

Annual Report of Chief Engineer
State Highway Department

1931

Dover, Delaware
December 31, 1931

To the Chairman
and Members of the
State Highway Department,
Dover, Delaware

Sirs:

In conformity with the statute, I have the honor to submit herein a report of the activities of the State Highway Department for the year 1931, with a list of roads which the Department has been petitioned to improve and with certain recommendations for the year 1932.

SURVEYS AND PLANS The Survey work for the year 1931 was carried on by five parties; two in each New Castle and Sussex Counties and one in Kent County. A summary of the activities of this Division is shown by the following tabulation:-

Base Line	211.1 miles
Topography	165.7 "
Cross Sections, preliminary and final	212.0 "
Contracts staked out for construction	76.4 "
Borrow Pits Cross Sectioned	55

The Emergency appropriation of \$400,000 together with our regular Federal Aid appropriation necessarily increased the number of projects during 1931 over previous years. For each project separate sketch maps, project

statements and estimates together with extra plans must be prepared for the Bureau of Public Roads. Inspections both preliminary and monthly during construction must be made with a member of the Bureau.

A summary of the work of the Drafting Department follows:

Line & Topography	194.2 miles
Cross Sections plotted (original and final).....	218.7 "
End Areas planimetered and completed (original and final)	127.8 "
Profile and Grade Line	131.6 "
Index Map plotted and traced	171.9 "
Plan and Profile traced	136.3 "
Plotted and Computed	55 Borrow Pits

This tabulation does not include the plotting, computing and tracing of plans for 12.66 miles of sidewalk which has been prepared during 1931.

During 1931 the Department held twelve (12) road lettings consisting of sixty (60) contracts with a total aggregate of four hundred and forty-five (445) separate bids. Each bid was tabulated and checked item for item by members of the Drafting Department.

RIGHT OF WAY During the year from December 1, 1930 to December 1, 1931 the Right of Way Department has had more work than any year in its history, having secured rights of way on 32 contracts with a total mileage of 103.3 miles, divided as follows: 83.1 miles of secondary roads having a total of 487 properties, 70 feet of additional land on 68 properties for the construction of 14.1 miles of dual highway, 120 feet additional land on 20 properties for the construction of 2.6 miles of dual highway, and on 111 properties having a mileage of 3.54 miles for the construction of sidewalks, making a total of 687 properties, of which the right of way was obtained on 554 by option, 47 by condemnation, while negotiations are pending on the remaining properties.

The monies spent for rights of way during the year are as follows:

Secondary Roads and Sidewalks

Salaries and Expenses	\$ 4,519.15
Legal	12,101.11
Right of Way	6,373.40
Fencing	13,908.39
House Moving	8,237.00
Condemnation Costs and Awards	9,621.53
Crops and Trees	760.60
Miscellaneous	1,576.96
	\$57,098.14

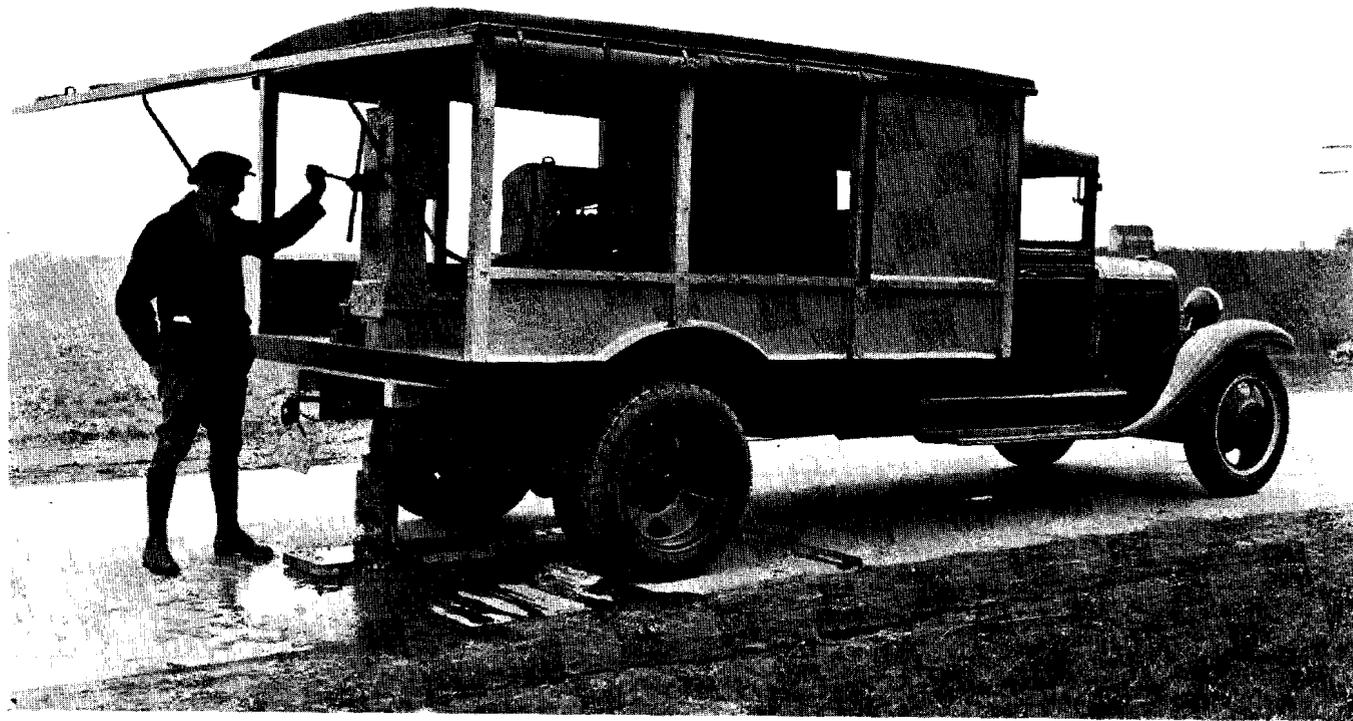
Dual Highway

Salaries and Expenses	\$ 2,041.22
Legal	681.65
Right of Way	40,566.07
Fencing	4,547.40
House Moving	8,622.00
Condemnation Costs and Awards	9,246.55
Crops and Trees	473.85
Miscellaneous	1,876.41
	\$68,055.15

The cost of rights of way on the dual road from St. Georges to Appoquinimink, a distance of 9.33 miles was \$47,171.82 or at the rate of \$5,055.93 per mile compared with \$6,013.31 per mile for the dual highway from State Road to St. Georges.

Other work of this Department consisted of the writing of 738 descriptions and the execution of 469 deeds and 288 releases, and the moving of 19 houses, 5 stores, 10 barns and a number of small buildings.

TESTING Routine tests were made by the laboratory during 1931 on all materials used in the construction of Delaware State Highways. Since most materials used are furnished from sources which have been in use for a period of several years, the quality of these sources is generally known, and routine check tests are sufficient to determine the quality of material furnished or to detect any tendency to vary from the requirements of the



