

I. INTRODUCTION

RESPONSIBILITY OF THE HIGHWAY DEPARTMENT

General

Since the enactment of legislation forming the Department in 1917 the duties of the Department have been increased and expanded, some by direct legislation and some by implication. Those duties assigned to the Department by legislation are definite and concise; those duties performed under the implied requirements often have been accepted as a result of an expressed judicial opinion, or assumed as a natural or logical extension of specific duties to meet current demands. An example of the direct assignment, other than road and bridge construction and maintenance, is the supervision of public lands, which was transferred to the Department by the legislature in 1929 from the Public Lands Commission; an example of the indirect assignment of duties is the establishment and supervision of public recreation areas on these public lands.

The main duties of the Department include:

1. The design, construction, maintenance, and operation of highways, bridges, and related sections of the street and highway system within the state.
2. The study, design, construction, and maintenance of public works involving dams, dikes and tide gates, and shore protection as authorized by the General Assembly.
3. The acquisition of land for Department projects.
4. The planning, regulation, and licensing of motor vehicle usage and operation in the state.
5. The planning and regulation of the various activities undertaken by the Department, including but not limited to traffic control, highway research, analysis and testing of materials, landscaping and highway beautification, maintenance of picnic and roadside rest areas, snow removal functions, and liaison activities with other agencies.
6. The preparation of maps for the Department.
7. The planning and implementation of mosquito control measures.
8. The planning, construction, maintenance, and operation of beach and public lands improvement projects and activities.

9. The operation of a state police force responsible for the control, regulation, and enforcement of all motor vehicle traffic control, and for the enforcement of criminal law.

10. The collection of motor fuel taxes.

11. The maintenance of a communication division for the service of the state.

12. To cooperate with the Interstate Highway Division (Delaware Memorial Bridge) and all other state and local governmental agencies.

13. To participate actively in Civil Defense.

14. To control, regulate, and enforce such measures as are necessary in emergency conditions which may occur from time to time in the state.

To perform the functions listed above the Department is organized as shown on page 7. All Divisions and sections of the Department cooperate to assure that the citizens of Delaware get the best possible service for their tax dollar.

Civil Defense

The Department has a major role in the Delaware Operational Survival Plan drawn up by the Delaware Department of Civil Defense.

The Delaware Operational Survival Plan provides that the State Engineering Division be under the Director of Operations of the State Highway Department and lists its responsibilities as follows:

- (1) Directs and coordinates emergency engineering planning and operations, to include debris clearance, precautionary demolitions, excavations, construction and repair and restoration of thoroughfares, bridges, ports and other appropriate facilities, including shelters.
- (2) Coordinates heavy rescue operations and planning with State Fire Division which has primary responsibility for light rescue.
- (3) In cooperation with State Utilities Division and local agencies, assist in the restoration of sanitary facilities and the provision of water supplies, both potable and non-potable.
- (4) Maintains necessary records of requirements for, and availability of, nonorganic engineering equipment and supplies

and coordinates allocation thereof in cooperation with State Resources Division.

- (5) Cooperates with CBR Division in development and coordination of fixed and mobile radiological monitoring capability by engineering teams.
- (6) Directs and coordinates the establishment of key transportation routes and control of traffic thereon in cooperation with State Police Division and other appropriate agencies.
- (7) Conducts and coordinates decontamination operations by engineering personnel with appropriate Civil Defense divisions and other appropriate agencies.
- (8) Assists EOR Division by providing engineering services determined to be feasible and necessary for the protection of vital facilities from unexploded ordnance.

The Department participated in the Area Emergency Planning Conference held in Pittsburgh on February 23, 1962.

The introduction of rockets, missiles and nuclear ordnance into modern warfare has greatly complicated the problem of explosive ordnance reconnaissance. During the year the Department has sent as many as 30 personnel to various training meetings. Two all-day sessions were held at the State Civil Defense headquarters at Delaware City and one session was conducted by U.S. Army instructors at the Aberdeen Proving Grounds. Personnel attending these courses were issued certificates.

Several employees of the Department took an active part in the command post exercise, *Night Watch V*, held at Delaware City on April 7, 1962.

In March, a registered professional engineer of the Department attended the Fallout Shelter Analysis Course for Architects and Engineers given at the U.S. Army School, Fort Belvoir, Virginia. Registered engineers completing this course are qualified to design as well as evaluate fallout shelters. The Department now has one of the six individuals in the state so qualified as one of its employees.

The Delaware State Highway Department, along with others throughout the country, cooperates with the Bureau of Public Roads in developing plans for facilitating the movement of the traveling public in the event of a national emergency. In such an emergency the State Highway Department, the State Police, and transportation organizations will be called upon to carry out the plans. It is imperative that the Department develop and be in a position to

implement plans and procedures for the directed movement of traffic over highways after an enemy nuclear attack. Thus, the Department is responsible to so organize its personnel that it can fulfill the duties and the responsibilities assigned to it by directives of the Bureau of Public Roads and through the provisions of disaster and survival plans for the State.

Interstate Boundary

One of the lesser-known but important responsibilities of the Department is maintaining the boundaries between Delaware and the neighboring states. Chapter 3, Title 29, Laws of Delaware (as amended in 1961) states:

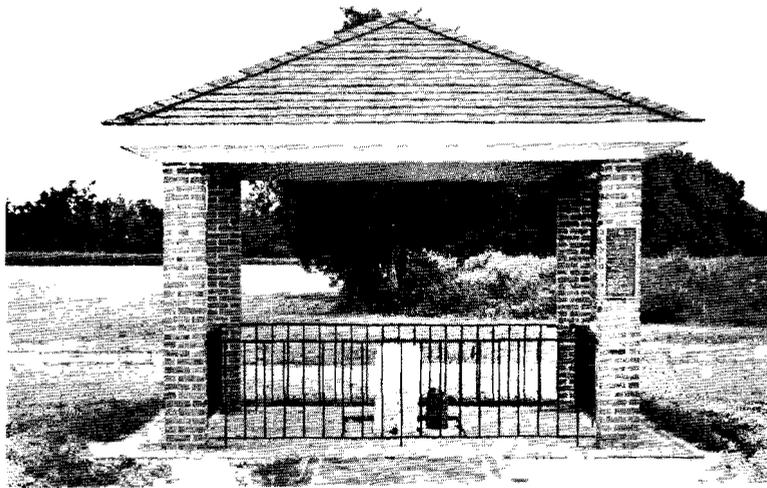
Section 302 (b) The State Archivist and the Director of Operations of the State Highway Department shall examine at least every 5 years the monuments marking the boundaries of this State. Whenever the State Archivist and the Director of Operations of the State Highway Department shall find that the monuments marking the boundary between Delaware and any other state or commonwealth have been lost, moved, removed, or defaced so that the boundary thereof becomes obscure, inaccurate or incorrect, the State Archivist and the Director of Operations of the State Highway Department shall cooperate with the state officials of any adjacent state or commonwealth in the replacement, restoration or repair of the monuments on the common boundary line.

