REPORT OF THE CHIEF ENGINEER

DELAWARE STATE HIGHWAY DEPARTMENT

July 1, 1953 to July 1, 1954

Dover, Delaware

Chairman and Members
State Highway Department
Dover, Delaware

Gentlemen:

It is required by law that the Chief Engineer of the State Highway Department submit annually to the members of the Department a report covering the activities of the preceding year. In accordance with this policy, I am pleased to present my annual report on the work accomplished in the period from July 1, 1953, to June 30, 1954. During this period, the Department appointed me Chief Engineer, effective August 1, 1953, to succeed Mr. Richard A. Haber. Mr. Haber resigned to accept employment in private practice and terminated his services with the Department on October 27, 1953.

In addition to my report on the activities of the Department, I am submitting my recommendations for its future operations.

At this time I wish to express to each of you my sincere appreciation for your valuable help during the past year. I especially want to thank Mr. Hugh R. Sharp, Jr., Chairman, and Mr. William P. Richardson, Vice-Chairman, for their penetrating observations and keen advice in the many intricate problems that face the Chief Engineer. No one could ask for a fuller measure of support than the Department has given me; I am deeply appreciative of that support.

At this time I must record also my indebtedness to the heads of the Divisions within the Department, who

have so ably cooperated with me in solving problems concerning our mutual responsibilities.

To those assistants reporting directly to me goes the highest praise for their accomplishments during the year. One could not ask for a finer staff than I now enjoy. Finally, to all the men and women who comprise our organization, my sincere thanks for their efforts to promote the efficient service which the Department is striving to provide to the public.

CONSTRUCTION

During fiscal year 1953-54, three contracts for 19 miles of divided highway were completed. These contracts were located near Dover, Canterbury and Laurel—all part of U. S. Route 13, the duPont Parkway.

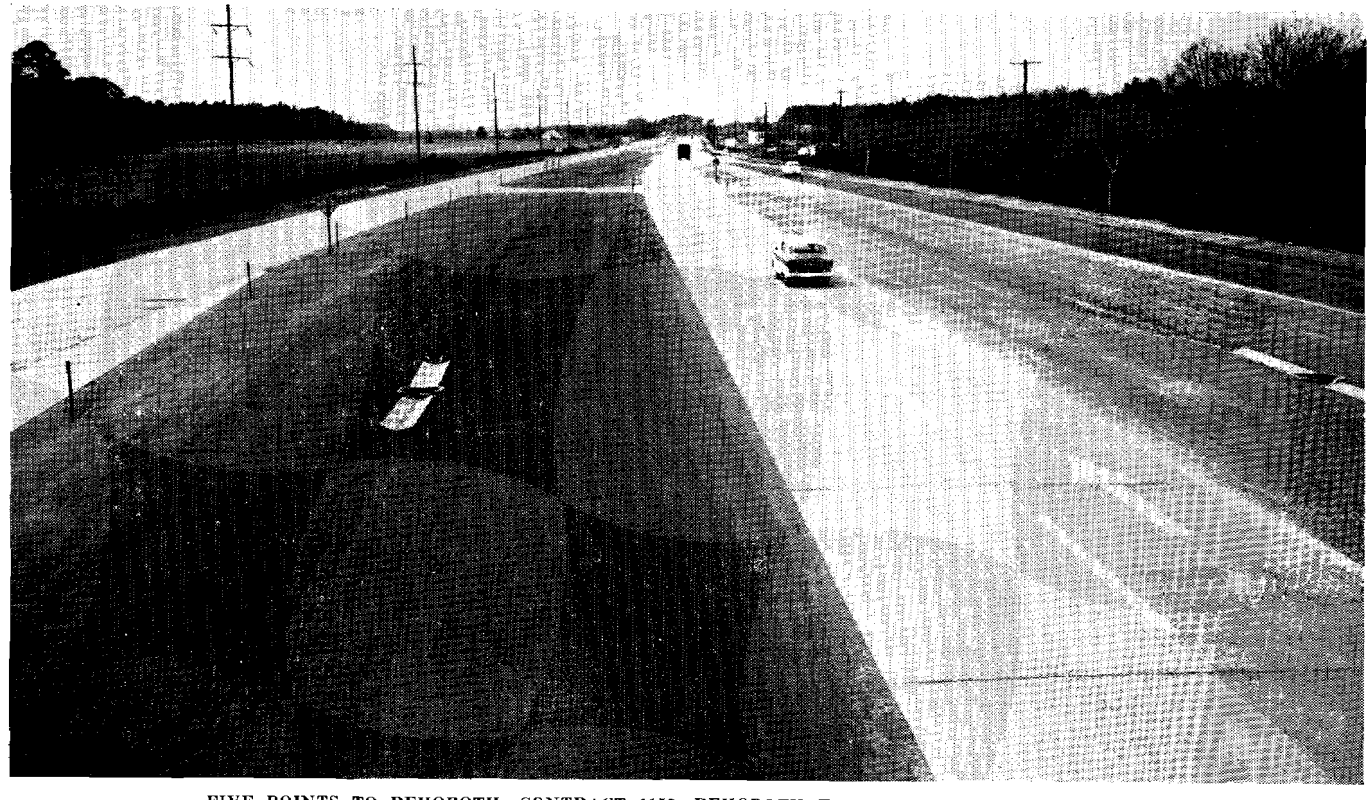
In addition, eight miles between Delmar and Laurel and seven and one-half miles between Canterbury and Harrington continued under construction during the year. Both are expected to be open for traffic by October, 1954.

When these contracts are completed, a divided highway on U. S. 13, between Wilmington and Delmar, will be complete with the exception of 10.2 miles between Harrington and a point one mile south of Greenwood. It is hoped that the next General Assembly will provide funds for the completion of the unfinished section.

Contract 1152 consists of a little over five and one-half miles of divided highway built between Rehoboth and a point at the intersection of Delaware Route 14 and Delaware Route 18, at Five Points. This contract was awarded in February, 1954, and is scheduled for completion in December, 1954. The construction should alleviate the present traffic congestion which occurs during the summer months between the beaches at Lewes and Rehoboth and the intersection of the above-mentioned routes—Route 18, which serves traffic from the Chesapeake Bay Bridge, and Route 14, which serves traffic from northern Delaware.

Considerable improvement has been made on Route 18 by widening and resurfacing.

A notable improvement on our construction program was the reconstruction of the Concord Pike from Murphy



FIVE POINTS TO REHOBOTH—CONTRACT 1152. REHOBOTH ENTRANCE. LOOKING NORTH.

Road to Talleyville. This contract is approximately two miles in length, with four traffic lanes of concrete, separated by a small median strip. Work on this project was started in September, 1953, and is expected to be completed and opened to traffic by October 1, 1954.

The Lancaster Pike has been reconstructed from the intersection of Delaware Routes 41 and 48 to the Pennsylvania State boundary, near Hockessin. The construction of this road was carried out through rather heavy terrain, with very steep grades. The Department decided to place an extra lane of concrete on the steep grades, in order that the heavy truck traffic which uses this road could be bypassed without delay to passenger car traffic.

In addition, the road bypasses the town of Hockessin and will greatly improve the traffic conditions within the limits of that municipality. Work was started in April, 1954, and it is expected that the project will be completed by July 1, 1955.

Centre and Centerville Roads, beginning at Boxwood Road and extending in a northerly direction to Price's Corner on the Robert Kirkwood Highway, and thence to the Lancaster Pike, past the Ferris Industrial School and the Chestnut Run plant of the DuPont Company, is under contract for a distance of 2.7 miles.

The road will be improved by a new, reinforced concrete pavement, with four traffic lanes and a median strip, similar to the construction used on the Concord Pike. Completion of this road should give much better access to the communities lying in the vicinity of Price's Corner, to Delaware Park, and to the industrial section of Boxwood Road. The completion date is set for some time early in 1955.

In addition to the construction of these major highways, the Department has widened and resurfaced U. S. 13, from Fieldsboro to McDonough.

The construction program covered a total mileage of 158.217 miles. Most of the work consisted of widening and resurfacing existing highways.

During the fiscal year, 90 contracts, with a total value of $13,223,813 were active, of which 30, totalling $4,111,255 in value, were carried over as active from the preceding year. During this fiscal year, 60 contracts, $9,112,558 in value, were awarded.

By June 30, 1954, 35 contracts had been completed and accepted. The total value of construction completed during the year was $7,194,528.

Five of the contracts carried over from the operations of fiscal year 1952-53 were still active at the end of 1953-54 period. The value of work remaining on the five contracts was $581,063.

Individual contracts awarded during the year varied in value from $1,727.50 for Contract 1318 (1), Basin Corner Interchange—Borings, to $999,557.50, for Contract 1152, a divided highway from Five Points to Rehoboth Beach.

The U. S. Bureau of Public Roads participated in eleven contracts awarded during the fiscal year. In addition, it had participated in fourteen contracts that had been carried over from the previous year. Its total participation, therefore amounted to 25 contracts.

Secondary Construction Program

Under our secondary construction program approximately 80 miles of old macadam and dirt roads were reconstructed into higher type highways. A number of plans for the continual improvement of the secondary road system are proceeding, and next year's report should reflect an increase in this type of construction.

Contracts for bituminous surface treatment and hot-mix asphalt patching amounting to $556,000 were necessary for improvements to the general road system. About 470 miles of roads were treated in this manner. A tabulation covering construction for the fiscal year 1953-54 is included. (Appendix, Table I, Page 90.)

In addition to the work placed under contract during the fiscal year, the program will continue for the last half of the biennium, and a little over eight million dollars worth of work is projected. This will cover approximately 60 additional miles of construction and reconstruction.

1954-55 Construction

Some of the outstanding projects scheduled for early construction in the next year will be the beginning of construction of a new bridge and underpass, with its connecting highways, over the Christina River, leading into the City of Wilmington. The contract will consist of punch-

HARRINGTON TO CANTERBURY—CONTRACT 915. BRIDGE AT MURDERKILL RIVER.

ing a new entrance to Walnut Street under the tracks of the Pennsylvania Railroad, building a new bridge, and constructing approach highways to connect with U. S. Route 13.

This should provide, when completed, a new entrance to the City of Wilmington, and while it will not solve all of Wilmington's traffic problems, it is apparently the best we can do within the limits of available finances.

The bridge will be a bascule-type span, which will be raised and lowered to take care of navigation in the Christina River. It is unfortunate that we were unable to construct a high-level bridge for a new entrance into the City. Such a bridge would have removed the necessity for delaying traffic for water navigation.

The elimination of the congestion at Basin Corner will be taken care of by the construction of a full interchange which should materially improve traffic conditions on U. S. Route 40, leading to the Delaware Memorial Bridge.

In addition to these outstanding projects, the program for improving dirt roads and the secondary system will be continued. (See Table II, Appendix, Page 93.)

Recommendations

The Chief Engineer of the State Highway Department has customarily included as part of his annual report his recommendations for the approaching biennium period. The recommendations are based on reports presented to the Chief Engineer by the various Division Engineers and on a knowledge of traffic conditions, maintenance economy and condition of the various roads in the State. Also considered, when the recommendations are tabulated, is the ability of the Department to actually perform the work involved in completing the contracts and, perhaps most important, the attitude of the Legislature in considering the appropriation necessary for the completion of the recommended program.

Each year it is less difficult to present a tabulation of roads in the various systems in the State eligible for construction or reconstruction. Each year it becomes more difficult to assign a fair priority order for the roads to be recommended for improvement. This difficulty is partially due to three factors: (1) the increased traffic volumes and usage of our highways which tends to make all roads relatively important; (2) the rapid deterioration of our existing highways, with accompanying high maintenance costs; and

(3) the indecision in the Department concerning the amount of money it will have from the Legislature to care for the problem. We cannot plan a long-range construction program to provide sound and safe highways for Delaware, without a long-range financing program which will assure the Department of adequate funds to meet their construction needs.

In order more fully to explain this problem to the members of the Department, to the Executive and Legislative Branches of our Government and to the citizens of our State, I have initiated a comprehensive study of our highways which will be intended to show our needs, based on traffic conditions for the near future, using adequate road design standards. This study, which will be available for the next General Assembly, will not only show the highway needs as our Department engineers see them, but will also show construction plans, priority methods, and a financial scheme which will enable the plan to be operated. The study, now under way, will show the need for a long range, adequate, financing plan for the construction of a sound highway system for the State.

While this is under way there are, as previously mentioned, many roads in the State in need of immediate improvement. Therefore, I submit to you the following list of roads from which I will recommend a program of construction depending on the funds appropriated to the Department by the General Assembly of 1955.

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
NEW CASTLE COUNTY

URBAN SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
11	Union Street—Lancaster Pike to Sycamore (Wilm.)	45-74	0.28	$ 112,000.00
50	Heald Street (Spruce Street to Christina River, Wilm.)	54	0.25	80,000.00
41 (SR 273)	West Newark Limits to Capitol Trail	55-66	1.18	378,000.00
11	Through Newark	57-74	2.06	660,000.00
217	Miller Road—Baynard Blvd. to Lea Blvd.	57	0.56	179,000.00
4A	Baynard Blvd. (Washington St. to Concord Ave.)	58	0.63	202,000.00
	Cleveland Avenue Extension (Newark)		0.10	18,000.00
		Total	5.06	$ 1,629,000.00
	Special Projects			
	Walnut Street Paving		0.57	$ 670,000.00
	Walnut Street (Front Street to 16th Street)	65	1.00	220,000.00
		Total Special Projects	1.57	890,000.00
		Total Urban Projects	6.63	$ 2,519,000.00
	Building Projects			
	Maintenance Building—New Castle			600,000.00

PRIMARY SYSTEM

336	Maryland Avenue (Boxwood Road to Silview)	45	1.50	780,000.00
18	Christiana to Newark (Rt. 273)	53	4.60	500,000.00
237	Lancaster Pike (Dupont Road to Centre Road)	54	1.00	150,000.00
19	New Castle Avenue (Fingerboard Rd. to Chestnut St.)	57	3.58	700,000.00
24	Philadelphia Pike to Bellevue Road to Claymont	57	2.50	550,000.00
6	Basin Corner to New Castle	57	1.30	78,000.00
34	McDonough to State Rd. (N.B.) U. S. 13	61	11.80	800,000.00
4	Concord Pike (Talleyville to Pennsylvania Line)	63	2.00	560,000.00
34	Corbit Station to Tybout's Corner (S.B.) U. S. 13	87	2.00	200,000.00
6	Basin Rd. (U. S. 13 to Newport) Route 41	69	2.30	200,000.00
21	Gap Road (Route 48 to Cedars)	86	3.50	350,000.00
		Total	36.08	$ 4,868,000.00

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
NEW CASTLE COUNTY

PRIMARY SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
	Special Project			
1315(3)	Naaman's Road Interchange (U. S. 13 to Chester Expressway)			$ 700,000.00
	State Road Interchange			375,000.00
			Total—Primary Projects	$ 1,075,000.00
			Grand Total—Primary System	5,933,000.00

SECONDARY SYSTEM

11C	Old Capitol Trail	28-62	2.14	128,000.00
271	Centre Road (Lancaster Pike to Kennett Pike)	31	1.25	375,000.00
212	Silverside Road—Concord Pike—Phila. Pike	33-48	4.59	459,000.00
214	Shipley Road—Phila. Pike—Naaman's Road	34-63	4.98	498,000.00
232	Rockland Road—Concord Pike to Penna. Line	35-65	5.91	591,000.00
270	Dupont Road to Gap Road (Faulkland Road)	35-56	3.37	337,000.00
336	Stanton to Newport	35-37	2.00	120,000.00
259	Centre Road to 275A	37-65	3.42	342,000.00
373	Road 374 to New Castle Avenue	40	0.81	81,000.00
13	Milford Crossroads to Limestone Road	41-45	3.51	211,000.00
235	Road 225 to Road 232 (Near Montchanin)	41	0.90	54,000.00
366A	Ogletown to Road 336 S. of Stanton	41-47	2.84	284,000.00
	Kiamensi Road	42-65	2.51	251,000.00
13	Curtis Mill Rd. (Newark to Milford Crossroads)	43	2.40	275,000.00
221	Beaver Valley Road	45-59	5.00	600,000.00
336	Road 387A to Christiana	46-50	4.55	273,000.00
202	Naaman's Road to Pennsylvania Line	47	0.71	43,000.00
261	Road 242 to 247 (Ashland to Yorklyn)	48	1.72	172,000.00
441	Odessa to Mathews Corner	48-51	0.98	59,000.00
27	Dupont Road—Maryland Avenue to Elsmere	49	0.44	44,000.00
225	Montchanin Road (Barley Mill Road to 221)	49-62	5.02	502,000.00
307	Corner Ketch to Thompson Station	49	1.69	101,000.00
207	Darley Road (Naaman's Road to Philadelphia Pike)	50	2.20	270,000.00
27 & 27A	Dupont Road—N. Elsmere Limits to Kennett Pike	50-52	1.60	160,000.00
247	Road 261 to Pennsylvania Line Near Yorklyn	50-63	2.41	145,000.00
258	275A to Road 261 (Ashland to Wooddale)	50	1.42	86,000.00
337	Road 338 to Capitol Trail (Near Stanton)	50-65	0.50	30,000.00
340	Hog Swamp Road—Road 3 to Road 6 (Near Newport)	51-59	3.63	218,000.00

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
NEW CASTLE COUNTY

SECONDARY SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
429	Armstrong's Corner to Odessa	51-61	3.63	$ 218,000.00
378	From Delaware City Road to 376 (New Castle to Delaware City)	52-65	5.44	327,000.00
410	Delaware City to Road 378	52-59	2.54	152,000.00
411	Delaware City to Dupont Parkway	52-62	3.49	209,000.00
448	Noxentown Road to Fieldsboro	52	2.48	149,000.00
243	Old Kennett Road	53	2.96	296,000.00
23	Marsh Road—Edgemoor Road to Philadelphia Pike	54	0.45	45,000.00
242	Road 9 to Road 261	54-65	2.60	156,000.00
338	Road 336 to 337	54	0.51	51,000.00
23	Marsh Road—Philadelphia Pike to Washington Street	55	0.48	144,000.00
449	Fleming's Landing—Mathews Corner	55-65	9.24	554,000.00
215	Weldin Road—Faulk Road to Shipley Road	56	1.36	136,000.00
218	Bellevue Road (Philadelphia Pike to Gov. Printz Blvd.)	58	0.58	125,000.00
5, 336 & 31	Route 7 (Limestone Road—U. S. 13 to Pennsylvania Line)	58	13.10	910,000.00
208	Faulk Road (Blue Ball to Naaman's Road)	58	4.00	1,200,000.00
40	Road 493 to Kent Line	58	1.55	31,000.00
221B	Road 221 to Pennsylvania Line	58	0.12	8,000.00
294	Limestone Road to Lancaster Pike	58	1.33	80,000.00
433	Summit Bridge to Maryland Line	58	3.27	66,000.00
452	Stump's Corner to Fieldsboro	58	1.73	35,000.00
339	Churchman's Road (Christina River to Road 336)	59	1.00	75,000.00
		Total Secondary System	134.36	$11,676,000.00
	Bridges			
424	Fenimore Bridge and Approaches			150,000.00
449	Taylor's Bridge and Approaches			150,000.00
	Seventh Street Bridge, Wilmington			400,000.00
	Marrow Road Bridge Over Pennsylvania Railroad			118,000.00
	Smith Bridge			15,000.00
		Total Bridge Construction & Repair		$ 833,000.00
		Grand Total—Secondary System		$12,509,000.00

TERTIARY SYSTEM

	Liberty Avenue		1.10	130,000.00
43	Lea Boulevard to Road 24	4891*	0.36	86,000.00
40	Road 378 to Road 7	223*	0.80	32,000.00
		Total Tertiary System	2.26	248,000.00
		New Castle County Grand Total—All Systems & Projects		$21,809,000.00

*24-hour Traffic Count

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
KENT COUNTY

URBAN SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
	Loockerman Street, Dover	55	0.77	$ 270,000.00
51	Division Street, Dover, from Penna. R.R. to King Street	60-64	0.58	180,000.00
		Total Urban System	1.35	450,000.00

PRIMARY SYSTEM

39	Commerce Street, Smyrna	50-67	1.12	224,000.00
8 (U.S. 113)	Frederica to Milford	58-71	8.58	344,000.00
6	Farmington through Harrington (Dual)	69	4.70	700,000.00
36	Harrington to Houston Road	71	3.50	250,000.00
27	Dover to Little Heaven (13A)	73	7.82	380,000.00
2	Dover to Bishop's Corner (U. S. 13, N.B.)	77	4.00	260,000.00
60	Vernon to Burrsville	78	4.50	240,000.00
1	Through Smyrna, Dual	80	1.53	255,000.00
7	Barker's Landing Bridge (Deck Repairs)			20,000.00
		Total	35.75	$ 2,673,000.00
	Special Projects			
7	Dover to Air Base, Dual, U. S. 13	57	3.37	2,000,000.00
		Grand Total—Primary System	39.12	$ 4,673,000.00

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
KENT COUNTY

SECONDARY SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
190	Layton Avenue, Wyoming	47	0.36	$ 15,000.00
65	Main Street, Smyrna, North to New Castle Line	49-62	1.50	90,000.00
35	Harrington to Frederica	58-62	7.35	295,000.00
45	Cheswold to Kenton	59-68	4.45	267,000.00
88	Dover—Leipsic Road (Road 7 to 334)	59	2.51	100,000.00
357	Dover Air Base to Lebanon	59	1.27	127,000.00
34	Through Frederica	60	0.50	30,000.00
53	Wyoming to Willow Grove	61	5.35	351,000.00
26 & 29	Wyoming to Lebanon	62	4.52	290,000.00
59	Fleming's Corner to Whitleysburg	62	7.91	480,000.00
39	Through Clayton to Smyrna	65	1.42	120,000.00
34	Through Felton to Frederica	67	6.25	400,000.00
17	Bay Road to Little Creek	68	3.93	160,000.00
345	South Little Creek Road	73	0.20	45,000.00
57	Felton to Whitleysburg (Rt. 12)	73	9.74	630,000.00
		Total Secondary System	57.26	$ 3,400,000.00
	Bridge Construction and Repair			
	Lebanon Bridge and Approaches (New Construction)		0.20	900,000.00
	Court Street Bridge, Dover (Replacement)			310,000.00
		Total Bridge Construction and Repair	0.20	$ 1,210,000.00
		Grand Total—Secondary System	57.46	$ 4,610,000.00