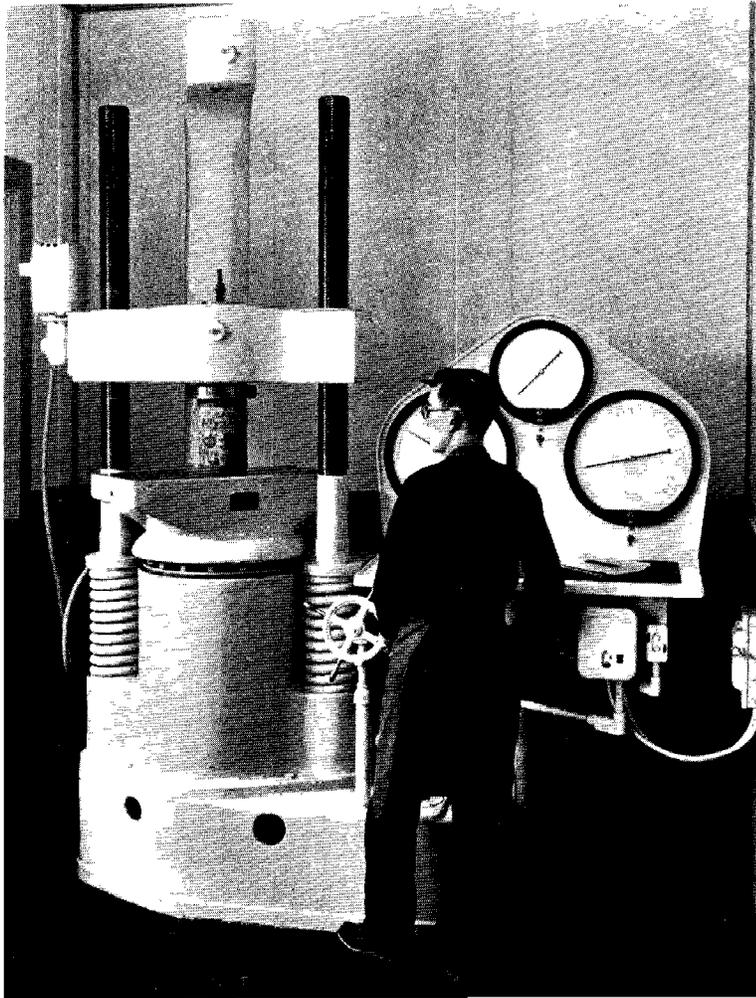
Core drill used for checking thickness and testing strength of Concrete Roadway

specifications. In all cases the greatest effort was made to prevent the rejection of material after it had been received on the work with the resulting financial loss and delay. When tests indicated that any material showed a tendency to change in quality, increased supervision was given at the point of manufacture to prevent the change going beyond the limits of the specifications. The manufacturers and producers of materials have generally adopted an attitude of thorough cooperation with this plan, and instead of being obliged to increase unit prices to take care of possible loss by rejection of material, have been able to furnish better material at somewhat lower cost.

A complete series of core drill tests were made on all concrete roadway constructed this year. The core drill outfit which was purchased the preceding year, was used on each contract and core drill specimens removed and measured before the payment of the final estimate. These specimens are six inches in diameter, and since they are drilled entirely through the roadway, their length is the actual depth or thickness of the roadway. By means of special laboratory apparatus the average length of these cores was determined and checked against the designed thickness of the roadway at the location from which each individual core was drilled.

A tabulation of the lengths of nearly one thousand cores drilled during the year, shows that the average thickness of the roadway exceeded the designed or required thickness by from three to seven per cent. Since these determinations were made on each contract before the final payment was made, there was no chance of the State paying for concrete which had not actually been placed.

It should be stated here that this method of checking thickness is a standard one which has been adopted by the United States Bureau of Public Roads and most State Highway Departments. It is employed more as a check on construction methods and on strength secured in the completed roadway than to question the intention of the contractor.



Testing Machine of 300,000 lbs. capacity used for determining the strength of cores drilled from Concrete Roads

After the cores were measured they were prepared for testing by placing a molten material on each end in such a manner that smooth and flat bearing surfaces were secured. These surfaces are parallel to each other and at right angles to the axis of the specimen. They were then stored in damp sand until they were tested for strength. The strength tests were made at standard ages so that the results on specimens from any contract are comparable with results from all other contracts.

Previous to this year, it was necessary to forward these specimens to other laboratories for tests, as the Testing Department did not have a testing machine of sufficient capacity. Last Spring, however, a 300,000 lb. capacity testing machine was purchased and installed. This machine exerts a pressure on opposite ends of the cores until failure of the concrete occurs and the amount of pressure is accurately measured so that the actual strength of the specimen is secured. From these results the compressive strength of the concrete in pounds per square inch was computed.

From the tabulations and studies of these results, a vast amount of information as to the strength and quality possible to attain in concrete using the available materials, has been secured. This is not only valuable information on present work, but of great assistance in designing concrete for future work with a view of increasing strength and quality. The average compressive strength of more than 800 cores drilled from roadway constructed during 1931 and tested at 28 days was in excess of 5,000 pounds per square inch.

There has been an improvement in the strength and quality of concrete during the past ten years. This has been due to improved construction methods; a general increase in the quality of Portland Cement produced and constant testing of materials as well as of the finished concrete. Weight proportioning of both fine and coarse aggregates, which has been used in placing all concrete roadway in this



Through Plate Girder Bridge over Red Clay Creek, Marshallton Cut-off, New Castle County

The Marshallton Bridge is of the through plate girder type of 113 feet clear span and forms a part of the Marshallton Cutoff opened to traffic in November. The total cost of the completed bridge was \$32,300.00. Through careful attention to details in its design this bridge presents an unusually pleasing appearance and with its approaches eliminates the traffic congestion and hazards which formerly existed on account of the narrow and winding route through the town.

The appreciation of the town's people of this work was expressed by an appropriate celebration at the formal opening November 21st, 1931.

The Drawyers and Appoquinimink Bridges form a part of the next section of the dual highway to be opened. Drawyers and Appoquinimink Rivers are bordered by marshes, the subsoil of which is composed largely of decayed vegetable matter of a depth up to 65 feet. This material has little supporting value and to secure suitable foundations concrete piling is driven by steam hammers to a solid stratum of clay and gravel beneath. The maximum lengths of these piles is 75 feet and the greatest weight 13.5 tons.

The bridges are now under construction and will be ready for opening in advance of the paving of this project.

In addition to its regular work the Bridge Division has taken careful boring of both the new and old embankments at Drawyers and Appoquinimink and a study of the extensive fill settlements at these locations has thus been made possible.

ESTIMATES During the year approximately 750 proposals have been prepared and checked for bidders. All items upon 142 construction estimates upon 56 different contracts have been computed and checked for payment. All items have been computed and prepared upon 65 Federal Aid Vouchers and 52 Public Utility Franchises have been prepared and issued.



Marshallton Cut-off, New Castle County, before construction



Marshallton Cut-off, New Castle County, 20 foot Concrete Roadway and Bridge After Construction

This section of the Department also assembles and tabulates data from construction projects.

MAINTENANCE The work of maintaining 857 miles of highways in the State System has been carried on effectively throughout the year.

The total cost of this work for the twelve months ending November 30, 1931 was \$254,947.17 or an average cost of \$297.49 per mile which includes the cost of new trucks and equipment amounting to \$32.55 per mile, as well as the maintenance of all bridges and drainage structures and the cost of operation and salaries of bridge tenders of the seven drawbridges now under the Department's supervision.

