjected to a thorough settling or ramming with heavy sledge-hammers, and thoroughly rolled with a.....ton.....roller. No stone larger than two and one-half ($2\frac{1}{2}$) inches to be left loose on top of telford.

MACADAM.

First Course of Broken Stone.

14. After the road-bed has been formed and rolled as above specified, and has passed the inspection of the Engineer and Supervisor, the first layer of broken stone, consisting of two and one-half ($2\frac{1}{2}$) inch stone, or stone that will pass through a ring three (3) inches in diameter, shall be deposited in a uniform layer, having a depth of.....inches, and rolled repeatedly with a.....ton.....roller until compacted to the satisfaction of the Engineer and Supervisor. No stone in this course shall be less than two (2) inches in length. Water must be applied in advance of the roller, when in the opinion of the Engineer and Supervisor it is necessary.

15. The depth of loose stone in this and all other courses must be measured by blocks the required thickness of the said loose stone. These blocks to be placed at frequent intervals amid the loose stone when being spread.

BINDER BETWEEN FIRST AND SECOND COURSE FOR TELFORD
OR MACADAM.

16. On the first course of stone a quantity of.....binder shall be spread in a uniform layer, and the rolling continued until the stones cease to sink or creep in front of the roller; water will be applied in advance of the roller, if ordered by the Engineer. The quantity and quality of this and all other binding to be at all times subject to the approval of the Engineer and Supervisor.

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SECOND COURSE OF BROKEN STONE FOR MACADAM OR TELFORD.

17. The second course of broken stone shall consist of one and one-half ($1\frac{1}{2}$) inch stone; that is, every piece of stone shall be broken so that it can be passed through a ring two (2) inches in diameter, and no stone shall be more than two (2) inches or less than one (1) inch long. This course is to be spread in a uniform layer of.....inches in depth, and rolled until thoroughly settled into place to the satisfaction of the Engineer and Supervisor. Water will be applied if ordered by the Engineer and Supervisor.

BINDER ON SECOND COURSE OF STONE.

18. Binder on this course of stone must be applied in the same manner as binder on first course of stone (see Art. 16), as directed by Engineer and Supervisor.

SURFACE.

19. When the two courses are rolled to the satisfaction of the Engineer and Supervisor, a coat of fifty (50) per cent. of three-quarters ($\frac{3}{4}$) inch stone and fifty (50) per cent. of screenings, properly mixed, is to be spread of sufficient thickness to make a smooth and uniform surface to the road; then again rolled until the road becomes thoroughly consolidated, hard and smooth.

20. Rolling to be done by contractor with a.....ton..... roller approved by the Engineer.

21. Any depressions formed during the rolling, or from any other cause, are to be filled with.....stone and screenings approved by the Engineer, and the roadway brought to a proper grade and curvature as determined by him.

22. Water to be applied in such quantity and in such manner as directed by the Engineer and Supervisor.

MANNER OF ROLLING.

23. In the rolling the roller must start from the side lines of the stone bed and work towards the center, unless otherwise directed. The rolling shall at all times be subject to the directions of the Engineer and Supervisor, who may, from time to time, direct such methods of procedure as in their opinion the necessities of the case may require.

QUALITY OF MATERIAL.

24. All stone must be as nearly cubical as possible, broken with the most approved modern stone crushing machinery, free from all screenings, earth and other objectionable substances, of uniform size, and the same kind and

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quality, or equally as good in every particular, as that shown in the Engineer's office. The one and one-half ($1\frac{1}{2}$) inch stone, three-quarter ($\frac{3}{4}$) inch and screenings for binder and final finish must be of the best trap rock, free from loam or clay.

25. The contractor must furnish samples to the Engineer of the kind of stone to be used in the work before the opening of the bids.

26. A shoulder of firm earth or gravel is to be left or made on each side, extending at the same grade and curvature of road to side ditches or gutters. This shoulder is to be rolled according to the directions of the Engineer.

SIDE DITCHES OR GUTTERS.

27. The side ditches or gutters are to be excavated as per stakes furnished by Engineer, in order to give an easy flow of water, so that no water shall be left standing on the road or in ditches, for all of which no extra payment will be made.

UNDERDRAINS.

28. Underdrains, if found necessary, shall be constructed by the contractor (at prices named in bids) of good four (4) inch.....tile, laid upon a board of not less than one (1) inch in thickness and six (6) inches in width, whenever and wherever the Engineer and Supervisor shall decide; top of tile or pipe must be at least.....inches deep, unless otherwise directed by the Engineer; the joints of the tile or pipe must be covered with salt hay, or material equally as good, and trench filled with previous earth.

29. When directed by the Engineer a stone drain may be used in place of the tile drains. A trench one foot in width and one foot six inches in depth shall be excavated below the sub-grade, said excavation to be filled with loose broken stone to a depth required by Engineer.

NO EXTRA PRICE.

30. No allowance in measure of depth of pavement will be made on account of any material which may be driven into the road-bed by rolling. The pavement, when completed, must conform to the grade and cross-section and be satisfactory to the Engineer, whose decision shall be final.

31. No extra work will be paid for unless the price has been agreed upon between the contracting parties, including the State Commissioner of Public Roads, and endorsed upon the agreement, witnessed by the Engineer.

32. All clay or gravel for shouldering or binder and all extra hauling is to be done at the contractor's expense.

BIDS.

33. Bids will be received under these specifications for the road complete. The prices per yard for excavation, telford, macadam, etc., are intended for

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the use of the Engineer in making estimates to the Board of Chosen Freeholders of work done. No bids will be received in which all of the following items are not filled out:

- (1) Price per cubic yard for earth excavations, without classification, as per cross-sections throughout the length and width of the road.
- (2)
- (3) Price per square yard for Telford road complete.
- (4) Price per square yard for Macadam road complete.
- (5) Price per lineal foot for underdrains, furnishing all labor and material.
- (6) Price (lump) for the whole road complete, according to above specifications and plans.

ESTIMATE OF QUANTITIES.

34. (1) Excavation, earth.....cubic yards.
- (2)
- (3) Telford.....square yards, as specified.
- (4) Macadam.....square yards, as specified.
- (5) Underdrainslineal feet.
- (6)

35. These quantities are result of calculation, but are to be considered as approximate. The county will not be responsible for any excess in above quantities, should any occur. The contractor is expected to satisfy himself, by a personal examination of the work contemplated, about the nature, character and quantity of the labor and material required.

BOND ACCOMPANYING BIDS.

36. Bids shall be accompanied with the bidder's bond in the sum of one thousand dollars, with security satisfactory to the Board of Chosen Freeholders, conditioned that if the contract shall be awarded to him he will, when required by said Board, execute an agreement in writing to perform the work according to the specifications.

LIABILITIES OF CONTRACTOR.

37. He shall maintain sufficient guards by day and night to prevent accidents from travel, and will be liable for any damage which may arise from his neglect to do so, or from any omission on his part.

38. He shall keep the road sprinkled until the final certificate of completion by the Engineer is given.

39. He is to commence and prosecute the work upon the road at such points as may be directed by the Engineer, within.....days from and after the signing of the contract, and shall continue work thereon until completion, except as herein provided.

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40. He further agrees to complete the same on or before the.....
day of.....A. D.....

Twenty dollars for each day that the work shall remain uncompleted, after the time allowed by contract, may be deducted, as liquidated damages, from any moneys due contractor, unless otherwise agreed upon by the Board of Chosen Freeholders, after presentation of certificate of the Engineer recommending the extension of the time limit of completion. A bonus or premium of one dollar per week will be paid the contractor for each week the road is completed before the time specified in the contract.

41. The contractor shall keep the finished roadway and earthwork in repair for the period of one year from the date of its completion and acceptance, during which time he shall be liable for wear and tear caused by ordinary travel, and in addition thereto for as much longer as for any period or periods during said year it shall be out of proper condition. If, during that time, the roadway or any part of the work shall, in the judgment of the Engineer and Board of Chosen Freeholders, require repairing, and they shall duly notify the contractor to make such repairs as required, and the contractor should refuse or neglect to do so to the satisfaction of the said Engineer and Board of Chosen Freeholders within five days from the date of service of notice, then the said Engineer and Board of Chosen Freeholders shall have the right to have the work done properly by other parties and pay the expense for the same out of the five per cent. retained.

42. The contractor will be required to preserve all stakes and bench marks made and established on the line of work until duly authorized by the Engineer to remove the same.

43. The contractor shall not disturb the position of title stones (the corners of properties adjacent to the road), but where they appear he will either lift or lower them, under the personal supervision of the Engineer.

44. The contractor must also preserve the roadway on which he is working from needless obstruction, and where necessary he must construct safe and commodious crossings, to be maintained in good order. He shall afford all proper and reasonable means for the accommodation of the public, and leave the roadway complete in every manner ready for immediate use.

PROVISION FOR DRAINAGE.

45. If it is necessary in the prosecution of the work to interrupt or obstruct the natural drainage of the surface, or the flow of artificial drains, the contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interests. He shall be held liable for all damages which may result from any neglect to provide for either natural or artificial drainage which he may have interrupted.

RIGHT TO BUILD BRIDGES, CULVERTS, ETC., AND SUSPENSION OF WORK.

46. The right of the county to build bridges, culverts, lay pipes or other appurtenances in said road during the progress of the work is expressly reserved, as well as suspending the work or any part thereof during the construction of the same, for the purposes above stated, without further compensation to the contractor for such suspension than an extension of time for completing the work as much as it may have been delayed.

STOPPING WORK ON ACCOUNT OF WEATHER.

47. The Engineer or Supervisor may stop any portion of the work if in their judgment the weather is such as to prevent the same being done properly. No allowance of any kind will be made for such stoppage, except an extension of time for the completion of the work as herein provided.

ABANDONMENT OF CONTRACT.

48. If at any time the work under contract should be abandoned, or if at any time the Engineer should judge and so certify in writing that said work, or any part thereof, is unnecessarily delayed, or that the contractor is wilfully violating any of the conditions or covenants of this contract, or is executing the same in bad faith, then, and in that case, the Board of Chosen Freeholders shall notify the said contractor to discontinue all work under this contract. They may employ other parties to complete the work in such manner as they may decide, and use such material as may be procured upon the line of aforesaid work, and, if necessary, to procure other material for its completion, and charge the expenses of the said labor and material to the contractor, which expense shall be deducted from any moneys due him under contract. In case these expenses shall exceed the sum which would have been payable under contract, if the same had been completed by said contractor, he or his bondsmen shall pay the amount of excess to the Board of Chosen Freeholders on notice from the Engineer.

ENGINEER.

49. The Engineer is to be selected or appointed by the Board of Chosen Freeholders and paid by them. He is to furnish all surveys, profiles, plans, specifications and estimates of quantities of all kinds before specifications are signed, and in such a clear manner that lump bids can be made upon the work. He shall furnish all lines and grades required for the completion of the work. He is to furnish estimates for quantities of work done before partial payments can be made, the quantity of road laid being determined by surface measurements. Should any difference arise between the contracting parties as to their meanings, his decisions on these matters are to be final.

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and conclusive. The work is to be done according to his directions and if any material of which he does not approve is brought upon the road, it is to be removed at the expense of the contractor. If the contractor fails or neglects to do any part of the work as specified or as directed by the Engineer, then in that case all other work shall be discontinued on notice from the Engineer to the contractor, or to the superintendent or foreman in charge of the work for the contractor, until such time as the work complained of has been done to the satisfaction of the Engineer; and the contractor will not be entitled to or allowed any compensation or extension of time for such discontinuation or suspension of the work.

SUPERVISOR.

50. Nothing in these specifications relating to the duties of the Engineer shall be taken or construed in any manner to conflict with the duties of the Supervisor, as specifically set forth in the act entitled "An act to provide for the more permanent improvement of the public roads of this State," approved March 22, 1895, and the acts supplementary thereto, but they shall co-operate as far as practicable.

INCOMPETENT WORKMEN.

51. The contractor shall employ competent men to do the work, and whenever the Supervisor shall inform him or his representative in charge, in writing, that any man on the work is unfitted for the place, or is working contrary to the provisions of the specifications or the instructions of the Engineer and Supervisor, he shall thereupon be discharged.

INSPECTION.

52. All directions and determinations necessary to give due and full effect to any of the provisions of these specifications shall be given by the Engineer and Supervisor.

53. All material and workmanship of any kind shall be subject at all times to the inspection of the Engineer and Supervisor. Whenever unfaithful and imperfect work is discovered, it shall be immediately repaired or replaced by the contractor, after due notification from the Engineer and Supervisor.

SUB-LETTING OF CONTRACT.

54. The contractor shall not assign or sub-let any portion of this contract without the consent of the Board of Chosen Freeholders and the State Commissioner of Public Roads.

PAYMENTS.

55.monthly payments will be made by the Board of Chosen Freeholders to the contractor for work performed, upon presentation by him of the proper certificates of the Engineer and Supervisor, in a sum not to exceed eighty per cent. of the amount then due, together with releases from all liens, if required. Fifteen per cent. will be paid at the completion of the work. The remainder of five per cent. will be retained by the Board of Chosen Freeholders for a period of one year, as provided for in Article 41.

BOND OF CONTRACTOR.

56. The contractor will be required to execute, within five days of giving of contract, a bond in such sum and with such securities as shall be approved by the Board of Chosen Freeholders, conditioned for the faithful performance of the contract, to indemnify and save harmless the said Board of Chosen Freeholders from all suits or actions of any name or description brought against them on account of any act or omission of the contractor or his agents, and for the faithful performance of the contract by the contractor. Said bond shall be in a sum of not less than fifty per cent. of the cost of the road when completed. Any change made in said plans, specifications, agreements or quantities without the consent of the bondsmen shall in no way vitiate said bond. The said contractor hereby further agrees that so much of the money due him, under and by virtue of this agreement, as shall be considered necessary by the Board of Chosen Freeholders, may be retained by them until all such suits or claims for damages aforesaid shall have been settled and evidence to that effect furnished to the satisfaction of the said Board of Chosen Freeholders.

CONTRACTOR TO INSURE PAYMENT FOR LABOR, MATERIAL,
ETC., ON FINAL ESTIMATE.

57. The contractor must also furnish said Engineer and Supervisor with satisfactory evidence that all persons who did work or furnished material for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents in the prosecution of the work, have been duly paid or secured; he shall also give notice to said Engineer and Supervisor within ten days after the completion of the work, and before final estimate is made, that any balance for such work or materials, or compensation for such damages due, has been fully paid or released.

The right to increase or decrease the quantity of work and to reject any or all bids is reserved.

.....
County Engineer.

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.....
.....
.....
.....
.....

Road Committee.

Approved this.....A. D.
.....by resolution of the Board of Chosen Freeholders.

.....
Director Board of Chosen Freeholders.

.....
Clerk of Board of Chosen Freeholders.

OFFICE STATE COMMISSIONER OF PUBLIC ROADS, TRENTON, N. J.

I have this day after carefully read and examined the foregoing specifications, and the same are hereby approved.

Any departure from these specifications which increases the cost of the road must have the written consent of the State Commissioner of Public Roads.

Given under my hand, this.....A. D.....

.....
State Commissioner of Public Roads.