Other sections provide for cooperation with the U.S. Coast and Geodetic Survey, and for punitive action against persons molesting the monuments.

The boundaries of Delaware have long been the subject of controversy and litigation. Even in the colonial days argument between the Calverts and the Penns echoed clear across the ocean to the royal courts in England. The cause of these early disagreements was, of course, the royal grants which often overlapped. Even the water boundary between Delaware and New Jersey was not settled until 1935. The photographs show some work done recently to preserve the ancient monuments marking the boundary. Mr. Lester W. Novinger, Chief of the Planning and Design Division, was appointed to serve on an interstate committee for the restoration and preservation of the Mason-Dixon Line monuments. Several meetings were held with representatives from the Maryland Board of Natural Resources, Maryland State Roads Commission, Daughters of the American Revolution, Sussex County (Del.) Society of Archaeology and History, the State Archivist of Delaware, and the Delaware State Highway Department. The ap-



Condition at site of boundary marks before restoration.



Boundary marker pavilion at the southwest corner of Delaware.



View of boundary markers showing the Calvert insignia.

proaches to the site were paid for by the Maryland State Roads Commission; the cost of the pavilion, the restoration of the markers, and the landscaping was borne by the Delaware State Highway Department, the Delaware State Archivist, the Delaware Chapter of the Daughters of the American Revolution, and the N. B. Downing Company.

The original stones were placed approximately every mile along the boundary line, the initials "M" and "P" being engraved on opposite sides ("P" being on the Delaware side because at that time it was part of Pennsylvania, and "M" being on the Maryland side). At every fifth mile a larger and more elaborately carved crown stone was placed. Crown stones were placed also at the ends or turnings of boundary lines. The top photo shows how the monuments were concealed by the undergrowth. The bottom photo shows how the stones marking the southwest corner of Delaware have been exposed to view and sheltered under a pavilion. The third photograph is a closeup view of the stones showing the Maryland state insignia; the largest stone is the Mason-Dixon monument. At the present it is not intended that all the boundary stones be given such elaborate treatment; however, all other stones will be inspected and repairs will be made as needed.

FACTORS INFLUENCING THE OPERATION OF THE HIGHWAY DEPARTMENT

Traffic and Population

Each year the population of our state and the number of vehicles registered in Delaware are increasing. Accordingly, the responsibilities of the Department are more widespread.

TABLE I

Year	Total Mileage of Streets and Highways under the Jurisdiction of State Highway Department	Approximate Number of Vehicles Registered	Population (State Board of Health Statistics)
1962	4,210.88	197,412	477,322*
1961	4,174.42	194,822	461,664*
1960	4,148.86	185,972	446,292
1959	4,125.51	178,896	443,469
1958	4,119.71	172,456	420,648
1957	4,073.70	163,648	407,828
1956	3,983.07	156,992	395,007
1955	3,957.37	146,438	382,187
1954	4,004.59	135,245	369,366
1953	3,974.24	127,199	356,545
1952	3,960.60	117,656	343,725
1951	3,925.62	111,376	330,904
1950	3,910.72	101,727	318,085
Increase 1950-1962	300.16	95,685	159,237
Percent Increase	7.68	94.06	50.06

*Estimated by State Highway Department

From 1950 to 1962 the mileage of streets and highways increased 300.16 miles or 7.68 percent above 1950. During the same period the number of registered vehicles increased 95,685 or 94.06 percent above 1950, while the population increased 159,237 or 50.06 percent above 1950. The increase in mileage is primarily the result of the increase in suburban streets accepted by the Department for maintenance. Continued usage requires the network of roads existing in 1950 to be improved by resurfacing, by widening, or by being completely reconstructed to accommodate the volume

of traffic. In many cases new roads must be built to replace existing pavement.

In 1950 for every 1,000 population there were 319.8 motor vehicles registered; in 1962 there were 413.5, an increase of 93.7 vehicles per 1,000 population. This figure reflects the development of suburban areas where public transportation has not been readily available and there has been great increase in commercial carriers to provide for the needs of the people.

Recent surveys indicate the future population will be:

Year	Population
1965	631,000
1980	856,700
2010	1,426,400
2060	3,352,000

There must be continuous construction and reconstruction to meet traffic demands; the maintenance costs will increase; and there will be an increase in land values as the result of competition for various land uses will be reflected in right-of-way costs. In the future there will be no appreciable abatement in the increasing volume of work of the Department.

TABLE II
MILEAGE OF STREETS AND HIGHWAYS
BY SURFACE TYPE BY COUNTY
DELAWARE
JULY 1, 1962

Surface Type	Kent	New Castle	Sussex	Totals
Brick	—	0.12	—	0.12
Concrete	109.15	118.42	115.88	343.45
Bituminous Concrete	148.20	456.60	251.89	856.69
TOTAL PAVED	257.35	575.14	367.77	1,200.26
Other Low Type Bituminous	20.07	96.67	32.90	149.64
Bituminous Surfaced Treated	494.32	419.40	1,002.40	1,916.12
Soil Surfaced	255.85	47.35	217.34	520.52
TOTAL SURFACED	770.24	563.40	1,252.64	2,586.28
Graded and Drained Earth	8.43	2.15	245.81	256.39
Unimproved	—	—	1.34	1.34
Primitive	—	0.41	1.07	1.48
TOTAL UNSURFACED	8.43	2.56	248.22	259.21
TOTAL NON-DIVIDED HIGHWAYS	1,036.02	1,141.10	1,868.63	4,045.75

TABLE .II (Continued)**DIVIDED HIGHWAYS**

Concrete	36.24	33.15	26.59	95.98
Bituminous Concrete	7.74	48.30	11.98	68.02
Low Type Bituminous	—	0.17	—	0.17
Bituminous Surface Treated	—	0.38	0.58	0.96
TOTAL DIVIDED HIGHWAYS	43.98	82.00	39.15	165.13
TOTAL ALL HIGHWAYS	1,080.00	1,223.10	1,907.78	4,210.88

TABLE III**MILEAGE OF STREETS AND HIGHWAYS
BY SYSTEM CLASSIFICATION BY COUNTY**

Interstate (F.A.P.)	—	37.91	—	37.91
Primary (F.A.P.)	132.92	168.85	266.04	567.81
Secondary (F.A.S.)	400.27	345.86	687.54	1,433.67
Tertiary	*546.81	*670.48	*954.20	*2,171.49
TOTAL	1,080.00	1,223.10	1,907.78	4,210.88
*Includes: H. B. 256	13.43	338.94	7.17	359.54
S. B. 387	10.88	35.77	28.89	75.54
TOTAL	24.31	374.71	36.06	435.08

Weather*General*

What the weather will be during the ensuing year is always an unpredictable factor influencing the operations of the Department. Weather records have been kept for many years by the U.S. Weather Bureau and have been compiled to serve as a guide in making an educated guess. Statistically we know what the average figures are for rainfall, snow, temperature, and other factors associated with weather. We know the weather maxima and minima and, based on averages, the anticipated frequency of extreme conditions. But even with all this background knowledge, long range forecasts are not possible.