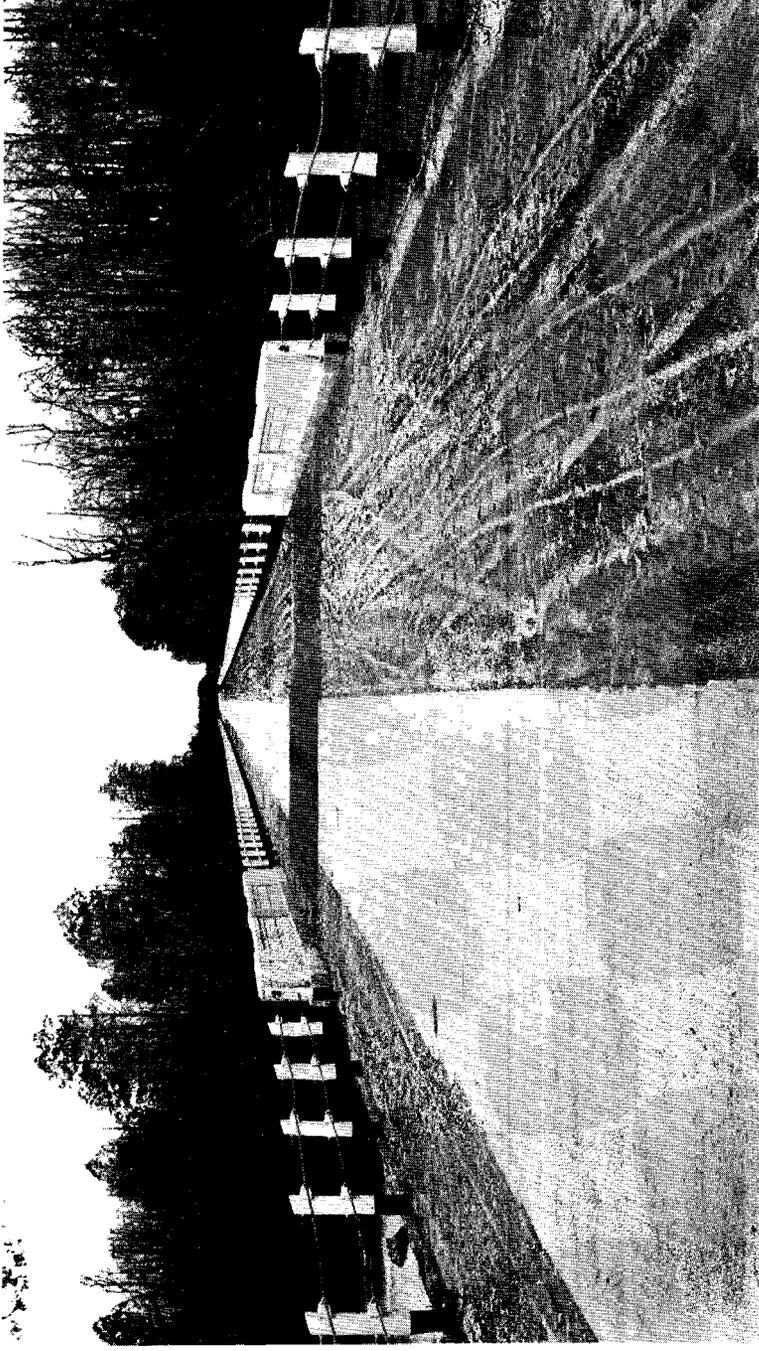
The almost universal adoption of dual tires on trucks and busses has made the maintenance of the shoulders at the edge of the pavement one of increasing difficulty and one that can hardly be overcome except by the widening of the paved surface on the more heavily traveled routes.

The State Highway Law places tree planting and roadside beautification under maintenance. No large projects have been undertaken during the year but work has been carried on consisting of the planting of trees, shrubs, rose bushes and vines, seeding of shoulders and slopes and the cutting of grass and weeds.

CONSTRUCTION The Department during the year past advertised twelve lettings comprising 57 contracts of which were as follows:-

- 26 Complete roadway contracts
- 7 Major grading contracts mostly dual highways
- 14 Sidewalk contracts
- 2 Major bridge contracts
- 2 Clearing and grubbing contracts
- 2 Fencing contracts
- Graveling National Guard Camp
- 1 Dredging contract.

The total low bids for this work amounted to \$2,429,369.30.



Double Bridges—Redden State Highway, Sussex County. 16 foot Concrete Roadway

The mileage totals of the roadway contracts were as follows :

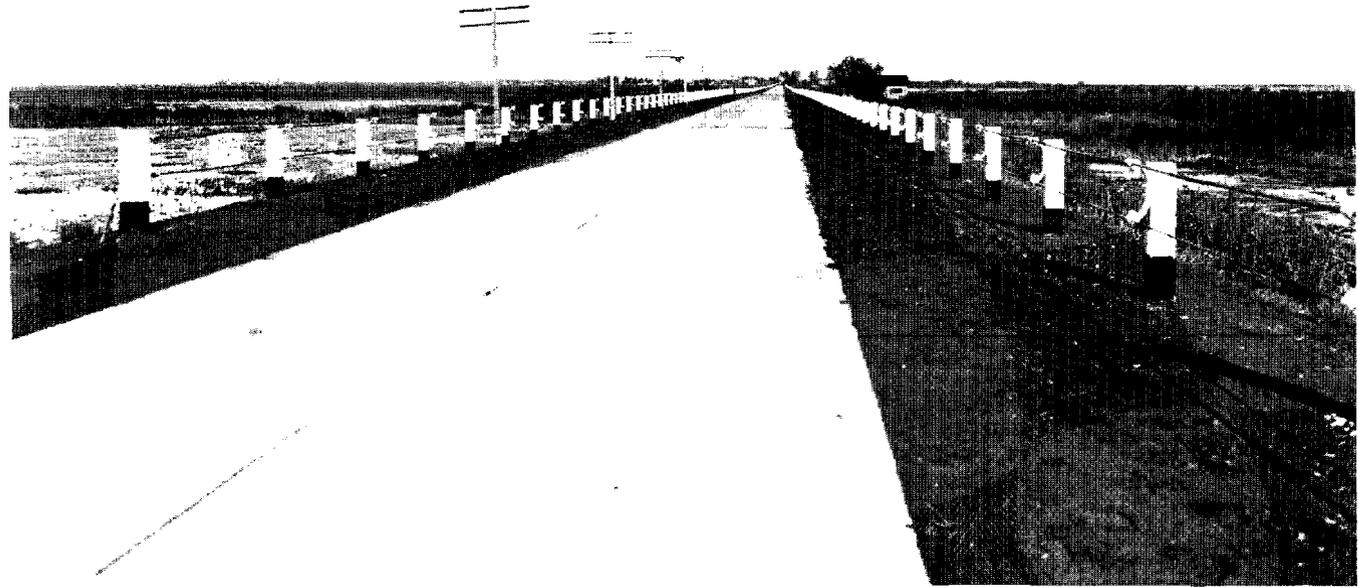
65.53	miles	Concrete roadways
16.34	"	4' Concrete widening strip
.83	"	10' Concrete widening strip
13.70	"	Traffic Bound Slag
12.66	"	Concrete Sidewalks
5.10	"	Gravel Surfacing
10.96	"	Grading
5.32	"	Clearing and Grubbing

The total of the above types represents 132.72 miles with the total contract price of \$2,345,859.50.

The construction season got off to a flying start this year due to the fact that Federal Aid Emergency monies were made available without matching of State's monies. The construction work season of 1930 was remarkable from a road building standpoint; the dry season aided in bringing roadways to an early completion and final estimates were paid early in the Fall.

Delaware's portion in addition to the regular Federal Aid monies amounted to \$400,000. Delaware was the first state to apply for this money and the first letting was advertised in January. In rapid succession other lettings were advertised and on approval from the Government, contracts were awarded and the peak of the early season was reached during July and August when the contractors' forces employed an average of over 800 men on construction contracts.

The mileage of new roadways completed during the season to be added to the 813.3 miles under State control at the beginning of the year amounts to 66.95 miles or a total of 880.3 miles. The 66.95 miles includes 4.4 miles built this year as a carry-over of from 1930 and does not include 4.9 miles of dual highway, 16.34 miles of the duPont road widening between Georgetown and Milford, 0.83 mile of widening on the Philadelphia Pike, the grading contracts or sidewalk contracts. Including the 44 miles of earth road



Port Penn—Delaware City State Highway, New Castle County, 16 foot Concrete Roadway

under State maintenance, this makes a total of 924.25 miles representing nearly 24.4% of the entire State's mileage of rural highways.

The highways constructed this year were mostly secondary roadways and connections between them, the widening of existing roads and links in the continuation of the dual highway to Dover.

Among the important roads built this year in addition to those mentioned was the 43rd Street Cutoff in Wilmington. This road will relieve congestion of traffic on North Market Street, Wilmington, by passing it to points west of Market Street by way of the Miller Road and Washington Street.

The building of the Port Penn-Delaware City road opened up an important north and south connection between these two water front towns.

Important secondary road connections were Wrangel Hill-Clark's Corner, Cooch's Bridge-Maryland Line in New Castle County; Little Creek-Bay Road, Woodside-Rising Sun, Fleming's Corner-Whiteleysburg in Kent County; and Double Bridges-Redden, Green's Mill-Bowden's Garage, Brown's Church-Middleford, and Elliott's School-Smith Mill roadways in Sussex County.