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
KENT COUNTY

TERTIARY SYSTEM

Road Number	Location	24-Hour Traffic	Mileage	Estimated Cost
9	Road 82 to Road 10	365	3.81	$ 33,000.00
32	Canterbury to Viola	261	0.90	70,000.00
444	From Road 36 to 443	216	1.90	38,000.00
243	From Road 241 to Main Street, Felton	195	0.62	13,000.00
170	From Road 41 to Road 49	160	4.50	90,000.00
445 & 446	Houston Streets	159-114	2.22	45,000.00
193	Wyoming to Camden	147	1.04	22,000.00
425	From 423 to Road 19	130	0.87	18,000.00
287	From 284 to Road 5	127	1.28	27,000.00
281	From 58 to Road 57	116	2.27	46,000.00
389	Road 8 to Road 34	114	1.05	60,000.00
129	Blackiston to Delaney's	114	3.11	50,000.00
185	From 184 to Marydel	109	1.19	22,000.00
286	From 5 to 284	96	0.73	16,000.00
385	From 384 to Road 5	95	3.24	64,000.00
256	Sandtown to Sheltie's Crossroads	93	3.09	65,000.00
91	Road 41 to Road 42	88	2.03	40,000.00
380	Ragtail Corner to Frederica	85	4.39	90,000.00
208	Sandtown to Chicken Joe's	81	3.40	80,000.00
331	Denney's Corner Road	81	3.33	66,000.00
		Total Tertiary System	44.97	$ 955,000.00
	Bridge Construction and Repair			
	Replacement—Numerous Small Steel Bridges with Pipe Structures			
		Totals by Systems:		
		Urban	1.35	$ 450,000.00
		Primary	39.12	4,673,000.00
		Secondary	57.46	4,610,000.00
		Tertiary	44.97	955,000.00
	Kent County Grand Total—All Systems & Projects		142.90	$10,688,000.00

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
SUSSEX COUNTY

PRIMARY SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
24	From U. S. 113 to Rehoboth Road	58-75	15.11	$ 906,000.00
26	From U. S. 113 through Dagsboro to Bethany Beach	61-75	10.37	623,000.00
50	Bethany Beach to Indian River	64	4.80	144,000.00
50	Rehoboth to Indian River	66	6.89	290,000.00
18	Georgetown to Harbeson	67	6.00	210,000.00
18	Maryland Line to Atlanta	68	1.96	120,000.00
4 & 6	1 Mile from Greenwood to Farmington	70	5.53	720,000.00
431	U. S. 113 to South Georgetown Limits	70	1.44	90,000.00
26 & 24	Millsboro to Maryland Line via Gumboro	71	11.50	357,000.00
14	Five Points to Milford	71	18.00	630,000.00
18	Bridgeville to Atlanta	71	7.55	272,000.00
404	Maryland Line to Bridgeville	71-75	7.51	451,000.00
20	Seaford to Reliance	72	5.48	175,000.00
18	Route 404A to Georgetown	73	9.66	600,000.00
4A	Market Street, Bridgeville, to U. S. 13	74	0.96	60,000.00
18A	Route 404 through Bridgeville to U. S. 13A	75	0.44	50,000.00
24	Laurel to Maryland Line—Sharptown	76	7.93	238,000.00
		Total	121.13	$ 5,936,000.00
	Bridge Construction and Repair			
14	Broadkill Bridge Repair			20,000.00
14	Rehoboth Bridge Repair			20,000.00
18	Lewes Bridge Repair			20,000.00
	Between Rehoboth and Fenwick Island: Replacement of Timber Bridges			300,000.00
14	Charles W. Cullen Bridge, North Approach Replacement			475,000.00
		Total Bridge Construction and Repair		$ 835,000.00
		Grand Total—Primary System		$ 6,771,000.00

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
SUSSEX COUNTY

SECONDARY SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
382	Roxana to Johnson (Road 389)	45-50	2.40	$ 96,000.00
389	Johnson to Williamsville	45	1.04	41,000.00
224	Road 216 to Rehoboth Road to Slaughter Beach	46-70	5.18	311,000.00
357	Route 26 in Ocean View to Canal	52	0.60	36,000.00
376	Frankford to Selbyville	52-63	4.06	244,000.00
16	East Ellendale Limits to Rehoboth Road	54-60	8.62	517,000.00
397	Road 58 to Maryland Line	54	0.61	15,000.00
26	Shaftox Corner to U. S. 113	55	5.58	335,000.00
399	U. S. 113 to Maryland Line	55	0.48	10,000.00
401	Road 26 in Dagsboro to U. S. 113 in Frankford	55-65	2.56	154,000.00
339	U. S. 113 South to Millsboro to Road 331	56	0.71	28,000.00
543	From Road 20 to Road 534	57	1.20	43,000.00
16	Kent Line through Greenwood to U. S. 13	57-70	5.70	342,000.00
346	Road 54 to 26 East of Clarksville	57	0.67	18,000.00
22	Harbeson to Waples Pond	58	7.75	225,000.00
78	U. S. 13 in Laurel to Road 493	59	2.56	128,000.00
225	Lincoln to Milford (207 to 36)	59-65	2.86	143,000.00
549	From Road 20 to Road 553	61	3.39	122,000.00
544	From Road 13 to Road 546	61	1.25	45,000.00
297	Oak Orchard Road	61	1.99	100,000.00
493	Broad Creek to Bethel	62	2.43	68,000.00
70	Hearn's Cross Roads to Smith's Mill	62	3.50	129,000.00
64	Bacon Switch to Smith Mill	62	2.56	76,000.00
285	Westcoat's Corner to Road 48	62	5.82	110,000.00
360	State Route 14 to Road 357	62	1.30	25,000.00
591	Road 40 to 600	62	2.16	44,000.00
352	Road 84 to Millville	63-66	1.04	21,000.00
363	Road 364 to 362 (Miller's Neck)	63	1.18	22,000.00
64	Smith Mill to Whitesville	64	4.80	160,000.00
583	Road 34 to Road 590	64	1.13	40,000.00
583	From Road 4 to Road 590	64	1.30	24,000.00
427	Road 64 to Road 62	64-65	3.24	65,000.00
58	Through Selbyville to Road 52	65-69	0.92	40,000.00
201	State Route 36 to Mispillion River	65	2.13	43,000.00
64	Whitesville to Route 26	66	2.50	62,000.00

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
SUSSEX COUNTY

SECONDARY SYSTEM

Road Number	Location	Sufficiency Rating	Mileage	Estimated Cost
213	From Road 207 to Milford	66	1.77	$ 32,000.00
365	From Road 52 to Road 84	66	1.53	28,000.00
536	Seaford to Woodland	66	3.00	54,000.00
80	Maryland Line to Seaford—Reliance Road	66	3.96	160,000.00
204	Cedar Creek to Slaughter Beach	66	1.93	45,000.00
16	Greenwood to Ellendale	67	7.52	210,000.00
582	Road 404 to Road 583	68	1.19	43,000.00
40	Bridgeville to Double Bridges	69	4.15	116,000.00
46	Brown's Church to Middleford	69	1.47	50,000.00
562	Road 18 to Road 404	69	4.00	150,000.00
		Total Secondary System	125.74	$ 4,770,000.00

TERTIARY SYSTEM

Bridge Construction and Repair
Replacement of Numerous Small Steel Bridges with Pipe Structures

RECOMMENDED ROADS
FOR FUTURE CONSTRUCTION
SUSSEX COUNTY

TERTIARY SYSTEM

Road Number	Location	24-Hour Traffic	Mileage	Estimated Cost
619	From Road 36 to Road 113	465	1.54	$ 56,000.00
328	From Road 326 to U. S. 113	280	0.40	8,000.00
419	From Road 455 to Road 26	246	4.90	100,000.00
556	From Road 536 to 547	204	3.27	63,000.00
310	From Road 24 to 308	198	0.58	12,000.00
212B	From Road 22 to 16	189	0.15	3,000.00
571	From Road 404 to Maryland Line	180	1.97	30,000.00
283A	From Road 275 to 277	169	2.08	41,000.00
546	Bridgeville Limits to Road 18	168	2.56	55,000.00
326	Road 20 to Road 318	167	0.68	14,000.00
365	Road 52 to Road 84	158	1.53	33,000.00
328	Road 113 to Road 20	150	0.16	3,000.00
224	From Road 42 to Road 36	150	3.20	57,000.00
402	Rom Road 113 to Road 406	141	1.50	27,000.00
627	From Road 215 to Road 224	140	1.10	19,000.00
290	From Road 22 to Road 292	133	2.43	43,000.00
366	From Road 353 to Road 84	129	1.48	23,000.00
318	From Road 48 to Morris Pond	121	1.00	18,000.00
507	From Road 76 to Road 76	114	1.86	33,000.00
227	From Road 16 to Road 230	110	4.19	75,000.00
273	From Road 14 to End	110	0.30	8,000.00
261	From Road 18 to Road 285	108	1.35	24,000.00
381	From Road 384 to Road 58	103	2.07	36,000.00
527	From Road 113 to Road 524B	100	4.00	72,000.00
483	From Road 484 to Road 20	94	2.13	36,000.00
565	From Road 241 to Road 319	90	2.50	45,000.00
525 & 526	From Road 18 to Road 46	88	4.00	72,000.00
313A	From Road 24 to Road 313	81	0.54	10,000.00
364	From Road 84 to Road 364A	81	1.30	24,000.00
270	From Road 14 to East (Dead End)	80	0.70	25,000.00
395	From Road 58 to Maryland Line	79	0.92	18,000.00
484	From Road 46 to Road 483	74	2.76	50,000.00
527	From Road 18 to Road 524B	74	3.00	54,000.00
586	From Road 58 to End	67	0.40	7,000.00
388	From Road 52 to Road 382	61	2.02	32,000.00
340A	From Road 26 to Helm's Landing	50	1.00	15,000.00
	Total Tertiary System		65.57	$ 1,241,000.00
	Totals By Systems:			
	Primary		121.13	$ 6,771,000.00
	Secondary		125.74	4,770,000.00
	Tertiary		65.57	1,241,000.00
	Sussex County Grand Total—All Systems & Projects		312.44	$12,782,000.00

DELMAR TO GEORGETOWN—LAUREL ROAD—CONTRACT 1149.

MAINTENANCE

Maintenance problems throughout the State continue to be of primary concern. The rapid rate of traffic increase in recent years and the growth of suburban areas, particularly in New Castle County, has caused many secondary roads to become primary in function. As a result, they are totally inadequate for the traffic they must carry.

Until such time as funds will allow for reconstruction, maintenance costs of these roads, particularly for patching and repairs, will continue to increase in direct proportion to increases in traffic.

Adequate equipment for the maintenance of bituminous roads on a twelve-month basis is now essential, and a program enabling such operation must be established. Concrete and bituminous patching is necessary in many areas, and a number of roads built ten or more years ago with narrow, high crowns should be built up in order to provide a surface which will support loads more evenly and reduce deterioration.

Earth Roads

The increase in home building in rural areas necessitates improvement of earth roads on a larger scale.

The earth road system is essential to our State's economy as part of the "farm-to-market" network. Hard-surfacing of selected earth roads should be increased. A special study of the earth road problem is underway, and I expect to have a report available on this subject for the next General Assembly.

Water is always a problem in connection with earth roads, either because of its presence or absence. Grading, ditching and placement of drainage pipes have been carried out extensively in order to alleviate drainage problems. The use of calcium chloride for dust control has been tried on an experimental basis and holds promise of solving the dust nuisance to home owners living close to roadway areas.

Suburban Development Maintenance

The increase in mileage of suburban streets added to the Department's system for maintenance throws a great strain on the maintenance organization. Maintenance costs and problems will continue to increase as additional mileage is added and as existing facilities deteriorate.

During fiscal year 1953-54, a total of $56,471.38 was spent on maintenance of suburban streets, an average cost for the 112 miles of streets accepted for State maintenance prior to 1951 of $504.21 per mile.

My recommendations for the next biennium will include additional funds for better care of the suburban street needs.

Bridge Maintenance

In addition to other maintenance duties, the County Divisions are responsible for the maintenance and repair of bridges throughout the State. The activities of these Divisions cover only general and periodical maintenance, except where damage occurs from unexpected sources.

Six spans received attention in New Castle County during 1953-54. Two of these, South Market Street Bridge and Newport Bridge, were damaged by accidents, and in the case of the former, the Department was reimbursed for the expense of repairs by the owner of the damaging barge. Repairs were made to the Fenimore, Flemings Landing, Third Street, and Seventh Street Bridges. In the last three cases, bridge houses were painted and received asbestos shingle siding.

The program inaugurated several years ago of surface-treating or putting a wearing course on the decks of the 75 creosote timber bridges in Kent County has been continued. These bridges, built between 1937 and 1941, were constructed to last about 20 years. Towards extending this life, experimental treating of the timbers of about 20 of the bridges was carried out during this report period. It is believed that this will extend the usefulness of the bridges for several years, but results of the tests cannot be evaluated at the present time.

General repairs and painting were carried out on four bridges in Sussex County.

The Charles W. Cullen Bridge at Indian River Inlet involved the heaviest expense in this category, having deteriorated to a great extent from lack of painting. High Street Bridge, Seaford, was also cleaned and painted.

Repairs were carried out on Bridge #335, near Bacon Switch, and Bridge #107, Greenwood. In addition, Bridge #420, near Georgetown, was widened. General repairs were made to the Woodland Ferry.

Snow Removal

Extremely heavy snow removal operations occurred during the winter of 1953-54. Total expenditures for this item for the year were $179,928.59. (See Table III, Appendix, Page 96, for annual comparisons.)

Although snow fence erection had begun and progressed in accordance with the established schedules, the year's first snow storm literally caught the Department with its fences down. In the five previous years, an annual average of only $51,180 had been spent on snow and ice control in the State—$32,000 less than the 1953-54 expenditure in New Castle County alone.

Consequently, available equipment was in poor condition, particularly in Kent County. The earliness of the first storm, incomplete fence erection, mechanical failures in equipment, and stalled vehicles resulted in serious traffic tie-ups. It was impossible to open some roads until three days after the storm. In the several later storms, however, no known tie-ups occurred.

Several steps have been taken which will remove any danger of a recurrence of the situation of November, 1953. In the future, erection of snow fence will begin on October 15, and snow equipment will be overhauled before cold weather begins. Sufficient snow fence has been purchased to be adequate except for annual replacements.

Snow- and ice-fighting procedures have been drastically revised and reorganized, and chemical aids—calcium chloride and salt—will be used liberally. All existing equipment is now in good operating condition. Certain replacements in outdated equipment are indicated. The responsibility of this Department to the people of the State in keeping highways safe and clear of snow and ice is a heavy one.

In our maintenance budgets for the next biennium, I am recommending substantial increases to care for new equipment sufficient to handle this operation efficiently. This plan will include rentals of emergency equipment available in the state from contracting organizations.

Roadside Operations

Another problem that increases with the development of rural areas, extension of highways and increases in traffic is that of keeping roads and roadsides free of trash and litter.

Clean-up costs in the State over the past year are estimated in excess of $140,000.

During the fiscal year 1953-54, the interest of civic organizations in this endeavor has taken constructive form. A Roadside Improvement Council has been organized, with the New Castle County Division Engineer serving on the executive council. The effectiveness of the organization is being watched with interest.

Since the only solution to the problem seems to be in educating the road user, civic organizations are an effective tool. The Department has cooperated with one of these groups, the Darley-Naaman's Civic Association. A trash disposal area established with their cooperation is being observed for its effect.

In accordance with the action of the 117th General Assembly, dumping areas have been established throughout the State. At the present time, a survey is being conducted with the State Board of Health, toward a solution to the dumping problem.

Experiments by the Kent County Division with herbicides for grass and weed elimination around State buildings have indicated that the use of weed killers as an adjunct to mowing operations, to eliminate hand methods in areas around signs and other obstructions, would be both effective and economical.

Maintenance Housing Facilities

At the present time, maintenance housing facilities are inadequate in the New Castle and Sussex County divisions. In both counties, it is necessary for maintenance equipment to be kept out-of-doors throughout the year, which results in costly rusting and deterioration.

I recommend that consideration be given to building or obtaining suitable facilities for the New Castle Division and that maintenace offices be brought to one location. Preliminary studies indicate an approximate cost of $600.000 for building such facilities on land already owned by the Department.

In Sussex County, consideration must be given in the future to purchasing a new site for the Division office building, shop, storage shed, carpenter and paint shop, and other necessary buildings, at the edge of Georgetown. It is

felt that the location of the present office building may make possible the realization of a good price for its sale.

It is recommended at the present time that land be bought near Georgetown and Seaford on which storage sheds for equipment may be built.

BRIDGE DIVISION

During the fiscal year 1953-54, this Division has been engaged in the design and preparation of plans, specifications and special provisions for bridges, culverts, retaining walls, dams and spillways, shore protection structures, tidal water control structures, special drainage projects and miscellaneous structural designs. In addition to regularly-scheduled work, the Division revised, rewrote, edited and amended the text of all items of a structural nature normally involved in bridge and drainage construction in the new 1954 Standard Specifications.

The Bridge Division performed all drainage and bridge design work for 20 construction projects, including two large dual highway projects involving the design of major bridge structures and extensive storm drainage systems. In addition, there were several road projects still in the design stage for which all bridge and drainage work was completed.

The Division participated in conferences, correspondence and negotiations between officials of the State Highway Department and other organizations involved in the preparation of plans, estimates and specifications for three important bridge construction projects: Walnut Street Extension—Wilmington, Basin Corner Interchange and Naaman's Road Underpass and Interchange.

In addition, the Division prepared plans and specifications and supervised construction on four important bridge projects:

White Clay Creek Bridge—Newark, New Castle County.

Harvey Road Bridge—Arden, New Castle County.

Red Clay Creek Bridge—Marshallton, New Castle County.

Frederica Bridge—Frederica, Kent County.

During the year, the Bridge Division was given responsibility for the periodic inspection of the Delaware Memorial Bridge from the standpoint of maintenance,

structural details and engineering problems in connection with the operation and preservation of the bridge.

The inspections, consultations and preparation of contract plans and specifications for work involved in the upkeep, repair and maintenance of the Delaware Memorial Bridge are now to be done in conjunction with the consulting engineers retained to perform services for the Bridge.

Project Narratives

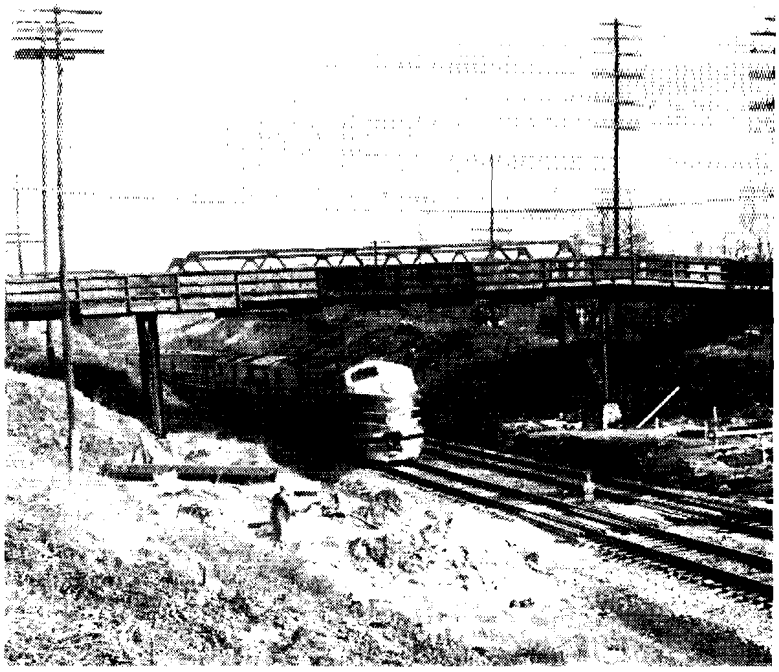
Contract No. 1208—White Clay Creek Bridge: This bridge, located at the easterly city boundary of Newark, carries State Route 2 across White Clay Creek. The bridge is a seven-span structure with a center, or stream, span of 92 feet, flanked on either side by two 70-foot spans and one 60-foot span, with an overall distance of 492 feet, center to center, of abutment bearings. A roadway width of 48 feet, with four 12-foot traffic lanes and two four-foot sidewalks, provides ample accommodation for highway and pedestrian traffic.

The existing concrete arch bridge which served for many years at this location was the scene of numerous serious highway accidents, because of the restricted roadway width and the dangerous approaches at both ends of the bridge. The improved alignment and changed location of the new bridge will eliminate these highway hazards and will satisfy a long-felt need for a wider and safer roadway and bridge crossing at this location.

The bridge superstructure consists of a framework of structural steel beams with spiral shear connectors, supporting a continuous reinforced concrete roadway and sidewalk slab. Reinforced-concrete parapets are provided. A somewhat unusual feature of the design is the hinged type of support for the main structural steel beams of the center approach spans.

Because of the extreme skew crossing, it was decided to construct the substructure piers with round column supports, thereby minimizing resistance to stream flow. A typical pier bent design consists of two spread footings resting on bed rock, surmounted by two circular column shafts supporting the pier cap. Abutments are of reinforced-concrete construction on spread footings.

It is felt that this bridge, because of its size and strategic location, is one of the most important structures to be constructed in the vicinity of Newark in recent years.



HARVEY ROAD BRIDGE—CONTRACT 1197—BEFORE CONSTRUCTION.

HARVEY ROAD BRIDGE—CONTRACT 1197—AFTER CONSTRUCTION.

The contract was awarded on December 11, 1953. Actual construction work began in January, 1954, and rapid progress was made, with all superstructure construction complete by the end of this report period.

