

TWENTY-FOURTH ANNUAL REPORT

OF THE

New Jersey State Highway Department

For the Year ending October 31

1917

UNION HILL, N. J.
HUDSON PRINTING COMPANY

1918

TWENTY-FOURTH ANNUAL REPORT

OF THE

State Highway Commission of New Jersey

For the Year Ending October 31, 1917.

BOARD OF COMMISSIONERS.

EX OFFICIO.

His Excellency, Walter E. Edge, Governor of the State of New Jersey.

BY APPOINTMENT.

John W. Herbert, Chairman, Helmetta, N. J.....	For one year
Anthony R. Kuser, Bernardsville, N. J.....	For one year
Senator George W. F. Gaunt, Mullica Hill, N. J.....	For two years
Colonel E. A. Stevens, C.E., Bernardsville, N. J.....	For two years
Watson G. Clark, C.E., Tenaflly, N. J.....	For three years
Walter J. Buzby, Atlantic City, N. J.....	For three years
Ira A. Kip, Jr., South Orange, N. J.....	For four years
George E. Blakeslee, Jersey City, N. J.....	For four years

A. Lee Grover, Secretary to the Commission.

General George W. Goethals, State Engineer.

Robert A. Meeker, State Highway Engineer.

W. G. Thompson, Assistant State Highway Engineer.

OFFICE OF THE STATE HIGHWAY COMMISSION,

TRENTON, NEW JERSEY, November 30, 1917.

To His Excellency Walter E. Edge, Governor of the State of New Jersey, and the Legislature of New Jersey:

We have the honor to submit the Twenty-fourth Annual Report of the State Highway Department, for the fiscal year ending October 31, 1917.

STATE HIGHWAY COMMISSION,

JOHN W. HERBERT,

Chairman.

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Report of Chairman.

The Legislature of the State of New Jersey, at its last session, passed several Acts known as the "Edge Bills" providing for a State highway system, a State Highway Department, means for financing the same and for the engagement of a State Engineer, in addition to the engineering force provided for in the bill creating the State Highway Department.

Chapter 15 of the Laws of 1917, entitled, "An Act to establish a State Highway Department and to define its power and duties; and vesting therein all the powers and duties now devolved by law upon the Commissioner of Public Roads and the existing State Highway Commission and Highway Commission," provides that the State Highway Department shall be governed by a Board to be known as the State Highway Commission, which shall consist of eight members, two of whom shall be qualified and competent engineers and all of whom shall be residents of the State. The Governor shall, in addition thereto, be ex officio a member of the Commission. The members of the State Highway Commission shall be appointed by the Governor, by and with the advice and consent of the Senate, for the following terms, to take office on the date of the appointment: two for one year, two for two years, two for three years and two for four years. Annually thereafter two members shall be appointed for a term of four years. The Governor shall have the power to summarily remove any or all members of the Commission.

The members of the Commission shall receive no compensation for their services, but the State Treasurer shall, upon warrant of the State Comptroller, reimburse them for their necessary expenses.

Under this Act the Governor appointed the following Commission:

John W. Herbert, for one year;
 Anthony R. Kuser, for one year;
 George W. F. Gaunt, for two years;
 Colonel E. A. Stevens, C. E., for two years;
 Watson G. Clark, C. E., for three years;
 Walter J. Buzby, for three years;
 Ira A. Kip, Jr., for four years;
 George E. Blakeslee, for four years.

The Act provides that the Commission shall organize each year by the selection of a Chairman and the appointment of a Secretary. Pursuant to the call of Governor Walter E. Edge, at the Executive Office in Trenton, on March 30, the Commission met and organized by the election of John W. Herbert as Chairman, and, at a subsequent meeting, A. Lee Grover was elected Secretary to the Commission.

At this meeting the Governor advised the Highway Commission that he had appointed, and the State House Commission had employed, General George W. Goethals as State Engineer, as provided in Chapter 98, Pamphlet Laws of 1917, thus securing to the State Highway Commission the services of the most eminent Civil Engineer of this country, if not in the world.

We desire to congratulate the people of New Jersey in having the advantage of General Goethals' great talents in the construction of our State Highways.

At the same meeting, on the recommendation of General George W. Goethals, the Highway Commission appointed as the State Highway Engineer Mr. Robert A. Meeker, at a salary of \$7,000 per annum, said appointment to be effective from April 1, 1917. Mr. Meeker had long been connected with the Highway Department and was familiar with its operations and procedure.

At the meeting of the State Highway Commission held on April 12, 1917, on the recommendation of General Goethals, Mr. W. G. Thompson, who was an assistant of General Goethals in the concrete work at the Panama Canal, was appointed Assistant State Highway Engineer at a salary of \$4,000 per year until the construction work of the road should begin, when his salary is to be \$5,000 a year. The Division Engineers under the old Highway Department were retained.

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The new highway system was created by Chapter 14 of the Laws of 1917, entitled, "An Act to establish a State Highway system and to provide for the improvement, betterment, reconstruction, resurfacing, maintenance, repair and regulation of the use thereof."

This Bill provides that the State Highway Commission should, as soon as practicable, lay out roads for a state highway system comprising fifteen different routes, particularly defined in the Act, and that said routes "shall be as short and direct as practicable between the points specified, due regard being had for the other requirements of the Act."

Section 3 of the same Act provides that the Highway Commission should give a hearing to all parties interested in each route, and after such hearing determine by resolution whether any routes, route or parts thereof, if any, shall be taken over as a State Highway. Upon the passage of such resolution such routes, route or part thereof shall become a State highway, and its further improvement, maintenance and repair shall be at the expense of the State under the jurisdiction of the State Highway Department.

The Highway Commission has given hearings on each of the fifteen specified routes, at points most convenient for attendance to the people of the State interested in such routes. These meetings were largely attended and a lively interest manifested, particularly as to the line of the routes. In only two or three cases were there any differences of opinion as to the line the route should take. It was necessary that the routes should run through the points designated in the Act, the termini and the points intermediate between such termini.

Section 2 of the Act provides that the State Highway Commission shall from time to time cause to be prepared a road map or plan of the State showing thereon the State highways and county roads.

The Engineering Department has prepared such a road map or plan of the State showing thereon the proposed State highways as embraced within the fifteen routes named in the Act of the Legislature above referred to.

The Highway Commission has held hearings on these routes as follows:

On May 16 on route No. 6 at the Court House, Woodbury, New Jersey.
On May 17 on route No. 4 at Asbury Park, New Jersey.

On May 24 on route No. 13 at the Court House, New Brunswick, New Jersey.

On June 15 on routes Nos. 3 and 4, at Atlantic City, New Jersey.

On June 15 on route No. 14 at Cape May Court House, Cape May, New Jersey.

On June 22 on route No. 9 at the Court House, Somerville, New Jersey.

On August 23 on route No. 5 at the Court House, Morristown, New Jersey.

On August 23 on route No. 12 at Hackettstown, New Jersey.

On August 24 on route No. 8 at Sussex, New Jersey.

On September 27 on route No. 15 at Cape May Court House, Cape May, New Jersey.

On October 10 on routes Nos. 1 and 2 at the State House, Trenton, New Jersey.

On October 18 on route No. 7 at Freehold Court House, Freehold, New Jersey.

On October 25 on routes Nos. 10 and 11 at Hackensack Court House, Hackensack, New Jersey.

The Commission announced at each of these hearings it would take up the routes named in the order of their importance to the State, and that until the routes were taken over they would have to be maintained and kept in repair by the municipalities then chargeable therewith.

The Highway Commission, in addition to these public hearings on these routes, has held regular meetings at the State House in Trenton on the second Thursday of each month, besides holding special meetings in Trenton and at other places. All of the fifteen routes named in the Act have been inspected by the Board and much time devoted to the work by all of the members of the Highway Commission.

Under Chapter 16 of the Laws of 1917, entitled "An Act to provide for the taxation of real and personal property in this State for State road purposes," provision is made for raising the money required to pay for the construction of the highway system. It covers a period of five years, during which time there is to be annually assessed, levied and collected in each of the municipalities of the counties of this State a tax of one mill on each dollar of the value of all the real and personal property in every such municipality upon which municipal taxes are or shall be assessed, levied and collected. It shall be the duty of the Collector, or other officer hav-

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ing the custody of the collected taxes, on or before the 22nd day of December in each year to pay to the County Collector of the county such State tax required to be assessed in his taxing district, and the County Collector shall pay the said State tax which he shall so receive from the taxing districts to the Treasurer of the State on or before the 20th of the next January, and it then becomes the duty of the State Treasurer to place the same in the State road fund.

It will be seen that no funds, therefore, will be available for the construction of the highway system under the Acts above referred to until after the payment made to the State Treasurer on the 20th of January next, and then only so much as the tax of one mill on every dollar of the ratables shall yield for the year.

The State Highway Commission, shortly after its organization, realizing the magnitude of the work to be performed and the expense of building the entire State highway system covered by the fifteen routes, decided that before any construction work should be started, the Engineering Department should make a comprehensive survey of the said routes to establish said routes and estimate the cost of constructing same. Under such direction the Engineering Department has prepared a road map of the State and made a survey of the 633 miles of road provided to be built in Chapter 14 of the Road Law. The estimate of the cost of the construction of these roads will be completed and ready for use by the Commission by the 15th of December, 1917.

The Highway Commission will be prepared to begin the active building of the roads next spring as soon as the weather will permit of the work being done.

A word of explanation is due regarding the action of the State Highway Commission in making appropriations for the construction of the connecting links with the cantonments at Camp Dix and Camp Merritt. When these camps were located in New Jersey, it was the opinion of the Governor of the State and the State Highway Commission that the expense of constructing the roads, not only within the cantonments but the main connecting links connecting with the State highway system, should be borne by the Federal Government, as military necessities. The Federal Government, failing to act in the matter, and realizing that the use of the roads by the heavy trucks for transportation of materials to the camps

and the use of such roads thereafter would in a short time make the roads impassable, thereupon his Excellency, Governor Walter E. Edge, suggested that a Committee be appointed by the State Highway Commission to go to Washington to urge upon the military authorities of the United States Government the urgent necessity of providing the funds for the important construction of these highways before the cold weather made the work of constructing them impossible.

There was appointed by the Commission a Committee consisting of Mr. Watson G. Clark, C. E., General George W. Goethals and John W. Herbert, for the purpose. This Committee visited Washington and secured the co-operation of the United States Senator Joseph S. Frelinghuysen, who introduced or advocated an amendment to the Deficiency Bill, providing for the construction of the highways connecting the various cantonments throughout the country with the main highways of the various States in which the camps are located. The provision was defeated by a very small margin.

The Commission, realizing the importance of having these roads built in order to facilitate the affairs of the camp and the care and training of the soldiers, made an appropriation of the money required for the purpose of building the roads from Camp Dix at Wrightstown to the main road at Georgetown, and from Camp Merritt through Tenafly to the permanent pavement at Englewood. Through the efforts of Commissioner George E. Blakeslee and the courtesy of Hudson County, a portion of the funds required for the purpose was made available.

The State Highway Commission, however, hopes and will endeavor to secure reimbursement from the Federal Government for the funds which the State may be required to expend for the purpose of performing this important work.

Paragraph 13 of the Act to establish a State highway system provides that all work of construction or building of unimproved roads and of extensive repairs to improve roads taken over as State highways shall be by contract or by labor of inmates of State institutions. The State Highway Commission has taken advantage of this provision of the law to make contracts for the construction of roads, the building of unimproved roads and the extensive repairs to improved roads by the inmates of State institutions, such contracts

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having been made with the New Jersey State Prison through the Board of Inspectors and the New Jersey Reformatory at Rahway. These contracts will prove highly advantageous to the State in securing the economical construction of the roads, especially at a time when it is difficult to secure competent help, owing to the demand made upon labor by the European war.

Respectfully submitted,

JOHN W. HERBERT,

Chairman.

State Highway Engineer's Report.

To the New Jersey State Highway Commission:

Gentlemen:

I have the honor to present herewith the reports of the several branches of the State Highway Department which describe in detail the work accomplished.

Only one road, approved during the fiscal year ending October 31, 1917, was finished, accepted and paid for in time to be reported. Several roads, the plans and specifications for which were approved in 1916, were finished and paid for this year. The total mileage of these amounts to 21.9273. In addition, a number of roads, which were begun in 1915, were completed and paid for, the mileage of which amounts to 18.53. Two roads, owing to exceptional physical conditions, were commenced in 1914, but were not completed and paid for until this year. The total mileage of these is 17.42, bringing the total mileage of new roads, added to our system, up to 57.8773.

The year 1917 marks a new departure on the part of the State in the field of road construction. Heretofore all the surveys, with the exception of a few minor stretches, have been made by the county or local authorities. Now the State intends to make all its own surveys and thus supervise and control not only the office but the field work of road construction. In order that the State may properly administer its new highway system, a corps of engineers, properly equipped, has been added to the department. At present we have 88 men in this corps, who are equipped with 17 transits and 22 levels, thus forming a very substantial basis upon which to build up a State Highway Engineering Corps. This will enable us to secure at first hand the necessary information and data upon which to base our plans and estimates for future work. This corps of engineers will also prove of vast value and importance

to us in the future, as it will be able to quickly and accurately determine how, when and where the work of construction and reconstruction shall be undertaken.

The engineering and inspection force has been materially increased during the past year and we are rapidly securing a body of skilled inspectors. In order that their work may prove more valuable, I would suggest that a portion of their time, during the winter, be devoted to work in the laboratory in order that they may become familiar with the methods of testing materials and thus be able to prevent the use of unacceptable material before it has been placed upon the road. By this means we will avoid the annoyance of adjusting the value of the work done when the same does not correspond with that specified or contracted for.

Respectfully submitted,

R. A. MEEKER,
State Highway Engineer.

Assistant State Highway Engineer's Report.

Mr. R. A. Meeker,
State Highway Engineer,
Trenton, N. J.

Dear Sir:

The following report of progress of surveys of State Highway System to October 31, 1917, is respectfully submitted:

Until the formation of the present State Highway Commission, all surveys for State purposes and for Township roads were made under the supervision of the Engineer of Surveys. This position was abolished in June, 1917, and all survey work placed under the Division Engineers, in order that they might have full knowledge of, and be held responsible for, all surveys, engineering, and construction in their respective divisions.

At its regular meeting on May 10, the State Highway Commission directed the Engineering Department to prepare a detailed estimate of the cost of construction of the several highway routes as laid down in the Act. Using the force of the former Engineer of Surveys as a nucleus, and, in the absence of a civil service eligible list, making temporary appointments, surveys were started on the several routes. The Civil Service Commission was requested to hold examinations to secure eligibles for the several positions in the Survey Corps. These examinations were held on July 9, and the eligibles secured therefrom, during the latter part of August, were all offered, and most of them accepted positions. The eligibles supplied were, however, insufficient for our purposes, and further temporary appointments were made, as the military draft rapidly depleted our forces.

Prior to June, 1917, there was, in possession of the Engineering Department, insufficient field equipment to properly equip more than three field parties. It was, therefore, necessary to purchase new equipment at a time when the output of nearly all manufacturers had been commandeered by the Government for war purposes. Parties were sent into the field as rapidly as they could be outfitted, and, considering the almost constant resignations, due to men entering the national military service and to their securing better positions elsewhere, good progress was made.

It was deemed inadvisable to start construction of any particular route until the cost of the system as a whole could be determined, in order that an average cost per mile, based on present current prices for materials and labor, could be established. It soon became evident that it would be impossible to make a complete and accurate detailed survey and estimate by the time the estimate was desired—namely, December 1, 1917,—owing to lack of sufficient men and equipment. Accordingly, a careful reconnaissance survey was started, which consisted of a complete profile of each route, with taped distances, typical cross-sections, observations as to surface and sub-drainage required, guard rail, culverts, etc.; present pavement types, widths, and depths noted; present width of right of way, necessary retaining walls, rip rapping, and estimates of repairing and extending existing walls, etc. Complete detailed surveys were made in every locality where changes of alignment from present road were considered advisable for the elimination of sharp curves, steep grades, grade crossings, etc.

In some cases, it was necessary to locate several miles of entirely new line between certain towns where no good road existed; as, for instance, between Budd's Lake and Hackettstown, in Warren County.

At the date of submitting this report, the field work for preliminary estimate is nearly complete, and office work of estimating and tabulation of data is in such form as will insure its being submitted to the State Highway Commission at its December meeting.

As the field work for the preliminary estimate is completed, field forces will resume work on the detailed surveys of the several routes, and will continue same throughout the winter. Provision is being made for office space in various localities, which will enable mapping and plotting of notes to proceed when inclement weather prevents outside work.

Our field forces have been seriously handicapped by inadequate transportation facilities, which, it is hoped, may be remedied at an early date by the purchase of a number of small automobiles. These will enable a more rapid and unhampered movement, and will allow much more work to be done at a lower cost than is at present possible.

A statement of the line to be followed by each route as established by the Highway Act, and giving the more important contemplated changes in alignment of each, is given below:

Route No. 1. Elizabeth to Trenton, by way of Rahway, Metuchen, New Brunswick, and Hightstown. This route, as surveyed, follows St. George's Avenue from Elizabeth to Rahway, thence along the westerly side of Pennsylvania Railroad main line, over Middlesex-Essex Turnpike and private right of way to Menlo Park, thereby eliminating many sharp turns on present road between Rahway and Menlo Park, and the main line grade crossing at Iselin. It then follows straight road from Menlo Park to Metuchen, thence over Pennsylvania Railroad on proposed new bridge, and straight into Highland Park, thence over Raritan River bridge into New Brunswick, thence over present bituminous con-

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crete pavement to Hightstown, thence to Windsor, thence along easterly side of Camden & Amboy Railroad to a point just north of Robbinsville, where a proposed bridge carries highway over railroad, thence to Hamilton Square, to Mercerville, and via Nottingham Way into East State Street, Trenton.

Route No. 2. Trenton to Camden. By way of South Broad Street, Trenton, to White Horse, thence over Crosswicks' Creek bridge to Bordentown, thence to Fieldsboro, thence to Roebling, to Burlington, and via the Burlington Pike into Camden. Except for minor changes to reduce curvature, there are no changes of alignment contemplated.

Route No. 3. Camden to Absecon, by way of Berlin and Hammonton, following what is known as the "White Horse Pike." A complete, detailed survey was made of this route, including surveys of three possible routes through the town of Hammonton, one via the Wilsey Mills Road from Elm to the Egg Harbor road south of Hammonton; one from Elm, via Main Road, to and through Bellevue Avenue, Hammonton; and one from Elm, via Main Road to Hammonton Lake, and through De Costa to Egg Harbor Road. A line was surveyed to carry the route along westerly side of railroad from a point near Acto bridge to a connection with the Ancora bridge. This eliminates the bridges at Atco and Waterford, which have very bad curves at their entrances. From the Ancora bridge to Absecon no changes are contemplated, except flattening of existing curves.

Route No. 4. From a point on Route No. 1 near Rahway to Absecon. This is the longest of the fifteen routes, being approximately 110 miles in length. From Rahway over existing roads to Perth Amboy, thence over Perth Amboy-South Amboy bridge to South Amboy. Surveys were made of three lines from South Amboy to Morgan: One via Broadway, South Amboy, to and over Raritan River Railroad, thence along westerly side of New York and Long Branch Railroad to an overhead crossing of said Railroad, thence along Raritan Bay side of said Railroad to junction with present road at Morgan; one via Main Street, Stevens Avenue, Bordentown Avenue, and Pine Street, South Amboy, to present brick pavement into Morgan; and one from Amboy bridge to Alpine Street, South Amboy, thence by overhead crossing of Pennsylvania Railroad yards, through private right of way into Pine Street, South Amboy, thence over brick road to Morgan. Definite choice between these alternates has not as yet been made. From Morgan, route as surveyed is via Keyport, Middletown, Red Bank, Eatontown, Long Branch, Asbury Park, Point Pleasant, Lakewood, Toms River, Tuckerton, and New Gretna, to Absecon. No important changes from existing roads are contemplated between Morgan and Absecon, except flattening of existing curves and possible slight changes near Manasquan, and elimination of some existing railroad crossings and bridges by acquiring private property.

Route No. 5. From Newark to the bridge crossing the Delaware River near Delaware, via Morristown, Dover, Netcong, Budd's Lake, Hackettstown, Buttsville, and Delaware. No important changes from existing roads are contemplated, excepting between Netcong and Hackettstown. As the existing roads are very crooked, indirect, unimproved, and have very steep grades, an entirely new line was surveyed from Netcong via Budd's Lake, to Hackettstown, approximately nine miles. It was also necessary to survey a new line to eliminate several objectionable railroad undercrossings in the vicinity of Delaware. Survey was also made for under crossing the Morris Canal near Netcong.

Route No. 6. Camden to Bridgeton and Salem. From Broadway, Camden, to and through Gloucester, to Gloucester-Woodbury Turnpike, (Toll Road), to Woodbury, thence via Mantua Turnpike to Mullica Hill, thence along one leg of divided route to Bridgeton, and via other leg of divided route to Salem. No important changes from existing roads are contemplated.

Route No. 7. Hightstown to Asbury Park. Beginning at the junction with Route No. 1 at Hightstown, along the Manalapan road to Manalapan, along the Manalapan-Freehold road to Freehold; thence along the Freehold-Jerseyville road to Jerseyville, and along the Jerseyville-Hamilton road to Corlies Avenue to Main Street, Neptune township, where it joins Route No. 4, and a short distance along same to Asbury Park.

Survey was made of proposed change in line at Hamilton's Mills to eliminate sharp curves on deep fill near Asbury Park Water Works. No other important changes in alignment are contemplated.

Route No. 8. Montclair to near Unionville, New York State. Beginning in Montclair and following the Pompton Turnpike to the junction with the Paterson-Hamburg Turnpike at Riverdale; thence along the Paterson-Hamburg Turnpike to Stockholm; thence along the Stockholm-Franklin Furnace road to Franklin Furnace; thence through Hardinstonville and Hamburg to Sussex; thence northerly from Sussex borough, on the road east of the D., L. & W. R. R. to the State line near Unionville.

Surveys were made for possible changes in alignment in the vicinity of Smith's Mills for elimination of two dangerous grade crossings. No other important changes in alignment are contemplated.