Attached is a summary of contracts advertised and awarded during the year, their location and type.

TABULATION OF CONTRACTS AWARDED IN 1931

Cont. No.	Location	Total Cost	Date of Award	Contractor	Length in Miles	Type of Roadway
168	Little Creek-Bay Road.....	\$69,117.40	2-5-31	George & Lynch, Dover, Del.....	4.118	9' Concrete
175	Flemings Corner-Whiteleysburg	142,787.00	2-5-31	W. W. Truitt, Lincoln City, Del.....	7.909	9' Concrete
179	Double Bridges-Redden	103,423.00	2-10-31	Highway Engr. & Const. Co., Selbyville, Del.....	5.458	9' Concrete
182	Fieldsboro-Odessa	43,995.00	2-10-31	R. E. Dutcher, Mt. Tremper, N. Y.....	2.623	Grading
182A	Odessa-Drawyers	43,933.00	2-10-31	R. E. Dutcher, Mt. Tremper, N. Y.....	1.797	Grading
144	Marshallton Bridge	19,661.00	3-9-31	George Shockley, Rehoboth, Del.....		Superstructure
169F	St. George-Drawyers	2,329.30	3-6-31	Boyce Bros., Stanton, Del.....	4.91	Fencing
173	Georgetown-Milford	133,875.00	3-9-31	Walter Roach & Sons, Georgetown, Del.....	16.34	4' Conc. Widening
174	Millsboro-Bryan's Store	101,337.50	3-6-31	Old Line Const. Co., Chestertown, Md.....	4.96	15' Concrete
182F	Fieldsboro-Drawyers	2,193.00	3-6-31	Geo. M. D. Hart & Sons, Townsend, Del.....	4.31	Fencing
183	43rd St. Cutoff, Wilmington.....	65,774.56	3-9-31	George & Lynch, Dover, Del.....	.87	20' & 40' Concrete
187	Bryan's Store-Hardscrabble.....	8,550.00	3-6-31	W. W. Truitt, Lincoln City, Del.....	4.7	Clearing & Grubbing
178	Cooch's Bridge-Maryland Line	67,638.00	4-30-31	Continental Cont. Co., Baltimore, Md.....	2.9	10' Concrete
181	Hartly-Sudlersville Road	68,513.00	5-7-31	George & Lynch, Dover, Del.....	2.9	16' Concrete
188	Green's Mill-Bowden's Garage	34,819.00	4-30-31	Highway Engr. & Const. Co., Selbyville, Del.....	1.5	16' Concrete
143	Wrangle Hill-Clark's Corner	43,872.50	5-27-31	D. E. O'Connell & Sons, Ridley Park, Pa.....	1.5	18' Concrete
190	Elliott's School-Smith's Mill	67,293.00	6-5-31	Old Line Const. Co., Chestertown, Md.....	3.59	9' Concrete
192	Woodside-Rising Sun	55,475.00	6-5-31	Old Line Const. Co., Chestertown, Md.....	3.8	9' Concrete
186	Port Penn-Delaware City	85,978.00	6-22-31	D. E. O'Connell & Sons, Ridley Park, Pa.....	3.7	
172	Whitehall Neck-Mott's Corner	56,265.50	6-22-31	George & Lynch, Dover, Del.....	3.3	16' Concrete
189	Brown's Church-Middleford	53,757.00	6-22-31	Highway Engr. & Const. Co., Selbyville, Del.....	3.5	9' Concrete
156	Pearson's Corner-Moore's Corner	47,543.00	7-28-31	W. W. Truitt, Lincoln City, Del.....	3.5	9' Concrete
193	Prime Hook Neck Road	47,304.00	7-21-31	Old Line Const. Co., Chestertown, Md.....	6.37	16' Traf. Bd. Slag
196	National Guard Camp	3,100.00	7-14-31	Bennett & Short, Bethany Beach, Del.....		16' Traf. Bd. Slag
197	Cotton Patch Hills-Inkt	6,387.00	7-21-31	Bennett & Short, Bethany Beach, Del.....	1.00	Graveling
198	Georgetown Sidewalks	1,585.00	7-18-31	A. Ventresca & Sons, Wilmington, Del.....	1200 Ft.	16' Gravel Sidewalk
144B	Marshallton Cutoff	14,236.00	9-5-31	D. E. O'Connell & Sons, Ridley Park, Pa.....	1500 Ft.	
182B	Appoquinimink & Drawyers Bridges	63,586.00	9-1-31	Jas. S. Bowers, Whiteville, N. C.....		20' Concrete Bridges
199	Dorman St., Harrington	15,271.50	8-31-31	Walter Roach & Sons, Georgetown, Del.....	3450 Ft.	
200	Laws & Cedar Sts., Bridgeville	11,641.50	8-24-31	Highway Engr. & Const. Co., Selbyville, Del.....	2600 Ft.	16' Concrete
202	School St., Millsboro	6,184.50	8-24-31	Old Line Const. Co., Chestertown, Md.....	1345 Ft.	16' Concrete
1(N-4)	Indian River Dredging	13,000.00	8-20-31	Hannaman & Burroughs, Salisbury, Md.....		Dredging

203	Philadelphia Pike Widening	32,785.00	10-9-31	George & Lynch, Dover, Del.	.835 Mi.	10' Conc. Widening
204	Farnhurst-City Line	15,449.00	11-3-31	Jos. S. Hamilton, Wilmington, Del.	2.35	Sidewalk
205	Rosehill School-Eden Park	12,182.50	11-3-31	Jos. S. Hamilton, Wilmington, Del.	1.25	Sidewalk
206	City Line-Shellpot Park	4,787.00	11-3-31	Jos. S. Hamilton, Wilmington, Del.	.50	Sidewalk
176	Dagsboro-Shaftox	84,465.00	11-17-31	Walter Roach & Sons, Georgetown, Del.	5.57	9' Concrete
209	Farnhurst-Wilmington	104,397.50	11-17-31	Edward Fay & Son, Philadelphia, Pa.	1.86	Dual Hwy. Grading
210	Hollyoak-Claymont	10,680.00	11-17-31	E. DiSabatino & Sons, Wilmington, Del.	6500 Ft.	
211	Camden-Camp Meeting Woods	2,826.00	11-13-31	Gooden & Clark, Dover, Del.	2500 Ft.	Sidewalk
212	Clayton-Smyrna	5,568.00	11-13-31	Smyrna Cement Products Co., Smyrna, Del.	4320 Ft.	Sidewalk
211	Millsboro-Harmon School	1,508.50	11-16-31	J. E. Friedel & Co., Bridgeville, Del.	1600 Ft.	Sidewalk
177	Georgetown-Springfield X Roads	16,711.00	11-27-31	Old Line Const. Co., Chestertown, Md.	4.1 Mi.	20' Gravel
194	Frankford-Roxana	25,284.00	11-27-31	Old Line Const. Co., Chestertown, Md.	3.83	16' Traf. Bd. Slag
215	Barker's Landing Causeway	47,240.00	11-27-31	Joseph Ciccone, Philadelphia, Pa.	2000 Ft.	Fill
207	Newport-Cranston Heights	9,767.50	12-2-31	D. E. O'Connell & Sons, Ridley Park, Pa.	6895 Ft.	Sidewalk
208	Woodland Beach Bridge	9,217.00	12-14-31	Tunstall-Johnson Co., Norfolk, Va.	380 Ft.	
219	Chestnut St., Cutoff, New Castle	26,934.00	12-2-31	D. E. O'Connell & Sons, Ridley Park, Pa.	.479 Mi.	Timber Bridge
220	Reynold's Corner-Fieldsboro	189,155.00	12-15-31	Vincent Schiavi, Buffalo, N. Y.	4.76	Grading
221	McDaniel Heights-Talleyville	8,285.00	12-9-31	Zecco-Turano, Philadelphia, Pa.	5530 Ft.	20' Concrete
222	Townsend-Ginn's Corner	2,036.00	12-9-31	Smyrna Cement Products Co., Smyrna, Del.	1510 Ft.	Sidewalk
223	Laurel toward Delmar	4,370.00	12-9-31	Hickman Short, Bethany Beach, Del.	4150 Ft.	Sidewalk
107	Price's Corner-Marshallton	10,849.00	12-28-31	Joseph Thomas, New Castle Del.	6600 Ft.	Sidewalk
184	Kenton-Blackistons	44,680.50	12-28-31	George & Lynch, Dover, Del.	3.51 Mi.	9' Concrete
233	Delaware Colony Road	1,080.00	12-28-31	Highway Engr. & Const. Co., Selbyville, Del.	0.62	Clearing & Grubbing



Hares Corner—Farnhurst Dual State Highway. U. S. Route 13, New Castle County. Emergency Employment Relief Work.