For Delaware the average annual temperature is from 54°F to 56°F. The average annual precipitation ranges from 43 inches in northern Delaware to 47 inches in lower Delaware. Approximately 47 percent of this precipitation occurs during the period of May through September. The

mean monthly rainfall for the state ranges from 2.47 inches to 4.79 inches.

Extreme deviation from these averages results in damages not only to the highways but also to housing development areas, farms, and other land uses.

During August 20-24, 1933, in southern Delaware there was a fall of 12 inches of rain; New Castle County received 7 inches. The low-lying areas of Laurel were flooded. Bridges were washed out, hundreds of trees were blown across highways. Traffic was suspended and several towns were isolated for 48 hours. This storm cost the Department \$100,000. The same storm today undoubtedly would double or even triple this figure. During July 7-9, 1935, five inches of rain fell in New Castle County. However, on September 4-6 a storm occurred in Kent County and Sussex County which destroyed 100 bridges in the county road system. In 1937 a storm occurred in New Castle County which removed many bridges near Newark. On September 17-21, 1938, six inches of rain fell in New Castle County, causing great damage.

Statistics about past weather are excellent, so are mortality tables dealing with life expectancy. Both are based on mathematic averages, but the individual man doesn't know exactly when his life will end, and the Department does not know when the next disastrous rainfall, snowfall, or hurricane will strike. Hence, the influence of weather for the year must be discussed relative to average conditions and the exceptional occurrences such as the storm of March 6-8, 1962.

Weather 1961-62

The snowfall for the winter of 1961-62 presented no unusual problems. Many areas in northern New Castle County had 24 inches of snow for the season. Around Dover, the total snowfall amounted to 12.5 inches, and in lower Sussex County approximately 16 inches was recorded. In the average winter, the snowfall will approach 20 inches. When the total snowfall exceeds 28.0 inches difficulties are encountered, and when the 49.5 inch fall occurs, as in the winter of 1957-58, traffic often comes to a standstill.

The following table is a comparison of the mean monthly rainfall for Delaware and the rainfall as recorded in Dover for the past year.

	Mean Monthly Rainfall (inches)	1961-1962 Recorded in Dover
July	4.79 inches	3.51 inches
August	4.68 "	3.20 "
September	3.75 "	2.00 "
October	3.15 "	4.17 "
November	3.83 "	2.30 "
December	3.38 "	3.67 "
January	3.47 "	2.55 "
February	2.74 "	3.35 "
March	3.86 "	3.40 "
April	3.62 "	5.02 "
May	4.27 "	1.49 "
June	4.06 "	3.20 "
Total	45.62 inches	37.86 inches

Thus for the year the general weather conditions could be classified as average except for the storm of March 6-8.

March 6-8 Storm

The storm of March 6-8, 1962 caused more devastation to the bay and ocean shores and the property along the shores than any other recorded in this area. According to the records of past storms, a storm of this character and magnitude may occur in the next 50 to 100 years. Statistics can be deceiving, especially when the phenomenal forces of nature are combined in an unusual manner so as to deviate from the expected pattern. A similar storm may occur next year or it may not happen for 200 years, yet the average occurrence would be every 100 years. Geographically Delaware is in the path of hurricanes and intense storms. This was illustrated in the 1961 Annual Report.

The combination of natural forms in this storm did not follow the usual pattern. Natural high tides calculated for these days were 1.5 feet above normal due to the position of the sun and the moon. However, simultaneously, a low pressure center developed north of Bermuda which generated a vast counterclockwise wind, which created northeast winds along the shore. Generally, low-pressure areas move northward in one day, but on this occasion the low pressure center remained in a stable position north of Bermuda and, as a result, winds ranging from 25 to 45 miles per hour from the northeast for 6 high-tide cycles continued for nearly 3 days. Because of these winds water was piled on the shoreline in what is called a storm tide. The combination of natural high tide and storm tide produced water levels ap-



Storm damage at Slaughter Beach.



Damage occurring at Surf and Lake Avenues, Rehoboth Beach.

proximately 6 feet above normal high tide. During the first two high tides waves crossed the beach and scoured away the berm. Once the beach was destroyed portions of the barrier dunes were undercut and toppled, causing huge gaps in the dunes; thus, with the destruction of the protective feature, waterfront properties were at the mercy of the ocean and bay for the last two high tides. Not only were beach areas damaged but bridges were damaged or destroyed, and flooding of inland areas occurred.

Summary of the damage:

Bay Area

1. PICKERING BEACH. After the storm there was no beach at the normal high-tide elevation; one cottage was completely destroyed and five others were seriously damaged. The boardwalk and most of the protective bulkheads were destroyed.

2. KITTS HUMMOCK. Thanks to the beach placed by the Department in 1960-61, the damage was minor. However, 70 percent of the older dike was destroyed.

3. NORTH BOWERS. All beach-front cottages near the mouth of the Murderkill River were destroyed.

4. SOUTH BOWERS. As a result of the protective fill placed by the Department in 1961 the damage was minor.

5. SLAUGHTER BEACH. Here again the damage was minor because of the fill placed by the Department in 1961. Immediately north and south of this new protective fill cottages were destroyed, some being washed a quarter of a mile inland, and the highway was cut through with inlets in many places.

6. SLAUGHTER BEACH TO BROADKILL. The protective dike built by the Department in 1938 and repaired in 1954 was totally destroyed. This permitted the saline waters of the bay to flood the farm lands.

7. BROADKILL BEACH. Beaches established in 1961 again demonstrated their value as the damage here was very minor. Only one cottage was toppled off its foundation and a porch was damaged on another cottage.

8. LEWES BEACH. The value of the restored beach placed in 1957 was well demonstrated. If this beach had not been restored there is little doubt that the beach front pro-



Rehoboth Beach boardwalk as seen from Surf Avenue on
March 6, 1962.



