LETTER OF TRANSMITTAL

To the Chairman and

Members of the State Highway Department

Dover, Delaware

Gentlemen:

In accordance with the requirements of Chapter 166, Laws of Delaware, entitled "State Highway Department," it is my privilege to submit this report showing the divisional activities of the State Highway Department for the Fiscal Year ending June 30, 1950.

Further, included are information and recommendations for consideration of the members which, if approved, will govern certain work for the coming year.

Colonel William A. McWilliams was named Associate Director of the Delaware River Crossing Division effective December 30, 1949, therefore the honor to have been selected as Chief Engineer of the Department is deeply appreciated and it is sincerely hoped that work under my supervision may be as well done as that under my capable predecessors.

Respectfully submitted,

M. ALLAN WILSON
Chief Engineer
State Highway Department

REPORT OF THE CHIEF ENGINEER

OF THE

STATE HIGHWAY DEPARTMENT

July 1, 1949 to July 1, 1950

Delaware stands today at the crossroad of highway transportation problems that are known to exist in almost every section of the State. Within the next few years the citizens must decide whether sufficient funds are to be provided the State Highway Department for the correction of traffic congestion and safety hazards and for the expansion of new facilities which are known to be needed within the immediate future.

The economy of the State is in a large degree dependent upon motor vehicle transportation, and since Delaware has always been a leader in the highway field it is reasonable to assume that the present system will not be faced with continuous deterioration nor will the past foresight and leadership in providing new and better road facilities be prevented from becoming future realities.

Many miles of roads constructed between the years 1917 and 1935 were adequately designed and constructed to serve the traffic of that period. This mileage gave an excellent service record until the early years of World War II, however the heavy volume and weight of commercial vehicles took a heavy toll after a few years. Many miles of these roads have already been reconstructed but many miles are in immediate need of reconstruction if the salvage value of the present pavement is to be utilized.

Delaware, like all other States, curtailed its construction and maintenance activities during the "active" years of World War II, thereby allowing almost five years to pass without major improvements to over-taxed highway facilities. The highway system within Delaware has not recovered from the inactive period. On the contrary, traffic volumes and weights have increased to such a point that the system in many locations is not only obsolete but has forced

consideration of major new and improved routes in order to accommodate present traffic demands.

Important among the new or improved routes meriting early consideration are:

(1) Route "A" as developed by the recent Wilmington Transportation Study.
(2) A suitable route connecting the Delaware Memorial Bridge with the new modern Maryland highway extending from the Chesapeake Bay Bridge to the Delaware Line.
(3) Extension of dual highways south of Dover.

The need for improvement and expansion of our highway system to accommodate the constantly increasing traffic is shown in this report and it is respectfully recommended that it be given thoughtful consideration.

DIVISION OF PLANS AND SURVEYS

The main function of the Division of Plans and Surveys consists of the design and preparation of detailed plans for the construction of new highways or the reconstruction of existing highway facilities which have deteriorated or become obsolete.

Before any design can be undertaken for the type of road to be built in a specific locality preliminary information must be obtained. This information consists of alignment and topography surveys, aerial surveys, drainage surveys, soil surveys, public and private utility surveys and traffic surveys. A number of these surveys are acquired through the cooperation of the other Divisions of the State Highway Department. In addition, the future need of the locality in which the highway is to be built must be given prime consideration.

All this information is studied carefully. From analysis the proper road is designed so as to give the most satisfactory modern highway conforming to current scientific practices and practical usage to suit local conditions.

This Division also prepares miscellaneous plans, sketches and charts for the use of the State Highway Department.

In addition, this Division assists with the improvement of streets in suburban communities in conformance with the Suburban Road Act.

Below is tabulated the work accomplished in making surveys and plans for the year ending June 30, 1950.

Surveys

Base Lines	90.5	miles
Topography	90.0	"
Preliminary Cross Section	84.2	"
Final Cross Section	52.6	"
Patch Survey	56.0	"
Borrow Pits, Preliminary	33	pits
Borrow Pits, Final	29	

Plans

Base Lines Plotted	90.5	miles
Topography Plotted	96.3	"
Profiles Plotted	94.2	"
Index Maps Plotted and Traced	84.1	"
Plans Traced	94.2	"
Cross Sections Plotted (Original)	84.2	"
Cross Sections Plotted (Final)	52.6	"
Grades Established	56.1	"
Quantities Established	101.5	"
Typical Sections	102	
Miscellaneous Drawings	165	

Blue Prints and Black & White Prints

Office & Construction	22,500	Prints
Utilities	6,000	Prints
Total	28,500	Prints

DIVISION OF ESTIMATES AND FEDERAL AID

This Division is responsible for all preliminary work pertaining to the letting of all construction and maintenance contracts and computes and prepares all estimates for periodic payments to contractors. This Division also works in closest cooperation with the Bureau of Public Roads in all matters pertaining to Federal Aid projects.

Contracts

The Department authorized fifty-eight projects for contract and approved eight suburban development projects to

the New Castle County Levy Court. Twelve advertisements for bids on State projects were issued between the dates of July 6, 1949, and June 21, 1950. A total of two hundred fifty-three bids were received, checked and tabulated. Tabulations of bids are forwarded to a mailing list maintained by the Division.

Approximately 2,400 proposal forms were prepared and assembled by the Division for bidding, contract and other purposes. Proposals were also prepared for the suburban subdivision contracts.

Projects let to contract during the year are classified as follows:

CLASSIFICATION OF CONTRACTS ADVERTISED

	FEDERAL AID PRIMARY			FEDERAL AID SECONDARY			STATE PROJECTS			LEGISLATIVE APPROPRIATIONS		TOTALS		
	Miles	No.	Amount	Miles	No.	Amount	Miles	No.	Amount	No.	Amount	Miles	No.	Amount
Roads	20.62	7	1,716,013.65	55.06	12	2,308,510.35	0.30	1	16,583.85	—	—	75.97	20	4,041,107.85
Bridges	—	2	860,094.60	—	2	61,105.61	—	—	—	2	84,433.00	—	6	1,005,633.21
**Interchanges	—	2	1,141,838.86	—	—	—	—	—	—	—	—		2	1,141,838.86
Buildings	—	—	—	—	—	—	—	1	117,279.00	—	—		1	117,279.00
Sidewalks	—	—	—	—	—	—	0.16	1	2,372.30	—	—	.16	1	2,372.30
Surface Treatment	—	—	—	—	—	—	—	6	557,043.50	—	—		6	557,043.50
Maintenance Material	—	—	—	—	—	—	—	8	166,805.90	—	—		8	166,805.90
Pest Control	—	—	—	—	—	—	—	2	16,980.00	—	—		2	16,980.00
Shore Protection	—	—	—	—	—	—	—	—	—	5	93,700.00		5	93,700.00
*Equipment	—	—	—	—	—	—	—	3	—	—	—		3	—
*Fuels	—	—	—	—	—	—	—	4	—	—	—		4	—
*Suburban Developments	—	—	—	—	—	—	—	8	—	—	—		8	—
TOTALS	20.62	11	3,717,947.11	55.06	14	2,369,615.96	0.5	34	877,064.55	7	178,133.00	76.13	66	7,142,760.62

*Indicated as to number of contracts only

**Interchanges are Delaware Memorial Bridge approaches

#1 Farnhurst—Comprises roadway and three grade separations

#2 New Castle Avenue—Comprises roadway and one grade separation

Projects placed under contract and holdover contracts from the previous year totalled fifty-eight active projects during the period. One hundred fifty-nine estimates for payment on these projects were processed. The value of estimates paid was $4,043,834.14. The portion reimbursable to the Department by the Bureau of Public Roads was approximately $1,700,000.00. Distribution of the estimate value by project classification is, Federal Aid, $3,527,160.06; State, $474,131.08, and Legislative appropriation account, $33,543.00.

Unexpended balances in the Department construction account as of June 30, 1950, were in the amount of $543,-851.34. Federal accounts receivable on that date were in the amount of $572,212.60, thus establishing the total unexpended balance to that account at the close of the year at $1,116,063.94. Projects either in program or approved status as of this date obligate this balance to construction in the very early part of the approaching fiscal period.

Federal Aid

The 1949 fiscal report indicated the submission of proposed additions and revisions to the Federal Aid Secondary System for approval. Approval was received in October 1949 on the submission and the system was enlarged by 140 routes, together with 26 revisions of previously approved routes. This system now comprises 1,222.4 miles of highways.

Twenty-two Federal Aid Projects were processed from the programming through the contract stages. The value represented by these new projects was $6,183,587.67, the Federal share of which was $2,988,776.98.

Forty-two reimbursement vouchers were presented to the Bureau of Public Roads for payment in the amount of $2,003,205.38. In addition, reimbursement was received on vouchers presented prior to the close of the previous fiscal year, thus increasing the reimbursement received to $2,145-669.11. Federal Aid accounts receivable as of June 30, 1950, were in the amount of $572,212.60.

Department obligations as to Federal Funds and the respective legal limits for obligation thereof are fully met as of this date. Total unprogrammed and unobligated balances of Federal Funds are $1,233,034.81.

DIVISION OF TESTS

This fiscal year the volume of the Division of Tests' inspection, testing and research activities continued to in-

crease in keeping with the general growth of the Department's activities. A large part of the Division's work in 1949 involved a great number and variety of tests and investigations in connection with the Delaware River Memorial Bridge construction and the other new phases of the Department's work. Although the amount of research conducted was necessarily curtailed to a minimum because of the immediate urgency of the Department's program, progress was made in the various fields of hot mix design and plant control and soils mechanics. This information will undoubtedly contribute ultimately to the overall improvement of the Department's operation.

The least spectacular of the Division of Tests' activities, and yet very important, are the reports which record the progress of all projects, and the specifications which incorporate their findings to assure that the best materials and equipment are secured. Also of importance and contributing to success in testing and research is the continuous contact maintained with other testing and research organizations, societies and other State Highway Departments. Through the Division's contact with The American Society of Testing Materials, The American Association of Highway Officials, The American Road Builders' Association, The American Concrete Institute and the American Wood Preservers' Association we are kept abreast of the latest methods and ideas.

Our testing and inspection during this fiscal year was conducted for some 78 projects. In the course of inspecting and testing the materials and processes used in these projects and in the Department's increased maintenance activities, the Division of Tests performed countless tests to insure a product of the highest quality and best workmanship.

Various phases of the Division of Tests' work were furthered through the close cooperation maintained with other Divisions of the Department and various agencies of State government. As an example, tests were conducted for oil used in Mosquito Control work, paper and ink for the Archives Commission and automotive equipment for the Motor Vehicle Division and the State Board of Agriculture. A series of tests of 61 paper samples and 6 samples of ink were conducted for the Public Archives Commission in order that they might publish a list of approved sources.

Our cost accounting system, which was set up late in the fiscal year of 1948, has been revised and enlarged so

that the man hours and the monies expended can be determined for the following phases of our work: soil surveys, borrow pit exploration, research in soils mechanics, field control of compaction and borrow pits, hot mix plant inspection, research in hot mix, concrete inspection, aggregate inspection, miscellaneous inspection (timber, pipe, piling, surface treatment, asphalts, gasolines, oils, papers, etc.) and administration.

The two new Baldwin Hydraulic Testing Machines have enabled the Division to increase the number and quantity of samples and specimens tested. The 120,000-lb. compression and tension machine with its low-range, extra-sensitive dial has proved most beneficial to the Soils Laboratory and the Asphalt Laboratory in stability testing. Compared with the prior fiscal year the number of cylinders, cores and beams tested was considerably increased by the acquisition of the new 300,000-lb. concrete compression testing machine. Experience to date indicates that these new machines will soon pay for themselves by their increased production in testing and by their extreme sensitivity, which has reduced considerably the number of samples required to determine any one factor.

Soils Laboratory

An engineering structure, such as a roadway or bridge, can be no better than the foundation on which it rests and the material of which it is made. Problems thus arising in the determination of foundation conditions and the control of materials involve both laboratory and field work—including such items as seepage control, sub-drainage investigation, deep foundation exploration, subgrade exploration and strength tests, borrow pit and field compaction control. An intensive foundation investigation and exploration program was carried out at the site of the proposed Farnhurst Interchange and the Brandywine River Crossing. During exploratory drilling operations the Soils Laboratory personnel supervised removal of over 240 soil and rock samples from 28 test holes sunk to depths from 35 to 60 feet.

The Soils Laboratory has intensified its prospecting for suitable selected material not only for present construction projects and maintenance but for future work. Field sites of possible selected material are located in the laboratory by the use of aerial photographs, geologic and soil maps. A total of 88 possible selected borrow sites were investigated of which 20.5% were recommended for purchase or use by

the Department. This is an increase of 5.5% above the number of pits recommended during the 1948 fiscal year.

