HIGHWAYS

An up-to-date analysis of existing highways and related facilities was continuously correlated with the demands made by motor vehicles using these highways to determine a priority schedule for the construction of new roads and the repair and rebuilding of existing ones. This activity was the primary responsibility of the Planning and Review Section.

The advance planning subsection concentrated on studies of traffic and planning for the purpose of forecasting traffic and its needs.

The counting and classifying of the various types of vehicles using the 4,235.12 miles of Delaware highways was done by 62 portable and ten permanent counter stations, and one manual classifier.

Portable counters were first used in 1941 but the activity was suspended from 1942 to 1949. This year 16 major, 28 minor, 17 weekday control and 425 single count stations were operated in accordance with a schedule which obtained complete coverage of all State highways in a three-year period.

The data obtained from the ten permanent automatic counters made it possible to develop seasonal factors, design hourly volumes, yearly trends for projection purposes, comparisons with past years and to determine the percentage of total traffic by hourly periods on a twenty-four hour basis. At stations on multilane highways, directional split information also was obtained.

In June 1963 a new permanent automatic counter station was placed in operation on State Route 261 (Foulk Road) just north of U.S. Route 202. This was the eleventh permanent counter station. It provided data for the development of new and more accurate commuter factors which could be applied to the peculiar trends in suburban area travel.

At each of the automatic counter stations, and at other key points throughout the State, manual classification counts were made for the purpose of determining the types of traffic found in the traffic stream. These counts provided the required data to sort or classify traffic volumes into the numbers of busses, passenger vehicles (foreign and local) and the various combinations of trucks.

From the data analyses of the Planning and Review Section it was possible to determine priorities for the highways which were needed. Such priorities were the basis for budget requests made to the General Assembly and for requests for funds for construction purposes.

TABLE I

Year	Miles of Streets and Highways under the Jurisdiction of State Highway Department	Number of Vehicles Registered	Population
1963	4,235.12	210,028	491,075
1962	4,210.88	197,412	476,150
1961	4,174.42	194,822	461,225
1960	4,148.86	185,972	446,300
1959	4,125.51	178,896	443,469
1958	4,119.71	172,456	420,648
1957	4,073.70	163,648	407,828
1956	3,983.07	156,992	395,007
1955	3,957.37	146,438	382,187
1954	4,004.59	135,245	369,366
1953	3,974.24	127,199	356,545
1952	3,960.60	117,656	343,725
1951	3,925.62	111,376	330,904
1950	3,910.72	101,727	318,085
Increase 1950-1963	324.40	108,301	172,990
Percent Increase	8.30	106.46	54.38

TABLE II
CONSTRUCTION CONTRACTS AWARDED
1 July 1962 - 30 June 1963

Contract Number	Description	Type	County	Mileage	Bid Price
I-1 (26)	Christina River Interchange	Paving	N. C.	0.42	$ 634,953.86
I-2 (1)	Route I-95 Structures	New Construction	N. C.	0.235	2,457,008.75
882	Drawyers Bridge and Approaches	Reconstruction	N. C.	0.69	426,405.54
1447	Willow Grove to Wyoming	Widening and Resurfacing	K	5.52	538,734.00
1563	Route 14 through Dewey Beach	Reconstruction	S	1.60	461,592.10
1567	Washington St. Extension	Widening and Reconstruction	N. C.	1.48	805,824.18
1568	New Castle Avenue	Widening and Reconstruction	N. C.	1.41	749,000.00
1599	Limestone Road	Reconstruction	N. C.	1.22	523,988.13
1623	Main and Washington St., Millsboro	"	S	0.61	244,999.00
1795	Cokesbury Church to Route 13	Widening and Resurfacing	S	6.59	543,987.60
1819	New Bridge Road	Reconstruction	N. C.	0.88	247,232.90
1823	South Little Creek Road	"	K	1.62	91,915.00
1846	Belvidere Streets	"	N. C.	0.97	139,542.50
1854	Bridge 357 on Road 451	Bridge Replacement	S		18,007.70
1858-2	South Bowers Beach Causeway	Miscellaneous	K		35,505.00
1880	Indian River Inlet Bridge	New Bridge	S	0.16	1,559,973.00
1880-3	" " " " Approach Fill	New Construction	S		159,985.80
1930	Hares Corner Intersection	Intersection Alt.	N. C.		105,110.00
1935	North Indian River Inlet Beach Fill	Beach Erosion	S		381,000.00
1955	Route 300, Maryland Line to Kenton	Widening and Resurfacing	K	5.38	395,489.50
1975	Union Street, Wilmington	Reconstruction	N. C.	1.09	502,783.50
1986	Bridge 555 on Road 60	Bridge Replacement	S		37,823.36
2012	Dirt Roads		S	5.90	114,440.04
2014-1	Bridge 461 on Road 468	Bridge Replacement	N. C.		23,765.00
2028	Bridge Repairs	Bridge Repairs	N. C.		7,950.00
2036	Dike Repairs	Beach Erosion	N. C.		43,490.00
2041	Bridge Painting	Bridge Repairs	N. C.		8,499.00
2042	Barkers Landing Bridge Repairs	" "	K		16,560.00
2049	South Market Street Bridge Repairs	" "	N. C.		14,897.00
2058	Frederica Bypass	New Construction	K	2.02	1,722,037.39
2065	Bridge Protection (Tax Ditches)	Miscellaneous	K & S		36,950.00
2078	Automatic Gates Lewes Bridge	"	S		8,990.00
2080	Bridge Replacements (Tax Ditches)	Bridge Replacement	K & S		43,812.10
2082	Dirt Roads		S	7.71	336,921.58
2085	" "		S	9.43	
2095	Woodland Beach Causeway	Bridge Repairs	K		14,360.00
2096	South Fenimore Bridge	" "	N. C.		11,210.00
2097	Riverdale Streets	Miscellaneous	S		7,480.00
2099	Dirt Roads		K	15.46	382,448.60
2101	Repairs to "Virginia C"	"	S		8,486.50
2105	Dirt Roads		S	12.24	266,000.00
2106	" "		S	8.72	192,183.09
2115	Bridge 102 on Road 612	Bridge Replacement	S		16,643.50
2116	Bridge 146 on U.S. 13A	Bridge Widening	S		17,501.20
			TOTAL		$14,355,486.42

TABLE III

CONTRACTS COMPLETED AND ACCEPTED

July 1, 1962 - June 30, 1963

Contract	Division	Contract Description
80-91	NC	Munsee
1694-1	K	Forrest Avenue, Dover
1466-2	NC	New Castle Maintenance Building
1632	NC	South Heald Street, resurfacing
1674	NC	Faulkland Road
1683	NC	Foulk Road
1740	S	Milford Bypass
1740-1	K - S	Haven Lake Bridge
1743	NC	Indian Field
1746	NC	Highland Woods
1757	K	Carpenter's Bridge
1763	NC	Bridge Replacements (Bridge 14 on Road 22 and Bridge 8 on Road 222)
1767	S	Stein Highway (U.S. 13 to Tull's Crossing)
1777	S	Bridge 438 on Road 382
1779	NC	Tuxedo Park
1799	S	Bridgeville to Cannon
1809	S	Road 549 (from Road 20 to Road 553)
1823	K	South Little Creek Road
1827	S	Double Bridges to Redden
1843	NC	South Union St. Connection (Wilmington)
1850	K	Intersection Alterations on U.S. 13
1858-2	K	South Bowers Beach Causeway
1861	NC	Bridge Replacements (Bridge 326 on Road 364 and Bridge 345 on Road 367)
1863	K	Dirt Road Program, Roads 91, 126, and 149
1870	K	Dirt Road Program, Roads 426, 427, 429, and 442
1880-2	S	Indian River Inlet Bridge Borings
1884	S	Dirt Road Program, Roads 256, 259, 233, 234, and 234B
1905	NC	Kirkwood Highway Crossovers
1925	NC	Bridge 437 on Road 30
1930	NC	Hare's Corner Intersection
1936	K	Dirt Road Program, Roads 214, 251, and 234
1981	NC	Augustine Cutoff and Concord Pike Intersection
1983	NC	Red Lion to Bear, resurfacing
1989	S	Bridge 460 on Road 381
2007	K	Dirt Road Program, Roads 131, 95, and 147
2009	K	Dirt Road Program, Roads 252, 263, 301, and 307
2010	S	Dirt Road Program, Roads 578, 588, and 602
2011	S	Dirt Road Program, Roads 506, 513B, 505A, 454C, 457, 502, 81, and 451
2013	S	Dirt Road Program, Roads 636, 627, 234, 236, and 264
2014	NC	Dirt Road Program, Roads 454, 468, 489, and 490
2014-1	NC	Bridge 461 on Road 468
2015	S	Dirt Road Program, Roads 567, 563A, 560, 526A, 548, 556, and 526
2016	K	Dirt Road Program Roads 173, 174, 170, and 167
2024	S	Dirt Road Program, Roads 424, 426, 410, and 337A
2028	NC	New Castle Bridge Repairs
2032	NC	Hot-Mix Program 1961 - 1962
2036	NC	Repairs to Red Lion, Dragon Run and Bayou Dykes
2037	S	Rehoboth Beach Groins
2041	NC	Painting 11th St. Bridge and South College Avenue Bridge
2042	K	Repairs to Baker's Landing Bridge North Pier
2043	S	Greenwood to Milford
2049	NC	Electrical repairs to South Market Street Bridge
2058-1	K	Frederica Bypass Borings
2059	NC	Foulk Road water line adjustment
2065	K-S	White Marsh and East Nanticoke Tax Ditches
2074	FW	Demolition and removal of structures
2078	S	Installation of automatic gates at Lewes Beach
2079	FW	Demolition and removal of structures
2080	K-S	Beaver Tax Ditch
2084	FW	Demolition and removal of structures
2087	FW	Demolition and removal of structures
2089	K	Resurfacing Program (1962 - 63)
2090	K	Initial and Retreatment Program (1962 - 63)
2091	S	Resurfacing Program (1962 - 63) east of U.S. 113
2093	K	Hot-Mix patching (1962-63)
2095	K	Repairs to Bridge 10A, Woodland Beach
2096	NC	Repairs to Bridge 392, South Fenimore Bridge
2097	S	Riverdale Streets, clearing and grubbing
2100	S	Resurfacing Program (1962 - 63) West of U.S. 113
2101	S	Festy Boat "Virginia C" repairs and painting
2102	S	Initial Surface Treatment Program (1962 - 63)
2103	FW	Demolition and removal of 45 dwellings
2112	FW	Demolition of 25 dwellings, FAI-2
2113	FW	Demolition of Dwire Provision Company buildings
2117	K	Supplemental Resurfacing Program (1962 - 63)
2118	FW	Demolition and removal of structures
2119	FW	Demolition of brewery building
2122	K	Slag or gravel roof, Sign Shop
2124	S	Supplemental Resurfacing Program (1962 - 63)
8155	S	Fertilization, north of Indian River Inlet
9013	S	Emergency road repairs at Indian River Inlet