PROPOSAL.

*To the Board of Freeholders of the County of.....State
of New Jersey:*

GENTLEMEN—The undersigned hereby declares that he has carefully examined the annexed specifications and the drawings therein referred to, and will provide all necessary machinery, tools, apparatus and other means of construction, and do all the work and furnish all the material called for by said specifications, in the manner prescribed by the specifications and the requirements of the Engineer and Supervisor under them for the following prices:

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(1) Price per cubic yard for earth excavations, without classification, as per cross-sections throughout the length and width of the road.

(2)

(3) Price per square yard for Telford road complete.

(4) Price per square yard for Macadam road complete.

(5) Price per lineal foot for underdrains, furnishing all labor and material.

(6) Price (lump) for the whole road complete, according to above specifications and plans.

Accompanying this proposal is an approved bond for the sum of one thousand (\$1,000) dollars, payable to the order of.....
.....County Collector of.....county;
which bond is to be forfeited as liquidated damages if, in case this proposal is accepted, the undersigned shall fail to execute a contract with said Board of Freeholders, under the conditions of this proposal, within the time provided for by the foregoing advertisement for proposals; otherwise, said bond is to be returned to the undersigned.

Signed.....

Address.....

.....N. J.....

CONTRACT.

This agreement, made the.....day of
.....in the year of our Lord one thousand nine hundred.....between THE BOARD OF CHOSEN FREEHOLDERS of the County of.....party of the first part, and
.....party of the second part,

Witnesseth, That the said party of the second part, for and in consideration of the payments hereinafter specified and agreed to be made by the party of the first part, hereby covenant and agree to furnish and deliver all the materials and to do and perform all the work and labor required to be furnished and delivered, done and performed in and about the macadamizing of
beginning at
and extending to.....
in the township of.....a distance of.....
in strict and entire conformity with the plans on file in the Engineer's office and with the specifications hereto annexed and duly approved by resolution of THE BOARD OF CHOSEN FREEHOLDERS of the County of.....
adopted the.....day of.....in the year of our Lord one thousand nine hundred.....and approved by the State Commissioner of Public Roads on the.....day of
.....in the year of our Lord one thousand nine hundred.....which said plans and specifications are hereby made part of this agreement as fully and with the same effect as if the same had been set forth at length in the body of this agreement.

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In consideration of the premises, the party of the first part hereby agrees to pay to the party of the second part for said work, when completed in accordance with the said specifications, the sum of..... payments to be made as provided in said specifications upon presentation of the proper certificates of the Engineer and Supervisor, and upon the terms set forth in the annexed specifications.

This contract to be binding upon THE BOARD OF CHOSEN FREEHOLDERS of the County of.....their successors or assigns and upon the party of the second part.....

In Witness Whereof, The Director of THE BOARD OF CHOSEN FREEHOLDERS of the County of.....by authority of a resolution of said Board, hath hereunto set his hand and affixed the corporate seal of the said Board, and the said party of the second part ha...hereunto set..... hand and seal the day and year first above written.

Signed, sealed and delivered in the presence of

.....

(THIS BOND TO BE FILLED OUT AND TO ACCOMPANY BID.)

KNOW ALL MEN BY THESE PRESENTS, That we,..... are held and firmly bound unto THE BOARD OF CHOSEN FREEHOLDERS of the County of.....in the sum of One Thousand Dollars, lawful money of the United States of America, to be paid to the said THE BOARD OF CHOSEN FREEHOLDERS of the County of.....their successors and assigns, for which payment, well and truly to be made, we bind ourselves, our and each of our heirs, executors and administrators, jointly and severally, firmly by these presents.

Sealed with our seals and dated the.....day ofin the year of our Lord one thousand nine hundred.....

Whereas, The above bounden..... has made a proposal to THE BOARD OF CHOSEN FREEHOLDERS of the County of.....in writing, bearing date the..... day of.....in the year of our Lord one thousand nine hundred.....

and being hereto annexed, for doing all the work and furnishing all the materials for the permanent improvement of the..... road in the said County of.....pursuant to an advertisement published in the.....on the..... day of.....one thousand nine hundred.....

Now the Condition of the Obligation is Such, That, in case the contract

for which said proposal is made shall be awarded to the said.....

 and if.....shall, when required by the said Board, execute an agreement
 to perform the said work and furnish said materials according to the speci-
 fications annexed to said proposal, then this obligation shall be void, or other-
 wise shall remain in full force and virtue.

Signed, sealed and delivered in the presence of

.....

**Standard State Aid Specifications for Gravel Roads as Amended
 by the State and County Road Engineers,
 February 1st, 1901.**

SPECIFICATIONS

*For a GRAVEL ROAD in.....County, New Jersey,
 known as.....beginning at.....
 and extending to.....a distance
 of.....feet, or.....miles.*

WORK TO BE PERFORMED.

The work to be performed will consist in furnishing all tools, machinery
 and labor necessary for the efficient and proper grading of roadway, side
 ditches and side banks; laying, spreading and rolling for road material, and
 leaving the roadway complete in every manner ready for immediate use.

PLANS AND DRAWINGS.

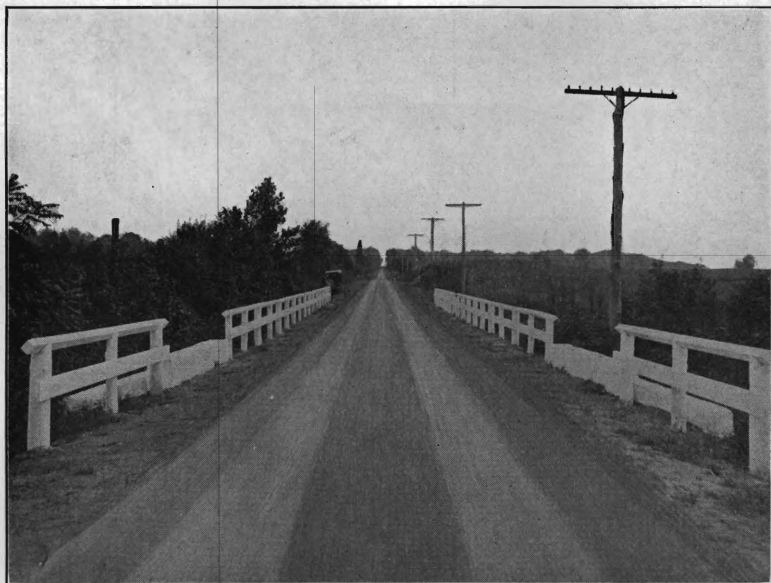
The plan, profile and cross-sections on file in the office of the State Com-
 missioner of Public Roads and at the office of.....
 County Engineer.....New Jersey, show general loca-
 tion, profile, details and dimensions. The work will be constructed in all
 respects according to the above-mentioned plans, profile and cross-sections,
 which form part of these specifications.

Any variation of location, profile, size and dimensions from that shown
 on the plans, as may be required by the exigencies of construction, will, in
 all cases, be determined by the Engineer; but the contractor shall not, on any
 pretense, save that of the written order of the contracting parties, deviate
 from the intent of the plans or specifications.

On all drawings, figured dimensions are to govern in cases of discrepancy
 between scale and figures.



Woodbury and Knight's Run Gravel Road,
Gloucester county. After improvement. Top Roe's Hill looking south.



Woodbury and Knight's Run Gravel Road,
Gloucester county. After improvement. Opposite Dobb's Brick Kiln looking south toward Roe's Hill.

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GRADING.

Under this head will be included all excavations and embankments required for the formation of the highway; cutting all ditches or drains about or contiguous to the road; removing all fences, walls, buildings, trees, poles or other incumbrances, the excavation and embankment necessary for reconstructing cross or branch roads in cases where they are destroyed or interfered with in the formation of the roadway, and all other excavations and embankments connected with or incidental to the construction of the said road.

EXCAVATION.

The roadway to the width of.....as shown on plan must be excavated or built to the same curvature as that of the surface of the road when finished; the grade, from center to sides, must be as shown on plans.

The earth taken away from any cut or ditch shall be deposited where the Engineer may direct, either within or without the lines of the road, but no earth shall be removed from the line of the road without the order of the Engineer.

EMBANKMENT.

Material taken from the excavations, except when otherwise directed by the Engineer, shall be deposited in the embankments, either on the roadway or sidewalks.

When there is not sufficient material in the excavations of the road to form the embankments, the deficiency must be supplied by the contractor from without the road. The character of said material and place of excavation must be approved by the Engineer. Said material is to be paid for at the same price per cubic yard as specified in the contract for other excavation.

The embankments will be formed in layers of such depth, generally twelve (12) inches, and the material deposited and distributed in such manner as the Engineer may direct, the required allowance for settling being added.

SLOPES.

Slopes in both embankment and excavation shall be one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical, unless otherwise ordered by the Engineer.

ROADWAY.

Sub-Foundations.

When the excavations and embankments have been brought to a proper depth below the intended surface of the roadway, the cross-section con-

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forming in every respect to the cross-section of the road when finished, the same shall, if ordered by the Engineer, be rolled until approved by him. If any depressions form under such rolling, owing to improper material or vegetable matter, the same shall be removed and good earth substituted, and the whole re-rolled until thoroughly solid and to above-mentioned grade.

SHOULDERING.

A shoulder of firm earth or gravel is to be left or made on each side of the gravel bed, extending at the same grade and curvature of road to side ditches or gutters. This shoulder is to be rolled according to the directions of the Engineer.

UNDERDRAINS.

Underdrains, if found necessary, shall be constructed by the contractor (at prices named in bids) of good four (4) inch.....tile, laid upon a board of not less than one (1) inch in thickness and six (6) inches in width, whenever and wherever the Engineer shall decide; top of tile or pipe must be at least.....inches deep, unless otherwise directed by the Engineer; the joints of the tile or pipe must be covered with salt hay, or material equally as good, and trench filled with previous earth.

When directed by the Engineer a stone drain may be used in place of the tile drains. A trench one foot in width and one foot six inches in depth shall be excavated below the subgrade, said excavation to be filled with loose broken stone to a depth required by the Engineer.

MATERIAL.

The material to be used in surfacing the road is to be furnished by thewithout any cost to the

The Road Committee, in conjunction with the Engineer, subject to the approval of the Board of Chosen Freeholders, will pass upon and approve all gravel to be used in surfacing the road. The contractor is to dig, cart and place upon the road, in accordance with the specifications, the gravel selected and use no other. Should any objectionable material be used, he is to remove the same at his own expense.

The contractor must furnish to the Engineer samples of the kind of gravel to be used in the work before the opening of the bids.

The gravel is to be placed upon the road in such manner as shall be approved by the Engineer, and be thoroughly rolled and solidified until it is consolidated, firm and approved by the Engineer. The gravel shall be of such thickness that when it is thoroughly compacted and approved, it shall be.....inches deep in the center and slope at a regular grade toinches in depth at a distance of.....feet on each side of the center line.

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Should any depressions appear these are to be carefully filled with gravel, so that the finished road will conform to the approved profile.

The contractor is to be paid by the cubic yard, as per depths above named, for the compacted gravel that he puts on the road, at the price named in the accepted bid, which shall include finishing the road and shaping the shoulders as above specified.

The contractor is to place sufficient gravel on the road to allow it to shrink thirty-three per cent. in rolling and settling.

OVERHAULS.

(This only to apply when county furnishes the gravel.)

The contractor will not be required to cart any gravel a greater distance than one-half mile without extra pay for each extra half mile of carting or fraction thereof, at a price per compact cubic yard named in his accepted bid.

All gravel used for surfacing found within one-half mile of the place where it is to be used, whether on the line of the road or not, must be carted without extra pay.

SIDEWALK.

The contractor will also be required, when the Engineer so directs, to grub and remove from a strip of land.....feet on outside of curb-lines all material objectionable to the Engineer, such as trees, strumps, roots and brush, and refill the holes with earth, thereby completing the opening of the entire road to a width of.....feet, which shall be.....feet on each side of the center line.

The grubbing and removing of such objectionable material that is ordered by the Engineer shall be styled as "grubbing," and paid for by the acre at price named in accepted bid.

STRIPPING GRAVEL BEDS.

(This only to apply when county furnishes gravel.)

Some of the gravel beds are covered with objectionable surface material which must first be removed by the contractor and deposited within one-half mile where the Engineer so directs, which shall be paid for by the county at a price per cubic yard named in accepted bid for removing or stripping such objectionable material from top surface of gravel bed. No allowance will be made for removing stumps, trees, brush or roots from gravel pit.

OPEN DITCHES.

The contractor is to grade the shoulders and open all necessary side ditches (as per stakes furnished by the Engineer) so that there will be no water allowed to stand by the side of the road or upon it, for which no extra payment will be allowed.

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EXTRA DEEP.

Should the Road Committee so order, the contractor is to build in all respects, as already specified, the gravel bed to a greater depth or thickness than that already named. The contractor is to do the same at a price named per square yard for each extra inch in depth.

NO EXTRA PRICE.

No allowance in measure of depth of pavement will be made on account of any material which may be driven into the road-bed by rolling. The pavement, when completed, must conform to the grade and cross-section and be satisfactory to the Engineer, whose decision shall be final.

No extra work will be paid for unless the price has been agreed upon between the contracting parties, including the State Commissioner of Public Roads, and endorsed upon the agreement, witnessed by the Engineer.

BIDS.

Bids will be received under these specifications for the road complete as follows:

- (1) Price per cubic yard for earth excavation, without classification, as per plans and cross-sections throughout the length and width of the road.
- (2) Price per acre for grubbing and removing objectionable material from sidewalks.
- (3) Price per lineal foot for completed tile drain.
- (4) Price per cubic yard for compacted gravel as specified.
- (5) Price per cubic yard for carting gravel more than one-half mile and each additional half mile or fraction thereof.
- (6) Price per cubic yard for stripping or removing earth from top of gravel bed.
- (7) Price per square yard for each ordered inch in depth in excess of thickness named.
- (8) Price (lump) for the whole road complete, according to the specifications and plans prepared by the Engineer.

No bid will be received in which all the above items are not filled out.

Items No. 5 and 6 only to apply when county furnishes gravel.

The person bidding the lowest on the aggregate of above propositions will be considered the successful bidder (all other things being equal.)

ESTIMATE OF QUANTITIES.

- (1) Earth excavations.....cubic yards.
- (2) Grubbing acres.
- (3) Tile drain.....lineal feet.

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- (4) Compacted gravelcubic yards.
- (5) Overhauls.....cubic yards.
- (6) Stripping.....cubic yards.
- Total estimated cost of the road \$.....

These quantities are the result of calculation, but are to be considered as approximate. The County will not be responsible for any excess in above quantities, should any occur. The contractor is expected to satisfy himself, by a personal examination of the work contemplated, about the nature, character and quantity of the labor and material required.

BOND ACCOMPANYING BIDS.

Bids shall be accompanied with the bidder's bond in the sum of one thousand dollars, with security satisfactory to the Board of Chosen Freeholders, conditioned that if the contract shall be awarded to him he will, when required by said Board, execute an agreement in writing to perform the work according to the specifications.

LIABILITIES OF CONTRACTOR.