STATE POLICE In recognition of the widening scope of their activities the General Assembly of 1931 officially designated the officers of the State Highway Department as State Police. Never have their services been in so great a demand as during 1931 and their activities have been State wide in extent.

The worth of the State Police to the people of the State cannot be evaluated and while the fines collected, value of stolen property recovered and fire losses prevented total a substantial amount, there is abundant evidence that the protection afforded the rural residents of the State and the assurance that police assistance is available at all hours of the day or night, are highly appreciated by our citizens at large even though the value cannot be computed in dollars and cents.

I can confidently assert that the general character, courage, loyalty and devotion to the public welfare of the force is such that the confidence of our citizens is not misplaced.

Officers of the State Police during the year 1931 covered 885,317 miles patrol duty, inspected 19,021 cars for defective lights and brakes, weighed 28,808 trucks, recovered 104 stolen cars, made 5311 arrests for 114 different offenses, issued 35,425 reprimands and secured convictions resulting in fines collected amounting to \$59,906.50.

The greatest number of arrests was 1868 for reckless driving; arrests for larceny totaled 175. A complete tabulation of arrests and of accidents with their causes is appended.

In the enforcement of the Aeronautical Laws of the State three airports and twenty-three planes were inspected and the registration of 22 pilots were checked. One mechanic's license was revoked by the Department of Commerce after failing to comply with established regulations.

Nine men were added to the force in May after completing the prescribed course of instruction. There is now a full complement of men at each station.

On December 1st the force was assigned for duty as follows:

Wilmington Headquarters: Superintendent, Captain, Lieutenant and Clerk.

Station No. 1, Penny Hill: Sergeant, Corporal and 10 Privates.

Station No. 2, State Road: Sergeant, Corporal and 14 Privates.

Station No. 3, Dover: Sergeant, Corporal and 8 Privates.

Station No. 4, Georgetown: Sergeant, Corporal and 6 Privates.

Station No. 5, Bridgeville: Sergeant, Corporal and 5 Privates.

There was one death and two resignations during the year.

The safety record for the year has been disappointing, there having been a slight increase of both fatal and non-fatal accidents. There has been, however, a decrease in fatalities other than pedestrians. The increase of pedestrian accidents is believed to be a result of the employment situation and the resulting increase of hikers along the main highways. It is hoped that the program of sidewalk construction now under way will be of no little assistance in securing a reduction in the future.

Arrests Made From January to December, Inclusive, 1931

Accessory	3
Adultery	2
Aiding and abetting	3
Allowing forest fires to spread	3
Allowing minor to operate	7
Allowing an unlicensed person to operate	105
Allowing an unregistered car to be operated	13
Allowing truck to be overloaded	1
Assault	12
Assault and battery	142
Assault, felonious	10
Assault to murder	4
Attempt to rape	1
Bastardy	2
Breach of peace	4
Breaking and entering	38
Breaking jail	6
Carrying concealed a deadly weapon	23
Coasting on hill	1
Conspiracy	3
Defacing engine number	2
Defective brakes	86
Desertion (Army)	3
Desertion (wife)	2
Disorderly conduct	89
Displaying another's license	14
Disturbing the peace	1
Drunk	24
Drunk and disorderly	148
Embezzlement	4
Exceeding registered weight	7
Failing to report accident	2
Failing to signal	4
Failing to stop at main highway	294
Forgery	4
Fugitive from justice	10
Held as witness	39

Held for investigation	11
Highway robbery	2
Hitch hiking	1
Horse drawn vehicle no lights	4
Improper lights	38
Improper tags	56
Insane	1
Interfering with officer	2
Interfering with operator	42
Keeping disorderly house	2
Larceny	175
Leaving accident	29
Leaving automobile without securing brakes	1
Lending license plates	8
Lending operator's license	10
Livestock running at large	3
Making false statement	12
Making threats	18
Malicious mischief	10
Manslaughter	41
Manufacturing liquor	3
Murder	3
No chauffeur's license	78
No clearance lights	14
No horn	4
No mirror	46
No muffler	3
No operator's license	569
No photo on paid driver's license	7
No title	9
No windshield wiper	2
Non-support	9
Obtaining goods under false pretenses.....	9
Obtaining money under false pretenses.....	1
Operating after revocation	6
Operating gambling table	2
Operating while intoxicated	254
Operator's license not signed	1
Overloaded rear axle	55

Overloaded semi-trailer	16
Overloaded trailer	5
Overloaded truck	212
Parking on highway	19
Parking no lights	6
Passing counterfeit money	1
Passing on right	11
Passing to the left of blinker light	10
Passing (red) traffic light	42
Passing trolley car on left	7
Passing worthless check	19
Perjury	1
Playing crap	3
Pointing fire arm	4
Possession of stolen car	5
Possession of stolen goods	2
Possession of whiskey	21
Rape	1
Receiving stolen goods	5
Reckless driving	1868
Refusing to stop upon request	9
Refusing to surrender registration	1
Resisting arrest	4
Riding without owner's consent	7
Runaway from home	22
Selling car without title	2
Taking car after it had been levied upon	1
Taking car without owner's consent	6
Throwing glass on highway	2
Throwing rubbish on highway	3
Trailer too long	2
Transporting liquor	25
Trespassing	10
Unregistered car	278
Using cut-out	2
Vagrancy	7
Violating age consent law	2
Violating Dyer Act	4

Violating learner's permit	23
Wife beating	6
Total number of arrests	5,311
Total number reprimands	35,425
Total number trucks weighed	28,808
Total number miles patrolled	885,317
Total number cars inspected for lights and brakes..	19,021
Total number hours spent on investigation.....	3,883
Total number hours spent on Special Duty.....	11,822
Total number hours spent on duty.....	153,610
Total number cars recovered.....	104
Total number school busses inspected	47
Total number schools visited	5
Total number school children addressed on safety..	1,560

Report of Accidents

Total number accidents	932
Total number killed	61
Total number injured	785
Estimated Property Damage	\$159,469.00

Fatalities	{	Motor Vehicles	25	
		Pedestrians	28	
		Railroad Crossing	5	
		Street Car Crossings	0	
		Horse and Wagon	3	
Injured	{	Slight	663	
		Serious	52	
		Pedestrians {	Slight	54
			Serious	16
Location	{	Curve	73	
		Intersection	241	
		Railroad Crossing	18	
		Street Car Crossing	3	
		Straight Road	597	

Causes

Recklessness	165
Inattention	117
Jay walking	62
Skidding	59
Failing to stop at main highway	55
Operating while intoxicated	55
Loss of control	51
Passing without proper clearance	41
Ran off roadway	34
Failing to signal	35
Driving on wrong side of road	31
Cutting in	28
Driving while asleep	26
Following too close	20
Glaring headlights	19
Tire (blow-out)	16
Pedestrian intoxicated	12
Operator confused	11
Obstructed view	11
Animal on highway	14
Inexperienced operator	9
Parking on concrete	6
No tail light	7
Defective steering gear	6
Defective brakes	4
Auto no lights	4
Parking no lights	6
Wagon no lights	4
Axle breaking	2
Wheels buckled	2
Not stated	20