CONSTRUCTION

This year 57 construction contracts were approved by the Department; 44 of these costing a total of $14,355,486.42 were awarded. The total construction cost of the roadway portion of these contracts was approximately $8.4 million. The Road Design Section handled approximately $5.2 million worth; the balance was prepared by consulting engineering firms under close supervision and review of Department personnel.

TABLE IV

PROJECTS APPROVED BUT NOT AWARDED
As Of June 30, 1963

Contract Number	Name
1920	Shipley Road, Washington Street to Wilson Road
1857	Limestone Road, Mill Creek to Pennsylvania Line
1974	Basin Road, Route 40 to I-95
1959	Route 26, Clarkesville to Bethany Beach
1978	Broadkill River Bridge, Route 14
1953	Duncan Road
1961	Wilmington Manor Crossovers
1673	Faulkland Road
1811	Lebanon Road Relocation
1808	Road 49, Route 5 to Route 18
1859	Millsboro Bridge and Approaches
1637	Center Road
2045	Terminal Avenue

It is a practice of the Department to attempt to maintain design facilities for a workload which can reasonably be expected from year to year. Avoidance of peaks of employment followed by layoffs when extraordinary work is completed is considered desirable for morale and economy. Accordingly, work such as interstate construction was designed by consulting firms.

Preliminary surveys are made by each of the county divisions prior to the actual design of the highway by the Road Design Section. Last year the heaviest survey load was handled by the New Castle County Division which completed 46.69 miles of preliminary surveys, including 16.37 miles of base line, 9.64 miles of detail, 6.05 miles of bench marks and 14.63 miles of cross sections. The Kent County Division surveyed 38.98 miles of roadway.

Following the road design, the land acquisition is handled by the Right-of-Way Division.

The first stage of actual construction is the staking of the route. This is handled by county divisions or, in the case of interstate highways, by the Freeways Division. New Castle County construction staking included 16.49 miles of construction center line, 16.82 miles of right-of-way staking, 20.76 miles of construction staking, and 6.96 miles of final cross sections.

After a contract is made by the Department with a construction firm, the activities of the firm are supervised to make certain that each phase of the work conforms to the specifications. The county divisions and the Freeways Division were assisted by the Materials and Research Section in this activity.

During the year 129.23 miles of highways were completed and opened to the public; 16.99 in New Castle County; 45.33 in Kent County; 65.57 in Sussex County, and 1.34 miles of the Interstate System. During the reconstruction of existing roads Department policy is to maintain at least one lane of traffic whenever possible. The closing of roads is avoided except when such a policy might have severely affected the quality of construction.

MAINTENANCE

The Maintenance and Equipment Section provides assistance to the county divisions which are directly responsible for maintenance of highways. The general objective is the use of uniform maintenance practices to provide attractive grounds and roadways which contributes to public health, safety and convenience.

Drainage

The Kent County Division cut 120,000 linear feet of ditches and placed more than 900 linear feet of various sizes of pipe in

Typical winter damage suffered by thinly-paved secondary roads. Modern design and construction methods minimize this type of damage.

fighting drainage problems. Cooperation with the U.S. Soil Conservation Service on the Beaverdam and White Marsh Tax Ditch Systems consisted in replacing pipe with larger sizes and at new elevations as necessary.

Prison labor was satisfactorily used by the New Castle County Division in cleaning and repairing drainage ditches. In addition to routine activities, 16 drainage projects totalling 3.85 miles were surveyed and reports were submitted.

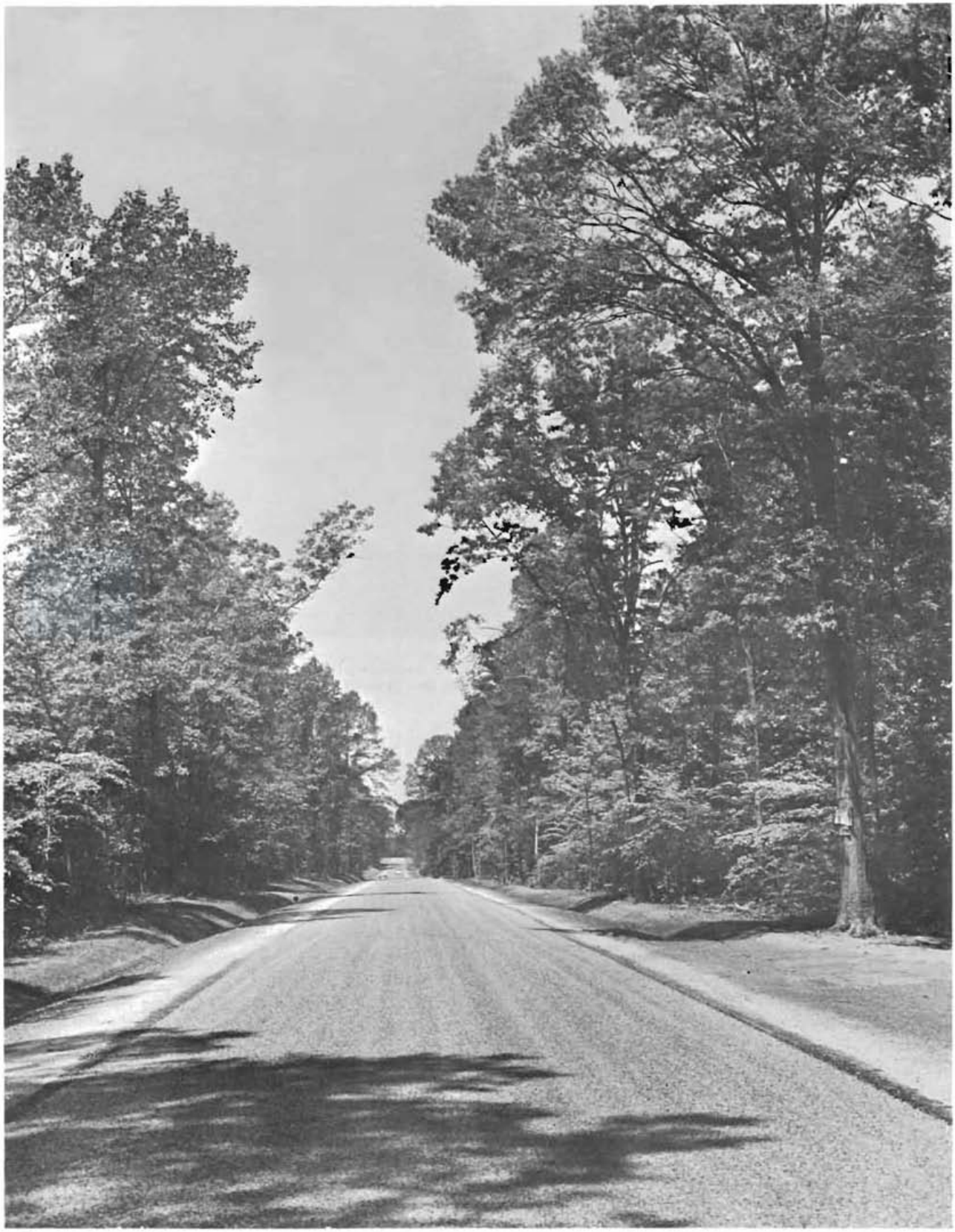
The Sussex County Division found that four all-purpose excavators working continuously were unable to maintain drainage facilities on and adjacent to the highways. It recommended the acquisition of an additional unit as soon as possible.