He shall keep up sufficient guards by day and night to prevent accidents from travel, and will be liable for any damage which may arise from his neglect to do so, or from any omission on his part.

He is to commence and prosecute the work upon the road at such points as may be directed by the Engineer, within days from and after the signing of the contract, and shall continue work thereon until completion, except as herein provided.

He further agrees to complete the same on or before the
day of A. D.

Twenty dollars for each day that the work shall remain uncompleted, after the time allowed by contract, may be deducted, as liquidated damages, from any moneys due contractor, unless otherwise agreed upon by the Board of Chosen Freeholders, after presentation of certificate of the Engineer recommending the extension of the time limit of completion. A bonus or premium of one dollar per week will be paid the contractor for each week the road is completed before the time specified in the contract.

The contractor shall keep the finished roadway and earthwork in repair for the period of one year from the date of its completion and acceptance, during which time he shall be liable for wear and tear caused by ordinary travel, and in addition thereto, for as much longer as for any period or periods during said year it shall be out of proper condition. If, during that time, the roadway or any part of the work shall, in the judgment of the Engineer and the Board of Chosen Freeholders, require repairing, and they shall duly notify the contractor to make such repairs as required, and the contractor should refuse or neglect to do so to the satisfaction of the said Engineer and the Board of Chosen Freeholders, within five days from the date of service of notice,

then the said Engineer and the Board of Chosen Freeholders shall have the right to have the work done properly by other parties and pay the expense for the same out of the five per cent. retained.

The contractor will be required to preserve all stakes and bench-marks, made and established on the line of the work, until duly authorized by the Engineer to remove the same.

The contractor shall not disturb the position of title stones (the corners of properties adjacent to the road), but where they appear he will either lift or lower them, under the personal supervision of the Engineer.

The contractor must also preserve the roadway on which he is working from needless obstruction, and where necessary construct safe and commodious crossings, to be maintained in good order. He shall afford all proper and reasonable means for the accommodation of the public, and leave the roadway complete in every manner ready for immediate use.

PROVISION FOR DRAINAGE.

If it is necessary in the prosecution of the work to interrupt or obstruct the natural drainage of the surface, or the flow of artificial drains, the contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interests. He shall be held liable for all damages which may result from any neglect to provide for either natural or artificial drainage, which he may have interrupted.

RIGHT TO BUILD BRIDGES, CULVERTS, ETC., AND SUSPENSION OF WORK.

The right of the county to build bridges, culverts, lay pipes or other appurtenances in said road during the progress of the work, as well as suspending the work or any part thereof during the construction of the same, for the purposes above stated, is expressly reserved, without further compensation to the contractor for such suspension than an extension of time for completing the work as much as it may have been delayed by such suspension.

STOPPING WORK ON ACCOUNT OF WEATHER.

The Engineer or Supervisor may stop any portion of the work if in their judgment the weather is such as to prevent the same being done properly. No allowance of any kind will be made for such stoppage, except an extension of the time for the completion of the work as herein provided.

ABANDONMENT OF CONTRACT.

If at any time the work under contract should be abandoned, or if at any time the Engineer should judge and so certify in writing that said work, or any part thereof, is unnecessarily delayed, or that the contractor is wilfully

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violating any of the conditions or covenants of this contract, or is executing the same in bad faith, then, and in that case, the Board of Chosen Freeholders shall notify the said contractor to discontinue all work under this contract. They may employ other parties to complete the work in such manner as they may decide, and use such material as may be procured upon the line of afore-said work, and, if necessary, to procure other material for its completion, and charge the expense of the said labor and material to the contractor, which expense shall be deducted from any moneys due him under contract. In case these expenses shall exceed the sum which would have been payable under contract, if the same had been completed by said contractor, he or his bondsmen shall pay the amount of the excess to the Board of Chosen Freeholders, on notice from the Engineer.

ENGINEER.

The Engineer is to be selected or appointed by the Board of Chosen Freeholders and paid by them. He is to furnish all surveys, profiles, plans, specifications and estimates of quantities of all kinds before specifications are signed, and in such a clear manner that lump bids can be made upon the work. He shall furnish all lines and grades required for the completion of the work. He is also to furnish estimates for quantities of work done before partial payments can be made, the quantity of road laid being determined by surface measurements. Should any difference arise between the contracting parties as to their meaning, his decisions on these matters are to be final and conclusive. The work is to be done according to his directions and if any material of which he does not approve is brought upon the road, it is to be removed at the expense of the contractor. If the contractor fails or neglects to do any part of the work as specified or as directed by the Engineer, then in that case all other work shall be discontinued on notice from the Engineer to the contractor, or to the superintendent or foreman in charge of the work for the contractor, until such time as the work complained of has been done to the satisfaction of the Engineer; and the contractor will not be entitled to or allowed any compensation or extension of time for such discontinuation or suspension of the work.

SUPERVISOR.

Nothing in these specifications relating to the duties of the Engineer shall be taken or construed in any manner to conflict with the duties of the Supervisor, as specifically set forth in the act entitled "An act to provide for the more permanent improvement of the public roads of this State," approved March 22, 1895, and the acts supplementary thereto, but they shall co-operate as far as practicable.

INCOMPETENT WORKMEN.

The contractor shall employ competent men to do the work, and whenever the Supervisor shall inform him, or his representative in charge, in writing,

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that any man on the work is unfitted for the place, or is working contrary to the provisions of the specifications or the instructions of the Engineer and Supervisor, he shall thereupon be discharged.

INSPECTION.

All directions and determinations necessary to give due and full effect to any of the provisions of these specifications shall be given by the Engineer and Supervisor.

All material and workmanship of any kind shall be subject at all times to the inspection of the Engineer and Supervisor. Whenever unfaithful and imperfect work is discovered, it shall be immediately repaired or replaced by the contractor, after due notification from the Engineer and Supervisor.

SUB-LETTING OF CONTRACT.

The contractor shall not assign or sub-let any portion of this contract without the consent of the Board of Chosen Freeholders and the State Commissioner of Public Roads.

PAYMENTS.

.....monthly payments will be made by the Board of Chosen Freeholders to the contractor for work performed, upon presentation by him of the proper certificates of the Engineer and Supervisor in a sum not to exceed eighty per cent. of the amount then due, together with releases from all liens, if required. Fifteen per cent. will be paid at the completion of the work. The remainder, or five per cent., will be retained by the Board of Chosen Freeholders for a period of one year, or until the road is finally approved as herein before set forth.

BOND OF THE CONTRACTOR.

The contractor will be required to execute, within five days of giving of contract, a bond in such sum and with such securities as shall be approved by the Board of Chosen Freeholders, conditioned for the faithful performance of the contract, to indemnify and save harmless the said Board of Chosen Freeholders from all suits or actions of any name or description brought against them on account of any act or omission of the contractor or his agents, and for the faithful performance of the contract by the contractor. Said bond shall be in a sum of not less than fifty per cent. of the cost of the road when completed. Any change made in said plans, specifications, agreements or quantities without the consent of the bondsmen shall in no way vitiate said bond. The said contractor hereby further agrees that so much of the money due him, under and by virtue of this agreement, as shall be considered necessary by the Board of Chosen Freeholders, may be retained by them until all

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such suits or claims for damages aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the said Board of Chosen Freeholders.

CONTRACTOR TO INSURE PAYMENT FOR LABOR, MATERIAL,
ETC., ON FINAL ESTIMATE.

The contractor must also furnish said Engineer and Supervisor with satisfactory evidence that all persons who did work, or furnished material for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents in the prosecution of the work, have been duly paid or secured; he shall also give notice to said Engineer and Supervisor within ten days after the completion of the work, and before final estimate is made, that any balance for such work or materials, or compensation for such damages due, has been fully paid or released.

The right to increase or decrease the quantity of work and to reject any or all bids is reserved.

.....
County Engineer.

.....
Road Committee.

Approved this.....day of..... A. D. 190 , by resolution of the Board of Chosen Freeholders.

.....
Director.

Attest:

.....
Clerk.

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OFFICE OF STATE COMMISSIONER OF PUBLIC ROADS, TRENTON, N. J.

I have this day carefully read and examined the foregoing specifications, and the same are hereby approved.

Any departure from these specifications which increases the cost of the road must have the written consent of the State Commissioner of Public Roads.

Given under my hand, this.....day of.....A. D 190

.....
State Commissioner of Public Roads.

PROPOSAL.

To the Board of Chosen Freeholders of the County of _____, State of New Jersey:

GENTLEMEN—The undersigned hereby declares that he has carefully examined the annexed specifications and the drawings therein referred to, and he will provide all necessary machinery, tools, apparatus and other means of construction, and do all the work and furnish all the material called for by said specifications, in the manner prescribed by the specifications and the requirements of the Engineer and Supervisor under them for the following prices:

- (1) Price per cubic yard for earth excavation, without classification, as per plans and cross-sections, throughout the length and width of the roadper cubic yard.
- (2) Price per acre for grubbing and removing objectionable material from sidewalks.....per acre.
- (3) Price per lineal foot for completed tile drain.....per lineal foot.
- (4) Price per cubic yard for compacted gravel as specified.....per cubic yard.
- (5) Price per cubic yard for carting gravel more than one-half mile and each additional half mile or fraction thereof.....per cubic yard.
- (6) Price per cubic yard for stripping or removing earth from top of gravel bed..... per cubic yard.
- (7) Price per square yard for each ordered inch in depth in excess of thickness named.....per square yard.
- (8) Price (lump) for the whole road complete, according to the specifications and plans prepared by the Engineer.....

Accompanying this proposal is an approved bond for the sum of one thousand dollars (\$1,000), payable to the order of..... County Collector of.....county; which bond is to be forfeited as liquidated damages if, in case this proposal is accepted, the undersigned shall fail to execute a contract with said Board of Freeholders, under the condi-

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tions of this proposal, within the time provided for by the foregoing advertisement for proposals; otherwise, said bond is to be returned to the undersigned.

Signed.....

Address.....

.....N. J.....

CONTRACT.

This agreement, made the.....day of
.....in the year of our Lord one thousand nine
hundred between
THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF
.....party of the first part, and.....
.....
.....
party of the second part,

Witnesseth, That the said party of the second part, for and in consideration of the payments hereinafter specified and agreed to be made by the party of the first part, hereby covenant and agree to furnish and deliver all the materials and do and perform all the work and labor required to be furnished and delivered, done and performed in and about the gravelling of.....
.....
beginning at
and extending to.....
in the township of.....a distance of.....
.....

in strict and entire conformity with the plans on file in the Engineer's office and with the specifications hereto annexed and duly approved by resolution of THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF
.....adopted theday of.....
in the year of our Lord one thousand nine hundred.....
and approved by the State Commissioner of Public Roads on the.....
day of..... in the year of our Lord one thousand nine
hundred.....which said plans and specifications
are hereby made part of this agreement as fully and with the same effect as if the same had been set forth at length in the body of this agreement.

In consideration of the premises the party of the first part hereby agrees to pay to the party of the second part for said work, when completed in accordance with the said specifications, the sum of.....
.....
.....

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payments to be made as provided in said specifications upon presentation of the proper certificates of the engineer and supervisor, and upon the terms set forth in the annexed specifications.

This contract to be binding upon THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....
their successors or assigns and upon.....
.....
the party of the second part.....

In Witness Whereof, The Director of THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....
by authority of a resolution of said Board, hath hereunto set his hand and affixed the corporate seal of the said Board, and the said party of the second part ha..... hereunto set.....hand and seal the day and year first above written.

Signed, sealed and delivered
in the presence of

(THIS BOND TO BE FILLED OUT AND TO ACCOMPANY BID.)

KNOW ALL MEN BY THESE PRESENTS, That we.....
.....
are held and firmly bound unto THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....in the sum of One Thousand Dollars, lawful money of the United States of America, to be paid to the said THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....their successors and assigns, for which payment well and truly to be made we bind ourselves, our and each of our heirs, executors and administrators, jointly and severally, firmly by these presents.

Sealed with our seals and dated the.....
day of.....in the year of our Lord one thousand nine hundred

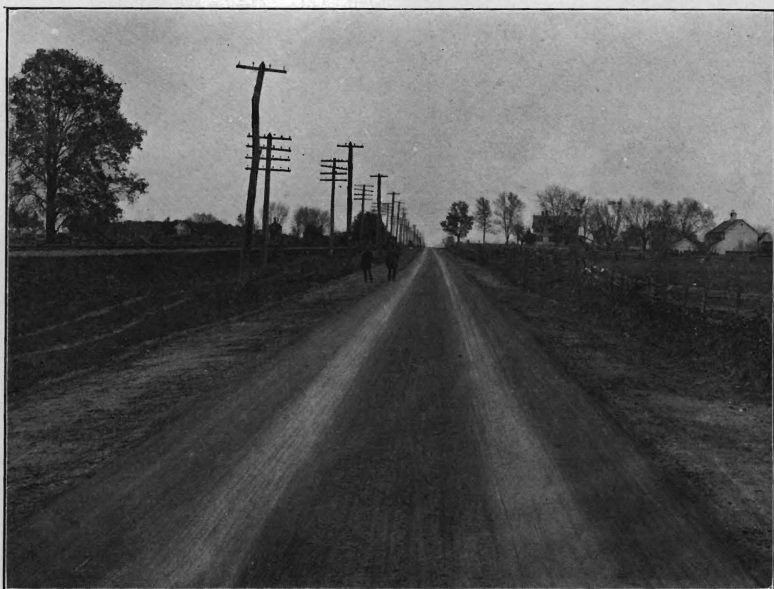
WHEREAS, The above bounden.....
.....
has made a proposal to THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....in writing, bearing date theday of.....in the year of our Lord one thousand nine hundred.....
.....
and being hereto annexed, for doing all the work and furnishing all the material for the permanent improvement of the.....
road in said county of.....pursuant to an advertisement published in the.....on the.....day ofone thousand nine hundred.....

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NOW THE CONDITION OF THIS OBLIGATION IS SUCH, That
in case the contract for which said proposal is made shall be awarded to the
said

.....
and if.....shall, when required by the said Board, execute an agreement
to perform the said work and furnish said materials according to the speci-
fications annexed to said proposal, then this obligation shall be void, or other-
wise shall remain in full force and virtue.

Signed, sealed and delivered
in the presence of



Edinburg, Windsor and Hightstown Road.
Mercer county. 14 feet wide, 6-inch macadam.



Underdraining Old York Road.
Mercer county.

APPENDIX B.

Following is the text of the State Aid Road law, with its amendments.

CHAPTER CCXXIII.

An Act to provide for the permanent improvement of public roads of this State.

I. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That whenever the board of chosen freeholders of any county in this State shall, by resolution, have declared their intention to cause any particular road or section thereof, within such county, to be improved under the provisions of this act, such board shall cause all necessary surveys to be made and specifications to be prepared; the specifications shall require the construction of a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good materials, in such manner that the same, of whatever materials constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel; shall be so prepared as to call for bids from which an approximate estimate of the cost can be ascertained. and shall state the amount of security that will be required of the bidder; after said specifications shall have been prepared they shall be submitted to the board of chosen freeholders for their approval or rejection; and if such board shall approve them, they shall then be submitted to the state commissioner of public roads for his approval or rejection; it shall be the duty of the commissioner of public roads, before approving the specification of any road so submitted to him, to ascertain, by personal examination or otherwise, the natural character of the soil upon which such road is proposed to be constructed, and all other facts that he may deem important, and if, after examination of the specifications and facts so ascertained, he shall be of the opinion that the specifications provide for the construction of a road that will, with reasonable re-

Board of freeholders may cause road to be improved.