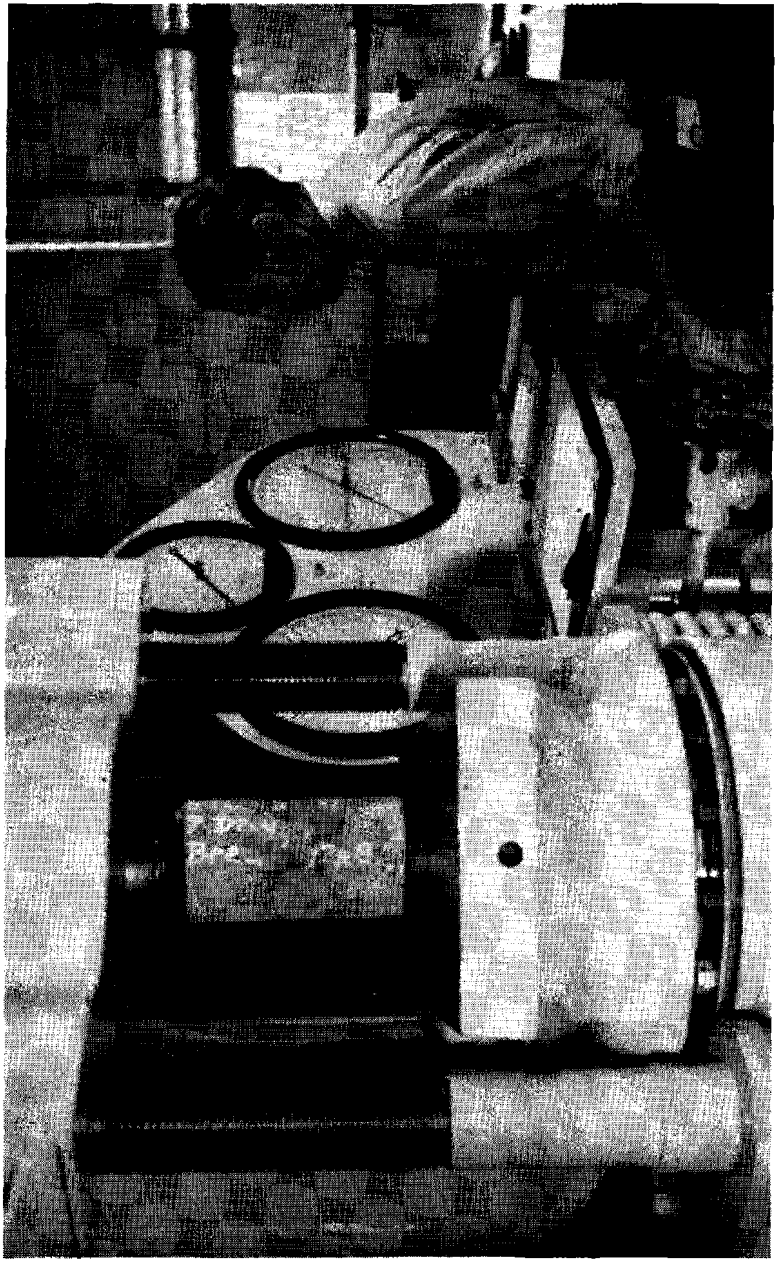
The Soils Laboratory also provides adequate laboratory and field control to insure that proper compaction and placing of selected material is obtained. Two men from the laboratory devoted their full time to this inspection service and over 150,000 cubic yards of selected material and approximately 60,300 cubic yards of common borrow were tested and inspected to insure the maximum possible density. To assure adequate densities 665 field control densities were made while over 500 quality control checks were run in the laboratory.

The Soils Laboratory also provides a consulting service to the Plans and Design Division. Approximately 84 miles of subgrade for proposed primary and secondary roads were sampled, tested, and reports prepared outlining anticipated construction difficulties and recommending pavement and base thicknesses. Also, eight Suburban Development projects were investigated to determine subgrade and surface conditions for proposed projects to make sure that the Development conforms to Department standards.

In each of the various phases of activity enumerated above, proceeding from the superficial to the highly-detailed, each has its own immediate objective and in each case the procedures of investigation must be tailored to the special problems of the area and the project. Tangible dollar-and-cent savings which result from adequate Soil Laboratory investigations are by no means the true measure of the Soils Laboratory's contribution. Its major contribution lies in the avoidance of costly mistakes and the promotion, through a better understanding of natural conditions, of lower costs and more durable highways and bridges. In carrying out this work the Soils Laboratory has conducted over 4,600 strength, moisture, density and classification tests.

Materials Laboratory

Laboratory testing and field investigation techniques of the Division of Tests have been developed to a point where a complete evaluation of materials can be made on functional, quantitative and economic bases. During the last fiscal year in testing 5,843 samples the Materials Laboratory has conducted the following number of individual quality control tests:



TESTING CONCRETE CORES — DIVISION OF TESTS

Material	No. Tests	Material	No. Tests
Sand	375	Concrete Pipe	75
Water	15	Creosote Oil	3
Cement	51	Galvanizing	12
Stone	1,442	Motor Oil	9
Gravel	146	Gasoline	6
Slag	241	Concrete Cores	351
Concrete Cylinders	1,568	Bituminous Concrete	637
Brick	8	Specific Gravity	153
Concrete Beams	200	pH Measurements	14
Asphalt	512	Asphalt Adhesion Tests	25

In addition to supervising the preparation of all central-mix Portland cement concrete and hot mix bituminous concrete, the Division added to the knowledge of these materials through various laboratory investigations. In an effort to evaluate field performance of our hot mix asphaltic concrete with its laboratory stability and physical properties, a total of 366 field stability tests and 546 laboratory quality tests were made. Also, 350 bituminous concrete cores were drilled from completed projects. The preliminary phase of our hot mix investigation is nearing conclusion and results should be forthcoming within the next fiscal year.

A system of quality control charts for both central-mix concrete production and hot mix asphaltic concrete was started late in the fiscal year. This statistical method applies to the analysis of test results and to recording in more efficient and interpretable form the data from numerous day-to-day quality control tests. The control chart technique is not used in its customary manner but as the clearest form of record of both concrete strength tests and gradation and asphalt control at the hot mix plant. Formerly the degree of control of concrete strengths or the gradation and asphalt content of the hot mix bituminous concrete could be summarized only when a project had been completed; now through the use of charts it appears possible to estimate these factors for work done at any stage during construction. These values are being calculated at frequent intervals for each current construction project to show trends in job control. The statistical approach to quality control is only briefly mentioned because preliminary results indicate that we have a promising and valuable tool.

The Materials Laboratory has played a vital role in the selection and use of materials employed in the construction

and maintenance of Delaware's Highway System. During the past fiscal year the Materials Laboratory has tested and inspected the following approximate quantities of materials:

MATERIAL	QUANTITY REPRESENTED
Cement	94,350 Bbls.
Bituminous Concrete	135,865 Tons
Asphalt	610,420 Gallons
Concrete Pipe	49,140 L. F.
Lumber	182,005 B.M.F.
Piling	8,866 L. F.
Guard Rail Posts	587 Each
Coarse Aggregate	93,100 Tons
Fine Aggregate	33,790 Tons
Reinforcing Steel	999,034 Lbs.
Structural Steel	1,525,140 Lbs.

TRAFFIC AND PLANNING DIVISION

During this fiscal year much progress was made in work conducted by the Traffic and Planning Division. The basic work of the Highway Planning Survey was continued, the Wilmington Transportation Study was well advanced, and the Traffic Engineering work within the department was continued. Some of the details incidental to all these phases are related in the following sections of this report.

Road Inventory

The end of the fiscal year finds the State Highway Department with a network of 3,910.72 miles of roads and streets in its several systems. Table I shows this latest information by mileage of streets and highways by surface type by county.

Table II shows the existing highway mileage for Federal Aid Primary and Secondary systems and indicates the mileage eligible for Federal Aid participation for construction purposes.

TABLE I

MILEAGE OF STREETS AND HIGHWAYS BY SURFACE TYPE BY COUNTIES

SURFACE TYPE	NEW CASTLE	KENT	SUSSEX	TOTALS
Concrete	142.31	178.79	250.94	572.04
Bituminous Concrete	118.24	30.84	83.35	232.43
Brick	.82	.51	.05	1.38
Belgian Block	.55	.04	—	.59
Bituminous Penetration	169.77	4.66	48.73	223.16
Dual Type	33.58	59.68	47.95	141.21
Combination Type	1.71	—	3.34	5.05
TOTAL PAVED	466.98	274.52	434.36	1,175.86
Sand Asphalt	4.91	.40	19.88	25.19
Bituminous Surface Treated	191.49	137.47	303.26	632.22
Other Low Type Bituminous	54.52	6.40	5.30	66.22
Gravel or Stone	37.05	122.00	29.19	188.24
Soil Surfaced	151.04	419.92	388.31	959.27
TOTAL SURFACED	439.01	686.19	745.94	1,871.14
Graded and Drained Earth	13.24	77.23	641.51	731.98
Unimproved	14.85	5.61	28.48	48.94
Primitive	.38	2.18	19.65	22.21
TOTAL UNSURFACED	28.47	85.02	689.64	803.13
TOTAL TWO AND FOUR LANED HIGHWAYS	934.46	1,045.73	1,869.94	3,850.13

DIVIDED HIGHWAYS

Concrete	14.12	4.17	.71	19.00
Bituminous Concrete	9.71	.28	—	9.99
Brick	—	—	.03	.03
Dual Type	25.54	6.03	—	31.57
TOTAL DIVIDED HIGHWAYS	49.37	10.48	.74	60.59
TOTAL ALL TYPES	983.83	1,056.21	1,870.68	3,910.72

TABLE II

MILEAGE OF STREETS AND HIGHWAYS BY SYSTEM CLASSIFICATION BY COUNTY

SYSTEM	NEW CASTLE	KENT	SUSSEX	TOTALS
State Primary	327.31	272.58	411.52	1,011.41
State Secondary	469.20	731.06	1,395.71	2,595.97
Urban Extensions	46.62	47.03	55.27	148.92
Private Developments ...	140.70	5.54	8.18	154.42
TOTAL	983.83	1,056.21	1,870.68	3,910.72

TABLE III

MILEAGE OF STREETS AND HIGHWAYS BY SYSTEM CLASSIFICATION BY COUNTY

SYSTEM	NEW CASTLE	KENT	SUSSEX	TOTALS
Primary F.A.P.	172.33	127.33	209.69	509.35
Secondary F.A.S.	306.13	304.18	607.35	1,217.66
Tertiary	505.37	624.70	1,053.64	2,183.71
TOTAL	983.83	1,056.21	1,870.68	3,910.72

Traffic

Traffic statistics show a continued increase in motor vehicle registration and in number of miles traveled.

Table IV shows the results of the traffic statistics compiled at four of the Automatic Counter Stations which have been in constant operation since 1940. The fiscal year of 1950 indicates an 11.27% increase in traffic over 1949 for the same stations. A comparison of 1950 with 1942 shows a 33.38% increase.

In addition to the information shown in connection with the permanent counters, additional statewide traffic data were obtained in 1950 giving complete traffic volume information for every rural road in the State. This information is available to interested individuals and provides basic factors for use in selecting roads for future improvements, and determining the geometrics of design.

TABLE IV

TRAFFIC VOLUMES AT FOUR AUTOMATIC COUNTER STATIONS BY YEAR BY MONTH WITH RELATED PERCENTAGES

Month	AVERAGE DAILY TRAFFIC 1941 - 1942	1948 - 1949	1949 - 1950	PERCENT CHANGE 1949-50 to 1941-42	1949-50 to 1948-49
July	22,721	23,493	25,389	+11.74	+ 8.07
August	22,328	21,196	24,349	+ 9.05	+14.88
September	19,902	21,482	23,589	+18.53	+ 9.81
October	17,491	20,097	22,554	+28.95	+12.23
November	17,056	18,536	20,759	+21.71	+11.99
December	16,174	17,362	18,841	+16.49	+ 8.52
January	13,421	16,637	18,062	+34.58	+ 8.57
February	13,736	17,210	19,304	+40.54	+12.17
March	14,062	18,312	20,642	+46.79	+12.72
April	15,583	19,992	23,502	+50.82	+17.56
May	14,744	22,352	23,721	+60.89	+ 6.12
June	13,810	24,320	27,427	+98.60	+12.78
TOTAL	201,028	240,989	268,139	+33.38	+11.27

Road Inventory of Incorporated Towns

During the past fiscal year much progress has been made on road and street information within the 50 incorporated towns in Delaware. The survey data concerning these towns were collected during the previous fiscal year and were analyzed during 1950. When the analysis is completed the number of miles of the various types of streets in each town in the State will be known.

Also, new transportation maps of each town have been prepared for the various incorporated towns in Delaware. At the end of the fiscal year 85% of this work had been completed and is available to the various towns and to other interested agencies. A reduced-size plate of one of the town maps is shown in Plate I.