Contract 1197—Harvey Road Bridge: This bridge is located in Brandywine Hundred, New Castle County, east of Arden. It consists of a three-span, reinforced-concrete and steel structure, carrying Harvey Road across the Baltimore and Ohio Railroad.

The existing three-span steel truss structure which served for many years at this location was constructed shortly after the turn of the century under an agreement between the Baltimore and Philadelphia Railroad Company and the Commissioners of Roads of Brandywine Hundred. The terms of the agreement called for "a bridge having a width of not less than twenty feet between centers of girders, and a height of not less than twenty-one feet above the rails . . ., with suitable approaches of ample width to permit the passing of loaded teams . . ."!

In recent years, it had become increasingly apparent that the old bridge, posted at eight tons, and the sharply-curved, steeply-graded approaches no longer served the best interests of the surrounding community. Fire-fighting equipment stationed at Claymont was forced, because of weight restrictions, to detour by way of Silverside grade crossing in order to answer calls in Arden, thereby increasing both potential and actual fire losses in the area.

Early in 1952, a cooperative agreement was entered into between the Baltimore and Ohio Railroad and the State Highway Department. Preliminary surveys and studies begun by the Bridge Division resulted in the completion of final plans and specifications for the project. Proposals were received on November 4, 1953, and the general contract awarded.

At the end of June, 1954, all substructure concrete in piers and abutments was complete; the steelwork had been erected, welded and riveted; and preparation was being made for the placing of deck slab forms, concurrent with the placing and compaction of common borrow on the approach fills.

The complete bridge structure and approach roadways will provide safe and convenient transportation for many years to come and will represent another forward step in the

replacement of obsolete bridges and unsafe approaches with facilities designed to meet present-day needs.

Contract 1253—Red Clay Creek Bridge: This bridge is located in the Town of Marshallton, New Castle County, approximately two miles west of Elsmere and north of the old Capitol Trail, formerly State Route 2. The bridge is a reinforced-concrete, two-span, rigid frame with two equal span lengths of 34 feet 10 inches. Provision is made for a clear roadway width of 28 feet, and two five-foot sidewalks. The parapets consist of fabricated metal railing panels supported and located between reinforced-concrete railing posts. The footings are of reinforced concrete, set on a firm rock foundation. Abutment wings are of reinforced concrete on spread footings. The bridge contract includes incidental work on the roadway approaches.

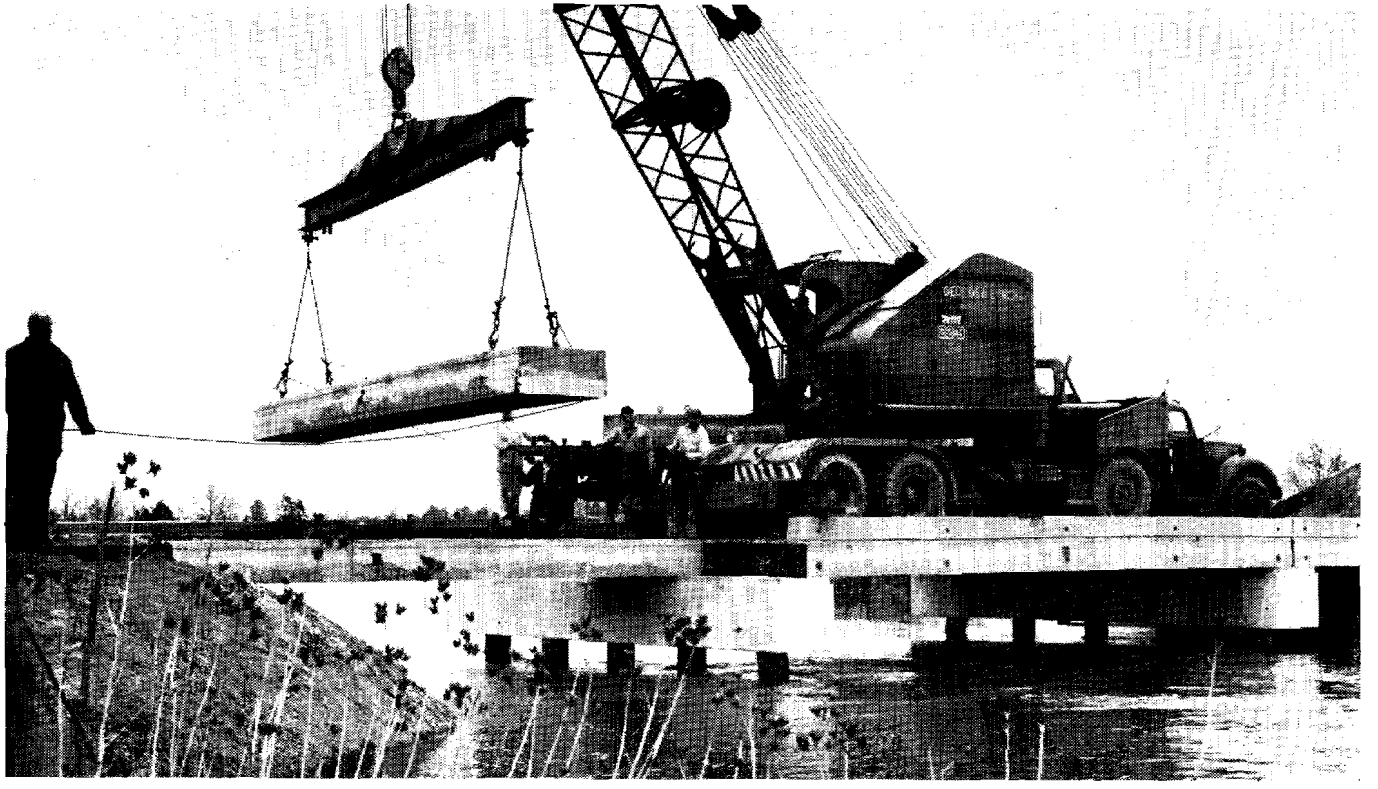
The former highway bridge spanning Red Clay Creek in the same location as the new structure consisted of a single-span steel truss structure with a cantilevered sidewalk on the west, or downstream, side. The clear distance between abutments was approximately 70 feet.

Attention was called to the old bridge early in 1952, when an inspection was made by the Bridge Division. As a result of the examination, it was recommended that the bridge be posted for six tons, and that the Delaware Coach Company reroute their regular passenger busses. Preliminary surveys and studies were made, following a meeting of the State Highway Department on June 12, 1952, authorizing the construction of a new bridge during the following year. During the preparation of plans, it was decided to erect a temporary Bailey footbridge across the stream, immediately upstream of the new bridge, and to reroute all highway traffic during construction. Proposals were received April 28, 1954, and the contract awarded. Actual work began on June 7, 1954.

At the close of the report period, the pedestrian footbridge was in place. Work was proceeding on the dismantling and removal of the old truss bridge.

The new rigid-frame structure, with its attractive appearance, roadway and sidewalk accommodation, will provide safe and uninterrupted service to the public for many years. Because of construction features, future maintenance costs are expected to be low.

Contract 1289—Frederica Bridge: This bridge, located at the southerly edge of Frederica, in Kent County,



FREDERICA BRIDGE—CONTRACT 1289—CONSTRUCTION OF DELAWARE'S FIRST PRE STRESSED, PRECAST CONCRETE BRIDGE.

carries County Road 109X across the Murderkill River. In earlier times, this was the only bridge crossing site at Frederica, and a succession of bridges, some of them draw spans, were erected there. In the early 1920's, the main highway, now U. S. 113, was by-passed to the east of the town, crossing the river approximately a quarter of a mile downstream on a new concrete bridge and causeway.

The old bridge, built of untreated timber about 1930, became seriously weakened through natural processes of deterioration and was finally posted for six tons in 1949. After an inspection by the Bridge Division in May, 1953, the structure was closed to traffic. Surveys and preliminary studies were made, followed by detailed cost estimates for several designs.

The final design, selected on the basis of previous cost comparisons, consisted of a three-span structure with a total length of 90 feet and a clear roadway width of 22 feet, 4 inches. The substructure consisted of four pile bents, each composed of five cast-in-place concrete piles and a reinforced-concrete pile cap. The bridge superstructure was composed of 24 prestressed, precast, reinforced-concrete bridge deck beams, each 30 feet long, 3 feet wide, with a depth of 17 inches. Eight of these units, placed side by side, comprised a complete single span. The two exterior beams were cast with a concrete curb, with inserts provided for the creosoted timber parapets.

The introduction of prestressed, precast, reinforced-concrete deck beams marked the first use of this type of bridge construction in Delaware. All bridge deck units were fabricated by the Concrete Products Company of America at Pottstown, Pennsylvania; factory inspection was performed by the Pennsylvania Department of Highways, in cooperation with the Delaware State Highway Department Testing Laboratory. The entire bridge superstructure was loaded on a fleet of 11 trucks and transported from the factory to the bridge site. Placement of bridge deck units was begun at 8:00 A.M. on February 24, 1954, and completed by 2:00 P.M., a total of only five hours working time.

Upon completion of the timber railings, the bridge was opened for public use. The installation of the hot-mix wearing surface on the roadway was postponed until a later date.

Contract 1224—Walnut Street Extension. The Bridge Division was given responsibility for the supervision of

the design and construction of the Walnut Street Extension project. This project is located on the extension of the present Walnut Street in Wilmington, between Front Street and the north end of the existing railroad overhead bridge on South Market Street. The roadway is designed for four 12-foot traffic lanes. Border roads are planned between A Street and the southerly city limit at Garasches Lane.

The project is subdivided in the following contracts:

Contract 1224 (1)—Borings

Contract 1224 (2)—Pennsylvania Railroad Underpass

Contract 1224 (3)—Walnut Street Bridge—Substructure

Contract 1224 (4)—Walnut Street Bridge—Superstructure

Contract 1224 (5)—Embankment and Stabilization—South Approach.

Interesting features of this project include the construction of the railroad underpass without interference with train movements, the double-leaf bascule bridge over the Christina River, and stabilization of the marsh areas on the south approach by the use of sand pile drains.

At the end of the report period, the boring contract has been completed and the award of contract has been made for the Pennsylvania Railroad Underpass. Plans and specifications for the Christina River bridge and for the marsh stabilization are completed, and these projects will be advertised in the near future.

Contract 1318—Basin Corner Interchange: This Division has been charged with the responsibility for the supervision of the design of a proposed grade separation and interchange at the intersection of the duPont Parkway and Basin Road in New Castle County. The design provides for a modified cloverleaf-type interchange with three traffic lanes in each direction on the duPont Parkway, bordered by a combination of service roads, acceleration and deceleration lanes, and provides four traffic lanes across the bridge structure on Basin Road.

Plans were practically completed at the end of the report period, and it is planned that this project will be placed under contract at an early date.

Contract 1315—Naaman's Road Underpass and Interchange: The supervision of the design of the Naaman's Road Underpass and Interchange is a part of the duties

assigned to this Division. The project provides for the widening of Philadelphia Pike to a four-lane highway, the construction of a new railroad underpass near Naaman's Road, and the construction of the roads and bridges necessary to connect the Philadelphia Pike with the proposed Chester Expressway at the Pennsylvania-Delaware State line.

The design is such that a connection with the Governor Printz Boulevard may be made in the future. The necessary work on all three of the foregoing projects was done in collaboration with the Plans and Design and Traffic and Planning Divisions.

My recommendations for future bridge construction and repair follow:

Replacement—Seventh Street Bridge—Wilmington—$400,000

Replacement—Taylors Bridge—New Castle County—$150,000

Replacement—Marrow Road Bridge over Pennsylvania Railroad—New Castle County—$118,000

Replacement—Fenimore Bridge—New Castle County—$200,000

Replacement with earth fill—S. Fenimore Bridge—New Castle County—$25,000

Repair—Smith Bridge—New Castle County—$15,000

Reflooring—Barkers Landing Bridge—Kent County—$20,000

Replacement—Lebanon Bridge—Kent County—$130,000

Replacement—Court Street Bridge—Dover—$310,000

Reflooring and Repairs—Lewes Bridge—Sussex County—$20,000

Reflooring—Rehoboth Bridge—Sussex County—$15,000

Reflooring—Broadkill Bridge—Sussex County—$15,000

Replacement—Timber Bridges on Ocean Highway between Rehoboth and Fenwick Island—$300,000

Replacement—North Approach—Charles W. Cullen Bridge—Sussex County—$475,000

Replacement—Bridge over Assawoman Bay at Fenwick Island—Sussex County—$60,000

Replacement—Numerous small steel bridges throughout the State with pipe structures.

Place Broadkill Bridge on 24-hour notice for opening, thereby relieving the need for bridge tenders at this location.

DESIGN DIVISION

The Design Division of the State Highway Department is under the direct supervision of the Design Engineer, who heads a staff of twenty men. These permanent employees of the Department are supplemented as necessary by additional men brought in from the construction forces during the winter months.

During the past year, the Design Division has completed approximately six miles of new construction, 25 miles of reconstruction and 21 miles of miscellaneous type construction, totalling an estimated value of $6,656,000. In addition to the regular design work accomplished by the Department, it has been necessary to employ consulting engineers on some contracts.

It would appear that if the shortage of highway engineers continues, the Department will have to call on more consulting service; this is especially true if an approved, accelerated construction program is undertaken during the immediate future.

A tabulation of the contracts completed within the Design Division will be found in the Appendix, Tables IV, V, and VI, Pages 97 and 98.

DIVISION OF TESTS

As has been reported previously, the Division of Tests is an important adjunct to our highway construction program, specifically charged with the control and design of materials used in construction. In order to ensure the high quality and safe performance of our roads and bridges, it is important that the testing procedure be continued.

Elaboration on the technical aspects of the work covered in the Division would be too involved for presentation here. An example of the volume of work conducted during the fiscal year 1953-54 may be seen in the tabulation in Tables VII and VIII, Page 99, Appendix.

FEDERAL AID DIVISION

At the beginning of the fiscal year, on July 1, 1953, a total of 31 contracts remained unfinished, of which there were 14 under Federal participation, 15 State construction contracts, one maintenance contract and one contract by legislative order. The estimated value of the uncompleted work was $4,112,714.63; the Federal Aid share was estimated at $1,256,790.02.

The value of programmed Federal Aid projects at that time was $836,270. The unprogrammed balances of federal funds amount to $2,819,946.27. The systems to which these balances remained were: Primary, $982,180.96; Secondary, $1,152,203.98; Urban, $564,311.33; Interstate, $121,250.

The Department had ample programming proposed to absorb these funds well in advance of June 30, 1956, the limitation date.

Under the Highway Act of 1952, an allotment of Federal funds amounting to $2,409,449 became available for the fiscal year ending June 30, 1955. These funds were available for programming on January 1, 1954, with a limitation date of June 30, 1957. The unprogrammed balances, including this allotment, amounted to $5,229,395.27. By system, the balances were: Primary, $2,188,743.96; Secondary, $1,956,578.98; Urban, $840,947.33; Interstate, $243,125.00.

The status of federal funds at the end of the report period indicates contractual obligations in amount of $2,834,113.07; projects in approvad program status, $1,289,747; and projects submitted to the Bureau of Public Roads for approval to advertise, $1,508,056.

Unprogrammed balances as of June 30, 1954, totalled $1,565,868.21; Primary, $461,283.53; Secondary, $982,709.58; Urban, $0.00; Interstate, $121,875.00.

The Federal Aid Highway Act passed by Congress in May, 1954, provides that the State of Delaware will receive $4,008,462 per annum for fiscal years 1956 and 1957, as compared with the $2,409,449 alloted for fiscal year 1955.

Comparison of the 1954 allotments per annum by system with previous allotments is as follows:

	Primary	Secondary	Urban	Interstate
1952 Act	1,206,563	804,375	376,636	121,875
1954 Act	1,547,437	1,031,625	354,790	1,074,610*

*60-40 ratio

Federal reimbursements for the year amounted to $1,219,932.97. Twenty-two reimbursement vouchers were prepared and submitted, fifteen of which were final. Reimbursement has been made on nine of the final vouchers presented during this fiscal year; seven final vouchers presented during previous periods remain unpaid.

In order to match Federal Aid Funds during the 1955-57 biennium, $8,000,000 in State monies will be required. It is recommended that these necessary funds be made available to the State Highway Department for this period as a part of Delaware's highway construction program.

RIGHT-OF-WAY DIVISION

In addition to the large amount of contract work of the past year, the Department acquired rights-of-way on all roads scheduled for improvement and hard-surfacing. This involved acquisition of more than 50 miles of right-of-way. A new form of easement was prepared which embodied both option and description and eliminated the need for a property search. Almost all of this additional work—part of the earth road improvement program—was located in Kent and Sussex Counties.

The fact that this Division has dealt successfully with 594 property owners and has been unable to deal with only two, speaks well for our agents. The figures also show the effects of the new condemnation law and the cooperative spirit of property owners toward the highway program. In the two condemnation cases heard, awards totalled not more than $10,000.

Finally completed during the year was the acquisition of rights-of-way for the eastern approach to the Delaware Memorial Bridge. Laws governing the construction of the Bridge require that the State of New Jersey hold title to all lands in New Jersey on behalf of the State of Delaware. The agency for the State of New Jersey is the State Highway Commissioner. Through his excellent cooperation, the acquisition of these rights-of-way was brought to a successful conclusion.

Building Development Problems

The influence of the Delaware Memorial Bridge on land values continues to cause inflated land prices in the area of the Bridge. In addition, possibilities of industrial

expansion in the Newark and Port Penn areas and the increase in building developments throughout the State will affect the prices the Department pays for future rights-of-way. I recommend that—wherever it is possible—the purchase of anticipated rights-of-way be accomplished in conjunction with developments and that a fund for future right-of-way needs be requested from the General Assembly. It is much easier to secure right-of-way from one owner before a property is developed than to negotiate with many afterwards.

Right-of-way conditions in New Castle County have been greatly improved through the zoning law there, and we would look forward with a great deal of interest in the extension of zoning regulations to Kent and Sussex counties.

I recommend enaction of legislation whereby development plats of any nature are required to be submitted to the State Highway Department for approval prior to being recorded.

Organization and Operation

At this time I should like to say something about the organization of the Right-of-Way Division. When I took over the position of Chief Engineer in August, 1953, this Division had 11 employees, furnished with seven automobiles. Employee salaries amounted to $42,692 a year. As of the date of this report, the Division is composed of six members, whose combined annual salaries are $23,782, and who are operating with three automobiles. There is no doubt but what the Right-of-Way Division is undermanned at the present time, and we will need at least one additional agent and a possible trainee.

I recommend that the highest possible type of employee be selected for this Division. My reason for making this request is that the right-of-way agent is such an important individual, dealing with the public pocketbook, and must have the highest integrity, if he is successfully to recommend the dispersal of public funds.

SUBURBAN DEVELOPMENT DIVISION

The Suburban Development Division is responsible for performing the duties imposed on the Department by the laws of Delaware concerning the acceptance for maintenance

of streets and roads that have been, or are to be, dedicated for public use, outside the corporate limits of cities or towns.

These laws relate to construction of new streets and reconstruction, improvement or additions to existing streets. The Department's duties are covered primarily in the following sections of the 1953 Revised Code of Delaware:

1. Suburban Road Laws: Title 9, Chapter 5, Sections 501 to 534.
2. Bonding Laws: Title 17, Chapter 5, Section 508.
3. Highway Laws: Title 17.

Streets Accepted

A total of 15.286 miles of streets was accepted into the State Highway Department's maintenance system during fiscal year 1953-54. These streets satisfied the Department's requirements as to construction and other factors, as specified in the above-mentioned laws. A tabulation by name and contract will be found in the Appendix, Table IX, Page 100.

During the year, the Suburban Development Division has worked on 24 suburban community projects totalling 16.5 miles and costing a probable $975,726, an average cost of $59,000 per mile. This includes four finished projects, six projects under construction, eleven being designed and two for which petitions have been received, as shown in Table X, Appendix, Page 101.

Because of the lack of adequate personnel in the Department, it has been necessary to place surveys, drafting and design with consultants. Approximately $17,300. was spent for consultants' fees during the fiscal year. The Division checks all plans and prepares special provisions and estimates for the Levy Courts.

Bonded Developments

Under the Bonding Law* any person, firm or corporation must post a performance bond with the Department in order to construct a new road or street which is to be dedicated for public use and become part of the general highway system of the State.

Since the Bonding Law became effective, in 1951, the ten percent performance bond has been posted on approximately 39 miles of streets with an average cost of $54,500

*1953 Delaware Code, Title 17, Chapter 5, Section 508.

per mile. A tabulation of this data (Appendix, Table XI, Page 102) shows that out of the 52 subdivisions for which bonds have been posted, streets have been accepted by the Department in only 17 cases. From this divergence between the rate of bonding and the rate of acceptance for maintenance, an apparent lag in construction may be assumed. (See Chart #1, page 49.)

Cooperation with Regional Planning Commission

The Suburban Development Division has worked closely with the Regional Planning Commission of New Castle County and with all consulting engineers planning new subdivisions.

During the past two years, plans have been reviewed for 74.4 miles of streets in 61 developments covering almost 2,700 acres of land, an average of 0.0277 miles of streets per acre. The area of all subdivisions reviewed is approximately 40 percent of the size of the City of Wilmington, or equal to the combined incorporated areas of Dover, Georgetown, Seaford and Bridgeville. (See Table XII, Appendix, Page 104.)