Repairs

General road repair included a variety of activities such as hauling borrow, repairing potholes, patching concrete, sealing cracks, and surface treatment.

The Kent County Division moved approximately 74,000 cubic yards of borrow in combating erosion. Surface repairs required 3,000 tons of cold-mix patching material, 130 cubic yards of concrete, 188,000 gallons of asphalt, 8,400 tons of stone, and 102,000 pounds of crack sealer on hot-mix roads. In addition, three contracts were awarded for the resurfacing of 260 miles of secondary roads.

The severe winter in New Castle County resulted in extensive road surface damage. The repairs caused by this damage affected the surface upgrading program because of the limited funds. The New Castle County Division used 13,105 tons of patching material, 177 cubic yards of ready-mixed concrete, 524,700 gallons of asphalt for surface treatment and 24,500 tons of stone in repairing damage to road surfaces.



Secondary road which has been surface treated by New Castle Division maintenance personnel.

Maintenance crew repairing storm damage on Delaware 14 near Indian River Inlet. Note sand accumulation on shoulders as a result of the March 1962 storm.

In combating road damage and drainage problems, the Sussex County Division used 10,500 tons of stone, 8,100 tons of slag, 285,000 gallons of asphalt and 4,500 feet of reinforced concrete pipe. The $450,000 required to resurface 4,000,000 sq. yds. was insufficient to preserve road surfaces or assure safe travel.

Five division-designed patching units were acquired for improved high-speed patching of either concrete or surface-treated roads and streets. The units are long wheelbase, 26,000 GVW trucks equipped with 100 cfm compressors, hydraulically-controlled front-end compaction rollers, plus the necessary accessories for cutting concrete and macadam and tamping the material as it is being placed in the patch.

Other maintenance activities included roadside care such as mowing grass and weeds and trimming trees and bushes during the warmer months, and snow removal in the winter.

Mowing

The Sussex County Division reported the mowing of parkway and roadside areas constituted the largest single expense for maintenance. In consultation with representatives of various chemical and equipment companies, three steps to achieve major reduction in this cost were tested. The application of grass growth inhibitors on Route 13 near Bridgeville resulted in a reduction of 50 percent in required mowing. The application of chemical vegetation killer around guardrail posts, sign posts and other obstacles, where mowing machines could not be used, resulted in the savings of hundreds of man-hours when compared with hand trimming operations. The third step was the acquisition of combination tractor brooms and mowers which permitted year-round use of the power units rather than seasonal usage for mowing only. Flail type mowers were installed on some of this equipment which has proven successful, and more economical than the rotary mowers.

Snow removal teams assemble at the New Castle Division maintenance headquarters.

Snow Removal

The use of chemicals in combating snow and ice was increased this year with generally successful results. Major primary roads were placed on a bare-pavement maintenance program.

In Sussex County the program included U.S. Route 13 and U.S. 113 from the Maryland line in the South to the Kent-Sussex line north of Milford. Two complete truck-mounted bulk salt spreaders were acquired from federal excess stock, and, through advertised bids, four spreader units for mounting on State-owned trucks were purchased. Part of the maintenance building near Blades was converted for storage of bulk salt and a new 24' x 90' building was constructed in the Gravel Hill maintenance yard for the same purpose.

Resurfacing

An extensive program of hot-mix resurfacing of old, narrow roads in New Castle County was undertaken. A total of 232 miles of roads are treated with hot-mix resurfacing or surface treatment. This program received very favorable comment.

Suburban Developments

The Road Design Section approved -- as provided by law -- construction plans and construction bonds covering $1,404,001.20 of street construction in suburban developments outside the boundaries of incorporated towns.

The Department accepted for maintenance 16.921 miles of streets all of which had been constructed in accordance with Department standards.

The New Castle County Division is responsible for 392.03 miles of streets in suburban developments -- more than 90 percent of the total -- and reported that construction is in progress in 61 developments in New Castle County.

TABLE V
SUBURBAN DEVELOPMENT STREETS
ACCEPTED INTO THE
MAINTENANCE SYSTEM
July 1, 1962 - June 30, 1963

	Miles
Alban Park	0.145
Albertson Park	0.308
Brandywine Estates	0.676
Brandywine Springs Manor	0.380
Briar Park (K)	0.049
Catalina Gardens	0.463
Claymont Manor	0.086
Cleland Heights	0.137
Coventry	0.946
Devon	0.165
Eastburn Acres	0.900
Gordy Estates	0.088
Grendon Farms	1.334
Heatherbrook	0.491
Hillendale	0.094
Jefferson Farms	0.129
Limestone Acres Add.	0.285
Llangollen Estates	0.220
Longwood	0.488
Manette Heights	0.218
Maplecrest	0.255
Meadowood	0.795
Munsee (SD-91)	0.354
Northwest Dover Hts. (K)	0.029
Old Mill Manor	0.606
Overview Gardens	0.079
Parkwood	0.111
Penn Acres	0.342
Pleasant Hills Estates	0.415
Rambleton Acres	0.865
Rodney Village (K)	0.173
Rosegate	0.663
Sheridan Square	0.572
Stockton	0.634
Stratford	0.546
Sycamore Gardens	0.886
Todd Estates	0.803
Welshire	0.252
Westgate Farms	0.982
West Park	0.057
TOTAL	16.921

BRIDGES

The Bridge Section revicwed and sent to the Bureau of Public Roads -- for type, size and location approval -- preliminary plans for 38 bridges to be constructed on the Interstate System. Twenty-one were approved and returned to the consultants for detail design; the others are still being considered.

Twenty-five contracts were awarded for other than interstate work for the widening or replacing of 28 structures and the repair of 13 others. Eleven of these contracts were completed.

Design of the South Wilmington Viaduct, a part of the Interstate System, was nearly completed. This structure, to be about 5,500 feet long, will be constructed across the tracks of three railroads, including the elevated, electrified main line of the Pennsylvania Railroad Company. Agreements were negotiated with each of the railroads as to construction and future maintenance of the part of the viaduct that affects each railroad by paralleling or crossing its property.

This Section closely supervised the driving of test piles in connection with the design of this structure.

A contract for a bridge on Frederica Bypass was awarded; a new high level structure at Indian River Inlet was started; work was continued on Drawyer's Creek for the southbound lane of Route 13; and the new Taylor's Bridge was nearly completed. The construction problems on the north and south approaches to the Drawyer's Creek Bridge were unusual in that piles were driven to support a reinforced concrete slab roadway as this was considered more economical than an attempt to stabilize the marsh area. This gives, in effect, a bridge 1458 feet in length free from future settlement. Seven other structures were completed on contracts awarded last year.

Special problems analyzed this year included those caused by the Dirt Road Improvement Program and the traffic problem at the bascule bridge over the Lewes-Rehoboth Canal at Lewes, Delaware. The improvement of many secondary dirt roads had been completed without a corresponding improvement in the bridges along these roads. An analysis of these structures resulted in a relatively large inventory of necessary bridge construction. The design and construction of automatic gates for the bascule bridge at Lewes was completed. This greatly increased the potential vehicular traffic which could be handled between openings of the bridge for navigation on the canal.

Drawyer's Creek southbound U.S. 13 was given a new alignment to reduce excessive curvature and replace a badly deteriorated reinforced concrete bridge. The new alignment is expected to improve a previous accident hazard.