What specifications require.

How prepared.

Freeholders to reject or approve.

Commissioner to examine road and approve specifications.

Cost of all roads not to exceed 33 1-3 per cent.

May withhold his approval.

Distribute among the counties.

When approved, freeholders must advertise for bids.

Committee to receive bids.

Bidders must give bond.

Bids, how received.

pairs thereto, be firm, smooth and convenient for travel at all seasons of the year, and if he shall also be of the opinion that one-third of the cost of constructing the road or section of road to which such specifications relate, together with one-third of the cost of constructing all other roads and sections of roads in this State under specifications previously approved by him, will not in any one year exceed the sum of one hundred thousand dollars, then he shall approve the specifications, but otherwise he shall reject them; *provided, however*, that he shall, in his discretion, have the power to withhold his approval of any specifications, to the end that the estimated aggregate amount of contracts made in any one year shall not exceed the sum of three hundred thousand dollars, and also to the end that the amounts paid out of the state treasury under the provisions of this act shall in each year be distributed amongst the several counties of the state in such manner as to the said state commissioner of public roads shall seem fair and equitable, and any specifications, the approval of which is withheld as aforesaid, may, if otherwise satisfactory to the said state commissioner of public roads, be approved by him in any year subsequent to the one in which the same may be presented for approval as aforesaid; if the board of chosen freeholders and the state commissioner of public roads shall both approve such specifications, it shall then be the duty of the director of the board of chosen freeholders to advertise in at least two daily newspapers, printed and circulating in the county, for the period of two weeks, or in at least two weekly newspapers, printed and circulating therein, for at least four weeks, for bids to do the work according to the specifications prepared; such advertisements shall state where bidders may find the specifications, and shall name a time and place where the board of chosen freeholders, or a committee of five members thereof, of whom the director shall be one, will meet to receive bids; every such bid shall be accompanied with the bidder's bond in the sum of one thousand dollars, with security satisfactory to the board, conditioned that if the contract shall be awarded to him he will, when required by the board, execute an agreement in writing to perform the work according to the specifications; no bids shall be received by the board or any member thereof, or by said committee or any member thereof, except at a meeting of said board or committee, of which notice shall be given as aforesaid, and all bids then received shall be immediately publicly read; if the bids shall be received by a committee of the board they shall be reported to the board at the next meeting thereof, with the recommenda-

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tions of the committee; the board may reject all bids if, in their opinion, good cause exists therefor, but otherwise they shall award the contract to the lowest bidder who shall give satisfactory evidence of his ability to perform the contract; *provided, however,* Limit of county expenditures. that the estimated amount of contracts awarded in any one year by any board of chosen freeholders, together with the estimated cost of repairs of roads already constructed, shall not exceed one-fourth of one per centum of the ratables of the county as reported to the state comptroller for the last preceding year; *and provided further,* that in every contract made as aforesaid it shall be specified that at least five per centum of the contract price shall not be Five per centum to be retained by county. paid to the contractor within the period of one year after the work specified to be done by such contract shall have been fully performed and accepted; the bidder to whom the contract may be Contractors must give bond. awarded shall, in addition to executing the agreement to perform the work according to the specifications, also execute to the board of chosen freeholders a bond conditioned for the faithful performance of the contract, in the sum specified in the advertisement for bids, and with such sureties as the board may approve; the contract shall, on behalf of the board of chosen freeholders, be executed by the director thereof, and, when executed by the bidder and said director, a copy of the contract and specifications, with the estimated cost of the work, shall be forthwith filed with the state commissioner of public roads. Copy of contract and specifications filed with state commissioner.

2. *And be it enacted,* That after a copy of the contracts and specifications shall have been filed with the state commissioner of public roads as aforesaid, the said state commissioner of public roads shall, as soon as practicable, appoint a supervisor of the construction of the work under such contract, who shall receive for his services under this act three dollars per day, to be paid out of the county treasury; if the work for which such contract shall be made shall have been petitioned for, pursuant to the provisions of the eighth section of this act, then, if the petitioners therefor, or any of them, shall in writing nominate to the said state commissioner of public roads one or more persons for the position of such Property-owners nominate supervisor. supervisor, it shall be the duty of said state commissioner of public roads, if only one nomination be made, to appoint as such supervisor the person so nominated, and, if more than one nomination be made, to appoint as such supervisor one of the persons so nominated, and if no such nomination be made, the said state commissioner of public roads shall then appoint as such supervisor any person whom he may consider competent for such position; the

Commissioner may remove supervisor.

Supervisor must give his full time to the work

Supervisor must certify payments.

Freeholders may borrow money temporarily.

Supervisor to prepare final certificate.

State to pay one-third cost.

Total state appropriation.

said state commissioner may, however, at any time summarily discharge any supervisor who, in the judgment of the state commissioner, is incompetent or who neglects his duty, and, in such case, shall appoint a new supervisor to take the place of the one so discharged; the supervisor shall supervise all work done under the contract, shall give his whole time thereto, shall require the provisions of the contract to be strictly adhered to by the contractor, and in any case where the contract provides for partial payments during the progress of the work, he shall also, as each payment becomes due, and before payment shall be made, present to the board his certificate, and also the certificate of the surveyor or engineer, if any there be, stating as near as may be the total amount of work done, and that such work has been done in all respects as required by the contract; and the board shall thereupon direct payment to be made by the county collector; *provided*, that no partial payment made during the progress of the work shall exceed eighty per centum of the estimated value of the work done; the board shall have power to borrow on temporary loans on the credit of the county such sums of money for the purpose of carrying on such work as may from time to time become necessary; and when the work shall have been fully completed, and the terms and conditions of the contract shall have been fully complied with, and such facts shall have been certified to the board to their satisfaction by the supervisor and the surveyor or engineer, if any there be, payment in full shall be made, less the amount required to be withheld for the period of at least one year, as in the next preceding section specified.

3. *And be it enacted*, That when the work under any contract shall have been fully completed, it shall be the duty of the supervisor to prepare a detailed and itemized statement in duplicate of the cost of the improvement, one copy whereof shall be filed with the board of chosen freeholders and one with the state commissioner of public roads.

4. *And be it enacted*, That one-third of the cost of all roads constructed in this state under this act shall be paid for out of the state treasury; *provided*, that the amount so paid shall not in any one year exceed the sum of one hundred thousand dollars; if one-third of such cost shall appear by the statements filed in any one year with the state commissioner of public roads to exceed the said sum of one hundred thousand dollars, then, and in such event, the said sum of one hundred thousand dollars shall be apportioned by the governor and state commissioner of public roads amongst

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the counties of the state in proportion to the cost of roads constructed therein for such year, as shown by the statements of costs filed in the office of the state commissioner of public roads; the governor and said state commissioner of public roads shall, between December fifteenth and thirty-first in each year, certify to the state comptroller the amount to be paid to each county for such year, and the state comptroller shall thereupon draw his warrants in favor of the respective county collectors for the sums certified as aforesaid upon the state treasurer, who shall pay the same out of any moneys in the state treasury not otherwise appropriated.

Allotment to be made before December 31st.

Comptroller to draw warrants.

5. *And be it enacted*, That on or before September first in each and every year it shall be the duty of the board of chosen freeholders to certify to the county board of assessors, either in the annual tax budget or separately, two-thirds of the estimated cost of all work for which contracts shall have been awarded under this act during such year; and the county board of assessors shall include the sum so certified in the county taxes assessed for such year, and the same shall be assessed, collected and paid over to the county in the same manner and within the same time that other county taxes are assessed, collected and paid over; if a deficiency shall exist in consequence of the cost exceeding the estimate, or in consequence of the receipt of less than one-third of the cost from the state treasury, the board of chosen freeholders shall have authority to borrow on temporary loans to the amount of such deficiency until the next annual taxes shall be assessed, collected and paid over to the county; and if there be a surplus, in consequence of the cost being less than the estimate, such surplus shall be retained and used in the construction of other roads under this act, or in repairs to roads constructed under this act.

Board of freeholders to certify cost to assessors.

Deficiency, how met.

6. *And be it enacted*, That instead of certifying to the county board of assessors two-thirds of the estimated cost of all work for which contracts shall have been awarded under this act in any one year, as required by the fifth section of this act, or two-thirds of said estimated cost, less one-tenth of said estimated cost, as required by the eighth section of this act, the said board of chosen freeholders may, if a resolution to such effect shall be adopted by a vote of at least two-thirds of all its members, borrow such sum or sums of money as may be necessary for the payment of such proportion of said estimated cost by the sale of the bonds of such county, issued in the name of the board of chosen freeholders thereof, and in such sums as the said board may deem proper; said bonds shall bear interest at a rate not exceeding five per centum

Two-thirds less one-tenth.

Bonds, how sold.

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When to mature.

Record to be kept.

County road, township rights acquired.

County supervisor, when appointed.

Compensation to be fixed. Duties of.

County to borrow by temporary loans.

per annum, shall be sold at not less than their par value, shall not exceed in the aggregate the proportion of the estimated cost of such roads as hereinabove mentioned, shall be so divided that one-tenth of the amount of the proportion of said estimated cost shall fall due in one year from their date, and one-tenth of the proportion of said estimated cost in each successive year thereafter for the period of ten years after their date, and shall be either coupon or registered bonds, as the board of chosen freeholders may determine; the principal and interest thereof may be made payable at the office of the county collector of such county; said bonds shall be signed by the director of said board and the county collector, and shall be sealed with the seal of the county, and the county collector shall keep a record thereof; it shall be the duty of the board of chosen freeholders each year to place in the tax levy for such county in each year, so long as said bonds shall run, a sufficient sum to pay the interest accruing thereon for said year and the principal of the bonds that shall mature in said year.

7. *And be it enacted*, That any road constructed under the provisions of this act, except within the limits of any city, shall forever thereafter be a county road, and the duty of keeping the same in repair, except within the limits of any city, shall devolve upon the board of chosen freeholders and the county supervisor hereinafter mentioned, and all other powers and duties respecting such roads, except within the limits of any city, shall be imposed upon and vested in the said board of chosen freeholders, to the exclusion of all township, borough or other municipal officers excepting city officers; after the first road shall have been constructed under this act in any county, it shall be the duty of the board of chosen freeholders thereof to appoint a county supervisor of roads, who shall hold his office for three years and until his successor is appointed, shall give bond to the board of chosen freeholders in the sum of one thousand dollars conditioned for the faithful performance of the duties of his office, with such sureties as the board may approve, and shall receive such salary or allowance as the board may fix; the board of chosen freeholders shall provide all moneys necessary to keep in a proper state of repair the roads constructed under this act, except within the limits of any city, and may, if there be no moneys on hand that can be lawfully used for such repairs, borrow therefor on temporary loans until the next annual taxes shall have been assessed, collected and paid over to the county; it shall be the duty of the supervisor to report to the board of chosen freeholders, or to the road committee there-

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of, all repairs he may think necessary or proper to be made to such county roads, and under the direction and control of the said board of freeholders, or its road committee, to expend moneys raised for such repairs in such manner and upon such portions of the roads as will tend to keep them in the best possible state of repair; no part of said moneys shall be paid into the hands of the supervisor but all expenses of repairs shall be paid by the county collector on the orders of the board of chosen freeholders, granted only on the presentation of bills verified by affidavit, as now required by law in the case of other claims against the county; if the board of chosen freeholders shall neglect or refuse to make appropriations sufficient to keep any such road as aforesaid in good repair, any citizen of the county may apply to the supreme court for a writ of mandamus to compel said board to make an appropriation as aforesaid; and when any such application is made, the court, upon a rule to show cause or otherwise, in such manner as the court shall prescribe, shall ascertain and determine whether such road as aforesaid is in a proper state of repair and may also, in its discretion, allow to the attorney of the applicant a reasonable counsel fee to be paid by the county; in case the board of chosen freeholders shall not have on hand sufficient moneys out of which to make the appropriation commanded to be made by any writ of mandamus granted as aforesaid, they shall borrow such sum or sums as may be necessary therefor on temporary loans on the credit of the county, and shall require the amount so borrowed to be raised by taxation with the next assessment of county taxes; it shall be the duty of the authorities of any city within which any portion of road may be constructed under the provisions of this act to keep the portion thereof within such city in repair forever after such construction, and such city shall have the same power, authority and jurisdiction over such portion of such road, and shall have imposed upon it the same duties as were imposed upon and vested in it with respect to such portion of such road before its improvement under the provisions of this act.

Money, how expended.

County collector to make all payments.

Neglect to repair.
Freeholders to be mandamus.

Portion of road within city limits to be kept in repair by the city.

8. *And be it enacted*, That whenever there shall be presented to the board of chosen freeholders of any county a petition signed by the owners of at least two-thirds, either in lineal feet or area, of the lands and real estate fronting or bordering on any public road or section of road in such county, taking in said estimate of area all the lands of every such owner which are assessed for taxes in said county and which lie together in any farm, tract or lot of which a part has a frontage on said road or section of road, pray-

Petition, how signed.

Lineal feet or area.

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<p>Length of road.</p> <p>If less than one mile.</p> <p>Estimated cost not to exceed one-fourth of one per centum of ratables.</p> <p>Board of freeholders to select road under certain circumstances.</p> <p>Must cause surveys to be made and specifications prepared.</p> <p>Stone or other good material to be used.</p> <p>When specifications are not approved or bids rejected.</p> <p>Other specifications to be made.</p> <p>No re-advertisement necessary.</p> <p>After contract awarded, board to certify two-thirds estimated cost,</p>	<p>ing the board to cause such road or section to be improved under this act, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting or bordering on said road or section shall be assessed thereon in proportion to the benefits conferred to an amount not exceeding ten per centum of the entire cost of the improvement, it shall be the duty of the board to cause such improvement to be made; <i>provided</i>, that the road or section desired to be so improved shall be at least one mile in length, or, if it be less than one mile in length, shall be an extension of or connection with some other permanently improved or paved road or street; <i>and provided further</i>, that the estimated cost of all improvements made under this act, together with the estimated cost of repairs of roads already constructed in any county in any one year shall not exceed one-fourth of one per centum of the ratables of such county for the last preceding year; <i>and provided, further</i>, that where more roads are applied for than can be constructed under this act in any one year, the said boards of chosen freeholders shall have the power and authority to select from the roads petitioned for the ones first to be constructed, having regard to the most important roads and the distribution of the benefits of this act to all parts of their counties; it shall not be necessary for the board in any such case to declare by resolution their intention to cause such improvement to be made, but they shall forthwith cause all necessary surveys of such road or section to be made, and specifications to be prepared for a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good material, in such manner that the same, of whatever materials constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel; the proceedings shall thereafter be the same as is hereinbefore required in cases where such intention has been declared; if the specifications shall not be approved by the board or by the state commissioner of public roads, or if all the bids for the work shall be rejected, it shall be the duty of the board to cause other specifications to be prepared, or re-advertisements for bids to be made, as often as may be necessary and until a contract shall be awarded, to the end that the improvement prayed for may be completed with reasonable speed; <i>provided, however</i>, that no re-advertisement need be made where the lowest bid submitted shows that the improvement prayed for cannot be made within the limit of expenditure in this section above mentioned; in every case where a contract shall be awarded after the presentation of such petition as aforesaid, the</p>
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board of chosen freeholders, instead of certifying to the county board of assessors two-thirds of the estimated cost of the work, as prescribed by the fifth section of this act, shall, unless they determine to issue bonds in the manner prescribed by the sixth section of this act, which they are hereby authorized to do, certify two-thirds of said estimated cost, less one-tenth of said estimated cost, which sum the county board of assessors shall include in their assessments of county taxes.