Same site two days later.

perties would have been destroyed. The 1956 report of the U.S. Corps of Engineers estimated the value of the beach front cottages at \$1,250,000. In 1957 the Department rebuilt the beach at a cost of approximately \$200,000 and just prior to the 1962 storm had spent another \$25,000 in this area.

This investment probably prevented a loss of at least \$1,000,000 of taxable property. If this beach had not been established the storm would have damaged a number of cottages in the area behind the beach-front cottages and the probable loss could have been near \$2,000,000. Many of the cottages farther back from the beach suffered flood damage as a result of high water in the Lewes-Rehoboth canal.

Ocean Area

1. REHOBOTH BEACH. Beaches along the ocean bore the full fury of the storm. The entire beach was removed, exposing the high ground which was undercut, and resulted in the toppling of the front 20 to 40 feet of buildings. The boardwalk was completely demolished.

2. DEWEY BEACH AND INDIAN BEACH. The entire beach was washed away and the dunes were destroyed, exposing all properties to the mercy of the elements. Many of the cottages in the first and second rows along the beach were razed or severely damaged; other cottages and business establishments back from the beach were damaged by water as a result of the high tide.

3. INDIAN BEACH TO INDIAN RIVER INLET. The beach here also was washed away and the dunes were razed. State Route 14 was damaged by washouts at three locations and the remainder of the road was covered with up to three feet of water and sand.

Public recreational facilities were severely damaged, all roads were buried in sand, the Key Box Road Campgrounds were completely obliterated, and the Indian River Inlet Trailer Park was severely damaged; but the restaurant and shower facilities received only minor damage.

Private business, cottages, and trailers located on both sides of the Inlet were severely damaged by the high, swift waters.

4. INDIAN RIVER INLET TO BETHANY BEACH. The entire beach and sections of the dunes were destroyed. Route 14 was covered with sand in many locations but other dam-



Rehoboth Beach boardwalk looking north from Rehoboth Avenue, March 6, 1962.



Same site on March 8, 1962.



Rehoboth Beach boardwalk looking south from Rehoboth Avenue, March 6, 1962.



Rehoboth Beach boardwalk looking south from Rehoboth Avenue, March 8, 1962.



Rehoboth Beach. Aerial view of the beach front at Rehoboth Avenue on March 13, 1962.



Dewey Beach. Aerial view of the beach front on March 13, 1962.

age to the road was minor. Many of the homes on the developments of Tower Shores and Sussex Shores were damaged, flooded, or destroyed.

5. BETHANY BEACH. There was a complete removal of the newly-placed beach material and the dunes. The boardwalk was completely destroyed and, with few exceptions, the beach-front properties were destroyed. Many cottages on the low land behind the beaches were flooded by the high waters.

6. BETHANY BEACH TO STATE LANDS. The beach and dunes were completely washed away. In the developments of Middlesex, South Bethany Beach, and York Beach the high ground and entire front rows of cottages along the beaches were destroyed.

7. YORK BEACH TO FENWICK ISLAND. The same destruction of beach and dunes occurred. Sand was deposited on Route 14 by high water and the road was breached in several places. A few private homes were severely damaged or destroyed.

8. FENWICK ISLAND. The beach was destroyed and a major portion of the dunes razed. Property damage was slight at the south end of the beach but in progressing northward the damage to property was more severe; at the north end destruction of cottages was complete.

In reviewing the description of damage it is apparent that in the bay area the protective beaches played an important part in the preservation of property. However, this was not the case on the ocean-front beaches.

Bridges

The storm damaged the north timber trestle approach to the Charles W. Cullen Bridge at Indian River Inlet.

Six small timber bridges on State Route 14 between Dewey Beach and Fenwick Island were entirely destroyed. These have not been restored as the movement of sand from the dunes filled in the low areas which drained through these bridges.

The bridge in Lewes on State Route 18 (over the Lewes-Rehoboth Canal), which provides the only access to the bay area between the Lewes Inlet and Cape Henlopen, was damaged extensively. Two other bridges, one over Cedar Creek on State Route 36 north of Slaughter Beach



Milton was flooded due to abnormal high tide in Broadkill Creek, March 7, 1962.



Road from Argos Corner to Slaughter Beach was inundated during the storm, March 6, 1962.

and the other Canary Creek at Lewes, were severely damaged.

Inland Areas

For four days northeast winds drove the waters of the bay into the inlets and tidal reaches of the inland streams. Many roads were rendered impassible by high waters. Roads were inundated near the shores, isolating many people and leaving them to face the fury of the storms until aid could be brought to them.

Mosquito Control Areas

Remarks relative to the damage suffered by mosquito control facilities are to be found on page 104.

Department Activities

GENERAL

All available Department employees and equipment from Kent and Sussex Counties were used to render service and aid in the disaster area.

Services ranged from the rescue of stranded people to the emergency repair of roads to allow access to the disaster areas. Many roads were barricaded to prevent cars from entering washed-out or flooded areas, which might have resulted in loss of life. In all these operations the value of the State Communications Division was demonstrated many times.

Damage to private property, highways, and public property in the flooded areas of the coastal region will never be calculated accurately. State and Federal agencies have estimated the damage to be in excess of \$6 million.

BRIDGE REPAIRS

As the Charles W. Cullen Bridge at Indian River Inlet is very important to the beach areas and fulfills the needs of transportation between towns and the resorts on the ocean front, the Department proceeded directly to the task of investigating the extent of the damage and preparing plans to strengthen the bridge as early in the summer season as possible. The disablement of the Indian River Inlet Bridge

resulted in a detour of 32 miles between Rehoboth Beach and Bethany Beach as compared with the 12-mile straight-line distance on Route 14. The Bureau of Public Roads approved the use of emergency Federal-Aid funds in the repairs of this bridge and the Department let a contract with the prospect of having the work completed near the first of July. This was the first flood emergency project approved in any state following the March storm.

The bridge in Lewes on State Route 18, the one over Cedar Creek, and the one over Canary Creek were repaired with use of state and federal emergency funds.

BAY AND OCEAN AREAS

Following the storm, the region damaged was declared a disaster area by the President of the United States, and emergency work was to be performed under Public Law 875. The U.S. Army Corps of Engineers was designated to serve as the engineering agency for the Office of Emergency Planning (a federal agency of the executive branch), and the State Highway Department was assigned as the engineering agency for Delaware.

The procedure to be followed in obtaining federal assistance under Public Law 875 for the repair of damage to the beaches and dunes involves a governmental agency such as a state, county, or municipality placing a request with the Office of Emergency Planning. The request must state that the necessary right-of-way will be provided and that the federal government will be protected from any damage suit which may arise as a result of the operations. Then the Office of Emergency Planning instructs the U.S. Army Corps of Engineers to prepare plans for the project. This being done, the Army Engineer submits the plans to the Department for review and approval. When the right-of-way certificate and the save-harmless agreements have been executed, the Army Engineers advertise, award, and supervise the execution of the project. The completed work is reviewed by the Department who indicate their approval by the issuance of a Certificate of Completion.