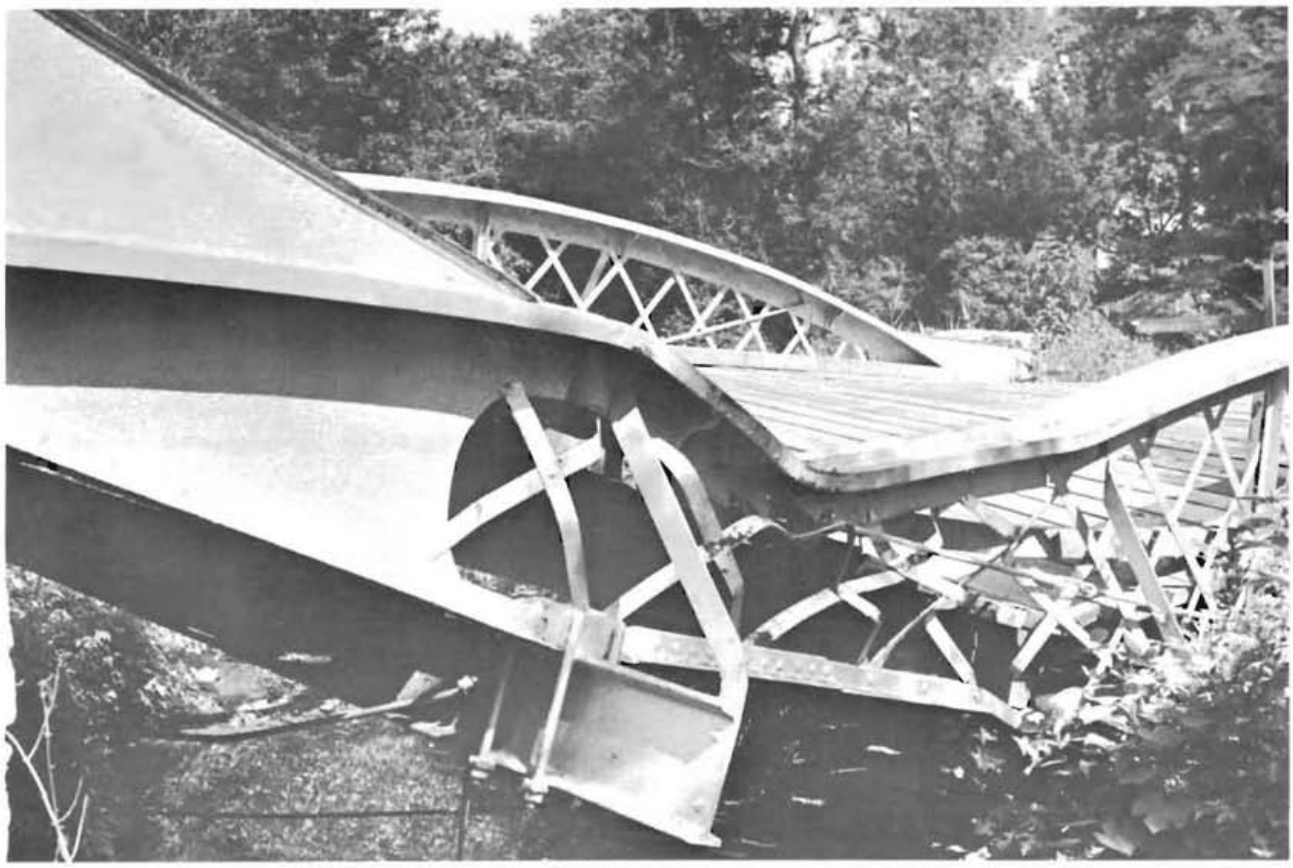
Tax Ditches

Another special problem had been caused by the cleaning and lowering of the beds of various tax ditches by the Soil Conservation Service. Estimating the State's share of the cost of bridges affected by this activity was extremely difficult because the Soil Conservation Commission could not say definitely which work would be undertaken. Nine bridges affected by this program were repaired or replaced; a tenth was placed under contract. The lowering of a stream bed before protective bridge work could be undertaken had damaged or undermined bridges, thus requiring complete renewal at greater costs than might otherwise have been the case. Control of this procedure was recommended.

Storm Damage

Following the storm in March 1962, the timber trestle on the north approach of the Charles W. Cullen Bridge at Indian River Inlet had been repaired on an emergency basis with steel "H" beam piling and 36-inch deep steel needle beams across the bridge roadway to support the deck without assistance from the timber bents. An inspection this year revealed that without such repair the bridge could have collapsed. Certain of the timber piles were out of position from under the caps and no longer supported them, and several entire timber bents moved an unreasonable amount under impact.

Other damage to bridges was mainly the result of overloads or deck deterioration. Four bridges were irreparably damaged because of overloads; one was placed under contract for repair and three were posted for restricted loading. The use of heavier service trucks and the wider use of services such as bulk milk pickup and fuel, oil and gas delivery to people in rural areas continued to take a toll on bridges throughout the State. The legal load limit for vehicles exceeded the strength of many of the



One of the many old truss bridges which collapsed under overloads.

light steel truss bridges which were built years ago. Also, older, light concrete and timber structures have deteriorated with age. Approximately 100 timber bridges which had been hastily constructed after the storm of March 1962 showed extreme signs of decay and the need for early replacement.

Deck deterioration on three bridges in New Castle County was found to be so severe that plans were begun for renewal even though funds had not yet been appropriated. It will cost many thousands of dollars to replace the decks of the Washington Street Bridge built in 1922, the 11th Street Bridge, built in 1932-33, and the Cranston Heights Viaduct built in 1939-40.

The six bridges maintained by the New Castle County Division were opened 4,589 times. The 3rd Street Bridge -- opened 2,093 times -- was closed for three days for repairs to a counterweight link casting. The sidewalk expansion plates and the electrical conduit for roadway lighting were replaced on Augustine Bridge.

INTERSTATE SYSTEM

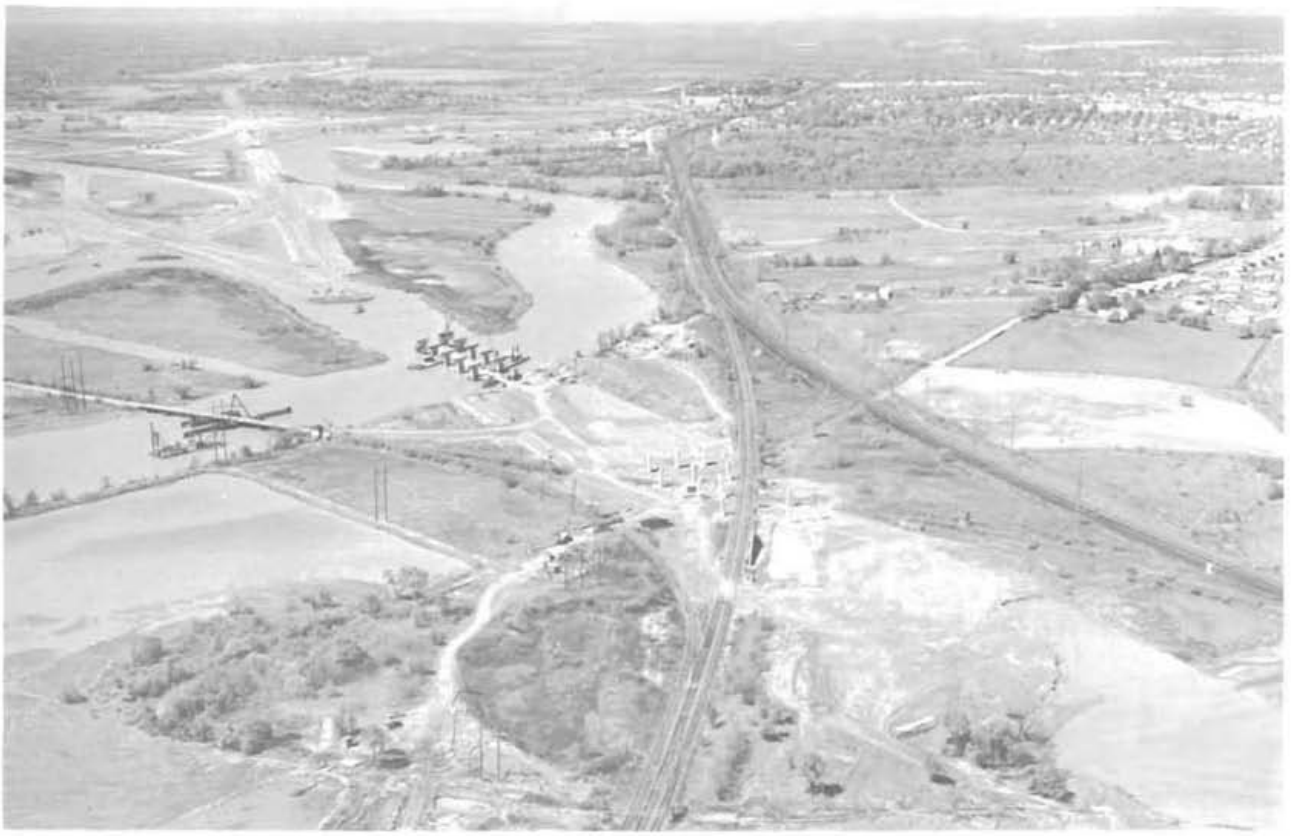
An important link in the Interstate System will be the Delaware Turnpike. The annual report of the Turnpike Division was published separately for the calendar year 1962.

At the end of this fiscal year, the roadway was nearly completed, the paving contract was awarded, construction on the service area buildings and the administration building was in progress and all bridge construction was completed.

At the request of the Maryland State Roads Commission, the Department authorized an attempt to have the turnpike ready for a mid-November opening, six weeks prior to the initially-planned completion date. Progress reports indicated

Box culvert of the type used to replace some of the old steel truss bridges removed from service due to damage.

Rumble patches of rough material, placed at decreasing intervals, alert the driver as he approaches this intersection; the usual warning devices were not sufficient here.



The junction of I-95 and I-295 at the north end of the Christiana River Interchange. Also shown are the unfinished bridges over the Christiana River and the PRR tracks.

