# REPORT OF THE CHIEF ENGINEER

OF THE

# STATE HIGHWAY DEPARTMENT

## July 1, 1945 to June 30, 1946

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Dover, Delaware
July 1, 1946

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

Gentlemen:

As required by Statute, I am submitting the Annual Report of the Chief Engineer covering the activities of the Department for the fiscal year ending June 30, 1946, together with certain recommendations.

The continued scarcity of labor and materials, during the first post-war year has made highway contracting uncertain and hazardous and has pushed costs to levels above that of any year since the early twenties.

The condition of much of the oldest mileage in the State system was so critical however that the Department decided, immediately following the close of hostilities, to proceed as rapidly as possible with the necessary reconstruction work, as long as reasonable competition among bidders was secured. Accordingly bids were taken and contracts awarded insofar as State funds were available.

## DIVISION OF PLANS AND SURVEYS

In preparation for future construction, plans and surveys were continued during the year as follows:

### Surveys

| Miles | |
|---|---|
| 49.2 | Base Line |
| 49.5 | Topography |
| 43.6 | Cross Sections (Prel.) |
| 5.5 | Cross Sections (Final) |
| 23.6 | Crack Survey |
| 114.9 | Patch Survey |

| Number | |
|---|---|
| 2 | Borrow Pits (Prel.) |
| 2 | Borrow Pits (Final) |

### Plans

| Miles | |
|---|---|
| 58.9 | Base Line Plotted |
| 72.2 | Topography Plotted |
| 47.8 | Profile Plotted |
| 67.9 | Index Maps Plotted and Traced |
| 58.2 | Plans Traced |
| 45.9 | Cross Sections Plotted (Original) |
| 5.5 | Cross Sections Plotted (Final) |
| 10.2 | Grade Laid |
| 53.5 | End Areas Planimetered and Computed (Prel.) |
| 5.5 | End Areas Planimetered and Computed (Final) |
| 114.9 | Patch Survey |
| 74.4 | Quantities Computed |

| Number | |
|---|---|
| 2 | Borrow Pits Plotted and Computed |

In addition to the above, there were 39 miscellaneous drawings prepared for this and other State Departments.

## DIVISION OF ESTIMATES AND FEDERAL AID

The Department authorized nine lettings during the fiscal year, the first of which was held in August. Advertisements for bids were released at regular intervals thereafter.

Bids were opened for a total of twenty-five (25) separate contracts, fifteen of which were Federal Aid Projects. The contracts awarded during the period are classified as follows: Bituminous Resurfacing, 6; Cement Concrete Pavement, 2; Bridge Repairs, 2; Drainage, 2; Timber Bridge, 1; Surface Treatment, 4; Motor Fuel, 1. One building contract was opened but the bid was rejected. The aggregate value of the contracts awarded, not including motor fuel was $1,792,288.30.

A total of eighty-four bids were received by the Department. All bids were checked and tabulated. Mimeographed copies of the tabulations were prepared and mailed to an average of two hundred addresses.

### Proposals and Contracts

The projects advertised by the Department required the preparation of five hundred eighty proposal forms.

In addition to the above, this division prepared the proposal and contract documents for the New Castle County Levy Court in initiating the first eight sub-division improvements. This work consisted of preparation of two hundred documents of sixteen pages.

The division also prepared three advertisements for the procurement of motor vehicles.

### Estimates

A total of fifty periodic estimates were prepared for payment to contractors on current projects. The payments totalled $826,891.42.

HIGHWAY OFFICE BUILDING AND TESTING LABORATORY, DOVER, DELAWARE

## Federal Aid

The revision of the Federal Aid Primary System of Highways and the establishment of a Federal Aid Secondary System of Highways submitted during the previous year was approved in March of this year. Delaware now has a total Federal Primary System of 526.15 miles and a Federal Secondary System of 485.97 miles.

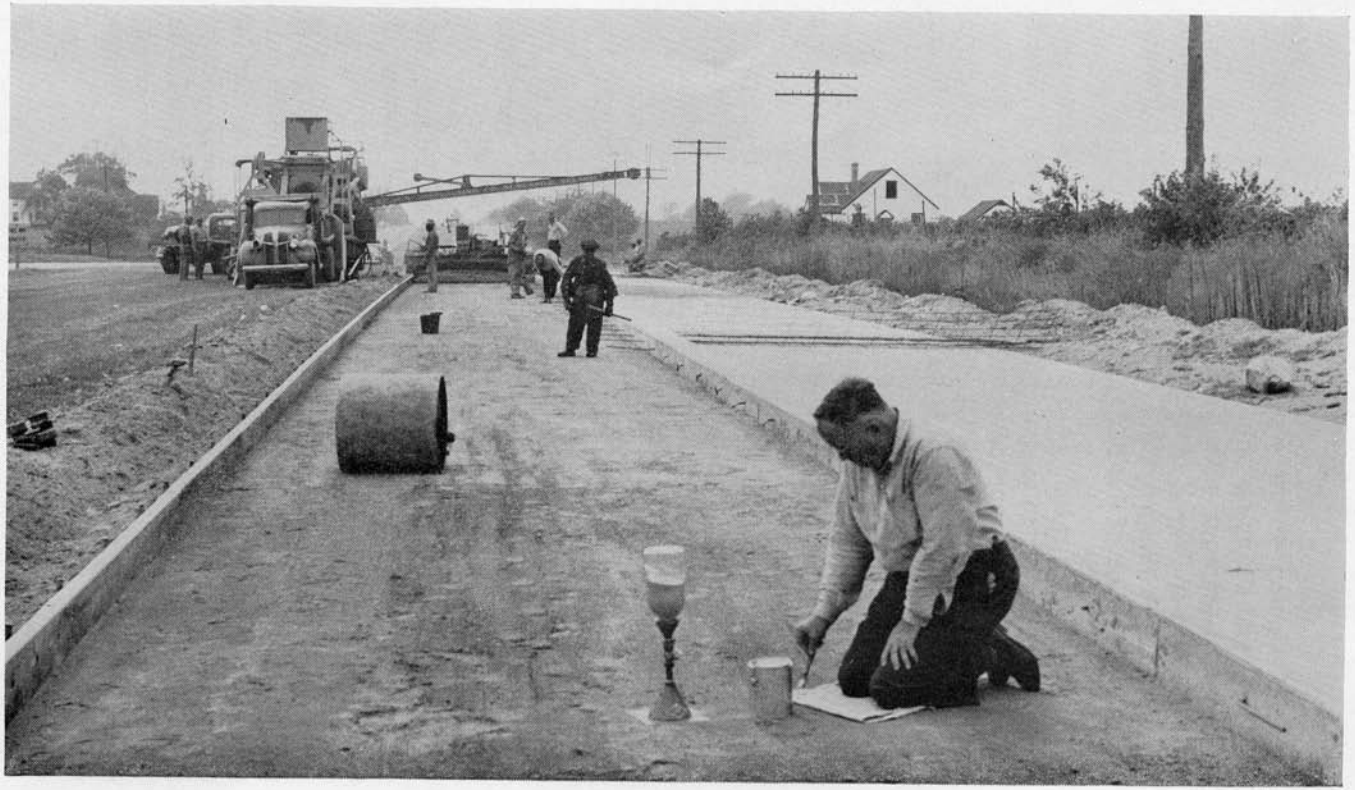
Having again returned to a normal status in construction it was possible to prepare sufficient projects to absorb the total amount of unprogrammed highway funds for the fiscal years 1941 through 1943. Partial programs have been submitted for the 1946 funds for projects on the Primary and Secondary Systems.