During the summer of 1962 projects for the placement of emergency dunes and beach fill were started and completed for the area between Fort Miles and the Maryland line. Following these projects, similar work is scheduled for many of the beaches on the Delaware Bay.



Dewey Beach. Clearing streets of sand carried in by the storm. March 13, 1962.



Route 14. Clearing away sand carried in by the storm. March 15, 1962.

Personnel

General

To administer the affairs of the Department and to carry out the duties assigned and entrusted to it, as outlined in the introduction, many of which are complicated and highly technical, numerous skills, qualities, and characteristics are required of its directors and employees. Specialists are required in structural and reinforced concrete design, in road design, in the field of transportation, in soils, in electronic computer work, etc. Surveyors are needed for mapping and layout work. Chemists are required for laboratory work. Horticulturalists are needed for roadside development.

To assist this group are the technicians who have acquired specialized skills through study and experience. This group includes draftsmen, laboratory assistants, field inspectors, machinists, machine operators, etc. Other personnel are needed to perform the manual labor of maintenance work.

To coordinate the work, many individuals are needed in the field of administration. Management must rule on the procedures to accomplish the mission of the Department and to satisfy the needs of the state. A personnel section is needed to select suitable employees for the positions which must be filled. Individuals trained in the field of accounting are needed. Many secretaries, stenographers, typists, and clerks are needed to assist in the complex operations of the Department. Each employee is carefully chosen according to the requirements of the job to be done and his ability to fit into the work group; every individual is an important cog in the machinery.

Personnel Strength

As of June 30, 1962 there were 1,232 employees in the engineering section of the Department, an increase of 118 over the previous year. The total employment of the Department will continue to increase as the population of the state and the number of vehicles increase.

The following is a summary of employees as recorded on June 30, 1962.

Biweekly Employees:

New Castle County Division	145
Kent County Division	157
Sussex County Division	259
Traffic Section	29
	<hr/>
	590

Salaried Employees:

Administration	36
Divisions	380
Operations	105
Planning and Design	121
	<hr/>
	642

The Department is fortunate in being able to number 53 engineers among its employees. Forty-seven have graduated from college; the others have gained their status through long experience, which is recognized by the state registrars. Twenty-eight of these are Registered Professional Engineers who have the legal status to practice in their own right by being certified by the Delaware State Board for the Registration of Professional Engineers and Land Surveyors and similar boards in other states.

Thirteen of the graduate engineers attended the University of Delaware; others attended the following colleges:

- Agricultural and Mechanical College of Texas
- American University
- Chicago Technical College
- Cornell University
- Drexel Institute of Technology
- Franklin and Marshall College
- George Washington University
- Georgia Institute of Technology
- McMaster University (Canada)
- Pennsylvania Military College
- Princeton University
- Robert College (Turkey)
- Tallinn Engineering School (Estonia)
- Tennessee Polytechnic Institute
- The John Hopkins University
- Tri-State College
- University of Latvia
- University of Pennsylvania
- Virginia Polytechnic Institute
- West Virginia University

It is with considerable pride that the Department acknowledges the great amount of graduate work done by the engineers. Many of the men have taken short courses at various highway-oriented educational institutions and a number of others have been able to attend longer courses.

All this extra work has been made at some personal inconvenience to the men and their families but the result is of great benefit to the Department as well as to the individuals who had the initiative to participate in the program.

Another way the Department keeps up to date is to participate in the activities of professional societies concerned with highway interests. Below is a list of such societies.

- American Association of State Highway Officials
- American Petroleum Institute
- American Road Builders Association
- American Society of Civil Engineers
- American Society for Testing Materials
- Association of Highway Officials of North Atlantic States
- Delaware Society of Professional Engineers
- Highway Engineering Exchange Program
- Highway Research Board
- Institute of Traffic Engineers
- National Society of Professional Engineers
- Portland Cement Association
- Ready Mix Concrete Association
- 1620 Users Group
- The American Concrete Institute
- The American Wood Preserving Institute
- The Asphalt Institute
- The Prestressed Concrete Institute

It is emphasized that Department membership is no mere payment of dues and acceptance of a membership card. Department personnel make material contributions to the progress of the associations toward their aims, which may be simply stated as progress for the benefit of all people.

Professional Assistance

In spite of the vast wealth of knowledge and experience available in the engineering staff, the Department finds itself hard put to keep pace with the extraordinary growth and development of Delaware. It has not been many years since the bulk of the state's industrial concentration was in New Castle County, especially in and around Wilmington; and the center of population, naturally, was there. World War II, however, caused a great expansion of Delaware's industrial and service-type businesses, some in entirely new fields. This development is continuing and the Department is feeling the effects of it in many forms, especially in that of roads suddenly becoming obsolete. So, even with its present fine staff, the Department many times

must resort to engaging engineer consultants to be able to maintain any sort of progress in the effort to serve the people.

Training Programs

The rapid increase in the volume of traffic and the changes in land use are only two effects the rapid growth of population has had on the Department. It is necessary, then, to try new methods, new devices, and new materials to keep the existing roads in service and to raise the capacity of the highway system by whatever means are feasible. In addition, these questions must be answered continuously:

1. Is the Department receiving full value for expenditures in construction and maintenance?
2. Can a particular operation be done more economically?
3. What work can be done more efficiently to increase the output of manpower?
4. How can we improve the quality of a road or structure to make it more lasting in order to reduce future maintenance costs? However, to adopt new methods, new equipment, and new materials to meet the problems facing the Department requires the training of personnel. A firm of professional consultants, versed in the fields of efficiency and modernization as applied to engineering and construction, is assisting the Department by observing, reviewing, and studying the management and personnel, and the construction and maintenance activities. Recommendations resulting from the evaluation of these studies were presented to the Department for consideration.

In order to evaluate the personnel before starting a training program, examinations were held in December for specific groups of employees. The examinations were related directly to the category being tested.

1. Administrative: division heads and their immediate assistants;
2. Construction: inspectors, surveyors, and supervisors;
3. Materials: material inspectors, laboratory technicians, and supervisors;
4. Maintenance: foremen and supervisors; and
5. Design: road designers, draftsmen, and supervisors.