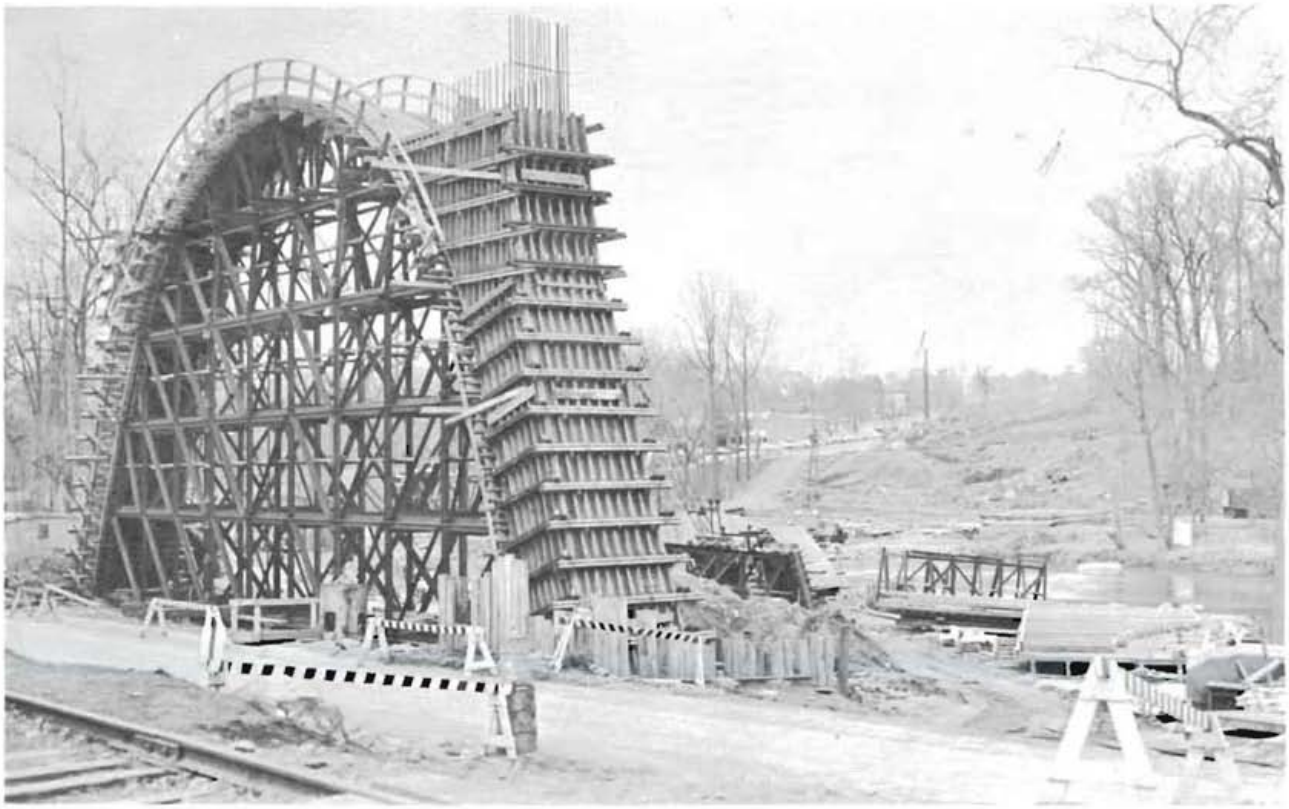
the road would be ready if weather permitted.

In other Interstate activity, primary attention was given to the roadway through the Christina River Interchange which joins the Delaware Turnpike at Basin Road to the Farnhurst Interchange. The route is scheduled for completion in time for the opening of the Delaware Turnpike in mid-November of the next fiscal year.

Authorization to proceed with the reconstruction of southbound Basin Road was given in September, 1962. The old road remained in service until the new northbound Basin Road was opened to traffic in November.

At the Christina River Interchange, four months of continuous round-the-clock operations were necessary before roadways, connections, and ramps were seen above the water level. This was the largest single construction contract ever undertaken by the Department. Dredges and clamshells, dozers, and draglines gnawed, gouged, and chewed into the muck of the marsh and disgorged it into disposal areas. Simultaneously, other dredges and machines delivered special fill from a variety of sources into designed muck-free areas. Approximately 5,242,580 cubic yards of borrow were placed underwater in connection with this project, and 3,135,960 cubic yards of earthwork was hauled into place above the water line. By the end of the year the grading of this most important interchange was nearly completed. A contract for paving a portion of the roadway had already become active along the important link between the Farnhurst Interchange and the Delaware Turnpike.

The Brandywine Crossing in Brandywine Park, Wilmington was begun in August, 1962, and by the end of the year some of the graceful parabolic arches were com-



A view of Brandywine Crossing Bridge showing in detail the forming of one of the parabolic arches.

pleted. Also, two contracts were awarded in August for the beginning of the I-95 Route north from the Christina River Interchange through the City of Wilmington. One contract included three bridges, one over the Christina River, another over the Pennsylvania Railroad, and the third over Little Mill Creek. The second contract provided for the construction of the roadway from the Christina River Interchange to the South Wilmington Viaduct. Both of these contracts were active at the end of the year.

Demolition contracts for the removal of houses and buildings were in progress along the path of the I-95 Route through the City of Wilmington where it has been known as the Adams-Jackson Street Route. Nine contracts were awarded for the demolition of a church, a brewery, a drugstore, a theater, and 193 dwellings.

In the spring of 1963 the Freeways Division was given the added responsibility of determining -- for projects under its control -- the earthwork quantities for payment. This led to the formation of a drafting room within the division. Here the cross sections are plotted, areas and volumes are calculated and an up-to-the-minute tabulation of all earthwork quantities is maintained.

PUBLIC WORKS

The General Assembly authorized the Department to undertake the study, design, construction, and maintenance of various public works projects involving dams, dikes and tide gates, and shore protection. Responsibility for beaches and public lands had also been placed with the Department.

The Bridge Section worked on preliminary investigation and design for several projects with the Game and Fish Commission. These included Garrisons Pond, Andrews Lake and Silver Lake (Milford) in Kent County, and Portsville, Collins, and

Heavy mechanized equipment was used to repair sand dunes damaged by the 1962 storms. Snow fence has been found to be an effective means of causing dunes to grow.

Millsboro Ponds in Sussex County. Other studies included impoundment at several of the tidal streams where control structures were recommended when practicable.

The Sussex County Division continued a limited program of erosion control for beach dune strengthening. Excess sand which accumulated in roadside areas was hauled to the shore side of protective dunes. Sand fence totaling 65,000 feet was erected parallel to a fence built by the Corps of Engineers contractors at elevation 10. These fences with their sand accumulation, have provided additional protection from elevation 10 to a new elevation of 14 with a lateral depth at the top of the dune of about 10-15 feet.

No planting or seeding was undertaken on the dunes or the backing areas, but the recuperation of the natural beach and marsh grasses, and to a minor degree other sand-retaining vegetation, was highly encouraging. This growth was accelerated and enhanced greatly in an experimental area between Indian River Inlet and the former Coast Guard Station by the application of pellet-type 10-10-10 fertilizer from an airplane at a rate of 20 pounds per 1,000 square feet.

Another experiment was conducted on the beach in the former Coast Guard Station area. Ocean-deposited sand at the high water mark was pushed by bulldozer and carried by pans to build up the emergency dunes on their ocean side to a slope of 1:20. This dissipated the destructive potential of an incoming ocean wave by forcing it to roll up the incline at a steady rate, thus preventing a massive punch at any one point. The results determined by close controls were gratifying and indicated this was a practical and economical means of protection against storm damage.

The emergency dune through Bethany Beach which was washed out in the storms of November 1962 was rebuilt to elevation 10 from the town's southern limits to the

northern limits with hauled-in common borrow.

In the course of working on beach protective dunes a glaring deficiency which detracted from the value of work accomplished by the Department was revealed: Privately owned lands adjoining State lands were deficient in their protection. Necessary legislation was recommended which would require proper protection on privately owned beach front.

SAND FENCES

In addition to sand fence erected on the dune line, approximately 30,000 feet of fence was placed along Route 14 and its lateral roads and ditches to prevent the accumulation of sand in the roadways and drainage facilities.

PLANNING

The planning and regulation of the various activities undertaken by the Department includes traffic control, highway research analysis, testing materials, landscaping and highway beautification, maintenance of picnic and roadside rest areas, snow removal functions, and liasion activities with other agencies.

Continuing analysis of data related to highway needs was made in the preparation of 19 major comprehensive annual statistical tables for the federal government. These tables include such information as motor fuel consumption, highway income, and motor vehicle registration. The Road Life Study determined the cost of operating the highway plant. The average life of various pavement types was estimated from construction records.