The Department's absorption of these funds at this time was most beneficial. The projects undertaken were immediate reconstruction necessities. All being located upon the Strategic Network of highways allowed the Department a much greater mileage of work for its limited finances owing to the seventy-five—twenty-five ratio, of Federal to State Funds.

During the year fourteen vouchers were submitted for reimbursement valued at $404,368.39. Reimbursement has been received on six of the submissions totalling $236,587.77. Vouchers submitted during the previous year were paid during this period with a value of $35,596.20.

This leaves a balance of vouchers submitted during the period but unpaid as of June 30, 1946, in the amount of $167,780.62.

Every effort is being made to voucher all Federal Aid projects within ninety percent of the project value on current estimate dates. This practice has been very successful during the year. The establishment of the branch office of the Public Roads Administration has been most helpful in this effort as problems arising are saved the time consuming transit period between the Administration and the Department as in the past.



SUBGRADE SOIL TESTING

The status of Federal Funds allotted to the State denotes an unprogrammed balance, exclusive of the 1946 funds, in the amount of $245,095.08. These funds are divided as follows: $5,200.00, WPH; $49,091.00, Federal Aid; $19,266.26, Federal Aid Secondary; $171,537.82, Federal Aid Grade Crossing. These balances will be absorbed into current projects and those projects now in process for submission to the Public Roads Administration. The unprogrammed balances in the Grade Crossing allotment will be utilized in the Elsmere Overhead Separation and two proposed grade crossing protections. All old balances from the fiscal years 1941 through 1943 should be under agreement in the very near future.

## DIVISION OF TESTS

Since a comparatively large program was well underway during the early part of the fiscal year, it was necessary for an appraisal to be made regarding personnel. Unfortunately three members of the Division who had been in key positions prior to the War did not return. This loss of key personnel handicapped the Division during the entire period.

To replace these key men, the services of several veterans were obtained, and even though they were not familiar with the work of our Department, they have performed their duties in a creditable manner. It is regretted that some of these veterans will be leaving during the early fall to re-enter educational institutions.

## MATERIALS LABORATORY

There has been no change made in the policy of sampling and testing aggregates at their source during the year. Because of the additional projects, it has been necessary to expand the personnel engaged in Plant Inspection.

To illustrate the needed expansion of field personnel, at periods there were three bituminous Hot Mix Plants operating, producing material for our projects, while last

U. S. 13, duPONT BOULEVARD, NORTH OF SMYRNA

year but one plant was operating. This increase in the number of plants required both additional field inspection and supervision.

The combination of good field inspection, together with efficient plant operation, has resulted in very uniform results having been obtained.

A tabulation showing the approximate quantity of the various materials tested by the Division during the fiscal year is listed below:

| | | |
|---|---|---|
| Coarse Aggregate (Stone) | 53,243 | tons |
| Coarse Aggregate (Gravel) | 10,560 | tons |
| Fine Aggregate | 20,443 | tons |
| Cement | 35,450 | bbls. |
| Concrete Pipe (All sizes) | 19,672 | lin. ft. |
| Creosote Timber Piling | 8,960 | lin. ft. |
| Creosote Timber and Lumber | 180,362 | ft. B. M. |
| Creosote Oil | 16,600 | gallons |
| Asphalt | 968,416 | gallons |
| Concrete Cores removed | 513 | |
| Concrete Cylinders broken | 452 | |
| Gasoline | 550,000 | gallons |
| Hot Mix | 70,000 | tons |
| Selected Borrow | 13,958 | cu. yds. |

In comparing this tabulation with that of recent years, it is seen that the quantities range from one to three times larger.

## SOILS LABORATORY

Within the year, the work of the Soils Laboratory has changed from the investigational or planning stage to the actual checking of Soils Construction. Specification requirements governing both quality of material and construction methods were checked in the field as construction progressed. In fact, it was possible to have one field man from the Laboratory devote his full time to checking quality of material and other necessary items of soil work. This

ST. GEORGES BRIDGE

man acted in an advisory capacity to the project engineer and between these two men, they have been able to obtain very satisfactory soils work this construction season.

Where selected material has been called for in new construction, definite limits governing minimum compaction under the new pavement have been rigidly enforced. As a result of this action, the subgrades under the new pavements constructed have been very stable and should give fine service. To date, there have been placed a total of 13,958 cubic yards of selected material under the joint supervision of both the Laboratory Field Men and the Construction Inspector. The work of checking by the Field man has been made possible by a piece of automotive equipment in which the necessary scales, density apparatus, balances, etc., have been arranged in convenient and satisfactory manner both as to travel and working conditions.

In addition to the routine soils checking on construction projects, the usual work in securing proper borrow for the Maintenance Divisions has been continued. In this line of work, members of the soils laboratory have removed and tested 109 samples from sites and stockpiles. Considerable good material has been located and removed for highway use from these locations.

In carrying out the soils work, the laboratory has completed a total of 1446 mechanical analysis tests.

## BRIDGE DIVISION

The closing of hostilities failed to bring the expected lifting of restrictions on building materials. Construction involving the use of steel in any considerable amount has been impracticable, up to this time, with no change as yet discernible in the near future. Consequently none of the proposed Post-War Program Bridge projects have been undertaken, although further progress has been made in the preparation of plans and specifications.

Among projects for which plans and specifications are completed or in an advanced stage are, the Overhead Bridge at Elsmere, eliminating the grade crossings over the B. & O.