Route No. 9. Elizabeth to Phillipsburg. Westfield Avenue westerly from Elizabeth city line to Westfield; thence along South Avenue to the Plainfield city line; thence westerly from Plainfield city line on Front Street and Lincoln road to Union Avenue, through Bound Brook to Gaston Avenue and Cliff street, Somerville; thence along Brunswick pike to the White House-Lebanon Road; thence along the Clinton-West Portal road through Bloomsbury and Still Valley to Phillipsburg.

Except for flattening of curves and complete survey of route over Musconetcong Mountain to secure better line and grades than exist on

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present unimproved road, and possible change in town of Clinton, no important changes from existing roads are contemplated.

Route No. 10. Paterson to Fort Lee Ferry. From Market Street bridge over the Passaic River in Paterson easterly along Essex Street to Hackensack, through Hackensack and along Bergen Turnpike to Ridgefield, thence through Ridgefield and the Boroughs of Palisade Park, Fort Lee and Edgewater to the Hudson River. Necessary changes from existing roads require a complete new survey from Fort Lee Ferry, along the face of the Palisades to and through Borough of Cliffside Park, in and through Borough of Ridgefield, to Edgewater Avenue in Ridgefield, thence to Bergen Turnpike.

Route No. 11. Paterson to Newark. Beginning at the southerly city line of Paterson Main street and continuing along the same to the northerly city line of Passaic; thence continuing from the southerly city line of Passaic on Passaic Avenue to the end of the same in Nutley; thence by a new line to Franklin Avenue and along the same, and by a new line through Soho Park to Harrison Street, through Bloomfield and Belleville to Franklin Street and along the same to the Newark city line, near the northerly end of Branch Brook Park.

Route No. 12. Paterson to Phillipsburg, via Little Falls, Pine Prook, Parsippany, Danville, thence over Route No. 5 to Budd's Lake, thence to Washington, Broadway, and Phillipsburg. A survey was made of a new line to have an undercrossing of Erie Railroad at Little Falls Station, thence across private right of way to and across Route No. 8 near Little Falls and into Pine Brook Road, west of Little Falls. The line surveyed for Route No. 5 between Netcong and Hackettstown will also carry Route No. 12 to a junction with the Washington road just east of Hackettstown. No other important changes of alignment are contemplated.

Route No. 13. New Brunswick to Trenton. From the westerly city line of New Brunswick along Somerset Street to Franklin Park; thence continuing to Ten Mile run, to Kingston, and across the canal and Millstone River to and through Princeton Borough; thence to Lawrenceville and along the Lawrenceville-Trenton road and Princeton Avenue to the Trenton city line.

Survey was made of proposed betterment at Kingston where line crosses the railroad and the Delaware and Raritan Canal. Surveys were made for minor alignment changes between Princeton and Lawrenceville.

Route No. 14. Egg Harbor City to Cape May City, via Mays Landing, Tuckahoe, and Cape May Court House. The only important contemplated changes in alignment are a relocation of line to the easterly side of railroad between Cape May Court House and Cape May City, whereby eight railroad grade crossings may be eliminated.

Route No. 15. Bridgeton to Cape May Court House, or such other point on Route No. 14 as may be designated by the State Highway Commission. No survey of this route has been made, but a number of

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alignment changes for the elimination of grade crossings are advisable, and are now in contemplation.

The usual amount of surveying of Township Roads was carried on during the year.

A complete survey was made of road leading from Georgetown to the military camp at Wrightstown, a distance of four miles; and construction was started, in order that the road might be made passable to traffic during the winter.

A survey for the purpose of improvement was made, of road leading from Englewood city line, to and through Tenaflly and over Knickerbocker Road to the military camp at Dumont, a distance of 2.08 miles.

The Survey Corps of the State Highway Department did all surveying necessary during construction of both of above-mentioned roads.

It is desired to commend the very good work performed by the Division Engineers and their assistants, under rather trying conditions, and to express our appreciation of the valuable assistance rendered this department by the several county and town engineers, in the form of plans and other information.

Respectfully submitted,

W. G. THOMPSON,
Ass't State Highway Engineer.

Report for Northern Division.

Mr. W. G. Thompson,
Assistant State Highway Engineer,
Trenton, New Jersey.

Dear Sir:

Organization of field parties for surveys and reports of the various routes suggested and final figures for estimates of the cost of proposed State Highway routes has taken up most of the time during the past summer, but, due to the faithful efforts of a small crew of inspectors and, more especially, to the co-operation of the officials representing the various counties, the work of rebuilding, repaving and general maintenance of the county road system in the eight northern counties of Jersey has continued remarkably well during 1917, despite the conditions of labor and the difficulties in securing machinery and material, which has crippled all kinds of business.

The general effect has been to increase the prices but in nearly all cases the quality of work has not suffered, and today a citizen of North Jersey should be proud to show a visitor over the long lines of good roads that stretch in all directions.

Exact details of particular jobs and amounts expended can be gained from the first lists in this book but it is with the general principles underlying the whole work that the Division Engineer is most concerned.

Thus far the State has assumed entire control of little or no mileage of actual road, but by co-operating with counties, townships, and municipalities has made possible many continuous routes of travel and has, to a large extent, standardized the work; in short, the State Highway Department acts as a kind of clearing house for road business.

War conditions, especially surrounding the manufacturing districts, have doubled and, in many cases, multiplied the number and weight of loads carried by highways, especially since the railroad freight and express business have become unreliable. Previously, unthought of sums have been required to keep certain sections in working order and, as usual, the habitual grumbler has been heard to complain of roads being closed for repairs, but such persons form a very small and unimportant per cent of our citizenship.

Construction of new roads and the rebuilding of large sections are let by contract but for much of the maintenance and repair work the work-

men are paid directly by the counties and municipalities. Each of the eight counties in North Jersey has a certain number of patrolmen on duty for the entire year and also patrol gangs serving these men with road material and occasionally helping on the heavier work. In the better organized counties the entire work of maintenance is in the hands of the County Supervisor of Roads who consults with the County Engineer regarding all general methods but carries out the details with his own force of helpers.

It is gratifying to note that some of the 1917 county money has gone into the purchase of road building equipment; because, without crushers, rollers, trucks and the innumerable small tools, the county officials are entirely dependent upon contractors.

It is necessary to keep constantly in mind that carefully designed work and attention to the small details during construction make all the difference between first class work and the indifferent kind which it is easy to get. If the contractor is not making expenses, let him bid high but we must insist on exactly what is contracted for. When a road is to be reconstructed let the engineer take time enough to procure land, get a better line at the bad turns, bank the curves, reduce the steep hills, if possible, in one way or another, get plenty of width and look well to the alignment.

If the funds are not available to put on the proper kind of pavement, let it wait a year or two, but first see to the drainage and foundation work. Put more money into width of fills and thus save on guard rail.

Several movements have been started to clear the gutters of bridges and pipes at private entrances but in most cases progress in this line is not at all what it should be; the citizens are not with us in this part of the work except in a few of the more advanced sections.

Convict labor at both Andover and Layton Camps has progressed and made a good showing during the summer. Additional allotments have made possible the purchase of more machinery and the employment of skilled labor to assist the prisoners in handling it.

Chapter 217, Public Laws of 1916, describes what is commonly known as the "Herrick Township Law," under which authority several small jobs are nearing completion in Warren, Sussex and Union counties and applications have been filed in Morris, Passaic and Bergen counties. The amounts spent on this class of work are usually quite small and, consequently, the work usually consists of rough grading, with the addition of a small amount of stone or gravel, but as this class of work is only intended for local travel the results are very gratifying to the communities in which the work is located.

Respectfully submitted,

E. M. VAIL,
Division Engineer.

Report from Central Division.

Mr. William G. Thompson,
Assistant State Highway Engineer,
Trenton, New Jersey.

Dear Sir:

The most important piece of work under construction in the Central Division this year is the River road, between Washingtons Crossing and Lambertville, in Mercer and Hunterdon counties. The construction of this road eliminates two very dangerous grade crossings and will give a beautiful road along the river from Trenton to Lambertville. The work is not yet completed, but macadam foundation is in such shape that the road is now open for travel.

The greatest improvement in the matter of repairs and maintenance shown by any county has been in Mercer County. Last year their roads were in bad shape but this year they are in first class condition.

The scarcity of labor and the high cost of materials and teams have seriously affected the work in many counties. In Mercer County this situation was partly overcome by having motor trucks meet laborers at different points in Trenton and taking them to the jobs in various parts of the county, bringing them back to Trenton at night.

The preliminary survey of the State Highway in the Central Division has been completed, and we are now working on the preliminary estimates. We have eight survey parties in the field and these are now proceeding with the detail survey so that final plans, specifications and estimates may be prepared for the construction of the State Highway System.

The construction work on several roads at Camp No. 2, near Princeton, has been completed by men from the New Jersey State Prison, and a complete report appears elsewhere.

The construction of Woodbridge Avenue, Section Three, or the Rahway Reformatory road, has been completed by the Reformatory boys, and a complete report appears elsewhere.

The establishment of the new Camp No. 2-A and quarry, near Monmouth Junction, was effective as of January 1, 1917, for construction of the unimproved section of the Trenton-New Brunswick Turnpike, but, owing to the imperative need for construction work along the other important routes, this job is now being temporarily closed and a report of the progress will probably be made next year.

TWENTY-FOURTH ANNUAL REPORT.

On October 22 seventy-five men were taken from the Rahway Reformatory to construct the Georgetown-Wrightstown road, leading from Bordentown to the cantonment at Camp Dix. The week, October 22-29, was spent in building additions to the bunk house and in putting up a mess room. The actual road work was started on October 31, and rapid progress is being made with the construction. The complete report on this work will probably be made next year.

In connection with the convict labor work on roads, I would urge that the State Prison convicts be given a daily wage similar to that which is paid the inmates from Rahway Reformatory. Our foremen feel that if this were done, it would mean an ultimate saving to the State, in that the men would do more work and much better results would be accomplished in that way.

Respectfully submitted,

EDWARD E. REED,
Division Engineer.

Report from Southern Division.

Mr. W. G. Thompson,
Assistant Highway Engineer,
Trenton, New Jersey.

Dear Sir:

The work of the Division Engineer's office in this division has been considerably diversified during the past year. To the former duties, in connection with State-aid improvements and repairs, has been added the oversight of surveys and preparation of plans and estimates for the proposed State Highway System. The preparation of plans and specifications for State Aid on township roads, which was formerly cared for by a special division of the department, has also been transferred to the Division Engineer's office.

Since the last report the Somers Point-Longport Boulevard, Main Avenue and Broadway in Somers Point and Bellevue Avenue in Hammonton have been completed in Atlantic County. The Absecon Boulevard is nearing completion. In Burlington County the Chesterfield-Jacobstown and Cookstown-Jacobstown roads have been built with State Aid to townships under the provisions of Chapter 395, P. L. 1912, and the Crosswicks-Chesterfield road under Chapter 217, P. L. 1916. In Camden County the Moorestown Pike is nearing completion and the Cedar Brook and Grenloch roads are about half done. In Cape May and Cumberland Counties no State Aid work outside of ordinary repairs has been under way during the year. In Gloucester County the Elmer-Hardingville road has been completed and the Turnerville-Cross Keys road is well under way. In Salem County Broadway and Maple Avenue in Pennsgrove is ready for acceptance, the Pennsville-Pennsgrove road is nearing completion, and Malag-Pennsgrove road, second section, second part, and the sixth section are about half done.

The money allotted to the counties from the motor vehicle receipts has been expended largely for ordinary maintenance except in Burlington County where a considerable portion has been put into extraordinary repairs, notably on the River road in Palmyra and on the Pemberton-Lewistown road, where Portland cement concrete pavements have been constructed, on the Jobstown Pike at Mount Holly, where a sheet asphalt surface is being laid on the macadam base that was placed last year, and on the Moorestown-Camden Pike where a sheet asphalt surface is to be laid on a new concrete base. In Cape May County no work has

been done with automobile money but a contract has been let for extraordinary repairs which will be made next year. In several of the counties considerable repair work will be carried over to next year because of present high prices of labor and material and the freight embargo on crushed stone.

The State convict camp was moved to Leesburg in Cumberland County in the month of May after work was finished on the Gloucester section of the Malaga-Pennsgrove road. The convicts are now employed in the construction of a section of route 15 of the proposed State Highway System. About thirty-five prisoners have been employed and more could be used to advantage if they could be obtained from the prison. Salem is the only county in this division to employ county prisoners on road work. The force in that county has been well organized and has done commendable work.

The survey of the proposed State Highway System has been the main task of this division during the past summer and up to the present time. A preliminary survey of the entire system has been finished and field work for about half of the final plans has been completed. Conditions incident to a state of war have delayed this work seriously; several members of the survey parties have enlisted in various branches of the military service and others have left to enter Federal employment in positions created by war conditions. The survey work has developed or brought into the department several men who, because of their ability and loyalty, form a valuable addition to the force, but the majority belongs to a floating, rather irresponsible class which has made an efficient organization difficult to secure and hold.

Work on township roads under Chapter 217, P. L. 1916, has been at a standstill because of lack of surveyors and the pressure of other work. The State's share for all roads on which application has been made is set aside and will be available when that work can be reached.

Concerning work for the coming year, surveys will be continued on the proposed State Highway System all next summer but plans and specifications will be prepared during this winter for all sections on which construction is contemplated during the next twelve months. Very little State aid has been requested by the counties up to the present time. Cape May County has plans approved for one road and Cumberland County has made application for consent to survey on one. No other action has so far been taken by the counties.

At the present time the prospect for new construction is decidedly uncertain because of the extraordinary conditions that exist now and the impossibility of predicting future developments. It is, however, not likely that very much construction will be undertaken.

Very respectfully submitted,

ROY MULLINS,
Division Engineer.

Report on Convict Labor Work.

Mr. William G. Thompson,
Assistant Highway Engineer,
Trenton, New Jersey.

Dear Sir:

Highway construction work, by Convict Labor both from the State Prison and Rahway Reformatory, has been performed to advantage in each of the Northern, Central and Southern Divisions of the State during the past year.

Modern use of inmate labor on public roads was first undertaken in New Jersey in 1913, ours being one of the pioneer states to attack the problem of applying the abundant labor supply in a manner beneficial to both the commonwealth and the inmates, without intruding upon the many industries or occupations operated by free labor. When we began, there was little or no information available regarding the more efficient and economical methods of handling the problem and for us, together with a few other States, experience served as the teacher. Since that time much important data has been prepared and published on the subject from our own and other records and many States of the Union have adopted, while others are preparing to adopt, the use of Convict Labor on roads.

At the outset considerable stress was laid upon the urgent need of safeguarding the men, but time has effectively demonstrated that exercising reasonable care from forces outside, as well as inside, is the most desirable, road camp life being a vast and helpful departure from the rigidity of confinement and segregation which necessarily obtains in the larger penal institutions. We have also learned that, when required along important work, the road camps may be established in a well populated region without bringing undue influence upon the morale of the men. Therefore, this knowledge has made it possible to contemplate the use of the labor along the more important routes, instead of contending with the earlier belief that the camps must be located in rather isolated sections, where the final result was a "philanthropic" use of the labor on unimperative work.

During the past two or three months a very comprehensive system has been inaugurated for the administration and accounting of convict

labor work throughout the State and the favorable results are already apparent, although it will require a couple of months longer to have the new arrangement operating smoothly. The plan includes accurate cost accounting as compared with the results obtained on the various items of work at the individual camps, which will be arrived at by daily reports from the respective camps; also the purchasing and ordering, through the central bureau, of the bulk of supplies, materials, equipment and property repairs for all of the camps and the checking of invoices for the same. More favorable prices and values and more prompt deliveries will evidently be the result and the central bureau will be in position to direct the shipment of costly but temporarily inoperative equipment from one camp to another where there is current need for same. A complete stock-keeping account will also be included in the work.

REPORT ON CONVICT LABOR CAMP No. 1-B.

In the Northern Division the work at the Layton Camp has progressed regularly during the year on the construction of the Layton-Dingmans road, which was begun in August, 1915. A complete report on this work will likely be made next year. The following has been accomplished to date:

Earth excavation	23,650 cu. yds.
Rock excavation	4,164 cu. yds.
Reinforced concrete flumeway	1,407 lin. ft.
Stone culvert, Station 42	127 cu. yds.
Storm drain	1,063 lin. ft.
Open ditch	795 lin. ft.
Stone box drain 18" x 18"	350 lin. ft.
Stone box drain 18" x 30"	900 lin. ft.
Culvert pipe 15"	130 lin. ft.
Culvert pipe 12"	418 lin. ft.
Tile drain 24"	42 lin. ft.
Tile drain 18"	259 lin. ft.
Tile drain 15"	45 lin. ft.
Tile drain 12"	194 lin. ft.
Stone fence removed	1,450 lin. ft.
Wire fence removed	550 lin. ft.
Grubbing, trees, etc.	4 acres
Sub-grading	20,760 sq. yds.
Telford complete	15,870 sq. yds.
Macadam surface 3"	17,510 sq. yds.

Together with crushing stone for the job, bridge construction, shoulder construction, etc., not yet complete.

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REPORT OF CONVICT LABOR CAMP No. 1-C.

The work at the Andover Camp on the construction of the Allamuchy road began in August, 1917, and a detailed report of this work will likely be made next year. The following has been accomplished to date:

Earth excavation	1,888 cu. yds.
Rock excavation	3,020 cu. yds.
Open ditch	336 lin. ft.
Rock to crush	237 cu. yds.
Placing drains	
Fence reset	

Following is a report of the work done during the fiscal year by convict labor in the Central Division:

REPORT ON CONVICT LABOR CAMP No. 2.

All the road work being prosecuted in connection with convict labor at State Road Camp No. 2, near Princeton, is now completed and maintenance work has also been carried out on the completed roads. As stated in last year's report, the original preparations for the establishment of Road Camp No. 2 began in June, 1913, and, commencing with September of that year, the first gang of men was taken to the camp site to begin the work of constructing the housing quarters. The materials for construction and the necessary tools and equipment had previously been carted to the grounds. During the construction period the men were conveyed each day by motor truck from the New Jersey State Prison to the camp site and return. The men were permanently located at the camp upon completion of the frame buildings early in November, 1913. and the road construction was at once undertaken.

It was at first intended to build only the Princeton-Bolmer's Corner Road, which extends from the trolley tracks at Bayard Lane, in Princeton, to the Somerville Road at Bolmer's Corner, near Rocky Hill. The new line runs over private right of way donated to the State for road purposes in Mercer County, from which point the improvement was continued along a former roadway in Somerset County, thus forming a more direct route from Princeton to Somerville and North Jersey. Later, however, it was decided to repair the road from Bolmer's Corner to Blawenburg, and also the road from Mount Rose to Rocky Hill. Considerable work was performed on all these roads, as the construction reports show. In addition to the road work, a new stone quarry was opened and operated to provide the trap rock needed in connection with the road construction.

The stone quarry, which was privately owned property, was stripped, and all the quarrying machinery and equipment were removed from the site. During the year the crusher equipment, which proved to be too

small and inadequate for our needs, was traded in at good value on the purchase price of a new and larger crusher plant, the latter being now operated to advantage at Camp No. 2-A. Upon the completion of the remainder of road work near Princeton, and new housing quarters near Monmouth Junction, the buildings and equipment of Camp No. 2 were removed to Camp No. 2-A, and the old camp abandoned. This change occurred officially as of January 1, 1917.

A complete and final statement on the costs and operation of Camp No. 2, as promised in the last annual report, is given below.

SUMMARY.

FINAL STATEMENT OF COST—CAMP No. 2.

From September 1, 1913, to January 1, 1917.

Items.	Grand Totals.	
	Equipment.	Operating.
1. Machinery	\$7,470.20	\$7,824.01
2. Machinery repairs .....	.....	3,835.06
3. Tool repairs.....	.....	146.12
4. Tools	230.30	947.22
5. Hardware and supplies.....	.....	1,047.35
6. Paint .....	.....	259.56
7. Gasoline, etc.....	.....	2,714.00
8. Soft coal.....	.....	1,766.82
9. Lumber and house building material.	2,395.19	909.05
10. Plumbing	1,157.60	468.50
11. Explosives	75.00	3,481.34
12. Road building material.....	1,468.00	5,709.21
13. Advertising .....	.....	228.10
14. Road supervision.....	.....	12,601.56
15. Team hire.....	.....	25,673.29
16. Convict hire.....	.....	43,687.71
17. Rent .....	.....	429.00
18. Telephone .....	.....	178.62
19. Liability and insurance.....	.....	1,132.62
20. Feeding and maintenance.....	.....	7,166.89
21. House and kitchen furnishings.....	64.10	1,450.15
	<hr/>	<hr/>
	\$12,860.39	\$121,656.18
Credit for transferred machinery.....	\$690.00	
Total operating.....		121,656.18
Total equipment.....		12,860.39
	<hr/>	<hr/>
Grand total expended.....		\$135,206.57

FINAL STATEMENT WORK AND VALUES, CAMP No. 2.

From September 1, 1913, to January 1, 1917.