TABLE VI
MILEAGE OF STREETS AND HIGHWAYS BY SURFACE TYPE BY COUNTY
DELAWARE
JULY 1, 1963

Surface Type	Kent	New Castle	Sussex	Totals
Brick	---	0.12	---	0.12
Concrete	109.33	115.08	112.10	336.51
Bituminous Concrete	146.91	478.83	253.31	879.05
TOTAL PAVED	256.24	594.03	365.41	1,215.68
Other Low Type Bituminous	19.86	93.87	32.90	146.63
Bituminous Surfaced Treated	524.64	416.53	1,047.53	1,988.70
Soil Surfaced	227.10	47.80	190.28	465.18
TOTAL SURFACED	771.60	558.20	1,270.71	2,600.51
Graded and Drained Earth	6.86	2.30	233.88	243.04
Unimproved	---	---	1.34	1.34
Primitive	---	0.41	1.07	1.48
TOTAL UNSURFACED	6.86	2.71	236.29	245.86
TOTAL NON-DIVIDED HIGHWAYS	1,034.70	1,154.94	1,872.41	4,062.05
DIVIDED HIGHWAYS				
Contrete	37.61	35.86	28.95	102.42
Bituminous Concrete	7.84	49.70	11.98	69.52
Low Type Bituminous	---	0.17	---	0.17
Bituminous Surface Treated	---	0.38	0.58	0.96
TOTAL DIVIDED HIGHWAYS	45.45	86.11	41.51	173.07
TOTAL ALL HIGHWAYS	1,080.15	1,241.05	1,913.92	4,235.12

The State Road Inventory was continued; New Castle County was completed. The inventory included total mileage, surface type widths, roadside culture and other pertinent information needed for mapping and other purposes.

The Statewide Accident Study Program which indicates deficiencies in drivers, roadway characteristics, traffic controls, or other safety factors, was expanded and revised. This study included the measurement of the need for traffic safety programs, the adequacy of current accident prevention activities, and specific accident prevention needs. This study was valuable in determining specific legislative requirements.

The annual Loadometer Study established truck weights and trends which are important in design criteria. The study also provided information which aided determination of equitable tax rates and regulation of vehicles. A major study completed was the Pavement Evaluation Survey of the Primary Highway System. A draft policy for the acceptance of tertiary roads and streets was also finished.

The annual fiscal study of the municipalities and counties reported the receipts and expenditures of funds related to the construction, maintenance and administration of roads, streets, alleys and other public ways; traffic police; debt service, status of bonds, and other financial obligations related to the highway user; and the use of any surplus road and street funds for nonhighway purposes.

The Planning and Review Section makes an annual inventory of all eligible streets in each municipality and prepares listings and maps for this purpose.

Maintenance Administration

In cooperation with the New Castle, Kent and Sussex Divisions the Maintenance and Equipment Section prepared 123 proposals for bidding purposes. There were 52 equipment proposal contracts, 62 material proposal contracts, 6 proposals for resurfacing contracts and three proposals for hot-mix contracts.

In preparation for snow removal and winter maintenance of State highways, 35

TABLE VII

MILEAGE OF STREETS AND HIGHWAYS BY SYSTEM CLASSIFICATION BY COUNTY

Interstate (F. A. P.)	---	37.91	---	37.91
Primary (F. A. P.)	129.33	170.32	263.33	562.98
Secondary (F. A. S.)	412.46	345.37	695.50	1,453.33
Tertiary	*538.36	*687.45	*955.09	*2,180.90
TOTAL	1,080.15	1,241.05	1,913.92	4,235.12
* Includes: H. B. 256	13.51	354.82	6.55	374.88
S. B. 387	10.88	37.21	31.18	79.27
TOTAL	24.39	392.03	37.73	454.15
ADDITIONAL BREAKDOWN OF SYSTEMS				
Interstate	---	37.91	---	37.91
Primary Rural	108.90	77.01	240.16	426.07
Primary Urban	14.10	90.08	2.60	106.78
Primary Municipal	6.33	3.23	20.57	30.13
Secondary Rural	385.08	235.59	666.17	1,286.84
Secondary Urban	7.99	107.31	4.64	119.94
Secondary Municipal	19.39	2.47	24.69	46.55
Tertiary Rural	526.43	331.82	943.40	1,801.65
Tertiary Urban	3.35	354.53	0.58	358.46
Tertiary Municipal	8.58	1.10	11.11	20.79

equipment rental agreements were drawn up with contractors throughout the State of Delaware prior to November 15, 1962. During the winter it was necessary to activate 16 of these contracts.

TESTING

The Materials and Research Section provided preliminary analysis for all projects advertised for bids, including soil surveys, borings, settlement analysis, foundation design, pavement and mix design, and checking of plans and specifications. On all awarded contracts the source of supply, producer, and manufacturer were approved before any materials were used in construction work.

During the year the county divisions cooperated with this Section by taking over the field control of some materials, mainly in soils work. Materials and Research Section personnel continued to function in an advisory and consulting capacity.

A system of random sampling was established as a check on results shown by job control sampling and testing. There were approximately 930 random samples and tests made during the year.

Additional materials tested included gasoline, oils, paper and chains, safety glass used in the automobile industry, paints, epoxy resins, concrete admixtures, and new products introduced during the year.

An erosion test section was established on southbound Route 13 just below Milford. Extensive research was performed using water reducing agents in concrete. Willow Grove Bypass was used as a test section for this with the U.S. Bureau of Public Roads participating.

The research section began work in conjunction with the State of Maryland, the U.S. Bureau of Public Roads, and the Highway Research Board by establishing test sections along the toll road beginning at the Delaware Memorial Bridge and extending to Baltimore, Maryland. The results of these tests will be used in conjunction with those already completed on the multimillion dollar test road constructed in Illinois under the supervision of the American Association of State Highway Officials. The end result of such research is to further the advancement of highway technology which benefits both the motoring public and the taxpayer.

Because of the quantity of the additional testing required, and because of the volume of Freeway construction in New Castle County, a permanent laboratory was established on New Castle Avenue. This laboratory was used to test soils used on the Freeway System.

A manual describing procedures for sampling and testing was completed. It is to be used by all construction divisions to foster statewide uniformity in sampling and testing. As new methods are approved they will be included in the manual.

TABLE VIII

A comparison of work done by the Materials and Research Section during the past two years is shown in the following table:

Materials Tested	Number of Tests 1962	1963
Asphalt	2,878	3,875
Hot-mix gradation	2,261	1,063
Concrete compression	2,248	4,359
Air entrainment	401	588
Slump	484	730
Fine aggregate	242	608
Coarse aggregate	1,632	3,107
Soil analysis	11,952	14,129
	Linear Feet	
Soils borings	12,950	17,011
	Number Tested	
Borrow pits	292	818

SIGNS, SIGNALS AND SAFETY

The safety of motorists and pedestrians is the primary goal of traffic engineering -- the application of engineering to the solution of traffic problems by providing highways with proper signs, signals, pave-

ment markings and other controls for the adequate and convenient movement of traffic.

The activities of the Traffic Section during the 1962-63 fiscal year included the design, installation, and maintenance of traffic signals, highway lighting and marking. Studies relative to signalization, speed, parking, crossover, channelization, and turning were made where the volume of traffic and related factors warranted.

In the performance of its duties the Traffic Section cooperates with the Delaware State Police, the Delaware Safety Council, and various civic and community organizations in the State which are interested in reducing accidents on Delaware highways. The State Police are particularly helpful in making recommendations for the location of traffic signs and signals and assisting with traffic studies.

The Department feels that effective traffic signing is a vital part of the Delaware roadway system. Signs are the fundamental and, many times, the only means of communicating with the motoring public. A simple, uniform signing pattern is, therefore, considered the most effective.

On April 11, 1963, a special sign clinic was held at the traffic sign shop in Dover. This clinic was cosponsored by the Traffic Section and a leading sign manufacturing company. Mayors and town managers from all towns and cities were invited to attend.

The discussion included such topics as a systematic traffic sign survey, a most important first step in sign improvement and maintenance, the method of establishing a program, the techniques in implementing such a program, and the latest equipment available in this field. The clinic emphasized the need for standardization in signing. One of the major results of this forum was numerous requests for copies of the National Manual On Uniform Traffic Control Devices For Streets and Highways which was adopted by the Department as its standard.

The increasing population of New Castle County, which caused a greater demand for highway facilities, also resulted in an increase in the number of schools and a problem in the maintenance of the warnings painted on the highways for schools and school crossings. During recent years, a reduction has been made in the words of the warning until now only the word SCHOOL is in use.

All major divided highway school crossings were indicated by an overhead sign bearing the word SCHOOL. This relatively maintenance-free signal has a greater impact on the driver than the roadside sign or even the word painted upon the road surface. The service life expectancy of seven years compares favorably with the less than one year life expectancy for words painted on the roadway.

This year marked the first time that a major signal rebuilding program was undertaken, apart from the regular highway construction contracts. Eight intersections were completely rebuilt as part of the unit price contract drawn exclusively for signal work.

A total of five new signals was installed, bringing the total traffic lights now under the care of the Department to 218.

Control equipment was altered at 18 intersections which were not included in the reconstruction contracts. These alterations were made to provide additional capacity and usually took the form of changing from semi-actuated to fully actuated, or to volume-density operation.

As part of a program of upgrading traffic signals, tests were completed on two types of detectors using sound waves to count vehicles. Both of these units were found to be satisfactory and were used extensively.

During the painting season, the Traffic Section had three striping machines in operation throughout the State. These machines used 12,857 gallons of white paint

New type of school crossing sign, being overhead, is more conspicuous than the surface markings and the flashing lights make it evident when school is in session.

in applying 1,548 miles of centerlines and 197 miles of edge lines in addition to painting numerous stop bars, STOP AHEAD and STOP markings, directional arrows at intersections, school markings, and crosswalks at schools. Pavement painting operations required 6,963 gallons of yellow paint in applying 422 miles of barrier lines.