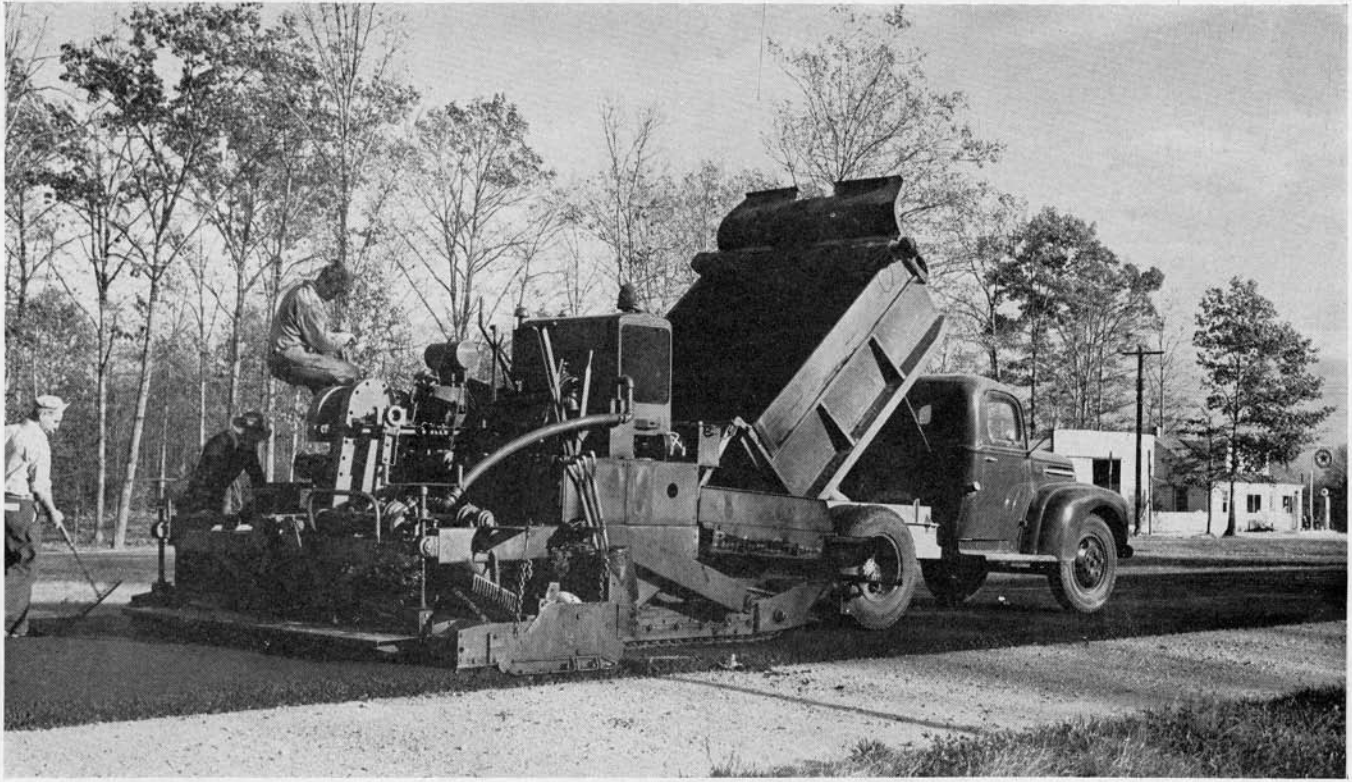
SNOW PLOW EQUIPMENT, KENT COUNTY, DOVER GARAGE

and Reading railroads; The Curtis Mill Bridge at Newark; the Leipsic River Bridge; a new bridge at Drawyers Creek for the relocation of the south-bound lanes of the duPont Boulevard; and the structures for the extension of the Governor Printz Highway between Claymont and the Pennsylvania Line at Ridge Road.

Two bridge repair contracts were entered into during the year, viz: the rebuilding of the center pier of the old swing bridge at Poplar Street, Laurel, and the placing of a steel deck on the Third Street Bridge over the Christina River in Wilmington.

Plans were made just before the War period for replacing the timber planking on the Third Street Bridge with an open steel mesh flooring, but the restrictions on the use of steel made it necessary to postpone the actual construction until the end of the conflict. Bids were received on February 27, 1946, and the contract was awarded, but steel deliveries were delayed for months and its completion correspondingly delayed. This will be a major improvement and will end the continuous repairs which have proved very expensive during recent years; and will greatly improve the riding qualities of the roadway and eliminate the noise and dirt created by the old plank flooring, which were very objectionable. While the bridge is closed to traffic other incidental repairs and improvements will be made also. The rebalancing of the movable spans is necessary and approximately thirty tons of dead weight will be removed from them. Replacement of the fender system is also a must project as soon as materials can be secured.

The traffic problem created by the closing of this bridge during its repair is a serious one and is causing much traffic congestion especially at Front and South Market Streets. The efficient manner in which the Wilmington City Police are handling this problem is most commendable and their willing cooperation at all times is greatly appreciated by the Department. This emphasizes the need for another crossing of the Christina River in the City of Wilmington in the future.



HOT MIX BITUMINOUS RESURFACING, duPONT BOULEVARD, KENT COUNTY, U. S. 13

Plans are in preparation for new flooring on the South Market Street Bridge which is also in a deplorable condition.

Detailed inspections of all bridges and structures shows the necessity of a large program of maintenance, which includes painting, repairs to flooring, fenders and electrical equipment to correct deficiencies the repair of which has been deferred during the War period. The continuing shortage of materials, labor, and department funds still makes the completion of only the most pressing of the repairs an immediate possibility.

## RIGHT OF WAY DIVISION

The inflation in real estate values has made right-of-way acquisition more difficult than usual, and negotiations in many cases have been abnormally prolonged and delayed.

During the year July 1, 1945 to June 30, 1946, the Right-of-Way Division secured 141 options; 77 deeds; 14 releases; 21 property plats were drawn; 164 descriptions written, and one easement prepared with the P. R. R. at Dagsboro, 2 borrow pits purchased, 8 houses moved, two public auctions were conducted, one of which was for farm land and dwellings in Sussex County, and the other for a dwelling to be moved from lands in Kent County. The total cost of the right-of-way for this period was $108,958.10.

## CONSTRUCTION

Owing to an almost complete cessation of active construction work for four years, with a considerable turnover in personnel and new types and methods of construction, it was felt that a need for a review of construction methods was desirable for our Inspectors, and in line with this a conference was held in Dover during March. At this meeting Department Heads and other speakers reviewed the Specifications and discussed problems affecting construction. All construction employees engaged in inspection work were present and a very successful program was carried out. It is proposed to conduct a similar conference during the coming winter.


CONCRETE PAVING, CONTRACT NO. 922, BOXWOOD ROAD

A serious shortage of stone for construction work affected the progress of work early in the construction year and continues at the present time. There is no prospect that the supply will be increased during this construction season. This shortage of steel, stone, and treated timber will delay the completion of most of the current road and bridge contracts.