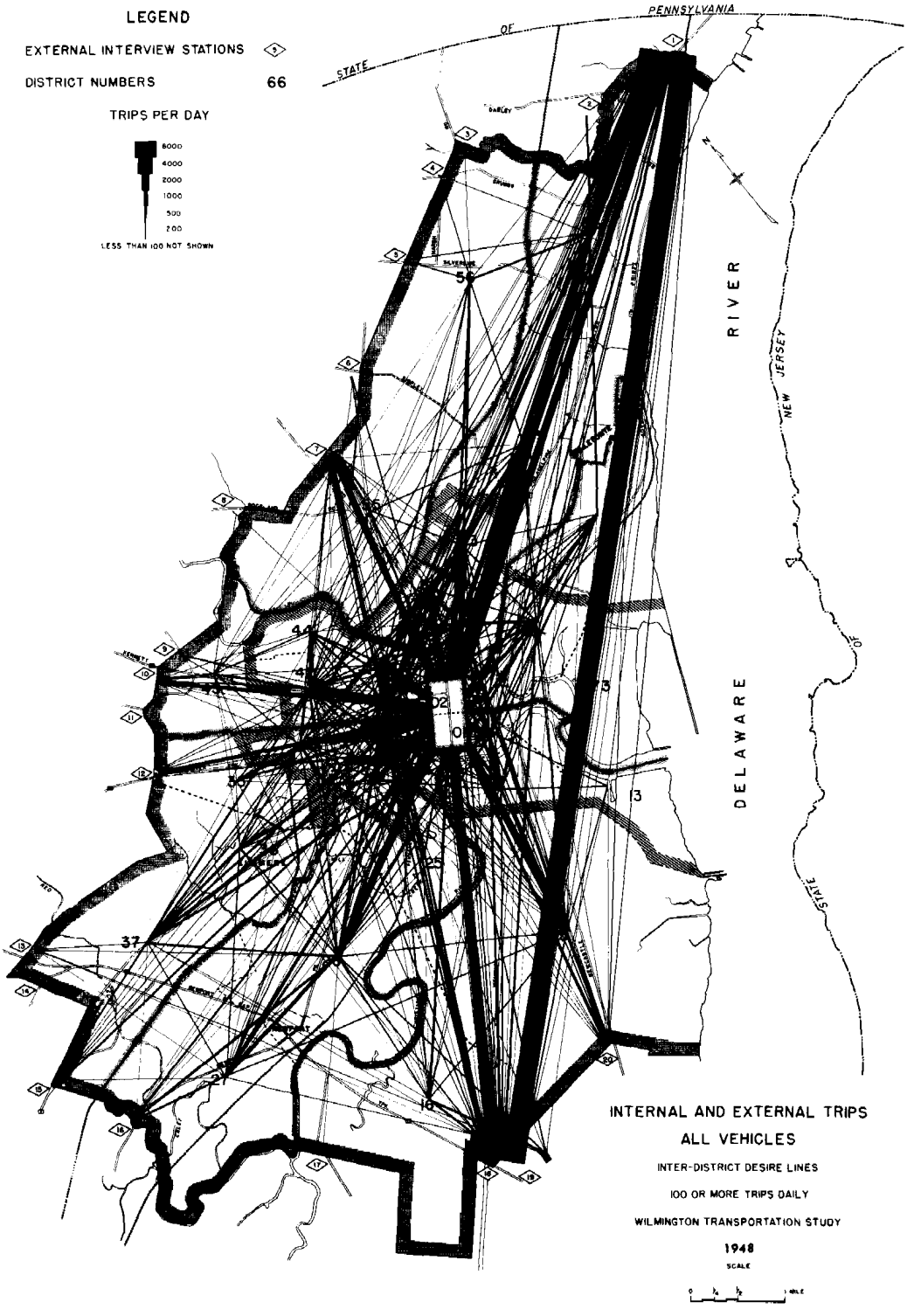

LEGEND
EXTERNAL INTERVIEW STATIONS
DISTRICT NUMBERS 66
TRIPS PER DAY
8000
4000
2000
1000
500
200
LESS THAN 100 NOT SHOWN
PENNSYLVANIA
STATE OF
DELAWARE RIVER
NEW JERSEY
STATE OF
INTERNAL AND EXTERNAL TRIPS
ALL VEHICLES
INTER-DISTRICT DESIRE LINES
100 OR MORE TRIPS DAILY
WILMINGTON TRANSPORTATION STUDY
1948
SCALE

PLATE I

Wilmington Transportation Study

In February, 1948, the State Highway Department in conjunction with the U. S. Bureau of Public Roads and with the cooperation of the Mayor and Council of Wilmington, the Levy Court of New Castle County, and various lay leaders within this area, conducted a comprehensive transportation study of the Wilmington Metropolitan Area. Following the compilation of the basic information obtained from the Wilmington Transportation Study a report was issued in 1949 showing the results obtained.

Plate II, which is a part of the Wilmington Transportation Study, shows the desire lines of travel for all types of motor vehicles within the study area. A study of the plate shows two significant patterns. The first is a segment of through traffic which does not wish to enter the area of downtown Wilmington; the second shows the heavy concentration of traffic which desires to make trips with origins and destinations west of the Central Business District.

When an analysis of the factual data obtained in the origin and destination study was begun all factors pertinent to such an analysis were subjected to thorough study. The factual data obtained in the study provided the basic travel desire line information.

Many other ideas presented by various individuals familiar with the Wilmington area were carefully considered; however, it was obvious that the factual data indicating the actual desires of the vehicle operator best delineated the routes to be studied. In addition, such important factors as land use, population trends, and traffic volume statistics were included in the analysis and contributed some influence in the selection of recommended routes.

In order to project the traffic volumes expected to use these routes to the year 1970 an expansion factor was derived based upon population trends and motor vehicle registrations, plus the increase of traffic within and through the area expected to be generated by the Delaware Memorial Bridge, now under construction.

The two routes selected as a result of the analysis of the Wilmington Transportation Study are herein known as Route A and Route B, as shown in Plate III. Although it was necessary to locate the suggested routes on specific streets, it is not intended nor possible to determine the exact locations at this time. Routes located in the general vicinity of those shown graphically would carry approxi-

mately the same volumes of traffic. Land values, topography, and construction costs must be taken into consideration prior to final route location and design.

Specific design geometrics concerning the suggested arterial streets are not included in the analysis of the Wilmington Transportation Study. While the design information is not complete and cost estimates have not been prepared, it is evident that the work necessary for the completion of the proposed arterial street program in the Wilmington Metropolitan Area will require much more revenue than is presently available to the various interested agencies.

If relief is to be obtained for the existing and expected traffic volumes which will be generated in this area, a workable solution to this problem of finances must be advanced.

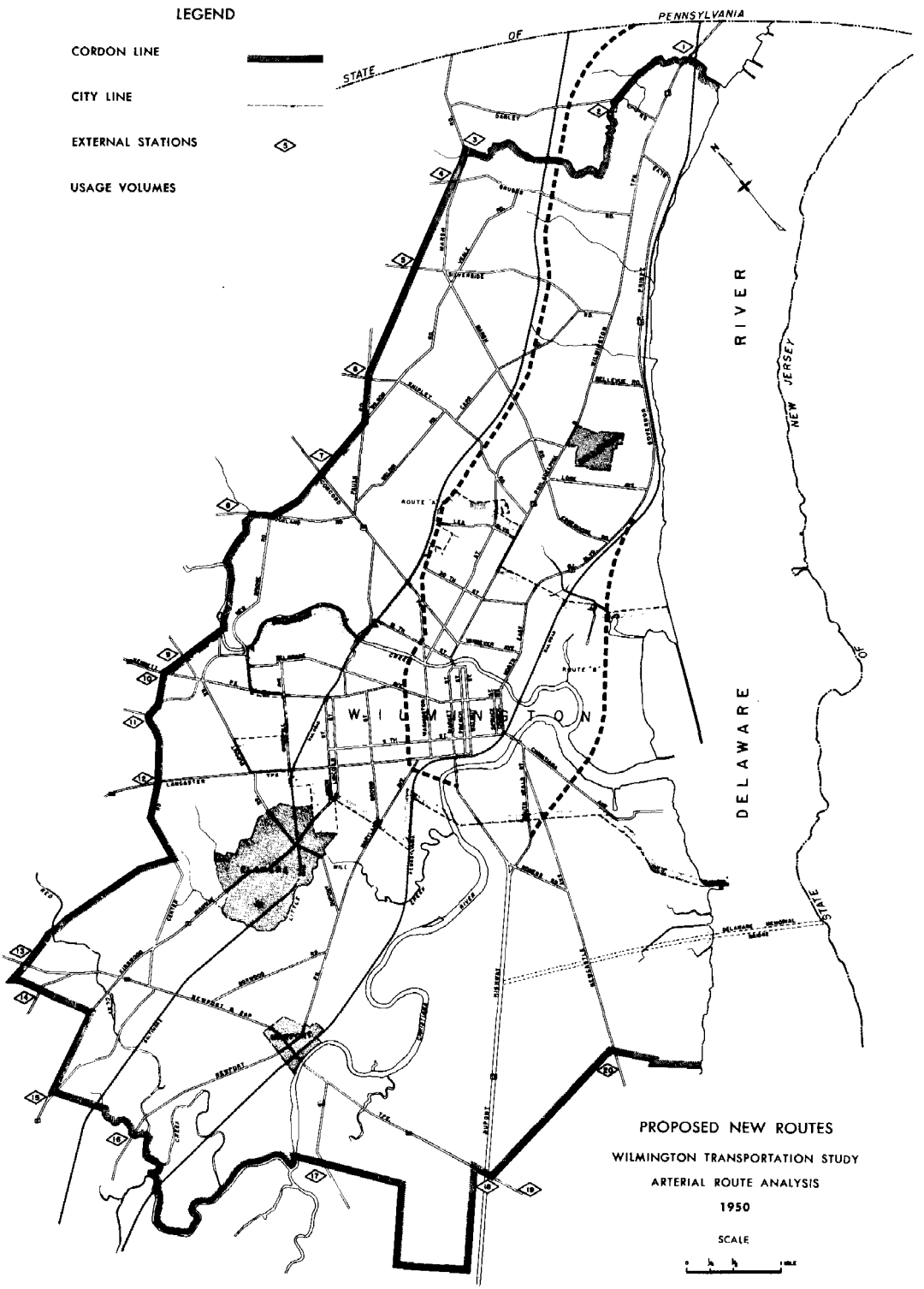

LEGEND
CORDON LINE
CITY LINE
EXTERNAL STATIONS
USAGE VOLUMES
PENNSYLVANIA
STATE OF
DELAWARE RIVER
NEW JERSEY
STATE OF
WILMINGTON
PROPOSED NEW ROUTES
WILMINGTON TRANSPORTATION STUDY
ARTERIAL ROUTE ANALYSIS
1950
SCALE

PLATE II

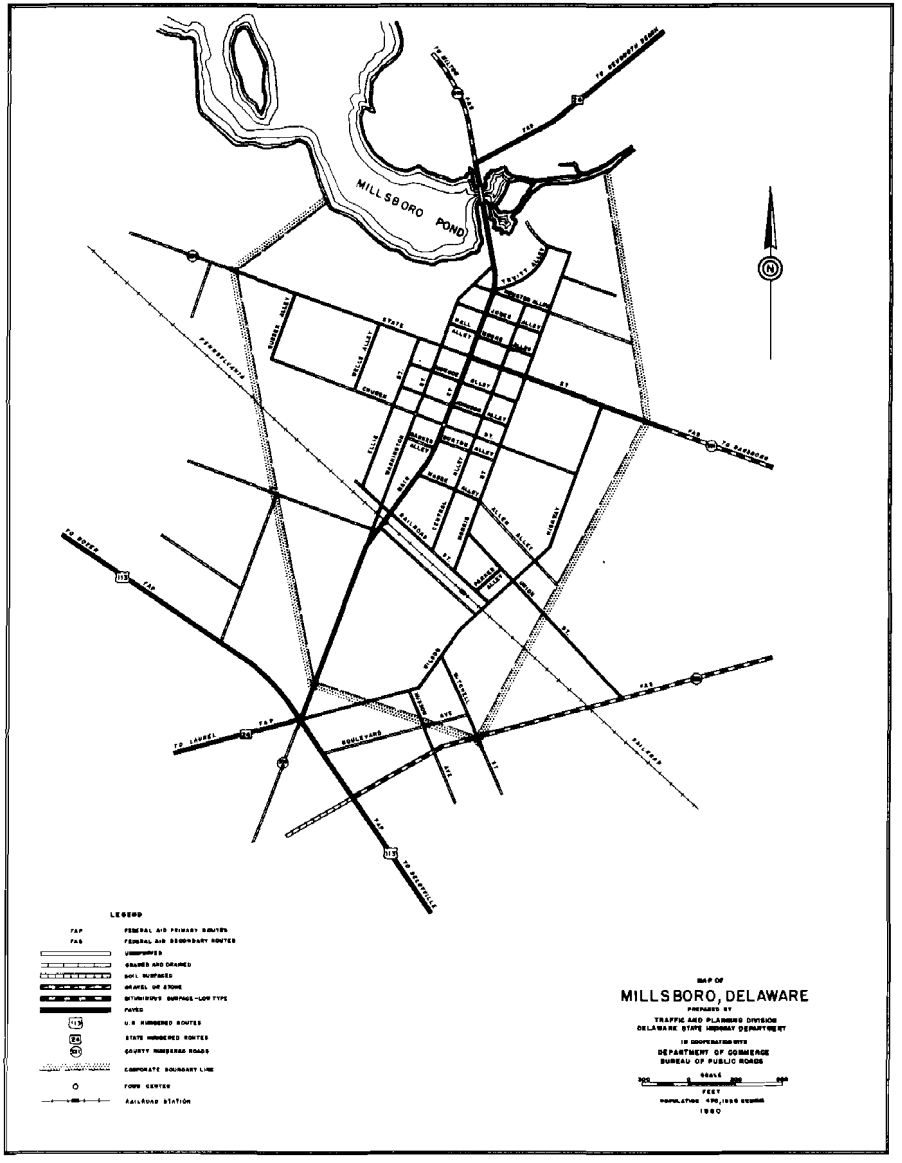

MILLSBORO POND
MAP OF
MILLSBORO, DELAWARE
PREPARED BY
TRAFFIC AND PLANNING DIVISION
DELAWARE STATE HIGHWAY DEPARTMENT
IN COOPERATION WITH
DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
SCALE
FEET
1960
LEGEND
FAP FEDERAL AID PRIMARY ROUTES
FAS FEDERAL AID SECONDARY ROUTES
UNIMPROVED
GRADED AND DRAINED
SOIL SURFACED
GRAVEL OR STONE
BITUMINOUS SURFACE-LOW TYPE
PAVED
U.S. NUMBERED ROUTES
STATE NUMBERED ROUTES
COUNTY NUMBERED ROADS
CORPORATE BOUNDARY LINE
POST OFFICE
RAILROAD STATION
MILLSBORO
SUSSEX COUNTY, DELAWARE
Page 23