TYPE OF VEHICLE INVOLVED IN ACCIDENT	<i>Number of Accidents</i>		
	<i>Total</i>	<i>Fatal</i>	<i>Non-fatal</i>
Passenger cars	1233	47	1186
Commercial cars	145	9	140
Omnibus	9	0	9
Motorcycle	14	3	11
Wagons	23	1	22
Bicycles	6	1	5
Totals	1430	57	1373

HIGHWAYS

County	120	8	112
Railroad Crossing	18	3	15
State	685	41	644
Street Car Crossing	3	0	3
Towns	106	8	101
Totals	932	57	875

LIGHT CONDITIONS

Darkness	419	31	388
Daylight	513	26	487
Totals	932	57	875

DAY OF OCCURENCE

Sunday	218	12	206
Monday	117	6	111
Tuesday	92	7	85
Wednesday	98	5	93
Thursday	110	5	105
Friday	125	9	116
Saturday	172	13	159
Totals	932	57	875

Number of Accidents
Total Fatal Non-fatal

WEATHER CONDITION

Clear	648	41	607
Cloudy	70	6	64
Fog	48	5	43
Rain	155	3	152
Snow	11	2	9
	932	57	875

TYPE OF ACCIDENT

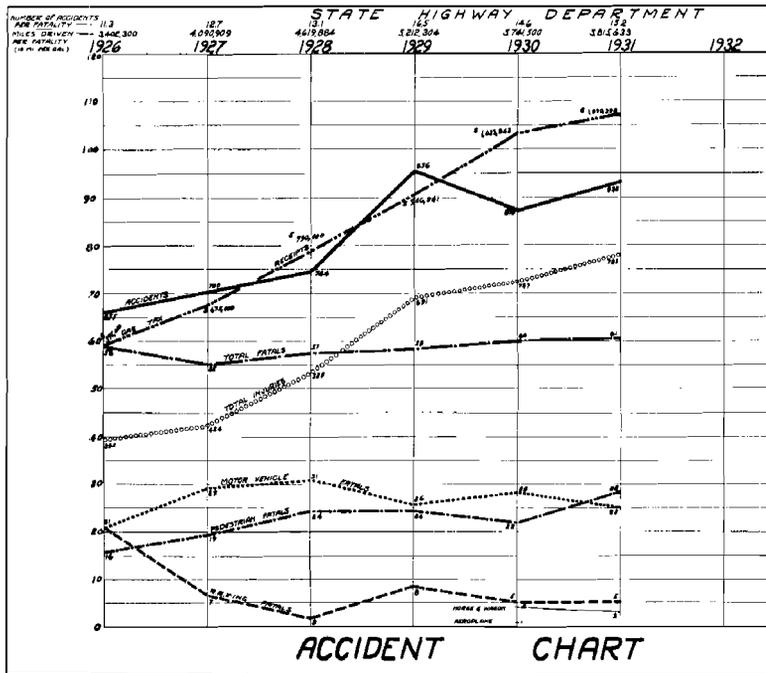
Collision with auto	533	9	524
Non-collision accident	110	8	103
Collision with fixed object	102	3	119
Collision with pedestrian	98	27	71
Collision with horse drawn veh.	23	3	20
Collision with train	13	4	9
Collision with street car	4	0	4
Collision with motorcycle	8	2	6
Collision with animal	14	0	14
Collision with bicycle	6	1	5
	932	57	875

HOOR OF OCCURENCE

12 to 1 A. M.	33	0	33
1 to 6 A. M.	97	4	93
6 to 7 A. M.	12	2	10
7 to 8 A. M.	25	0	25
8 to 9 A. M.	26	0	26
9 to 10 A. M.	21	1	20
10 to 11 A. M.	37	2	35
11 to 12 A. M.	28	1	27
12 to 1 P. M.	32	0	32
1 to 2 P. M.	42	3	39
2 to 3 P. M.	48	1	47

Number of Accidents
Total Fatal Non-fatal

3 to 4 P. M.....	65	5	60
4 to 5 P. M.....	50	2	48
5 to 6 P. M.....	79	6	73
6 to 7 P. M.....	68	7	61
7 to 8 P. M.....	68	6	62
8 to 9 P. M.....	56	3	53
9 to 10 P. M.....	52	6	46
10 to 11 P. M.....	39	5	34
11 to 12 P. M.....	54	3	51
Totals.....	932	57	875



Number of Accidents
Total Fatal Non-fatal

DRIVER'S SEX

Female	135	5	130
Male	1360	52	1308
Totals.....	1495	57	1438

Total In Fatal In Non-fatal
Accidents Accidents

DRIVER'S AGE

Under 18 years	36	1	35
18 to 24 years	393	22	371
25 to 54 years	938	27	911
55 and over	101	5	96
Not stated	27	2	25
Totals.....	1495	57	1438

DRIVER'S EXPERIENCE

Less than 3 months	28	1	27
6 to 12 months	21	1	20
1 to 2 years	126	9	117
2 years or more	1282	42	1240
Not stated	38	4	34
Totals.....	1495	57	1438



Sidewalk along State Highway South of Laurel. U. S. Route 13, Sussex County. Emergency Employment Relief Work.



Sidewalk along Cheswold—Bishop's Corner State Highway, Kent County. Emergency Employment Relief Work.

WIDENING HIGHWAYS The widening of the duPont Boulevard to a minimum width of 18 feet between Georgetown and Milford was carried out in accordance with the recommendation of last year at a cost of \$130,203.69 for 16.34 miles. This is an improvement of much importance and removes the last of the 14 foot pavements from our heavily travelled roads.

Another widening project just completed is the addition of another traffic lane to the Philadelphia Pike thru Claymont. This was formerly a point of traffic congestion but this work makes the Philadelphia Pike a four-lane highway from the City Line to Naaman's Station.

One of the most pressing traffic needs at present is the widening of U. S. Route 13 from Dover to Delmar and U. S. Route 113 from Dover to Milford, to a width of 20 feet. I would recommend that as much as possible of this be placed under contract during 1932 and that it be completed as rapidly as available funds will permit.

SIDEWALKS The increasing number of pedestrians annually killed upon our highways emphasizes the necessity for the construction of sidewalks along heavily travelled highways outside the incorporated limits of towns and cities. As a safety and employment measure the Department has awarded fourteen (14) contracts during the past three months for sidewalk construction totaling 12.66 miles. Plans are in preparation for other contracts to be let early in the New Year.

LOW COST ROADS The Highway Act of 1917 has been amended by the General Assembly giving the State Highway Department authority to grade earth roads with its own forces, preparatory to surfacing with low cost materials. Under this Act the Department has graded and drained 44 miles of earth roads. These are now being maintained by the Department and will be surfaced with sand, gravel, broken stone or slag as need develops under traffic.

They are now giving good service but the abnormal weather conditions of the past two seasons have hardly been a suitable test of their worth under average conditions.

The cost of grading and draining these roads and surfacing with local sand has averaged approximately \$1000 per mile.

I would recommend that this work be continued where conditions are favorable and the amount of traffic does not justify hard surface construction.

FEDERAL For the years ending June 30, 1931 and 1932

AID Congress appropriated \$125,000,000 annually as Federal Aid to the States for highway construction, the apportionment for Delaware being \$609,375.

In addition the Emergency Public Works appropriation Bill passed on December 20th, 1930 allotted to Delaware \$400,000 for construction which had to be completed before September 1, 1931. The purpose of this appropriation was to help solve the unemployment problem, but is a loan and not a gift to the State and barring further legislation will have to be repaid from future Federal appropriations in five annual installments beginning with the ensuing year.

The funds were all taken up during the season and enabled us to increase our program over recent years without bond issues. There are numerous bills now before Congress relating to Federal Aid for highway construction with varying appropriations. It is too early to predict their final outcome but it seems probable that no less than \$125,000,000 will be appropriated for 1933 and 1934 of which the Delaware allotment will be \$609,375.00 less an \$80,000.00 payment on the Emergency Loan or a net of \$529,375.00.