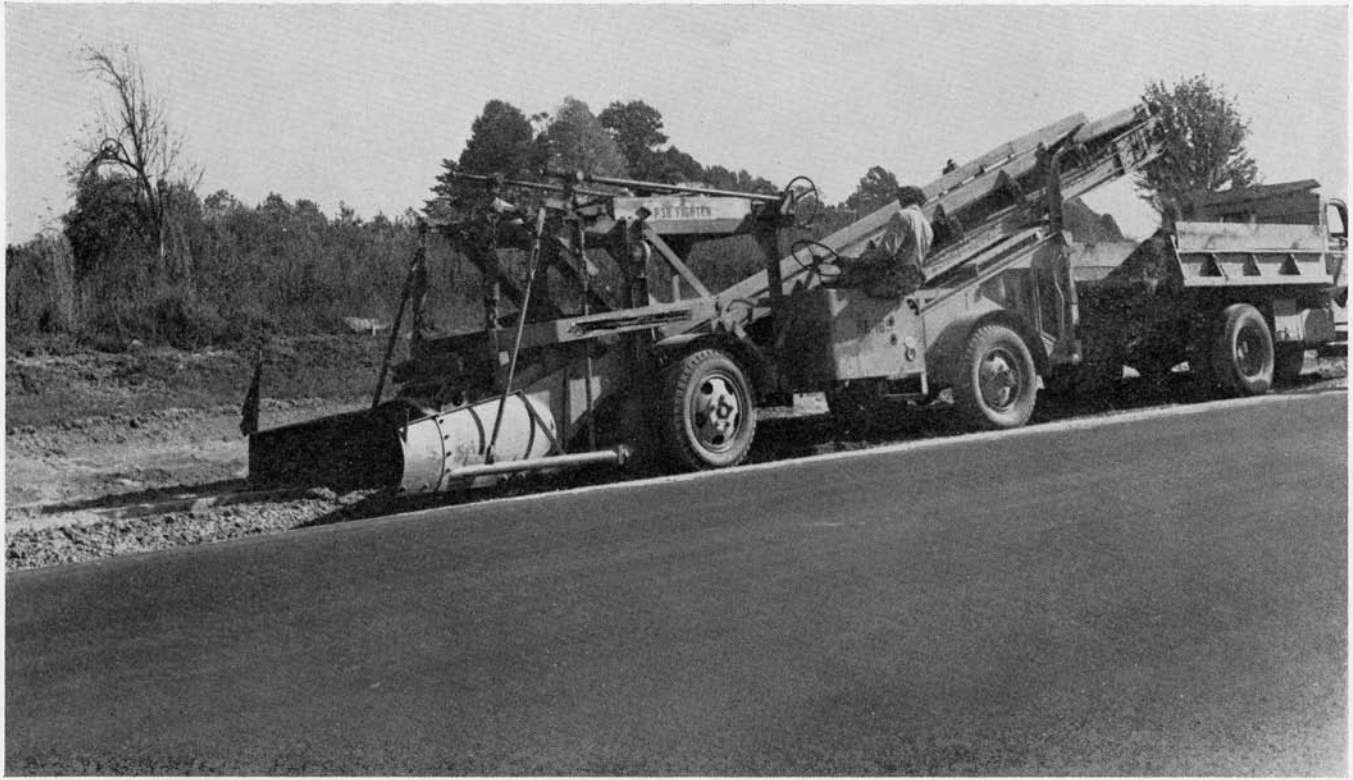
Several major contracts were let totalling 39.4 miles, all of these contracts have been in the nature of reconstruction and improvement of existing main highways, with one exception; Boxwood Road, 1.8 miles in length. This highway connecting Newport Pike with the Newport-Gap Turnpike provides access to the new General Motors Plant. The total contract price for all these projects is $1,600,676.80.

Barring the Boxwood Road Contract, all of this work has been on U. S. 13 and 40, which are a part of the Strategic Military Highway System of the United States, and are the oldest and most heavily travelled roads in the State. This was a fortunate circumstance because as has been noted elsewhere the contribution of the Federal Government on this System was on the basis of 75% Federal money to 25% State, and enabled the State to improve double the mileage that would have otherwise been possible.

This year's program of 39.0 miles of main highway which have been widened and resurfaced with hot-mix bituminous concrete, and two and one-half miles of old concrete replaced by new concrete, added to similar work done in 1944 and 1945, has greatly improved the riding qualities and safety of sixty miles of the heaviest travelled of the State's highways, which were in serious need of reconstruction, as most of them had given twenty to twenty-five years service and had been particularly hard hit by the very heavy truck traffic during the War, which frequently carried loads considerably in excess of legal limits.

## MAINTENANCE

Highway maintenance is one of the most essential duties performed by the State Highway Department. During the War years the shortage of men, materials and equip-



EARTH LOADER OPERATING DURING SHOULDER REPAIR WORK

ment have curtailed much important work. This year saw the end of the War, but did not check the rising prices of both labor and materials. A serious shortage of parts for old equipment still exists, and new equipment has not been available in any quantity. In November 1945, negotiations were entered into with the War Assets Administration for the purchase of construction equipment to be used on maintenance, the last delivery of which was made in June. If this equipment had been purchased through normal commercial channels, the cost to the State would have been at least 40% higher. This probably represents the high spot in our equipment program, for the War Assets Administration has now placed the States in fifth priority, making this source of supply of little value.

## MAINTENANCE PERSONNEL

**Unskilled Labor:-**

The Maintenance Division of the State Highway Department employed about two hundred (200) unskilled laborers prior to the War years. Wages paid to this type of labor have been comparable with wages paid by commercial and farm labor employers in the local community. During the War the number of unskilled laborers was materially reduced, wages rose at a very rapid rate, and have continued to rise since the cessation of hostilities. The Department has attempted to keep their labor forces on an equitable basis with local employment practices, but has been unable to do so, making it increasingly difficult to secure satisfactory help; as an example—common labor wage rates in 1940-41 in two downstate Counties, ran from thirty to thirty-five cents per hour, and at the present time, the wage scale has risen to sixty-five cents per hour—an increase of over 100%. There is no indication that in the near future this trend will be downward.

If we are to secure the type of labor necessary, we will be forced to pay a wage equal to the local rates. This will materially increase Budget requirements.