Traffic Maintenance

Traffic maintenance crews erected 7,999 new signs, replaced 5,419 signs, straightened 776 signs, reset 127 signs, installed 116 bridge panels, erected 11,376 new posts, painted 14,435 posts, replaced 2,055 reflectors, and erected 614 snow stakes.

In addition to making 11,711 new signs during the past fiscal year, the sign shop made 105 special license plates and 8,172 inserts for the Motor Vehicle Department.

Upon recommendation of the Traffic Section, 71 resolutions were approved by the Department for the control of traffic. These resolutions were for all types of traffic control devices, including signals, and speed limit, parking, and stop signs. Over 300 locations were covered by these resolutions.

The Controller's Office collected over $4,000 for damage to signals. Damages were collected only in cases where the Traffic Section received a report from the State Police. In many cases no one was seen doing the damage, much of which was from gun fire; this undetected type of damage results in far more expense to the Department.

An initial and final signing plan was designed for Interstate 95 between the Delaware Memorial Bridge and the Maryland State line. The plan recognizes the fact that this will be a high volume, high speed facility, that a reasonable compliance to the AASHO Manual For Signing And Pavement Markings Of The National System Of Interstate And Defense Highways was required by the Bureau of Public Roads, and that many important destinations will be possible for the motorists using the complex interchange along this route.

A large number of the signs will be placed overhead with a maximum of two destinations per sign and sufficient space between signs to permit adequate comprehension and decision time. The plans call for the illumination of guide signs as necessary for the safe and effective movement of traffic.

LAND ACQUISITION

At the end of the last fiscal year bond monies were made available for the acquisition of the remaining lands along the alignment of Interstate Route FAI-1, known as "The Delaware Turnpike." It was considered desirable to acquire the remaining properties as quickly as possible. In the absence of Federal restrictions, right-of-way or right-of-entry was certified along the entire alignment prior to the award of the first construction contract on May 1, 1962.

This speed, however, was not achieved without problems. The most significant of the problems was the amount of compensation to be paid for the property acquired. During the interval between the announcement of the plan to construct the turnpike and the time the right-of-way negotiators started work, a period of 4 years, property values increased phenomenally.

Another difficulty which resulted from the pressure for fast acquisition can only be described as intangible, but it is important nevertheless. The Department has long enjoyed wide recognition for the courteous treatment accorded those whose properties are affected by highway construction or modification. The understanding manner of the negotiators has always been a matter of considerable comment; however, the shortening of the lead time on this project placed this excellent reputation in some jeopardy. This problem was alleviated by the selection of highly competent attorneys, appraisers, and real estate agents to assist the personnel of the Right-of-Way Section. Considering the magnitude of the project, it must be stated that the right-of-way problems have been minimal.

Personnel from all sections of the Department attended classes on right-of-way subjects.

Right-of-Way Training

An educational program was conducted by Temple University for the Right of Way Section. Classes included condemnation law, contract procedure, plan reading, plan preparation, description writing, description interpretation, appraisal techniques, and public relations. This course began in October and continued through March for a total of 160 hours. Personnel from other divisions and sections attended and the results of this program were very satisfactory.

Two members of the Right-of-Way Section successfully completed courses in training in real estate appraisal as presented by the American Institute of Real Estate Appraisers. It was recommended that the Department authorize the attendance each year of two men from the Right-of-Way Section to these very informative sessions, since persons completing the entire curriculum are awarded the designation MAI (Member of Appraisal Institute), the highest classification obtainable in this field.

PERSONNEL

The Department's 1,265 employees included 662 on salary and 603 on hourly wages. There are 57 professional engineers, of whom 31 are also Registered Engineers.

A revised personnel manual was issued to new employees. It describes the duties, privileges, benefits, and responsibilities of the employee and includes a short history of the Department.

A group life insurance program was instituted whereby employees, through payroll deductions, may be insured for an amount equal to their annual salary, plus coverage for accidental death and dismemberment. Dependents may be included upon payment of an additional premium but with substantially lower benefits. Claims of $28,000 were paid this year to beneficiaries.

In cooperation with the Department of Public Instruction, the Highway Department selected 37 current high school graduates who did not plan to attend college to participate in a technical training program during the summer months. The program

TABLE IX

Following is a tabulation of the various activities of the Right-of-Way Section during the reported year:

	Freeway and Turnpike	New Castle	Kent	Sussex	Total
Options obtained	121	53	163	571	908
Easements	0	59	128	585	772
Agreements, misc.	0	0	68	108	176
Descriptions	190	50	109	550	899
Deeds executed	164	56	65	26	311
Releases obtained	43	33	37	22	135
Plats prepared	80	50	5	0	135
Condemnations settled	2	3	6	9	20
Condemnations heard	14	2	0	1	17
Borrow pits purchased	0	0	0	2	2
Demolitions	169	0	0	0	169
Houses sold	2	0	0	0	2

TOTAL RIGHT-OF-WAY EXPENDITURES

Interstate and Turnpike	$ 2,312,055.13
New Castle County	232,468.18
Kent County	166,016.13
Sussex County	126,784.87
TOTAL	$ 2,837,324.31

was administered and conducted by the University of Delaware during the period June 17 to August 23 and was under the immediate direction of the University's Civil Engineering Department.

The students were required to live on campus, and the total cost of tuition, room and board was borne by the Department. However, the students were required to purchase their own books, drawing instruments, and supplies.

A full daily program, Monday through Friday, included instruction by the University in mathematics, surveying, engineering, drafting, and materials. In addition, various representatives of the Department gave two-hour orientation presentations on various aspects which were not included in the university program. Also, field trips to maintenance and construction projects gave the students an insight into the practical application of their studies.

The Department plans to offer permanent employment to those students successfully completing the program.

Consulting engineers completed five years of efforts to improve efficiency in operations with a three-phase training program. A pretest helped determine the needed courses and a subsequent test measured the growth of the individual employees. The program provided valuable information for future personnel and training policies.

ORGANIZATIONAL CHANGES

On April 1, 1963, the responsibility for reviewing plans drawn by consultants was transferred from the Road Design Section to the newly-activated Review Section which was incorporated in the Planning and Review Section.

The Delaware Interstate Highway Division was succeeded on February 6, 1963, by the Delaware River and Bay Authority. The association of the director of operations, the chief engineer, and the assistant chief engineer with the facilities for which the Authority was responsible was continued.

OFFICE ENGINEER

In addition to the detail associated with the letting of contracts, the Office Engineer supervises the activities of the Special Assignments, Federal Aid, Special Hauling Permits, and Outdoor Advertising Sections, and the purchasing of office supplies and equipment.

Special Assignments

The Special Assignments Section is working on the development of a Concurrent Audit Manual. This is being done at the request of the United States Bureau of Public Roads. The manual, when completed, will delineate in considerable detail the duties, responsibilities, activities, and procedures of every phase of contract administration, supervision, approval and acceptance.

The Special Assignments Section also conducts the Department's duties with respect to Civil Defense.

Hauling Permits

The increase in overweight or oversize vehicles paralleled the general increase in traffic. Extraordinary weights are permitted to traverse only routes which can readily accomodate them. No pavement is constructed to carry unlimited loads and the regulation of this traffic is an effort to minimize excessive wear.

Fees charged for permits are administrative. There were 14,076 permits issued for oversize and overweight vehicles at fees totaling $89,419.02.

Outdoor Advertising

The Department continued a program of controlling outdoor advertising for both safety and esthetic reasons. Contrasted with this is the desire to maximize competitive opportunities in this field of private enterprise. Outdoor advertising was limited only as needed to prevent the cluttering of roadsides at intersections so that traffic signs and signals will not be obscured.

The Department issued 2,272 permits for the erection of approved types of outdoor advertising. The fees collected totaled $4,713.00.

UTILITIES

The Utility Section conducted close and continuous liaison with utility companies and contractors on all projects. The timely and detailed notice of road improvements enabled the utility companies to cooperate with the contractor doing road construction and improvements. The total reimbursement to utility companies for adjustment of their lines was $332,997.00.

The utility companies were granted 514 franchises for the installation of facilities on 446.82 miles of State-owned right-of-way. These franchises included 15.4 miles of water lines, 37.07 miles of gas lines, 4.2 miles of sanitary sewers, 281.5 miles of underground conduit and buried cable, and 125.65 miles of aerial cable and pole lines.

Electronic Computer

In July 1962 computer data input was converted from paper tape to the more flexible punched cards. Paper tape had proven slow, awkward, and not easily changed or corrected. The speed and versatility of data handling was much increased by punched cards.

The use of the computer doubled during the past year. It was used by the Road Design Section, the Bridge Section, the Planning Section, and the Materials and Research Section.

INTERAGENCY COOPERATION

In addition to the specific responsibilities assigned by the General Assembly, the Engineering Division also performed a variety of services for and in cooperation with other divisions and agencies of the State.

Civil Defense

One of the more important of these activities is the role of the Department in the Delaware Operational Survival Plan as prepared by the Delaware Department of Civil Defense. Under this plan the Director for the Department is responsible for the Engineering Division which is required to coordinate emergency engineering planning, establish key transportation routes, and conduct and coordinate decontamination operations in the event of a major emergency.