PLATE III

Sufficiency Index Study

During the course of this year, a study was inaugurated to attempt to give numerical ratings to the various roads in the Federal Aid Primary and Secondary systems.

A field party of two men, experienced in construction and maintenance details, inspects the various roads in the State and assigns numerical values to the various sections. The better the section, the higher the numerical value becomes. The information, when complete, will provide a basis for selecting the construction program. As a particular road is improved the values for it are changed so that the information is kept current.

Petitions

During the past year this Division investigated all petitions presented to the Highway Department for improvements or alterations to roads and bridges within the State.

In the previous fiscal year 24 petitions were processed and 59 petitions were presented and investigated this year. Each petition requires traffic counts, an investigation of conditions at the location, visits in the field with the Division Engineer, sketches of the roads concerned, and the compilation of the information in report form.

The result of the work done for this purpose serves a useful purpose in helping to formulate a list of roads for the construction program. The information obtained on these petitioned roads serves to advise the Department of the wishes of the citizens of the State and the results obtained by the survey work enables the Department to evaluate each request.

Permits for Overloaded or Oversized Vehicles

Beginning with the 1950 fiscal year permits to road contractors for overloaded or oversized trucks were issued from this Division for other than local moves. During this year a new form was prepared and an explanatory manual was issued and distributed, after being approved by the Department, to those persons interested. In accordance with laws enacted by the 1949 General Assembly, the rates for such permits were revised and blanket permits for 30-day periods were authorized for pole trailer movements.

There were issued from this office in the fiscal year 1950, 682 Special Heavy Hauling Permits, including 16 for the U. S. Army, with a revenue of $3,392.50. In addition, there were issued 1,573 Single Trip Piling Permits and 156 Thirty-Day Blanket Permits with a revenue of $3,265.00.

Accident Reports

Cooperative arrangements were made this year with the State Police to enable the Traffic and Planning Division to obtain a copy of each accident report.

A state-wide spot map of all accidents is kept in conjunction with a cross-indexed locator file. This information is particularly useful in traffic engineering investigations, in design work for new or reconstructed facilities and in selecting trouble spots to be improved by signs, signals, markings or construction work.

Traffic Engineering Studies

With the increase in traffic, as noted earlier in this report, also comes an increase in related problems. Consequently the Division has had many more requests for assistance in traffic engineering than ever before. However, it is felt that many good, constructive results are being obtained throughout the State as a result of the continuous effort being expended to assist in the safe and expeditious movement of persons and goods on our streets and highways.

At one time or another in the past several years almost every town in the State has requested, and received, traffic engineering assistance. Among those assisted this year were Wilmington, Harrington, Newport, Milford, Elsmere, Laurel, Newark, Rehoboth Beach, Millsboro, Townsend, Bethany Beach, Felton, Bridgeville, Seaford, Delmar, Greenwood, Smyrna, New Castle, Delaware City, Lewes, Selbyville and Odessa.

In addition to the incorporated towns, many of the unincorporated areas, particularly in New Castle County, have had traffic engineering work performed.

In general, the traffic engineering work consisted of speed zoning studies, accident analysis, detour routings, traffic signallizations, highway lighting studies, parking studies, channelization studies, schools and assistance to the county maintenance personnel, crossover location studies, pavement marking studies, and consultation work within

the Department regarding design problems for proposed construction.

Miscellaneous

The Traffic and Planning Division also prepared numerous monthly and annual reports for the use of other State agencies, the United States Bureau of Public Roads and the general public. Among these are Monthly Traffic Tables, Monthly Detour Bulletins, Annual Loadmeter Tables, Annual State Mileage Tables, Annual Report for the Delaware Safety Council, Annual Tables on State Income and Expenditures, Traffic Paint Testing Report, and other varied types of statistical information.

BRIDGE DIVISION

The period covered by this report has been one of record activity for the Bridge Division. During the fiscal year 1949-1950 thirty-two contracts were awarded that required major participation by the Division. In addition to the work performed on the awarded contracts, much assistance was given to other construction and maintenance projects throughout the State in the matter of culvert and drainage problems.

Brief progress summaries of the larger and more important projects are herein listed and include several that are hold-overs from the 1948-1949 Fiscal Year.

Elsmere Overhead

This project, begun during the previous fiscal year, was estimated to be 52% complete at the start of the current fiscal year, with only 39% of the allotted time period elapsed.

This excellent progress continued and early in December 1949 the project was 95% complete, and by the end of December 1949 the overhead structure was so far advanced it was opened to traffic. It will be noted that this event occurred approximately nine months in advance of the scheduled completion date of September 15, 1950.

A final inspection of this project was made on May 11, 1950, and by June 2, 1950 all construction and related work was completed.

Newport Bridge

Although the contract for reflooring and repairing the fender system of this bridge was let during January 1949, the delayed delivery of steel flooring and structural steel resulted in the lengthening of the construction period well into this fiscal year. The final inspections and acceptance were made in the latter part of August 1949. The new steel flooring affords a smooth riding surface and is ideally suited for the constantly increasing vehicular traffic using this bridge. The fender repairs have now ended the long existing need for protection of this bridge from the hazards of river traffic.

Curtis Mill Bridge

Construction work on this project had reached the final stages at the end of the preceding report period. The only unfinished work consists of minor roadway items, and a general cleanup of the site, which was completed in August 1949.

Leipsic Bridge

In addition to the deteriorated condition of the present structure, further serious damage to this bridge resulted on January 1, 1950, from an automobile colliding with an end post of one of the bridge trusses. Temporary repairs were made by maintenance forces and the bridge was reopened to traffic on January 23, 1950.

A new structure is authorized for this location but due to several revisions in the original plans and specifications the start of actual construction has been deferred until the next fiscal year.

Cedar Creek Bridge

The original span at this location was constructed during World War I by the U. S. Engineers as a temporary expedient. It continued in use until 1948 when it was declared unsafe for vehicular traffic.

A new bridge was planned and constructed during this report period and opened to traffic in June 1950.

The movable swing span and adequate fender system, together with a widened and improved approach road, provides a safe and suitable crossing and has removed one more obsolete bridge from the highway system.

McCauley's Dam

This project, consisting of a four-span creosoted timber bridge and spillway, with incidental grading and surfacing on roadway approaches, was in its final stages of construction at the close of the report period.

The legislature had previously authorized an appropriation for the replacement of the existing bridge and spillway in order to restore the pond to its former level. Plans for the dam and spillway were completed as far back as November 1948, however, the contract was not awarded until August 10, 1949.

Construction began in October 1949 with the driving of test piles and the removal of part of the existing structure. The delayed deliveries of creosoted timber and piling to the site prevented the meeting of the scheduled completion date. At the close of this report period the project was practically complete with the exception of minor roadway items. The realignment of the bridge and roadway provides improved sight distances which will be of much assistance in the reduction of accidents at this location.

Silver Creek Bridge

This bridge is located in New Castle County on County Road #424 approximately 3½ miles east of McDonough.

The original bridge was destroyed by fire in July, 1944.

Funds for the construction of a new bridge at this location were made available through a supplementary appropriation by the legislature in 1949.

New construction was started on August 27, 1949, and the structure was completed February 2, 1950. The new bridge consists of creosoted spans with a total length of 286 feet.

Barley Mill Bridge

This bridge is located on Barley Mill Road and spans Red Clay Creek in New Castle County.

The bridge previously serving this crossing consisted of two double lattice wooden through trusses having a clear span of approximately 66 feet. The bridge rested on masonry abutments. Failure of this structure occurred on May 31, 1949 and was caused by the passage of an over-

loaded concrete mixer truck. The alignment of the roadway approaches to the old bridge was very poor, so it was decided to improve this condition for the new crossing by straightening the roadway alignment. This moved the location of the proposed new bridge downstream from the previous crossing, and resulted in a skewed bridge. A temporary Bailey Bridge was set up on the masonry abutments of the old bridge in order to serve the travelling public during the construction period.

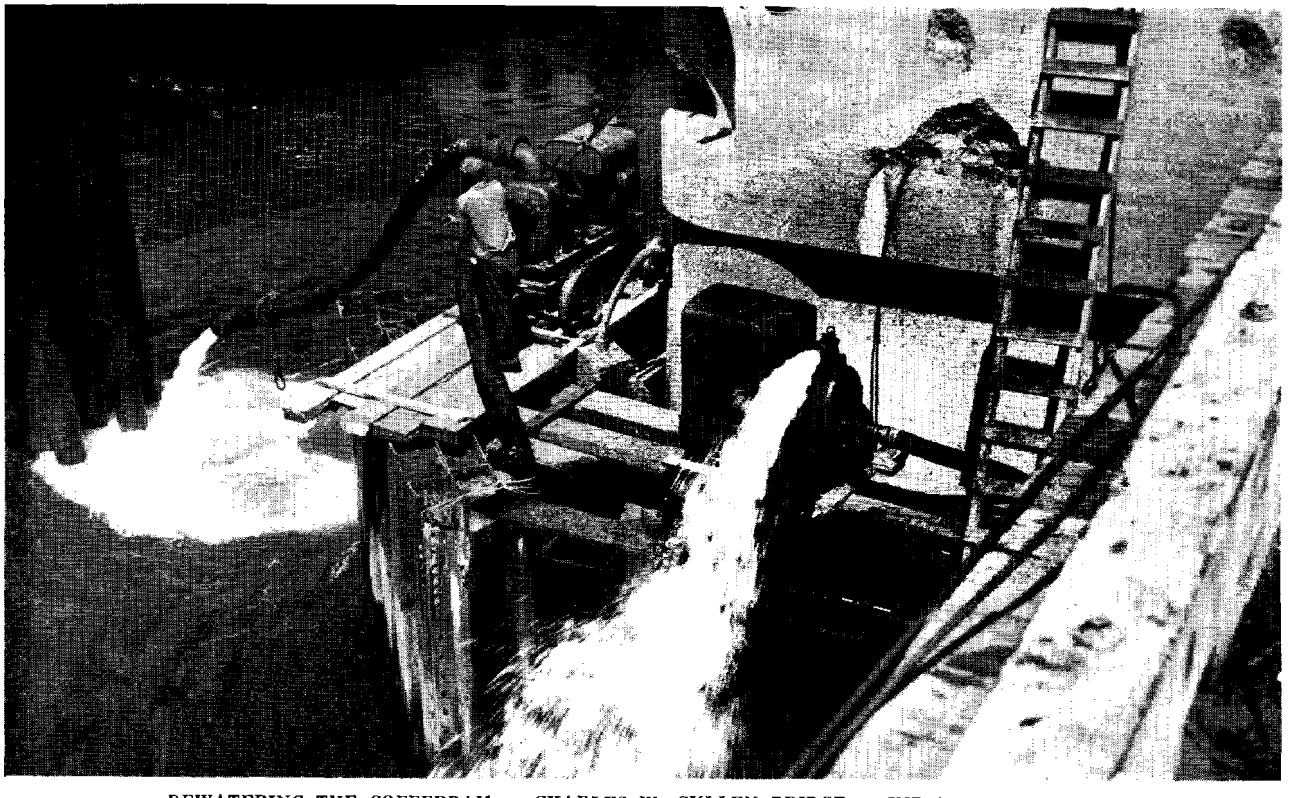
The design adopted consists of a two-span continuous I-beam and concrete slab bridge supported on one stream pier and two concrete abutments located on the stream banks. A roadway width of 24 feet was provided for highway traffic with two safety curbs a foot and a half wide for pedestrian emergency use. The bridge railing consists of a flexible steel beam guard rail mounted on structural steel posts. Design features were kept as simple and uncomplicated as possible in order to obtain low construction costs. The project was originally intended to be constructed with 100% State funds, however, its status was later changed to a Federal Aid project.