Items	UNIT VALUES		FINAL TOTALS		
		Work Quantities	Bldg. Values	Roads Values	Totals
Princeton-Bolmer's Corner Road					
Excavation, shale and clay.....	.70	cu. yd. 21,546		\$15,082.20	
Excavation, rock	2.50	" " 14,334		35,835.00	
Open Ditch .....	.05	lin. ft. 600		30.00	
Open Ditch, in water, 18"x2'.....	.10	" " 1,100		110.00	
Open Ditch, in rock, 18"x3'.....	.35	" " 2,744		960.40	
Open Ditch, in earth, 4"x5'.....	.70	cu. yd. 163		114.10	
Clearing Ditch .....	.05	lin. ft. 300		15.00	
Pipe Ditch .....	.65	cu. yd. 167 1-5		108.68	
Bridge Channel, earth .....	.70	" " 220		154.00	
Bridge Channel, rock	2.50	" " 75		187.50	
Pipe placed, 6" T. C. P. ....	.40	lin. ft. 60		24.00	
Pipe placed, 18" T. C. P.	1.25	" " 60		75.00	
Pipe placed, 24" T. C. P.	1.80	" " 430		774.00	
Pipe placed, 8" C. I. P.	1.00	" " 111		111.00	
Pipe placed, 12" C. I. P.	1.75	" " 192		336.00	
Pipe placed, 14" C. I. P.	1.95	" " 72		140.40	
Pipe placed, 18" C. I. P.	2.15	" " 192		417.50	
Tile placed .....	.35	" " 825		288.75	
Stone Underdrain .....	.50	" " 160		80.00	
Stone Gutter, grouted	1.59	sq. yd. 205		325.95	
Concrete Bridges, plain	8.00	cu. yd. 220 1-2		1,764.00	
Concrete Bridges, reinforced	10.00	" " 121 1-9		1,211.00	
Dry Wall	3.00	lin. ft. 113		339.00	
Fencing removed .....	.00½	" " 685		3.43	
Fencing removed and reset .....	.01	" " 600		6.00	
Fencing, new wire in place .....	.01	" " 1,640		16.40	
Grubbing, heavy work	250.00	acre 9 1-4		2,312.50	
Grubbing	50.00	" " 7-200		1.75	
Foundation, macadam 4" comp.....	.46	sq. yd. 36,031		16,574.26	
Surface, macadam, 4" comp. ....	.50	" " 39,179		19,538.50	
Surface treatment, tar and screenings.....	.06½	" " 29,650		1,927.25	\$98,909.87
Blawenburg-Bolmer's Corner Road					
Excavation, earth and shale	1.25	cu. yd. 1,000		1,250.00	
Excavation, earth .....	.70	" " 4,773		3,341.10	
Open Ditch .....	.05	lin. ft. 12,080		604.00	
Grubbing work	50.00	acre 1-5		10.00	
Surface treatment, stone and binder.....	.50	sq. yd. 8,041		4,020.50	9,225.60
Mt. Rose Rocky Hill Road					
Excavation, earth .....	.70	cu. yd. 200		140.00	
Scraping roadway	264.00	mile 3		792.00	
Open Ditch .....	.05	lin. ft. 63,360		3,068.00	
Grubbing	50.00	acre 1 97-500		59.70	4,059.70
Camp Buildings and Construction					
Original structures			4,339.68		
Additional wing			4,434.60		
Road and Quarry Buildings			1,605.52		
					10,379.80
GRAND TOTAL.....					\$122,574.97

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FINAL SUMMARY

FINAL STATEMENT WORK COSTS AND VALUES, CAMP NO. 2

From September 1, 1913, to January 1, 1917.

Princeton-Bolmer's Corner Road

Fiscal Year 1913	5,979.44	
Fiscal Year 1914	41,340.64	34,142.94
Fiscal Year 1915	38,981.71	38,650.61
Fiscal Year 1916	20,890.35	24,189.07
Fiscal Year 1917	1,631.47	1,927.25

	\$108,823.61	\$98,909.87	\$108,823.61	\$98,909.87
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Blawenburg-Bolmer's Corner Road

Fiscal Year 1914	1,187.13	1,250.00
Fiscal Year 1915	1,421.53	1,462.30
Fiscal Year 1916	2,947.70	4,492.10
Fiscal Year 1917.....	1,155.67	2,021.20

	\$6,712.03	\$9,225.60	\$6,712.03	\$9,225.60
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Mt. Rose-Rocky Hill Road

Fiscal Year 1916 ..	\$930.64	\$4,059.70	\$930.64	\$4,059.70
Original Camp Bldgs., 1913 Fiscal....	\$2,169.84	\$4,339.68		
Additional Camp Bldgs., 1914 Fiscal..	2,217.30	4,434.60		
Road and Quarry Bldgs., 1915-6-7....	802.76	1,605.52		

	\$5,189.90	\$10,379.80	\$5,189.90	\$10,379.80
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GRAND TOTALS	\$121,656.18	\$122,574.97
Final Value, Camp No. 2 work—Sept 1, 1913 to Dec. 31, 1916.....		\$122,574.97
Final Costs, Camp No. 2 work—Sept. 1, 1913 to Dec. 31, 1916		121,656.18
Net Gain, Camp No. 2 work—Sept. 1, 1913 to Dec. 31, 1916.....		\$918.79

REPORT ON CONVICT LABOR CAMP No. 2-A.

Actual operations at this camp near Monmouth Junction began with January, 1917, on the construction of the unimproved section of the Trenton-New Brunswick turnpike, but, after two miles of heavy grading had been completed, it was decided temporarily to discontinue the work owing to close proximity of two main State Highway routes, and the graded section is now being rendered serviceable for travel. A definite report of this Camp will likely be made next year.

REPORT ON CONVICT LABOR CAMP No. 4.

The construction of Woodbridge Avenue, Section Three, otherwise known as the Woodbridge-Reformatory Road, Middlesex County, was finally completed during September, 1917, the work having commenced in July, 1915.

Inmate labor of the Rahway Reformatory was used on this work, and as the job is located near that institution, the young men walked to and from the work, which eliminated the necessity of establishing a temporary road camp. The material advantage of these conditions is very evident in the financial net gain as set forth in the final statement of costs and values herewith.

Woodbridge Avenue was formerly a dirt road and is an important connecting link between the several towns located in that section, as well as being the road along which the Rahway Reformatory is situated,

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and the improvement of the stretch will not only furnish the institution with a proper outlet, but it will also serve to divert much traffic that would otherwise make continuous use of the few good main-traveled routes in that locality. The road also runs along the trolley line of the community, and these two factors of transportation should greatly enhance the value of the many nearby properties.

The road construction is of water-bound macadam with a surface treatment of Ugite tar, made in two applications, each of one-quarter gallon per square yard and covered with stone screenings. Three reinforced concrete bridges were also built, with extensions to accommodate the trolley system, all the work being accomplished by the inmates under supervision of the road foreman.

The trolley roadbed and also some water-mains along the route had to be relocated, but as it was not possible for the private concerns to provide adequate labor for performing the work, and as it was imperative that the jobs should be finished promptly in order that the road construction might not be delayed, an arrangement was effected with the concerns whereby our labor was applied on their work, while the concerns furnished their own materials and the result was an expeditious job, fully completed in all its branches. In payment for services rendered, the concerns provided us with a definite amount of crushed stone and similar road materials, used in our portion of the work, which amounts are given in the below statement as materials received.

A complete and final statement on the costs and operations of Camp No. 4, as promised in the last annual report, is appended herewith.

SUMMARY.

FINAL STATEMENT WORK AND VALUES—CAMP No. 4.

From July, 1915, to September, 1917, Inc.

ITEMS.	Unit Values.	Work Quantities.	Total Values.
Earth excavation (main road).....	.70 cu. yd.	11,511	\$8,057.70
Earth excavation (driveways).....	.70 "	390	273.00
Telford base .....	.50 sq. yd.	267	133.50
Replacing foundation (used).....	.45 "	2,657	1,195.65
Scarifying (Hazelwood Avenue).....	.02 "	920	18.40
Macadam foundation and surface 8"			
Main road .....	.90 "	28,084	25,275.60
22 wyes .....	.90 "	2,041	1,836.90
15 driveways .....	.90 "	950	855.00
Hazelwood Avenue, 6".....	.45 "	920	414.00
Resurfacing intersections .....	.45 "	267	120.15
Ugite application and screenings (2 applications)			
Main road .....	.16 "	28,084	4,493.44
10 wyes .....	.16 "	928	148.48
9 driveways .....	.16 "	570	91.20
Hazelwood Avenue.....	.16 "	920	147.20
Reformatory Drive .....	.16 "	900	144.00
Removing old bridges.....	50.00 each	4	200.00
Reinforced concrete bridges.....	1000.00 "	2	2,000.00
Reinforced concrete bridge.....		1	1,200.00

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Open ditch10 lin. ft.	1,377	137.70
French drain 4".....	.50 "	4,943	2,471.50
Pipe placed—			
12" C.I.P.	2.00 "	36	72.00
36" "	8.00 "	36	288.00
12" T.C.P.	1.00 "	16	16.00
Total value materials received	Mid.	\$286.72	
	Corb.	329.00	
	P. S.	1,708.78	
	P. S.	3,547.40	5,872.00
GRAND TOTAL.....			\$55,461.42

SUMMARY.

FINAL STATEMENT COST—CAMP No. 4.

From July, 1915, to September, 1917, Inc.

ITEMS.	Grand Totals.	
	Equipment.	Operating.
1 Machinery	\$278.50	\$954.05
2 Machinery repairs		236.88
3 Tools	63.64	331.18
4 Hardware and supplies.....		60.80
5 Kerosene, oils, etc.....		57.72
6 Soft coal.....		411.23
7 Lumber	145.74	37.85
8 Road building materials.....		13,824.75
9 Advertising		10.40
10 Road supervision.....		3,780.00
11 Supervision expenses.....		386.35
12 Team hire.....		8,483.96
13 Convict hire.....		11,840.17
	\$487.88	\$40,415.28
Total equipment		\$487.88
Total operating		40,415.28
Grand total expended		\$40,903.16

FINAL SUMMARY.

FINAL STATEMENT WORK COSTS AND VALUES—CAMP No. 4.

From July, 1915, to September, 1917, Inc.

	Costs.	Totals.	Values.
Fiscal year 1915.....	\$8,407.96		\$12,316.00
Fiscal year 1916.....	16,996.56		15,795.57
Fiscal year 1917.....	15,010.76		27,349.70
	\$40,415.28		\$55,461.42

GRAND TOTALS.

Final value Camp No. 4 work, July, 1915, to September, 1917.....	\$55,461.42
Final costs Camp No. 4 work, July, 1915, to September, 1917.....	40,415.28
	\$15,046.14

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REPORT ON CONVICT LABOR CAMP No. 4-A.

Operations in connection with the construction of the Georgetown-Wrightstown (Camp Dix) cantonment road began during the last two weeks of this fiscal year, and, as the time was mainly devoted to providing adequate housing quarters for the labor, teams, etc., and to procuring materials and equipment under present abnormal conditions, very little road construction was begun before the close of October. A complete report on this camp will likely be made next year.

REPORT ON CONVICT LABOR CAMP No. 3.

In the Southern Division work at the Leesburg Camp began during June, 1917, on the construction of the Prison Farm road, which is a cut-off along Route No. 15, that will eliminate two railroad grade crossings and also make the route more direct in that section. Actual road construction began during July and a detailed report on this camp will likely be made next year. The work is located in the pine and gravel country of South Jersey, and the following has been accomplished to date:

Earth excavation.....	14,189 cu. yds.
Grubbing—heavy.....	14 acres

As there is considerable back cost data to be properly compiled from records at hand before accurate statements to date may be rendered, there are several of the above camps that must be withheld until next year before definite cost accounts are presented.

Respectfully submitted,

ROBERT H. EXTON,
Clerk of Convict Labor.

NEW JERSEY STATE LIBRARY

Report of Bridge Work for the Department of Highways.

Mr. R. A. Meeker, State Highway Engineer, Trenton, New Jersey:

Dear Sir—On June 4 an agreement was reached whereby the bridge work for the Highway Department was to be done by the Division of Bridges and Grade Crossings of the Public Utility Commission. Additional quarters were arranged for in the Kinney Building, Newark, adjoining those of the Public Utility Commission, and by July 1 two draughtsmen and two engineers were engaged on this matter. On the same date two outside inspectors were taken over and continued on the Absecon-Atlantic City Boulevard, on which they were already engaged. One of these inspectors was transferred back to the Highway Department on September 1. At that time another draughtsman was added. The personnel at present consists of one outside inspector, three draughtsmen and one engineer employed continuously on this work. One inspector and one draughtsman are employed intermittently.

Maps of the various Highway Routes, showing the location of all bridges and grade crossings, have been prepared, and work has progressed in co-operation with the surveys made by the Highway Department.

Two field parties were organized and a detailed inspection of each bridge of five feet span and over was started. Route 3 was completed and a report filed concerning it. Outside inspections of this nature have been finished for Routes 4, 6, 7, 13, 14 and 15, and partially finished on Routes 1 and 9. These inspections have been made on foot, covering 362 miles of Highway Route. On them have been found 195 bridges and 44 railroad crossings at grade.

On October 1 an urgent request was received for an estimate to be finished by December 10, covering all the bridges on each route, this estimate to include the description of each bridge on its particular route, giving length, width and the load which it could safely bear. If the strength of the bridge were found to be less than would be required for a ten-ton roller, an estimate of the cost to either strengthen or rebuild the bridge was to be made, together with the estimated cost for rebuilding every bridge which did not conform to the requirements of the Highway Act. On the fifteen routes aggregating 633 miles there were found 463 bridges of five feet span and over, and 93 railroad grade crossings, divided among the fifteen routes as follows:

Number of Route.	Number of Bridges.	Railroad Grade Crossings.
1	28	7
2	16	3
3	8	2
4	72	16
5	59	8
6	33	10
7	24	2
8	49	14
9	53	2
10	7	7
11	11	3
12	55	4
13	20	1
14	11	9
15	17	5
	<hr/> 463	<hr/> 98

Up to date the bridges on routes 1, 2, 5, 8, 9, 10, 11, 12 and 13 have been covered, totalling 316 miles of highway, on which are 284 bridges and 48 steam railroad grade crossings. To date, therefore, 50% of the highway mileage, 65% of the bridges and 53% of the grade crossings have been investigated in the field, and the office work is following the field work very closely. The preliminary estimate will, therefore, be completed by December 10.

The work on the Absecon-Atlantic City Boulevard was near completion when the supervision of bridges on it was assumed on July 1. The ten bridges on this line are in various stages of completion, all but numbers 1, 9 and 10 being nearly finished. Time for the completion of this work has been extended to May 1, 1918, which should give ample time for all the bridges to be finished.

Examination of plans and specifications of eight other bridges in various parts of the State have been made, but reports on them have been delayed owing to the fact that the estimate above mentioned is so urgent that it required the entire time of every available man.

We have been fortunate in securing the services of exceptionally well experienced men, thus enabling the work to be pushed vigorously from the start.

Respectfully submitted,

CHARLES A. MEAD,
Chief Engineer.

Report of Laboratory Work.

Mr. R. A. Meeker, State Highway Engineer, Trenton, New Jersey:

Dear Sir—The following is a brief outline of the work done for the State Highway Commission in the laboratory maintained by the Department of Conservation and Development. In general, the method followed during the seasons of 1915 and 1916 of specifying under each item of construction the type and grade of materials to be used therein was continued during 1917. Our "Approved List of Road Materials" has been referred to more frequently during the past season than during any previous year. The advantages to be secured by designating materials in the manner above stated were quite thoroughly set forth in our 1915 and 1916 reports and will not be repeated here. The conclusions given in the 1915 report regarding the merits of the different types of pavements also appear to be verified.

AMOUNT OF WORK DONE—As in previous years, we have endeavored to test all of the materials used in the construction of State-aid bituminous pavements and the pavement samples taken therefrom. In addition, an effort was made this year to test materials used in the construction of Portland cement concrete bases and pavements. The quantity of this class of work increased so rapidly that it was found impossible to test all of the bituminous pavement samples forwarded or the materials used therein. As a result of this excess work, many samples of these pavements will have to be tested the first part of the coming year after we are installed in the new laboratory.

LABORATORY BUILDING:—The space available in the building now being occupied as a laboratory is so limited that the quantity of work that can be done is quite definitely determined thereby. The Department of Conservation and Development has now nearly completed a new laboratory building, which, when occupied, will provide ample room for testing all materials used in road construction. The early part of this year it was thought that this laboratory building could be completed about September first of this year. On this assumption we began testing the materials used in Portland cement concrete roads with the results above stated.

ADDITIONAL HELP AND EQUIPMENT:—Most of the equipment needed is now on hand or ordered, but some additional apparatus will have to be purchased for certain special lines of work. To properly

inspect and test the materials now being used, additional chemists and inspectors will have to be employed. There is now being constructed sufficient bituminous and block pavements to keep two men busy on this class of work alone.

FUNDS REQUIRED:—The Department of Conservation and Development does not have the funds available to pay for additional help or equipment, but, under the Statute, Chapter 49, P. L. 1916, it is prepared to carry on such work as the necessary money is provided. During the past year the State Highway Commission transferred to the Department of Conservation and Development, in the manner prescribed by Chapter 49, P. L. 1916, the sum of \$10,000.00. This money was expended for equipment for the laboratory, so that as soon as the building is completed there will not be any delay in the work for the Highway Commission. From this, and funds of the Department of Conservation and Development, a three hundred thousand-pound testing machine, alberene stone for benches, numerous heating ovens, thermostats, field equipment for inspectors, and other apparatus were purchased.

INSPECTORS:—If the work in the field is to be benefited by the results secured in the laboratory, it is necessary that the inspectors be able to interpret properly the reports made upon the various samples forwarded and tested. They should also know the fundamental characteristics of the materials used and the pavements constructed therefrom. In addition, they should know how to make a few preliminary field tests.

INSTRUCTING INSPECTORS:—It is the intention of the writer to hold numerous conferences with the different classes of inspectors during the early part of 1918. At those conferences it will be explained to them just what their duties are in regard to proper sampling and the uses of various materials, also the distinguishing characteristics of different materials and pavements, in addition to showing them how to make preliminary field tests, and the equipment that will be needed. By such a method of procedure it should be possible to eliminate some of the errors now made in sampling and forwarding materials.

PREVENTION OF ERRORS IN CONSTRUCTION:—If errors are to be prevented in the construction of high grade pavements, it is of the utmost importance that experienced inspectors be employed. Without such inspectors most of the work done in the laboratory is wasted and the grade of pavement secured is certainly inferior to that constructed under the supervision of a competent man. More energy must be expended in the future in preventing the use of inferior grades of materials or improper methods of construction. To refuse to accept and pay for a poorly constructed pavement on completion does not make it a good pavement or lengthen its life. To compel the contractor by

STATE HIGHWAY COMMISSION.

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suit, or otherwise, to rebuild it, is a tedious and costly undertaking. From every point of view it is more economical to compel the use of the proper materials and methods of construction by efficient supervision than to expect to remedy either or both after the pavement is completed. In road-building, as in many other activities, an ounce of prevention is worth a pound of cure.

Respectfully yours,

R. B. GAGE,
Chemist, Division of Geology,
Department of Conservation and Development.

NEW JERSEY STATE LIBRARY

FINANCIAL STATEMENT

Statement of Appropriations—November 1, 1916, to October 31, 1917.

PUBLIC ROAD FUNDS.	Carried Forward on Contracts.	Annual Appropriation.	Total Amount Available.	Expended.	Outstanding on Requisitions.	Balance Forward on Contracts.	Lapsed to State Treasury.
Appropriation Public Roads, 1909-10.....	\$1,203.63	\$.....	\$1,203.63	\$.....	\$.....	\$1,203.63	\$.....
State Road Fund, 1913-14.....	41,160.91	.....	41,160.91	15,546.50	.....	24,594.05	1,020.36§
State Road Fund, 1914-15.....	128,071.45	.....	128,071.45	89,276.48	.....	34,761.43	4,093.49§
State Road Fund, 1915-16.....	394,773.71	.....	394,773.71	125,926.94	.....	264,552.50	4,294.27§
State Road Fund, 1916-17.....	500,000.00	.....	.....	.....	.....	.....	.....
Less amount set aside for administration..	150,000.00	.....	350,000.00	57,423.35	8,682.96	279,181.98	4,711.71*
	<u>\$571,599.89</u>	<u>\$350,000.00</u>	<u>\$915,209.70</u>	<u>\$288,173.27</u>	<u>\$8,682.96</u>	<u>\$604,233.64</u>	<u>\$14,119.33</u>

Statement of Expenditures under Commissioner of Public Roads.

GENERAL APPROPRIATIONS.	Annual Appropriation.	Expended.	Merged to State Road Fund.
Salary of Commissioner.....	\$5,000.00	\$2,249.96	\$2,750.04
Salary of State Highway Engineer.....	4,000.00	1,666.60	2,333.40
Salaries of Division Engineers.....	8,000.00	2,499.90	5,500.10
Clerical and Office Expenses (including Survey).....	26,500.00	11,396.54	15,103.46
Administration of Township Roads Act.....	4,800.00	1,520.24	3,279.76
R. H. Ingersoll Services.....	750.00	750.00	.....
Essex County State Aid.....	75,000.00	75,000.00	.....
Convict Labor (Annual).....	75,000.00	35,984.26	39,015.74
	<u>\$199,050.00</u>	<u>\$131,067.50</u>	<u>\$67,982.50</u>

Note§: Amounts lapsing to State Treasury on account of savings on contracts on which final payments have been made.

Note*: Amounts as apparent; these may be changed through entire amount outstanding on requisitions not being used.

Statement of Expenditures under State Highway Commission.

	Funds Set Aside.	Total Amount Available.	Expended.	Total Expended.	Outstanding on Requisitions.
Fund Set Aside for Administration.....	\$150,000.00	\$.....	\$.....	\$.....	\$.....
Balance of Appropriations Merged.....	67,982.50	217,982.50	.....	.....	.....
Administration and Office Expenses.....	.....	.....	25,611.37	.....	.....
Survey Corps, Salary and Expenses.....	.....	.....	34,539.47	.....	.....
Survey Corps, Supplies and Equipment.....	.....	.....	7,371.32	.....	.....
Purchase of Automobile.....	.....	.....	1,125.90	.....	.....
Automobile Maintenance.....	.....	.....	3,469.81	.....	.....
Rent .....	.....	.....	903.68	.....	.....
Administration of Bridge Division.....	.....	.....	5,261.52	.....	.....
Township Roads Act.....	.....	.....	1,691.66	.....	.....
Convict Labor.....	.....	.....	63,948.41	143,923.14	74,059.36
	<u>\$217,982.50</u>	<u>\$217,982.50</u>	<u>\$143,923.14</u>	<u>\$143,923.14</u>	<u>\$74,059.36</u>

MOTOR VEHICLE ACCOUNT.

	Balance Forward.	Receipts.	Total Amount Available.	Expended.	Carried Forward.
Motor Vehicle Fund.....	\$1,040,547.69	\$1,876,325.08	\$2,916,872.77	\$.....	\$1,702,317.65
Paid on Allotments.....	.....	.....	.....	1,083,715.12	.....
Appropriated for Expenses Assistant Supervisors.....	.....	.....	.....	3,000.00	.....
Appropriated for Expenses Motor Vehicle Department.....	.....	.....	.....	127,840.00	.....
	<u>\$1,040,547.69</u>	<u>\$1,876,325.08</u>	<u>\$2,916,872.77</u>	<u>\$1,214,555.12</u>	<u>\$1,702,317.65</u>

STATEMENT OF EXPENDITURES.