A summary of the streets handled in one form or another during the fiscal year follows:

	Miles	Value
Suburban Road Law	16.50	$ 975,726.45
Bonding Law	39.40	2,147,058.22
Potential	35.90	2,000,000.00
	91.80	$5,122,784.67

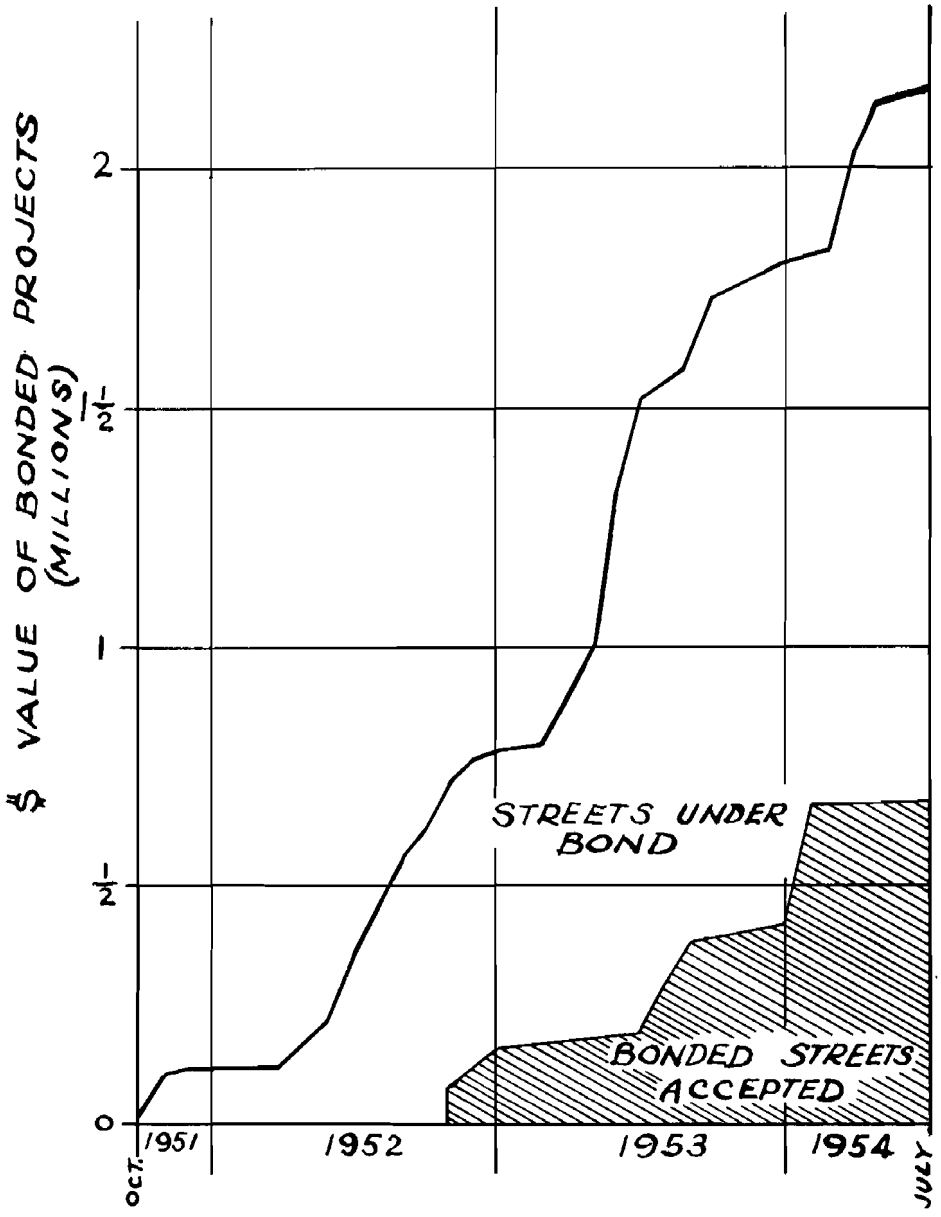
Growth And Acceptance of Streets in New Castle County

The legislative act under which the Department assumed responsibility for streets formerly maintained by the Levy Courts was passed in 1935. Chart II (page 51) is the result of a review of the streets accepted since that time.

In 1935, there were 138 miles of streets on record; at the present time the total is approximately 338 miles. This 245 percent increase is indicative of a change in living habits of Delawareans as they have moved from urban areas into suburbs.

From the 90 miles of streets accepted by the Department in 1935, the maintained mileage has increased to date

CHART #1


$ VALUE OF BONDED PROJECTS (MILLIONS)
2
1½
1
½
0
STREETS UNDER BOND
BONDED STREETS ACCEPTED
1951
1952
1953
1954
OCT.
JULY

by 188 percent. The potential figure for streets to be constructed and accepted for maintenance is 365 percent of the original figure.

It is obvious that maintenance costs will increase greatly as the streets now on record are constructed and accepted into the State Highway System.

The Drainage Problem

The drainage problem is one of the major issues in connection with suburban development work in New Castle County. Changes in land use invariably alter the runoff of surface water. Since drainage is a function of street maintenance and construction, freeholders applying for reconstruction of streets under the Suburban Road Laws often need expensive storm water sewer systems through their communities.

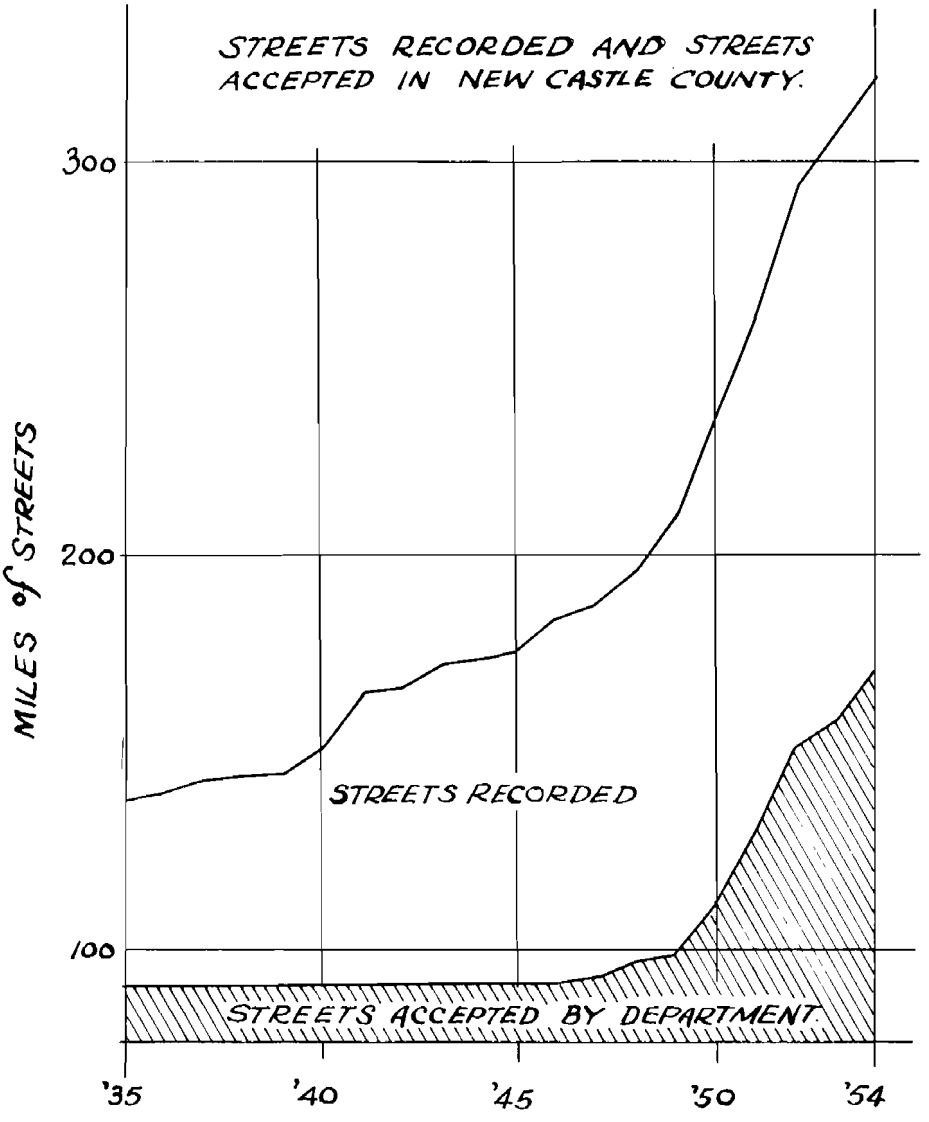
The sanitary problem in New Castle County has been solved in recent years by an overall county plan. A similar plan is now necessary for the surface water problem.

Much of the countryside which formerly absorbed a great deal of storm water has now become suburbanized. Housing developments, with their roofs, streets and sidewalks, have eliminated the means which nature provided for absorption of storm water. In addition, these improvements have caused water to flow off at a much greater speed than is normal, thereby making its control more difficult.

Any drainage area, considered as a unit, contains three major parts: the farms and countryside, the subdivisions, and the dedicated lands, which comprise streets, highways and parks. Each of these parts involves a threefold problem: first, the recognition that water flows into a drainage area from adjacent lands; secondly, provisions for carrying the water through the area; thirdly, delivery of storm water at outlets in a manner satisfactory to adjoining areas.

Suburban and urban area drainage should be treated as a public utility. A solution to the State's drainage problems lies with the General Assembly, where laws should be enacted defining the level of state and local responsibility for financing, designing and constructing needed runoff controls. A number of State agencies now have some control over streams and ditches, but no real overall control exists in any one level of government.

CHART # 2


STREETS RECORDED AND STREETS ACCEPTED IN NEW CASTLE COUNTY.
300
200
100
MILES of STREETS
STREETS RECORDED
STREETS ACCEPTED BY DEPARTMENT
'35
'40
'45
'50
'54

Through the excellent cooperation of the New Castle County Regional Planning Commission, some small degree of control is exercised over developments of the housing nature. Industrial control over natural streams could and should be exercised at a level of government which will protect the people's interests.

Every major rain storm brings floods of complaints to the attention of the State Highway Department. These complaints range from farmers with ponds in their fields, to suburban dwellers with water in their cellars. The soil conservation districts, under the State Drainage Engineer at the University of Delaware, are exercising good practice with agricultural runoff problems, as is the State Water Pollution Commission on the cleaning up of Delaware watersheds. What is needed is a coordinating agency with broad legal powers to enforce the controls recommended by good drainage engineers, professionally qualified to determine such controls. The problem of knowing what our needs are is simple. How to pay the bill is the difficulty.

The General Assembly should find, however, that the financing of the program would not be unduly burdensome at either the county or state level. Perhaps a state aid program wherein the State would furnish a certain percentage of the costs may prove feasible.

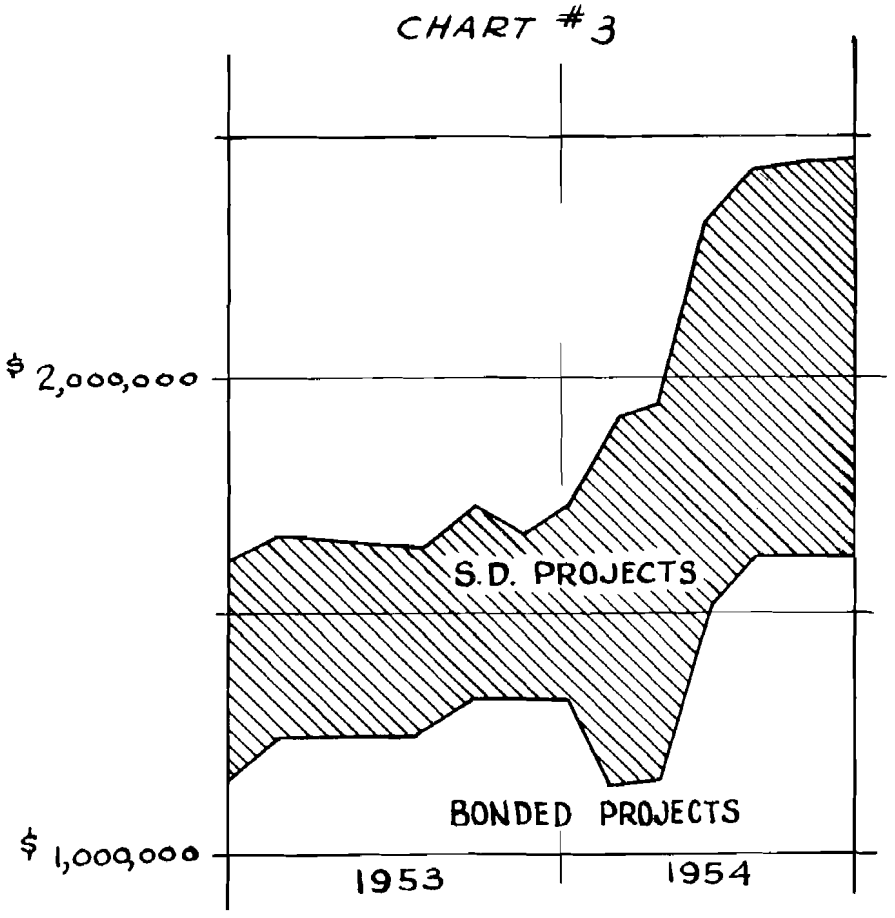
Future Growth of Developments

At the present time there is no indication of a decrease in the development of subdivisions; reports from developers indicate continuing increases in suburban development in New Castle County. In Kent County there is also a noticeable increase in subdivision planning because of the housing needs of Dover Air Base personnel.

In Sussex County, growth is evident in the resort areas. One proposed subdivision there is to be constructed to Department standards; all others will be private streets.

Work in connection with the construction of suburban developments is increasing. As home owners request reconstruction of old streets to better standards, the volume will increase further. This is occurring in Kent as well as New Castle County. The pattern is changing from small to larger projects.

Establishment of a Regional Planning Commission for Kent and Sussex Counties would be to the advantage of the



VALUE OF PROJECTS UNDER BOND
AND SUBURBAN ROAD LAWS

Department, the home owners, and the counties. Plans could then be examined in the tentative stages, and recommendations could be made before the recording of final plans. The pertinent questions of water, sewerage, drainage and other problems would be solved prior to construction. It is difficult to deal with subdivisions in the two lower counties because of the lack of such a commission.

Although, at present, developers in resort areas are advised to construct private streets if they do not want to comply with Department standards, it is unlikely that it will be possible to continue these as private streets after long use and enjoyment by the public. The recording of a plan and its use to sell lots may constitute dedication of streets to public use, and uninterrupted use of a road or street by the public for 20 years is considered evidence of dedication.

In view of this, the Department may be called upon, through invocation of the Suburban Road Laws, to reconstruct these streets in 20 years. Because of narrow widths, inadequate grades and poor drainage, we will be confronted with difficult problems in design, with the expense of surveys and plans, and with higher costs to the freeholders. Action now will decrease future problems as well as conserving recreational areas by eliminating factors which cause blighted areas.

Classification of Streets

At the present time, 10 classes of suburban streets exist in the unincorporated regions of the State:

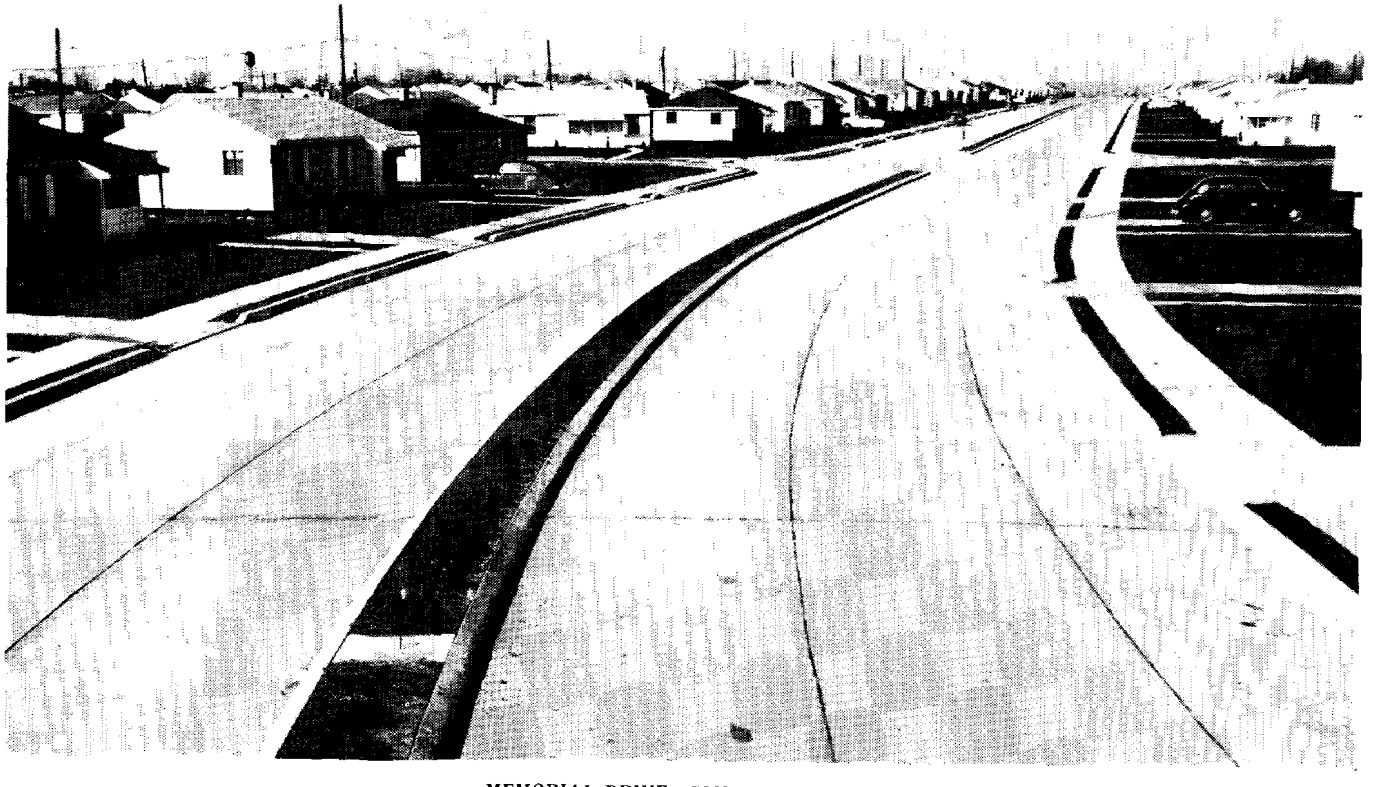
1. Those accepted from the Levy Courts in 1935, now maintained by the Department and to be constructed at Department expense.

2. Those accepted from developers since 1935, but before the effective date of the Bonding Law, maintained by the Department, to be reconstructed by others.

3. Those accepted from abutting property owners, maintained by the Department, to be reconstructed by others.

4. Those accepted by means of Suburban Road Laws, maintained by the Department, to be reconstructed by others.

5. Those accepted from developers through the action of the Bonding Law, maintained and to be reconstructed by the Department.



MEMORIAL DRIVE—CONTRACT 1317.

6. Those which have been constructed but never accepted by the Department.

7. Those which are legally laid out on plats, but which have never been constructed or used.

8. Those which have been accepted by the Department, which has title to the street beds and maintains and must reconstruct in part or in entirety.

9. Those streets which are private, but which will become public-dedicated with time and use.

10. Those which are private and will remain private through action of their owners.

Evaluation

The act which created the State Highway Department in 1917 contemplated that the state level of government would support a major network of highways which would, in effect, furnish the State a permanent system of state highways along routes of travel so as to accommodate the greatest need of the people of Delaware. Over the intervening years, the system of highways has been expanded to a point where the state level of government now accepts responsibility for the construction, improvement and maintenance of nearly 4000 miles, including the most primitive earth roads in rural areas.

This mileage not only comprises practically all roads and streets outside the incorporated areas of the State, but includes 50 miles of streets in communities with a population of over 5,000.

The expansion of housing developments in the metropolitan area of Wilmington has added each year a number of miles of additional streets to the system. Many incorporated areas of the State are by the very nature of our laws denied the street advantages which are enjoyed by communities larger in size and population. This means that the state level of government must maintain from state revenues many miles of streets which are strictly of a local nature. To cite an example: A citizen of Dover must pay taxes for street maintenance, while a citizen of Brookside has his street maintenance paid for by the State. The Brookside citizen's developer built the streets to state standards, under the Bonding Law, and the State accepted them for maintenance. The Attorney General has ruled that the State will be forever responsible for the care and control

of streets built under this law, which means that the State must reconstruct such streets when they can no longer adequately serve the community's needs. The citizen of Dover or Wilmington forever after pays for maintenance and reconstruction.

Still another discriminatory situation exists. Under the Suburban Road Laws a community may construct its streets by bond financing through the Levy Courts. Here the Attorney General has ruled that although the State maintains the streets, when they can no longer serve the community's needs, the property owners must pay for reconstruction.

In effect, the present State laws governing the operation of the State Highway Department are discriminating against the taxpayer who lives in incorporated areas.

Recommendations

I recommend that legislation be enacted which will create a Regional Planning Commission, similar to that in New Castle County, for Kent and Sussex Counties, in order that expansion and growth of subdivisions in those counties can be carried out in conformance with minimum recognized standards governing streets, sanitation, water and drainage.

It is further recommended that legislation be encouraged which would recognize storm drainage as a necessary utility and establish statute law to govern action so as to benefit the public without encroaching upon the rights of individuals without just compensation.

Legislation should be encouraged whereby the maintenance and reconstruction of the different classifications of streets under the Department's care is simplified to a single standard.

TRAFFIC AND PLANNING DIVISION

Road Inventory

The several systems of the State Highway Department contain 3,918.79 miles of roads and streets (Appendix, Table XIII, Page 106). Comparison with last year's figures indicates a definite reduction in dirt road mileage and a corresponding increase in the mileage of bituminous surface-treated roads. Largely because of the construction of new divided roads, an appreciable increase in divided highways is shown.

Table XIV, (Appendix, Page 107) indicates the existing mileage of the four systems controlled by the Department. Urban mileage as listed is the extension of primary rural roads in cities with a population of 5,000 or more: Wilmington, Elsmere, Newark, New Castle, Dover and Milford. The transfer of roads from the Secondary to the Urban System in Newark increased this mileage.

The Primary System includes all main arterial routes through the State, except those described in the Urban System. It is identical with the Federal Aid Primary System. The Secondary System comprises the intermediate roads of the State and is the same as the Federal Aid Secondary System. All other roads in the State's highway system are classified in the Tertiary System. This system includes 243.62 miles of suburban development roads, of which the State Highway Department maintains 169.5 miles.