9. *And be it enacted*, That when the improvement prayed for as aforesaid shall have been completed and the statement of the cost thereof filed with the board of chosen freeholders, as prescribed by the third section of this act, said board shall apply to the circuit court of the county for the appointment of commissioners to estimate and assess the peculiar benefits conferred by such improvement upon the lands and real estate fronting or bordering on the road or section thereof improved, of the time and place, of which application notice shall be given by ten days' publication in two daily newspapers printed and circulating in the county, or by two weeks publication in two weekly newspapers printed and circulating in therein, at which time and place, or at such other time and place as the court shall designate, said court shall, without unnecessary delay, appoint three commissioners, who shall be disinterested freeholders and residents of the county in which the application is made, to estimate and assess the benefits aforesaid; the said court shall have power to remove any commissioner and appoint another in his place and also to fill any vacancy that may occur in the office of any commissioner from any cause; said commissioners shall each receive three dollars per day, to be paid by the county collector.

10. *And be it enacted*, That said commissioners, before entering upon the duties required by them by this act, shall take and prescribe before some person duly authorized to administer the same an oath or affirmation that they will make all assessments and estimates required of them fairly, legally and equitably, according to the best of their skill and understanding, which oath or affirmation shall be attached to the report that they are hereinafter required to make.

11. *And be it enacted*, That the said commissioners, having thus qualified, shall give such notice as the court may direct of the time and place when and where they will hear any persons in interest who may present themselves to be heard, and at such time and place and at such other times and places to which they may adjourn for

less one-tenth,
to assessors.

Commissioners
to estimate
benefits, how
appointed.

To give notice
of appointment

Court to ap-
point and re-
move commis-
sioners.

Compensation
of.

Oath of com-
missioners.

Commissioners
to give public
hearing of
time of meet-
ing.

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that purpose the said commissioners shall attend, and shall give a public hearing to those persons in interest who may desire to be heard; the said commissioners shall have power to examine witnesses under oath or affirmation, to be administered by any one of them, and to enter upon and view the lands and real estate fronting or bordering on the road or section thereof improved, and to adjourn from time to time in their discretion, or as directed by said court; they shall use diligent efforts to ascertain the names of the owners of the lands fronting or bordering on the road or section thereof improved, and shall state the same in the report hereinafter mentioned; but the failure to ascertain the name of any owner, or to state the same correctly, or the omission of any such name from the report, shall not invalidate said assessment nor be a bar to the collection of the same.

Commissioners
to report in
writing.

12. *And be it enacted*, That after having given opportunity as aforesaid for a public hearing of the persons in interest, and having viewed the lands fronting or bordering on the road or section thereof improved as aforesaid, the said commissioners shall make a report in writing of their estimates and assessments to the said court,

Map made by
engineer in
charge of the
road.

accompanied by a map prepared by the engineer in charge of the construction of the road, showing the several tracts or parcels of land and real estate fronting or bordering on said road or section thereof; the said report shall state the cost of the whole work, which shall be furnished to the commissioners by the board of chosen freeholders from the report of the supervisor of construction filed with said board under the requirement of the third section of this act, and shall give the names, so far as ascertained, of the owners of the tracts or parcels of land and real estate fronting or bordering on said road or section thereof, the city, township, borough or other municipality in which each tract or parcel of lands is situate, and the amount of the assessment upon the owner or owners of each of said tracts or parcels of lands and real estate for the said benefits; which several assessments shall be in proportion, as near as may be, to the peculiar benefits deemed to have been conferred by said improvement upon the respective tracts of lands and real estate aforesaid; if any tract of land shall be located in more than one city, township, borough or other municipality, it shall be stated in said report as being in the city, township, borough or other municipality, in which there is the greatest frontage by lineal feet on the road or section thereof improved; in no case shall any tract or parcel of land and real estate, or any owner thereof, be assessed beyond the amount of benefit actually derived from said improvement, nor shall the ag-

Names of
property own-
ers required.

Location of
tracts of
land.

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gregate amount of assessments imposed upon the tracts of parcels of land fronting or bordering on such road or section thereof exceed ten per centum of the total cost of the improvemnet.

13. *And be it enacted*, That upon the coming in of any such report signed by the said commissioners, or any two of them, said court shall cause such notice to be given as it shall deem proper of the time and place of hearing any objections that may be made to such assessment, and after hearing any matter that may be alleged against the same the said court, either by rule or order, shall confirm the said report, or shall refer the same to the same commissioners for revision and correction, or to new commissioners to be appointed by the said court forthwith to reconsider the subject-matter thereof, and the said commissioners to whom such report shall be so referred by the court shall return the same corrected and revised, or a new report to be made by them in the premises, to the said court, without unnecessary delay, and the same, being so returned, shall be confirmed, or again referred by the said court in the manner aforesaid, as right and justice shall require, and so, from time to time, until a report shall be made or returned in the premises which said court shall confirm; such report, when so confirmed, shall be final and conclusive, as well upon the said boards of chosen freeholders and the cities, townships, boroughs or other municipalities in which said lands may be situate, as upon the owners of any lands and real estate affected thereby, and the court shall require the same to be forthwith filed with the county clerk, and certified copies thereof and of the accompanying map, and of the rule or order confirming the report, to be promptly delivered to the county collector, one for said county collector and for each city, township, borough or other municipality in which the assessed lands may lie; the county collector shall retain one of the said copies for his own use, and shall forthwith give one to the collector or receiver of taxes in each of the cities, townships, boroughs and other municipalities in which the assessed lands may lie; each city, township, borough or other municipality whose collector or receiver of taxes shall receive such certified copy shall, by its proper disbursing officer, within six months after the date of the said order of confirmation, pay the amount of assessments appearing by said report to have been assessed upon the lands situate in such city, township, borough or other municipality, who shall receive for his services three per centum of the money so collected to be paid by the county.

Court to give notice of hearing.

Court may order new report.

When report is confirmed shall be final and conclusive.

File with county clerk. Copies to county collector and townships, &c.

Township to collect in six months.

No certiorari allowed.

14. *And be it enacted*, That no certiorari shall be allowed by any court to review any of the proceedings in relation to such improvement, nor in any way to affect any assessment made by such commissioners, after the lapse of thirty days from the making of the order of the court confirming such assessment; the court shall designate what notice, if any, shall be given by the publication or otherwise of the confirmation of the report of said commissioners.

Assessments to remain a lien on the property.

15. *And be it enacted*, That the assessments made by said commissioners shall be and remain a lien upon the lands assessed from the date of the confirmation of the report of assessments in the same manner and to the same extent that taxes are liens upon lots or tracts of land situate in the city, township, borough or other municipality in which the assessed lands may be.

Collector to notify owners of lands.

16. *And be it enacted*, That the receiver or collector of said city, township, borough or other municipality shall, as soon as the said report is delivered to him, give to the owners of lots and tracts of lands appearing by said report to be assessed, such notice of the assessments and of the time within which the same are required to be paid, as the court in its order of confirmation, hereinabove mentioned, shall prescribe; all such assessments shall become due and payable to such receiver or collector within six months from the date of the order of confirmation hereinabove mentioned.

Township, &c., to bring suits for collection of assessments.

17. *And be it enacted*, That if any assessment upon any lot or tract of land made under the provisions of this act shall not be paid within the time appointed in said notice, the township committee, common council or other governing body of the city, township, borough or other municipality within which such lot or tract of land shall be situate, or a majority of them, may, as they shall deem proper, either bring an action on contract in any court of competent jurisdiction, in the corporate name of such city, township, borough, or other municipality, against the owner or owners of such lot or tract of land for so much money laid out and expended by them for the use of such owner or owners and declare generally, and give the special matter in evidence, and either party from any judgment rendered therein may have the same remedy by appeal or otherwise as if said parties were private individuals, or they may proceed to collect the said assessment by sale of the lot or tract of land whereon such assessment has been imposed, or may be a lien, in the same manner and to the same extent as lands are now sold for unpaid taxes in such city, township, borough or other municipality, and the purchaser or purchasers at any such sale or sales, and his legal representatives shall hold and enjoy such lot or tract of land, with

Either party may appeal.

Assessments to be a lien upon the lands and sold as lands are now sold for taxes.

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the rents, issues and profits thereof, in the same manner and by the same title and tenure as purchasers at the sales of lots or tracts of land for unpaid taxes can now hold and enjoy the same in such city, township, borough or other municipality.

18. *And be it enacted*, That any property owners or owner along any road in any county of this state which has not been improved, or is not undergoing improvement, under the previous sections of this act, shall desire any section of any road in such county to be improved, and are or is willing to contribute the whole expense of such improvement, the supervisor of roads of such county shall, upon the written request of such owners or owner, make a plan of such section of road so to be improved, in which shall be given the levels and distances, and also specifications, which shall state the materials that may be used, and the manner of using them; and a copy of such plan, specifications and of any bids to do such work shall then be submitted by such owners or owner to the board of chosen freeholders, and if such board shall approve them, it shall then be lawful for such owners or owner to accept any bid or bids so approved from among the bidders, and then proceed to build such section of road according to such plan and specifications, and such owners or owner shall have control of the expenditure of the moneys used to make such improvement, subject to the approval and supervision of the supervisor of such county; and upon the completion of the improvement to the satisfaction of the said supervisor and said board of chosen freeholders, and upon the submission to said board of receipts, showing full payment for materials furnished and work done under the plan and specifications, such section of road so improved shall thereafter be a county road; and the said supervisor shall be paid by the aforesaid owners or owner the sum of ten dollars for making the plan, the sum of five dollars for drawing the specifications, and the sum of five dollars for the supervision of the work, and in case such supervisor is not a civil engineer and an actual survey is necessary, then such owners or owner, at their or his expense, shall procure a survey, which shall be subject to the approval of such supervisor, which survey shall take the place of the plan before mentioned.

Property-owners may improve at their own expense.

Bids and specifications received.

Owners to disburse the money.

Shall be a county road. Fees allowed.

19. *And be it enacted*, That the act entitled, "An act to provide for the more permanent improvement of the public roads of this state," approved the fourteenth day of April, one thousand eight hundred and ninety-two, and all acts supplementary thereto and amendatory thereof, be and the same are hereby repealed; *provided, however*, that this section shall not cause any proceedings for the improvement of any public road or section thereof under the provisions of the act

General repealer.

Proviso.

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hereby repealed to abate, but such proceedings may be continued under the provisions of this act in the same manner as if they had been commenced hereunder.

20. *And be it enacted*, That this act shall take effect immediately.

Approved March 22, 1895.

CHAPTER 43.

ACT TO INCREASE APPROPRIATIONS.

A Further Supplement to "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

Appropriation
for public
roads.

1. The sum of one hundred and fifty thousand dollars be and the same is hereby appropriated annually, or so much thereof as may be included in the annual appropriation law, to be paid out of any moneys in the state treasury not otherwise appropriated, for the extension of the benefits and making effective the provisions of the act to which this act is a supplement.

2. This act shall take effect immediately.

Approved March 17, 1899.

CHAPTER 44.

STATE AID TO TOWNSHIPS.

Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this State," approved March twenty-second, one thousand eight hundred and ninety-five.



East Passaic Avenue,
Bloomfield township, Essex county. Before improvement.



East Passaic Avenue,
Essex county. 8-inch Telford pavement through deep cut.

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BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Whenever there shall be presented to the township committee, borough council, board of trustees or commissioners, or other governing body of any township, town, borough, village, or of any municipality governed by a board of commissioners, a petition signed by the owners of at least two-thirds in lineal feet of the lands fronting on any public road or section of road in such township, town, borough, village or municipality, praying such governing body to cause such roads or section to be improved under the act to which this is a supplement, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting on said roads or section shall be assessed thereon, in proportion to the benefits conferred, to an amount not exceeding ten per centum of the entire cost of the improvement, it shall be the duty of such governing body to consider and determine whether the road or section mentioned in such petition is of sufficient general importance to warrant the expenditure necessary for the improvement thereof, and to grant the prayer of such petition or refuse the same if of opinion that the improvement is not of sufficient public importance, or that the expense thereof will be an unnecessary public burden; and in case the prayer of such petition is granted, then such road shall be improved in the same manner and subject to the same regulations, as far as practicable, as in case where a petition is presented to the board of freeholders of any county under the eighth section of the act to which this is a supplement.

When property may be assessed not to exceed 10 per cent. for road benefits.

2. The said governing body shall cause all necessary surveys to be made, and specifications to be prepared for a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good material, in such manner that the same will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel, and shall thereafter proceed in the same manner as the board of freeholders is required to proceed by the act to which this is a supplement; and the state commissioner of public roads shall have the same power and authority in respect to the roads authorized by this supplement as by said act are conferred upon him in respect to roads improved under such act.

Construction of road; supervision.

3. The state commissioner of public roads shall appoint as supervisor of the work, such person as shall be nominated by such governing body; such supervisor shall perform the same duties and shall be subject to the same provisions as the supervisor appointed under the act to which this is a supplement, and shall be paid out of the treasury of the township, or other municipality, and shall file one

Supervisor of construction.

copy of the statement required by the third section of the aforesaid act with the township committee, or other municipal authority, and the other with the state commissioner of public roads.

Proportion of
charges, how
assumed.

4. The aggregate amount of the peculiar benefits conferred on the lands fronting on any road improved under authority of this supplement, not exceeding ten per centum of the entire cost of the improvement, shall be borne by the owners of the land so benefited, one-third of the cost of the improvement (less so much thereof not exceeding one-tenth as shall be assessed upon the property benefitted) shall be paid for out of the state treasury; the remaining two-thirds of such cost shall be borne by the said township, or other municipality within which said road is located.

Assessment of
benefits.

5. The amount of peculiar benefits conferred by such improvement on lands fronting on such road shall be assessed on the application of the township committee, or other governing body, in the manner prescribed by the act to which this is a supplement, and all proceedings under this supplement shall conform as far as practicable to the proceedings authorized and directed by said act, and the said governing body shall, so far as concerns roads constructed by virtue of this supplement, perform the same duties and have the same powers as by said act devolve upon the board of freeholders in respect to roads built under the aforesaid act.

Maintenance
of roads.

6. Every road constructed under the provisions of this supplement shall thereafter be maintained and kept in repair by the township or other municipality in which such road is situate, in the same manner in all respects as other public roads therein are or may be maintained and kept in repair, and none of the special provisions of the act to which this is a supplement, whereby said road shall be a county charge, shall be applicable to roads built by authority of this supplement.