# TABULATION OF CONTRACTS AWARDED JULY 1, 1945 TO JUNE 30, 1946

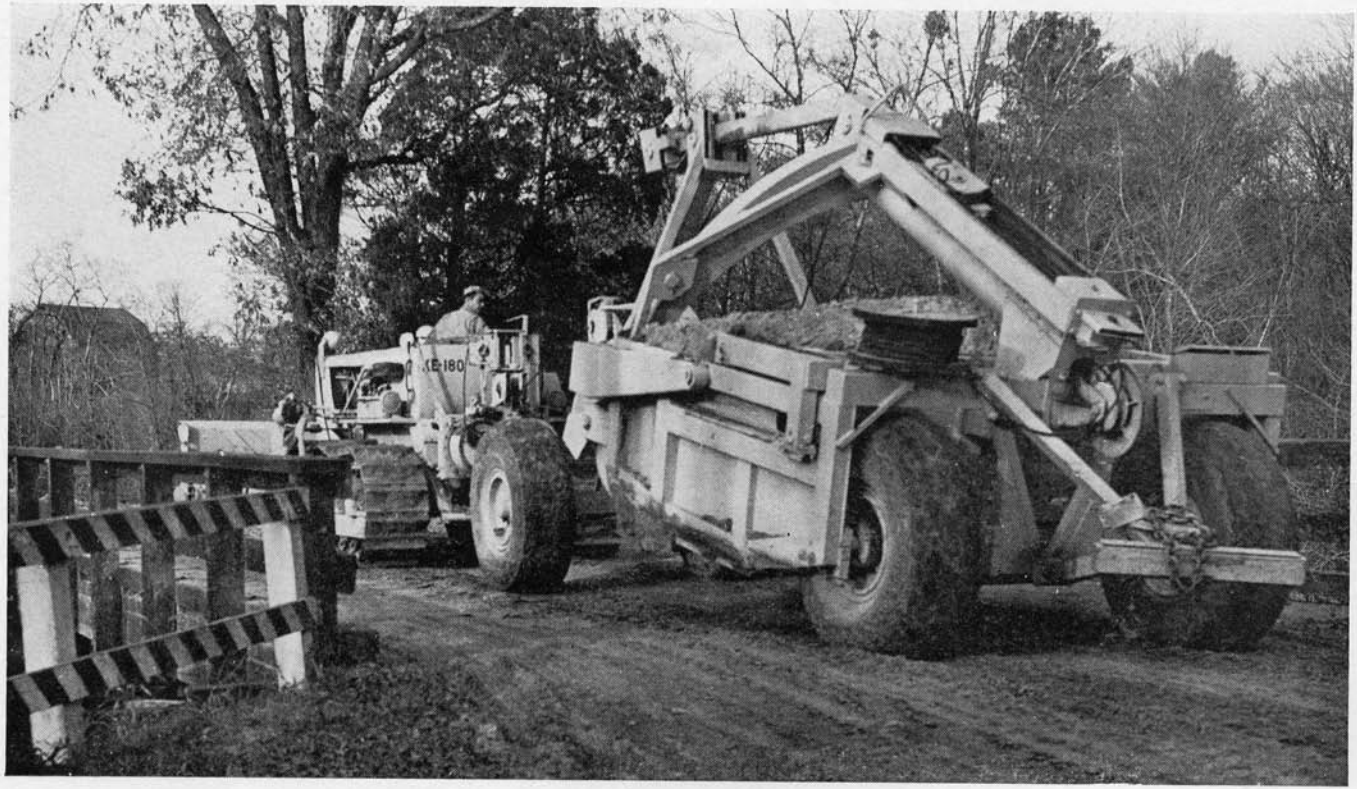
| Contract Number | Location | Total Bid Price | Date of Award | | Length in Miles | Type of Construction |
|---|---|---|---|---|---|---|
| 859 | Bridgeville to 1.5 miles North of County Line | $221,787.50 | 10/11/45 | Standard Bitulithic Co., N. Y. | 7.020 | Widening and Bit. Resurfacing |
| 848 | Md. Line to Bear | 236,576.10 | 10/11/45 | George & Lynch, Wilm., Del. | 7.319 | Widening and Bit. Resurfacing |
| 772 | Dover to Smyrna | 167,983.50 | 9/4/45 | George & Lynch, Wilm., Del. | 8.555 | Widening and Bit. Resurfacing |
| 851 | Tybouts Cor. to Hares Cor. | 124,645.50 | 1/22/46 | Wilson Contr. Co., N. C., Del. | 3.698 | Widening and Bit. Resurfacing |
| 842 | Harrington to Canterbury | 292,728.45 | 1/22/46 | Highway Constr. Co., Wash., D. C. | 11.959 | Widening and Bit. Resurfacing |
| 923 | Wilmington Manor | 6,063.90 | 3/19/46 | George & Lynch, Wilm., Del. | 0.219 | Storm Water Sewer |
| 817 | Mill Creek Bridge, Portsville | 14,868.60 | 3/14/46 | George & Lynch, Wilm., Del. | | Bridge and Approach Fill |
| 941 | Poplar Street Bridge, Laurel | 21,495.00 | 3/14/46 | George & Lynch, Wilm., Del. | | Bridge Repairs |
| 645A | Third St. Bridge, Wilmington | 53,849.80 | 3/14/46 | McCormick Constr. Co., Wilm., Del. | | Bridge Repairs |
| 876 | Middletown | 8,856.25 | 5/30/46 | Pleasanton & Edgell, Dover, Del. | 0.492 | Storm Water Sewer |
| 849 | Bear to State Road | 131,768.50 | 4/22/46 | Wilson Contr. Co., N. C., Del. | 2.486 | Reconstruction S. B. Highway |
| 852 | Hares Cor. to Rogers Cor. | 164,639.00 | 6/6/46 | Wilson Contr. Co., N. C., Del. | 4.655 | Bituminous Resurfacing |
| 922 | Boxwood Road | 155,414.70 | 6/3/46 | George & Lynch, Wilm., Del. | 1.819 | Reconstruction |
| 949 | Bit. Surf. Tr., New Castle | 76,093.50 | 6/13/46 | Asphalt Industries, Inc., Morton, Pa. | | Surface Treatment |
| 950 | Bit. Surf. Tr., Kent | 22,783.50 | 6/13/46 | Asphalt Industries, Inc., Morton, Pa. | | Surface Treatment |

# TABULATION OF CONTRACTS AWARDED JULY 1, 1945 TO JUNE 30, 1946—(Continued)

| Contract Number | Location | Total Bid Price | Date of Award | | Length in Miles | Type of Construction |
|---|---|---|---|---|---|---|
| 951 | Chips for Surface Tr., Kent | 23,316.00 | 6/13/46 | John T. Dyer Quarry Co., Birdsboro, Pa. | | Maintenance Material |
| 954 | Bituminous Surface Tr., Sussex, 1946 | 69,418.50 | 6/13/46 | Delmarva Asphalt Co., Seaford, Del. | | Maintenance Material |
| 955 | Gasoline Requirements 1946-1947 | * 0.0160 below posted tank wagon price | | Atlantic Refining Co., Phila., Pa. | | |

| | |
|---|---|
| Total Construction | $1,600,676.80 |
| Total Maintenance Materials | 191,611.50 |
| Grand Total | $1,792,288.30 |

* Not included in totals



GOVERNMENT SURPLUS EQUIPMENT, MAINTENANCE CONSTRUCTION

**Skilled Labor:-**

For skilled labor the Department must employ trained operators for construction and maintenance machinery, this includes supervisory employees and operators—Foremen, Grader Operators, Painters, Carpenters, Shovel Operators, Auto Mechanics and Truck Drivers. The type of labor required here is such as to raise the wage scale considerable. The same conditions exist for this type of labor as for unskilled workers.

A total of $678,970.85 was expended during the fiscal year for salaries and wages, representing 50% of the total expenditures for Maintenance.

## PLANT AND EQUIPMENT

Replacement and new equipment for the Maintenance Division was purchased in the amount of $139,286.24. This includes purchases made from the War Assets Administration of the Federal Government. At the present time a shortage of automotive equipment, specifically, trucks and cars exists. We are continuing to operate automotive equipment which should have been replaced a number of years ago. The prospects for replacements during the coming year are far from bright. We have followed a policy of preventive maintenance on all of our equipment, but the burden on the old equipment has reached a point where only replacement will solve our problems; in some cases where replacement was impossible, the equipment had to be retired from service.

## MAINTENANCE PRIMARY SYSTEM

The maintenance of the primary system has received the greatest amount of attention for a large amount of repair work was necessary. A large mileage of our concrete roads is now over twenty years old requiring increasingly greater maintenance of the pavement areas, patching of scaled areas and the repairing of broken and faulted slabs. This will be an ever increasing problem until funds are available to resurface them.

MAINTENANCE CONSTRUCTION, KENT COUNTY

The completion of our resurfacing program along U. S. Routes 13 and 40 will relieve many maintenance problems, allowing an opportunity to give attention to other details.

**Roadside Development:-**

Roadside improvement including the care of trees and shrubbery has been continued, but new plantings and large scale operations in this work have been curtailed because of lack of men and budget considerations. It is recommended that future budgets include a reasonable sum for highway planting and erosion control.

**Traffic Service:-**

Traffic service was maintained in a satisfactory condition, but much improvement is needed. Direction signs and traffic center lines were not kept up to usual prewar standards, due partly to a lack of paint and steel. It is hoped that this condition can be remedied in the coming year. Some experimental centerline painting using a broken line has been tried, and is proving both satisfactory and economical. A new type of paint machine facilitates the painting of broken center line marking. It is planned that future lines will be painted in this manner.