For Fiscal Year 1916-17.

PUBLIC ROAD FUNDS.

Paid on Contracts.....	\$197,684.34	
Paid on Extras.....	14,016.66	
Paid for Engineering (final).....	11,053.96	
Paid for Inspection (final).....	6,005.29	\$228,760.25
Paid in advance for Inspection on 40% roads, 1917.....	4,666.65	
Paid in advance for Inspection on 40% roads, 1916.....	10,128.00	
Paid in advance for Inspection on 40% roads, 1915.....	695.50	15,490.15
Paid for Inspection not charged to any given roads:		
Salary Regular Inspectors.....	1,850.00	
Expenses of Inspectors.....	2,056.13	
Salary of Foreman.....	15,678.32	
Wages of Seasonal Inspectors.....	24,348.42	43,922.87
		<u>\$288,173.27</u>

MOTOR VEHICLE FUNDS.

Paid on Allotments for Maintenance and Repair of Roads..		\$1,083,715.12
Paid for Expenses of Assistant Supervisors.....	\$890.01	
Merged in State Road Fund.....	2,109.99	3,000.00
Appropriated for Expenses of Motor Vehicle Department..		127,840.00
		<u>\$1,214,555.12</u>

Balance Sheet—October 31, 1917.

PUBLIC ROAD FUNDS.

Assets.

Cash Balance, Appropriation for Public Roads, 1909-10.....	\$1,203.63
Cash Balance, State Road Fund, 1913-14.....	24,594.05
Cash Balance, State Road Fund, 1914-15.....	34,701.43
Cash Balance, State Road Fund, 1915-16.....	264,552.50
Cash Balance, State Road Fund, 1916-17.....	287,864.94
	<u>\$612,916.60</u>

Liabilities.

Approved Contracts for New Construction Outstanding.....	\$536,221.89
Approved Extras Outstanding.....	5,125.25
Reserve for Extras, Engineering and Inspection.....	62,886.50
Outstanding on Requisitions.....	8,682.96
	<u>\$612,916.60</u>

MOTOR VEHICLE FUNDS.

Assets.

Cash Balance, Motor Vehicle Fund.....	\$1,702,317.65
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Liabilities.

Allotments for Maintenance Outstanding.....	1,681,196.91
Balance Available.....	<u>\$21,120.74</u>

Respectfully submitted,

A. LEE GROVER,
Chief Clerk.

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TWENTY-FOURTH ANNUAL REPORT.

Burlington County.

	Miles.		
Cookstown-Jacobstown road.....	2.3763		
Cost allowed		\$11,413.80	
State's share.....			\$4,135.02
Vincentown-Buddtown Road.....	2.515		
Cost allowed.....		6,358.22	
State's share.....			2,272.72
Vincentown-Eayrestown road.....	2.015		
Cost allowed.....		5,066.88	
State's share.....			1,840.97

Hunterdon County.

	Miles.		
Hoffman's-Lower Valley road.....	1.67		
Cost allowed.....		\$15,567.20	
State's share.....			\$5,632.83
Clinton-West Portal road, Section One			
Cost allowed on partial payment		24,188.43	
State's share on partial payment			9,675.37

Middlesex County.

	Miles.		
Woodbridge-New Brunswick Turnpike, Section Four.....			
Cost allowed on partial payment		\$11,078.65	
State's share on partial payment			\$4,431.46

Morris County.

	Miles.		
Blackwell Street and Sussex Turnpike, Section One.....	1.988		
Cost allowed		\$82,034.55	
State's share.....			\$31,435.32

Ocean County

	Miles.		
Barnegat-Buddtown road, Section One..	6.098		
Cost allowed.....		\$24,677.31	
State's share.....			\$5,760.58
Bayhead-Point Pleasant road.....	.565		
Cost allowed		\$3,682.68	
State's share			1,317.87

STATE HIGHWAY COMMISSION.

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Salem County.

	Miles.		
Pennsgrove-Pennsville road, Section One			
Cost allowed on partial payment		\$15,264.00	
State's share on partial payment			\$6,105.60

Union County.

	Miles.		
St. George Avenue.....	.183		
Cost allowed		\$8,980.94	
State's share.....			\$3,162.44
St. George Avenue Bridge.....			
Cost allowed.....		9,043.06	
State's share.....			1,808.61
Mountain or Westfield Avenue, West Section	3.631		
Cost allowed.....		83,443.87	
State's share.....			32,031.42

Warren County.

	Miles.		
Buttzeville-Danville road, change in line and grade.....	.369		
Cost allowed.....		\$9,140.78	
State's share.....			\$3,481.31
Total mileage paid for from 1916 appropriation	21.7903		
Total cost allowed on contracts paid for from 1916 appropriation.....		\$317,230.91	
Total State's share paid on contracts from 1916 appropriation.....			\$115,734.74
Payments for general inspection of roads			101,128.00
Total payments from 1916 appropriation			125,862.74

TWENTY-FOURTH ANNUAL REPORT.

PAYMENTS FROM 1915 APPROPRIATION.

The following payments were made during the fiscal year 1917, but paid from the appropriation for 1915:

Atlantic County.

	Miles.		
Bridges on Somers Point-Longport Boulevard			
Cost allowed.....		\$38,369.50	
State's share			\$468.62
Somers Point-Longport Boulevard.....	4.114		
Cost allowed.....		151.081.12	
State's share.....			18,384.23

Bergen County.

	Miles.		
Anderson Avenue, Section Two.....	1.576		
Costs allowed.....		\$39,695.14	
State's share.....			\$15,452.05

Camden County.

	Miles.		
Cresson road.....	3.036		
Cost allowed.....		\$20,543.36	
State's share.....			\$7,530.66

Monmouth County.

	Miles.		
Riverside Drive.....	1.667		
Cost allowed.....		\$187,745.98	
State's share.....			\$2,352.59

Somerset County.

	Miles.		
Greater Cross Roads road, Section Two	2.715		
Cost allowed.....		\$52,452.59	
State's share.....			\$20,138.04
Bridge on Greater Cross Roads road, Section Two.....			
Cost allowed.....		5,510.00	
State's share.....			1,102.00

STATE HIGHWAY COMMISSION.

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Warren County.

	Miles.		
Buttzeville-Danville Road.....	5.422		
Cost allowed.....		\$59,208.45	
State's share.....			\$22,532.79
Buttzeville-Danville Bridge.....			
Cost allowed.....		3,100.00	
State's share.....			620.00
Total mileage paid for from 1915 ap- propriation	18.53		
Total cost allowed on contracts paid for from 1915 appropriation.....		388,706.14	
Total State's share paid on contracts from 1915 appropriation.....			88,580.98
Payment for general inspection of roads			695.50
Total payments from 1915 appropria- tion			89,276.48

PAYMENTS FROM 1914 APPROPRIATION.

The following payments have been made during the fiscal year 1917,
but paid from the appropriation for 1914:

Atlantic County.

	Miles.		
Somers Point-Mays Landing road.....	14.1		
Cost allowed.....		\$87,634.51	
State's share.....			\$11,405.94

Sussex County.

	Miles.		
Newton-Branchville road, Section two	3.32		
Cost allowed.....		\$33,844.68	
State's share.....			\$4,140.56
Total mileage paid for from 1914 ap- propriation	17.42		
Total cost allowed on contracts paid for from 1914 appropriation.....		\$121,479.19	
Total State's share paid on contracts from 1914 appropriation.....			15,546.50

Payments for general inspection of roads	
Total payments from 1914 appropriation	15,546.50

Total length of improved roads added to mileage during fiscal year ending October 31, 1917, and total amount of money allowed and expended by State on contracts during same period:

	Miles.	Cost Allowed.	State's Share.
Paid from 1917 appropriation.....	.137	\$1,943.47	\$630.39
Paid from 1916 appropriation.....	21.7903	317,230.91	115,734.74
Paid from 1915 appropriation.....	18.53	388,706.14	88,580.98
Paid from 1914 appropriation.....	17.42	121,479.19	15,546.50
	57.8773	\$829,359.71	\$220,492.61

The following roads are approaching completion:

Atlantic County.

Name of Road.	Miles.	Cost Approximate
Bellevue Avenue, Hammonton.....	1.	\$32,791.29
Absecon-Atlantic City Boulevard.....	4.78	280,321.25

Burlington County.

Chesterfield-Jacobstown road	2.192	18,442.50
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Camden County.

Moorestown Pike.....	3.173	61,973.03
Grenloch road	1.47	27,753.75

Gloucester County.

Elmer and Hardingville road.....	1.27	8,612.41
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Hunterdon County.

New Germantown-Lamington.....	1.156	15,659.58
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STATE HIGHWAY COMMISSION.

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Mercer County.

Hightstown-Princeton Junction.....	4.887	52,573.95
Rosedale-Mt. Rose-Hopewell, Section		
One	2.125	32,046.59
Rosedale-Mt. Rose-Hopewell, Section		
Two	2.001	25,742.62
River Road, Section Two.....	2.877	73,244.74
River Road, Section Three.....	.272	11,191.25

Passaic County.

Paterson-Hamburg, Section Two.....	.947	34,214.75
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Salem County.

Broad Street and Maple Avenue, Penns-		
grove	1.155	19,472.08
Pennsville-Pennsgrove, Section One.....	2.126	62,265.69

Sussex County.

Newton-Sparta	4.966	57,162.60
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Warren County.

Hope-Bridgeville, Section One.....	4,124	60,532.92
		<hr/>
Total,	40.521	\$874,001.00

TWENTY-FOURTH ANNUAL REPORT.

TWENTY-FOURTH ANNUAL REPORT.

Number of Miles of Road Built in Each County with State Aid in Each Year and Total

County.	1893. No. Miles.	1894. No. Miles.	1895. No. Miles.	1896. No. Miles.	1897. No. Miles.	1898. No. Miles.	1899. No. Miles.	1900. No. Miles.	1901. No. Miles.	1902. No. Miles.	1903. No. Miles.	1904. No. Miles.	1905. No. Miles.
Atlantic,				12.00	10.00	6.84	4.03		7.03	20.10	13.00	1.00	1.51
Bergen,										1.02		9.375	2.22
Burlington, ..	10.54	20.46	9.75	11.02	10.48	15.03	18.36	8.93	17.36	19.131	27.98	2.48	
Camden,	13.62		8.25		4.125	12.79	2.23	1.00	4.48	8.80	9.50	5.985	1.40
Cape May,									6.00	5.394	6.20	0.15	2.63
Cumberland, ..											1.22		
Essex,			6.5	6.00	4.91	6.67	12.07	9.60	9.36	8.723	5.79	8.545	8.24
Gloucester, ..			7.75	6.00	5.5	7.59	11.40	6.04	17.44	6.875	7.73		
Hudson,								2.44					
Hunterdon,													
Mercer,		9.46	6.40	10.95	4.75	2.704	10.83	9.16	10.37	15.89	12.3	7.55	16.18
*Middlesex, ..	3.18	2.36	7.68	8.43	4.75	6.164	13.10	9.01	6.12	14.95	9.52	12.42	8.335
Monmouth, ..				3.75	5.00	5.1	14.46	5.64	6.67	13.25	17.67	5.21	7.47
Morris,					6.13	6.3	10.46	6.53	4.306	10.079	7.13	5.98	3.59
Ocean,										3.9	9.97	11.83	7.16
Passaic,					4.79	5.48	8.67	6.73	3.987	6.57	6.09	1.54	5.38
Salem,				2.67			2.17	2.05		2.51	4.61	7.477	
Somerset, ..					6.22	7.27	6.6	6.65	7.93	5.88	6.24	10.68	2.685
Sussex,									0.893		4.03	1.695	0.98
Union,								3.432		2.141		0.63	
Warren,							0.08		7.43	8.792	3.94	13.09	
Totals,	27.34	32.28	46.33	60.82	66.655	81.938	114.46	77.212	109.37	154.005	152.92	105.637	67.78

*In 1892, Middlesex, 10.55 miles.

STATE HIGHWAY COMMISSION.

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STATE HIGHWAY COMMISSION.

Each Year Since Passage of State Aid Law, also Total Number Built
Number in Each County.

1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	Total
No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.	No. Miles.
.....	6.408	13.94	7.24	8.077	.....	.....	11.016	11.867	.....	17.365	18.594	170.017
0.42	1.14	9.595	10.533	.....	.....	3.607	8.776	2.704	1.760	4.979	1.576	57.705
2.51	3.11	7.55	0.132	.....	2.9	8.095	14.244	11.595	.....	1.133	6.902	229.692
.....	20.51	2.33	2.43	5.113	4.987	.....	2.924	8.070	1.402	1.350	3.036	124.332
.....	4.00	3.399	11.87	3.042	.....	16.809	10.797	6.161	.....	.....	.....	76.452
.....	.....	.....	.....	.....	.....	19.141	5.595	1.458	.....	17.192	.....	44.606
.....	7.115	12.623	.....	.....	8.157	1.414	3.355	2.831	6.409	.....	.....	128.312
.....	.....	5.74	.....	.....	3.594	2.169	3.503	.....	4.079	6.770	.....	102.180
2.32	.....	.....	.....	.....	.....	0.785	.....	.....	.....	.....	.....	5.545
5.55	5.37	6.478	5.867	1.000	9.207	4.394	5.839	9.940	13.185	5.01	1.807	69.138
.....	5.85	7.85	2.25	.....	5.308	5.506	.....	.....	7.057	.....	.....	150.365
4.981	5.13	17.674	13.613	1.685	5.158	3.470	10.354	4.958	1.784	4.272	.....	189.648
3.36	2.18	11.54	7.085	8.226	9.607	1.173	2.781	2.310	2.150	.....	1.667	136.299
5.94	0.69	.....	.....	6.585	2.938	.....	4.524	.....	.....	1.063	1.988	84.233
.....	6.91	11.006	2.867	.....	5.379	19.675	22.168	5.420	6.420	9.947	6.663	120.315
3.88	4.132	4.99	.....	0.789	2.786	0.528	2.969	7.802	0.632	.....	.....	77.745
.....	.....	2.906	7.78	3.31	1.779	5.049	14.540	6.753	2.955	.....	.....	66.559
5.6	7.284	4.37	5.365	1.268	5.155	10.343	5.038	.....	3.029	1.041	2.715	111.363
.....	.....	.....	.....	3.455	3.278	.....	12.628	5.476	.....	4.487	3.32	40.242
4.01	2.336	4.232	7.757	.....	4.427	3.520	7.916	4.038	2.067	1.135	3.814	51.455
.....	.....	7.95	1.92	.....	12.265	.....	.....	10.663	.....	3.065	5.791	74.986
38.571	82.165	134.173	86.709	42.550	86.925	105.678	148.967	102.046	52.929	65.300	57.873	2,111.189

Description and Statement of Cost of Roads Improved in 1917.

ATLANTIC COUNTY.

Main Avenue and Broadway, .38 Miles Long; .394 Miles Long Including Bridge.

This is a short connecting link between the Shore road and the Mays Landing—Somers Point road, thus making a continuous improved highway from the various towns along the Shore road, opposite Atlantic City, through Somers Point to English Creek and Mays Landing, thereby forming a very important service road to Somers Point and the other towns along the main shore and also to Atlantic City, thus giving the truck raisers along its line an easy and convenient access to the markets of Atlantic City.

The road is graded to a width of 30 feet and the pavement extends over the entire graded width of the road, which, on Broadway, is widened out to 36 feet. The pavement is of gravel and macadam with bituminous dressing. The depth of the gravel on Broadway is 8 inches and the re-surfacing on Main Avenue is 2½ inches in depth.

There were several very difficult grade problems to be solved. These were successfully done by the County Engineer, thereby reducing the maximum grade on the top of the knob from 5.6 to 3.125 per cent.

Detailed statement of the cost of Main Avenue and Broadway, City of Somers Point, County of Atlantic:

Total length, 2,019 feet, or .38 miles (.394 mile, including bridge).
Kind of pavement, M. B. D. & G.
Width of paved way, 30 feet.
Length of paved way, 2,019 feet
Depth, 2½ to 8 inches.
Width between slopes or curbs, 30 to 40 feet.

Foundation type M (old), 3,570.5 sq. yds., at 30 cents; total.....	\$1,071.15
“ “ M (new), 1084.5 sq. yds., at 70 cents; total.....	759.15
Surface, type M, 3,570.5 sq. yds., at 45 cents; total.....	1,606.73
“ “ M, 1,084.5 sq. yds., at 50 cents; total.....	542.25
“ “ G, 1,608.0 sq. yds., at 60 cents; total.....	964.80
Gravel, “C,” 119 1-6 cu. yds., at 50 cents; total.....	59.58
Earth excavation, 1632 cu. yds., at 30 cents; total.....	489.60
Under drain, type C. L., 124 lin. ft., at 200 cents; total.....	248.00
Retaining wall, 20 cu. yds., at 700 cents; total.....	140.00
Gutter, type C, 611 8/9 sq. yds., at 100 cents; total.....	611.89
Catch basins, 2' at \$100.....	200.00

Extras Paid by County.

Excavation (for S. W. &c.), 895 cu. yds., at 30 cents.....	\$268.50	
Retaining wall, 15 cu. yds. at \$7.00.....	105.00	
Setting curbs, \$71.89; steps, hedge work, &c., \$76.87.....	148.76	
Gravel "A," 16 cu. yds., at \$1.80.....	28.80	
	<hr/>	
	\$551.06	\$6,693.15
Inspection		273.00
Engineering		324.39
		<hr/>
Extras paid entirely by county.....		\$7,290.54
		551.06
		<hr/>
Total cost of road.....		\$7,841.60
Lump sum, contract price.....		6,487.80
Amount allowed by State.....		7,290.54
		<hr/>
Forty per cent. of above, State's share.....		2,916.22
Less credit by cost of inspection already paid by State.....		273.00
		<hr/>
Amount due by State.....		\$2,643.22

Maximum grade before, 5.6 per cent. Maximum grade after, 3.125 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

A. H. NELSON,
Engineer..
GEORGE T. DUKES,
Inspector..
ROY MULLINS,
Div. Engineer.

Date, May 15th, 1917.

Somers Point-Longport Boulevard, 4.114 Miles Long.

This is a new road across the salt meadows, from Somers Point to Longport, at the southern end of the island on which Atlantic City is built.

The present improvement begins at New York Avenue and Shore road, in the city of Somers Point, and thence bears easterly across the meadows and over five bridges to Minnesota and Oberon Avenues, in the borough of Longport. This road is of great importance to the southern end of the island and also furnishes a more ready and convenient means of access to Ocean City and points lying south and directly east of Atlantic City.

The road is graded to widths varying from 30 to 42 feet, and gravelled for the entire graded width. This gravel was 8 inches in thickness after ultimate compression.

The road proper is practically level and elevated about 4 feet above high water. The only exception is the approach at the Somers Point end, where, for a short distance, the maximum grade is 5 per cent, having been reduced from 6 per cent.

This road is of great value in relieving the very intense traffic over the Pleasantville Boulevard into Atlantic City.

STATE HIGHWAY COMMISSION.

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Detailed statement of the cost of the Somers Point-Longport Boulevard, Township of Egg Harbor, County of Atlantic:

Total length, 21,724.15 feet, or 4.114 miles.
 Kind of pavement, Gravel.
 Width of paved way, 30, 36, 40, 42 feet.
 Length of paved way, 21,724.15 feet, including bridges.
 Depth, 8 inches.
 Width between slopes or curbs, 40, 44, 46 feet.

Gravel "A," 73,430.3 sq. yds., at 43 cents, total.....	\$31,575.03
Gravel "A," 607 1-3 sq. yds., at \$3.00; total.....	1,822.00
Gravel "C," 735 1-3 sq. yds., at \$3.00; total.....	2,206.00
Extra Embankment, 261,349 2-3 cu. yds., at 26 cents.....	67,950.91
Bulkheads, 2,574 6-12 lin. ft., at \$12.00.....	30,894.00
Guard rail, 26,755 2-3 lin. ft., at 45 cents.....	12,040.05
	<hr/>
	\$146,487.99
Less Liquidated Damages Retained by County.....	1,050.00
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Inspection	\$145,437.99
Engineering	\$1,980.98
	<hr/>
Total cost of road.....	\$151,081.12
Lump sum, contract price, less "Small Bridges & Culverts" item.....	\$143,211.91
Amount allowed by State.....	151,081.12
	<hr/>
Forty per cent. of above, State's share.....	60,432.45
Less credit by cost of inspection already paid by State \$1,980.98, and partial payments, \$10,671.65 and \$29,395.59.....	42,048.22
Amount due by State.....	18,384.23

Maximum grade before, 6.0 per cent. Maximum grade after, 5.0 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

A. H. NELSON,
 Engineer.

B. F. FEENEY,
 Inspector.

Date, November 10th, 1916.

Somers Point-Mays Landing Road, 14.1 Miles Long.

This road begins at Somers Point and extends in a general north-westerly direction through Scullville, English Creek and Gravelly Run to the Mays Landing and Pleasantville county road. It is constructed of gravel, varying in width from 20 to 30 feet, and of a compacted depth of 8 inches. Through the thickly settled sections the road is gravelled for its entire graded width of 30 feet; in the open country it is gravelled for a width of 20 feet.

This road is quite an important road locally, as it leads through a farming and trucking section whose principal market is Atlantic City and from which the residents have been cut off, to a great extent, by the poor roads.

The maximum grade was reduced from 5 per cent to 3 per cent and the alignment of the road was decidedly improved at many points, thus converting what was an old sand road, through the pines and fields, into an improved highway, smooth and convenient for travel at all seasons of the year.

TWENTY-FOURTH ANNUAL REPORT.