The actual contract work was begun on February 15, 1950. Work proceeded more or less uneventfully during the winter months. The footing design of the stream pier was changed when bed rock failed to materialize, otherwise the bridge construction conforms to the contract plans. Construction was still in progress at the close of the report period with completion expected at an early date.

Charles W. Cullen Bridge

Preceding annual reports have furnished a complete description of the destruction of the south approach on February 10, 1948, due to an unusual combination of tide, wind and ice-flow. A temporary one-lane timber trestle was constructed in May, 1948, and has been in use until the beginning of reconstruction operations.

A consulting firm was engaged to prepare suitable plans for the replacement of the destroyed south approach, a new fender system and the remodeling and alteration of the electrical system. Plans were prepared, and proposals opened on August 10, 1949. Upon review and further study the bids were withdrawn due to the objection that the cost of construction was too high. As a result the consultants were instructed to prepare an entirely new design with a



DEWATERING THE COFFERDAM — CHARLES W. CULLEN BRIDGE — INDIAN RIVER INLET

view to reducing the essential costs of the project to a minimum. New plans were prepared and new proposals received on March 15, 1950.

Actual work on the project was delayed due to failure of equipment and materials to arrive at the site. By the end of the period work had progressed to the completion of the two pile load tests, and the driving of several H-piles. The contractor has given assurance that every effort will be made to overcome this disappointing start and to secure much more rapid and satisfactory progress on this project in the immediate future.

Brandywine Boulevard

This contract has proved to be unique in the annals of Highway Department projects in that it is the first contract in which a large and comprehensive storm drainage system has been included in a highway project. The design of this extensive storm water system involved considerable study of local topography and the gathering of extensive data concerning existing and proposed utilities within the limits of the project in order to eliminate, wherever possible, any conflict between the proposed storm drainage system and the various utilities. The entire work of planning and designing the storm sewer systems was performed by the Bridge Division. This phase of the work was begun early in 1949 and continued well into 1950. Federal Aid participation was granted for that portion of the storm drainage system immediately adjacent to and along the roadway improvement; however, participation was refused for that portion of the storm water trunk lines extending down Rodman Road and Edgemoor Road, the cost of this portion of the work being borne entirely by the State. The project was finally awarded on May 12, 1950. Actual construction was begun on May 24, 1950.

The preparation and planning involved in the contract has established a precedent for projects of this nature, both for the State Highway Department and the Public Roads Administration. Construction progress will be watched with marked interest as the effect of this work may have considerable bearing on future planning of improvements of a similar nature in the Wilmington area.

Shore Protection

During its last regular session the legislature enacted five bills authorizing and directing the State Highway De-

partment to perform necessary shore protection work at Slaughter, Rehoboth, Lewes, Broadkiln and Bethany Beaches.

Due to an overrun on bids received, it was necessary to make a number of changes in the original plans in order to stay within the appropriated funds.

Contracts for all five projects have been awarded during this report period and actual construction is scheduled to begin early in the next fiscal year.

Seaford Bridge

The contract for the reflooring of this bridge was awarded in June of this fiscal year. The work is expected to be completed within the early months of the next fiscal year.

Little Creek Bridge

The traffic over this bridge is steadily increasing both as to volume and weight. The weight of many of the vehicles using this bridge far exceeds its posted maximum of three tons. During January of this report period heavy trucks damaged the bridge so extensively it had to be closed to all traffic for several weeks.

Early replacement with a span of modern design should be considered if we are to meet the traffic needs at this location.

RIGHT OF WAY DIVISION

Land prices, particularly in the Wilmington area, continue to rise. These increases do not seem to be of a speculative nature, but represent orderly buying of large tracts of land. Rural shopping centers, with parking areas designed to accommodate a large number of cars, are being built, indicating a business trend from the city and its crowded parking conditions. Large rural apartment projects are being constructed. Choice sites are bringing unprecedented sums and buying competition is keen among super-markets, oil companies, sign companies, and other businesses. It seems evident this activity is a fore-runner of an even greater building boom when the Delaware River Memorial Bridge becomes a reality.

If we continue to use recent sales as a basis for our calculations—this seems to be the most reliable source of determining values—then it stands to reason that the cost of obtaining right of way will increase proportionately with the increased costs of neighboring land sales.

In an effort to reduce the costs of rights of way several new features have been adopted during this report period, the results of which have proved very profitable to the Department. They are Slope Easements and Trespass Agreements. The importance of these new features seems to justify the following short explanations.

A method of Slope Easement was adopted this fiscal year and has proven beneficial to the Department in reducing the cost of rights of way. The obtainment of such easement insures the property owner that his property line will not be disturbed. After filling or cutting the lands abutting the slope easement to conform to the grade of the road this easement automatically expires and the fee title remains vested in the original property owner.

Trespass Agreements have also been used advantageously both to the Department and the involved property owners. In these agreements the property owners grant permission to trespass upon their lands during the period of construction in return for the assurance that their properties will be put in presentable appearance insofar as their steps, walk entrance and lawns are concerned. These agreements reduce the cost of right of way in that they eliminate the necessity of acquiring short strips of land. The contractor is protected from possible trespass charges and the complaints to the State are reduced to a minimum.

Including the unfinished business from the previous year, the members of the Division processed 56 separate projects in which the following work was completed:

Options obtained	381
Trespass Agreements executed	94
Drainage Agreements executed	69
Slope Easements	55
Deeds executed	354
Partial Mortgage Releases executed	113
Partial Judgment Releases executed	5
Descriptions written	416
Condemnations heard	30
Condemnation appeals	3
Plats prepared	25
Parcels State land sold	2
Auction Sale Buildings	3
Borrow Pit Agreements	2
Total Expenditures	$315,762.06

The unusually large number of condemnation cases can be attributed to the following:

Nine parcels of land were condemned in acquiring an abondoned trolley right of way along Hillcrest Avenue, Haines Avenue and Brandywine Boulevard in Brandywine Hundred. Through organized opposition nine owners stood condemnation rather than donate their lands as requested by the State, and were awarded sums far in excess of the real value of the land taken. More than half of the owners along this road had indicated their approval of the construction by executing a gratis option. These options were voided and the owners were given payments comparable to those set by the condemnation proceedings.

The remaining twelve condemnations were more or less normal procedure for the year.

SUBURBAN COMMUNITIES

During the report period the following suburban development contracts were completed and accepted for maintenance by the Department:

Contract	Development	Mileage
SD 21-A	North Bellevue Manor	0.159
SD 23	Wilmington Manor	1.976
SD 24	Wilmington Manor	1.472
SD 25	Lyndalia	0.600
	Total Mileage Accepted	4.207

In addition to the above, a number of roads within the following developments were constructed to Department Specifications by the developer of the community and accepted for maintenance:

Development	Mileage
Claymont Heights	0.613
Kiamensi Gardens	0.331
Llangollen Estates	0.665
Nanticoke Acres	0.563
Normandy Manor	0.202
Pembrey	0.320
Willow Run	0.253
Total Mileage	2.947

In all, 7.154 miles of suburban roads were added to the highway system for maintenance during the fiscal year.

Eight other contracts were awarded, the completion dates of which will extend into the next fiscal year. These contracts are as follows:

	Development
SD 10	Holly Oak Terrace
SD 27	Hilltop Manor
SD 28	Woodcrest #1
SD 29	Woodcrest #2
SD 30	Christiana Acres
SD 32	Delaview Avenue
SD 33	Westwood Manor
SD 36	Roseville Park

Throughout the State, particularly in New Castle County, a number of new developments are under construction and many more are being planned. It is quite evident this new construction will add many miles to our maintenance program and it seems time to give serious consideration to our budget requirements if we are to maintain these streets and roads adequately.

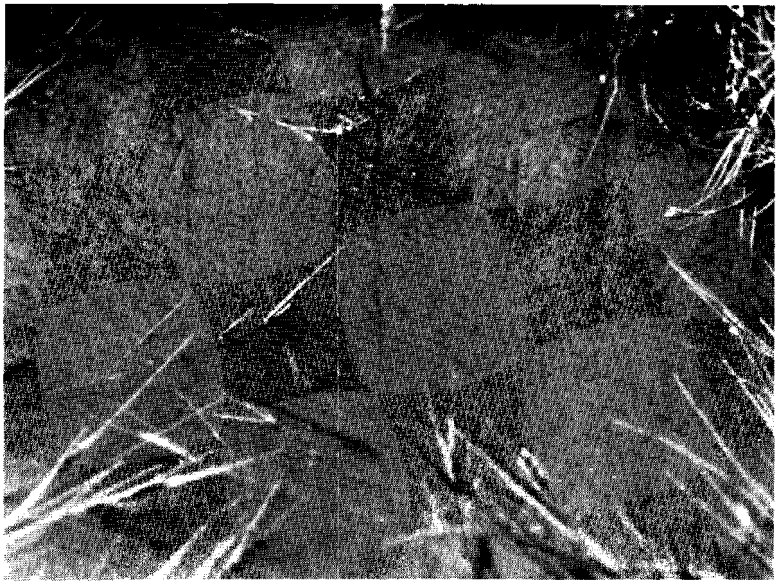
The maintenance of these streets and roads certainly will become a major problem unless proper precautions are taken immediately to protect them from damage by heavy vehicles. In several communities heavy trucks are using the streets as short cuts and have damaged the streets so extensively they will soon need reconstruction. Some prompt action should be taken in this matter if we are to conserve our already extended maintenance funds.

MOSQUITO CONTROL DIVISION

The report of this division would give a much clearer view of its activities and needs if it were based on a calendar year instead of the fiscal year. Invariably the weather conditions, tides, etc. of succeeding summers differ considerably, therefore making the needs of that particular part of each fiscal year quite different. For example, 1949 was dry with little trouble from extra-high tides, while 1950 was the exact opposite.

There has been much increased demand for both air-spraying and ditch work by residents of marsh-surrounded communities. By and large the cooperation of property owners has been very gratifying, especially in regard to ditching. There have been several instances where new

roads being cut through marshes have filled in our drainage ditches. This has been brought to the attention of the Division by the property owners themselves. In these cases



MOSQUITO LARVAE IN UNTREATED SUSSEX COUNTY SWAMP

DRAINAGE DITCHING FOR MOSQUITO CONTROL

the owner has furnished the proper kind and amount of tile and the Mosquito Control Division has furnished the labor to get that particular area back to its original state of drainage. The one blot on this is at Dewey Beach where new roads are being cut continually, blocking up ditches and forming individual ponds of stagnant water. The Division did not try to drain each pond but kept mosquitoes under control by careful inspection and spraying from both ground and air as soon as signs of breeding were noticed.

In regard to airspraying, the Division received the usual complaints from marsh owners that the muskrats were being killed. Each complaint was investigated and an agreement satisfactory to both sides usually was reached. In the past, tests have been conducted by the University of Delaware, and it has been found that our spray solution, dispersed at the rate of two quarts per acre, has no effect on muskrats, crabs and similar forms of life. Evidently the absence of muskrats is due to over-trapping. The New Jersey Wildlife laws permit six muskrats to be caught per acre per year. Delaware trappers admit to many more than that. On the whole the vast majority of the people demand and depend on aerial spraying, and without it the seashore resorts and private camps would be untenantable.

This biennium started with $150,000, or $75,000 for each fiscal year. In the first fiscal term a total of $71,581.00 was used in the following ways:

Salaries & Wages	$42,045.95	58.0%	of total
Office Expenses	1,687.62	2.8%	" "
Travel	448.40	0.6%	" "
Operation	23,828.51	33.4%	" "
Repairs & Replacements	2,655.95	3.7%	" "
Equipment	822.52	1.3%	" "
Gas Tax Refund Account	92.05	0.2%	" "

The salaries and wages which make up 58% of our expenditures represent about 20 yearly employees plus four or five extra for summer operations.

This report will discuss later the amount of ditching we are able to clean and the need for more men to maintain ditches cut by the Civilian Conservation Corps. Despite airspraying, ditching is still the answer to mosquito control. Mosquito breeding is seldom found in any ditch that is at least half-way open.

Operational expense makes up the bulk of the rest of the expenditures, and includes airspraying, fuel oil, DDT

and other materials that are used for the control of the mosquito.

The activities of the Mosquito Control Division are divided into two phases: summer and winter. Hand cleaning goes on the year round, but the summer airspraying does away with the carpenter crew for repair of outlet boxes, and the machine cleaning crew, both being part of winter operations. These men are utilized in the summer as inspectors and for the mixing of larvicide, etc.