## MAINTENANCE SECONDARY SYSTEM

**Surface Treated Roads:-**

Surface treated roads require the greatest annual expenditure per mile for maintenance and as the demand for dustless roads increases so must the annual Maintenance Budget. The winter of 1946 saw the breaking up of some of the sections of this type but in general it can be said that it is giving excellent service. The repair of the damaged sections has been completed and it is hoped that with present stabilizing methods they will carry through average winter conditions without serious break-ups.

**Gravel and Earth Roads:-**

The progressive improvement of earth roads by surfacing with gravel and stabilizing materials has been resumed, but this work has been limited due to shortages of labor.

A considerable mileage of earth roads has been ditched and reshaped but much remains to be done before these roads can be restored to their prewar condition.

## TRAFFIC AND PLANNING DIVISION

The past year marked the low ebb of activities for the division. Two continuing phases of work were kept current and numerous traffic and safety investigations were conducted, resulting in traffic safety improvements.

**Road Inventory:-**

Only one change occurred in the system's classification table. One road, 1.7 miles in length, in the State system was abandoned as the result of the construction of the Georgetown Airport.

TABLE I

### OFFICIAL MILEAGE OF STREETS AND HIGHWAYS BY SYSTEM CLASSIFICATION BY COUNTY

| System | COUNTY New Castle | Kent | Sussex | Totals |
|---|---|---|---|---|
| State-Rural | 321.68 | 273.50 | 413.59 | 1008.77 |
| County-Rural | 456.11 | 741.75 | 1394.38 | 2592.24 |
| Urban Extensions | 42.09 | 46.07 | 54.83 | 142.99 |
| Private Developments | 139.91 | 5.05 | 8.18 | 153.14 |
| TOTALS | 959.79 | 1066.37 | 1870.98 | 3897.14 |

Only two significant changes occurred in the surface type table. 14.68 miles were converted from concrete to bituminous concrete roads, and 9.15 miles were removed from their soils surface or gravel to bituminous surface types of roadway. 1872.69 miles of highways or 48.05% of our total mileage now has a dustless or better surface.

TABLE II

## MILEAGE OF STREETS AND HIGHWAYS BY SURFACE TYPE BY COUNTY

| Surface Type | COUNTY New Castle | Kent | Sussex | Totals |
|---|---|---|---|---|
| **TWO AND FOUR LANE HIGHWAYS** | | | | |
| Concrete | 126.32 | 204.37 | 309.64 | 640.33 |
| Bituminous Concrete | 115.18 | 6.15 | 13.15 | 134.48 |
| Brick | .82 | .51 | .05 | 1.38 |
| Belgan Block | 1.14 | .04 | ..... | 1.18 |
| Bituminous Penetration | 9.51 | 7.89 | .97 | 18.17 |
| Dual Type | 33.61 | 58.38 | 49.11 | 141.10 |
| Combination Type | 1.59 | ..... | 4.59 | 6.18 |
| TOTAL PAVED | 288.17 | 277.14 | 377.51 | 942.82 |
| Sand Asphalt | 5.74 | .40 | 20.73 | 26.87 |
| Bit. Surface Treated | 331.14 | 116.74 | 319.00 | 766.88 |
| Other Lot Type Bit. | 57.52 | 11.99 | 5.30 | 74.81 |
| Gravel or Stone | 40.58 | 126.90 | 38.68 | 206.16 |
| Soil Surfaced | 156.18 | 437.78 | 404.78 | 998.74 |
| TOTAL SURFACED | 591.16 | 693.81 | 788.49 | 2073.46 |
| Graded and Drained Earth | 13.40 | 77.23 | 656.11 | 746.74 |
| Unimproved | 16.51 | 5.61 | 28.48 | 50.60 |
| Primitive | .38 | 2.18 | 19.65 | 22.21 |
| TOTAL UNSURFACED | 30.29 | 85.02 | 704.24 | 819.55 |
| TOTAL TWO AND FOUR LANE HIGHWAYS | 909.62 | 1055.97 | 1870.24 | 3835.83 |
| **DIVIDED HIGHWAYS** | | | | |
| Concrete | 32.29 | 4.20 | .71 | 37.20 |
| Bit. Concrete | 2.36 | .18 | ..... | 2.54 |
| Brick | ..... | ..... | .03 | .03 |
| Dual Type | 15.52 | 6.02 | ..... | 21.54 |
| TOTAL DIVIDED HIGHWAYS | 50.17 | 10.40 | .74 | 61.31 |
| TOTAL ALL TYPES | 959.79 | 1066.37 | 1870.98 | 3897.14 |

1. 1872.69 or 48.05% has a dustless or better surface.

**Mapping:-**

The Planning Survey's County Maps continued to be in demand from the public, industry, and other State and Federal agencies. During the period 487 maps were sold as compared to 420 during the previous year. There is a need also for a State map which the Division intends to prepare as soon as Planning Survey activities can be resumed.

**Traffic:-**

Traffic volumes were reported at four automatic traffic stations. An analysis of these figures provides a general indication of the amount of traffic using the highways as compared to the previous year, and to the year 1941-42. Traffic increased 30.92% over the previous year, but is still 19.33% under the peak traffic year 1941-42 volumes. Immediately after V-J Day traffic volumes started a steady climb until they reached a point some 15% to 20% under 1941-42 volumes. The table shown below compares by months these traffic trends.

TABLE III

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

| | AVERAGE DAILY TRAFFIC | | | PERCENT CHANGE | |
|---|---|---|---|---|---|
| Month | 1941-42 | 1944-45 | 1945-46 | 1945-46 to 1941-42 | 1945-46 to 1944-45 |
| July | 23,379 | 12,078 | 12,640 | —45.93 | + 4.65 |
| August | 23,369 | 12,238 | 14,180 | —39.32 | +15.87 |
| September | 19,753 | 11,061 | 13,794 | —30.17 | +24.71 |
| October | 16,957 | 9,877 | 12,700 | —25.10 | +28.58 |
| November | 15,901 | 9,213 | 11,986 | —24.62 | +30.10 |
| December | 15,164 | 8,856 | 10,869 | —28.32 | +22.73 |
| January | 12,382 | 6,996 | 10,691 | —13.66 | +58.28 |
| February | 12,725 | 7,887 | 11,648 | — 8.46 | +47.69 |
| March | 13,065 | 9,326 | 12,832 | — 1.78 | +37.59 |
| April | 14,355 | 9,673 | 13,797 | — 3.89 | +42.63 |
| May | 13,749 | 10,197 | 14,626 | + 6.38 | +43.43 |
| June | 13,332 | 12,214 | 16,839 | +26.31 | +37.87 |
| TOTAL | 194,131 | 119,616 | 156,602 | —19.33 | +30.92 |

**Traffic Engineering:-**

Municipalities are taking a keen interest in traffic safety. Traffic studies have been conducted in Dover, Bridgeville, Milford, Newport, Ocean View, Millville, Smyrna, Bethany Beach, Frederica, and minor safety improvements recommended and installed. This trend is encouraging since much of the traffic problem lies within or in the vicinity of the

small cities and towns. In addition many rural investigations were made and minor improvements made where necessary. Mr. William J. Miller returned from the Armed Services during the year and it is now possible to gradually increase activities in this field.