7. This act shall take effect immediately.

Approved March 17, 1899.

Destroying Power to Mandamus.

CHAPTER 168.

A Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

COMMISSIONER OF PUBLIC ROADS.

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BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Whenever there shall be presented to the board of chosen freeholders of any county in this state any petition by the owners of lands praying the said board to cause any road or section thereof to be improved under the provisions of the act to which this is a supplement, it shall be the duty of such board of chosen freeholders, if they are satisfied that all the provisions and conditions of said act have been met and complied with in and by such petitions, to consider and to determine by a vote of a majority of all the members constituting said board, whether the road or section mentioned in said petition is of sufficient general importance to warrant the expenditure of the county and state money for the improvement thereof; and said board of chosen freeholders is hereby authorized, by a vote of a majority of all the members constituting the said board, to grant the prayer of the said petition or to refuse the same if said board shall be of the opinion that the improvement is not of sufficient public importance or that the expense thereof will be an unnecessary public burden; *provided*, that this act shall in no way affect any proceeding heretofore taken to procure a mandamus in case of petition filed under said act.

2. All acts and parts of acts inconsistent with the provisions of this act be and the same are hereby repealed, and this act shall take effect immediately.

Approved April 14, 1896.

Changing Location or Improving.

CHAPTER 75.

An Act to amend an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. The eighteenth section of the said act shall be amended so as to read as follows:

18. That if any property-owners or owner along any road in any county of this state which has not been improved or is not undergo-

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Property-own-
ers to contri-
bute whole ex-
pense of im-
provement.

ing improvement under the previous sections of this act shall desire any section of any road in such county to be improved or to be changed in location and improved, and are or is willing to contribute the whole expense of such improvement, and provided every owner of land upon that part of the road proposed to be vacated under this act shall consent in writing to such vacation, the supervisor of roads of such county shall, upon a written request of such owners or owner, make a plan of such sections of roads so to be improved or changed in location and improved, in which will be given the levels and distances, and also specifications stating the materials that may be used and the manner of using them; and a copy of such a plan, location, change of location, specifications and of any bids to do such work shall then be submitted by such owners or owner to the board of chosen freeholders, and if such board shall approve them and any change of location which may be proposed, it shall then be lawful for such owners or owner to accept any bid or bids so approved from among the bidders, or at their own expense to proceed to build such section of road according to such plan, location and specifications,

Owner to have
control of ex-
penditures.

and such owners or owner shall have control of the expenditure of moneys used to make such improvements, subject to the approval and supervision of the supervisor of such county; and upon the completion of the improvement to the satisfaction of the said supervisor and said board of chosen freeholders, and upon the submission to said board of receipts showing full payment for materials furnished and work done under the plan and specifications, such section of road so improved shall, if the board of chosen freeholders shall so declare, thereafter be a county road, but otherwise shall remain an ordinary public highway, and any and all portions of any road now existing which may have been rendered unnecessary or be superseded by the new road so constructed shall be vacated and abandoned as a public road, without other action or proceedings than the approval of the board of chosen freeholders as hereinbefore provided; and the said supervisor shall be paid by the aforesaid owners or owner the sum of ten dollars for making the plan, the sum of five dollars for drawing the specifications, and the sum of five dollars for the supervision of the work, and in case such supervisor is not a civil engineer and actual survey is necessary, then such owners or owner, at their or his expense, shall procure a survey, which shall be subject to the approval of such supervisor, which survey shall take the place of the plan before mentioned, and shall include all the new roads proposed to be constructed and all the old roads proposed to be abandoned.

Old road va-
cated.

Approved March 23d, 1896.

COMMISSIONER OF PUBLIC ROADS.

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Increased Power to Borrow.

An Amendment to an act entitled "A Supplement to an act entitled 'An act to enable boards of chosen freeholders to acquire, improve and maintain public roads,'" approved March nineteenth, one thousand eight hundred and eighty-nine, which supplement was approved April ninth, one thousand eight hundred and ninety-two.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. The first section of an act entitled "A supplement to an act entitled 'An act to enable boards of chosen freeholders to acquire, improve and maintain public roads,'" approved March nineteenth, one thousand eight hundred and eighty-nine, which supplement was approved April ninth, one thousand eight hundred and ninety-two, be amended so as to read as follows:

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. In counties of the second class it shall be lawful to raise a sum not to exceed four hundred thousand dollars, for which bonds may be issued by the board of chosen freeholders of any such county, under the act to which this is a supplement or any supplement or amendment thereof; *provided, however,* that if work under said act and supplements or amendments has already been done to an amount exceeding said sum, bonds under said act and supplements may be issued to an amount sufficient to raise and pay for such work; *and provided also,* that no county road bond shall be issued to such an amount as, in addition to existing debt, shall raise the debt of the county for all purposes above three per centum of the assessed value of the real estate therein; and in case any such bonds shall be issued in excess of the limit aforesaid, all such bonds so issued in excess shall be void in the hands of any person or party, notwithstanding any recitals therein or any representations that may be made concerning the same; in case application has already been made to the circuit court and a certificate shall have been recorded and filed, as required by said act, such application need not be repeated in case of any subsequent issue of such bonds where the original certificate on file shows that the new issue of bonds will not exceed three per centum of the assessed value of the real estate in said county as limited by this act.

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2. The second section of said act be amended so as to read as follows:

Board not to use money raised except to grade, &c.

2. In any county of the second class wherein the board of chosen freeholders thereof shall heretofore or may hereafter issue bonds under said act and supplements, that such board of such county shall not use any of the money so raised for any other purpose except to grade, macadamize or improve any road in any such county, under the provisions of the act to which this is a supplement and the several supplements and amendments thereof; *provided*, nothing herein shall prohibit the doing of the necessary repair of any road heretofore graded, macadamized or improved by any such board or that may be hereafter graded, macadamized or improved under said act and supplements.

Proviso.

3. All acts and parts of acts inconsistent herewith be and the same are, so far only as they conflict herewith, repealed, and that this act shall take effect immediately.

Approved March 24th, 1897.

CHAPTER 100.

A Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

Boundary road or street may be improved.

1. Any road or street, or section of road or street, which constitutes the boundary line between two counties, may be acquired, improved and maintained in manner provided for in the act to which this act is a supplement.

Freeholders of adjoining counties may meet to consider improvements.

2. It shall be lawful for the board of chosen freeholders representing adjoining counties which are divided by any road, street or section of road or street, to jointly meet at such time and such place, in either county, as they may agree upon, to consider and determine the question of acquiring improving and maintaining said boundary road or street, or section of road or street, according to the provisions of said act, to the best advantage of the public and the owners of property adjacent thereto; and to that end the said joint board

Prepare maps.

are hereby authorized to prepare maps, plans and specifications, subject to the approval of the commissioner of public roads, for said im-

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provement, which they shall deem necessary and proper for said purposes; the said joint board shall have power to employ a competent engineer or surveyor and such other assistance as they may deem necessary, and upon the completion of said maps, plans and specifications, duplicate copies thereof shall be filed in the office of the clerk of each of the counties affected thereby, and in the office of the commissioner of public roads.

Employ engi-
neer.

3. The said joint board may adopt a resolution directing the improvement, as provided for in said act, to be made, and thereupon said joint board shall have full power and authority to enter into contracts with responsible persons for doing the work and furnishing the necessary materials therefor; they shall advertise for proposals in at least two newspapers published in each county, for at least three weeks, and their contracts shall be awarded to and made with the lowest responsible bidder who will comply with the requirements of the joint board and will give ample security for doing the work and performing the contract, but said joint board shall be under no obligation to accept the lowest bid, in which case all other bids will be thrown out and new proposals advertised for in the manner hereinbefore provided.

Make contract.

4. The said joint board shall, on the certificate of the engineer and surveyor, and on such other evidence as they may require as to the work done and materials used and furnished for said improvement, order payments to be made to the contractor or contractors in the manner provided in said act.

Payment.

5. All costs and expenses incurred in the proceedings hereinbefore authorized shall be borne and paid by each county in equal proportion, and the said joint board shall, after the completion of the contract and acceptance of the improvement, divide the road into two equal sections, and shall designate the section which each county shall maintain and keep in repair, and therefore each of said counties shall maintain and keep in repair the sections of the road so assigned to it.

Expenses
equally di-
vided.

Maintenance.

6. Said joint board may choose a chairman and secretary and such other officers, and may make such rules for government as shall be deemed advisable; the said joint board shall have power to meet and adjourn from time to time, and as often as in their judgment it shall be deemed necessary to fully carry into effect the provisions of this act; the votes of a majority of the members of the board of each county voting separately shall be necessary to decide any question, order, motion or resolution which may come before the said joint board; the secretary of said joint board and the engineer and supervisor appointed shall receive such compensation for their services as

Method of
transacting
business by
joint board.

Compensation.

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the said joint board shall, as aforesaid, determine to be just and proper; the members of said board shall be entitled to the same compensation as is allowed to them as members of the board of chosen freeholders, and shall comply with the provisions of and receive the benefits from the act to which this is a supplement, as far as the same is consistent and practical.

7. This act shall take effect immediately.

Approved March 23d, 1898.

An Act to provide for the acquirement of turnpike roads for free public use.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

Turnpike roads may be acquired for public use.

Commissioners appointed.

Hearings had.

Notice given.

1. Whenever there shall be presented to the state commissisoner of public roads a petition signed by the owners of at least two-thirds of the land and real estate fronting or bordering on any turnpike road, praying that said road may be acquired for free public use, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting or bordering on said road shall be assessed thereon to an amount not exceeding ten per centum of the entire cost of the said road, then the governor shall appoint five commissioners from the county or counties through which the said road runs; the said commissioners, when appointed, shall take an oath or affirmation faithfully and fairly to perform their duties, and shall thereupon proceed to estimate and determine the fair and just value of the said road, having given ten days' notice of the time and place when and where they will meet to hear any representation in behalf of the said corporation or of the board or boards of chosen freeholders of the various counties through which the said turnpike runs, or of the applying freeholders in the said matter; said notice shall be served upon the president or other chief officer of said corporation, upon the director or clerk of the said board or boards of chosen freeholders, and shall be published at least one week prior to the time of meeting in one newspaper published in each county through which said turnpike runs; such meeting shall be adjourned from time to time at the discretion of the said commissioners; when the said commissioners shall have arrived at a price or value of the said turnpike road satisfactory to themselves they shall report the same to the road commissioner, who may thereupon ratify the same and report it to the

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board or boards of chosen freeholders of the counties through which the said road runs, who may thereupon purchase the same; and they are hereby empowered to make temporary loans upon the credit of the said county or counties for the acquirement of the said roads as aforesaid.

2. One-third of the cost of all roads so acquired under this act shall be paid for out of the state road appropriation; *provided*, that the amount so paid shall not in any one year exceed the amount of twenty thousand dollars; if one-third of such cost shall exceed the sum of twenty thousand dollars, the said sum of twenty thousand dollars shall be apportioned by the governor and the state commissioner of public roads among the counties of this state in proportion to the cost of the roads acquired by them for such year, as shown by the statement of cost filed in the office of the state commissioner of public roads; the governor and the said commissioner shall, between December fifteenth and thirty-first in each year, certify to the state comptroller the amount to be paid to each county for such year, and the state comptroller shall thereupon draw his warrants in favor of the respective county collectors for the sums certified to as aforesaid upon the state treasurer, who shall pay the same out of any moneys in the state treasury not otherwise appropriated; *provided further*, that the cost of all turnpike roads acquired under this act in any county in any one year, together with all roads built or repaired, shall not exceed one-fourth of one per centum of the ratables of such county for the last preceding year.

3. On or before August first in each and every year it shall be the duty of the board of chosen freeholders to certify to the county board of assessors, either in the annual tax budget or separately, the two-thirds of the cost of all turnpike roads acquired so as aforesaid during the year, and the county board of assessors shall include the sum so certified in the county taxes assessed for such year, and the same shall be assessed, collected and paid over to the county in the same manner and within the same time that other county taxes are assessed, collected and paid over; if a deficiency shall exist in consequence of the receipt of less than one-third of the cost from the state treasury, the board of chosen freeholders shall have the authority to borrow on temporary loans to the amount of such deficiency until the next annual taxes shall be assessed, collected and paid over to the county.

4. If the said road shall run through more than one county the petition to the state commissioner of public roads shall be signed by at least two-thirds of the owners of land and real estate bordering on said road in each county before the governor shall be required to

Temporary loans may be made.

Cost. Proviso.

Proviso.

Assessors to include certain amount in county taxes.

Deficiency.

If the road is in more than one county.

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appoint the five commissioners mentioned in the first section of this act; and each of the said counties shall bear the expenses of the acquirement of the said road in proportion to the length thereof within the said counties, and all proceedings after the appointment of the said five commissioners that may be required by virtue of this act shall be had separately and independently in each of the said counties.

Road to be free and maintained by county.

5. Any road so acquired shall forever thereafter be a free county road, and the duty of keeping the same in good order and repair shall devolve upon the county officers in like manner as heretofore provided for free stone roads.

Benefits assessed by commissioners appointed by court.

6. When the said turnpike roads shall have been so acquired the board of chosen freeholders shall apply to the circuit court of the county for the appointment of commissioners to estimate and assess the peculiar benefits conferred by such acquirement upon the lands and real estate bordering on the road so acquired, of the time and place of which application notices shall be given by ten days' publication in two daily newspapers printed and circulating within the said counties, then by two weeks' publication in two weekly newspapers printed and circulating therein, at which time and place or at such other time and place as the court shall designate, shall, without unnecessary delay, appoint three commissioners, who shall be freeholders, and residents of the county in which the application is made, to assess the benefits aforesaid; the said court shall have power to remove any commissioner and appoint another in his place and also fill any vacancy that may occur in the office of any commissioner at any time.

Method of assessing benefits.

7. The said commissioners shall then proceed in like manner as the commissioners appointed to assess the benefits conferred by the improvement of the public roads of this state under and by virtue of an act of the legislature entitled "An act to provide for the permanent improvement of the public roads of this state," approved March twenty-second, one thousand eight hundred and ninety-five, and the supplements thereto, and the report of the said commissioners when filed and approved shall be a lien upon the properties assessed in like manner, and the said assessment shall be collected in like manner as the assessment in the said act last before mentioned.

8. This act shall take effect immediately.

Approved May 11, 1897.

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Vacation of Turnpikes.

SUPPLEMENT.

Approved February 13, 1884.

Sec. 1. That whenever any turnpike company of this State shall execute to any city, township or other municipality of this State, a deed of cession and transfer of all or any part of any turnpike road lying within the limits of any such city, township or other municipality, and shall have the same duly proven in the manner required for the proof of deeds or conveyances of lands, and shall deliver the same, together with a map or survey of the road, or of the part of road so ceded and transferred to the common council, township committee or other governing board of such city, township or other municipality, and the said common council, township committee or other governing board shall accept the said deed of cession and transfer, by a writing indorsed thereon, the said deed, proof, map or survey and acceptance shall then be recorded in the office of the clerk of the county in which the road so ceded and transferred lies, in the book containing the records of public roads for said county, and after being so recorded shall be filed in the office of the Secretary of State; *provided*, that where the charter or act of incorporation of any city or other municipality prescribes the manner in which deeds of dedication of lands for public highways or streets shall be accepted, the proceedings for the acceptance of any deed of cession and transfer by a turnpike company as aforesaid shall, in any such city or other municipality, be the same as is required for the acceptance of a deed of dedication of lands for a public highway or street.