Mileage changes during the year resulted from construction on new locations, transfers from one system to another and the assimilation of 15.3 miles of suburban development roads.

A complete set of road inventory tables showing mileage by type, surface width and traffic volumes is available from the Traffic and Planning Division.

Traffic

Six automatic counter stations located on roads selected for distinctive traffic characteristics play an important role in furnishing pattern and volume data for the annual traffic density survey. Four of these counters have been in operation continuously since 1941, which makes possible some interesting comparisons over the 14-year period.

Table XV, (Appendix, Page 107) dramatizes the ever-increasing traffic volumes on a statewide basis and indicates an increase in total traffic of 99.36% for fiscal year 1953-54 over fiscal year 1941-42. Also shown is a 5.75% increase for fiscal year 1953-54 over the preceding year.

In addition to the six permanent counter stations, the annual traffic counting program was continued this year. Including the use of portable counters and manual classification counts at predetermined major and minor stations, this program enables the Division to publish traffic volume information annually for all roads in the State outside the limits of incorporated towns.

Mapping

Distribution of maps to the general public, state agencies and other organizations continues to increase. The county maintenance maps were revised during the year and orders for the two different sizes were increased to meet the demand.

The official State Tourist Map has been revised and is now near completion by the lithographer. In addition to other changes, a new area map in color has been prepared for the reverse side of the map folder and new color photographs will replace most of the pictures used previously.

The Delaware State Development Department, which distributes most of these maps, reports that 26,283 copies were issued during the past fiscal year. Adding to this total the number distributed by the State Highway Department and other agencies, the complete total is approximately 35,000 copies.

In addition to free Tourist Maps distributed, the following county, state and incorporated town maps were sold during the past year, as compared with four previous years:

Fiscal Year	Total Maps Sold	Total Receipts
1950	747	$258.75
1951	622	226.25
1952	781	301.35
1953	718	295.90
1954	946	486.80

Fiscal Study

In conjunction with the U. S. Bureau of Public Roads, a fiscal report for the past year was prepared. As described in the 1953 Annual Report, the purpose of this study is to show incomes and expenditures of all incorporated towns in Delaware and the county offices and to extract the incomes and expenditures related to streets and highways.

The survey was a continuation of previously-established procedures. Tables derived from the analysis of data gathered by field trips were basically the same.

Table XVI, (Appendix, Page 108) shows income of incorporated towns in three population groups; under 1000, 1000 to 2500 and over 2500. Also shown are street-related expenditures in each case. The table illustrates that in-

creased vehicle travel has increased spending for street maintenance in urban areas.

Motor Vehicle Use Study

The Motor Vehicle Use Study is designed to determine the character of highway travel and the extent to which State highways and urban streets are used by the various population groups and to show how essential highway transportation is to our economy.

The study was initiated in 1952, and field work was completed March 1, 1954. The home interview method was used to complete 2,546 reports, coding of which was completed on April 30. After the information is punched on I.B.M. cards, by August 1, 1954, an analysis will be made with a view of publishing tables showing the information collected.

The knowledge derived from the survey could be important in the solution of highway finance problems and in planning future development of the highway system. It will be used by U. S. Bureau of Public Roads in combination with similar studies of other states for a study on a national basis.

Rural Intersection Accident Study

In Delaware, as in most states, increasing traffic volumes on highways seem to result in increased numbers of vehicular accidents. The frequency and location of accidents in Delaware prompted this study, which was started and completed during the last six months of 1953. The goal was the development of information which would indicate which rural intersections experienced the highest accident frequency during the calendar year 1952.

The two most important pieces of information for the study—traffic volumes on rural roads and the accident reports for the same roads—were available in the Division office.

A report was prepared which included several tables and listings for the information in this study. The accompanying traffic and accident table, by counties, was made showing all rural intersections, average traffic per intersection, all accidents, and the average number of vehicles per accident. Approximately 82 percent of the State's rural intersections had no accidents, and 46 percent of vehicles

entering intersections in the State were represented at these intersections. It was determined from the study that elimination of one half of one percent of the intersections would reduce intersection accidents by 20 percent. A paper concerning the details of the study was presented at the annual meeting of the Highway Research Board in Washington, D. C., in January, 1954.

The results of the study were given to the State Police as a guide to critical intersections, to the Plans and Design Division of this Department, so that plans for intersections could be improved by good engineering practice, and to the press, so that the public would know of intersection conditions.

Sufficiency Study

A sufficiency study of the primary system was re-evaluated and brought up-to-date during fiscal year 1952-53. Soon after its completion, preparations were made for an examination in the field of some 1269 miles of road which make up the Secondary System.

The object of the study is to provide a numerical rating for each section of roadway, assigning highest ratings to the best highways and lowest to the least sufficient. One hundred points are allocated for the three elements considered for individual ratings; condition, 40 points; safety, 30; and service, 30.

Each element is divided into sub-elements, for more detailed evaluation. Condition consists of evaluation of type, dependency of traffic volumes carried, thickness, surface condition, drainage, remaining life and maintenance economy. The safety element is divided into shoulder and safety widths, stopping sight distances and consistency of alignment. Service includes horizontal curvature, passing opportunity, surface width and rideability.

As of June, 1954, the study was still in progress, with 100% of field work completed and approximately 50% of necessary coding accomplished. It is expected that copies of the Sufficiency Study will be available for distribution by October 1.

Loadometer Study

In the annual summer Loadometer Survey all traffic was counted and trucks were weighed at the usual locations

throughout the State. Tables were compiled in order to study the type and extent of road surface failures attributed to the frequency increase of heavy vehicles with excessive axle load and gross weights. Results were also given to the U. S. Bureau of Public Roads for use in a national study.

Table XVII, (Appendix, Page 109) gives comparative information since 1941, obtained from this survey.

It is thought that some attention should be given to a recent report of the AASHO Committee on Highway Transport, which indicates that the Northeastern states, including Delaware, should review existing laws in order to satisfy ourselves and the trucking companies concerning their efficiency. The adoption of a policy cognizant of particular vehicular requirements would reduce axle limits on trucks and increase pay loads for truckers.

Permits

In general there have been increases in special permits for oversize and overweight vehicles, with the exception of 30-day piling in number of permits issued and money collected over fiscal year 1952-53.

The increase of 8.74% in heavy hauling permits is particularly significant since this category of the trucking industry reflects the trend toward heavier loaded vehicles not only in Delaware but on a nation-wide basis.

Table XVIII, (Appendix, Page 110) shows comparative activity in handling special permits in fiscal years 1952-53 and 1953-54.

Petitions

During recent years there has been a varying annual increase in numbers of petitions to the Department for improvements or alterations to roads, streets and bridges; construction and relocation of crossovers on divided highways; and installation of traffic signals. The 87 petitions received during fiscal year 1953-54 represents a 4% decrease from the preceding year, but a 4% increase over fiscal year 1952.

For preparation of data concerning each petition, an investigation of existing conditions, detailed sketches of the roads, intersections or locations involved, and a field visit

to the Division Engineer concerned, are essential. This information constitutes the basis on which the merits of each request are evaluated.

Petitions in general concerned rural conditions, but investigations were also made in Clayton, Camden, Frederica, Hartly, Houston, Laurel, Leipsic, Newark, Odessa, Bellefonte, Milford, Millsboro, Seaford and Wilmington.

Traffic Engineering Studies

Increasing traffic volumes in all rural and urban areas indicate a need for continued traffic engineering studies to determine the most efficient methods for the movement of motorists and commodities from origin to destination. While the traffic accident situation continues as a major problem in the State, there are indications every year of satisfactory results in designing and effecting highway safety regulations.

During the fiscal year, the Traffic and Planning Division conducted 67 studies and investigations concerning traffic signalization, parking, speed zoning, road and street marking, location and types of traffic signs, and vehicular turn-movements at various intersections.

In addition, 30 detailed studies of existing signalized intersections were made to determine whether facilitation of increased traffic movement and provision of greater highway safety required changes in signals. Prints of these intersections were prepared for the use of the field engineers, for additional study and for the permanent record.

These studies included streets and highways in rural and urban areas. Acceleration of traffic densities there directed particular attention to the Delaware Memorial Bridge and its approaches.

The Division cooperated with the Governor's Highway Safety Committee in an effort to carry out the continuing phases of the highway safety program. A Highway Fatality Scoreboard on U. S. 13, north of State Police Troop #2, indicates Delaware's fatality comparisons by years to motorists. Additional scoreboards are at the Dover and Bridgeville State Police Troops.

At annual conferences with personnel of Delaware Park and Brandywine Raceway, preparations are made for traffic movement to and from the track areas. Immediately before

the opening of either meet, crews from the track cooperate with the Department in the erection of necessary signs.

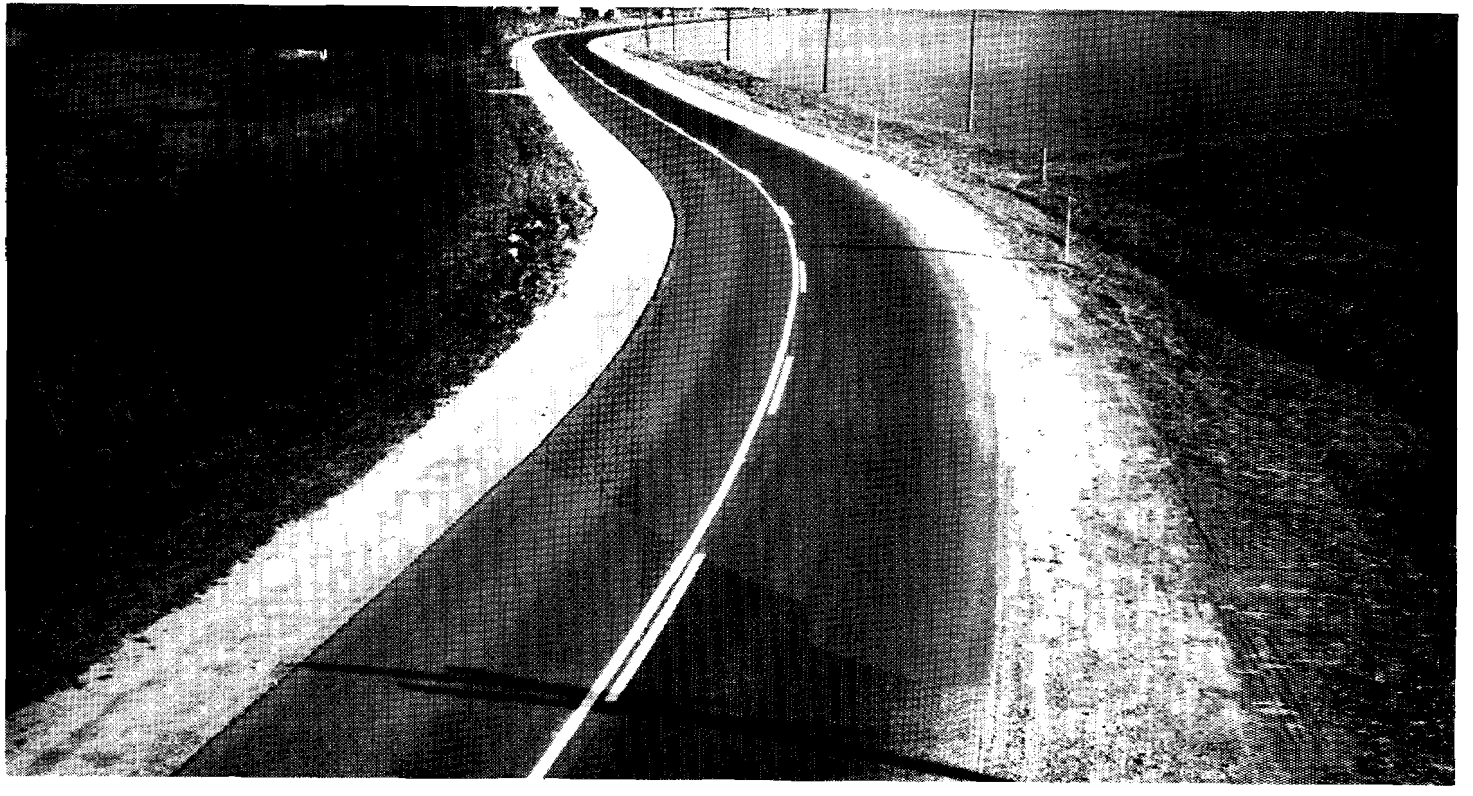
Cooperative paint tests were made by the New Jersey and Delaware Highway Departments and the DuPont Company during the year, and a performance test was made for the purpose of awarding our own highway painting contracts. Special engineering studies during the year included a report concerning the highway needs in the vicinity of the Dover Air Force Base; a report on the construction of a new, high-level, four-lane bridge over the Chesapeake and Delaware Canal at Summit; reports and agreements with Wilmington concerning the Walnut Street Crossing of the Christina River, and its approaches; reports, conferences, and agreements with Newport concerning the projection of Maryland Avenue through the town; reports, conferences, and studies concerning the Basin Corner Interchange between U. S. 13 and Delaware Route 41; the beginning of an arterial route study of approach highways to the Delaware Memorial Bridge by the consulting engineering firm of Howard, Needles, Tammen and Bergendoff; and the beginning of a highway needs study of Delaware by the Traffic and Planning Division.

Traffic Maintenance

During the year, the State Highway Department purchased all lease contracts under which automatic traffic signals had been used in the State. This means that all automatic, traffic-actuated traffic signals in Delaware are now owned by the State Highway Department and maintained by Department personnel. This is a forward step which will mean improved signal maintenance as well as a financial saving.

Two highway lighting units and 13 traffic signals were warranted and installed during the year; two traffic signals were removed. Of the 13 signals installed, three are of the blinker type, three are pretimed, and seven are actuated. The Department now maintains a total of 98 signals: 18 of the blinker type, 21 pretimed stop and go signals, and 59 stop and go signals that work automatically with traffic flow.

Under the new safety program in the Traffic Division, maintenance personnel are now protected by safety glasses, helmets and shoes, first aid kits, fire extinguishers. Safety posters, bulletins, and informal lectures keep the workmen safety conscious.



SMYRNA TO WENDELL'S CORNER—CONTRACT 682.

A forward step was taken during the year in methods of marking detour routes and hazards resulting from construction. Warning and detour signs and barricades of various sizes have been standardized. These signs are now detailed on a standard sheet of all construction plans issued to highway contractors. All such signs and barricades are to be reflectorized or electrically lighted, or both.

As well as improving detour marking, this move will ensure the posting of adequate warning signs and barricades on contracts where traffic must be maintained during construction.

The Department is now making standard highway signs of sheet aluminum. After the metal is cleaned, it is necessary only to apply reflectorized sheeting before silk-screening the desired message. This method will increase products considerably, and the purchasing of expensive signs from outside sources will be eliminated.

Each year the demand for additional signs, signals, and markings on State highways increases. The addition of many streets to the State Highway System by the construction of suburban streets only increases the problem. The need for traffic controls is readily apparent in most cases, and it is felt that the motorists and citizens of our State should be provided with the best service possible along these lines.

PERSONNEL

Previous reports have stressed the fact that the Department is handicapped by a shortage of engineers and other technically-trained personnel. This shortage is often directly reflected in delays and the quality of work performed. No real material change has occurred in this field.

Adequate, competent and trained personnel is a prime requisite to the successful operation of any organization, whether it be in the field of government or private industry. Today's market is highly competitive. Employers have a choice: they must either enter the competitive field, train a young, competent organization or do the best possible job with material that is available.

To have a successful and competent organization, modern personnel practices and policies must be adopted. Employers must offer fair wages; they should have adequate retirement and disability plans; a training program

should be an accepted practice; and it is imperative that economic security be provided through some assurance of continuity of service.

In the past few years many of these factors have been recognized and legislation has been adopted and policies promulgated which have been morale boosters and strides in the proper direction.

In order further to strengthen our position in this field, there are several matters which should receive close attention during the ensuing years, and I wish to recommend that steps be taken to:

1. Revise our policy on the subject of working hours, employee classifications, wages and salaries, and annual and sick leave.

2. Strongly urge the provision by legislative action of some form of economic security through assurance of continuity of service for engineers, other technically trained people and those in the lower classifications with long years of service.

The following tabulation shows the number of permanent employees in the Department during the month of June in 1952 and during the same month in 1954. It is to be noted that we were operating in June, 1954, with some fifty employees fewer than during the month of June, 1952.

Division	Professional		Subprofessional		Clerical-Stenographic		Maintenance Monthly		Maintenance Biweekly		Total	
	6-30-52	6-30-54	6-30-52	6-30-54	6-30-52	6-30-54	6-30-52	6-30-54	6-30-52	6-30-54	6-30-52	6-30-54
Plans and Design	10	8	10	12	1	1	—	—	—	—	21	21
Testing	5	5	27	27	1	1	1	—	—	—	34	33
Traffic & Planning	5	6	9	12	8	5	1	2	—	28	23	53
Bridge Design	6	5	—	1	—	—	—	—	—	—	6	6
Suburban Development	2	2	—	1	1	1	—	—	—	—	3	4
Right-of-Way	4	2	1	1	4	3	—	—	—	—	9	6
New Castle	15	18	54	41	9	6	37	29	170	143	285	237
Kent	4	4	20	25	7	5	25	5	132	129	188	168
Sussex	10	10	31	29	7	8	42	35	211	192	301	274
Mosquito Control	2	2	—	—	1	1	—	—	13	22	16	25
Administration	4	5	2	2	6	6	1	—	—	—	13	13
	67	67	154	151	45	37	107	71	526	514	899	840

MOSQUITO CONTROL DIVISION

Because of increasing sensitivity of people living within the control band to the presence of mosquitoes, this Division is expected every year to reach greater perfection in mosquito control. The increase in outdoor activities and high-powered lights and the absence of screens makes the public more vulnerable to the insect. Erection of cottages and development of camping facilities in recent years have brought the public nearer the mosquito breeding grounds. Despite increased possibilities of annoyance, trap collections indicate that the activities of this Division have been effective in reducing the mosquito population below the annoyance level.

Appropriation and Operation

An annual allotment of $96,300 was granted by the 1953 Legislature for the biennium ending July, 1955. This amount is largely expendable on ditch maintenance and air-spraying in the resort areas. A supplementary appropriation of $25,000 per year was provided for spray work upstate.

So that this extra allotment might be used economically, a survey was made to determine the most productive breeding sections of marsh which affect populated sections. This survey indicated that treatment of a minimum of 6,947 acres of marsh in Kent County and 5,874 in New Castle County would result in some degree of comfort.

In a normal season, an application is required every ten days to two weeks. At an average cost of $5,100 per application, the amount of the supplementary appropriation is insufficient to cover spraying the necessary acreage in Kent and New Castle Counties. Since this fund became available late in August, there would have been an unexpended balance at the end of the fiscal year. This balance was used to purchase chemicals and supplies in advance, so that the full value of the special fund for the next period could be used for spraying in the upper counties.

Both appropriation bills provided that "all unexpended balances at the end of each fiscal year shall revert to the General Fund." If unexpended balances were not reverted until the end of the biennium, the operations account could vary considerably from year to year, and funds would be available in the event of a wet season.

Spraying

Since the cost of effective aerial spraying of towns and other non-mosquito-producing areas is high, concentration of effort at the breeding sources is essential. Such control gives relief to rural as well as urban areas. Permanent control—at the breeding source—is the only economical means of protecting the population of the State.

During fiscal year 1953-54, 116,882 acres of marsh were sprayed, including 27,414 acres upstate, between late August 1953 and June 30, 1954. In order to spray this acreage, 58,441 gallons of #2 fuel oil, containing 35,064 pounds BHC and DDT, were used. The entire spray program, including supervision and research, cost $61,516.51, an average of $0.526 per acre. About 14% of the labor assigned to the mosquito control program was used in this operation.

Contracts for aerial spraying were awarded in accordance with Department specifications. The Sussex County contract for 1953 was awarded at $0.1648 per acre, that for work upstate at $0.1248 per acre. The lowest bid for the 1954 season was $0.20 per acre. The fuel oil award was $0.1107 per gallon delivered in 1953 and $0.1097 for 1954.

The introduction of airspraying has outdated most of the groundspraying work, but it continues to be economical under certain conditions. A total of 28 acres was treated by ground equipment: 1,236 catch basins were sprayed and 11,313 acres were fogged. The rate of application for the season by fog machine averaged two quarts of spray to 4.5 acres, while the rate of application by plane is two quarts per acre. Ground spraying represented about 1% of the labor charge.

Certain revisions were made to the DDT and BHC mixing plant, and storage capacity was increased to meet requirements for upstate work. The outstanding improvement to the plant was the addition of a heating coil by which mixing oil is preheated by water circulation instead of circulating through the heating system. This process eliminated carbonizing of the oil that had caused a sludge in the spray mix and reduced the possibility of clogging truck and airplane lines.

Ditches and Drainage

Ditch cleaning was largely done by hand, since the machines are not practical for sand base marshes. Our efforts were largely directed along the seacoast during the

year because little maintenance had been done there recently. Such marshes are very productive when neglected and require careful study and special care. During the fiscal period, approximately 560,000 linear feet of ditch was cleaned by hand or machine at an average rate of 25.5 feet per man hour. The labor, including supervision, cost an average of $0.0464 per linear foot, and represented 58% of a total of 38,000 man hours devoted to mosquito control during the fiscal year.

Construction and maintenance of structures represented about 3% of the labor charge. This work will be increased, since many structures need repairs and several places need water control gates or culverts.

About 13% of the labor expenditure was chargeable to the miscellaneous category, which included 3,162 cubic feet of fill to eliminate breeding places, clearing 193,960 square feet of ditches of brush and construction of 347,960 square feet of fire lanes. All construction, structure repair, ditch maintenance, and miscellaneous work amounted to 74% of the labor charge.