**Miscellaneous:-**

The Division prepared monthly and annually many special reports for the Public Roads Administration. In addition numerous reports, charts, and tabulations were prepared for other divisions of the State Highway Department.

## SUBURBAN COMMUNITIES

Decentralization of the cities and towns and the accompanying development of many satellite unincorporated suburban communities has long presented a knotty problem in its relation to street improvements. It threatens the tax structure by segregating a sizeable group of freeholders into communities without local government. In fact several of the suburban communities have reached such proportions that if incorporated, they would challenge Dover for second position in the State. The property owners of these communities more and more are looking to the County and State for needed community improvements. Many of the residents expect the County or State to pay for the improvements, although current tax sources do not provide funds for such purposes; nor would the use of general taxes be fair to the communities that are incorporated.

In New Castle County, which represents the major problem, there are some 150 suburban communities embracing 140 miles of streets. As a result of legislation passed in 1935, the Department is maintaining some 82 miles. Responsibility for the remaining 58 miles does not rest with any level of government. The condition of the streets in these developments varies from good to extremely poor. To provide suitable street improvements throughout all of these communities (exclusive of storm sewers) would require the expenditure of from four to five million dollars.

Recognizing this need the Department in 1941 recommended, and the Legislature in 1945 passed enabling legislation in the form of the Suburban Road Act. Although it is in reality a substitute for local government, it enables suburban communities to obtain road improvements through the combined efforts of the local freeholder, Levy Court and State Highway Department. The freeholder pays the bill, the Levy Court handles the finances through a bond issue, and the State Highway Department furnishes all necessary engineering and technical assistance.

Under the Suburban Road Act the problem resolves itself into three distinct parts; (1) those streets (82) miles presently being maintained by the Department; (2) streets (58) miles not under the jurisdiction of any level of government; and (3) future streets to be developed. Phases one and two can be handled under the Suburban Road Act as fast as the local freeholders desire improvements which will in turn encourage the original developer to construct future streets to State Highway Department specifications. In addition, the Department, in conjunction with the New Castle County Regional Planning Commission is meeting with marked success in encouraging original developers to provide adequate street facilities. In any event the burden of improvement rests directly with the local owner.

In accordance with the provisions of the Act, during October and November, 1945, nine suburban communities; Greenhill, Delaire, Liftwood, Westwood Manor, Beechwold and Forrest Hills Park, Blue Rock Manor, Lancaster Village and Woodcrest in New Castle County; and Roosevelt Avenue in Kent County petitioned their respective Levy Courts for road improvements. In addition two communities in New Castle County; Edgemoor Terrace and Deerhurst made contracts directly with contractors for the improvement of existing streets.

Surveys were made and plat plans, road plans, specifications, and estimates were prepared. Although this work placed an additional burden on an undermanned engineering staff, the final submission was sent to the Levy Court on June 14, 1946.

## SUBURBAN COMMUNITIES

### Mileage and Costs

| Community | Miles of Improv. | Estimated Cost | Cost Per Front Foot |
|---|---|---|---|
| Greenhill | 0.239 | $11,961.00 | $4.78 |
| Delaire | 0.281 | 10,174.00 | 3.55 |
| Westwood Manor | 1.014 | 35,543.00 | 3.82 |
| Blue Rock Manor | 0.349 | 9,704.00 | 2.95 |
| Beechwold and Forrest Hills Park | 0.452 | 11,854.00 | 2.69 |
| Liftwood | 0.876 | 21,235.00 | 2.99 |
| Lancaster Village | 0.347 | 12,100.00 | 3.58 |
| Woodcrest | 1.832 | 54,143.00 | 3.48 |
| Roosevelt Avenue | 0.452 | 9,856.00 | 2.07 |
| Deerhurst* | 0.513 | 6,421.00 | ..... |
| Edgemoor Terrace* | 1.594 | 6,877.00 | ..... |
| | 7.949 | $189,868.00 | |

* Reconstruction

On June 3, referenda were held by the New Castle County Levy Court for the communities of Greenhill, Delaire, and Lancaster Village, 90% of the possible votes were cast indicating a keen interest on the part of the property owners. Each of the communities voted favorably, the result being 4 to 1, 14 to 1, and 1½ to 1 for the respective communities. The effect of corner properties on the voting was very noticeable. In Greenhill and Delaire where there are no corner properties, the measure was approved by a wide margin, however, in Lancaster Village where 40% of the vote was controlled by owners of corner properties, the measure was approved by the slim margin of 1½ to 1. On July 8th and 15th referenda will be held for the communities of Liftwood, Beechwold and Forrest Hills Park, Westwood Manor, Blue Rock Manor and Woodcrest. Blue Rock Manor is expected to vote in the negative since they have decided to construct sanitary sewers before improving their streets. Roosevelt Avenue, near Dover, was disqualified as a result of the estimated cost of the improvement exceeding 10% of the assessed value of the abutting properties.

The Suburban Road Act has met with marked initial success and although it is difficult to forecast the future it appears probable that the Act will establish a pattern for community road improvement.

MECHANICAL DITCH CLEANER IN OPERATION

MOSQUITO CONTROL DIVISION—DITCH AFTER CLEANING
WITH MECHANICAL DITCHER

## MOSQUITO CONTROL DIVISION

The mosquito control program was continued with its limited wartime allotment of $20,000, and supplemented by the continuation of a federal aid project which over a two year period amounted in value to a total of approximately $12,500.

The federal project was in cooperation with the United States Public Health Service and the U. S. Army whereby prison labor could be used for the protection of Fort Miles and the Dover Air Base against pest mosquitoes, provided work was held within a three mile radius of the reservations. During the period covered by this report prison labor was not available until March and April of 1946 and with such aid a total of 1,580 man hours of work was accomplished near the Dover Base and 8,243 man hours of work near the Fort Miles Reservation. For the time the project was active their accomplishments were 133,212 linear feet of ditch cleaned; 6,526 linear feet of new ditch dug, 433,388 square feet of brushing on banks of ditches, and other miscellaneous work.

The State crew aside from its supervisory duties toward the Prisoner of War project continued on a very limited basis with its usual seasonal activities. During the summer period approximately 4,782,734 square feet of breeding was located and 1,434 spray gallons of material was applied on areas near Rehoboth. The greater part of our time was devoted to the readjustment of ditches at Dewey Beach east of the highway and some north of Rehoboth. In connection with this type of work many of the existing ditches which continually bred mosquitoes were filled by road disk and replaced by 10″ ditches graded insofar as possible above M. H. W. so as to prevent the collection of surface water.

Also many low depressions in these sections were filled by rotary scoop from nearby secondary sand dunes. Inasmuch as this type of work has proven highly satisfactory it will be continued in similar areas as funds and labor permit. For the year approximately 5,000 cubic yards of fill was made to old ditches and depressions either by use of disk or

rotary scoop. There was also considerable survey work involved in the grading of 33,008 linear feet of new 10″ ditch constructed by hand. In other areas there was a total of 49,712 linear feet of ditch cleaned and 131,994 square feet of brushing accomplished. Fire lanes were renewed at Dewey Beach and the area received its usual burning over on the basis mentioned in previous reports. Other work included the maintenance of equipment, repair of outlet boxes, and cooperative research work with the University Agricultural Experimental Station.