The hand cleaning crew this fiscal year cleaned 431,518 linear feet of ditches. This accomplishment required 17,281 man-hours, giving a cost of approximately $.03 per foot for the actual cleaning. In Delaware there are approximately 10,000,000 feet of drainage ditches that should be cleaned at least every three years, with many of them needing it every year. Many thousands of feet of this ditching can not be maintained properly due to budgetary limitations.

This fiscal year 402,830 linear feet of ditches were cleaned by machine. The machine cleaning is done by a crew of four, using two tractors and a home-made ditch cleaner. It is pointed out that the machine does not clean thoroughly enough to be considered a suitable tool, so a hand-cleaning crew must follow the machine, but their job is made easier by the prior machine operation.

The Division repaired twelve outlet boxes along the north shore line of the Indian River Bay and Indian River from the tip of Long Neck to and including Oak Orchard. In addition, two culverts were installed at vital points, three concrete catch basins were poured at Oak Orchard, and approximately 200 feet of tile was laid at various sites.

The main summer operation is airspraying. The Division has approximately 18,000 acres mapped out which are sprayed a varying number of times, depending upon the location and the amount of mosquito breeding found there. During this fiscal year a total of 98,405 acres were sprayed, as follows: from July to September, 1949, 77,817 acres; during June, 1950, 20,588 acres. The contract price for spraying in 1950 was nineteen cents per acre as compared with twenty cents per acre in 1949.

The towns of Lewes and Rehoboth received the greatest benefit from the spraying, being given eight applications. In addition, and more important, the marshes surrounding these towns were kept under constant surveillance and the breed-

ing was killed before it reached the adult stage and had the opportunity to get into the populated areas. Bethany Beach received six applications.

The Delaware City area received eleven applications totalling 25,651 acres, or approximately 25% of the total acreage. Control here is very difficult because of the vast areas of marsh that go untouched. There was a noticeable relief after each application but in four or five days a new brood would mature and migrate into the town.

In 1950 the above towns and Camp Barnes and Camp Arrowhead were treated with our normal 5% DDT in oil plus one pint of 20% Lindane per 75 gallons of solution. Lindane provides a better kill of flies and other insects which resist our 5% DDT solution, and was used on the recommendation of the Department of Entomology of the University of Delaware.

In addition to the above-mentioned recommendation for the use of Lindane, the Entomology Department is carrying on research for new larvicides and improved methods for controlling the mosquito. At the end of this fiscal year Dr. Richard Darsie was employed on a full-time basis to work with the Mosquito Control Division. In 1949 Professor Donald MacCreary did experiments on the "Influence of a Low Forest Canopy on the Effectiveness of Plane Applications of DDT Against Mosquito Larvae." The complete results of this experiment are to be found in Publication #233 and Scientific Article #155 of the Department of Entomology, February 24, 1950. The main points brought forth state that although 50% of the droplets were screened out, the percentage of kill (90.5%) was sufficiently high to preclude the necessity of increasing the dosage of DDT in these heavily wooded areas. Also, in an effort to make the people of Delaware more mosquito-conscious, a booklet entitled "Delaware Mosquitoes" was prepared and some 13,000 copies were distributed to civic organizations throughout the State. The purpose of the publication is to give the overall picture of mosquito control and explain why certain small sections can not be given individual attention.

The importance of proper ditching and adequate spray coverage of all surrounding marshlands can be shown by a comparison of the trap collections of two separate areas, namely Delaware City and Oak Orchard. At Oak Orchard the ditches have been cleaned this year and a close check on breeding in surrounding marshes has been maintained.

As a result, in a 110-day period a total of 314 mosquitoes were caught in the trap. At Delaware City, where all the treated marshland is in the immediate vicinity of the town, a total of 9,986 mosquitoes were caught in a like period.

All told, 22 different species of mosquitoes were found in northern Delaware and 16 different species in the southern part. In New Castle County **culex salinarius** was most common while **aedes sollicitans** predominated in Sussex County.

During the fiscal year no new equipment was purchased, but to maintain the present scope of control several items are needed. The mixing plant is sufficient, but a new tank truck to supplement the present 1941 Chevrolet is of primary importance. Several other smaller items are needed to provide for a smoother spray and ditching program.

It should be pointed out that the summer work has to be planned in advance, and any demands in excess of the original estimate of acres to spray, etc., will require more equipment and men than the present appropriated funds will permit.

MAINTENANCE

The continuation of high and adequate maintenance standards has been very trying during the period of this report. Conditions contributing to this difficult task are the same throughout the nation and not peculiar to Delaware. It is nationally recognized that foremost of the deterrents to adequate highway maintenance are the inability to keep pace with needed new construction of all types of highways and the ever increasing traffic volumes, weights and widths presently using our highways.

From recent surveys it has been established that throughout the State there are many miles of highways that are inadequate either in width or surface condition. Because of financial deficiencies much of this same highway mileage was not considered when the construction programs for the prior and current biennium were approved. It is therefore apparent that unless many miles of these roads are reconstructed or improved in some manner their continued deterioration will result in the dissipation of already insufficient maintenance funds.

The increase in traffic, both in quantity and in weight, has been very substantial, especially on the main highways. For example, it has increased on all highways and streets of the nation from 252 billion vehicle-miles in 1936 to an estimated 419 billion vehicle-miles in 1950. Registration has increased from 26 million in 1935 to over 46 million in 1950.

In addition to traffic volume the weight of traffic has taken its toll of maintenance costs. In 1936 traffic studies indicated that only 13 out of each 1,000 trucks traveling the rural roads had axle loads of 18,000 pounds or more. More recent studies show that 93 out of each 1,000 trucks on these roads had axle loads of 18,000 pounds or more. This represents an increase of 615% in the heavily loaded vehicles using our main rural roads.

The increased volume of traffic has caused the poorer section of our highways to become a burden on our maintenance budget. This higher traffic intensity, in combination with wide truck bodies, has caused more frequent use of the shoulders and consequently increased the shoulder maintenance cost.

The aforementioned factors naturally influence the costs of maintenance. It seems unnecessary to dwell for any great length upon the continued rising costs as the times make this very evident in every field of endeavor. Statistics about to be published by the Highway Research Board will indicate that a highway department now can maintain only 1,260 miles of primary roads for one million dollars and the current mileage is even less where the traffic is heavy or the roads are worn or obsolete. Stated another way, it now requires $784.00 per mile to perform the same amount of maintenance that could be performed ten years ago for $436.00 per mile.

Increased volumes, weights, widths and the resultant additional costs have dictated the extent of our maintenance during this report period and we must recognize that because of these influences our highway system is not completely maintained since we could meet only the basic needs.

The state-wide expenditure for maintenance during the fiscal year was $1,897,332.07, full details of which are included in the report of the Secretary.

Snow Removal and Ice Control

Snow removal and ice control is a variable operation. For the winter season of this fiscal year the snowfall was

very light and ice conditions were below normal, nevertheless it was necessary to be prepared for occasional heavy snow and ice storms.

Approximately 90,000 feet of snow fence was erected along the important highways of the State and all trucks and tractors were so equipped that snowplows could be attached for immediate use.

The expenditure for this item of maintenance was $32,463.67, the lowest since the 1943-1944 fiscal year.

This reduced expenditure materially aided the spring maintenance program in that the savings were available for other maintenance purposes which otherwise could not have been considered in this fiscal year.

Comparative expenditures for this maintenance operation are herewith indicated for the past ten fiscal years:

SNOW REMOVAL AND ICE CONTROL

FISCAL YEAR	NEW CASTLE	KENT	SUSSEX	TOTAL
1940-41	$ 20,260.03	$ 9,570.96	$ 6,919.05	$ 36,750.04
1941-42	11,011.16	6,787.65	5,298.91	23,097.72
1942-43	21,075.98	4,937.30	3,168.62	29,181.90
1943-44	18,383.81	4,432.73	2,671.05	25,487.59
1944-45	39,443.57	3,266.13	1,244.92	43,954.62
1945-46	30,553.61	8,318.34	8,062.61	46,934.56
1946-47	49,578.15	13,007.78	6,775.90	69,361.83
1947-48	60,866.54	21,797.22	33,069.91	115,733.67
1948-49	35,913.29	5,879.91	10,748.06	52,541.26
1949-50	25,260.36	4,405.21	2,798.10	32,463.67
TOTALS	$312,346.50	$82,403.23	$80,757.13	$475,506.86

TRAFFIC SERVICE

Traffic densities also have increased the need for more traffic services, signals, signs, guard rails, etc., and the more frequent renewal of center lines and other markings.

Much progress has been made this fiscal year in meeting this accelerated need. A number of signals have been approved and installed at critical intersections, many old signs have been repainted or replaced and wherever justified new signs have been erected. The painting of center lines,

crosswalks and other related work has been accomplished progressively throughout the State. The erection of route markers and destination signs continues and it is expected this work will be completed early in the next fiscal year.

The requests for signals and other traffic control devices continue to be numerous, and each requires thorough investigation. Although time-consuming, these investigations are invaluable; they reduce the number of unwarranted signals which in most cases hinder more than help traffic difficulties.

This expenditure has increased gradually and now exceeds that of ten years ago by 142%. It is evident that this trend will continue and that Traffic Service must be considered a major item in future budgets.

TRAFFIC SERVICE

FISCAL YEAR	NEW CASTLE	KENT	SUSSEX	TOTAL
1940-41	$ 38,210.01	$ 10,445.04	$ 10,375.71	$ 59,030.76
1941-42	39,887.41	12,009.78	6,377.53	58,274.72
1942-43	34,182.39	14,100.43	11,498.87	59,781.69
1943-44	34,572.96	12,502.39	6,435.53	53,510.88
1944-45	33,567.55	13,243.70	5,512.76	52,324.91
1945-46	37,530.42	18,329.44	12,828.23	68,628.09
1946-47	45,534.10	17,254.17	14,580.11	77,368.38
1947-48	54,944.91	17,926.34	12,765.88	85,637.13
1948-49	69,254.30	27,406.18	17,659.57	114,320.95
1949-50	76,719.33	28,366.68	37,913.90	142,999.91
TOTALS	$464,403.38	$171,584.15	$135,948.09	$771,935.62

CONSTRUCTION

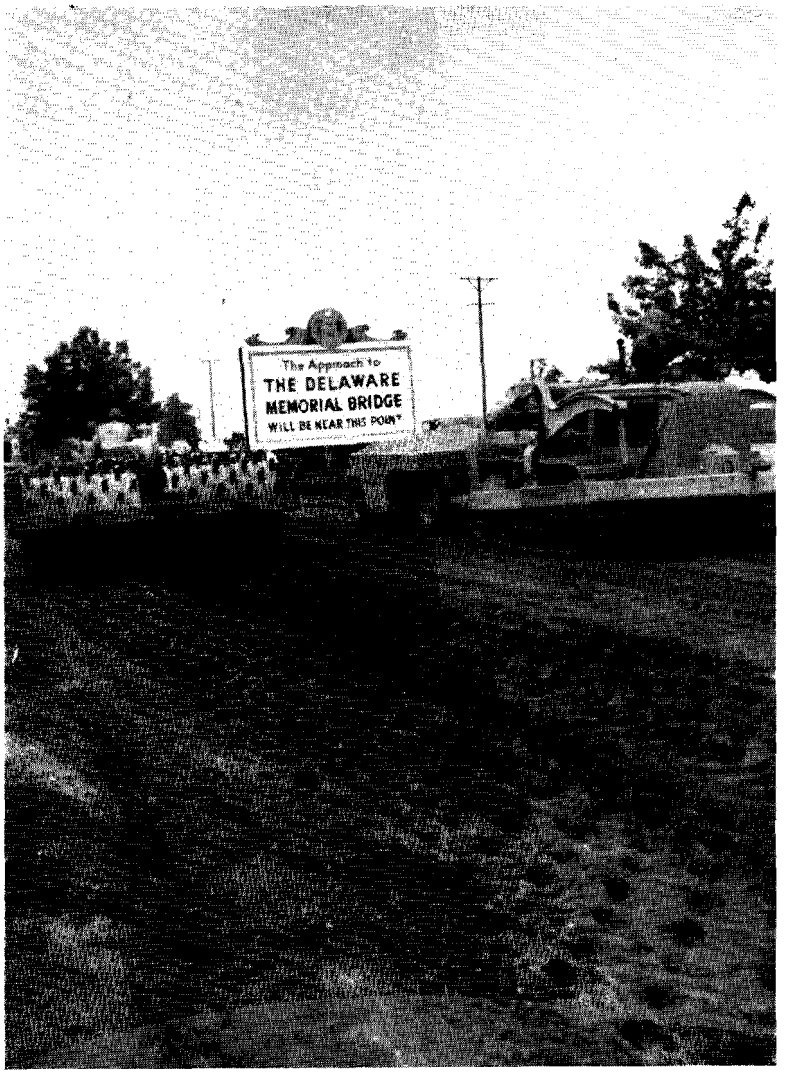
In spite of serious handicapping economic conditions during the fiscal year the Department accomplished a huge total of construction. During the period 48 contracts, amounting to $6,797,274.66, were awarded, representing the greatest number of construction projects and, as evidenced by Figure I, it is the largest construction expenditure of any year since the emergency began.