Deed of cession and transfer of turnpike road, how executed and filed.

Proviso.

Sec. 2. That any turnpike company making a cession and transfer of any part of their turnpike road in the manner aforesaid, shall, from the date of filing the deed of cession and transfer in the office of the Secretary of State, be released and discharged from all authority and control over the part or parts of their road so ceded and transferred, and from all liability on account of the same, and the same shall thereafter be to all intents and purposes a public road or highway in such city, township or other municipality, and be subject to the same jurisdiction, authority and control by such city, township or other municipality, as it has over other public roads or highways within the limits thereof.

Company released from control, etc., of part of road ceded when deed is filed in office of secretary of state.

COMMISSIONER OF PUBLIC ROADS.

An act authorizing turnpike companies to vacate or dispose of a portion of its road and property.

Approved April 20, 1885.

When turnpike company may vacate or dispose of portion of road.

Sec. 1. That when any turnpike company in this State may deem it advisable to dispose or vacate any portion of their road not in excess of one-half of its entire length, they shall hereby have the power and privilege of so doing at any time when the same may be favored by a vote represented by those owning two-thirds of the capital stock of said company, to be voted at a special meeting of said stockholders called by the officers of said company, and the notice of said meeting being published in at least one newspaper in each county where said road is located, for the space of thirty days, once in each week, said notice to state the time and object of said meeting; the said stockholders may, by a vote represented by those owning two-thirds of the capital stock of said company, authorize and empower their president and secretary to sell or vacate to the freeholders of the county or counties the portion so desired; and if vacated without compensation, a committee of the Board of Freeholders of the county or counties may view the same and report to the said board upon what terms they have agreed to take said road, and the action of a majority of said Board of Freeholders in accepting or rejecting said report shall be final.

An act to authorize turnpike companies to abandon a portion of their roads and property.

Passed June 1, 1886.

Turnpike companies may abandon portion of road.

Sec. 1. That any turnpike company in this State may abandon any portion of their road not exceeding two-thirds of the entire length of the road, when the same may be favored by a vote of those owning a majority of the capital stock of said company; the resolution to abandon a portion of said turnpike shall describe the part so abandoned, and shall be signed by the president and secretary of said turnpike company, duly acknowledged before an officer authorized to take the acknowledgment of deeds in this State, and shall thereupon be recorded in the office of the clerk of the county wherein such turnpike company is situated; *provided*, that the part of said turnpike so abandoned shall be in all respects in as good repair as when the said company began operating the same.

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Broad Tires.

CHAPTER 76.

An Act to amend an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes."

I. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*. That section one of an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes," approved March sixteenth, one thousand eight hundred and ninety-three, which reads as follows:

I. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed fifty cents for each wheel in use in any one year," be and the same is hereby amended so as to read as follows:

I. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed one dollar for each wheel in use in any one year.

2. That this act shall take effect immediately.

Passed March 24th, 1896.

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CHAPTER 63.

A Supplement to an act entitled "An act to provide for the acquirement of turnpike roads for free public use," approved May eleventh, one thousand eight hundred and ninety-seven.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

Compensation. 1. The pay of the commissioners heretofore or hereafter appointed under said act shall be a sum not exceeding five dollars per day, and necessary expenses not exceeding two dollars per day, for actual number of days employed in such service.

Settlement when road not accepted. 2. If the freeholders of the county or counties fail to accept the turnpike roads appraised under the act to which this is a supplement within twelve months after the commission have submitted their award to the state road commissioner, the bill of said commissioners, upon the approval of the state road commissioner and the signature of the governor, shall be presented to the comptroller of the state, who thereupon shall draw his warrant therefor upon the state treasurer, who shall pay the same out of the annual state appropriation for roads.

3. This act shall take effect immediately.

Approved March 20, 1900.

CHAPTER 98.

Further Supplement to an act entitled "An act concerning roads," approved April sixteenth, eighteen hundred and forty-six.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

Highway must be kept clear of weeds, etc. 1. The owner or occupant of land abutting on any highway in any township in this state shall, during the month of September of each year, cut and remove all brush, briars and weeds growing in or upon such portion of such highway as his or her lands abut upon, and in case such owner or occupant shall fail to perform the duty imposed hereby, the township committee of the township in which such lands abut as aforesaid shall cause such work to be done and the owner of such lands shall pay the expense thereof, with costs, to be recov-

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ered in an action upon contract before any justice of the peace of the county at the suit of such township committee.

2. This act shall take effect immediately.

Approved March 23, 1900.

An Act for the better protection of travelers, pedestrians, vehicles and animals on the public streets and highways.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Whoever places upon the surface of any public street, highway or other way customarily and lawfully used for public travel, or upon any sidewalk appurtenant to such way, any broken glass, bottle, metal, loose stones, earthenware, or other substance of a nature likely to cause injury to travelers or pedestrians, or to carriages, bicycles or other vehicles traveling or moving on said way, or which might wound, disable or injure any horse or other animal, or which might injure, cut or puncture any pneumatic tire, shall forfeit for each offense five dollars, to be sued for and recovered in an action of debt by any person who will sue for the same.

Penalty for placing glass bottles, etc., upon public highways.

2. Any overseer of the highways, committeeman, contractor, or other person whomsoever, who shall place or spread broken stone on any of the highways of this State, for the purpose of improving or repairing the same, shall, if such stone be of the dimension of an inch and one-half or more in diameter, cause the same to be covered with fine stone, earth or screenings, within such period of time as it shall be possible to obtain such fine stone, earth or screenings after said broken stones are spread upon said road, unless prevented by causes beyond his control, under a penalty of twenty dollars for each offense, to be sued for in an action of debt and recovered with costs by any person who shall be injuriously affected by the willful neglect or failure to cover said stone as herein provided.

Broken stone of dimension of one inch or more placed on highways to be covered.

3. This act shall take effect immediately.

Approved May 12, 1896.



Georgetown Road,
Burlington county. Before improvement.



Georgetown Road,
Burlington county. 8-inch macadam. After improvement.

APPENDIX C.

NEW JERSEY.

1. All road taxes are to be paid in money.
2. The office of overseer of highway is abolished.
3. The roads of a township are placed under the management of the township committee, and money may be raised by township bonds for grading, macadamizing and improving the same; bonds to be authorized by vote at the annual town meeting.

4. Under the County act, the Board of Chosen Freeholders of any county may designate certain roads as county roads, and improve the same by the issue of county bonds; townships to pay one-third of the cost.

5. Under the County State Aid law, whenever the owners of two-thirds of the lands fronting on any public road will undertake to pay one-tenth of the cost of improving such road, the Board of Chosen Freeholders may cause such improvements to be made, the State paying one-third of the cost up to, at present, the limit of \$150,000 per year.

Under the Township State Aid law whenever the owners of two-thirds of the lands fronting on any public road will undertake to pay one-tenth of the cost of improving the same, the township committee may cause such improvements to be made, the State paying one-third of the cost, less the ten per cent., and the township 67 per cent., the township forever keeping the road in repair.

6. Under the act for the acquirement of turnpike roads for free public use, whenever the owners of two-thirds of the land fronting on any turnpike toll-road pray that said road may be acquired for free public use, and that they are willing to pay ten per cent. of the entire cost of such road, the Governor appoints five commissioners to estimate and determine the fair and just value of said road; after having arrived at such value, if the State Road Commissioner ratifies the same, the board may purchase, the State paying one-third of the cost and the county paying the balance, fifty-seven per cent.

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LAYING OUT ROADS.

Receiving many inquiries how to proceed to lay out roads, change location, etc., to save correspondence we give the following quotations from the statutes:

Laying out Roads by Freeholders after General Election.

It shall be lawful for the Board of Chosen Freeholders of any of the several counties of this State, when said board deem it for the best interests of such county, to lay out, construct and maintain public roads extending through such county in any direction, to submit, by resolution, the question whether or not such public roads shall be laid out, to the electors of said county, at an election, to be held at the same time and place of holding the general election in and for said county for members of the General Assembly of this State, by the same officers, but in separate ballot-box, and if, at such election, a majority of the electors shall vote "against public roads," nothing in this act shall apply or be effective in said county; but if a majority of the electors vote "in favor of public road," then the board shall proceed as directed by the act entitled "An act to authorize the board of chosen freeholders of any of the several counties of this State to lay out, open, construct, improve and maintain a public road therein," approved April 7th, 1888. P. L. 1888, page 397.

LAYING OUT, VACATING OR ALTERING PUBLIC ROADS BY SURVEYORS OF HIGHWAYS. (Revised Statutes, page 2828-119, Sec. 1.)

That when ten or more persons, being freeholders, shall think a public road necessary, or any public road which hath been or shall be laid out unnecessary, or any alteration in such road necessary in any part of the county in which they reside, it shall be lawful for the said persons to make application in writing to the inferior court of common pleas of the said county, in open court, having given previous notice for at least ten days of such intended application, and also of the day on which such application is intended to be made, by advertisements under their hands, and set up at three of the most public places in the township in which the said road is proposed to be laid out, vacated or altered, and if there be more townships than one through which the said road may run, by advertisements to be set up at three of the most public places in each township; and the said

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court, when applied to as aforesaid, on due proof being made that the advertisements have been set up according to law, on which the judgment of the court shall be final and conclusive, are hereby authorized and required to appoint six of the surveyors of the highways of the said county, ever having regard to the appointment of the surveyors of the highways of the township or townships where the said road shall be so applied for to be laid out, vacated or altered; *provided*, that no surveyor shall be appointed through whose land the road may run, or who for any other reason which the court in their discretion shall deem sufficient, think ought not to be appointed; and the said surveyors shall meet at such time and place as the said court shall direct, a copy of which appointment shall be served on each of the said surveyors at least six days prior to the time of their meeting; and two of the said applicants shall, at least twelve days prior to the said time, sign and set up advertisements at three of the most public places in the said township or townships, setting forth the time and place of the meeting of the surveyors agreeably to the directions of the court, and designating the points or places from and to which the said road is proposed to be laid out, vacated or altered. (See Secs. 138 and 168, *post*.)

VACATION AND RELAYING OF PUBLIC ROADS BY FILING CONSENT WITH
CLERK AND RECORDING.

138. Sec. 1. That whenever ten or more persons, being freeholders, shall think any alteration of any public road necessary in any part of the county wherein they reside, by having such road or a portion thereof vacated, and the same relaid or another road substituted therefor, they may make application in writing to the inferior court of common pleas of such county, or to one of the judges thereof, setting forth in writing the road or portion thereof as aforesaid which it is proposed to have vacated, describing the same by courses and distances, and also describing the road as it is to be relaid, or the road which is to be substituted therefor, to which description there shall be attached a map showing the location of the road or portion of road to be vacated and the road as relaid, or the road which is to be substituted therefor; and if within ten days after such application shall have been made as aforesaid, or if at the time of making such application there shall be presented to said court or judge the consent in writing of the owners of all the lands intersected by such old road or portion thereof proposed to be vacated, and of all the property intersected by the road as proposed to be relaid, or

by the road which it is proposed to substitute therefor, and also the written consent of the township committee of the township wherein such road or roads do lie, that said application shall be granted, then it shall be lawful for said court or judge to cause said application, with the accompanying survey, map and return, and the written consents of the owners of lands as aforesaid, and of the township committee, to be filed with the clerk of the county, to be by him recorded in the book of roads for said county; and when said application and other papers shall have been so filed, such old road or portion thereof shall thereupon and thereby be deemed to be vacated, and the road is relaid, or the new road substituted therefor, shall thereupon and thereby be deemed and taken to be a public road.

VACATION OF PUBLIC ROADS BY CONSENT AND FILING WITH COUNTY
CLERK.

186. Sec. 1. That whenever ten or more persons, being freeholders, shall think the vacation of a part of any public road necessary in any part of the county wherein they reside, they may make application in writing to the inferior court of common pleas of such county, or to one of the judges thereof, setting forth in writing the road or portion thereof which it is proposed to have vacated, describing the same by courses and distances, to which description there shall be attached a map showing the location of the road, or portion thereof to be vacated, and if within ten days after such application shall have been made as aforesaid, or if at the time of making such application, there shall be presented to said court or judge the consent in writing of the owners of all the lands by such old road or portion thereof proposed to be vacated, and also the written consent of the township committee of the township wherein such lands do lie, that such application shall be granted; then it shall be lawful for said court or judge to cause said application, with the accompanying survey, map and return, and the written consents of the owners of lands as aforesaid, and of the township committee, to be filed with the clerk of the county to be by him recorded in the book of roads for said county, and when said application and papers have been so filed, such portion of such old road shall thereupon and thereby be deemed to be vacated; *provided*, that no portion of any old road proposed to be vacated under this act shall exceed one thousand yards in length.



East Passaic Avenue,
Bloomfield township, Essex county. Telford, 16 feet wide, 8 inches deep,
along canal.



East Passaic Avenue,
Essex county. 8-inch telford. After improvement. Deep cut.

APPENDIX D.

Number of tons of stone per mile required to build the following depths and widths.

For the information of intending road-builders, we have compiled the following tables, which approximate the number of tons of thoroughly-rolled stone necessary to construct each mile at the designated depths and widths.

The basis is 3,000 tons of loose stone or 3,500 tons of compressed stone for a road one mile long, sixteen feet wide and eight inches deep. A road eight inches deep, when finished, will have required at least ten inches of stone. It should be placed in two layers of five inches each, and each layer rolled down to four inches. Then the application of the three-quarter inch and screenings will bring the road to the prescribed depth; for other thickness the stone should be placed in proportion to the intended finished depths.

An observance of this rule will insure the contract thickness for the road-bed, and save the sometimes necessary expense of resurfacing before acceptance from the contractor.