Trap Collections

Collection records for 1953 indicate the importance of drainage work in conjunction with spraying. Two mosquito traps in Kent County, one located near the Dover Air Base and one near the Bombay Hook Refuge, caught substantially the same number of mosquitoes (20,000 to 30,000) in the same proportion of species. These figures would support the opinion that the Refuge contributes to annoyance in the Dover area. The annoyance factor has been determined for collection in traps at 24, or more, per night. Collections in these traps showed only one or two nights when the count was below 24. In the same period, the Lewes and Rehoboth traps collected a total of 2,615 mosquitoes, and the figures exceeded 24 on only eight nights.

In the control area, therefore, there were only eight nights of annoyance in 100, while the non-control area experienced about 98 nights of annoyance. The highest collection at Bombay Hook was 2,924 on June 8, 1953; the highest at Rehoboth was 74, on July 30.

Ditch Maintenance

Under the CCC program, a total of 11,271,002 linear feet of ditches was constructed in Kent and Sussex Counties,

but appropriations in the past 20 years have been insufficient to maintain this ditch structure. Therefore, our efforts have been directed towards the resort section of the State, where the work was started.

There has been no maintenance of importance on more than 3,000,000 linear feet of ditches in Kent County since they were installed. Since many of these ditches are overgrown or clogged, the original mosquito reduction can no longer be appreciated. The airspraying program may reduce the mosquito population, but it will be necessary to recondition these ditches in order to effect conditions comparable to those in Sussex.

Some effort must be made to reduce mosquito breeding in the Bombay Hook Refuge, if maintenance is to be resumed in the marshes in Kent County, since it contributes substantially to annoyance to the Dover area and the Air Force Base.

Community Cooperation

The value of community aid in mosquito control should not be overlooked, since state forces are already burdened with major mosquito problems. Community organizations and individuals can assist by employing such measures as disposing of unnecessary containers, draining surface water from property, sealing or screening cesspool openings, and spraying catch basins or open drainage systems. Treatment of catch basins is particularly important and can be accomplished through proper organization of maintenance forces. These measures may provide ample relief and eliminate the necessity of more expensive methods such as fogging or airspraying, as well as reducing criticism of the mosquito program. The effectiveness of community work in this endeavor will determine, somewhat, the degree of mosquito annoyance.

Cooperative Research Program

The cooperative research program with the University of Delaware has been continued. This Division contributes, in addition to its assistance, $5,500 a year to this work, which is more than matched by University and other funds. For the next biennium, $13,000 has been requested for continuing this work.

Associate Research Professor Darsie of the Agricultural Experimental Station has stated that the mosquito

insecticide situation was much improved by the end of the 1953 season. Laboratory and field tests conducted by the University's Department of Entomology showed that salt marsh mosquitoes were no longer DDT-resistant. This is the result of "dilution" of the populations by non-resistant mosquitoes from outside controlled areas and the lack of exposure to DDT in 1952 and 1953. On the basis of these observations, DDT was used in the 1954 spray program and has been very effective.

Two new insecticides, EPN and malathion, which have been used against DDT-resistant species in California, were evaluated as insecticides. In modified field tests they proved extremely toxic to Delaware's tidewater mosquitoes.

Dr. Stearns, head of the Department of Entomology at the Experimental Station, has said that trapping studies should be continued and toxicity tests should be expanded to develop several effective replacements for currently-used insecticides in case resistance is again encountered.

Our commitments to the agencies involved in investigations at Bombay Hook must be fulfilled, and such work could well be attempted on other areas. Extension of the control effort northward, particularly into New Castle County, makes knowledge of the biology and control of Culex salinarius urgently needed. Information on its habits is scant, and measures satisfactory against the salt-marsh mosquito, Aedes sollicitans, and related forms in the resort area may prove inadequate.

Recommendations

I recommend a budget proposal of $175,000 for fiscal year 1955-56 and $195,000 for fiscal year 1956-57. The increase in funds would be used for salaries and wages, operation, repairs and replacements, and equipment accounts.

The requested increase would cover the salaries of the 32 employees presently on the payroll, allow for additional maintenance work, and some supervisory assistance in the spray and inspection programs.

The extra allotment for the operations account is requested in order to supply funds for the proposed spray program upstate, to continue the average amount of spray work in the resort section, and to provide for the University of Delaware research program. The repairs and replacement account has been increased slightly from the amount

expended during the last fiscal period, and the equipment account is increased for the purchase of new ditching equipment.

If the maintenance of the ditch system installed by the CCC in Kent County is to be carried out, a supplementary fund will be necessary.

PUBLIC WORKS

In the 117th General Assembly, special appropriations were passed for eleven public works operations involving dam, dike and tide gate construction and shore protection work. These projects were designed and plans and specifications were prepared by the Department's Bridge Division.

Port Penn Dikes and Tide Gates—Contract 1304

The unchecked forces of nature have accomplished progressive erosion and breaching of dikes and deterioration of tide gates in the Port Penn area. As a result, flood and storm tides have brought extensive flooding of lands. State and private roads are rendered impassable, wells are made unsafe and conditions detrimental to the public health are created by such periodic flooding.

The State Highway Department was directed by the General Assembly to repair, reconstruct or construct certain dikes and sluice gates, to prepare engineering plans and make inspections at Port Penn in order to correct this situation so that tidal waters of the Delaware River will not overflow the banks there and damage highways.

Under House Bill No. 111, a sum of $225,000 was appropriated for this work. Plans have been prepared, a contract awarded, and actual construction has begun.

The improvement consists of the construction of approximately 1,000 linear feet of protective dikes, including new sluices with tide gates, and of core walls for dike construction, removal of an existing sluice, the raising and surfacing of two sections of roadway adjacent to Port Penn, and incidental work.

The original appropriation provides no funds for the periodic maintenance of the completed dikes and tide gates. Past experience has proved the value of the constant preventive maintenance which is so necessary for the preservation of structures of this nature.

Most, if not all, of this construction is being done on privately-owned lands, often at a considerable distance from existing highways. A permanent easement should be obtained across private lands so that all newly-constructed dikes and tide gates will be conveniently accessible for inspection and maintenance.

Blair's Pond Dam—Contract 1305

Blair's Pond is located approximately two and one-half miles west of Milford, near the Kent-Sussex boundary. It is immediately upstream from the area which once was Griffith's Pond.

Prior to the passage of House Bill No. 370 by the 1953 General Assembly, the United States Government had agreed to appropriate a sum sufficient to restore Griffith's Pond for use as a game and fish preserve, from the Dingle-Johnson fund.

Field investigations by the Bridge Division of the State Highway Department and U. S. Fish and Wildlife engineers, indicated that the water control structure at Blair's Pond Dam was inadequate in size and that the earth dam was badly in need of repair.

A statement was received in writing from the Federal Government that it was unwilling to appropriate funds for the restoration of Griffith's Pond unless the dam at Blair's Pond was rebuilt so as to ensure against a washout, which would destroy any work at Griffith's Pond and would affect Haven Lake and Silver Lake, located on the same stream at Milford.

The General Assembly appropriated a sum of $10,000 for the repair of Blair's Pond Dam, but made no provision for maintenance.

The improvement consisted of the construction of a new, reinforced concrete spillway, the raising of the old earth dam, and the repair of the old water control structure.

Red Lion Dike and Tide Gate—Contract 1306

For several years, the shore road between New Castle and Delaware City had been flooded periodically at the Red Lion Creek Causeway. This condition was brought about by the inoperative condition of the timber sluice box at the mouth of Red Lion Creek, which permitted almost unrestricted entrance of tidal water from the Delaware River.

In many instances, the water on the Red Lion Causeway has reached a point where the road had to be closed to all traffic. In addition, a large area of low-lying land behind the barrier was kept continuously flooded, thereby reducing, if not completely destroying, its value for agricultural purposes.

To correct this situation, the 117th General Assembly passed House Bill No. 102 directing the State Highway Department to repair or reconstruct a dike and sluice gate located at Red Lion Creek Causeway, on the shore road between the City of New Castle and Delaware City, in New Castle County, "putting it in such condition that the tidal waters of the Delaware River will not overflow the river banks at that place and damage the public highway adjacent thereto."

The sum of $85,000.00 was appropriated for construction purposes. The improvement will consist of the construction of a new sluice, with tide gates, the demolition of the existing sluice, the placing of two tide gates on two existing 30-inch corrugated metal culverts, the repair, reconstruction and rip rap protection of approximately 2,300 lineal feet of Red Lion Creek Dike, and incidental work. Plans have been prepared, a contract awarded, and construction is now in progress.

New Castle Dikes and Tidal Gates—Contract 1307

For several years the Town of New Castle has been subject to periodic flooding of roadways, marshes and low-lying areas adjacent to and within the town. These conditions were the result of tidal waters of the Delaware River forcing their way inland through breaches and low sections in the existing dike system and through gates which were unable to perform their proper function because of structural inadequacy or breaches in adjacent dikes.

In the 1953 session of the General Assembly, House Bill No. 10 was passed, directing the State Highway Department to perform the necessary reconstruction of dikes and tide gates. The appropriation for construction purposes was $100,000.

The proposed improvement consisted of the reconstruction of tide gates and dikes at two locations, one in north New Castle and one south of the town. A contract has been awarded and construction is in progress.

As in the case of the projects at Red Lion Creek and Port Penn, allotted funds were directed for construction only. No provisions have been made for maintenance or property easements.

Slaughter Beach Shore Protection—Contract 1308

Under the terms of House Bill No. 157, $15,000 was appropriated for protecting the beach at Slaughter Beach from erosion and inundation by the waters of the Delaware Bay.

The design of the improvement, which was for the construction of two new treated-timber groins and the lengthening of one existing timber groin, was dictated by the amount of money available and does not by any means completely correct the excessive loss of beach at the north end of Slaughter Beach. It is felt that the work done should be supplemented in the very near future, with the placement of beach fill material in the eroded areas.

Repairs to Earth Dikes—Broadkill Beach to Mispillion River—Contract 1309

House Bill No. 181 appropriated funds for the repair and rebuilding of coastal dikes between Broadkill Beach and the Mispillion River, for the purpose of protecting low-lying inshore areas from inundation by the waters of the Delaware Bay.

Dike rebuilding and repair was accomplished by crane and bulldozer. All work was completed by contract and accepted in March, 1954.

Delaware City Dikes—Contract 1310

A sum of $8,000 was appropriated by the General Assembly, in accordance with House Bill No. 195, for repairs to certain dikes in the Town of Delaware City. The purpose of these repairs was to prevent the tidal waters of the Delaware River from overflowing areas in the town. The improvement consisted of the replacement of a tide gate structure and rebuilding of the adjacent dikes.

No appropriation was made for maintenance of the installation.

Silver Lake Pumping System—Rehoboth Contract 1311

Under the terms of House Bill No. 218, the Department was directed to purchase and install a pumping system to pump salt water from the Lewes and Rehoboth Canal into Silver Lake, at the southerly city limit of Rehoboth Beach, to eliminate the growth of certain undesirable weeds and fungi. A sum of $13,000 was appropriated for the purchasing and installation of the pumping system, but no provisions were made for the operation and maintenance of the installation.

The original plan developed by the Bridge Division provided for the construction of an electrically-operated pump, enclosed in a reinforced-concrete, weatherproofed pump house, and appropriate pipe lines between the canal and the lake. At meetings with interested local groups, it became clear that neither these groups nor the City of Rehoboth Beach were willing to assume the responsibility for operating and maintaining the pumping system, including the furnishing of electric power.

As a result of these meetings the plans and specifications were changed in favor of a gasoline-operated pump placed on a platform located at the edge of the canal. The gasoline-operated pump can be removed from the platform when not in use and stored in a protected location.

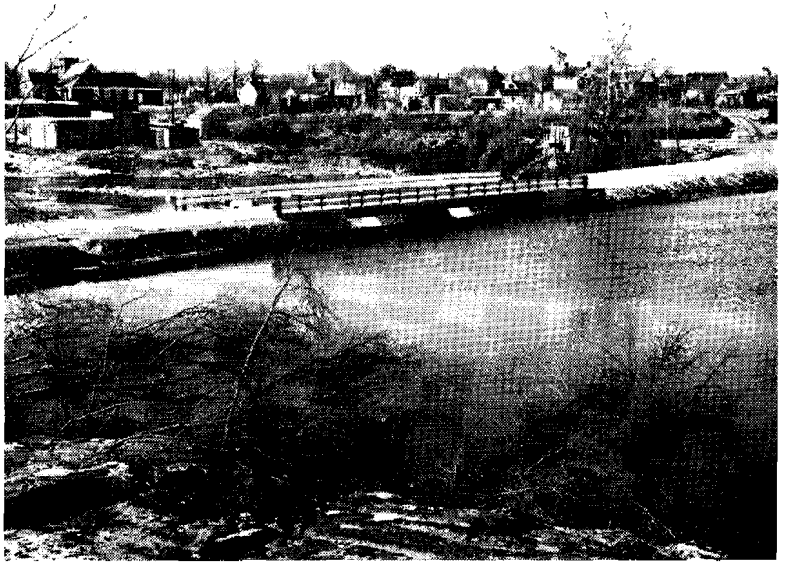
The future operation and maintenance of the pumping system remains an unsettled problem. In the meantime the Department plans to store the pumping equipment at its Division Maintenance Shops in Georgetown, where it will be maintained and will be available for future work at the lake if needed.

Williams Pond Dam—Contract 1312

The sum of $65,000 was appropriated by the General Assembly under the terms of Senate Bill No. 365 for the construction of a combination dam and highway bridge at the old Williams Pond Dam site, on the north branch of the Nanticoke River, near Seaford. The improvement would create public recreational facilities and, at the same time, provide an additional entrance to the nearby Nanticoke Memorial Hospital.

A detailed study of the requirements at the site indicated that the appropriated sum was sufficient only to construct the dam and bridge substructure, and plans

WILLIAMS POND DAM—CONTRACT 1312—BEFORE CONSTRUCTION.



WILLIAMS POND DAM—CONTRACT 1312—AFTER CONSTRUCTION.

were prepared on this basis. It later developed that proposed improvements to High Street, Seaford, would require an expensive detour bridge. It was decided that it would be much cheaper for the Department to complete the Williams Pond dam-bridge superstructure than to construct the detour bridge on High Street, and such action was approved by the Department.

Bethany Beach Dikes—Contract 1321

For the protection of the highways and lands near Bethany Beach from inundation by the waters of the Atlantic Ocean, the General Assembly appropriated a sum of $20,000, under House Bill No. 325.

The work in this area to date has consisted of the placement of a sand dike immediately in back of the boardwalk.

Lewes Beach Shore Protection—Contract 1322

Under the terms of Senate Bill No. 341, a sum of $25,000 was appropriated for protecting the Lewes Beach from erosion by the waters of the Delaware Bay.

After consultation with experts from the Beach Erosion Board and the U. S. Engineers, it was decided that the funds available could be spent to best advantage by pumping sand on the beach. Plans were prepared, and a dredging contract was awarded. It is expected that all work will be completed and accepted on July 15, 1954.

It is recognized that the work undertaken is a temporary expedient only. Upon completion of a comprehensive beach erosion study of the Delaware coastline, it will be possible to prepare plans for additional work which will fit into the overall picture of beach erosion needs and requirements.

Recommendations

I submit herewith my recommendations for the maintenance of projects constructed as a result of special legislative appropriations. Such public works projects include, but are not limited to, sluice gates, dikes, groins, bulkheads and other forms of shore protection, boardwalks, dams, spillways, and pumping systems.

In most instances, these projects are located on privately-owned lands, often at a considerable distance from existing public highways. No funds are included in the

original legislative appropriations for obtaining easements for entry or for periodic inspection and maintenance of the completed projects. Since past experience has proved the value of constant maintenance so neecssary for the proper preservation of these installations, it is recommended that an annual appropriation be made available for the necessary maintenance of these installations.

In order that the Department may, without undue difficulty, obtain the necessary rights-of-way or easements across private lands so that the installations may be properly maintained, it will be necessary that the Department be given the authority to condemn property under power of eminent domain for these special purposes. At present, the Department can only condemn property for highway purposes.

For the proper maintenance of our shore protection installations, and to provide for emergencies caused by storms, erosion, etc., it is recommended that a sum of $100,000 per year be appropriated. Any unused funds from this annual appropriation should not revert to the General Fund until a total emergency fund of $300,000 is established. The funds should be permitted to be used on a statewide basis, with the approval of the Governor and the State Highway Department.

These recommendations presume that the Department will be designated by the General Assembly as the agency to maintain public works projects constructed as a result of special legislative appropriations.

STATE LANDS

From Cape Henlopen to the Maryland Line, large areas of dune lands lying parallel to the Atlantic Ocean are owned and controlled by the State of Delaware. They have been under the care and management of the Department since 1928. Management of these lands, for many years, was confined to dune care and beach erosion control. In recent years, the Department has constructed roads to the ocean area south of Rehoboth, built a trailer camp and restaurant at the Inlet and operated tenting areas for public campers.

Lack of experienced personnel and proper appropriations for development of these lands has, in my opinion, resulted in conditions which are not favorable to public cleanliness. Private enterprise in the areas of Lewes, Rehoboth, Bethany Beach and Fenwick Island lacks proper

public parking, bathing and recreational facilities. If these conditions are allowed to continue, they must result in the lowering of property values and the creation of undesirable neighborhoods for tenants as well as property owners.

Now is the time for the people themselves, through their General Assembly, to provide for their own use the needed facilities for the enjoyment of the public lands bordering the Atlantic Ocean and Inland Bays of Rehoboth and Indian River.

The present dunes and meadows should be preserved in their natural state, erosion by wind and ocean waters studied and steps taken to control such erosion.

An excellent plan for public development of these lands was prepared in 1938 by the State Highway Department and is available, complete with detailed plans and proposed ordinances covering the control of the areas.

It is my recommendation that the Department prepare, in conjunction with the State Parks Commission, a report to the Governor covering the respective responsibilities, in relation to use of our State Lands, of the two agencies. It may not be in the best interest of the State to divorce the Department from all responsibility for control of State Lands. Since engineering is required for erosion control and the Department has personnel qualified to carry out such work, it would be comparatively simple for us to handle this important work, given the needed funds.

Conversely, the State Park Commission would appear to be the agency which should be charged with the responsibility for establishing and operating the recreational facilities located on State Lands.

Development of these recreation areas should be planned on a long-range basis. The areas selected should be restricted for specific purposes; other areas could be kept under Department control and closed to the use of the general public. All land should be patrolled and policed by uniformed personnel. Our experience indicates that unauthorized encroachment by squatters must be controlled at all times.

The public land areas along the Atlantic Ocean in Sussex County are among the State's most valuable assets. Many states are now trying to repurchase public beach areas for general public use. We already own ours.

The State of Delaware is the owner of approximately 2,500 acres of State lands in Sussex County. The boundaries of these lands are not clearly defined; in many cases corners have been lost, destroyed, or removed.

I recommend that the Department request an appropriation from the General Assembly to make a complete survey and prepare plats of all State lands in Sussex County. I recommend that, after completion of the survey, permanent monuments marking the limits of State-owned property, be put in place.

The survey should be tied into the State Coordinate System and U. S. Coast and Geodetic Survey.

DELAWARE MEMORIAL BRIDGE

As Chief Engineer of the Department, I have assumed at your direction the supervision of administration and maintenance of the Delaware Memorial Bridge, and the Delaware Memorial Bridge Division, formerly known as the Delaware Crossing Division. I have continued as Director of the Delaware Memorial Bridge Division, a position I have held since 1950. Elsewhere in this report is a resume of that Division's activities, a more detailed report of the operation and maintenance of the structure will be prepared by the General Manager of the Bridge on the activities covered by his responsibilities. I wish, however, to supplement both of these reports by acquainting you with some urgent problems facing the Department, problems inextricably bound up with the operation of the Bridge.

The Delaware Memorial Bridge has solved the problem of crossing the Delaware River which in the past was a barrier to highway transportation in the coastal region of the Middle Atlantic States.

Following the successful removal of this barrier the State of New Jersey constructed the great New Jersey Turnpike, a toll road stretching 118 miles from the Bridge to New York City. These two projects, which are being financed by toll revenues, are imposing intolerable burdens upon the free roads of the State of Delaware—burdens which the State should not be forced to assume from its regular source of taxable income.

The successful operation of a toll facility such as the Delaware Memorial Bridge is dependent on a free flow of traffic. This is assured at the New Jersey entrance by a

network of approach roads both free and toll, constructed to the highest modern standards, while on the Delaware side local free roads are congested and crowded beyond their capacity to serve. Long delays, irritating stops, costly operation of vehicles and heavy accident experiences result, all of which, if allowed to continue, will eventually result in lowered revenues for the Bridge.

We are being forced at this very moment to expend about two million dollars of the taxpayers' money to expedite traffic on the western approach roads (U. S. 13 and 40) to the Bridge. I therefore strongly urge bold and aggressive action by the Department for additional authority to issue revenue bonds, based on the Bridge's ability to finance such issues from current and predicted revenues for the immediate future. These funds would be used to construct new facilities, modern in every respect and equal to those existing in our neighboring State of New Jersey.

There is little doubt of the success of such a venture on the part of the State of Delaware, and it appears to me as the one real solution toward overcoming the highway problem the State of Delaware must accept. A further argument in favor of such action is that when the burden of financing these highways is shifted from the shoulders of the Delaware taxpayer to the Bridge users, normal tax funds will be available to help solve the serious highway needs throughout the three counties of the State.

IN MEMORIAM

Mr. Samuel Culver, a former member of the State Highway Department passed away on October 19, 1953.