Based on the results of these examinations, training programs were established in basic mathematics and in the subject of specification requirements and control procedures, where weaknesses were indicated. These training courses were held during the winter months when con-

struction activity had practically ceased. Before presenting these courses the division engineers were oriented as to the objectives sought. Classes were taught by representatives of the consultant's organization and personnel of the Department. However, to insure proper instruction, Mr. Donald S. Robinson, an accredited teacher in the employ of the Department, gave professional assistance prior to the start of the courses by briefing the instructor on "How to Teach," and he furnished them with sample lesson plans and other reference material to guide them in preparing for their classes.

A total of 346 of the personnel from the Materials and Research, Road Design, Freeways, Administrative, Construction, and Maintenance Sections attended the courses. Evaluation of the final examinations, held in April, showed a marked improvement over the control test made in December. Grades made on the examinations became a permanent part of the personnel record of the employees. However, individuals are not evaluated solely on the basis of these examinations; their experience, initiative, and good judgement must also be considered.

This year 37 employees, on their own time, are taking advantage of the established policy of the Department to reimburse them for the costs of courses which will improve their engineering knowledge, provided they successfully complete the course.

Courses taken include college mathematics, algebra, geometry, drainage, road surfaces, and traffic control. Several of these courses are given at the University of Delaware, the remainder are from sectional units of civil engineering courses offered by various correspondence schools. Besides the formal courses attended by some of the operating personnel, many of the Director's staff attend seminars devoted to subjects of interest to the Department, such as the roadside beautification and roadside facilities seminar presented by the Ohio Department of Highways.

Employee Guidance and Selection

During the year, to assist in the evaluation of employees, a policy of rating all personnel by their superiors was established. All ratings are discussed by the immediate supervisor and the employee. By this means the employee is aware of his weakness and is guided to improve himself.

A testing program for applicants for employment was initiated in February. Entrance examinations were de-

signed to determine whether the applicant actually does have the knowledge required as a minimum for the job. Since the initiation of this policy 173 applicants have been tested, of whom 62 were employed.

Employee Benefits

During the year the Department approved the following for the benefit of the employees:

1. Increase in sick leave earned from 1 day per month worked to $1\frac{1}{4}$ days per month worked and increased the number of days an employee could accumulate from 60 to 90.
2. To pay the estate of any deceased employee a lump sum, based on his wage or salary, equal to the amount of accumulated sick leave and annual leave due to the employee on the date of his death.
3. Increase in military leave allowed from 5 working days to 10 working days during any one year.

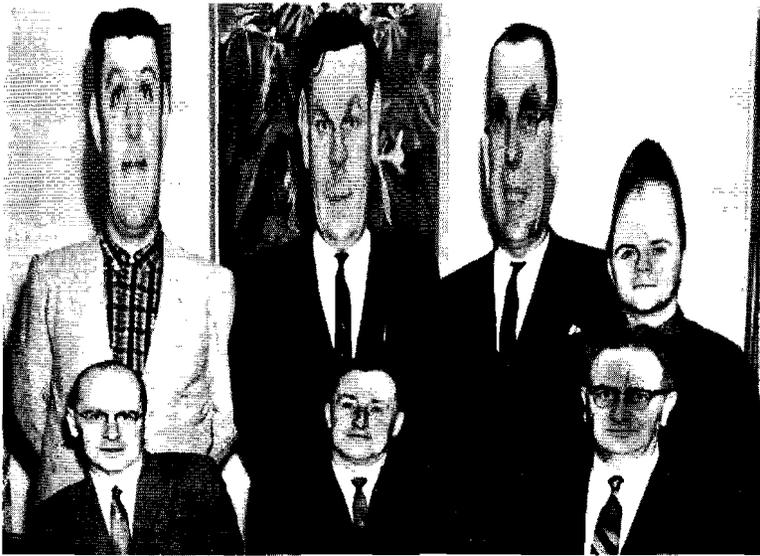
The Department has authorized the Personnel Section to investigate group insurance plans which include employee life insurance, accidental death or dismemberment insurance, dependent life insurance and weekly payment accident sickness insurance. A group insurance policy would fill the void in protection to the employee which Blue Cross does not cover.

Employee Organizations

CREDIT UNION

The Delaware Highway Federal Credit Union, chartered in August 1960, is growing slowly. In spite of a potential membership of over a thousand, less than 300 are members. However, at the end of this period the total amount of money loaned since organization is \$26,101, which is an increase of \$19,201 over the previous year, indicating that there is considerable interest in the facilities the Credit Union offers.

The main incentive is not profit but protection. It is true that dividends are paid (last year the Credit Union paid a 3 percent dividend on shares) but the whole object of the movement is to afford protected loans at low rates of interest. Insurance, without extra cost to the borrower, is provided on loans made to members who are below the age of seventy. Thus a member's estate is not encumbered by a debt to the Credit Union; "The debt dies with the debtor."



Delaware Highway Federal Credit Union board of directors. Front row: Joshua T. West; Arthur N. Sipple, President; Donald S. Robinson, Treasurer. Back row: Dale B. Cooper; Willis E. Kates, Vice President; Edward H. Slaughter; Rene L. Herbst, Jr., Secretary.

Furthermore, the Credit Union carries insurance which provides benefits other than that on a loan balance. Each member is insured, with certain exceptions relating to age, physical condition, etc., for an amount equal to insurable balance of his shares in the Credit Union (up to \$2,000) at the time of his death.

TEN-YEAR CLUB

On May 1 employees who had been in the employ of the Department 10 years or more met at the State Armory in Dover for the express purpose of creating an employees' organization to be known as the 10-Year Club. The meeting, under the guidance of the acting chairman, Mr. Robert Wetherall, proceeded to adopt a constitution and bylaws and to elect officers for the ensuing year. Mr. John K. Smith, Jr., was elected as the first president.

The objects of the club are: To encourage the exchange of ideas and opinions, to promote good fellowship and to advocate a better understanding between employees and members of the State Highway Department.

Mr. William J. Miller, Jr., Director of Operations, and Mr. N. Maxson Terry, Chairman of the Department, spoke briefly about the advantages of the club and wished the club success in attaining its objectives.

Construction Program Financing

For the past several years the Department's construction programs have been financed by bond issues authorized by the General Assembly for this specific purpose. Also in recent years the General Assembly has directed the Department to prepare specific project resolutions outlining the use the Department intends for the funds requested. These resolutions show not only the projects which have been approved by the Department for construction, but also indicate the estimated costs for the work and the amount of state and federal funds to be spent.