Detailed statement of the cost of the Somers Point-Mays Landing Road, Township of Egg Harbor, County of Atlantic:

Total length, 73,430.17 feet, or 14.1 miles.	
Kind of pavement, Gravel.	
Width of paved way, 20 and 30 feet.	
Length of paved way, 72,762.17 feet, exclusive of bridges.	
Depth, 8 inches.	
Width between slopes or curbs, 30 feet.	
Gravel, 40,647.78 cu. yds., at \$1.12; total.....	\$45,625.51
Earth excavation, 76,643 cu. yds. at 30 cents; total.....	22,992.90
Extra Embankment (see sheet attached), 1,432 cu. yds., at 40 and 45 cents; total	592.55
Under drain, type, (see sheet attached).....	3,481.80
Guard Rail, 23,536 lin. ft. at 32 cents; total.....	7,531.52
Grubbing, 14.6 acres at \$100; total.....	1,460.00
Part of extras on account of change in line on Patcong Creek Meadows..	95.16
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Inspection	\$81,679.44
Engineering	2,046.00
	<hr/>
Extras paid entirely by county (see sheet attached).....	3,909.07
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Total cost of road.....	\$87,634.51
	<hr/>
Lump sum, contract price.....	179.72
Amount allowed by State.....	<hr/>
Forty per cent of above, State's share.....	\$78,181.34
Less payment already made on account.....	87,634.51
Less credit by cost of inspection already paid by State.....	35,053.80
	<hr/>
	\$2,160.86
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	2,046.00
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	23,647.86
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Amount due by State.....	\$11,405.94
 Maximum grade before, 5.0 per cent. Maximum grade after, 3.0 per cent.	

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

A. H. NELSON,
Engineer.
GEORGE T. DUKES,
Inspector.

Dated March 17th, 1916.

BERGEN COUNTY.

Anderson Avenue, Second Section, 1.576 Miles Long.

This road forms an important link between the Hudson County Boulevard, at the upper end of Hudson County, with the system of improved roads in Bergen County.

The pavement consists of hot mix bituminous concrete, 16 feet in width and 2 inches in thickness, placed upon a macadam base 5 inches thick.

The work was let in 1915, and finished October 30, 1915. The original contract, however, called for the construction of the road to the Hudson County line. Owing to the fact that a storm sewer was constructed

STATE HIGHWAY COMMISSION.

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at the lower end of the job, it was decided to omit 100 feet of the original pavement in order that the base might have sufficient time to settle before a durable pavement was placed across it. This accounts for the shortening of the length of the original contract.

The graded width of the road was 30 feet and the maximum grade was slightly altered by the removal of a few humps and filling in of small holes, thereby reducing the maximum grade from 6 per cent to 5 per cent.

Detailed statement of the cost of the Anderson Avenue, Second Section, Boroughs of Fairview and Cliffside Park, County of Bergen:

Total length, 8,321.73 feet, 1.576 miles.	
Kind of pavement, B. C. (Hot Mix).	
Width of paved way, 16 feet.	
Length of paved way, 8,421.73 feet.	
Depth, 7 inches.	
Width between slopes or curbs, 30 feet.	
Foundation, Type "M," 14,794 sq. yds., at 0.333.....	\$4,926.40
Surface, Type B. C. "H," 14,794 sq. yds., at 0.851.....	12,589.69
Macadam Shoulders, 1,000 sq. yds., at 0.44.....	444.00
Macadam Intersections, 3,186 sq. yds., at 0.444.....	1,414.58
Earth Excavation, 749 cu. yds., at 0.407.....	304.84
Rock Excavation, 2,849 cu. yds., at 2.405.....	6,851.85
Embankment, 1,632 cu. yds. at 0.407.....	664.22
Under Drain, -French, 6 in., 6,635.5 lin. ft., at 0.74	7,130.28
Second Hand Gutter Blocks, 2,533 sq. yds., at 1.11.....	2,811.63
L 12 in. C. I. Pipe, 180 lin. ft., at 1.665.....	299.70
Manhole Tops Reset, 24, at 5.18.....	124.32
Trees removed, 7, at 5.18.....	36.26
	<hr/>
Inspection	\$37,597.77
Engineering	\$426.00
	1,671.37
	39,695.14
Extras paid entirely by County (list attached).....	5,918.11
	<hr/>
Total cost of road.....	\$45,613.25
Lump Sum Contract Price.....	34,337.89
Amount allowed by State.....	39,695.14
Forty per cent. of above, State's share.....	15,878.05
Less credit by cost of inspection already paid by State.....	426.00
Amount due by State.....	15,452.05

Maximum grade before, 6 per cent. Maximum grade after, 5 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

H. W. DURHAM,
Engineer.

WM. J. LALLY,
Inspector.

Date of completion, October 30, 1915.
Date of signatures, October 20, 1916.

BURLINGTON COUNTY.

Cookstown—Jacobstown Road, 2.3763 Miles Long.

This new construction begins in Cookstown and extends to Jacobstown, thus completing the improved line from Bordentown through Chesterfield to Cookstown. It is of great value to the farmers in this locality as it affords them a quick and good outlet for their produce to the railroad station at Cookstown. It might properly be described as a local or agricultural road.

This road was graded to a width of 30 feet and was graveled for a width of 16 feet, and to a depth varying from 8 inches in the center to 4 inches on either side.

A number of sharp hills and hollows were encountered in the line of the road, owing to the rolling nature of the country, and, as a result of this improvement, the maximum grade was reduced from 6 per cent to 2 per cent, thereby greatly increasing the value of the road to the farmers and others who use it to transport their products over it.

Detailed statement of the cost of the Cookstown-Jacobstown road, Township of North Hanover, County of Burlington:

Total length, 12,546.9 feet, or 2.3763 miles.	
Kind of pavement, Gravel A.	
Width of paved way, 16 feet.	
Length of paved way, 12,546.9 feet.	
Depth, 8 and 4 inches.	
Width between slopes or curbs, 30 feet.	
Gravel, 3,785.35 cu. yds., at \$1.25; total.....	\$4,731.69
Earth excavation, 11,986.06 cu. yds. at 35 cents; total.....	4,195.12
Under drain type, Tile, 3,273 lin. ft., at 25 cents; total.....	818.25
To 1,594.25 sq. yds. turf and sod, at 25 cents.....	398.56
To grubbing 1½ acres, at \$100.....	150.00
Note: Earth excavation reduced 2,864.35 cu. yds. by change of grade ordered by State Highway Department.	
500 lin. ft. French drain, at 50 cents not used.	
500 lin. ft. stone drain, at 60 cents not used.	
455.75 sq. yds. less turf and sod used than estimated.	

Inspection	\$10,293.62
Engineering	\$430.50
	689.68
	<hr/>
	\$11,413.80
Lump sum, contract price.....	\$11,384.33
Amount allowed by State.....	11,413.80
Forty per cent. of above, State's share.....	4,565.52
Less credit by cost of inspection already paid by State.....	430.50
Amount due by State.....	4,135.02

Maximum grade before, 6 per cent. Maximum grade after, 2 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

EARL THOMSON,
Engineer.

Date, June 11, 1917.

STATE HIGHWAY COMMISSION.

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Vincentown-Buddtown Road, 2.515 Miles Long.

This is another township road which has been treated with stone by the Township Committee in days gone by and has been regraded and resurfaced with the aid of the State to a width of 30 feet and paved to a width of 9 feet. An additional thickness of 3 inches of compacted macadam has been placed upon the old road.

This road extends through a very flat country and for that reason there was practically no change of grade. It might be familiarly described as a "farmer's road," and is constructed for the purpose of furnishing the farmers along its line with a good, smooth and convenient road, at all seasons of the year, to the markets and county seat.

Detailed statement of the cost of the Vincentown-Buddtown road, Township of Southampton, County of Burlington:

Total length, 13,280 feet, or 2.515 miles.
Kind of pavement, Water Bound Macadam.
Width of paved way, 9 feet.
Length of paved way, 13,280 feet.
Depth, 4-in. rolled to 3 inches.
Width between slopes or curbs, 30 feet.

Surface type, M. W. B., 13,280 sq. yds., at 43 cents; total.....	\$5,710.40
Inspection	\$5,710.40
Engineering	\$270.57
	377.25
	<hr/>
	\$6,358.22
Total cost of road.....	\$6,358.22
Lump sum, contract price.....	\$5,710.40
Amount allowed by State.....	6,358.22
Forty per cent. of above, State's share.....	2,543.29
Less credit by cost of inspection already paid by State.....	270.57
Amount due by State.....	2,272.72

Maximum grade before, 1.00 per cent. Maximum grade after 0.87 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

JAMES LOGAN,
Engineer.
W. S. TRAVIS,
Inspector.

Date, October 19, 1916.

Vincentown-Eayrestown Road, 2.015 Miles Long.

This is a township road built without the assistance of the county, but with the assistance of the State. It is really a resurfacing of an old township road.

The road was regraded to a width of 30 feet and paved a width of 9 feet, and an additional coat of 3 inches in thickness was placed on the old surface. There was little change in the grade as is evinced by the fact that the maximum grade was reduced from 2.2 per cent to 2.11 per cent.

This road is of considerable local value inasmuch as it forms a short and convenient outlet from Vincentown and Eayrestown to the county seat of Mount Holly.

Detailed statement of the cost of the Vincentown-Eayrestown road, Township of Southampton and Lumberton, County of Burlington:

Total length, 10,648.50 feet, or 2.015 miles.	
Kind of pavement, Water Bound Macadam.	
Width of paved way, 9 feet.	
Length of paved way, 10,648.50 feet.	
Depth, 4-in. rolled to 3 inches.	
Width between slopes or curbs, 30 feet.	
Surface type, M. W. B., 10,648.50 sq. yds., at 43 cents; total.....	\$4,578.85
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Inspection	\$4,578.85
Engineering	185.78
	<hr/>
	302.25
	<hr/>
	\$5,066.88
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Total cost of road.....	\$5,066.88
	<hr/>
Lump sum, contract price.....	4,578.85
Amount allowed by State.....	5,066.88
	<hr/>
Forty per cent. of above, State's share.....	2,026.75
Less credit by cost of inspection already paid by State.....	185.78
	<hr/>
Amount due by State.....	1,840.97
Maximum grade before, 2.20 per cent. Maximum grade after, 2.11 per cent.	

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

JAMES LOGAN,
Engineer.
W. S. TRAVIS,
Inspector.

Date, October 19, 1916.

CAMDEN COUNTY.

Cresson Road, 3.036 Miles Long.

This improvement begins at Batesville, a suburb of Haddonfield, and extends easterly to Hillman's Corner, which is midway between Haddonfield and Cresson. It is a road of purely local importance at present, and furnishes an easy and convenient outlet at all seasons of the year for the farmers and truck raisers, living along it, to Haddonfield and thence over the improved roads to Camden and Philadelphia.

The improvement consists of macadam on the westerly end and the remainder of the road is of gravel. The pavement is 16 feet wide and 8 inches thick. The entire road is graded to a width of 30 feet.

There were some slight modifications in the grade caused by cutting some of the knolls and filling in some of the hollows, whereby the maximum grade was reduced from 4.75 per cent to 4.25 per cent.

STATE HIGHWAY COMMISSION.

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Detailed statement of the cost of the Cresson road, Township of Delaware, County of Camden:

Total length, 16,030.04 feet, or 3.036 miles.
 Kind of pavement, Gravel and Macadam.
 Width of paved way, 16 feet.
 Length of paved way, 16,030.04 feet.
 Depth, 8 inches.
 Width between slopes or curbs, 30 feet.

Foundation, type M, 9,680 sq. yds., at 49 cents; total.....	\$4,743.20
Surface, type M, 9,680 sq. yds., at 47 cents; total.....	4,549.60
Gravel, 4,193.6 cu. yds., at 95 cents; total.....	3,983.92
Earth excavation, 13,782 cu. yds., at 30 cents; total.....	4,134.60
Excavation, outside of road, 242 cu. yds., at 40 cents; total.....	96.80
Under drain, type Tile, 2,816 lin. ft., at 11 cents; total.....	309.76
Gutter, type C, 78.55 cu. yds., at 650 cents; total.....	510.58
C. I. P. Cross Drains, 24,533 lbs., at 2 cents; total.....	490.66
End walls at Cross Drains, 11.5 cu. yds., at 800 cents; total.....	92.00
	<hr/>
Inspection	\$18,911.12
Engineering	686.68
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Extras paid entirely by county.....	\$20,543.36
	<hr/>
Total cost of road.....	\$313.64
	<hr/>
Lump sum, contract price.....	\$20,857.00
Amount allowed by State.....	\$19,871.15
	<hr/>
Forty per cent. of above, State's share.....	20,543.36
Less credit by cost of inspection already paid by State.....	8,217.34
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Amount due by State.....	686.68
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	7,530.66

Maximum grade before, 4.75 per cent. Maximum grade after, 4.25 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

J. J. ALBERTSON,
 Engineer.
 RICHARD T. COLLINGS,
 Inspector.

December 11, 1916.

HUNTERDON COUNTY.

Lambertville-County Line Road, Section 2, .137 Miles Long.

This is an extension of the Lambertville-County Line road, Section No. 1, being 723 feet in length over newly acquired right of way. This extension forms a connecting link with the River road in Mercer County.

The original specifications for this road provided for a macadam road 16 feet wide and 6 inches in thickness. During construction, some good gravel was encountered and this was used for foundation and 4 inches of one and one-half inch stone used for the second course. This was finished as an ordinary waterbound macadam.

There was a deduction of 10 cents per square yards made for this change in the type of construction.

One very unusual feature connected with the construction of this road was that it was built for less than the contract price and was finished one month before the time set in the specifications.

Detailed statement of the cost of the Lambertville-County Line road, Section No. 2, Township of West Amwell, County of Hunterdon:

Total length, 723 feet, or 0.137 miles.
Kind of pavement, Macadam.
Width of paved way, 16 feet.
Length of paved way, 723 feet.
Depth, 6 inches.
Width between slopes or curbs, 30 feet.

Foundation, type gravel, 1,285 sq. yds., at 20 cents; total.....	\$257.00
Surface, type M, 1,285 sq. yds., at 40 cents; total.....	514.00
Surface, type Entrance, 90 sq. yds., at 50 cents; total.....	45.00
Extra embankment 686 cu. yds., at 40 cents; total.....	274.40
Earth excavation, 136 cu. yds., at 35 cents; total.....	47.60
Excavation, outside road, 83 cu. yds., at 35 cents; total.....	29.05
Cross drain, 16-in. corr. pipe, 42 sq. yds., at \$2.00; total.....	84.00

Amount by items.....	\$1,251.05
Percentage bid 140.....	\$1,751.47
Inspection	\$147.00
Engineering	45.00

\$1,943.47

Total cost of road..... \$1,943.47

Lump sum, contract price.....	\$1,931.37
Amount allowed by State.....	1,943.47

Forty per cent. of above, State's share.....	777.39
Less credit by cost of inspection already paid by State.....	147.00
Amount due by State.....	630.39

Maximum grade before, new location. Maximum grade after, 0.5 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

GRANT DAVIS,
Engineer.

I. H. HIGGINS,
Inspector.

April 30, 1917.

Hoffman's-Lower Valley Road, 1.67 Miles Long.

This improvement is an extension of the High Bridge-Califon macadam road, from Hoffman's to the Lower Valley Church in Lebanon township. It is intended to eventually carry the work to the Morris County line, and, when the section from Lower Valley to German Valley is completed, we will have a continuous macadam road which will connect with the improved system of roads in Morris County.

The road is graded to a width of 30 feet and paved to a width of 16 feet. It is built with a rock bottom foundation and water bound macadam surface. The total depth of pavement is 9 inches.

The road in its line crossed a number of sharp foot hills and, as a result, it was necessary to reduce the maximum grade from 9 to 5 per cent, in order to obtain a road which would render efficient service to the people along its line.

STATE HIGHWAY COMMISSION.

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Detailed statement of the cost of the Hoffman's-Lower Valley road, Township of Lebanon, County of Hunterdon:

Total length, 8,818 feet, or 1.67 miles.
Kind of pavement, Macadam.
Width of paved way, 16 feet.
Length of paved way, 8,792 feet.
Depth, 9 inches.
Width between slopes or curbs, 30 feet.

Foundation, type R. B., 16,630 sq. yds., at 20 cents; total.....	\$3,126.00
Foundation, type Entrances, 428 sq. yds., at 25 cents; total.....	107.00
1½-in. stone Maintenance, 5 tons, \$1.30; total.....	6.50
Surface, type M. W. B., 15,630 sq. yds., at 26 cents; total.....	4,063.80
Surface, type Entrances, 887 sq. yds., at 30 cents; total.....	266.10
Screenings—maintenance, 30 tons, \$1.30; total.....	39.00
Excavation outside road, 168 cu. yds., at 50 cents; total.....	84.00
Earth excavation, 10,692 cu. yds., at 45 cents; total.....	4,811.40
Rock excavation, 350 cu. yds., at \$1.75; total.....	612.50
Under drain, type French, 2,079 lin. ft., at 22 cents; total.....	457.38
Under drain, type Stone, 116 lin. ft., at 20 cents; total.....	23.20
Gutter, type Rubble, 55 sq. yds., at 90 cents; total.....	49.50
Cross drains, 12-in. corr. pipe, 78 ft., \$1.30; total.....	101.40
Cross drains, 16-in. corr. pipe, 106 ft., \$1.80; total.....	190.80
Cross drains, concrete, 25.5 cu. yds., \$8.00; total.....	204.00
Rip-rap, 62 sq. yds., 50 cents; total.....	31.00
Resetting fences, 6,984 ft., 2 cents; total.....	139.68
Guard railing, 700 ft., 22 cents; total.....	154.00

	\$14,467.26
Contract price 100.49 per cent. of engineer's estimate.....	\$14,538.15
Inspection	594.05
Engineering	435.00

Extras paid entirely by county, resetting fence extra.....	\$15,567.20
	8.38

Total cost of road..... \$15,575.58

Lump sum, contract price.....	\$14,576.43
Amount allowed by State.....	15,567.20

Forty per cent. of above, State's share.....	6,226.88
Less credit by cost of inspection already paid by State.....	594.05
Amount due by State.....	5,632.83

Maximum grade before, 9 per cent. Maximum grade after, 5 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

GRANT DAVIS,
Engineer.

A. T. TRIMMER,
Inspector.

November 14, 1916.

MONMOUTH COUNTY.

Riverside Drive, 1.667 Miles Long.

This improvement begins at the Middletown Turnpike at a point about one-fourth of a mile north of the Navesink bridge and follows the general course of the bluff along the Navesink river to a point a short distance southwest of the bridge over McClee's creek.

The work upon this road consisted of a reconstruction, rebuilding and resurfacing of a road that had been previously locally improved but not in a thorough manner.

The first 1458 feet consists of a gravel pavement, 18 feet wide and 6 inches in depth, placed upon the old gravel. From this point to a point 6500 feet from the beginning the old base was of a very wet and treacherous nature; therefore the pavement was constructed of 9 inches of cinders, upon which was placed a coating of gravel 3 inches in thickness after compaction, the width being, as in the former section, 18 feet. From this point to the end of the improvement the road had been coated with gravel; therefore, after scarifying and leveling up the old gravel, the work was completed by covering the whole with a coating of gravel 18 feet wide and 4 inches in depth, after ultimate compression.

The road forms a very necessary outlet for the residents along its line who were subjected to considerable inconvenience, annoyance and delay by reason of the 5,000 feet of road which was often in an impassable condition.

The maximum grade was reduced from 6½ per cent. to 5 per cent.

The graded width has been increased to 30 feet, thus making what was merely a local road of varying widths a complete and well finished highway, conducive both to the comfort and pleasure of the traveling public.

Detailed statement of the cost of the Riverside Drive road, Township of Middleton, County of Monmouth.

Total length, 8,800 feet, or 1.667 miles.
Kind of pavement, gravel.
Width of paved way, 18 feet.
Length of paved way, 8,800 feet.
Depth, 4, 6, 12 inches.
Width between slopes or curbs, 30 feet.

Foundation, type slag, 10,202 sq. yds., at 61 cents; total.....	\$6,223.22
Surface, type G, 6-in., 2,916 sq. yds., at 39 cents; total.....	1,137.24
Surface, type G, 3-in., 10,202 sq. yds., at 20 cents; total.....	2,040.40
Surface, type G, 4-in., 4,668 sq. yds., at 29 cents; total.....	1,353.72
Earth excavation, 5,150 cu. yds., at 31 cents; total.....	1,596.50
Under drain, type F, 9,530 lin. ft., at 30 cents; total.....	2,859.00
Gutter, 148 sq. yds., at \$1.80; total.....	266.40
Cross drains 30-in. V. P., 22 lin. ft., at \$1.25; total.....	27.50
Cross drains 24-in. V. P., 34 lin. ft., at \$1.00; total.....	34.00
Slope protection, 150 sq. yds., at 36 cents; total.....	54.00
Guard rail, 2,122 lin. ft., 25 cents; total.....	530.50
Concrete, 35.5 cu. yds., \$10.00; total.....	355.00
	<hr/>
	\$16,477.48

EXTRA WORK:

Foundation, type slag, 1,792 sq. yds., at 61 cents; total.....	\$1,093.12
Excavation, earth, 448 cu. yds., at 31 cents; total.....	138.88
Under drain, type F, 450 lin. ft., at 30 cents; total.....	135.00
Gutter, 5 sq. yds., at \$1.80; total.....	9.00
Plus difference between items and lump sum.....	190.00
	<hr/>
Inspection	\$18,043.48
Engineering	\$388.50
	<hr/>
	\$18,971.98
Extras paid entirely by county, \$226.00, included in above statement.	
Total cost of road.....	\$18,971.98

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Lump sum, contract price,.....	16,667.48
Amount allowed by State,.....	18,745.98
Forty per cent. of above, State's share,.....	7,498.39
Less credit by cost of inspection already paid by State,.....	\$388.50
Less credit by previous payments,.....	5,245.15
	} 5,633.65
Amount due by State,.....	1,864.74
Maximum grade before,.....	6.50 per cent.
Maximum grade after,.....	5.00 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

GEORGE D. COOPER,
County Engineer.
JOHN H. DAVIS,
Inspector.

December 9th, 1916.

MORRIS COUNTY.

Blackwell Street and Sussex Turnpike Road, Section One, 1.988 Miles Long.

This reconstruction starts at the easterly curb line of Prospect street in the town of Dover and extends westerly to the top of Mine Hill, to a point opposite the Liondale road.

The road was very rough and uneven and was one of the worst obstacles to be overcome by the traveling public between Newark and Lake Hopatcong. It is also a part of State Highway No. 5, and forms one of the most important links in the line of this improvement.

The road was graded to a width of from 33 to 50 feet. The pavement, of brick and bituminous concrete, varied from 18 to 50 feet in width and the depth varied from 7 inches for the bituminous concrete to 10 inches for the brick.