Sam Culver contributed much to the successful administration of the Highway Department, both as Chairman and Member. The esteem in which his fellow members held him is exemplified in the Resolution adopted by the Department at its meeting of August 19, 1953:

"WHEREAS, The Honorable Samuel N. Culver has been a member of the Delaware State Highway Department since May 1, 1950,

"WHEREAS, his services, wise counsel and unselfish labors have been of inestimable value to the State and to the other members and officials of the Department, and

"WHEREAS, it is eminently proper that such distinguished service should receive appropriate recognition and due appreciation,

"NOW, THEREFORE, BE IT UNANIMOUSLY RESOLVED by the Delaware State Highway Department in meeting assembled this nineteenth day of August A. D. One Thousand Nine Hundred and Fifty Three,

"THAT it is the sense of this Department that the public services rendered so untiringly by the Honorable Samuel N. Culver as a Member during the past three years, has been of incalculable value to the State and to the Members and employees of the Department,

"THAT the efficient functioning of the Department and the successful progressive highway programs of recent years were made possible by the contribution of his sound business judgment, wise counsel and intelligent understanding of the many complex problems that continually arose,

"THAT, the Members sincerely regret the recent illness of Mr. Culver and that such illness has influenced his decision to resign as a member of this Department effective August 19, 1953, and that because of such resignation, the State will lose a faithful and learned public servant and that the Department will be aware of the absence from its council table of one whose personal friendship and prudent judgment have been an inspiration to his fellow members, . . ."

* * *

On December 20, 1953, the Department lost by death one of its most trusted and valued employees. Lyle T. Maybee, Principal Right-of-Way Engineer, would have completed twenty-five years of service with the Department in April, 1954. An able and conscientious engineer, a genial and loyal friend and companion, he is sorely missed by his friends and associates. His life work was devoted to the development of the Delaware Highway system. In his untimely passing, the State lost a loyal citizen and an efficient and able official.

Respectfully submitted,

W. A. McWILLIAMS
Chief Engineer

SUMMARY OF RECOMMENDATIONS

Construction

Development of a long-range plan for financing highway construction (Page 17).

Maintenance

Establishment of a long-range program for year-round maintenance of bituminous roads. That hard-surfacing of selected earth roads be increased (Page 30).

That consideration be given to building or obtaining housing facilities for the New Castle and Sussex County Divisions, and that land be purchased near Georgetown and Seaford on which equipment storage sheds may be built (Page 33). That additional funds be supplied for suburban street needs and the purchase of snow-fighting equipment (Pages 31, 32).

Bridges

That eleven bridges be replaced and nine refloored or repaired, that numerous small, steel bridges throughout the State be replaced with pipe structures, and that Broadkill Bridge be placed on 24-hour notice (Page 42).

Right-of-Way

That the General Assembly be requested to establish a fund for future right-of-way needs (Page 46). That one additional right-of-way agent and possibly a trainee be added to the Right-of-Way Division (Page 46).

Suburban Development

That legislation creating a Regional Planning Commission for Kent and Sussex Counties be encouraged (Page 52). That legislation recognizing storm drainage as a necessary utility be encouraged (Page 50). That laws be enacted under which the maintenance and reconstruction of streets is simplified to a single standard (Page 57).

Personnel

That personnel policy be revised, and that provision be made by legislative action for the assurance of continuity of service for certain personnel (Page 61).

Mosquito Control

A proposed budget of $175,000 for fiscal year 1955-1956 and $195,000 for fiscal year 1956-1957 (Page 73).

Public Works

That an annual appropriation for the necessary maintenance of public works installations be made, and that the Department be given authority to condemn property for rights-of-way across private lands, in order to facilitate maintenance of public works facilities (Page 80).

That a sum of $100,000 per year be appropriated for the proper maintenance of shore protection installations, to be used on a state-wide basis (Page 81).

Public Lands

That the Department prepare, in conjunction with the State Parks Commission, a report covering the respective responsibilities of each agency with regard to State-owned lands, and that planning toward the development of recreational facilities on State lands be carried out on a long-range basis (Page 82).

Delaware Memorial Bridge

That the Department acquire additional authority to issue revenue bonds, based on the ability of the Bridge to finance such issues, for the construction of highway facilities on adequate approach networks (Page 84).

APPENDIX

TABLE I—ACTIVE CONSTRUCTION CONTRACTS
JULY 1, 1953 TO JUNE 30, 1954

	Contract	Fund*	Active 7/53 Remaining Value	Awarded Amount During F/Y	Award Date	Value Constructed During F/Y	County	Active At End of F/Y 54	Mileage	Date Accepted
682	Smyrna to Wendall's Corner	47	$	$ 136,111.90	5/11/54	$ 36,578.85	K	$ 99,533.05	2.377	
755	Lancaster Pike	47	50,712.00		9/ 5/52	39,053.80	NC		2.138	8/10/53
798	Maryland Avenue: Boxwood to Broom	ST	3,515.00		2/ 5/52	95,136.48	NC		1.395	4/28/53
799	Concord Pike	ST	398,053.00		7/15/52	378,934.97	NC	1,000.00	2.436	11/25/53
843	Canterbury to Camden	47	22,315.00		6/22/52	193,628.51	K		5.850	6/18/53
855	Maryland Avenue: Broom to Lancaster	ST	238,470.00		9/ 5/52	257,968.38	NC	1,000.00	0.846	1/ 6/54
913	Dover Bypass (U. S. 13)	47	11,000.00		11/ 8/50	16,500.00	K		4.464	4/16/52
915	Harrington to Canterbury (Dual)	47		880,945.80	9/21/53	195,858.00	K	685,087.72	7.587	
977	Carpenter's Bridge and Approach	95	67,634.00		2/26/52	79,139.07	NC		0.303	8/26/53
1057	New Castle Avenue Overpass	47	28,069.00		5/12/50	64,827.54	NC		0.365	
1063	Line Road East of Delmar	47		89,788.50	7/31/53	86,249.27	S	3,539.23	4.392	6/23/54
1085	Ocean View to Bethany	47	12,697.00		4/10/52	17,966.39	S		3.458	7/15/53
1098	Brandywine Bridge Approach	47	25,300.00		8/22/51	28,843.28	NC		0.925	8/27/53
1103	Records Pond and Nanticoke Bridges	ST	171,944.00		10/ 5/51	53,117.34	S		0.033	9/15/53
1148	Georgetown-Laurel Road to Brown's Church	47	202,616.00		4/21/52	287,258.12	S		8.385	9/ 3/53
1149	Delmar to Georgetown-Laurel Road	47	1,340,081.00		6/19/52	771,384.29	S	568,696.47	7.956	
1152	Five Points to Rehoboth (Dual)	47		999,557.50	2/23/54	120,697.25	S	878,860.25	5.618	
1154	Chrysler Plant to Ogletown	47	207,206.00		10/28/52	225,490.66	NC		3.261	4/24/54
1156	Little Creek Bridge and Approaches	47	16,890.00		8/ 6/52	19,002.97	K		0.641	5/15/53
1160	Middletown to Summit Bridge	ST	384,076.00		11/11/52	334,654.57	NC		7.388	4/24/54
1161	Summit Bridge to Tybout's Corner	ST	213,875.00		6/27/52	202,987.98	NC		7.042	8/31/53
1164	Glenwood Avenue, Smyrna	47	34,821.00		8/ 6/52	44,962.55	K		1.106	5/ 8/53
1170	Oak Lane Drive (South Laurel)	ST		23,138.75	8/ 3/53	14,201.79	S	8,936.96	0.480	5/28/54
1175	Broom Street, Wilmington	47	183,599.00		10/28/52	181,993.83	NC	10,000.00	0.677	1/ 5/54
1181	Possum Park Road	47	192,316.00		1/28/53	191,347.32	NC		1.775	10/12/53
1187	Churchman's Road Relocation	ST	119,544.00		3/16/53	124,930.13	NC		2.056	10/ 5/53
1188E	East Cleveland Avenue, Newark	ST	12,779.00		8/ 4/52	11,932.23	NC		0.582	5/ 5/53
1189	Green Street, Claymont	ST	73,266.00		3/ 3/53	84,545.41	NC	367.01	0.700	12/24/53
1195	Elmhurst Drainage	ST	8,571.00		8/29/53	9,994.31	NC		0.820	5/29/53
1196	Burnt Mill Road	ST	22,634.00		2/19/53	34,741.22	NC		0.464	9/11/53
1197	Harvey Road Bridge and Approaches	ST		243,550.61	11/10/53	75,343.81	NC	168,206.80		
1208	White Clay Creek Bridge	ST		457,272.05	12/11/53	122,266.32	NC	335,005.73	0.433	
1219	Pearson's Corner to Dover	ST		179,060.00	7/13/53	156,707.65	K		5.752	11/ 4/53
1222	Milford Crossroads	ST	21,319.00		9/22/52	27,695.34	NC		0.398	6/29/53
1223	Concord Pike (Murphy Road to Talleyville)	ST		662,539.50	9/16/53	291,477.51	NC	371,061.99	1.912	

TABLE I—ACTIVE CONSTRUCTION CONTRACTS—(Continued)
JULY 1, 1953 TO JUNE 30, 1954

	Contract	Fund*	Active 7/53 Remaining Value	Awarded Amount During F/Y	Award Date	Value Constructed During F/Y	County	Active At End of F/Y 54	Mileage	Date Accepted
1224(2)	Walnut Street Extension, Section 2	47	$	$ 663,540.21	5/25/54	$	NC	$ 663,540.21		
1226	Jefferson Avenue, Willow Run	ST	21,272.00		3/ 3/53	4,214.14	NC		0.126	11/ 9/53
1229	Incidental Construction	ST	5,291.00		11/ 5/52	5,760.41	NC			5/19/53
1232	Minquadale Drainage	ST	7,166.00		3/ 3/53	5,963.13	NC		0.820	6/12/53
1233	White Oak Road, Drainage	ST		27,327.20	8/ 3/53	26,582.61	K		0.382	10/ 8/53
1234	Forest Brook Glen, Drainage	ST	14,224.00		3/18/53	20,159.99	NC		0.215	1/ 4/54
1236	Lancaster Pike. Paving	47		509,097.00	4/24/54	12,175.38	NC	496,921.62	3.063	
1239	Smyrna School Streets	ST		39,000 00	7/15/53	37,599.08	K		0.260	11/25/53
1243	State Hospital Approaches, Farnhurst	ST		20,172.50	9/16/53	21,082.49	NC			12/ 4/53
1244	Marshallton School Drive	ST		19,190.00	1/11/54	4,316.87	NC	14,873.13	0.151	
1245	Georgetown to Harbeson	ST		23,450.00	11/10/53	22,475.00	S	975.00	5.937	5/28/54
1247	Greenville School Curb & Sidewalks	ST		18,946.50	11/10/53	11,420.98	NC	7,525.52	0.326	6/ 3/54
1253	Red Clay Creek Bridge	ST		52,016.00	4/30/54		NC	52,016.00		
1254	River Road	ST		53,947.30	12/ 3/53	11,531.15	NC	42,416.15	0.204	
1259	Kennett Pike (Penna. Line to Greenville	ST		104,012.00	7/19/53	100,261.72	NC		3.805	11/ 6/53
1260	Basin Corner to Minquadale	ST		147,995.00	7/15/53	79,925.88	NC	68,069.12	1.772	6/25/54
1261	Marrow Road, Newark	47		162,959.90	5/26/54		NC	162,959.90	1.419	
1265	Harbeson to Five Points	47		301,958.10	2/23/54	65,471.40	S	236,486.70	6.255	
1271	Kennett Pike (Greenville to Wilmington)	ST		94,323.00	8/ 7/53	98,222.58	NC		2.014	11/25/53
1287	Fieldsboro to McDonough	47		289,089.75	5/24/54		NC	289,089.75	5.177	
1289	Frederica Bridge	ST		43,649.30	9/16/53	44,773.67	K	996.75		
1290	Bituminous Surface Treatment—New Castle	ST		228,840.00	7/15/53	197,684.44	NC		259.350	6/30/54
1291	Bituminous Surface Treatment—Kent	ST		217,057.50	7/15/53	142,736.94	K	1,000.00	114.172	6/29/54
1292	Bituminous Surface Treatment—Sussex	ST		195,352.50	7/15/53	118,533.35	S	2,000.00	73.410	
1293	Hot-Mix Resurfacing—New Castle	ST		18,407.50	7/23/53	17,984.62	NC			6/30/54
1294	Hot-Mix Resurfacing—Kent	ST		22,035.40	7/13/53	26,520.00	K			9/17/53
1295	Hot-Mix Resurfacing—Sussex	ST		41,250.00	7/15/53	63,888.00	S	1,000.00		
1300	Centre Road	47		633,450.00	6/11/54		NC	633,450.00	2.770	
1304	Port Penn Dikes and Sluice Gates	LB		162,470.00	3/ 4/54	3,750.00	NC	158,720.00		
1305	Blair's Pond Dam	ST		8,781.50	5/25/54		S	8,781.50		
1306	Red Lion Dikes and Sluice Gates	LB		79,810.00	1/12/54	11,310.26	NC	68,499.74		
1307	New Castle Dikes and Sluice Gates	LB		24,293.60	1/11/54	10,462.88	NC	43,830.72		
1308	Slaughter Beach Shore Protection	LB		11,492.50	12/ 2/53	4,935.09	S	6,557.41		6/28/54

TABLE I—ACTIVE CONSTRUCTION CONTRACTS—(Concluded)
JULY 1, 1953 TO JUNE 30, 1954

	Contract	Fund*	Active 7/53 Remaining Value	Awarded Amount During F/Y	Award Date	Value Constructed During F/Y	County	Active At End of F/Y 54	Mileage	Date Accepted
1309	Mispillion River to Broadkill River Dikes	LB	$	$ 6,750.00	12/ 4/53	$ 6,416.25	S	$		3/17/54
1310	Delaware City Dikes	LB		7,950.30	2/23/54		NC	7,950.30		
1311	Silver Lake Pumping System	LB		10,043.29	4/ 1/54		S	10,043.29		
1312	Williams Pond Dam	ST		51,717.50	11/25/53	52,613.72	S	16,159.53		
1313	Churchman's Road Extension	ST		98,809.00	10/29/53	36,933.20	NC	61,875.80	0.851	
1314	Georgetown—Arrow Road	ST		14,831.50	1/11/54	8,730.00	S	6,101.50	0.505	
1316	Chrysler Plant to Ogletown Ext.	47		33,222.50	11/10/53		NC	33,222.50	0.216	
1317	Memorial Drive	ST		239,117.50	4/30/54		NC	239,117.50	0.963	
1318(1)	Basin Corner Grade Separation	ST		1,727.50	5/26/54		NC	1,727.50		
1321A	Bethany Beach Shore Protection	LB		4,150.00	2/23/54	11,618.30	S	2,000.00		5/25/54
1322	Lewes Beach Shore Protection	LB		23,800.00	6/22/54		S	23,800.00		
1323	Broadkill Beach Shore Protection	LB		14,773.20	2/23/54		S	14,773.20		
1325	Stockdale Curve, Gov. Printz Blvd.	ST		54,830.25	4/16/54		NC	54,830.25	0.471	
1326	Georgetown Police Station Addition	LB		5,950.00	4/ 2/54	3,034.50	S	2,915.50		
1337	Delaware Memorial Bridge Cleaning	DMB		16,900.00	6/ 2/54		NC	16,900.00		
1338	Bituminous Surface Treatment—New Castle	ST		177,903.50	5/27/54		NC	177,903.50	234.150	
1339	Bituminous Surface Treatment—Kent	ST		70,584.41	5/28/54		K	70,584.41	34.910	
1340	Bituminous Surface Treatment—Sussex	ST		217,786.26	5/27/54		S	217,786.26	146.740	
1341	Hot-Mix Asphalt Patching—New Castle	ST		9,990.00	6/ 8/54		NC	9,990.00		
1345	Bank Run Hot-Mix Asphalt Surface—New Castle	ST		36,100.00	6/ 8/54		NC	36,100.00	5.700	
1346	Bank Run Hot-Mix Asphalt Surface—Kent	ST		50,077.80	6/ 9/54		K	50,077.80	12.800	
1347	Bank Run Hot-Mix Asphalt Surface—Sussex	ST		49,665.00	6/ 9/54		S	49,665.00	8.000	
	TOTALS		$4,111,255.00	$9,112,558.38		$6,165,905.25		$7,194,528.27	1,020.949	

*Figures show percent of cost paid by Federal Aid Funds.
LB indicates cost met by Legislative Bill.
ST indicates entire cost paid by State Funds.
DMB indicates cost paid by Delaware Memorial Bridge.

TABLE II-A
CONSTRUCTION PROGRAM FOR FISCAL YEAR 1954-1955
NEW CASTLE COUNTY

Contract Number	Location	Estimated Mileage	Sufficiency Rating Before Improvement	Estimated Cost
1331	North Star Road	0.640		$ 83,926.30
1224(3)	Walnut St. Ext. Substructure	0.185		820,455.50
1334	Church & Spruce Streets	2.246	65-72	61,025.00
1192	Holloway Terrace	1.130		140,244.50
1257	Washington Street	0.424	53	76,389.00
1224(4)	Walnut St. Ext. Superstructure	0.185		1,251,781.00
1318(2)	Basin Corner Interchange	0.724		1,039,309.00
1299	Heald Street	0.255	50	78,369.00
1224(5)	Walnut St. Ext. Marsh Stabilization	0.565		725,098.90
1235	Veale Rd.—Concord Pike to Marsh Road	0.425	42-48	420,000.00
1238	Liberty Avenue—Minquadale	0.563		130,000.00
1301	Gov. Printz Blvd.—11th to 30th St.	1.103	61	300,000.00
1302	Delaware Avenue—Newark	0.826		170,000.00
881	Union Street—Wilmington	0.290	45	40,000.00
1288	U. S. 13—Minquadale to Rogers Corner	0.890	76	250,000.00
1333	Harvey Road	0.774	44	100,000.00
1315(1)	Naaman's Road Underpass			750,000.00
1315	Naaman's Railroad Paving	0.400		250,000.00
1327	Chapel St. Crossing Protection—Newark Newport Pike Crossing Protection			56,000.00
1191	Middletown to Warwick	1.250		150,000.00
	TOTAL	12.875		$6,892,597.70

TABLE II-B

CONSTRUCTION PROGRAM FOR FISCAL YEAR 1954-1955—(Continued)

KENT COUNTY

Contract Number	Location	Estimated Mileage	Sufficiency Rating Before Improvement	Estimated Cost
1351	State Street—Dover	1.630	68-76	$ 53,925.00
1344	Bayview School—Cedar Grove to Hart's Garage	5.336		41,976.50
1362	Alterations to Boiler Room and Heating			5,340.00
1363	Alterations to Boiler Room-Testing Laboratory			3,890.00
1364	Alterations to Electrical System			9,884.00
1364-A	Metal Office Partitions			3,214.00
1364-B	Acoustic Tile Installation			555.00
1364-C	Soundproof Carpeting			861.94
1364-D	Airconditioning Installation			7,873.05
1240	Harrington Streets	0.936		70,842.50
1343	County Roads 95, 96A, and 97	4.700	73-78	43,905.00
1298	Viola Railroad Crossing	0.181		30,000.00
1327	Kenton Crossing Protection			4,770.00
1372	Burrsville Relocation	1.000		80,000.00
	Dickinson Mansion	0.320		7,000.00
	Parking Lot—Administration Building			5,000.00
	TOTAL	14.103		$ 369,036.99

TABLE II-C

CONSTRUCTION PROGRAM FOR FISCAL YEAR 1954-1955—(Continued)

SUSSEX COUNTY

Contract Number	Location	Estimated Mileage	Sufficiency Rating Before Improvement	Estimated Cost
1320	County Road 380	2.338	.....	$ 47,795.80
1328	Timber Dock—University of Delaware	.....	.....	10,167.00
1335	Bedford Street—Georgetown	1.430	58-70	244,244.00
1330	Church Street—Bridgeville	0.440	61	50,200.00
1365	County Road 224	1.759	....	23,832.50
1319	High Street—Seaford	0.977	.....	320,000.00
1361	Governor's Avenue Bridge	.....	.....	12,000.00
1367	Delmar to Brown's Church—Seeding	16.341	.....	31,000.00
1366	County Roads 205 and 206	3.315	.....	45,000.00
1370	Road 472	1.803	.....	26,000.00
1369	Gravel Hill to Road 249	2.000	60	26,000.00
1371	Road 370 (County Road 17 to Road 382)	1.420	43	18,500.00
	TOTAL	31.823		$ 854,739.30
	TOTAL ALL COUNTIES	58.801		$8,116,373.99

TABLE III
MAINTENANCE
SNOW REMOVAL BY FISCAL YEARS

Fiscal Year	New Castle	Kent	Sussex	Total
1944-1945	$ 39,443.57	$ 3,266.13	$ 1,244.92	$ 43,954.62
1945-1946	30,553.61	8,318.34	8,062.61	46,934.56
1946-1947	49,578.15	13,007.78	6,775.90	69,361.83
1947-1948	60,866.54	21,797.22	33,069.91	115,733.67
1948-1949	35,913.29	5,879.91	10,748.06	52,541.26
1949-1950	25,260.36	4,405.21	2,798.10	32,463.67
1950-1951	39,363.76	4,841.22	10,679.21	54,884.19
1951-1952	47,221.23	8,145.29	6,904.95	62,271.47
1952-1953	43,063.42	3,533.06	7,147.54	53,744.02
1953-1954	82,982.21	54,318.58	42,627.80	179,928.59
10-Year Cost	$454,246.14	$127,512.74	$130,059.00	$711,817.88

TABLE IV

DESIGN DIVISION

CONTRACTS COMPLETED

Contract Number	Description	Miles New Construction	Miles Reconstructed	Miles Resurfaced & Widened	Miles Roadway Shaping	Miles Resurfaced	Miles Patching
1170	Oak Lane—Laurel	0.480					
1271	Kennett Pike					2.014	
815	Canterbury to Harrington		7.587				
1243	State Hospital Ent.—Farnhurst						
1223	Concord Pike—Murphy Road to Talleyville		1,912				
1197	Harvey Road		0.407				
1247	Greenville School Sidewalk		0.326				
1316	Chrysler Plant—Ogletown Road Extension	0.216					
1208	White Clay Creek Br. Approaches		0.433				
1254	River Road		0.204				
1298	Viola R.R. Crossing	0.181					
1314	Arrow Road—Georgetown	0.505					
1245	Georgetown—Harbeson						5.937
1244	Marshallton School Drive	0.151					
1152	Five Points—Rehoboth		5.618				
1236	Lancaster Pike		2.929				
1299	Heald Street		0.256				
682	Smyrna—Wendall's Corner			2.377			
1325	Stockdale Curve			0.471			
1261	Morrow Road, Newark		1.419				
1287	Fieldsboro-McDonough			5.177			
1300	Centre Road		3.431				
1317	Memorial Drive	0.936					
1331	North Star Road	0.640					
1344	Bayview School—Cedar Grove to Hart's Garage				5.336		
1320	County Road 380, Sussex County	2.338					
1257	Washington Street		0.424				
1351	State Street—Dover and Incidental Construction					1.600	
1334	Church & Spruce Street, Wilmington—New Bridge Rd.					2.246	
	TOTAL	5.447	24.946	8.025	5.336	5.860	5.937