The construction resolutions provide funds, after legislative approval, for projects of various types. The most recent bond issue for the construction program was authorized by the legislature in May 1961 for \$26.6 million. The money was allocated as follows:

	State Funds	Federal Funds	Total
Interstate System	\$ 3,125,400	\$26,830,500	\$29,956,000
ABC System	10,144,600	8,814,400	18,961,000
100% State Projects	3,230,000		3,230,000
Suburban Roads	1,310,000		1,310,000
Dirt Roads	4,000,000		4,000,000
Beach Erosion	700,000		700,000
Engineering & Planning	2,000,000		2,000,000
Projects left from previous year	1,500,000		1,500,000
Drainage & other public works	650,000		650,000
Totals	\$26,660,000	\$35,644,900	\$62,304,900

It is to be noted that the \$26.6 million provided by the legislature allows a total project expenditure of \$62,304,900.

The project resolutions are prepared by the staff engineers, and all divisions of the Department are consulted to assure complete and accurate figures. The resolutions are presented to the Department for approval. In turn, the Department sends the approved resolution to the General Assembly for financing. Of some interest are the following features which the resolutions indicate:

1. The construction funds for general highway projects are allocated to each county based on road mileage, area, population and the number of vehicle-miles traveled. This division of funds is more equitable than a simple proportion based on mileage alone.

A balancing of these factors involves the following formula:

$$\text{FA (\%)} = 2A + 3P + 2M + 3T, \text{ where}$$

A = area factor, based on square miles
P = population factor based on the most recent United States census
M = milage factor based on miles of road
T = travel factor based on the number of vehicular miles traveled during the year
FA = percent of funds allocated

In 1961-1962 this resulted in the following percentages:

New Castle County	47.7
Kent County	21.1
Sussex County	31.2
	<hr/>
	100.0

2. The Interstate System in Delaware is wholly within New Castle County. It is only 40 miles in length, compared with the nationwide total of 41,000 miles.

3. There are provisions in each resolution which permit 20% of the funds to be transferred to other projects, provided the Director of Operations recommends such changes and the Department concurs.

4. The Department Controller is required to report to the Governor, the General Assembly, and the Department at least quarterly on the status of funds for each project in the resolutions for which funds have been authorized.

CHRONOLOGICAL HISTORY OF SOME IMPORTANT EVENTS OF THE DEPARTMENT DURING 1961-1962

July 1961 Legislature enacted new outdoor advertising control legislation; the new law provides that outdoor advertising on the Interstate system will be in accordance with Bureau of Public Roads requirements and that billboards on other highway will be better controlled.

Under the provisions of the State Municipal Street Aid Act, 51 Delaware municipalities received a total of \$1.2 million in gasoline taxes, of which about 40 percent (\$498,547) was allocated to the City of Wilmington.

Under the new State Highway Department reorganization the fiscal year started under a Controller office setup for fiscal control. All accounting responsibilities will fall under the Controller.

The Director of Operations informed members of the Department of a new job classification manual which spells out the duties and requirements of each job and employment of personnel will be based on their qualification for a specific job.

The Department decided to give serious consideration to the need for a new bridge and new approaches over the Christina River at Third Street in Wilmington.

August 1961 It was estimated that an annual savings of \$113,213 in rent for office space could be effected by constructing a new State Highway Department administration building. Greater efficiency in operations is envisioned with all units centralized in this manner. The existing building would be turned over to other state agencies.

Mosquito control experts from the Federal government, New Jersey, and Maryland visited the Little Creek impoundment, one of the largest of its type in the nation.

The House of Representatives passed a measure, already approved by the Senate, which would authorize the Department to issue revenue bonds to finance the construction of a turnpike from the Delaware Memorial Bridge to the border of Maryland. The Governor, on August 24, 1962, signed this measure and opened the way for the eventual construction of a self-amortizing, tax-free toll road.

The Tenth Anniversary of the opening of the Delaware Memorial Bridge was observed on August 15. Since the opening of the bridge the passenger-car toll has been reduced from 75¢ to 25¢. The great volume of traffic has paid off the bonded indebtedness at a much faster rate than anticipated.

The Director of the Mosquito Control Division believes it is possible to permanently subdue Delaware's mosquitoes in five years at a cost of about \$4.5 million.

An inventory which was made by the Traffic Section over a period of six months at a cost of approximately \$50,000 indicates that the Department has placed over

39,000 traffic signs and signals throughout the state.

September 1961 Meetings were held with banking interests and engineering firms to arrange the schedule for the toll road bond sale and related activities.

The Governor, the Attorney General, and the Highway Department met and agreed to hire two attorneys to represent the State. The attorneys were to follow up the charges contained in the Attorney General's report following his investigation of the Highway Department.

Representatives from the Chesapeake Bridge-Tunnel Crossing, the Maryland State Roads Commission, the Delaware State Highway Department, the New Jersey Turnpike, and the New York Port Authority met in Baltimore to discuss the impact of the toll facilities in these States.

October 1961 The Attorney General's Office has filed suits to recover some \$627,000 from a number of contractors who allegedly received money from the Department illegally or improperly.

The Chief Engineer announced that red concrete would be used on Foulk Road between Blue Ball and Silverside Road. This is a traffic control and safety experiment and it will indicate where turns may be made at intersections.

It was announced that direct telephone line service between Dover and Wilmington would be increased from two to twelve lines, serving all State agencies. In addition, switchboards will enable State agencies to dial directly to other state agencies without having to go through commercial centrals.

The members of St. Paul's Methodist Church agreed to accept \$642,632 for the church property which stands in the path of the Freeway through Wilmington.

An auditor's report indicates that rentals amounting to \$48,559 had been misappropriated on the rental units along the Adams-Jackson Street Freeway. The investigation into this matter has spread into areas outside the State Highway Department and the possibility of prosecution was announced by the Attorney General.

The bridge over Drawyer's Creek, in the southbound lane of US 13, was reopened to single-lane traffic at reduced



**Mrs. Clara Warrington, secretary to the
Director of Operations.**

speed. These restrictions will be continued until the bridge is repaired or replaced.

Winds in excess of 45 miles per hour caused extensive flooding and damage in Sussex County shore areas. Tides were 3 feet above normal, some dunes were breached, and several roads were flooded in the Dewey Beach-Fenwick Island area.

November 1961 One of Delaware's few covered bridges, Smith's Bridge in New Castle County, was severely damaged by fire in an act of vandalism committed during the Hallowe'en period.

Two sections of FAI-2 through Wilmington were included in the Department's construction program for 1962: a bridge over Brandywine Creek, and a section of the road between Maryland Avenue and the Christina Interchange.

Mrs. Clara Warrington, secretary to several Chief Engineers and the Director of the State Highway Department, was given recognition of her faithful and competent public service in the form of a biographical sketch in the *Wilmington Morning News* in the "Peninsula Spotlight" column.



Engineer's drawing showing a proposed second bridge to be built north of the present Delaware Memorial Bridge.