For convenience of comparison are listed below the average number female mosquitoes trapped for the season at the various locations from 1940 to 1945 inclusive.

| | Lewes | Rehoboth | Fort Saulsbury | Dover |
|---|---|---|---|---|
| 1940 | 14.3 | 16.5 | ..... | 33.2 |
| 1941 | 9.5 | 9.9 | 52.6 | 14.8 |
| 1942 | 26.0 | 30.1 | 212.4 | 48.9 |
| 1943 | 5.8 | 4.4 | 35.4 | 43.0 |
| 1944 | 9.8 | 4.4 | 68.5 | 32.4 |
| 1945 | 30.3 | 19.6 | 330.5 | 25.3 |

Appreciation is expressed for the aid given us in research work by the University of Delaware Agricultural Experimental Station and other agencies of the State Highway Department who have contributed to the program.

Insufficient funds together with increased labor rates have limited operations to the point where the 2,285 mile ditch system is becoming a serious problem. It is, therefore, recommended that the appropriation be increased to $100,000 per year, which would permit the purchase of new equipment, allow a more elaborate emergency program during the summer period such as airplane spraying, and as labor is available to continue the necessary drainage work on a larger scale.

Regardless of new developments in spraying materials and methods, it is believed that drainage will continue to be the most important weapon in fighting the mosquito.

## DELAWARE RIVER CROSSING

As directed by the 107th General Assembly the Department made a study of "The Feasibility of a Crossing of the Delaware River near Wilmington." This report made by nationally known consultants, was presented in January 1941 to the Governor and the 108th General Assembly. It demonstrated the practicability of such a crossing and of the possibility of constructing a bridge or tunnel crossing which would be self liquidating in a reasonable number of years. Owing to the imminence of the War no action was taken at that time.

However, the Assembly in 1945 enacted legislation authorizing the State Highway Department "To Construct, Operate, and Maintain a Crossing over the Delaware River." Another Act was also passed and approved by Governor Bacon on April 19, 1945, by which the Department was authorized and empowered to issue revenue bonds to defray the cost of the construction of such a crossing, up to a total of $25,000,000.

Following the passage by the New Jersey Legislature of the necessary legislation authorizing the construction of the bridge; the Department at its meeting on September 6, 1945, created a separate division of the Department to be known as the "Delaware River Crossing Division."

The Department was most fortunate in being able to secure for the Director of the Division an engineer of great ability and broad experience, Lieutenant General Eugene Reybold, Chief of Engineers of the United States Army, during World War II. General Reybold entered upon his duties on November 1, 1945. At a meeting of the Department on May 2, 1946, the firm of Howard, Needles, Tammen and Bergendoff was selected as Consulting Engineers for the project.

Enabling legislation was introduced in Congress on May 2, 1946, and Committee hearings are now being held. Speedy passage of this Act is anticipated.

After approval by the United States Engineers of the governing dimensions, the preparation of the detail plans and specifications can proceed, and it now appears that this long anticipated and much needed addition to the transportation facilities of the Atlantic Seaboard is assured.

## POST WAR PROGRAM

On account of the necessity of carrying on an extensive reconstruction and repair program, no start was made on the proposed Post War Program although delayed new construction had accumulated to over $5,000,000. In other words the State will have to expend more than $5,000,000 at prewar prices before the highway system will be in the condition which it would normally have reached but for the interruptions due to military necessity.

On July 1, 1946, there were available for highway construction Federal funds as follows:

| | |
|---|---|
| Federal Aid Primary System | $2,692,841.50 |
| Federal Aid Secondary System | 1,641,766.20 |
| Federal Aid Grade Crossing Funds | 191,537.82 |
| Federal Aid Urban System | 408,114.00 |
| Federal Aid Balance | 5,200.00 |
| Total | $4,939,459.52 |

These funds must be matched by State funds on a 50-50 basis with the exception of the grade crossing funds which can be allocated on a 100% Federal basis.

Funds in the construction account of the State Highway Department as of this date, July 1, 1946, according to the Secretary's report, amounted to $849,909.76, this must cover the cost of any new contracts awarded during the fiscal year 1946-47 as well as any expenditures made by the Department, viz: engineering cost, right-of-way, and the improvement of secondary roads by Department forces. Obviously, little construction can be entered into with funds presently available, and no active program can be attempted until the wishes of the next General Assembly are expressed by appropriations for the purpose.

## RECOMMENDATIONS

For your consideration during the coming year, I wish to submit the following recommendations:

1. That the program of reconstruction of the older highways which has been the principal work carried on during the past year be continued until all main highways are brought up to standard widths and their riding surfaces strengthened and improved, and that the following reconstruction program be authorized for the 1947 construction year, and as much be placed under contract as funds will allow:

### New Castle County

| Contract | Miles | Estimated Cost |
|---|---|---|
| Wilmington Arteries | 3.2 | $400,000 |
| St. Georges to Corbit | 2.2 | 70,000 |
| Blackbird to Fieldsboro | 3.2 | 110,000 |
| Cranston Heights to Basin Corner | 4.1 | 170,000 |
| Market Street Bridge | | 30,000 |
| Naamans Creek Road | 6.3 | 160,000 |
| Marsh Road | 4.2 | 120,000 |

### Kent County

| Contract | Miles | Estimated Cost |
|---|---|---|
| Milford to Little Heaven | 10.5 | $330,000 |
| Maryland Line to Kenton | 7.6 | 220,000 |
| South of Harrington to Farmington | 2.3 | 60,000 |

### Sussex County

| Contract | Miles | Estimated Cost |
|---|---|---|
| Seaford to Bridgeville | 6.3 | $200,000 |
| Georgetown to Ellendale | 9.4 | 330,000 |
| Selbyville to Dagsboro | 8.7 | 300,000 |
| Dagsboro to Georgetown | 10.2 | 350,000 |
| Shawnee to Greenwood | 8.0 | 220,000 |
| Selbyville to Williamsville | 6.2 | 160,000 |
| Delmar to Laurel | 6.7 | 200,000 |

2. That as soon as materials and funds are available the post war program be initiated and the following new projects be undertaken: New Castle County—Newport Pike; Extension of the Governor Printz Boulevard to the Pennsylvania Line; the Elsmere Viaduct; the Lancaster Pike extension to the Pennsylvania Line; the Curtis Paper Mill Bridge; and realignment of Drawyers Creek.

Kent County—the construction of the section of the proposed dual highway between Dover and Canterbury; the Leipsic Bridge. Sussex County—the construction of the section of the proposed dual highway by-passing the town of Bridgeville.

3. That the progressive improvement of the dirt roads of the State be resumed as funds are available.

The growing demand for the further improvement of slag and gravel roads by surface treatment calls attention to the fact that such improvements substantially increase the annual cost of maintenance and I further recommend that for the present, selections of roads for this improvement be made from those highways which have traffic counts, of not less than one hundred vehicles per day. Petitions now in the files for this type of work number forty-eight for a total of approximately 150 miles.

In closing I wish to express my appreciation of the consideration and courtesies I have received from the Chairman and Members of the Department.

To my associates my thanks for their loyalty and cooperation during the past year.

Respectfully submitted,

W. W. MACK

*Chief Engineer*