PUBLIC During the year permanent markers were
LANDS set locating the boundaries of the Public Lands.

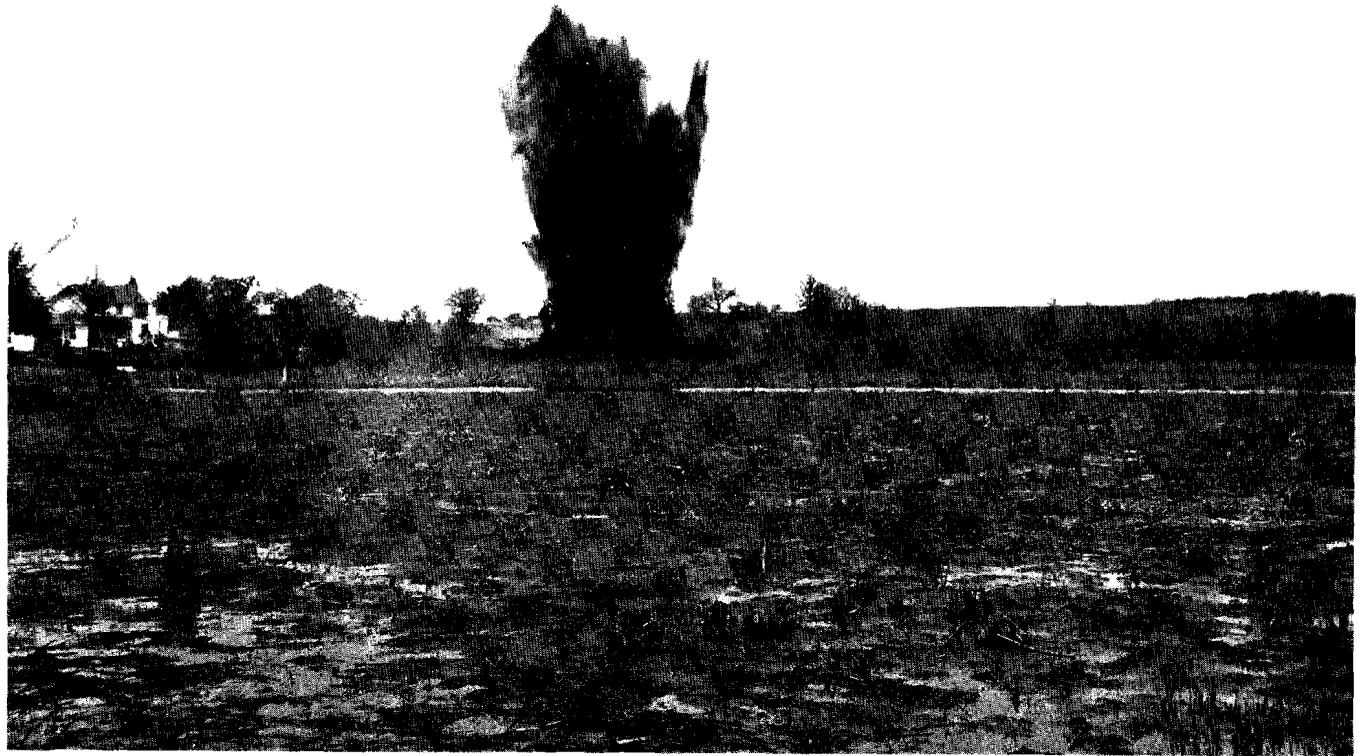
A contract was awarded and the gravel road from Bethany Beach was continued through the Public Lands to

the Indian River Inlet. This highway has been used to an extent far beyond anticipation and makes the ocean front and Indian River Inlet and Bay available for fishing, gunning and recreational purposes as never before.

Brushing of breaks in the sand dunes to protect the highways and to assist in preventing beach erosion was done at a cost of \$233.03.

EMERGENCY Under the energetic leadership of
EMPLOYMENT Governor Buck the Department early in
PROGRAM October undertook an Emergency Program of highway work intended to improve employment conditions, particularly in the vicinity of the City of Wilmington. For this purpose the sale of bonds during the coming year to an amount of \$1,000,000 was authorized and surveys and plans were immediately started. Surveys and plans have been made and contracts awarded and advertised to date for twenty-six (26) contracts of an estimated cost of \$538,462. The work proceeded rapidly aided by unusually favorable weather conditions and there are at present about 600 men employed on these contracts in the Wilmington area alone and it is hoped to increase this materially in the near future.

This program has entailed a large amount of rush work on the engineers of the Department in making surveys, preliminary plans, securing rights of way and getting contracts ready for construction. I wish to here express my appreciation of the hearty cooperation which I have received from all employees of the Department in this work and the readiness with which personal convenience has been set aside and work carried on outside of regular hours and on holidays, that the program might be advanced. I particularly desire to mention in this connection Mr. Samuel Knopf, Principal Assistant Engineer; Mr. Charles G. Yocum, Right of Way Engineer and Mr. E. Earle Downing, Resident Construction Engineer on whom the burden of this work has fallen.



Odessa—Drawyers Dual State Highway. U. S. Route 13, New Castle County. Blasting before making fill across swampy land.

DUAL HIGHWAYS Continued operation of the dual type highway confirms earlier opinions as to its advantages both as to safety and efficient handling of heavy traffic.

Another section, 4.91 miles in length extending from St. Georges to Drawyers, was opened to traffic early in September. Grading has been completed to Fieldsboro, a distance of 4.4 miles and the contract has been let for grading and paving another section 4.8 miles in length.

This work when completed during the summer of 1932 will complete the State Road-Dover dual highway to a point about one mile south of Blackbird.

Grading for a dual highway has also been started between Wilmington and State Road as an Emergency Project. When completed this will relieve the traffic congestion which exists on this heavily travelled highway particularly on week-ends and holidays during the summer season, and should also reduce materially the number of fatalities of which there have been thirteen on this section during 1931.

I would recommend the letting of contracts for the completion of dual type highways from Wilmington to State Road, State Road to the Maryland Line near Glasgow and from Reynold's Corner to Dover as rapidly as funds are available.

RECOMMENDED ROADS I recommend that the roads chosen for improvement during the coming year be selected from the following list, which includes those for which petitions have been received by the Department:

NEW CASTLE COUNTY

Porter-Wrangle Hill.
Wright's Corner-Dexter's Corner via Green Spring.
duPont Boulevard-David's Corner.
Lancaster Pike.
Kirkwood-Howell School.
Creek Road from Newark to Pennsylvania State Line.
Old St. Anne's Church to "Levels," thence to Townsend Road.

Dexter's Corner-Coldwell.
New London-Newark.
Walker's School-David's Corner.
Adam's Dam-Thompson's Bridge.
Clayton-Green Spring.
Centerville-Perry's Tavern.
Brandywine Sanitarium-Lincoln Highway.
Porter Station-Cooch's Bridge.
Porter Station-Red Lion.
Thomas Corner via Price's Corner to Blackbird.
Noxentown School to Fieldsboro.
Milltown-Lincoln Highway.
Newark-Pennsylvania Line, Creek Road.

KENT COUNTY

Todd's Corner-Andrewsville.
Harrington-Hughes Crossroads.
Maryland Line-Edwardsville-Hollandsville.
Greenwood-Andrewsville Road from the Sussex County Line
to the Andrewsville-Farmington Road.
Pratt's School-Pearson's Corner.
Hastings' Corner-Moore's Corner.
Adamsville School to Wesley Church at Maryland Line.
Hazletville-Willow Grove.
Brenford-Seven Hickories.
Woodside-Willow Grove-Petersburg Road.
Barker's Landing-Magnolia.
Houston-Staytonville.
Viola-Petersburg.
Todd's Church-Prospect Church.
King's Highway, Dover.
Frederica Lane-South Bowers Road.
Canterbury to Milford-Harrington Road.
Andrewsville-Vernon.
Staytonville-Farmington.
Wendall's Corner-Bayview School.
Prettyman's Corner-Williamsville.
Vernon-Brownsville.
Dover-Sussex County Line, (widening).
Dover-Milford, (widening).
Hubbard Ave., Bowers Beach.
Downe's Chapel-Hazel's Corner.
Dinah's Corner-Kenton.
Tub Mill-Frederica Lane.
Frederica Lane-Thompsonville.
Marvel's Cross Roads-Staytonville.