January 1962 The Delaware Roadside Council made representations to the Department in an effort to save the 66 trees along US Route 13 adjacent to the Greater Wilmington Airport. The trees have been marked for removal in the interest of aircraft safety as they are near the end of the most-used runway.

Beginning of Miller-Warden School. Formal examination was given to each Department employee at the beginning of the session.

February 1962 Final location of the Wilmington Interchanges for the proposed Adams-Jackson Street Freeway was approved by the City's Department of Public Works.

An editorial in a Wilmington newspaper reveals that Governor Carvel has received a proposal from the Governor of New Jersey that the two states cooperate in the construction of another bridge across the Delaware River, to be located between a place in southern New Jersey and Bombay Hook, Delaware.

At a meeting held in the Department's Dover offices \$28 million worth of revenue bonds for the Delaware Turnpike were sold at $4\frac{1}{8}$ percent interest. Maryland was able to dispose of turnpike bonds at the same terms.

The Ladies' Auxiliary of the Sons of Union Veterans appealed to Governor Carvel to prevent the proposed movement of graves of Civil War soldiers in the Wilmington and Brandywine Cemetery. A small portion of the cemetery will be affected by the Interstate Route 95 construction.

Mr. Chauncey O. Simpson, Special Assignments Engineer, was awarded the citation "Engineer of the Year" by the Delaware Society of Professional Engineers. The award was made in recognition of Mr. Simpson's ". . . untiring efforts through the years to enhance the engineering profession in the State of Delaware."

A public hearing relative to the proposed Frederica Bypass in Kent County was held.

March 1962 Again the Governor of New Jersey has expressed interest in a river crossing in the area east of Smyrna. He asked that consideration for such a bridge be given priority by the Delaware River-Bay Authority. The Interstate Highway Division has agreed to study and report on the suggestion.



Chauncey O. Simpson receives citation as "Engineer of the Year" from Governor Elbert N. Carvel.

Violent storms on March 6 and 7 caused extensive damage to the Delaware coastal areas. A full report of these storms is given on page 21 of this report. The General Assembly quickly approved Governor Carvel's request for an appropriation of \$500,000 for storm relief which will at the same time qualify for Federal-Aid relief funds.

The storms wreaked such havoc upon the coastal marsh drainage systems and other works of the Mosquito Control Division that it is anticipated that the mosquito nuisance will be greatly increased this summer unless there are unexpected variations in the normal weather for this area.

April 1962 C. J. Langenfelder and Son, Inc. submitted the low bid of \$2,360,544 for the first section of the Delaware Turnpike. The work under this contract consists of grading, drainage, and construction between Basin Road and Churchman's Road.

Mr. Aubrey B. Lank was appointed by Governor Carvel to succeed Mr. Benjamin Ableman, whose term as a member of the Highway Department expired this month.

Engineers of the Department and the City Council of New Castle discussed the Buttonwood Drainage problem.

A committee appointed by the Governor for bulk purchasing met and agreed to request bids for such items as tires, paper, and similar items on a single contract for all state agencies.

The Kent-Sussex Chapter of the Delaware Society of Professional Engineers was formed in a meeting at the Dover Air Force Base.

The Governor, the Secretary of State, and the Director of Operations attended a meeting in Atlantic City which was attended by Governors and representatives from each state bordering the Atlantic Ocean and the U.S. Army Corps of Engineers to discuss ways and means to deal with the March storm damage.

May 1962 Brann and Stuart, contractors from Trenton, N.J. submitted the low bid of \$46,675 for repairing the bridge at Indian River Inlet. It is expected that the bridge will be reopened to the public early in July.

Governor Carvel endorsed the observance of the week of May 20 through the 26th as Delaware Highway Week. The 7th Annual State Highway Day, May 21, will be marked by ceremonies in the Hotel duPont in Wilmington; participation will be by the Associated General Contractors of Delaware, the Delaware Safety Council, and various professional engineering societies.

Department employees formed the Ten-Year Club. Eligibility depends upon a minimum of 10 years' service with the Department. The aims of the club are social, fraternal, and to promote a mutual understanding and sympathy among the employees and the Department itself.

Major Eugene B. Ellis was promoted to lieutenant colonel and appointed as executive officer of the Delaware State Police, making him second in command of Delaware's highly efficient and much-honored force.

About 30 new State Police Troopers, recently graduated from the Delaware State Police Academy, were placed on duty in an attempt to reduce the highway fatality rate



Lt. Col. Eugene B. Ellis, executive officer of Delaware State Police.

and to patrol other types of hot spots. Each new trooper will be assigned to work with a veteran, thus getting experience in the field which would not be available in the classroom.

Mr. Lester W. Novinger, Plans and Design Engineer, was awarded a certificate "in recognition of his outstanding service to the Highway Research Board in its administration and direction of the AASHO Road Test during the period 1956-62 as a member of the Regional Advisory Committee, District 1."

June 1962 Two low bids totaling more than \$7 million were received by the Department for toll road and freeway projects in New Castle County. S. J. Groves and Co., of Camp Hill, Pennsylvania, submitted the low bid of \$4,831,058 for grading, drainage, and the construction of bridges on the toll road between Churchman's Road and the Glasgow-Newark Highway, a section 5.1 miles long; and C. J. Langenfelder and Son, Inc., already working on the project, was low-bidder on another portion of the road between the Christina River Interchange and Wilmington for \$2,244,212.

Wilmington newspapers published excerpts from the recently-released 1961 Annual Report of the Department. Headlines referred the Director's recommendation that the merit system be instituted on a State-wide basis rather than one peculiar to the Department.

Publicity

It is important that the public be kept informed not only of the regular activities of the Department but also of any activity necessary in case of emergency situations. This is done by the following means:

1. Daily papers: regular news releases are furnished to 4 papers on the peninsula and special reports are sent to 4 others in nearby metropolitan areas.

2. Weekly papers: news releases are provided to 10 papers published in Delaware. Information contained in these releases pertains to projects and activities within the general distribution area of the papers.

3. Radio and television: all news copy is furnished to 10 radio stations and one television station. These stations are most cooperative during emergencies.

4. Magazines: information is sent to 6 magazines of national circulation pertaining to engineering and highways.

During the year 341 news stories of general interest were released and 71 stories of special interest. When photographs are available they are circulated with releases and stories for illustration purposes.

II. ACTIVITIES OF THE ENGINEERING SECTION

PLANNING AND DESIGN DIVISION

The function of the Plans and Design Division is to coordinate the activities of the Road Design Section, the Bridge Section, the Right-of-Way Section, the Planning Section, and the Utilities Section with other sections of the Department which are concerned with any aspect of contract plan preparation.