This increased activity in construction indicates pronounced progress and has assisted materially in the reduction of the backlog of needed improvements which for reason of the war economy were neglected. Much of the back-

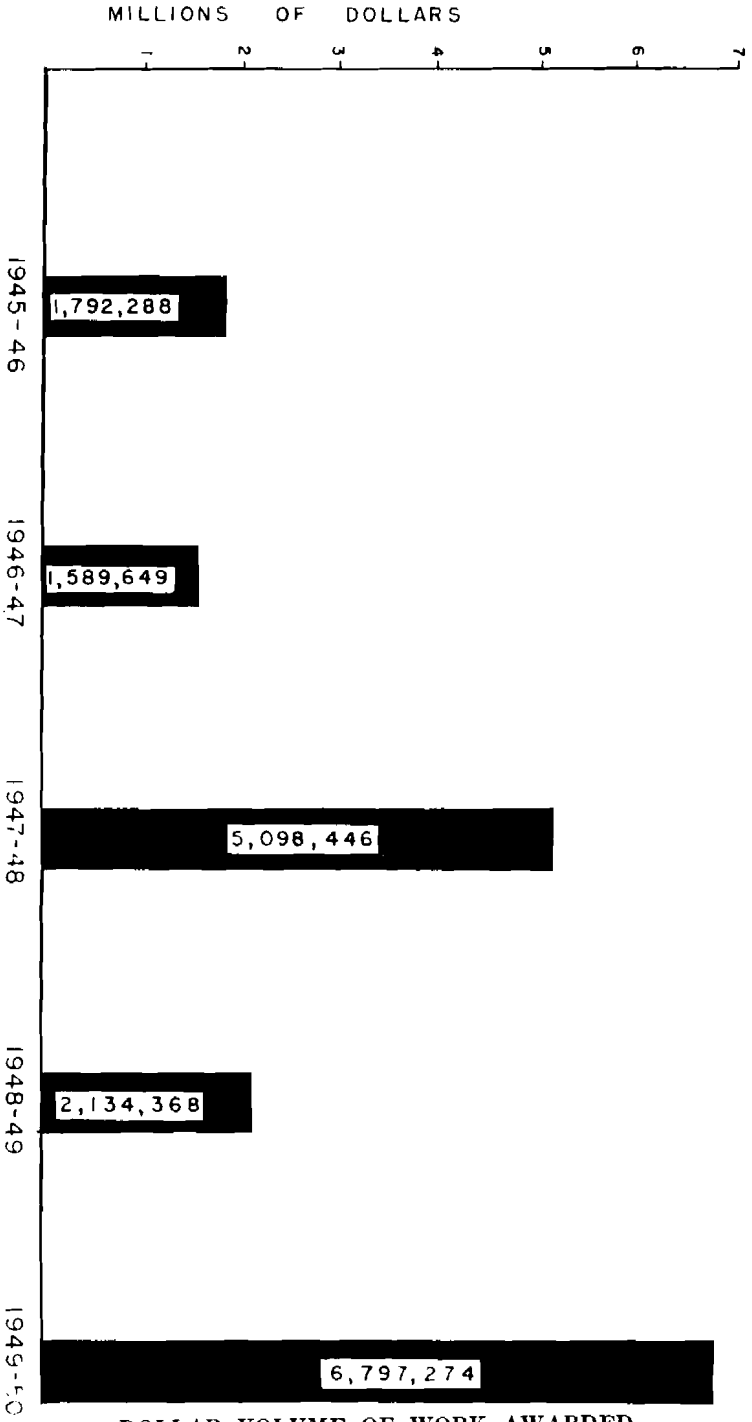
log remains and the post-war years have added additional construction problems that must be considered urgent, as the demands of modern traffic for expanded facilities are in themselves adding to this backlog.

The construction activities were concentrated mainly on the urban and rural sections of the primary system, but they also included many sections of the secondary system. In a few vital areas progress has been made toward creating the modern facilities that are needed in many parts of the State. Important in this category are the Farnhurst Interchange, New Castle Avenue Overpass and the approach to the Delaware Memorial Bridge. These facilities were started in this report period and are scheduled for completion at the same date as that set for the Delaware Memorial Bridge, July 1951.

Information relative to contracts awarded during this fiscal year is contained in the following tabulation.



TAMPING OF FILL — FARNHURST INTERCHANGE



DOLLAR VOLUME OF WORK AWARDED
BY CONTRACT FOR YEARS INDICATED.
(Not including Fuel Requirements)
Figure I

TABULATION OF CONTRACTS AWARDED JULY 1, 1949 TO JUNE 30, 1950

Contract Number	Location	Total Bid Price	Date of Award	Contractor	Type of Construction
1006	Wyoming—State Route 8..	$ 31,215.25	7/13/49	James Julian, Elsmere, Delaware	Stab. Earth and Surface Treatment
962	Cranston Heights—Basin Corner	199,857.00	7/13/49	Wilson Contracting Co., Wilmington, Del.	Cement Concrete Widening and Hot Asphaltic Surface
987	Camp Meeting Woods—Silver Lake	217,480.50	7/13/49	Wilson Contracting Co., Wilmington, Del.	Cement Concrete Widening and Hot Asphaltic Surface
1000	Newark—Limestone Road Section Two	412,247.70	8/16/49	James Julian, Elsmere, Delaware	Cement Concrete Widening and Hot Asphaltic Surface
929	Silver Creek Bridge.....	37,080.50	8/11/49	George & Lynch, Wilmington, Del.	
1035	McCauley's Dam	47,353.00	8/11/49	Delmarva Asphalt Co., Seaford, Del.	
1005	Masten's Corner—Felton ..	131,360.00	8/29/49	George & Lynch, Wilmington, Del.	Cement Concrete Widening and Hot Asphaltic Surface
1009	Philadelphia Pike	436,353.00	12/12/49	Henry C. Eastburn, Newark, Del.	Resurface Hot Asphalt
791	Wilmington Avenue	152,483.25	12/30/49	James Julian, Elsmere, Del.	Cement Concrete Widening and Hot Asphaltic Surface
1060	Barley Mill Bridge and Approaches	43,135.61	12/30/49	George & Lynch, Wilmington, Del.	Cement Concrete Widening and Hot Asphaltic Surface
1034	Hay Road Extension.....	16,583.85	12/30/49	E. E. Downing Co., Wilmington, Del.	Cement Concrete Widening and Hot Asphaltic Surface

TABULATION OF CONTRACTS AWARDED JULY 1, 1949 TO JUNE 30, 1950—(Continued)

Contract Number	Location	Total Bid Price	Date of Award	Contractor	Type of Construction
1059	Delaware State Police Station No. 2	$117,279.00	8/29/49	Globe Improvement Co., Baltimore, Md.	New Building
1053	New Castle County Bituminous Treatment ..	73,104.50	7/20/49	Henry C. Eastburn, Newark, Del.	Surface Treatment
1054	Kent County Bituminous Treatment ..	53,836.00	7/20/49	Delmarva Asphalt Co., Seaford, Del.	Surface Treatment
1055	Sussex County Bituminous Treatment ..	95,593.00	7/20/49	Delmarva Asphalt Co., Seaford, Del.	Surface Treatment
1030	Charles W. Cullen Bridge..	430,605.00	3/22/50	Baltimore Contractors, Inc., Baltimore, Md.	Concrete & Steel Deck Structure Fenders and Draw Span Protection
815	Seaford to Atlanta	157,691.00	3/22/50	James Julian, Elsmere, Del.	Cement Concrete Widening
1074	Appleby Road	26,384.00	3/30/50	John Julian, Elsmere, Del.	Stabilized and Surface Treated Roadway
1092	Townsend School Sidewalk	2,372.30	3/22/50	T. Paul Dabson, Wilmington, Del.	Cement Concrete Sidewalk
1066	Hardscrabble to Concord..	170,691.80	3/22/50	George & Lynch, Wilmington, Del.	Waterbound Macadam Widening and Hot Mix Surface
1039	Farmington to Harrington	122,731.50	2/18/50	George & Lynch, Wilmington, Del.	Stabilized and Surface Treated Roadway
1045	Delaware Memorial Bridge Approach	209,215.50	5/16/50	Henry C. Eastburn & Son, Newark, Del.	Grading & R.C.C. Paving

TABULATION OF CONTRACTS AWARDED JULY 1, 1949 TO JUNE 30, 1950—(Continued)

Contract Number	Location	Total Bid Price	Date of Award	Contractor	Type of Construction
1057	New Castle Avenue Overpass	$429,489.60	5/12/50	Conduit & Foundation Corp., Philadelphia, Pa.	Steel and Concrete Structure Ramps and Approaches
1001	Laurel to Mission	571,635.65	2/13/50	Standard Bitulithic Co., Newark, N. J.	Cement Concrete Widening and Hot Mix Resurfacing
1040	Hardscrabble to Laurel	262,786.00	2/13/50	George & Lynch, Wilmington, Del.	Cement Concrete Widening and Hot Mix Resurfacing
993	Brandywine Boulevard	522,072.50	5/12/50	Olivere Paving & Construction Co., Wilmington, Del.	Hot Mix Asphaltic Pavement
1070	Farnhurst Interchange	712,349.26	6/13/50	Wilson Contracting Co., Wilmington, Del.	Concrete & Steel Grade Separation Structures
816	Blackiston to Clayton	154,662.50	6/2/50	Wilson Contracting Co., Wilmington, Del.	Concrete Widening and Hot Mix Resurfacing
1091	Slaughter Beach	6,480.00	6/10/50	Indian River Yacht Basin, Inc., Rehoboth, Del.	Sand Fill (Shore Protection)
1093	Broadkill Beach	22,700.00	6/27/50	Delmarva Asphalt Co., Seaford, Del.	Creosoted Timber Groins and Bulkhead
1095	Lewes Beach	23,510.00	6/27/50	Delmarva Asphalt Co., Seaford, Del.	Creosoted Timber Groins
1096	Rehoboth Beach	16,560.00	6/19/50	George & Lynch, Wilmington, Del.	Stone Filled Creosoted Timber Groins
1097	Bethany Beach	24,450.00	6/26/50	George & Lynch, Wilmington, Del.	Stone Filled Creosoted Timber Groins

TABULATION OF CONTRACTS AWARDED JULY 1, 1949 TO JUNE 30, 1950—(Continued)

Contract Number	Location	Total Bid Price	Date of Award	Contractor	Type of Construction
1043A	Seaford Bridge Reflooring.	$ 17,970.00	6/27/50	McCormick Constr. Co., Wilmington, Del.	Open Mesh Steel Flooring
1043	Laurel to Seaford.....	322,786.30	6/28/50	Standard Bitulithic Co., Newark, N. J.	Concrete Widening and Hot Mix Resurfacing
1100	New Castle County Surface Treatment	138,030.00	6/5/50	Richard F. Kline, Frederick, Maryland	
1101	Kent County Surface Treatment	77,380.00	6/10/50	Pleasanton & Edgell, Dover, Delaware	
1102	Sussex County Surface Treatment	119,100.00	6/5/50	Delmarva Asphalt Co., Seaford, Del.	
1106	Concrete Pipe Requirements	18,546.50	6/5/50	Hayman Concrete Pipe Co., Dover, Del.	
1107	Maintenance Patching Material	52,615.00	6/5/50	Kingston Bituminous Products Co., Newark, N. J.	
1108	Bituminous Concrete New Castle Co.	14,790.00	6/5/50	Petrillo Bros., Inc., Wilmington, Del.	
1109	Maintenance Patching Material—New Castle Co...	7,750.00	6/5/50	Wilson Contracting Co., State Road, Del.	
1110	Maintenance Patching Material—Kent County	16,575.00	6/5/50	George & Lynch, Wilmington, Del.	
1111	Maintenance Patching Material—Sussex County ..	9,350.00	6/5/50	George & Lynch, Wilmington, Del.	

TABULATION OF CONTRACTS AWARDED JULY 1, 1949 TO JUNE 30, 1950 — (Continued)

Contract Number	Location	Total Bid Price	Date of Award	Contractor	Type of Construction
1112	Hot Mix Asphalt Surfacing —Kent County	$ 25,520.00	6/5/50	George & Lynch, Wilmington, Del.	
1113	Creosoted Timber Requirements	21,659.40	6/6/50	Atlantic Creosote Co., Philadelphia, Penna.	
MC-5	Mosquito Control Airplane Spraying	18,507.14 (Final)	5/5/50	Lehava Air Service, Philadelphia, Penna.	
MC-6	Mosquito Control (Program Season)	5,346.55 (Final)	6/5/50	Atlantic Refining Co., Philadelphia, Penna.	

TOTAL $6,797,274.66

RECOMMENDATIONS

After a thorough study of our construction needs, I wish to recommend for the consideration and subsequent action of the Members the following list of projects from which the next construction program may be selected.