SUSSEX COUNTY

Dublin Hill-Trinity School.
Cedar Neck School House-Cedar Beach.
Whitesville-Hardscrabble.
Independence School-Ward's Store.
Laurel-Georgetown State Hwy. to Concord-Hardscrabble State Highway.
East of Georgetown on Harbeson State Highway to West of Milton on Ellendale State Highway.
Lewes-Rehoboth.
Blackwater Bridge-Culver's Dairy.
Lincoln Ave., Delmar.
Lincoln via Clendaniel's and Ponder's mill into Milton Lane.
Laurel to Broad Creek-Bethel Road.
Johnson's School-Sunnyside School.
Delmar-Ward's Store.
Sunnyside School-Bridgeville.
Wesley Church-Atlanta.
Vine's Creek-Y. W. C. A. Camp-Sandy Landing.
Dagsboro-Millsboro-Laurel Road near Mission.
Millsboro-Sandy Forks to Concord Road where it intersects Laurel-Georgetown Road.
Frankford to Dagsboro-Shaftox Road.
Lowe's Cross Roads through Gumboro to Selbyville.
Lincoln City-Milford-Rehoboth Road.
Marshy Hope Road-State Highway, North of Greenwood.
Lone Gum to Middleford.
Roxana-Sound Church Road.
Concord-Laurel Georgetown Road via Spicer's Mill.
Collins' Mill-Middleford.
Lowe's Corner towards Gumboro.
Bryan's Store-Sandy Forks.
Bryan's Store to Hardscrabble.
Baker's Corner to Greenwood-Ellendale Road.
Delmar-Kent County Line (widening).
Prince George's Church-Roxana.
Dagsboro-Piney Neck Road.
Mt. Pleasant Church-Blackwater.
Milton to Broadkilm.
Stockley to Millsboro-Bryan's Store Road.
Fisher's School-Blanchard-Union School-Bridgeville Road.
Coverdale Cross Roads to Bridgeville-Redden Road.
Independence School to Bethesda Church.
Oakley to Milford-Greenwood Road.
Lincoln to Milford-Greenwood Road.

Cokesbury to Phillips' Hill via Pusey's Cross Roads.
 Jacob's Cross Roads-Atlanta.
 Oakley-Smith's School.
 Pilot Town Road Lewes.
 Roxana-Dagsboro via Owen.
 S. Bedford St., Georgetown.
 Frankford-Dagsboro.

OTHER ACTIVITIES The 103rd General Assembly made six appropriations designating the State Highway Department as the disbursing agency. These appropriations were as follows:

- | | |
|--|-----------|
| 1. Resetting of Liston's Point Monument..... | \$ 500.00 |
| 2. Maintenance of Indian River Inlet | 40,000.00 |
| 3. Lewes Pier | 60,000.00 |
| 4. Maintenance of Wharf at Little Creek | 100.00 |
| 5. Improvement of National Guard Camp Site..... | 4,000.00 |
| 6. Care & Maintenance of Ditches in Kent County. | 10,000.00 |

1. The monument at Liston Point has been reset as directed at a cost of approximately \$50.00.

2. Bids were received on August 19th for the dredging of the Indian River Inlet and the contract awarded to the lowest bidder at an estimated cost of \$13,000.00. This work has been practically completed.

The Inlet closed on November 21st before the dredging was finished, but is expected to open again not later than January 10, 1932.

Unless adequate jetties are constructed reaching from above high water mark to a depth below where wave action extends, it is not probable that the Inlet will remain open for any considerable length of time without annual or biennial maintenance dredging operations.

3. Lewes Wharf. None of the appropriation of \$60,000 for a ferry wharf has been expended, as no com-

pany has as yet made application for its rental with a guarantee of continued operation.

4. The appropriation of \$100.00 for the Little Creek Wharf will be expended before the end of the fiscal year.

5. A contract for the graveling of the National Guard Camp Site at Bethany Beach was let and the work completed before the opening of the camp in August. The total amount of \$4,000 in this appropriation was thus expended.

6. Chapter 256 of Vol. 37 of Laws of Delaware, entitled "An Act with reference to Ditches and Drains in Kent County" provides that any ditch or drain company may turn over to the State Highway Department the care and maintenance of any or all ditches in Kent County under its supervision; the State Highway Department, thereafter to have charge of the maintenance and care of such ditches. An appropriation of \$10,000 annually for two years was made available by the Act.

There being no record as to the number of ditch companies, mileage of ditches concerned, or of the probable cost of the work required, a meeting was advertised to be held in Dover May 27, 1931. Officials of twenty-one ditch companies representing a ditch mileage of approximately 300 miles attended this meeting, and considerable information was secured.

The companies were advised to retain their organization with the assurance that the Department would make such investigations and studies as would be necessary to develop the best methods of securing permanent improvement with the money expended, but with the amount of money appropriated it was improbable that more than a small portion of the total mileage could be improved.

Investigations and surveys are being made under a cooperative agreement with the U. S. Department of Agri-

culture and a competent Drainage Engineer has been assigned to assist in the work without cost to the State Highway Department. Up to the present time the maintenance work has been confined to clearing brush and trees and excavating short sections in various sizes of channels to determine the most economical method of procedure.

Clearing has been done by hand and with the aid of tractors while excavation has been carried on by hand, dredge and the use of explosives.

Most of the ditches examined are badly choked with growing trees, fallen logs, weeds, brush and other debris, the cross-section uneven, and the channel eroded into a succession of curves and bends.

Erosion and deposition of materials have disturbed the cross sectional area and slope to such an extent that capacities are greatly impaired and maintenance without first properly correcting these would be very difficult. By taking all logs and trees from the channels, removing sand bars which disturb the uniform grade and relieving the curves, the capacities of the ditches could be greatly increased.

Practically all of the main channels need to be deepened before adequate drainage can be secured. However, clearing out trees and logs, removing large sand bars, relieving sharp curves and revetting the outer side of the curves are the most immediate needs.

The work will be continued on the main ditches along such lines as investigations prove most adaptable to conditions encountered.

FINANCIAL The Secretary will present an itemized **STATEMENT** report of the finances of the Department after the clearing of the accounts for the year.

I am attaching a summarized statement of Income and Expenditures for the period beginning January 1, 1931 and ending November 30, 1931.

Income

Balance from 1930	\$ 292,697.75*
Motor Vehicle Fees	1,086,545.40
Titling Fees	26,450.90
Gasoline Tax	987,465.71
Police Fines	57,744.00
Federal Aid	1,330,346.95
P. R. R. Co. Newport Underpass	5,874.08
Misc. Rentals and Reimbursements	11,074.04
	<hr/>
Total Income.....	\$3,212,803.33

*Deficit without the motor vehicle and title fees for November and December 1930.

Expenditures

Administration	\$ 36,324.80
Fixed Charges	
Int. State Highway Bonds	58,100.00
Int. New Castle County Bonds	101,487.50
Int. Kent County Bonds	86,112.50
Int. Sussex County Bonds	84,000.00
Maintenance	211,149.92
Plant and Equipment	34,549.35
Traffic Police	144,095.18
Construction	1,973,654.18
	<hr/>
Total Expenditures.....	\$2,729,473.43
Balance December 1, 1931	\$483,329.90

In conclusion I wish to thank each member of the Department for their support and assistance and His Excellency, the Governor, for his advice and counsel which have made easier a year of unusual and varied activities.

Respectfully submitted,

W. W. MACK
Chief Engineer



Tappahanna Ditch near Marydel, Kent County, before cleaning



**Tappahanna Ditch near Marydel, Kent County, after cleaning by
hand labor**