A road 8 feet wide and 4 inches deep will require						875	tons of stone per mile			
"	8	"	"	6	"	"	1,312½	"	"	"
"	8	"	"	8	"	"	1,750	"	"	"
"	8	"	"	10	"	"	2,187½	"	"	"
"	8	"	"	12	"	"	2,625	"	"	"
"	9	"	"	4	"	"	984¾	"	"	"
"	9	"	"	6	"	"	1,476 9-16	"	"	"
"	9	"	"	8	"	"	1,968¾	"	"	"
"	9	"	"	10	"	"	2,460 15-16	"	"	"
"	9	"	"	12	"	"	2,953¼	"	"	"
"	10	"	"	4	"	"	1,093¾	"	"	"
"	10	"	"	6	"	"	1,640⅝	"	"	"
"	10	"	"	8	"	"	2,187½	"	"	"
"	10	"	"	10	"	"	2,734¾	"	"	"
"	10	"	"	12	"	"	3,281¼	"	"	"

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A road 11 feet wide and 4 inches deep will require 1,203 $\frac{1}{8}$ tons of stone per

"	11	"	"	6	"	"	1,804 11-16	"	"
"	11	"	"	8	"	"	2,406 $\frac{1}{4}$	"	"
"	11	"	"	10	"	"	3,007 13-16	"	"
"	11	"	"	12	"	"	3,609 $\frac{3}{8}$	"	"
"	12	"	"	4	"	"	1,312 $\frac{1}{2}$	"	"
"	12	"	"	6	"	"	1,968 $\frac{3}{4}$	"	"
"	12	"	"	8	"	"	2,625	"	"
"	12	"	"	10	"	"	3,281 $\frac{1}{4}$	"	"
"	12	"	"	12	"	"	3,937 $\frac{1}{2}$	"	"
"	13	"	"	4	"	"	1,421 $\frac{7}{8}$	"	"
"	13	"	"	6	"	"	2,132 13-16	"	"
"	13	"	"	8	"	"	2,843 $\frac{3}{4}$	"	"
"	13	"	"	10	"	"	3,554 11-16	"	"
"	13	"	"	12	"	"	4,265 $\frac{5}{8}$	"	"
"	14	"	"	4	"	"	1,531 $\frac{1}{4}$	"	"
"	14	"	"	6	"	"	2,296 $\frac{7}{8}$	"	"
"	14	"	"	8	"	"	3,062 $\frac{1}{2}$	"	"
"	14	"	"	10	"	"	3,828 $\frac{1}{8}$	"	"
"	14	"	"	12	"	"	4,593 $\frac{3}{4}$	"	"
"	15	"	"	4	"	"	1,640 $\frac{5}{8}$	"	"
"	15	"	"	6	"	"	2,460 15-16	"	"
"	15	"	"	8	"	"	3,281 $\frac{1}{4}$	"	"
"	15	"	"	10	"	"	4,101 9-16	"	"
"	15	"	"	12	"	"	4,921 $\frac{7}{8}$	"	"
"	16	"	"	4	"	"	1,750	"	"
"	16	"	"	6	"	"	2,625	"	"
"	16	"	"	8	"	"	3,500	"	"
"	16	"	"	10	"	"	4,375	"	"
"	16	"	"	12	"	"	5,250	"	"
"	17	"	"	4	"	"	1,859 $\frac{3}{8}$	"	"
"	17	"	"	6	"	"	2,789 1-16	"	"
"	17	"	"	8	"	"	3,718 $\frac{3}{4}$	"	"
"	17	"	"	10	"	"	4,648 7-16	"	"
"	17	"	"	12	"	"	5,578 $\frac{1}{8}$	"	"
"	18	"	"	4	"	"	1,968 $\frac{3}{4}$	"	"
"	18	"	"	6	"	"	2,953 $\frac{1}{8}$	"	"
"	18	"	"	8	"	"	3,937 $\frac{1}{2}$	"	"
"	18	"	"	10	"	"	4,921 $\frac{7}{8}$	"	"
"	18	"	"	12	"	"	5,906 $\frac{1}{4}$	"	"

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A road 19 feet wide and 4 inches deep will require 2,078 $\frac{1}{8}$ tons of stone per mile									
"	19	"	"	6	"	"	3,117	3-16	" " "
"	19	"	"	8	"	"	4,156	$\frac{1}{4}$	" " "
"	19	"	"	10	"	"	5,195	5-16	" " "
"	19	"	"	12	"	"	6,234	$\frac{3}{8}$	" " "
"	20	"	"	4	"	"	2,187	$\frac{1}{2}$	" " "
"	20	"	"	6	"	"	3,281	$\frac{1}{4}$	" " "
"	20	"	"	8	"	"	4,375		" " "
"	20	"	"	10	"	"	5,468	$\frac{3}{4}$	" " "
"	20	"	"	12	"	"	6,562	$\frac{1}{2}$	" " "

TABLES.

As many persons interested in the construction of stone roads are asking questions about their cost, we inclose a table to show at a glance the number of square yards at different widths in a mile of road; also the cost at different widths and various prices per square yard. Any variations from these prices can be quickly ascertained, by adding, subtracting, multiplying and dividing, for a less or greater width. For example, a road eight feet wide has 4,693 1-3 square yards in one mile. Nine feet wide would be obtained by adding one-eighth of that number of square yards; for seven feet wide you would subtract one-eighth of that number of square yards. For twice that number of feet you would multiply by two.

SQUARE YARDS IN ONE MILE OF

8 feet in width.....			4,693 1-3 square yards.
10	"	.....	5,866 2-3 "
12	"	.....	7,040 "
14	"	.....	8,213 1-3 "
16	"	.....	9,386 2-3 "
18	"	.....	10,560 "

8 feet wide, or 4,693 1-3 square yards, at 25c. per yard.....			\$1,173 33 1-3
10	"	5,866 2-3 " 25c. "	1,466 66 2-3
12	"	7,040 " 25c. "	1,760 00
14	"	8,213 1-3 " 25c. "	2,053 33 1-3
16	"	9,386 2-3 " 25c. "	2,346 66 2-3
18	"	10,560 " 25c. "	2,640 00

8	"	4,693 1-3	"	30c.	"	.....	\$1,408 00
10	"	5,866 2-3	"	30c.	"	.....	1,760 00
12	"	7,040	"	30c.	"	2,112 00
14	"	8,213 1-3	"	30c.	"	2,464 00
16	"	9,386 2-3	"	30c.	"	2,816 00
18	"	10,560	"	30c.	"	3,168 00

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8 feet wide, or 4,693 1-3 square yards, at 35c. per yard.....						\$1,642	66 2-3
10	"	5,866 2-3	"	35c.	"	2,053	33 1-3
12	"	7,040	"	35c.	"	2,464	00
14	"	8,213 1-3	"	35c.	"	2,874	66 2-3
16	"	9,386 2-3	"	35c.	"	3,285	33 1-3
18	"	10,560	"	35c.	"	3,696	00
8	"	4,693 1-3	"	40c.	"	\$1,877	33 1-3
10	"	5,866 2-3	"	40c.	"	2,346	66 2-3
12	"	7,040	"	40c.	"	2,816	00
14	"	8,213 1-3	"	40c.	"	3,285	33 1-3
16	"	9,386 2-3	"	40c.	"	3,754	66 2-3
18	"	10,560	"	40c.	"	4,224	00
8	"	4,693 1-3	"	45c.	"	\$2,112	00
10	"	5,866 2-3	"	45c.	"	2,640	00
12	"	7,040	"	45c.	"	3,168	00
14	"	8,213 1-3	"	45c.	"	3,696	00
16	"	9,386 2-3	"	45c.	"	4,224	00
18	"	10,560	"	45c.	"	4,752	00
8	"	4,693 1-3	"	50c.	"	\$2,346	66 2-3
10	"	5,866 2-3	"	50c.	"	2,933	33 1-3
12	"	7,040	"	50c.	"	3,520	00
14	"	8,213 1-3	"	50c.	"	4,106	66 2-3
16	"	9,386 2-3	"	50c.	"	4,693	33 1-3
18	"	10,560	"	50c.	"	5,280	00
8	"	4,693 1-3	"	55c.	"	\$2,581	33 1-3
10	"	5,866 2-3	"	55c.	"	3,226	66 2-3
12	"	7,040	"	55c.	"	3,872	00
14	"	8,213 1-3	"	55c.	"	4,517	33 1-3
16	"	9,386 2-3	"	55c.	"	5,162	66 2-3
18	"	10,560	"	55c.	"	5,808	00
8	"	4,693 1-3	"	60c.	"	\$2,816	00
10	"	5,866 2-3	"	60c.	"	3,520	00
12	"	7,040	"	60c.	"	4,224	00
14	"	8,213 1-3	"	60c.	"	4,928	00
16	"	9,386 2-3	"	60c.	"	5,632	00
18	"	10,560	"	60c.	"	6,336	00
8	"	4,693 1-3	"	65c.	"	\$3,050	66 2-3
10	"	5,866 2-3	"	65c.	"	3,813	33 1-3
12	"	7,040	"	65c.	"	4,576	00
14	"	8,213 1-3	"	65c.	"	5,338	66 2-3
16	"	9,386 2-3	"	65c.	"	6,101	33 1-3
18	"	10,560	"	65c.	"	6,864	00

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8 feet wide, or	4,693	1-3 square yards, at	70c. per yard.....	\$3,285	33	1-3
10	"	5,866	2-3 " 70c. "	4,106	66	2-3
12	"	7,040	" 70c. "	4,928	00	
14	"	8,213	1-3 " 70c. "	5,749	33	1-3
16	"	9,386	2-3 " 70c. "	6,570	66	2-3
18	"	10,560	" 70c. "	7,392	00	
8	"	4,693	1-3 " 75c. "	\$3,520	00	
10	"	5,866	2-3 " 75c. "	4,400	00	
12	"	7,040	" 75c. "	5,280	00	
14	"	8,213	1-3 " 75c. "	6,160	00	
16	"	9,386	2-3 " 75c. "	7,040	00	
18	"	10,560	" 75c. "	7,920	00	
8	"	4,693	1-3 " 80c. "	\$3,754	66	2-3
10	"	5,866	2-3 " 80c. "	4,693	33	1-3
12	"	7,040	" 80c. "	5,632	00	
14	"	8,213	1-3 " 80c. "	6,570	66	2-3
16	"	9,386	2-3 " 80c. "	7,509	33	1-3
18	"	10,560	" 80c. "	8,448	00	
8	"	4,693	1-3 " 85c. "	\$3,989	33	1-3
10	"	5,866	2-3 " 85c. "	4,986	66	2-3
12	"	7,040	" 85c. "	5,984	00	
14	"	8,213	1-3 " 85c. "	6,981	33	1-3
16	"	9,386	2-3 " 85c. "	7,978	66	2-3
18	"	10,560	" 85c. "	8,976	00	
8	"	4,693	1-3 " 90c. "	\$4,224	00	
10	"	5,866	2-3 " 90c. "	5,280	00	
12	"	7,040	" 90c. "	6,336	00	
14	"	8,213	1-3 " 90c. "	7,392	00	
16	"	9,386	2-3 " 90c. "	8,448	00	
18	"	10,560	" 90c. "	9,504	00	
8	"	4,693	1-3 " 95c. "	\$4,458	66	2-3
10	"	5,866	2-3 " 95c. "	5,573	33	1-3
12	"	7,040	" 95c. "	6,688	00	
14	"	8,213	1-3 " 95c. "	7,802	66	2-3
16	"	9,386	2-3 " 95c. "	8,917	33	1-3
18	"	10,560	" 95c. "	10,032	00	
8	"	4,693	1-3 " \$1.00 "	\$4,693	33	1-3
10	"	5,866	2-3 " 1.00 "	5,866	66	2-3
12	"	7,040	" 1.00 "	7,040	00	
14	"	8,213	1-3 " 1.00 "	8,213	33	1-3
16	"	9,386	2-3 " 1.00 "	9,386	66	2-3
18	"	10,560	" 1.00 "	10,560	00	

TABLE FOR GRAVEL.

Table showing number of cubic yards of gravel required in the construction of one mile of gravel road, of widths varying from 6 feet to 20 feet, and depth from 6 to 12 inches. The within quantities should be multiplied by $1\frac{1}{2}$ to give the number of cubic yards of loose gravel required to make the within depths of compact gravel.

(184)	One mile in length.	Number of feet in width.	Number of cubic yards in road 6 inches deep.	Number of cubic yards in road 7 inches deep.	Number of cubic yards in road 8 inches deep.	Number of cubic yards in road 9 inches deep.	Number of cubic yards in road 10 inches deep.	Number of cubic yards in road 11 inches deep.	Number of cubic yards in road 12 inches deep.
	One mile.	6 ft. wide							
	"	7	586 ² ₃	684 ⁴ ₉	782 ² ₉	880	977 ⁷ ₉	1,075 ⁵ ₉	1,173 ¹ ₃
	"	8	684 ⁴ ₉	798 ¹⁴ ₂₇	912 ¹⁶ ₂₇	1,026 ² ₃	1,140 ³⁰ ₂₇	1,254 ²² ₂₇	1,368 ⁸ ₉
	"	9	782 ² ₉	912 ¹⁶ ₂₇	1,042 ³⁸ ₂₇	1,173 ¹ ₃	1,303 ¹⁹ ₂₇	1,434 ² ₂₇	1,564 ⁴ ₉
	"	10	880	1,026 ² ₃	1,173 ¹ ₃	1,320	1,466 ² ₃	1,613 ¹ ₃	1,760
	"	11	977 ⁷ ₉	1,140 ²⁰ ₂₇	1,303 ¹⁹ ₂₇	1,466 ² ₃	1,629 ¹⁷ ₂₇	1,792 ¹⁶ ₂₇	1,955 ⁵ ₉
	"	12	1,075 ⁵ ₉	1,254 ²² ₂₇	1,434 ² ₂₇	1,613 ¹ ₃	1,792 ¹⁶ ₂₇	1,971 ²³ ₂₇	2,151 ¹ ₃
	"	13	1,173 ¹ ₃	1,368 ⁸ ₉	1,564 ⁴ ₉	1,760	1,955 ⁵ ₉	2,151 ¹ ₃	2,346 ² ₃
	"	14	1,271 ¹ ₉	1,482 ²⁶ ₂₇	1,694 ³² ₂₇	1,906 ² ₃	2,118 ¹⁴ ₂₇	2,330 ¹⁰ ₂₇	2,542 ² ₃
	"	15	1,368 ⁸ ₉	1,597 ¹ ₂₇	1,825 ⁵ ₂₇	2,053 ¹ ₃	2,281 ¹³ ₂₇	2,500 ¹⁷ ₂₇	2,737 ⁷ ₉
	"	16	1,466 ² ₃	1,711 ¹ ₉	1,955 ⁵ ₂₇	2,200	2,444 ⁴ ₉	2,688 ⁸ ₉	2,933 ¹ ₃
	"	17	1,564 ⁴ ₉	1,825 ⁵ ₂₇	2,085 ²⁵ ₂₇	2,346 ² ₃	2,607 ¹¹ ₂₇	2,868 ⁴ ₉	3,128 ⁸ ₉
	"	18	1,662 ² ₉	1,919 ⁷ ₂₇	2,216 ⁸ ₂₇	2,493 ¹ ₃	2,770 ¹⁰ ₂₇	3,047 ¹¹ ₂₇	3,324 ⁴ ₉
	"	19	1,760	2,053 ¹ ₃	2,346 ² ₃	2,640	2,933 ¹ ₃	3,226 ² ₃	3,520
	"	20	1,857 ⁷ ₉	2,167 ¹¹ ₂₇	2,477 ¹ ₂₇	2,786 ² ₃	3,096 ⁸ ₂₇	3,405 ²⁵ ₂₇	3,715 ⁵ ₉
	"		1,955 ⁵ ₉	2,281 ¹³ ₂₇	2,607 ¹⁷ ₂₇	2,933 ¹ ₃	3,259 ²⁷ ₂₇	3,585 ⁵ ₂₇	3,911 ¹ ₃

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IDEAL MAP
THE STATE OF
NEW JERSEY