TABLE V

DESIGN DIVISION

PROJECTS IN DESIGN STAGE

TO BE COMPLETED BEFORE OCTOBER 1, 1954

		Percent Completed
1235	Veale Road	100
1192	Holloway Terrace	100
1301	Governor Printz Boulevard	85
1240	Harrington Curbs and Drainage	100
1302	Delaware Avenue—Newark	60
1319	High Street—Seaford	40
881	Union Street—(Viaduct to Sycamore Street)	10
1288	U. S. 13—Rogers Cor. Intersection to Minquadale	40
1330	Church Street—Bridgeville	100
1335	North & South Bedford Street—Georgetown	100

TABLE VI

DESIGN DIVISION

PROJECTS NOT PROGRAMMED—

SURVEYED AND PARTIALLY DESIGNED

		Percent of Survey Completed	Percent of Plans Completed
1191	Middletown to Warwick	90	20
1237	Darley Road—Naaman's Road to Phila. Pike	90	20
1329	Gap Road—Route 48 to Route 2	90	20
1269	Churchman's Road—Christina River to Rd. 336	90	15
915	U. S. Route 13—Canterbury to Harrington	95	60
916	U. S. Route 13—Harrington to Farmington	90	60
1263	U. S. Route 13—Northbound—Dover to Bishops Corner	90	80
	U. S. Route 13—Dover to Air Base	65	10

TABLE VII

DIVISION OF TESTS

MATERIALS LABORATORY

Material	No. of Tests	Quantity Represented
Fine Aggregate (Sand)	390	89,150 Tons
Coarse Aggregate (Gravel, Crushed Stone, Slag)	2,242	385,000 Tons
Cement	430	170,000 Bbls.
Asphalt	422	3,621,000 Gals.
Central-Mixed Concrete	Production Control	25,092 Cu. Yds.
Bituminous Concrete	570	133,660 Tons
Reinforcing Steel	61	674,000 Lbs.
Structural Steel	111	1,323,000 Lbs.
Truck-Mix Concrete	Production Control	3,986 C.Y.
Concrete Pipe	235	190,399 L.F.
Piling	Inspection	4,165 L.F.
Lumber	Inspection	149,770 B.F.
Guard Rail Posts	Inspection	1,551
Concrete Cores	422	(drilled from pavement & tested)
Bituminous Concrete Cores	237	(drilled from pavement & tested)
Benzene Recovered	.....	383 Gals.
Concrete Cylinders	1,079	
Concrete Beams	236	
Brick	10	
Creosote	11	
Water (for use in Concrete)	23	
Motor Oil	25	
Asphalt Adhesion Tests	23	
Diesel Fuel Oil	13	
Specific Gravities of Aggregates	52	
Air-Entrainment Tests (Conc.)	52	
Joint Sealing Compounds	23	

TABLE VIII

DIVISION OF TESTS

SOILS LABORATORY

Description	Amount
Borrow Pits investigated for State Highway Department	51
Borrow Pits recommended for SHD to purchase	5
Common Borrow Pits investigated for contract use	19
Common Borrow Pits recommended for contract use	12
Select Borrow Pits investigated for contract use	51
Select Borrow Pits recommended for contract use	21
Total number of Borrow Pits investigated for all purposes	121
Select Borrow controlled	289,195 Cu. Yds.
Common Borrow controlled	507,100 Cu. Yds.
Excavation controlled (excavated from job site)	473,960 Cu. Yds.
Total earthwork controlled	1,270,255 Cu. Yds.
Laboratory Tests for earthwork compaction control	28
Field Tests for earthwork compaction control	573
Soil Survey of proposed highway alignments	29.87 Miles
Strength Tests for pavement design (C.B.R.)	40
Foundation Investigations for proposed structures (borings)	1,262 L.F.
Special Underdrainage and ground-water control investigations	8
Quality Control Field Checks of select borrow pits	318
Routine Mechanical Analysis and Classifications	2,856
Suburban Development Investigations (both State & Bonded)	41

TABLE IX

SUBURBAN DEVELOPMENT DIVISION

MILEAGE OF SUBURBAN STREETS ACCEPTED

1953-54

Contract	Development	Mileage
Agreement	Bellefonte	0.333
SD-42	Blue Rock Manor	0.360
Developer	Brack-Ex	0.174
Developer	Brookview Apartments	1.373
Developer	Capitol Green	0.915
Developer	Carrcroft Crest	0.247
Developer	Castle Hills	0.981
SD-54	Cleland Heights	0.129
SD-45	Edgehill	1.121
Developer	Grayling	0.113
Developer	Hyde Park	0.572
Developer	Manor Park, Section C	0.763
Developer	McDaniel Crest	0.349
Developer	McDaniel Heights	0.150
Developer	Newport Heights	0.093
Developer	Normandy Manor	0.207
Developer	Northwood	1.373
Developer	Rolling Park	0.538
Developer	Rosehill Gardens	0.259
Developer	Shellburne	0.251
Developer	Shipley Heights	0.764
Developer	West Farm	0.488
SD-40	Westwood Manor	0.376
Developer	Windybush	0.150
Developer	Woodbrook	1.036
SD-50	Woodcrest	0.089
Developer	Woodcrest	0.398
SD-56	Woodcrest	0.220
SD-52	Woodcrest	0.115
SD-43	Woodcrest	0.468
Developer	Woodlawn Apartments	0.881
	TOTAL STREETS ACCEPTED	15.286

TABLE X
SUBURBAN DEVELOPMENT DIVISION
PROJECTS 1953-54

1. Projects Finished:

Contract	Development	Mileage	Cost
SD-40	Westwood Manor	0.376	$ 33,357.45
SD-42	Blue Rock Manor	0.360	22,749.99
SD-45	Edgehill	1.121	60,401.52
SD-54	Cleland Heights	0.129	7,877.96
		1.986	$124,386.92

2. Projects under Construction:

Contract	Development	Mileage	Bid Price
SD-39	DuRoss Heights	1.660	$ 52,002.55
SD-41	Maplewood Lane	0.174	19,331.20
SD-47	Roseville Park	1.061	32,824.65
SD-53	Keystone	0.275	17,690.00
SD-55	Gwinhurst	0.284	18,998.98
SD-57	Fernhook	0.229	16,192.15
		3.683	$157,039.53

3. Projects rejected by vote of freeholders: None.

4. Projects being designed:

Contract	Development	Mileage	Probable Cost
SD-15C	Swanwyck	0.677	$ 42,500.00
SD-58	Edgehill Acres	0.908	70,000.00
SD-60	Bellemoor Heights	0.293	10,000.00
SD-59	Addicks Estates	1.510	100,000.00
SD-61	Idela	0.183	13,000.00
SD-62	Delaire	0.493	31,000.00
SD-63	Dover Heights	0.371	23,000.00
SD-64	Collins Park, Section 2	1.532	96,000.00
SD-65	Collins Park, Section 3	2.516	170,000.00
SD-66	Newport Heights	0.563	35,000.00
SD-67	Stanton Crest	0.204	12,000.00
SD-69	Collins Park, Section 1	0.871	54,000.00
		10.121	$656,500.00

5. Projects for which petitions have been received:

Contract	Development	Mileage	Probable Cost
SD-68	Wilmington Manor, Section D	0.584	$ 31,000.00
SD-70	Woodside Hills	0.128	6,800.00
		0.712	$ 37,800.00

6. Projects rejected, petition illegal: None.

Grand Total	Projects	Miles	Probable Cost
GRAND TOTAL	24	16.502	$975,726.45
Average Cost per Mile: $59,000.00			

TABLE XI

SUBURBAN DEVELOPMENT DIVISION

Subdivision	Mileage Bonded Fiscal Year 1951 1952	1952 1953	1953 1954	Contract Price
Ashbourne Hills			0.532	$ 28,540.00
Brookside Park, Section C		2.023		97,000.00
Brookside Park, Section K		2.661		107,000.00
Brookside Park, Section M			3.950	167,000.00
*Capitol Green		0.453		64,157.80
*Carrcroft Crest		0.243		15,118.80
Carrcroft, Section C		0.485		34,431.07
Castle Hills			0.376	17,500.00
*Castle Hills		1.491		95,000.00
Chestnut Hills Estates			0.814	46,696.20
Chelsea Estates, Section 3		1.139		57,252.80
Cedars Knoll			0.154	8,115.00
Cleland Heights	0.152			5,560.00
Cleland Heights		0.089		3,550.00
Cleland Heights		0.143		7,537.70
Cleland Heights		0.125		5,500.00
Cleland Heights		0.062		3,250.00
Cleland Heights		0.038		2,000.00
Cleland Heights			0.095	4,000.00
Cleland Heights			0.052	2,750.00
Cleland Heights			0.152	8,000.00
Cleland Heights			0.095	3,500.00
Cleland Heights			0.066	3,447.50
Clearfield			0.248	15,437.35
Concord Manor Addition			0.887	34,159.90
Deerhurst, Section 4		0.259		17,664.90
Deerhurst, Sections 3 & 4		0.151		2,826.75
Dunlinden Acres			1.402	105,874.86
Dunlinden Acres			0.517	38,979.00
Dunlinden Acres			0.737	39,993.50
Garfield Park, Section 2			0.699	25,911.40
Glendale			0.545	45,512.30
*Grayling		0.113		6,000.00
Guyencourt			0.209	15,966.00
Holly Hill			0.189	15,802.00
*Hyde Park	0.068			3,485.20
*Hyde Park	0.279			29,454.40
*Hyde Park		0.191		17,159.20
Kenilworth		0.509		33,822.26
Kenilworth			0.161	9,600.00
Kiamensi Gardens Addition			0.446	26,580.00
Landers Park			0.221	14,479.90
Liftwood, Section A			0.189	8,000.00
Liftwood, Section A			0.162	7,524.00
Limestone Acres		1.509		89,925.65
Lynnfield		0.333		18,435.00
Lynnfield			1.342	74,810.50

TABLE XI—(Continued)

SUBURBAN DEVELOPMENT DIVISION

Subdivision	Mileage Bonded Fiscal Year 1951 1952	1952 1953	1953 1954	Contract Price
*Manor Park	0.763			$ 50,000.00
Mayfield			0.532	26,300.00
Morris Estates		0.449		20,000.00
Morris Estates, Section II			0.445	26,862.50
*Newport Heights		0.031		2,120.85
*Normandy Manor		0.133		6,580.00
*Normandy Manor, Section A		0.072		3,572.00
North Star		1.190		30,000.93
North Star		1.329		69,000.00
*Northwood		0.415		9,300.00
*Northwood		0.415		20,227.50
*Northwood		0.352		17,945.00
*Northwood		0.396		20,176.00
Pennrock		0.199		12,250.00
*Rosehill Gardens		0.259		24,376.50
*Shellburne		0.251		11,650.00
*Shipley Heights	0.074			3,288.80
*Shipley Heights		0.095		4,527.00
*Shipley Heights		0.057		2,850.00
Shipley Heights			0.364	18,672.50
Shipley Heights			0.445	22,985.30
Silver Springs		0.095		9,000.00
Stonehaven			0.076	4,425.20
Stonehaven			0.266	18,550.00
Villa Monterey		0.699		40,758.00
*West Farm		0.488		25,750.00
West View	0.047			1,821.00
Westview			0.298	23,200.35
Westview			0.128	7,197.00
Westview			0.082	6,000.00
Windsor Hills			0.459	28,802.50
*Windybush		0.025		1,905.00
*Windybush		0.138		7,640.00
Windybush			0.185	9,878.00
Windybush			0.137	7,358.75
*Woodbrook		1.048		55,998.60
*Woodcrest		0.059		3,393.00
*Woodcrest			0.038	2,000.00
Woodcrest		0.118		6,385.00
TOTAL	1.383	19.001	19.024	$2,147,058.22

*Streets Accepted.

GRAND TOTAL 39.408 Miles
Average Cost per Mile $54,500.00

TABLE XII

SUBURBAN DEVELOPMENT DIVISION

PLANS EXAMINED JULY, 1952 TO JUNE, 1954

Development	Acreage	Miles of Street
Ashbourne Hills	27.2	0.568
Bertram Village	98.3	2.075
Bestfield	29.9	1.136
Brookmount	140.0	3.466
Brookside Park, Section K	87.8	2.651
Brookside Park, Section M-1	149.1	3.129
Capitol Green, Dover	38.0	1.458
Capitol Trail Farms	11.0	0.398
Carrcroft Crest	107.0	2.405
Carrcroft, Section C	41.7	1.326
Castle Hills	170.0	4.091
Cedars Knoll	12.3	0.330
Chelsea Estates	46.0	1.182
Chestnut Hill Estates	138.8	3.845
Clearfield	9.8	0.506
Cleland Heights	50.6	2.595
Concord Manor Addition	20.8	0.625
Cooper Farm, Section B	12.5	0.494
Crestfield	10.3	0.406
Deerhurst	13.6	0.256
Dunlinden Acres	83.7	2.917
Eastburn Estates	59.0	1.685
Fairfax Addition	32.9	1.148
Fairfax Apartments	7.0	0.439
Fairfax Extension	20.5	1.061
Faulkland Wood Extension	3.7	0.095
Forrest Hills Park	39.9	1.444
Galewood, Section A	6.9	0.227
Glendale	63.0	1.856
Georgian Terrace	18.7	0.436
Glen Berne Estates	13.0	0.303
Greenmeadow	16.9	0.733
Guyencourt	26.6	0.246
Holly Hill	10.0	0.182
Klair Estates	54.0	2.408
Landers Park	12.1	0.227
Liftwood, Section A	45.0	1.379
Limestone Acres	71.0	1.373
Lynnfield	53.1	1.742
Mayfield	19.9	0.591
Milford Meadows	11.4	0.110
Morris Estates, Section 2	17.6	0.398
North Star	161.0	2.670

TABLE XII—(Continued)

SUBURBAN DEVELOPMENT DIVISION

PLANS EXAMINED JULY, 1952 TO JUNE, 1954

Development	Acreage	Miles of Street
Oak Lane Manor	57.0	1.544
Penndrew Manor	17.9	0.672
Pennrock	21.5	0.788
Rambleton Acres	58.0	1.862
Redmont	11.7	0.295
Rolling Green	9.2	0.208
Rosehill Gardens	16.0	0.436
Sedgely Farms, Section 1	50.0	0.304
Sherwood Park	85.4	2.379
Silver Springs	5.6	0.227
Staffordshire	36.5	1.108
Stonehaven	7.9	0.347
Swanwyck Gardens Extension	5.9	0.108
Villa Monterey	35.0	1.023
Windybush	71.2	2.216
Westview	34.7	1.204
Woodbrook	25.0	1.042
Woodland	79.1	1.989
TOTAL (61 Developments)	2,689.2	74.364

TABLE XIII

TRAFFIC AND PLANNING DIVISION

MILEAGE OF STREETS AND HIGHWAYS BY SURFACE TYPE BY COUNTY—DEL. APRIL 1, 1954

Surface Type	Kent	New Castle	Sussex	Total
Belgian Block	.....	.51	.....	.51
Brick	.68	4.45	.....	5.13
Concrete	202.38	155.21	258.76	616.35
Bituminous Concrete	65.66	167.53	114.63	347.82
Bituminous Penetration	1.07	325.38	51.23	377.68
TOTAL PAVED	269.79	653.08	424.62	1,347.49
Other Low Type Bituminous	21.58	25.43	107.11	154.12
Bituminous Surface Treated	226.09	163.20	354.94	744.23
Gravel or Stone	47.27	12.00	9.17	68.44
Soil Surfaced	412.52	128.68	369.16	910.36
TOTAL SURFACED	707.46	329.31	840.38	1,877.15
Graded and Drained Earth	68.03	6.96	580.77	655.76
Unimproved	1.73	7.66	14.19	23.58
Primitive	1.46	.30	.....	1.76
TOTAL UNSURFACED	71.22	14.92	594.96	681.10
TOTAL TWO- AND FOUR-LANE HIGHWAYS	1,048.47	997.31	1,859.96	3,905.74
DIVIDED HIGHWAYS				
Concrete	14.63	20.23	9.15	44.01
Bituminous Concrete	6.47	39.00	7.24	52.71
Low Type Bituminous	.....	.73	.....	.73
Bituminous Surface Treated	.....	.60	.68	1.28
Soil Surfaced	.....	.12	.....	.12
TOTAL DIVIDED HIGHWAYS	21.10	60.68	17.07	98.85
TOTAL ALL TYPES	1,069.57	1,057.99	1,877.03	4,004.59

TABLE XIV

TRAFFIC AND PLANNING DIVISION

MILEAGE OF STREETS AND HIGHWAYS

BY SYSTEM CLASSIFICATION BY COUNTY

	Kent	New Castle	Sussex	Total
Urban (Over 5,000 Population)	10.13	42.00	2.56	54.69
Primary (F.A.P.)	120.52	145.82	213.66	480.00
Secondary (F.A.S.)	322.02	311.84	634.86	1,268.72
Tertiary (N.F.A.)	616.90	558.33	1,025.95	*2,201.18
TOTAL	1,069.57	1,057.99	1,877.03	4,004.59

*85.61 miles not State maintained.

TABLE XV

TRAFFIC AND PLANNING DIVISION

TRAFFIC VOLUMES AT FOUR AUTOMATIC

COUNTER STATIONS BY YEAR BY MONTH

WITH RELATED PERCENTAGES

	Average Daily Traffic			Percent Change	
Month	1941 1942	1952 1953	1953 1954	1953-54 1941-42	1953-54 1952-53
July	22,721	36,702	40,250	+ 77.15	+ 9.67
August	22,328	37,066	39,755	+ 78.05	+ 7.25
September	19,902	33,587	37,954	+ 90.70	+13.00
October	17,491	31,469	33,362	+ 90.74	+ 6.02
November	17,056	28,078	28,391	+ 66.46	+ 1.11
December	16,174	28,013	29,837	+ 84.48	+ 6.51
January	13,421	25,429	24,592	+ 83.24	— 3.30
February	13,736	27,731	29,350	+113.67	+ 5.84
March	14,065	29,678	30,490	+116.78	+ 2.74
April	15,583	31,919	33,964	+117.96	+ 6.41
May	14,744	32,892	35,018	+137.50	+ 6.50
June	13,810	36,425	37,819	+246.30	+ 3.80
TOTAL	201,031	378,989	400,782	+ 99.36	+ 5.75

TABLE XVI
TRAFFIC AND PLANNING DIVISION
FISCAL STUDY

Year	AREAS UNDER 1000		AREAS 1000-2500		AREAS OVER 2500	
	Total Receipts	Expended on Streets	Total Receipts	Expended on Streets	Total Receipts	Expended on Streets
1948	$139,169.27	$35,961.14	$399,548.15	$ 64,733.80	$ 5,681,757.35	$215,500.21
1949	151,620.73	82,687.02	421,676.67	128,102.95	6,257,714.52	455,837.39
1950	99,714.08	60,104.71	432,882.52	149,178.47	6,555,467.82	453,406.79
1951	121,515.92	58,870.27	488,999.48	158,502.93	6,970,367.44	829,136.51
1952	128,782.16	70,857.36	572,222.56	223,714.58	*12,309,187.76	914,169.17
1953	134,453.13	72,105.90	579,216.15	242,509.82	6,486,446.64	897,191.67

(*Resulting from large Bond issues)

TABLE XVII

TRAFFIC AND PLANNING DIVISION

LOADOMETER STUDY

RESULTS OF LOADOMETER SURVEYS MADE AT FOUR LOCATIONS FOR 1941-47, AT NINE LOCATIONS FOR 1948-50, AND AT EIGHT LOCATIONS FOR 1951-53 IN DELAWARE EACH YEAR AS INDICATED

Year	Total Traffic Counted	Tractor Truck Semi-Trailers Average Maximum Axle Load of Loaded Vehicles	Tractor Truck Semi-Trailers Average Total Weight of Loaded Vehicles	Tractor Truck Semi-Trailers Frequency per 100 Vehicles of Axles Over 18,000 Pounds	Tractor Truck Semi-Trailers Percent of Vehicles With Gross of 45,000 Pounds or More
1941	13,497	15,256	32,149	15	0
1942	7,390	16,053	34,351	23	3.42
1943	7,549	15,575	33,866	24	1.96
1944	7,804	16,126	33,957	40	3.48
1945	9,449	16,484	36,594	43	6.83
1946	11,434	17,779	36,153	38	7.41
1947	11,004	17,983	37,961	63	15.44
1948	34,540	17,876	38,895	64	20.99
1949	36,819	17,030	39,410	53	24.01
1950	40,861	17,157	41,106	46	27.12
1951	28,921	16,776	41,555	42	25.53
1952	27,165	16,246	41,471	38	31.93
1953	31,111	16,265	42,674	37	32.14

TABLE XVIII
TRAFFIC AND PLANNING DIVISION
PERMITS ISSUED

	7/1/52 to 6/20/53		7/1/53 to 6/30/54		Per Cent Change	
	Number	Dollars	Number	Dollars	Number	Dollars
Heavy Hauling Permits	4,155	$14,916.26	4,518	$19,965.04	+ 8.74	+33.85
30-day Piling Permits	283	2,830.00	276	3,347.50	— 2.47	+18.29
Trip Piling Permits	168	336.00	198	482.50	+17.86	+43.60
House-Moving Permits	319	638.00	354	856.00	+10.97	+34.17
Free Permits	402	.....	412	.....	+ 2.49	.....
TOTAL	5,327	$18,720.26	5,758	$24,651.04	+ 8.09	+31.68