The most important reduction in grade was made near the top of the hill where the maximum grade was reduced from $5\frac{1}{2}$ to 4.7 per cent.

Detailed statement of the cost of Blackwell Street and Sussex Turnpike road Sec. 1, Town of Dover, Borough of Wharton, Township of Randolph, County of Morris.

Total length, 10,497.73 feet, or 1.988 miles.
Kind of pavement, Bituminous Concrete on Macadam Foundation.
Width of paved way, 18 or more feet.
Length of paved way, 10,497.73 feet.
Depth, not less than 7 inches.
Width between slopes or curbs, 33 to 46 feet.

Foundation, type M. & M. W. B., 26,920 sq. yds., at 60 cents; total,.....	\$16,152.00
Foundation, type Concrete, 4,562 sq. yds., at \$1.00; total,.....	4,562.00
Foundation, type M. shoulders, 2,327 sq. yds., at 35 cents; total,.....	814.45
Foundation, type M. Entrances, 240.5 sq. yds., at 35 cents; total,.....	84.18
Surface, type B. C., 26,920 sq. yds., at \$1.14; total,.....	30,688.80
Surface, type Brick, 4,562 sq. yds., at \$1.50; total,.....	6,843.00
Surface, type M. W. B. shoulders, 2,327 sq. yds., at 40 cents; total,.....	930.80

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Gravel, M. W. B. entrances, 240.5 yds., at 40 cents; total,.....	96.20
Earth excavation, 16,893.5 cu. yds., at 80 cents; total,.....	13,514.80
Rock excavation, 310 cu. yds., at \$2.00; total,.....	620.00
Under drain, type T, 6-in. 500 lin. ft., at 40 cents; total,.....	200.00
Under drain, type F. 4-in., 952 lin. ft., at 40 cents; total,.....	380.80
Gutter, type Cobble, 947 sq. yds., at \$1.00; total,.....	947.00
Cross Drains, Iron pipe 15-in., 189 ft., \$2.00; total,.....	378.00
Cross Drains, Concrete, 57 ft., \$2.00; total,.....	114.00
Retaining Wall, Concrete, 263 cu. yds., \$8.00; total,.....	2,104.00
Guard Rail, 2-in. pipe, 275 ft., 60 cents; total,.....	165.00
Supplemental Contract for Catch-basins,.....	61.02
Supplemental Contract for Entrances,.....	322.10

Inspection,	\$78,978.15
Engineering,	1,378.50
	1,677.90

\$82,034.55

Total cost of road,.....	\$82,034.55
Lump sum, contract price,.....	73,898.22
Amount allowed by State,.....	82,034.55
Forty per cent. of above, State's share,.....	32,813.82
Less credit by cost of inspection already paid by State,.....	1,378.50
Less credit by partial payment,.....	29,394.25
Amount due by State,.....	2,041.07

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

EL. M. VAIL,
Division Engineer.
FREDERICK S. SMITH,
Engineer.
EDWARD W. KILPATRICK,
Inspector.

July 20th, 1917.

OCEAN COUNTY.

Barnegat—Buddtown Road, First Section, 6.098 Miles Long.

This improvement begins at the Main Shore road in Barnegat and extends westerly, a distance of six miles, toward the Burlington county line. It is the first portion of the proposed improved highway across the State from the Main Shore road toward Mount Holly, and, when completed, will form a very important short cut from Camden and Mount Holly to the shore of Barnegat Bay.

The present improvement is of gravel, 24 feet in width, and a thickness, after compaction, of 8 inches in the center to 4 inches on either side. The road is graded to a total width of from 30 to 33 feet.

The improvement is most marked as the old road consisted simply of a wagon track through the pines. In its place we now have a smooth, hard and well finished highway.

The line of the old road crosses the contours almost at right angles and in the improvement a number of hills were cut off and hollows

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filled in, thus reducing the maximum grade from 7 per cent to 4 per cent.

The change made by this improvement is one of the most striking of recent years.

Detailed statement of the cost of the Barnegat-Buddtown road, 1st section, Township of Union, County of Ocean.

Total length, 32,200 feet, or 6.098 miles.
Kind of pavement, Gravel.
Width of paved way, 24 feet.
Length of paved way, 32,200 feet.
Depth, 4 inches at shoulders, 8 inches at center.
Width between slopes or curbs, 30-33 feet.

Maintenance, gravel, 150 cu. yds., at 71 cents; total,.....	106.50
Gravel, 15,808 cu. yds., at 71 cents; total,.....	11,223.68
Earth excavation, 27,162 cu. yds., at 32 cents; total,.....	8,691.84
Extra embankment, 1,406 cu. yds., at 32 cents; total,.....	449.92
Cross drain, type, 12-in. C. I. P., 144 lin. ft., at \$1.15; total,.....	165.60
Cross drain, type, 10-in. C. I. P., 132 lin. ft., at \$1.00; total,.....	132.00
Grubbing, 15.96 acres, at \$50.00; total,.....	798.00
Foreign materials, 10 cu. yds., at 25 cents; total,.....	2.50
Catch basins, 4, at \$20.00; total,.....	80.00
Turf on slopes, 6,792 sq. yds., at 15 cents; total,.....	1,018.80

\$22,668.84

Reduction in contract:

Decrease in gravel, 245 cu. yds., at 71 cents,.....	\$173.95
Increase in excavation, 255 cu. yds., at 32 cents,.....	81.60

\$92.35 92.35

\$22,576.49

Inspection,	972.00
Engineering,	1,128.82

\$24,677.31

Total cost of road,..... **\$24,677.31**

Lump sum, contract price,.....	22,668.84
Amount allowed by State,.....	24,677.31

Forty per cent. of above, State's share,.....	9,870.92
Less credit by cost of inspection already paid by State,.....	972.00
Less previous payment,..... \$3,138.34	3,138.34

Amount due by State,..... **5,760.58**

Maximum grade before,.....	7 per cent.
Maximum grade after,.....	4 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

H. C. SHINN,
Engineer.

DAVID M. WHITE,
Inspector.

June 20th, 1917.

Bay Head-Point Pleasant Road, .565 Miles Long.

This improvement begins at Osborn Avenue in Bay Head, at the end of the road heretofore improved, and extends northerly and westerly to the easterly end of the Lakewood and Point Pleasant Road.

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The road is graded for a width of 33 feet and covered with gravel for a width of 24 feet and a depth of 8 inches in the center and 4 inches at either side.

This road is of more importance than its length would indicate as it connects the long stretch of improved road beginning at Seaside Park and extending northerly along the Atlantic Ocean to Bay Head, and thence inland to the Lakewood and Point Pleasant Road, which has already been improved at this point. A continuation of this road leads us to Lakewood. By turning to the right, at the end of the present improvement, we follow an improved road into Point Pleasant; hence this improvement may, in every sense of the word, be called a connecting link.

As the country is very flat and nearly level, the grade remains practically the same.

Detailed statement of the cost of the Bay-Head-Point Pleasant road, Township of Brick, County of Ocean.

Total length, 2,985 feet, or .565 mile.	
Kind of pavement, Gravel, Grade A.	
Width of paved way, 24 feet.	
Length of paved way, 2,985 feet.	
Depth, 8 inches to 4 inches.	
Width between slopes or curbs, 33 feet.	
Gravel, 1452 cu. yds., at \$1.35; total,.....	\$1,960.20
Earth excavation, 1,276 cu. yds., at 30 cents; total,.....	382.80
Extra embankment, 600 cu. yds., at 35 cents; total,.....	210.00
Foreign material, 25 cu. yds., at 50 cents; total,.....	12.50
Cross drain, 30-in. cast iron pipe, 42 lin. ft., at \$6.00; total,.....	252.00
Cross drain, 8-in. cast iron pipe, 80 lin. ft., at \$1.75; total,.....	140.00
Grubbing, .1 acre, at \$100.00; total,.....	10.00
Retaining wall, turf, 338 cu. yds., at \$1.00; total,.....	338.00
Maintenance, gravel A., 40 cu. yds., at \$1.35; total,.....	54.00
	<hr/>
Inspection,	\$3,359.50
Engineering,	155.20
	167.98
	<hr/>
	\$3,682.68
Total cost of road,.....	<hr/>
	\$3,682.68
Lump sum, contract price,.....	3,359.50
Amount allowed by State,.....	3,682.68
Forty per cent. of above, State's share,.....	1,473.07
Less credit by cost of inspection already paid by State,.....	155.20
Amount due by State,.....	1,317.87
Maximum grade before,.....	3.87 per cent.
Maximum grade after,.....	.34 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications as modified.

I. H. CRAMER,
Engineer.
LYMAN L. LISTER,
Inspector.

June 9th, 1916.

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SOMERSET COUNTY.

Greater Cross Roads Road, Second Section, 2.715 Miles Long.

This is an extension of the road built some years ago from Bedminster to Greater Cross Roads, and completes the improvement to the Hunterdon County line at the Lamington River Bridge.

The road was graded to a width of 33 feet. It was paved 16 feet wide and 8 inches deep, except in a few spots where the bottom was very soft, at which places the depth was increased to 12 inches. Owing to the crooked and irregular line of the old layout, it was necessary to make several important changes in the alignment of the road. An idea of the amount of grading required to bring this road up to a state of requisite efficiency may be gained from the fact that the maximum grade was reduced from 13 to 5 per cent.

When the short section in Hunterdon County is constructed, we will have a much shorter and more convenient outlet for all the upper portion of Somerset County to Whitehouse, High Bridge and the Delaware River.

Detailed statement of the cost of the Greater Cross Roads road, Second Section, Township of Bedminster, County of Somerset.

Total length, 14,333 feet, or 2.715 miles.

Kind of pavement, M.-M. W. B.

Width of paved way, 16 feet.

Length of paved way, 14,286 feet.

Depth, 8-12 inches.

Width between slopes or curbs, 33 feet.

Foundation, type M., 27,360 sq. yds., at 39 cents; total,.....	\$10,670.40
Surface, type M. W. B., 25,982 sq. yds., at 40 cents; total,.....	10,392.80
Entrances, M. W. B., 608 sq. yds., at 50 cents; total,.....	304.00
Earth excavation, 46,966 cu. yds., at 50 cents; total,.....	23,483.00
Under drain, type P. T.-Stone, 11606 lin. ft., at 30 cents; total,.....	3,481.80
Gutter, type Cobble, 62 sq. yds., at 80 cents; total,.....	49.60
Cast iron pipe, 12-in., 84 lin. ft., at \$2.00; total,.....	168.00
Cast iron pipe, 15-in., 36 lin. ft., at \$2.60; total,.....	93.60
Cast iron pipe, 18-in., 60 lin. ft., at \$3.00; total,.....	180.00
Cast iron pipe, 24-in., 48 lin. ft., at \$4.00; total,.....	192.00
Terra-cotta pipe, 24-in., 132 lin. ft., at \$1.95; total,.....	257.40
Concrete, 22-13/100 cu. yds., at \$10.00; total,.....	221.30
One concrete encased beam bridge,.....	1,680.00
Two concrete arch bridges,.....	2,300.00
Concrete extension and repair of culvert,.....	1,530.00

Inspection,	\$55,003.90
Engineering,	843.00
	2,115.69
	<hr/>
	\$57,962.59

Total cost of road,..... \$57,962.59

Lump sum, contract price,.....	53,714.72
Amount allowed by State on road,.....	52,452.59
Amount allowed by State, on bridge,.....	5,510.00

Forty per cent., State's share of road work,.....	20,981.04
Twenty per cent., State's share of bridge work,.....	1,102.00

Total State's share,.....	\$22,083.04.
Less credit by cost of inspection already paid by State,.....	843.00

Amount due by State,.....	\$21,240.04
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Maximum grade before,.....	13 per cent.
Maximum grade after,.....	5 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

JOSHUA DOUGHTY, Jr.,
Engineer.

FRANK MOKE,
Inspector.

October 16th, 1916.

SUSSEX COUNTY.

Newton-Branchville Road, Section two, 3.32 Miles Long.

The improvement of this road was begun at Ross's Corner and carried northward through Branchville to the macadam road built some years ago, thus completing the improved stone highway across the county of Sussex from Netcong to Layton, the latter place being situated about $2\frac{1}{2}$ miles from the Delaware river at Dingman's Ferry. Thus we have only $2\frac{1}{2}$ miles to finish in order to procure an improved road across the State to the Delaware river, the section between Layton and Dingman's being at present under improvement by a force of convicts employed by the State.

The improvement consists of a graded roadway 30 feet in width through the center portion of which extends a macadam pavement 16 feet wide and 7 inches deep.

An idea of the great improvement made in this road may be gleaned from the fact that the maximum grade was reduced from 12 per cent to $6\frac{1}{2}$ per cent, this latter maximum grade being only for a short distance through the built up portion of Branchville, at which point the road is over ten feet below the original surface.

Owing to the limited train service in this section of the State this highway is of very great importance and of much benefit to those residing in and traveling through the county.

Detailed statement of the cost of the Newton- Branchville road, Section Two, Township of Frankford, Borough of Branchville, County of Sussex.

Total length, 17,532 feet, or 3.32 miles.
Kind of pavement, Macadam.
Width of paved way, 16 feet.
Length of paved way, 17,532 feet.
Depth, 7 inches.
Width between slopes or curbs, 30 feet.

Foundation, type C., 31,168 sq. yds., at 29 cents; total,.....	\$9,038.72
Surface, type A., 31,168 sq. yds., at 30 cents; total,.....	9,350.40
Earth excavation (outside), 488.5 cu. yds., at 60 cents; total,.....	293.10
Earth excavation, 22,939 cu. yds., at 30 cents; total,.....	6,881.70
Rock excavation, 106.2 cu. yds., at \$2.00; total,.....	212.40
Under drain, type 4-in. tile, 600 lin. ft., at 30 cents; total,.....	180.00
Under drain, type 6-in. tile, 479 lin. ft., at 50 cents; total,.....	239.50
Gutter, type Cobble, 127 sq. yds., at 90 cents; total,.....	114.30
Cross drains, 12-in., 206 ft., at 80 cents; total,.....	164.80
Cross drains, 16-in., 122 ft., \$1.25; total,.....	152.50

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Cross drains, 18-in., 76 ft., at \$1.40; total,.....	106.40
Cross drains, 30-in., 176 ft., at \$3.00; total,.....	528.00
Cross drains, 42-in., 42 ft., at \$4.00; total,.....	168.00
Cross drains, 48-in., 18 ft., at \$5.25; total,.....	94.50
Concrete, 10 cu. yds., at \$7.00; total,.....	70.00
Reinforcing and placing,.....	13.51
Lowering 12-in. C. I. pipe,.....	10.85
Moving 10-in. C. I. pipe,.....	9.46
Rubble work on 48-in. cross drain,.....	4.44
Labor on old sluiceway,.....	3.10
Concrete retaining walls,.....	562.75
Dry walls, 1,296.3 cu. yds., at \$2.50; total,.....	3,240.75

Inspection,	\$31,439.18
Engineering,	697.50
	1,708.00

\$33,844.68

Total cost of road,..... \$33,844.68

Lump sum, contract price,.....	28,089.22
Amount allowed by State,.....	33,844.68
Forty per cent. of above, State's share,.....	13,537.87
Less credit by cost of inspection already paid by State,.....	697.50

Amount due by State,.....	12,840.37
Less partial payment,.....	8,699.81

\$4,140.56

Maximum grade before,.....	12 per cent.
Maximum grade after,.....	6.5 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

HARVEY SNOOK,
Engineer.
THOMAS L. FARLEY,
Inspector.

January 9th, 1917.

UNION COUNTY.

Mountain or Westfield Avenue, West Section, 3.631 Miles Long.

The extraordinary improvement of this road begins at the Somerset County line at Greenbrook, in the township of Fanwood, and extends northeasterly to a point just beyond Mountainside Chapel in the borough of Mountainside. This is a re-improvement of a road, the main portion of which was constructed under the County Bonding Act in 1889. At that time the road consisted of a Telford pavement, which, under the excessive increase of traffic, had proved itself inadequate to answer the demands of the present day. For that reason the State and county decided that a concrete pavement, 18 feet in width, and varying in depth from 8 inches in the center to 6 inches at the sides, should be laid. This was done and, at the same time, the road was graded to a width of from 36 to 40 feet.

A few reverse curves which had been deemed of aesthetic value in 1889, but which now had developed into danger zones, were eliminated, and the line of road very much straightened. There was one hill near

Mountainside which was not graded as much as it should have been in 1889. The grade of this was reduced from 5.61 to 3.65 per cent.

After the pavement had been laid, it was thoroughly washed and broomed, and an application of hot tar was applied from auto-pressure distributors over the entire length and width of the concrete.

The reason for changing the pavement from Telford to Portland cement concrete was that after careful consideration it was deemed more economical to maintain the Portland cement in a condition smooth, hard and convenient for travel, than it would be possible to so maintain a Telford road.

Detailed statement of the cost of Mountain or Westfield avenue, West Section, Township of Fanwood, Town of Westfield and Borough of Mountainside, County of Union.

Total length, 19,172.07 feet, or 3.631 miles.
Kind of pavement, concrete, type C., with bituminous dressing type B. D.
Width of paved way, 18 feet.
Length of paved way, 19,172.07 feet.
Depth, 6 inches to 8 inches, finished.
Width between slopes or curbs, 36 ft. to 40 feet.

Foundation, type C., 39,439 sq. yds., at \$1.25; total.....	\$49,298.75
275 trees removed, lump sum.....	825.00
Surface, type B-D., 39,439 sq. yds., at 10 cents; total.....	3,943.90
New Macadam at intersections and entrances, type M. W. B., 1,030.1 sq. yds., at 40 cents; total.....	412.04
Shoulders, type Old Macadam, 6,688 sq. yds., at 10 cents; total.....	668.80
Earth excavation, 24,036 cu. yds., at 40 cents; total.....	9,614.40
Rock excavation, 106 cu. yds., at \$1.25; total.....	132.50
Under drain, type, tile, 38,302 lin. ft., at 20 cents; total.....	7,660.40
Hedges and fences reset, 6,080 lin. ft., at 10 cents; total.....	608.00
Gutter, type Cobble, 138.6 sq. yds., at 60 cents; total.....	83.10
Cross-drains at following locations:	
Sta. 23 + 08, \$280.00; Union Ave., N. gutter, \$180.00; Union Ave., S. gutter, \$250.00; Stout St., S. gutter, \$180.00; Montague St., S. gutter, \$150.00; Westfield Rd., \$115.00; Sta. 103 + 30, \$360.00; Sta. 107 + 28, \$300.00; Sta. 123 + 06.5, \$480.00; Sta. 133 + 20, \$260.00; Sta. 142 + 74, \$260.00; Sta. 153 + 47, \$350.00; Sta. 159 + 30, \$440.00; Woodland Ave., W. gutter, \$300.00; Sta. 168 + 51, \$450.00; Sta. 177 + 49.5, \$675.00. Total of above 16 items.....	
Cast iron pipe reset, 242 lin. ft., at 20 cents; total.....	48.40
Extra work as per detailed statement of Jan. 31, 1917.....	472.45

Inspection,	\$78,797.74
Engineering,	1,346.13
	3,300.00
	<hr/>
	\$83,443.87

Total cost of road.....	\$83,443.87
Lump sum, contract price.....	79,313.55
Amount allowed by State.....	83,443.87
Forty per cent. of above, State's share.....	33,377.55
Less credit by cost of inspection already paid by State.....	1,346.13
Amount due by State.....	32,031.42
Maximum grade before.....	5.61 per cent.
Maximum grade after.....	3.65 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

J. L. BAUER,

CHARLES H. DENNISTON,

Engineer.

Inspector.

February 3rd, 1917.

STATE HIGHWAY COMMISSION.

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St. George Avenue, .183 Miles Long.

This road begins at Leesville Avenue or Colonia Road, in the city of Rahway, and ends at the Middlesex County line. It is graded for a width of 40 feet and paved to a width of 24 feet, with a depth of 6, 8 and 10 inches.

This short improvement is of much more value than its length would indicate, as it fills the last remaining gap in the improved pavement between Newark and Perth Amboy. The line of the road is also very much improved, and the convenience of the traveling public very much conserved by the erection of a new reinforced concrete bridge, which replaced an old truss bridge with plank floor.

The work was somewhat delayed owing to the fact that it was necessary to fill in the old bed of the brook before the pavement could be laid. This filling was done in the spring and early summer and allowed to thoroughly settle and consolidate until winter, at which time the Portland cement concrete pavement was laid and also the short piece of brick pavement which was necessary to complete the connections with the brick pavements laid by the Pennsylvania railroad at this point.

The grade was not changed.

Detailed statement of the cost of St. George Avenue, City of Rahway, County of Union.

Total length, 964 feet, or 0.183 miles.	
Kind of pavement, concrete base, type C-1 with brick surface, type B.-P.	
Also concrete base, type C. with Bituminous dressing, type B.-D.	
Width of paved way, 24 feet.	
Length of paved way, 637.2 feet.	
Depth, 6 inches, 8 inches and 10 inches.	
Width between slopes or curbs, 40 feet.	
Foundation, type C-1, 383.4 sq. yds., at 90 cents; total,.....	\$345.06
Foundation, type C. 1.608 sq. yds., at \$1.60; total,.....	2,572.80
Surface, type B.-P., 383.4 sq. yds., at \$1.80; total,.....	690.12
Surface, type B.-D., 1,608 sq. yds., at 12 cents; total,.....	192.96
Earth excavation, 4,032 cu. yds., at 70 cents; total,.....	2,822.40
Under drain, type 3-in. tile, 971 lin. ft., at 40 cents; total,.....	388.40
Concrete curb, 58 lin. ft., at 60 cents; total,.....	34.80
Concrete and 4-in. blue stone header, 100.5 lin. ft., at 40 cents; total,....	40.20
Cross drain at Sta. O. lump sum,.....	420.00
Cross drain at pipe at Sta. 6 + 10, lump sum,.....	380.00
95 feet vitrified tile drain, 18-inch, Sta. 9 + 64, lump sum,.....	75.00
Extra work at intersection of Colonia road,.....	42.08
60 feet of 18-inch pipe drain with excavation at \$1.90,.....	114.00
Total road work,.....	\$8,117.82
New bridge over South Branch of Rahway river, lump sum,...	\$7,875.00
Extra work at bridge,.....	734.88
Total of bridge work,.....	8,609.88
	<hr/>
	\$16,727.70
Cost of road work,.....	\$8,117.82
Inspection,	429.94
Engineering on road work,.....	433.18
Total cost of road work,.....	\$8,980.94
Cost of bridge work,.....	\$8,609.88
Engineering,	433.18
Total cost of bridge work,.....	\$9,043.06

Lump sum, contract price road work, \$7,918.72; bridge work, \$7,875.00...	\$15,793.72
Amount allowed by State on road, \$8,980.94; on bridge, \$9,043.06,.....	18,024.00
Forty per cent. of above, State's share on road work.....	3,592.38
Twenty per cent. of above, State's share on bridge work.....	1,808.61
Less credit by cost of inspection already paid by State,.....	429.94
Amount due by State,.....	4,971.05
Maximum grade before,.....	1.6 per cent.
Maximum grade after,.....	1.6 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

J. L. BAUER,
Engineer.
PETER J. MAGÉE,
Inspector.

February 1st, 1917.