Many of the projects listed are of the earth type and their improvement would mean much to the citizens of the State living near these roads or who use them regularly.

NEW CASTLE COUNTY

CONTRACT	TYPE OF CONSTRUCTION	FEDERAL AID SYSTEM	MILEAGE
Middletown to Summit Bridge	Reconstruction	Primary	7.4
Summit Bridge to Tybouts Corner	Reconstruction	Primary	7.2
Lancaster Pike Extended	Grading	Primary	2.7
Kennett Pike	Reconstruction	Primary	5.6
Fieldsboro to St. Georges (Northbound U. S. 13)	Reconstruction	Primary	9.4
Christiana to Newark	Reconstruction	Primary	4.7
Ridge Road	Reconstruction	Primary	0.2
Glasgow Station to State Road (Eastbound U. S. 40)	Reconstruction	Primary	5.0
New Bridge over Christiana River (Wilmington)	New Construction	Urban & Primary	—
Governor Printz Extension (near Claymont)	New Construction	Primary	2.0
Baynard Boulevard (Washington Street to Concord Ave.)	New Construction	Urban	0.7
Du Pont Road (Maryland Avenue to Kennett Pike)	Reconstruction	Secondary	2.9
Glasgow Station to Newark	New Construction	Secondary	5.6
Drawyers Bridge & Approaches	New Construction	Primary	0.7
Concord Pike (Murphy Road to Talleyville)	New Construction	Primary	2.9
Philadelphia Pike (Bellevue Road to Claymont)	Reconstruction	Primary	2.5
Marsh Road (Washington Street Extension to Governor Printz Boulevard)	Reconstruction	Secondary	0.9
Bellevue Road (Philadelphia Pike to Governor Printz Boulevard)	Reconstruction	Secondary	0.6
Silverside Road (B/O Railroad to Philadelphia Pike)	Reconstruction	Secondary	0.9
Rockland Road	New Construction	Secondary	1.2
Christiana to Hare's Corner	Reconstruction	Primary	3.2
King's College to New Castle	New & Reconstruction	Secondary	6.4
St. Georges Bridge to Black Cat (Northbound U. S. 13)	Reconstruction	Primary	9.1
Lincoln Street (Wilmington)	New Construction	Urban	1.4
Lancaster Pike (Ferris Road to Greenhill Avenue)	New & Reconstruction	Primary	1.4
Blackbird to Walker's School	New Construction	Secondary	2.7
Maryland Line to Newark (S.R. #2)	Reconstruction	Secondary	2.7
Maryland Line to Newark (S.R. #273)	Reconstruction	Primary	2.0

NEW CASTLE COUNTY—(Continued)

CONTRACT	TYPE OF CONSTRUCTION	FEDERAL AID SYSTEM	MILEAGE
Newark to Maryland Line (S.R. #896)	Reconstruction	Secondary	3.0
Route "A" Wilmington Transportation Study*	New Construction	Primary	—
Warwick to Memorial Bridge*	New Construction	Primary	—
Lancaster Pike from Pennsylvania Line S-E	Reconstruction	Primary	2.8
Newport to Boxwood Road	New & Reconstruction	Primary	1.1
Maryland Avenue-Broom Street to Lancaster Avenue	New & Reconstruction	Primary	0.9
Delaware St., New Castle, to Heald St., Wilmington	New & Reconstruction	Primary	6.3
Broom Street	Reconstruction	Primary	1.5
Union Street from Pennsylvania Avenue to City Line	Reconstruction	Primary	1.4
Heald Street from Christiana Ave. to New Castle Ave.	Reconstruction	Primary	0.2
Lancaster Pike to Brandywine Sanitorium	Reconstruction	Primary	2.0
Washington Street from 16th Street to Front	Reconstruction	Primary	1.5
Basin Corner to New Castle	Reconstruction	Primary	1.3
Concord Pike-Talleyville to Pennsylvania Line	New & Reconstruction	Primary	2.2
4th Street	Reconstruction	Primary	1.8
Fingerboard Road	Reconstruction	Primary	0.7
Fieldsboro-Middletown	New Construction	Secondary	1.1
NW of Smyrna from Road 47 to Road 471 (Road 470)	Reconstruction	———	4.0
Limestone Road from Stanton to Pennsylvania Line (Route 7)	Reconstruction	Secondary	7.1
		TOTAL	130.9

*Contract sections to be determined at a later date.

KENT COUNTY

CONTRACT	TYPE OF CONSTRUCTION	FEDERAL AID SYSTEM	MILEAGE
Commerce Street (Smyrna)	New Construction	Primary	1.1
Pearsons Corner to Dover	Reconstruction	Primary	5.9
Division Street (Dover)	New Construction	Primary	0.9
South of Woodside to Camden	Reconstruction	Primary	4.6
Canterbury to Camp Meeting Woods	New Construction	Primary	7.0
Willow Grove to Burnt House	New Construction	Secondary	3.1
Whitleysburg to Felton	Reconstruction	Secondary	9.8
Police Station #3 to Leipsic	New Construction	Secondary	3.3
Pickering Beach Road	New Construction	Secondary	2.2
County Road #208	New Construction	Secondary	4.1
County Roads #330 and #331	New Construction	Secondary	3.5
Burrsville to Harrington	Reconstruction	Primary	9.5
Marydel to Pearsons Corner	Reconstruction	Primary	6.2
Tilghman's Corner to Hazlettville	Reconstruction	Secondary	5.0
Smyrna to Woodland Beach	Reconstruction	Secondary	6.1
Walnut Street (Milford)	Reconstruction	———	0.7
Mill Creek Road (Smyrna)	New Construction	Secondary	1.2
Barber's Corner to Hazel School	New Construction	Secondary	10.1
Slaughter Station Road	New Construction	Secondary	2.7
Harrington to Frederica	Widening	Secondary	7.3
Harrington to Milford	Reconstruction	Primary	7.3
Little Creek Bridge	New Construction	Secondary	—
Mahon's Ditch Road	New Construction	———	3.7
Magnolia to Barker's Landing	New Construction	Secondary	
Barker's Landing Bridge	Repairs	———	———
Collins Curve—Little Creek	Widening	Secondary	4.1
Bowers to U. S. 13	New & Reconstruction	Primary	3.0
Little Heaven to Milford	New (Dual)	Primary	10.0

KENT COUNTY—(Continued)

CONTRACT	TYPE OF CONSTRUCTION	FEDERAL AID SYSTEM	MILEAGE
North Milford to Sussex Line	Reconstruction	Primary	1.4
Dover to Little Heaven (U. S. 113-A)	Reconstruction	Primary	7.7
Dover to Little Heaven (U. S. 113)	New & Reconstruction	Primary	9.1
Through Milford (S-R 14)	New & Reconstruction	Primary	1.5
State Street (Dover)	Reconstruction	Primary	3.2
Maryland Line to Flemings Corner	New Construction	Secondary	6.8
Sandtown to Tilghman's Corner	New Construction	———	4.1
Barratts Chapel to Canterbury	New Construction	———	5.9
Bridge No. 14A	Repairs	Secondary	—
Bridges Nos. 227 A, 439 A, 306 A	New Bridge	———	—
Leipsic Streets	Reconstruction	———	—
Farmington to Staytonville (Rd. 117)	Reconstruction	———	2.9
Adamsville to Maryland Line (Rd. 112)	Reconstruction	———	4.4
Andrewsville to Sussex Line (Rd. 309)	Reconstruction	———	2.0
		TOTAL	172.8

SUSSEX COUNTY

CONTRACT	TYPE OF CONSTRUCTION	FEDERAL AID SYSTEM	MILEAGE
Georgetown Airport Road	New Construction	Secondary	2.1
Maryland Line to Laurel (S.R. #24)	Reconstruction	Primary	7.4
Bridgeville By-Pass	New Construction	Primary	2.5
Hardscrabble to Georgetown	Reconstruction	Primary	7.6
Divided Highway (West Side) (Dover-Delmar)*	New Construction	Primary	—
Cokesbury Church to U. S. 113	New Construction	Secondary	5.7
Pilot Town Road	New Construction	Secondary	2.9
Indian Mission to Harbeson	Reconstruction	Secondary	8.4
Oak Orchard to Harmon School	Reconstruction	Secondary	2.1
Line Road (Delmar East)	New Construction	Secondary	5.1
Fenwick Island Bridge	Repairs	Secondary	—
Laurel to Concord	New Construction	Secondary	5.1
C. R. #277	New Construction	Secondary	5.5
C. R. #583	New Construction	Secondary	1.5
C. R. #305	New Construction	Secondary	2.0
Shingle Point to Milton	New Construction	Secondary	4.6
Argo's Store to Slaughter Beach	Reconstruction	Secondary	3.6
Milton to Waples Pond	Reconstruction	Secondary	2.5
Harbeson to Milton	Reconstruction	Secondary	5.3
Dagsboro to Shaft Ox	Reconstruction	Secondary	5.7
Maryland Line to Portsville	New Construction	Secondary	5.3
Gravel Hill to Milton	New Construction	Secondary	4.4
Wainwright's School to Oak Grove	Reconstruction	Secondary	3.5
Seaford to Ross Station	Reconstruction	Secondary	2.6
Dagsboro to Piney Neck	New Construction	———	3.1
Mispillion Light House Road	New Construction	Secondary	1.0
Hopkin's Corner to S. R. #14	New Construction	Secondary	4.3
Mission to Shortly	New Construction	Secondary	4.5

*Contract sections to be determined at a later date.

SUSSEX COUNTY—(Continued)

CONTRACT	TYPE OF CONSTRUCTION	FEDERAL AID SYSTEM	MILEAGE
Johnson's Store to Bayard	New Construction	Secondary	1.7
Greenwood to U. S. 113	Reconstruction	Secondary	7.5
Frankford to Clarksville	Resurfacing	Secondary	6.0
C. R. #308, #309 and #310	New Construction	———	1.9
C. R. #550	New Construction	———	2.0
C. R. #249	New Construction	Secondary	5.2
Mission to U. S. 113, Millsboro	Reconstruction	Primary	5.1
Shaft Ox to Mission	Reconstruction	Primary	0.9
Indian River Inlet Bridge to Fenwick Island	Reconstruction	Primary	11.0
Maryland Line to Shaft Ox Via Gumboro	Reconstruction	Primary	5.8
Maryland Line to Atlanta Via (18-A)	Reconstruction	Primary	4.0
N-E of Atlanta to Bridgeville	Reconstruction	Primary	3.3
Georgetown to Lewes	Reconstruction	Primary	17.0
Dagsboro to Bethany Beach	Reconstruction	Primary	10.5
Belltown to Rehoboth	Reconstruction	Primary	5.6
Seaford to Reliance	Reconstruction	Primary	4.6
Maryland Line to Bridgeville Via Woodenhawk	Reconstruction	Primary	7.4
Milford to Belltown	Reconstruction	Primary	18.4
553-A; 553; 552; 557; 558	Reconstruction	Secondary	5.9
Dagsboro (Main & Clayton Street)	Reconstruction	Primary	2.5
2 Bridges on Road 326 between U. S. 113 & Millsboro	Reconstruct Bridges	Secondary	—
Nassau to Pilotown Road (CR 266)	Reconstruction	Secondary	2.8
Concord to Old Furnace Mill (CR 524)	Reconstruction	———	2.4
C. R. #582, C. R. #584, Cocked Hat Road	Reconstruction	Secondary	2.2
By Pass-Oak Lane Development-Laurel	New Construction	———	0.5
Good Hope School Bridge	Repairs	———	—
Mill Creek Bridge	New Bridge	———	—
Assawoman Canal Bridge (Ocean View)	Redeck	Primary	—
Fany's Branch Bridge	New Span	———	—

SUSSEX COUNTY—(Continued)

CONTRACT	TYPE OF CONSTRUCTION	FEDERAL AID SYSTEM	MILEAGE
Tantrough Branch Bridge	Repairs	——	—
Road 427 from Road 64 to 26	Reconstruction	——	2.4
Road 527 from Road 524 to 113	Reconstruction	——	3.9
Road 494 from Road 495 to Maryland Line	Reconstruction	——	4.0
Road 380 from Road 60 to 113	Reconstruction	——	2.3
Road 361, 362, 363 (Ocean View Area)	Reconstruction	——	6.0
Road 472 from Road 436 to 24	Reconstruction	——	3.7
Road 485 from Road 13 to 493	Reconstruction	——	1.8
Road 449 from Road 24 to 447	Reconstruction	——	2.6
Road 483, 516, 446	Reconstruction	——	6.0
Road 244 (from 319A to 113)	Reconstruction	——	2.9
C. R. #380	New Construction	——	2.3
		TOTAL	280.4

In conclusion, I wish to express my appreciation for the guidance and cooperation the Chairman and the other members of the Department have given so freely. At all times their good counsel was rendered gladly, no matter how small or large the problem.

To the employees of the Department who have made progress possible, I wish to thank them sincerely for their loyalty and energetic work.

Respectfully submitted,

M. ALLAN WILSON
Chief Engineer