Employees received training in Explosive Ordnance Reconnaissance. The classes were held at the State Civil Defense Center at Delaware City. Department personnel were trained in principles of explosive ordnance reconnaissance, investigation and diagnosing of unexploded ordnance, reporting procedures, effects of nuclear explosions, radiological contamination, description of atomic devices and nuclear weapons and fire.

During the year six employees attended a class in radiological monitoring at the Kent County Civil Defense Office in Dover.

In March several men participated in exercises held at Delaware City designed to depict a realistic attack upon the country.

Land Use

The Engineering Division has also been given the responsibility of cooperating with the State Planning Office in conducting a Land Use and Transportation Study for New Castle County. A plan for land use and transportation will be prepared as a guide for development. A three-year priority schedule for major public facilities, financial programs, and the various actions needed to effectuate the plan will be established.

The most significant accomplishment in this program was the drawing up of an agreement between the State Highway Department, the State Planning Office, New

Castle County, and the incorporated municipalities in New Castle County for the conduct of this study. While the federal government will participate in the study to the extent of providing assistance, service, and advice, and will reimburse the State for much of the money that is spent in this study, it is not a participant in the agreement.

Boundaries

In 1951 the Maryland General Assembly passed an Act (Article 66C Sec. 31-32) authorizing the Board of Natural Resources to cooperate with an adjacent State in maintaining the boundaries of that State. In the same year Delaware passed a complementary act, thus the States are in a position to cooperate in the restoration of the common historic boundaries. At the joint petition of the State Archivist of Delaware, the chief engineer of the Delaware State Highway Department, and the Board of Natural Resources of Maryland, the 84th Congress enacted Public Law 342 which directs the U.S. Coast and Geodetic Survey to resurvey the north-south line between Maryland and Delaware, which was established and marked at mile intervals by Maryland and Delaware during the period 1763 - 1767. The two States have no boundary dispute; the purpose of the resurvey is to confirm the position of each marker so that the States can cooperate in the restoration of damaged markers and the replacement of any which are missing. The resurveys were started by the U.S. Coast and Geodetic Survey in the fall of 1961 and were completed in the spring of 1962.

The U.S. Coast and Geodetic Survey summarized the results of the 1961-62 surveys in a conference of Delaware and Maryland. The survey shows that the north and south line between the southwest corner of Delaware and the tangent point is not a straight line, but curves slightly to the east. The curve reaches a maximum near the middle of the line and is about 18 feet from a straight line, an error which is negligible in a line 82 miles long. Most of the monuments are intact and in the position where they were set by Mason and Dixon. Five of these monuments were off the boundary a sufficient distance to indicate they had been moved from their original position. A few other monuments have been removed from the boundary with the intent to return them at a subsequent date.

The following conclusions were reached:

1. The original markers remaining on the north-south line were sufficient to leave no doubt of the boundary.

2. Because of their historic significance it was agreed that each of the Maryland - Delaware markers which had been removed from the line should be returned to its correct position on the boundary, their positions to be calculated by the U.S. Coast and Geodetic Survey.

3. It was agreed that the Deputy Attorneys General of Maryland and Delaware should advise their respective States of any legal complications that might arise from the above action.

MAPS

Mapping is one of the major functions of the Planning and Review Section.

A new county general highway map of Kent County was prepared and printed in six colors. This includes the county map, scale 1" = 1 mile, and scale 1" = 2 miles; and a Dover area supplement sheet, scale 2" = 1 mile. A New Castle County map was begun which will include, in addition to the county maps produced in the same scales as the Kent County maps, a supplement sheet detailing upper New Castle County. A Sussex County map is also planned.

A 1964 edition of the Official Delaware Highway Map was also in production. Plans call for a complete revision of the map and a new pictorial and historical side.

A list of maps available from the Planning and Review Section is as follows:

TABLE X

STATE AND COUNTY MAPS AVAILABLE FOR DISTRIBUTION

STATE MAPS

MAPS SHOWING THE COMPLETE STATE

Description	Size	Scale	Printing Date	Price Each
1. State Highway Map	30" x 55"	1" = 2 Miles	1961	$1.00
2. Traffic Flow Map	25" x 39"	1" = 3 Miles	1961	1.50
3. Sufficiency Rating Map, Primary System	25" x 39"	1" = 3 Miles	1960	1.50
4. Sufficiency Rating Map, Secondary System	25" x 39"	1" = 3 Miles	1960	1.50
5. Delaware Official Road Map	18" x 30"	1" = 3½ Miles	1961-62	Free
6. Highway Condition Bulletin	19" x 24"	1" = 4 Miles	1963	Free

COUNTY MAPS

MAPS OF NEW CASTLE, KENT AND SUSSEX COUNTIES

(To Order, Specify County and Type)

Description	Size	Scale	Printing Date	Price Each
1. Maintenance Maps (Large)	36" x 48"	1" = 1 Mile	1962	$ .75
2. Maintenance Maps (Small)	18" x 24"	1" = 2 Miles	1962	.50
3. Hundred Divisions Maps	18" x 24"	1" = 2 Miles	1962	.75

COUNTY GENERAL HIGHWAY MAPS

Description	Size	Scale	Printing Date	Price Each
1. Kent County	36" x 53"	1" = 1 Mile	1963	$1.50
2. Kent County	18" x 27"	1" = 2 Miles	1963	.75
3. Dover Area Supplement Sheet	32" x 36"	2" = 1 Mile	1963	1.00

Note: A New Castle County map is in progress and Sussex County will follow.

INCORPORATED TOWN MAPS

MAPS OF THE INCORPORATED CITIES AND TOWNS OF DELAWARE

(To Order Individual Maps, Specify Town or City)

Description	Size	Scale	Printing Date	Price Each
1. Incorporated Town Maps	20" x 27"	Varies	1959	$ .35
2. Incorporated Town Maps	10" x 13"	Varies	1959	.25
3. Book of 51 Town Maps	10" x 13"	Varies	1959	10.00

MAP DESCRIPTIONS

STATE HIGHWAY MAP - Complete state map printed in black and white with water detail in blue. Shows state maintained roads, road types, cities, towns and villages, U.S. route numbers, state route numbers and other detail.

TRAFFIC FLOW MAP - A map of the primary and secondary highway systems showing 1959 annual average traffic figures and with three colors superimposed over the roads to separate the major routes into three traffic groups.

SUFFICIENCY RATING MAPS - State maps showing results of a highway condition evaluation survey. Colors superimposed over the highways classify them into three sufficiency rating groups.

DELAWARE OFFICIAL ROADS MAPS - Official tourist map of the complete state. Printed in full color and illustrates interesting features of the state with photographs and descriptive notes. Shows state roads, U.S. route and state route numbers, and other details.

HIGHWAY CONDITION BULLETIN - A state map showing major construction projects and detours in effect during the construction period, published monthly except January, February and March.

COUNTY MAINTENANCE MAPS - Black and white prints of the three counties of Delaware with water detail in blue. Shows state maintained roads, road types, cities, towns, and villages, U.S. route numbers, state route numbers, county maintenance numbers, and other detail.

COUNTY GENERAL HIGHWAY MAPS - Six color maps of the counties showing all public roads, road types, cities, towns and villages, U.S. and state routes, state reference numbers, roadside culture and other details.

HUNDRED DIVISIONS MAPS - Small maintenance maps with hundred names overprinted in red and red lines delineating hundreds boundries.

INCORPORATED TOWN MAPS - Maps of the fifty-one incorporated cities and towns of Delaware showing street types, street names, state and U.S. numbered routes, population, and main business sections. Large size are blue line ozalid prints, small size are black line offset prints. (See below for listing).

HOW TO REMIT

The rules of this office require that remittances be made in advance of shipment of maps by check or money order payable to the Delaware State Highway Department. Currency may be sent at sender's risk. Please do not send stamps. Postage charges are included in the listed price unless special handling is requested.

A 25% discount is granted to U.S. Government, State, County, and Municipal Agencies.

MAP LISTING OF CITIES AND TOWNS

1. Bellefonte
2. Bethany Beach
3. Bethel
4. Blades
5. Bowers
6. Bridgeville
7. Camden
8. Cheswold
9. Clayton
10. Dagsboro
11. Delaware City
12. Delmar
13. Dover
14. Ellendale
15. Elsmere
16. Farmington
17. Felton
18. Fenwick Island
19. Frankford
20. Frederica
21. Georgetown
22. Greenwood
23. Harrington
24. Hartly
25. Houston
26. Kenton
27. Laurel
28. Leipsic
29. Lewes
30. Little Creek
31. Magnolia
32. Middletown
33. Milford
34. Millsboro
35. Millville
36. Milton
37. New Castle
38. Newark
39. Newport
40. Ocean View
41. Odessa
42. Rehoboth Beach
43. Seaford
44. Selbyville
45. Smyrna
46. Slaughter Beach
47. Townsend
48. Viola
49. Woodside
50. Wyoming
51. Wilmington*

* The Wilmington map does not show all street names and other detail.