WARREN COUNTY.

Buttzeville—Danville Road, Change in Line and Grade, .369 Mile Long.

This short piece of road eliminates a very sharp double turn at the Danville end of the road, which this Department urged the Board of Freeholders to eliminate when this improvement was first contemplated. At that time the Board thought the expense would be too great and therefore requested that it be permitted to construct the road along the old lines, with the understanding that it would, sometime in the future, improve the alignment at the Danville end; but when the bids were received, they were found to be so much lower than had been anticipated, and, owing to the insistent demands of the residents of Danville that the road should be carried in a direct line westerly from the village along the lines originally proposed by this Department, the old crooked alignment was eliminated from the original contract and this short length constructed.

This improvement very much enhanced the safety of the road, not only to the traveling public but also to the inhabitants along the line, and particularly to the school children who attend the school upon the corner adjoining and north of this new line.

The pavement was constructed to correspond with that of the remainder of the road; namely, of macadam, 16 feet in width and 6 inches in depth after final consolidation. It was also graded to a width of 30 feet.

An idea of the amount of work and the extent of the improvement may be gained from the fact that the maximum grade was reduced from 12 per cent to 6 per cent.

STATE HIGHWAY COMMISSION.

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Detailed statement of the cost of the Buttzville-Danville road change in line and grade, Township of Hope and Independence, County of Warren.

Total length, 1,950 feet, or 0.369 miles.
 Kind of pavement, water bound macadam.
 Width of paved way, 16 feet.
 Length of paved way, 1,950 feet.
 Depth, 6 inches.
 Width between slopes or curbs, 30 feet.

Foundation, type M., 3,945 sq. yds., at 28 cents; total,.....	\$1,104.60
Surface, type M. W. B., 3,945 sq. yds., at 30 cents; total,.....	1,183.50
Earth excavation, 11,420 cu. yds., at 45 cents; total,.....	5,139.00
Gutter, type Cobble, 453.7 sq. yds., at 60 cents; total,.....	272.22
Cor. iron pipe, 12-in., 126 lin. ft., at \$1.10; total,.....	138.60
Cor. iron pipe, 18-in., 60 lin. ft., at \$1.53; total,.....	76.50
Vit. tile pipe, 15-in., 534 lin. ft., \$1.04%; total,.....	557.36
Grates for catch basins, 2, at \$5.50; total,.....	11.00
Concrete end walls, 6.2 cu. yds., at \$10.00; total,.....	62.00
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Inspection,	\$8,544.78
Engineering,	175.00
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Extras paid entirely by county,.....	1,055.43
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Total cost of road,.....	\$10,196.21
Lump sum, contract price,.....	7,916.70
Amount allowed by State,.....	9,140.78
Forty per cent. of above, State's share,.....	3,656.31
Less credit by cost of inspection already paid by State,.....	175.00
Amount due by State,.....	3,481.31
Maximum grade before,.....	12 per cent.
Maximum grade after,.....	6 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

F. W. SALMON,

Engineer.

FREDERICK D. WOODRUFF,

Inspector.

November 8th, 1916.

Buttzville-Danville Road, 5.422 Miles Long.

This improvement begins at the end of the macadam road at Danville, now known as Great Meadows, and extends along the valley of the Pequest River to the macadamized road at Buttzville. The old road was very crooked and narrow, and crossed and re-crossed the railroad at two points. The new line was constructed in such manner as to eliminate all of the railroad crossings, thereby greatly increasing the safety as well as the comfort of the traveling public.

The amount of work done in grading was much in excess of that ordinarily required, owing to the necessity of straightening the line and laying out a new route over a portion.

This road forms a very important link in our through route across the State toward the Delaware Water Gap. We have now an improved

highway from the Hudson to the Delaware River, and that the same is greatly appreciated by the traveling public is evidenced by the large increase in the number of automobilists who use this road daily.

This road was graded to a width of 30 feet and macadamized to a width of 16 feet and to a depth of 6 inches. The maximum grade was reduced from 9 per cent to 5 per cent.

Detailed statement of the cost of the Buttzville-Danville road, Townships of White and Hope, County of Warren.

Total length, 28,626.83 feet, or 5.422 miles.
Kind of pavement, water bound macadam.
Width of paved way, 16 feet.
Length of paved way, 28,626.83 feet.
Depth, 6 inches.
Width between slopes or curbs, 30 feet.

Foundation, type S., 22,465 sq. yds., at 26 cents; total,.....	\$5,840.90
Foundation, type M., 28,893 sq. yds. at 26 cents; total,.....	7,512.18
Concrete culverts, 57 cu. yds., at \$10.00; total,.....	570.00
Surface, type M. W. B., 51,358 sq. yds., at 20 cents; total,.....	10,271.60
Surface, type M. W. B. entrances, 156 sq yds., at 30 cents; total,.....	46.80
Concrete end walls, 79.4 cu. yds., at \$10.00; total,.....	794.00
Earth excavation entrances, 673 cu. yds., at 40 cents; total,.....	269.20
Earth excavation, 50,725 cu. yds., at 29 cents; total,.....	14,710.25
Rock excavation, 4,554 cu. yds., at 1.75 cents; total,.....	7,969.50
Under drain, type French, 707 lin. ft., at 25 cents; total,.....	176.75
Rubble masonry retaining walls, 1,349.2 cu. yds., at \$3.00; total,.....	4,047.60
Gutter, type Cobble, 159.3 sq. yds., at 60 cents; total,.....	95.58
Cor. iron pipe, 12-in., 785 lin. ft., at \$1.10; total,.....	863.50
Cor. iron pipe, 14-in., 138 lin. ft., at \$1.25; total,.....	172.50
Cor. iron pipe, 18-in., 126 lin. ft., at \$1.75; total,.....	220.50
Cor. iron pipe, 24-in., 270 lin. ft., at \$2.20; total,.....	594.00
Cor. iron pipe, 30-in., 152 lin. ft., at \$3.00; total,.....	456.00
C. I. pipe (take up and relay), 12-in., 60 lin. ft., at 50 cents; total,.....	30.00
C. I. pipe (take up and relay), 18-in., 18 lin. ft., at 50 cents; total,.....	9.00
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	\$54,649.86
Bridge No. 1,.....	\$1,300.00
Bridge No. 2,.....	850.00
Bridge No. 3,.....	950.00
Bridge work,.....	\$3,100.00
Inspection,	1,150.59
Engineering,	3,408.00
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	\$59,208.45
Extras paid entirely by county,.....	956.89
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Total cost of road and bridges (road, \$60,165.34; bridges, \$3,100.00) ..	\$63,265.34
Lump sum, contract price (road, \$49,571.75; bridges, \$3,000.00).....	52,571.75
Amount allowed by State on road work.....	59,208.45
Forty per cent. of above, State's share,.....	23,683.38
Less credit by cost of inspection already paid by State,.....	1,150.59
Amount due by State on road work,.....	22,532.79
Amount due by State on bridge work, 20 per cent. of \$3,100.00,.....	620.00
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	\$23,152.79
Maximum grade before,.....	9 per cent.
Maximum grade after,.....	5 per cent.

We hereby certify that the above road is finished in all respects in strict compliance with the plans and specifications.

F. W. SALMON,

Engineer.

FREDERICK D. WOODRUFF,

Inspector.

November 8th, 1916.

Cost of Repairs.

In compliance with Chapter 113, P. L. 1906, amended Chapter 235, P. L. 1909, amended Chapter 225, P. L. 1910, also amended Chapter 395, P. L. 1912, further amended Chapter 317, P. L. 1913, money from the motor vehicle fund, during the fiscal year from November 1, 1916, to October 31, 1917, has been sent to the various authorities for repairs on the following roads:

NAME OF ROAD.	County.	Amount.
Adelphia-Farmingdale road,	Monmouth,	\$353.90
Aldine-Pole Tavern road,	Salem,	2,500.00
Amboy-Keyport, first section,	Monmouth,	12,708.72
Amboy-Keyport, second section,	Monmouth,	2,265.00
Amboy-Keyport, second section,	Monmouth,	750.00
Ballinger's Mills-Pole Tavern road,	Salem,	2,095.20
Beach road,	Ocean,	1,000.00
Beach and Shore roads,	Ocean,	1,000.00
Beach and Shore roads,	Ocean,	4,000.00
Belleville Turnpike,	Hudson,	1,330.97
Belleville Turnpike,	Hudson,	2,289.50
Belleville Turnpike,	Hudson,	3,000.00
Bergen Mills Cut-Off,	Monmouth,	2,750.50
Blazier's Corner-Mt. Harmony,	Somerset,	8,800.00
Bloomsbury-West Portal road,	Hunterdon,	150.00
Bloomsbury-West Portal road,	Hunterdon,	150.00
Bowne's Corner-Columbia road,	Burlington,	2,876.85
Brighton Avenue, Long Branch,	Monmouth,	3,425.76
Broad street, Keyport,	Monmouth,	5,601.78
Broad street and Maple avenue,	Salem,	6,400.00
Brown's Mills-Lakehurst road,	Burlington,	2,000.00
Burlington-Bridgeboro road,	Burlington,	5,993.12
Central avenue, Borough of Norwood,	Bergen,	5,000.00
Clayton-Malaga-Downstown road,	Gloucester,	1,000.00
Clinton-Hampton road,	Hunterdon,	1,500.00
Coffin's Corner road,	Camden,	3,500.00
Connecting Links,	Salem,	1,773.27
Cranbury Turnpike, section four,	Middlesex,	30,000.00
Crown Point road,	Gloucester,	773.95
East Rahway avenue,	Middlesex,	3,000.00
Edgewater Borough,	Bergen,	2,000.00
Elmer-Alloway road,	Salem,	1,702.73
General Repairs, Englewood Cliffs,	Bergen,	750.00
Fairview and Grove avenues,	Essex,	30,000.00
Flemington-Frenchtown road,	Hunterdon,	2,000.00
Flemington-Frenchtown road, first section,	Hunterdon,	1,100.00
Flemington-Pleasant Run road,	Hunterdon,	1,800.00
Fort Lee road,	Bergen,	250.00
Freehold-Adelphia road,	Monmouth,	2,000.00
Frenchtown-Spring Mills road,	Hunterdon,	1,000.00
General Repairs,	Essex,	5,000.00
General Repair of roads,	Hudson,	7,500.00
General Repair of roads,	Hudson,	2,589.10
General Repairs,	Mercer,	55,000.00
General Repairs,	Sussex,	1,099.43
General Repairs,	Union,	12,000.00
General Repairs,	Warren,	4,000.00
Hancock's Bridge-Canton road,	Salem,	714.34
High Bridge-Clinton,	Hunterdon,	1,000.00
High Bridge-Hoffman's,	Hunterdon,	2,000.00
Hightstown-Manalpan,	Middlesex,	1,000.00

NAME OF ROAD.	County.	Amount.
Jobstown Pike,	Burlington,	6,418.14
Jobstown Pike,	Burlington,	21,000.00
King's Highway,	Camden,	7,414.44
Kingston-Franklin park,	Somerset,	3,000.00
Kingston-Monmouth Jct.-Dayton,	Middlesex,	1,000.00
Kingston-Van Doren's Mills,	Somerset,	4,000.00
Lambertville-Ringoes,	Hunterdon,	1,000.00
Lambertville Ringoes,	Hunterdon,	1,700.00
Lebanon-Clinton road,	Hunterdon,	1,500.00
Lodi Avenue, Little Ferry,	Bergen,	169.90
Marlton Pike,	Camden,	1,802.46
Metuchen-Oak Tree,	Middlesex,	1,200.00
Metuchen-Perth Amboy,	Middlesex,	19,000.00
Metuchen-Perth Amboy,	Middlesex,	2,000.00
Middletown Turnpike,	Monmouth,	15,000.00
Morris and Belvidere Turnpikes,	Warren,	20,000.00
Mt. Holly-Lumberton road,	Burlington,	10,000.00
Mt. Kemble Avenue road,	Morris,	40,000.00
Mullica River Bridge Approach,	Burlington,	650.00
Nassau Street,	Mercer,	9,000.00
Newark Turnpike,	Hudson,	526.40
Newton-Stanhope road,	Sussex,	174.78
Norwood Avenue,	Monmouth,	436.65
Oakdene Avenue, Edgewater,	Bergen,	500.00
Palisades Ave.-Gorge Road, Cliffs Park,	Bergen,	4,500.00
Park Avenue,	Bergen,	5,000.00
Parry Road,	Burlington,	4,780.14
Passaic Valley road,	Morris,	5,000.00
Paterson-Hamburg Turnpike, Section four,	Passaic,	11,300.00
Paterson Plank road,	Hudson,	5,500.00
Paterson Plank road,	Hudson,	1,404.50
Paterson Plank road, Meadow section,	Hudson,	29,363.06
Pennsgrove Borough Road,	Salem,	1,000.00
Pennsgrove Borough Road,	Salem,	1,820.17
Pennsgrove-Salem road,	Salem,	2,284.82
Plainville-Stoutsbury,	Somerset,	1,000.00
Prospect Plains-Applegarth,	Middlesex,	1,000.00
Red Bank-Oceanic road,	Monmouth,	2,578.00
Repairs of Roads per schedule,	Bergen,	57,500.00
Repair of Roads per 1916 apportionment,	Bergen,	35,000.00
Repairs of Roads per schedule,	Burlington,	21,570.79
Repairs of Roads per schedule,	Cumberland,	1,714.65
General Repair of Roads,	Hudson,	8,000.00
Repair of Roads,	Mercer,	13,000.00
Repair of Roads per schedule,	Mercer,	60,000.00
Repair of Roads per schedule,	Middlesex,	12,900.00
Repair of Roads per schedule,	Morris,	76,800.00
Repair of Roads per schedule,	Monmouth,	27,600.00
Repair of Roads per schedule,	Ocean,	9,100.00
Repair of Roads per schedule,	Passaic,	53,000.00
Repair of Roads per schedule,	Salem,	19,291.16
Repair of Roads per schedule,	Sussex,	9,000.00
Repairs to County Roads,	Sussex,	1,501.62
Repair of Roads as per schedule,	Union,	35,000.00
Ringoes-Flemington road,	Hunterdon,	1,800.00
Ringoes-Woodsville road,	Hunterdon,	2,000.00
River road,	Camden,	1,000.00
River road, Edgewater Borough,	Bergen,	2,500.00
River Road,	Middlesex,	2,000.00
Riverside Drive,	Monmouth,	1,000.00
Sayreville-So. Amboy road,	Middlesex,	1,500.00
Shore road,	Burlington,	818.90
Shore road,	Ocean,	1,000.00
So. Amboy Bridge Approach,	Middlesex,	3,500.00
So. Orange and Roseland avenues,	Essex,	35,000.00
South River, Main Street, etc.,	Middlesex,	1,700.00
South River-Old Bridge-Matawan,	Middlesex,	2,000.00
Spotswood-Englishtown,	Middlesex,	700.00
Spotswood-Jamesburg,	Middlesex,	400.00
Spotswood-Old Bridge-So. Amboy,	Middlesex,	2,000.00
Springfield Avenue, Cranford,	Union,	13,000.00
Springfield Avenue, to Morris Turnpike,	Essex,	10,000.00
Stelton-Newmarket-Dunellen road,	Middlesex,	2,000.00
Terrill road,	Union,	18,000.00

STATE HIGHWAY COMMISSION.

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NAME OF ROAD.	County.	Amount.
Union Avenue,	Middlesex,	300.00
Union Avenue, No. Branch road,	Somerset,	3,000.00
Vincentown to Bayrestown road,	Burlington,	547.50
Washington Avenue, Little Ferry,	Bergen,	250.00
Watchung road,	Morris,	79.70
Westfield Avenue,	Union,	20,000.00
West Portal-Bloomsbury road,	Hunterdon,	1,000.00
Westville-Glassboro road,	Gloucester,	2,000.00
White Horse pike,	Camden,	3,367.37
White Horse pike,	Camden,	3,500.00
Whitehouse-Pleasant Run road,	Hunterdon,	2,000.00
Woodbury-Knight's Run road,	Gloucester,	950.40
Woodbury-Swedesboro-Mantua road,	Gloucester,	1,000.00
Wyckoff road, Hoboken,	Bergen,	1,390.74
Wyckoff and Airmont roads,	Bergen,	764.91
Total,		\$1,079,565.32
Special Allotments—		
Township Roads Act,		3,271.28
Fish Hatchery Road,		878.52
Total,		\$1,083,715.12

REPAIRS AND RESURFACING FROM COUNTY FUNDS DURING THE YEAR 1917.

In some cases it is difficult to secure accurate returns; consequently, the figures in this table are approximate only.

County.	Amount.
Atlantic,	\$54,000.90
Bergen,	253,562.77
Burlington,	69,892.07
Camden,	27,966.81
Cape May,	56,430.53
Cumberland,	17,468.95
Essex,	239,668.28
Gloucester,	18,342.85
Hudson,	293,854.52
Hunterdon,	58,687.47
Mercer,	172,086.79
Middlesex,	146,262.52
Monmouth,	229,140.95
Morris,	151,799.51
Ocean,	21,779.53
Passaic,	155,505.47
Salem,	37,452.42
Somerset,	29,199.81
Sussex,	34,486.43
Union,	110,000.00
Warren,	35,417.90
Total,	\$2,213,006.48

NEW JERSEY STATE LIBRARY

Township Aid Law.

CHAPTER 217, P. L. 1916.

An Act to provide for the proper construction, grading and drainage of the unimproved township roads of the State and to provide State aid therefor.

Be it enacted by the Senate and General Assembly of the State of New Jersey:

1. There shall be set aside annually from the net receipts of the motor vehicle fund the sum of one hundred and five thousand dollars, which shall be used to meet the State's share of the cost of the work hereinafter prescribed. Payments from this fund shall be made in the same way as other payments from the motor vehicle fund. The State Commissioner of Public Roads shall reserve each year a sum of five thousand dollars to meet the said State's share in each county until the first day of July. Any amount thus reserved that has not been applied for on said date shall be distributed among other applicants, in the discretion of said Commissioner, for the work contemplated by this act.

2. Any township committee may on its own motion apply to the said Commissioner for aid under this act. Such application may be passed by resolution of said township committee at any meeting. It shall set forth the road or roads on which it is proposed that the work shall be done and the beginning and ending points of such work, and the amount of money the said committee may be authorized to spend on the work, including any contributions thereto.

3. The State Commissioner of Public Roads shall decide which applications in any county will best serve the interests of the township, county and State. He shall notify the township committee of his approval of such applications and shall thereupon enter with them into a written agreement for the necessary planning and surveying and for the doing of the actual work and for the inspection thereof. Said work may be performed, in whole or in part, by the labor of prisoners, by contract, either with or without advertisement, but advertisement shall in every case be made upon the demand of said Commissioner.

4. The work contemplated under this act will include, in addition to constructing said road, the survey and preparation of plans, profiles and cross-sections, the grading and drainage of the road and the construction of the necessary culverts and bridges whose construction and maintenance is by law now imposed upon the township authorities.

5. The share of the cost of the work to be assumed by the State shall not exceed fifty per centum of the cost of the actual work. In addition the State shall pay the cost of the survey and preparation of plans. Said work of survey and planning shall in all cases be done by said Commissioner and shall be paid for out of said fund.

6. Township committees are hereby authorized to raise funds necessary for the work contemplated in this act, by including the same in the tax levy or by temporary loans, the amount of which said temporary loans and the interest thereon until time of payment shall be included in the tax levy of the next year following that in which the indebtedness is incurred. Any township committee is hereby authorized to accept contributions from any person or corporation, toward meeting its share of the cost of this work. The financial officer of the township is hereby directed to receive such contributions and to properly credit the same.

7. Any township committee may acquire any land necessary for straightening or relocation of any road on which work is to be done under this act by gift, grant, demise, by purchase, or by the exercise of eminent domain, in the manner now provided by law. All roads on which work may be done under this act shall have a right of way not less than thirty-three feet wide.

8. It shall be the duty of any township committee, accepting State aid under this act, to maintain the roads on which State aid has been received in a condition satisfactory to the State Commissioner of Public Roads. The State Commissioner of Public Roads may agree in any year to assume a share, not exceeding one-half of the cost of said maintenance, and to pay the same out of the receipts of the motor vehicle fund.

9. The State Commissioner of Public Roads is hereby authorized to employ such assistants, either temporary or permanent, as may be necessary for the discharge of the duties imposed upon him by this act.

10. All acts and parts of acts inconsistent with this act are hereby repealed, but this repealer shall not work to revive any statute or part thereof heretofore repealed.

11. This act shall take effect immediately.

Approved March 20, 1916.

State Highway Laws

CHAPTER 14.

An Act to establish a State Highway System, and to provide for the improvement, betterment, reconstruction, resurfacing, maintenance, repair and regulation of the use thereof.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. The State Highway Commission shall as soon as practicable lay out routes for a State Highway System as follows: Routes for highway system.

ROUTES.

Route No. 1. From Elizabeth to Trenton, by way of Rahway, Metuchen, New Brunswick and Hightstown. Route 1.

Route No. 2. From Trenton to Camden, by way of Bordentown, Fieldsboro, Roebling and Burlington. Route 2.

Route No. 3. From Camden to Absecon, by way of Berlin and Hammonton. Route 3.

Route No. 4. From a point on Route No. 1 in or near Rahway to Absecon, by way of Perth Amboy, Keyport, Middletown, Red Bank, Long Branch, Asbury Park, Point Pleasant, Lakewood, Toms River, Tuckerton and New Gretna. Route 4.

Route No. 5. From Newark to the bridge crossing the Delaware river about two miles above Delaware, by way of Morristown, Dover, Netcong, Budd's Lake, Hackettstown, Buttsville and Delaware. Route 5.

Route No. 6. From Camden to Bridgeton and Salem, by way of Woodbury, Mullica Hill, Woodstown and Pole Tavern. Route 6.

Route No. 7. From Hightstown to Asbury Park, by way of Freehold, Jerseyville and Hamilton. Route 7.

Route No. 8. From Montclair to State line at Unionville, by way of Singac, Wayne, Pompton Plains, Butler, New Foundland, Stockholm, Franklin Furnace and Sussex. Route 8.

Route No. 9. From Elizabeth to Phillipsburg, by way of Westfield, Plainfield, Bound Brook, Somerville, White House, Clinton, West Portal and Bloomsbury. Route 9.

Route No. 10. From Paterson to Fort Lee Ferry, by way of Dundee Lake and Hackensack. Route 10.

Route No. 11. From Newark to Paterson, by way of Belleville, Bloomfield, Nutley and Passaic. Route 11.

Route No. 12. Paterson to Phillipsburg, by way of Little Falls, Pine Brook, Parsippany, Denville, thence over Route No. 5 to Budd's Lake, thence to Washington and Broadway. Route 12.

Route No. 13. New Brunswick to Trenton, by way of Kingston, Princeton and Lawrenceville. Route 13.

Route No. 14. From Egg Harbor City to Cape May City, by way of Mays Landing, Tuckahoe and Cape May Court House. Route 14.

Route No. 15. From Bridgeton to Cape May Court House, or such other point on Route No. 14 as may be determined by the State Highway Commission. Route 15.

Said routes shall be as short and direct as practicable between the points specified, due regard being had for the other requirements of the act. Direct as practicable.

Use of existing roads.	Existing highways may be made use of wherever it is convenient so to do, but the commission may lay out, open and improve new roads over acquired rights of way, and may also lay out routes in continuation of, connecting with, or in addition to the routes above specified.
Road map.	2. The State Highway Commission shall from time to time cause to be prepared a road map or plan of the State showing thereon the State highways and county roads.
Notice of intent to take over route.	3. When, in its discretion, it shall see fit so to do, the State Highway Commission shall give notice in writing, which may be served by mailing to the presiding officer or clerk of the governing body in charge, that the said commission will upon a day to be fixed in said notice, and not less than thirty days from date thereof, give a hearing to all parties interested thereon, and shall after said hearing determine by resolution whether any routes, route or parts thereof, if any, shall be taken over as a State highway, and shall notify such governing body of such action. Upon the passage of such resolution, such routes, route or part thereof, shall become a State highway, and its further improvement, maintenance and repair shall be at the expense of the State under the jurisdiction of the State Highway Department; <i>provided, however,</i> that whenever the governing body, or other jurisdiction from which said highway is taken over, has rights or benefits by virtue of an understanding, agreement, award or contract with any public utility or other company, firm, individual or corporation, to repair, maintain or construct all or any part of such highway, or to deliver or execute any other source of obligation with respect thereto, the said undertaking shall remain in force, and all such contractual or agreement rights, duties and benefits shall pass to and be taken over and assumed for the State by the State Highway Commission. All the terms, conditions and requirements of such agreements or contracts shall be fulfilled to the State by any public utility or other company, firm, individual or corporation, in the same manner as if they had been originally made between the State and said companies, firms, individual or corporations.
Action taken.	
Proviso.	
Fulfillment of contracts.	
When act suspended.	4. If at the time when it is proposed to take over any highway, a contract for any work thereon, shall have been awarded but the work thereunder not completed, the further operation of this act with respect to such highway or part thereof shall be suspended until the completion of such work.
Reimbursement of counties for work done on certain roads.	5. If when any highway is taken over by the State under this act, any county shall have improved, reconstructed or made any extraordinary repairs upon the same, or any part thereof, under a contract or contracts awarded after the first day of March, one thousand nine hundred and sixteen, the State Highway Commission shall first set aside from the funds under its control herein provided for a sufficient sum of money to reimburse such county for all money expended by it on such work, whether the moneys so expended were raised by the issue of bonds or otherwise, exclusive, however, of all moneys which may have been received by such county in the form of State aid, and expended as part of the cost of such extraordinary repairs or reconstruction. <i>Provided, however,</i> that no such repayment shall be made by virtue
Proviso.	

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of any award of contract made therefor after the date upon which this act shall take effect, unless some proceeding concerning such contract has been heretofore begun or said contract shall have been approved by the State Highway Commission, before the execution thereof. For the purpose of determining the amount of money expended by any such county as aforesaid, the county engineer shall prepare and file with the State Highway Commission a detailed certificate of the moneys so expended by such county, and shall be accepted as fixing the amount so expended by such county; *provided, however*, that such work shall be equal to that required by the provisions of this act.

Detailed certificate of expenditures.

Proviso.

In case any money thus repaid to any county was raised by sale of bonds an amount equal to the amount thus raised, shall be used to retire said county bonds or invested in such manner as may be lawful for sinking funds.

Retiring county bonds.

6. The State highways herein provided for shall be paved with granite, asphalt, or wood blocks, bricks, concrete, bituminous concrete, sheet asphalt or other pavement having a hard surface and of a durable character. But nothing in this act shall be held to prevent the State Highway Commission from maintaining roads heretofore improved with other materials with their present or similar surfaces pending their paving with materials complying with this act. In all cases the width of the pavement shall be at least eighteen feet and the total width of the roadway shall be at least thirty feet. All sharp turns and angles and railroad grade crossings shall be eliminated wherever practicable.

Paving material to be used.

Maintenance of existing roads.

Width of road and pavement.

Angles and grade crossings.

7. The State Highway Commission shall take charge of all work on State highways and maintain the same in good order. All work of improvement, betterment, reconstruction, or resurfacing shall be done in accordance with plans and specifications prepared by the State Highway Department. All work of maintenance, repair and extraordinary repair shall be done at the expense of the State and may be done either as an independent contractor or employer or through contracts made in the name of the State of New Jersey.

All work and repairs done by State.

8. For any road in the State Highway System prior to its taking over as a State highway, as provided by this act, no consent, grant or franchise for the laying in or upon it of any railroad or street railway crossings, gas pipes, water pipes, electric conduits or other piping, telegraph, telephone, electric light or power poles shall be given except under such restrictions, regulations and conditions as are or shall be approved and officially made known by the State Highway Commission to the body with authority to issue such privilege. No issue of such consent, grant or franchise by any public body shall operate as a waiver of liability in favor of the person, firm, company or corporation laying or erecting such works in or upon such highway or any portion thereof.

Use of roads by public utilities.

9. No State highway shall extend into any municipality other than township of a population exceeding twelve thousand in number, as determined by the most recent census. With such municipality, the streets or roads of which will form proper connections of State highways, the State Highway Commission shall enter into contract for work which shall place such streets or roads in a condition which

State highways in certain townships only.

will be in keeping with the nature of the State highways approaching and leaving such municipality.

Such contracts shall terminate on the thirty-first day of October in each and every year.

10. In the construction, repair and maintenance of highways, forming a part of the State Highway System, the said commission shall possess and exercise, in addition to those conferred by this act, all those rights and powers, not incompatible with its functions nor prohibited by law, which are now exercised by overseers of roads and boards of chosen freeholders in road construction, repair and maintenance.

11. It shall be lawful for the State Highway Commission to enter into written agreement with any board of chosen freeholders or other public body, or any person or corporation for co-operation in any work, and to assume any portion of that cost. Such board or public body may raise their proportionate share of such cost in accordance with the provisions of any law providing for road improvement or maintenance. Upon approval by the said commission of the certificate of the inspector and engineer in charge of the work that the same has been satisfactorily completed in whole or in part, according to contract, drawings and specifications, the disbursing officer of said board or body shall pay its share of the whole or partial cost to the State Treasurer to the credit of the State Road Fund.

12. The State Highway Commission may enter into a contract with any person, company, firm or corporation, public or private, for the acquisition of any necessary lands, or easements for gravel pits or other natural deposits of road materials, advantageously located to the State highways, and may take title in the name of the State.

13. All work of construction or building of unimproved roads and of extensive repairs to improved roads taken over as State highways shall be by contract or by labor of inmates of State institutions.

14. The State Highway Commission shall advertise for bids on the work and materials covered by the plans and specifications, and may divide the same into two or more contracts, but all bids for the whole or as subdivided shall be submitted at one time. Such advertisement shall be by public notice published for at least three weeks before the contract may be awarded, at least once a week in each of two newspapers printed in the county or counties where such roads are located and in one other newspaper in Trenton, and may be inserted in one or more American engineering periodicals. The advertisements shall give a brief description of work and materials required, specify where plans and specifications can be seen, or had, the hour, the date, and place where the sealed proposals will be received and publicly opened and read, and such other pertinent information the commission may include.

15. The commission may reject any or all bids not in accord with the advertisement of specifications, or for other irregularity, or may reject any or all bids if the price for work or materials is excessively above the estimated cost or for any other cause. The State Highway Engineer shall prepare a list of the bids, including any rejected and

Termination
of contracts.

Rights and
powers of
highway com-
mission.

Agreement
with other
bodies for
co-operation.

Provision for
cost.

Payment on
approval.

Contract for
certain ma-
terials.

Work done
by contract
or inmates of
State institu-
tions.

Proposals
invited by ad-
vertisement.

Right to
reject bids.

Contract
awarded low-
est bidder.

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the cause therefor, and the commission by resolution shall award the contract to the lowest responsible bidder.

16. A certified check equal to at least ten per centum of the bid; *provided*, that in case the bid be less than five thousand dollars (\$5,000) the check shall be five hundred dollars (\$500) must accompany the same, drawn to the order of the State Treasurer, and shall be held as security that, if awarded the contract, the bidder will deliver the same, within ten days from the ratification of the award, properly signed and secured by a satisfactory bond. In case of the bidder's failure so to do, said check shall be forfeited to the State, as liquidated damages, and shall be applied and become a part of the State road fund. The commission may require, in addition to said certified check, such additional evidence of the ability of the contractor to perform the work required by the contract, as it may deem necessary or advisable.

Certified check to accompany bid.

Evidence of contractor's ability to perform work.

17. Contracts may provide for partial payment on work of construction or maintenance, but not in excess of eighty per centum of the value of materials in place and of the work done. Where, however, the contract provides that a portion of the work may be deferred with the approval of the State Highway Commission, the sum withheld from the contractor may be not less than twenty-five per centum in excess of the value of such deferred work.

Partial payment on contract.

18. At the end of each fiscal year the State Highway Commission shall make to the State Comptroller a full financial report showing the available unexpended balances in the several accounts, also all outstanding liabilities, under contracts or other financial obligations to counties, municipalities, person, firm or corporation.

Annual report at close of fiscal year.

19. Wherever in this act the following words are used, they shall be held to have the meanings hereinafter given:

Definitions.

DEPARTMENT: The State Highway Department, acting through the action of the State Highway Commission, or such officials as may be by the Commission designated.

Department.

COMMISSION: The State Highway Commission.

Commission.

ENGINEER: The State Highway Engineer, or the Assistant State Highway Engineer, when designated.

Engineer.

HIGHWAY: Any public right of way, whether opened or improved or not, including all existing factors of improvements.

Highway.

STATE HIGHWAY SYSTEM: All highways included in the routes set forth in this act, or others added thereto, including all bridges, culverts, such necessary gutters, guard rails, along the route thereof.

State highway system.

ROADS: Highways other than streets, boulevards and parkways.

Roads.

STATE ROADS: Roads taken over by the State and maintained by the State.

State roads.

COUNTY ROADS: Roads taken over, controlled or maintained by the county.

County roads.

STREETS: A highway in a thickly settled district where, in a distance of one thousand three hundred and twenty feet on the center line of the highway, there are twenty (20) or more houses within one hundred feet of said center line; or any highway which the governing body in charge thereof and the commission may declare a street; also all

Streets.

	highways within incorporated municipalities of over twelve thousand population by the last census; the word "street" shall be deemed to include boulevards, parkways, speedways, being highways maintained mainly for purposes of scenic beauty or pleasure, or of which the public use is restricted.
Routes.	ROUTES: A highway or set of highways including roads, streets, boulevards, parkways, bridges and culverts needed to provide direct communication between designated points.
Governing body.	GOVERNING BODY: The mayor and council, town council, village trustees, commission or committee of any municipality, including townships. And the board of chosen freeholders of any county.
Take over.	TAKE OVER: The action by the department in assuming the control and maintenance of any part or parts of the State Highway System.
Authority.	AUTHORITY: Any governing body or public official charged with the care of any highway.
Improvement.	IMPROVEMENT: The original work on a road or right of way which converts the same into a road which shall, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel. Improvement shall consist of location, grading, surface, and sub-surface drainage provisions, including curbs, gutters and catch basins, foundations, shoulders and slopes, wearing surface, bridges, culverts, retaining walls, intersections, private entrances, guard rails, shade trees, illumination, guide posts and signs, ornamentation and monumenting. All of these component factors need not be included in an original improvement.
Betterment.	BETTERMENT: Construction, subsequent to the original improvement, of any one or more of the component factors properly belonging to the original improvement, which may have been omitted in the original improvement of a road, or which adds to the value thereof after improvement.
Reconstruction.	RECONSTRUCTION: Rebuilding with the same or different material of an existing improved road, involving alterations or renewal of practically all the component factors of which the original improvement consisted.
Resurfacing.	RESURFACING: Work done on an improved road involving a new or partially new pavement, with or without change in width, but without change in grade or alignment.
Maintenance.	MAINTENANCE: Continuous work required to hold an improved road against deterioration due to wear and tear and thus to preserve the general character of the original improvement without alteration in any of its component factors.
Repairs.	RPAIRS: Limited or minor replacements in one or more of the component factors of the original improvement of a road which may be required by reason of storm or other happening in order that there may be restored a condition requiring only maintenance to preserve the general character of the original improvement of a road.
Extraordinary repairs.	EXTRAORDINARY REPAIRS: Extensive or entire replacement, with the same or a different kind of material, of one or more of the component factors of the original improvement of a road, which may become necessary because of wear, disintegration or other failure.
Jurisdiction.	JURISDICTION: The civil division of the State, over the roads of which any authority may have charge.

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WORK: The acquisition of land for any purpose connected with highways by lease, gift, purchase, demise, or condemnation, for temporary or permanent use; the laying out, opening, construction, improvement, repair and maintenance of highways; the building, repair and operation of bridges; the building of culverts, walls and drainage, the planting of trees, the protection of slopes, the placing and repair of road signs and monuments, the opening, maintenance and restoration of détours, the elimination of grade crossings, the lighting of highways, the removal of obstructions to traffic and to the view, surveying and preparation of drawings and papers, the counting of traffic, the letting of contracts, purchase of equipment, materials and supplies, hiring of labor, and all other things and services necessary or convenient for the performance of duties imposed by this act. Work.

20. In case any clause, proviso or section of this act shall be attacked in any court of competent jurisdiction and shall be declared to be invalid or unconstitutional, the clause, proviso or section so declared to be invalid or unconstitutional shall be excised from this act, but the remainder of the act shall stand. As to constitutionality of act.

21. All acts or parts of acts inconsistent herewith are repealed, and this act shall take effect immediately. Repealer.

Approved March 13, 1917.

CHAPTER 15.

An Act to establish a State Highway Department and to define its powers and duties; and vesting therein all the powers and duties now devolved by law upon the Commissioner of Public Roads, and the existing State Highway Commission and Highway Commission.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. A State Highway Department is hereby established and the same shall be governed by a board to be known as the State Highway Commission, which shall consist of eight members, two of whom shall be qualified and competent engineers, and all of whom shall be residents of the State. The Governor shall, in addition thereto, be ex officio a member of the commission. State highway commission—how composed.

The members of the State Highway Commission shall be appointed by the Governor, by and with the advice and consent of the Senate, for the following terms, to take office on the date of the appointment: two for one year, two for two years, two for three years, and two for four years. Annually thereafter two members shall be appointed for a term of four years. The Governor shall have the power to summarily remove any or all members of the commission. Vacancies shall be filled for the unexpired terms. Appointment.
Terms.
Vacancies.

No pay; expenses met.

The members of the commission shall receive no compensation for their services, but the State Treasurer shall, upon the warrant of the State Comptroller, reimburse them for their necessary expenses.

Organization.

2. Said commission shall organize each year by the selection of a chairman, and the appointment of a secretary, who shall be an employee of the department. The board shall hold not less than twelve stated meetings each year, and all stated meetings and the minutes thereof shall be open to the public.

Meetings.

Engineer.

3. The board shall elect a person who shall be known as the State Highway Engineer, who shall be a qualified and competent engineer, who has had actual experience in road and bridge construction and maintenance. He shall hold office for the term of five years, and shall devote his entire time and attention to the duties of his office. His salary shall be fixed by the board, and he shall also receive reimbursement for his necessary expenses, to be paid out of the treasury of the State. He shall furnish a bond to the State in the sum of ten thousand dollars, conditioned for the faithful performance of his duties.

Term.

Salary.

Bond.

Assistant engineer.

The board shall elect an Assistant State Highway Engineer, whose qualifications shall be the same as those prescribed for the State Highway Engineer. His salary shall be fixed by the board, and he shall also receive reimbursement for his necessary expenses. He shall hold office for the term of five years. He shall furnish a bond to the State in the sum of five thousand dollars conditioned for the faithful performance of his duties. The board shall have the power to summarily remove the State Highway Engineer or the Assistant State Highway Engineer, for cause after hearing.

Salary.

Term.

Bond.

Power of removal.

Accountings.

4. The board shall provide for the proper auditing of all accounts and moneys received or expended, and of labor performed or materials used in road work, and for the collection and tabulation of such statistics as may be proper or necessary for the use of the department in carrying out the provision of any law or laws.

Assistants.

5. All other appointees and employees shall be appointed and employed by the board as and when necessary, and their compensation and duties shall be fixed by said commission, subject always to the appropriations provided therefor. All such appointments and employments, excepting that of the State Highway Engineer and Assistant State Highway Engineer shall be within the civil service of the State. The State Highway Commission may by resolution delegate to the State Highway Engineer or the Assistant State Highway Engineer the authority to engage any employee, and to fix the wages and duties thereof, subject at all times to the approval of said State Highway Commission.

Civil service

Delegated authority.

Office holding.

6. No member of the State Highway Commission shall, during the time for which he shall have been appointed, be elected or appointed by said commission to any office except that of chairman.

Office and equipment.

7. The State Highway Department shall be furnished with suitable accommodations in the State House, and elsewhere in the State as may be necessary, the same to be properly equipped for the transaction of its business.

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8. The State Highway Department shall succeed to and exercise all the powers and perform all the duties now exercised or performed by or conferred and charged upon the State Commissioner of Public Roads or upon the existing State Highway Commission or the Highway Commission by virtue of any existing law or laws, and shall have full control and direction of all projects and work on State highways.

Powers and duties.

9. All unexpended balances of appropriation heretofore made for roads shall be transferred to the commission, but without any of the restrictions or conditions imposed thereon, excepting rights heretofore vested in any governing body by any State aid contract or certificate of allotment, as to which the commission shall discharge the duties and responsibilities now imposed on the State Commissioner of Roads. All property now held by the State Commissioner of Public Roads shall likewise be transferred to the commission.

Transfer of funds and property to commission.

10. The work of the department shall be performed under the State Highway Commission, which shall have all power necessary therefor, without recital in detail. All action shall be determined by the State Highway Commission by the vote of a majority thereof. In case of a tie in any vote the Governor shall be requested to cast the deciding vote. The signature of the chairman of the State Highway Commission, or in his absence or disability the signature of a person designated by the commission, to any order, regulation, contract, bill or other paper or document required to be signed on behalf of the State Highway Department, shall be sufficient evidence of the authority therefor and authenticity thereof.

Scope of power.

Action determined by vote.

Signature of chairman as evidence of authority.

11. The State Highway Commission shall formulate and adopt such rules and regulations and prescribe duties for the conduct of the business, work and general administration of the State Highway Department, its officers and employees. The commission may purchase such material and equipment as shall be necessary for the competent, efficient and economical administration of the State Highway Department.

Rules and regulations.

Equipment.

12. In addition to, and not in limitation of, its general powers, the State Highway Commission shall have power—

Additional powers.

a. To determine and adopt rules, regulations and specifications and to enter into contract covering all matters and things incident to the acquisition, construction, reconstruction, maintenance and repair of State highways.

Matters incident to highways.

b. To execute and perform as an independent contractor or through contracts made in the name of the State of New Jersey, all manner of work incident to the maintenance and repair of State highways.

Maintenance and repair.

c. To establish and maintain as an independent contractor or employer a patrol repair system for the proper and efficient maintenance and repair of State highways.

Patrol repair system.

d. To employ and discharge, subject to the provisions of the civil service act, all foremen and laborers, prescribe their qualifications and furnish all equipment, tools and material necessary for such patrol repair system.

Laborers, tools, etc.

e. To widen, straighten and regrade any State highway and to acquire any lands or rights therein by gift, devise,

Improve, etc., roads.

Do what may be necessary.	purchase or condemnation, according to the procedure as contained in an act entitled "An act to regulate the ascertainment and payment of compensation for property condemned or taken for public use" (Revision of 1900), approved March twentieth, one thousand nine hundred, and vacate any State highway or any part thereof.
General performance.	To do and perform whatever may be necessary or desirable to effectuate the object and purposes of this act. To do and perform all acts now required by any law to be done and performed by the State Commissioner of Public Roads, the State Highway Commission or the Highway Commission. These powers are to be liberally construed.
State road fund—how composed.	13. The funds provided to meet lawful expenditures appertaining to roads, as required under this act or any other law, shall constitute a State road fund. It shall include the appropriations made therefor by the Legislature, the receipts from motor vehicle licenses, and from fines for violations of chapter 113, Laws of 1906, its amendments and supplements, as therein provided, and from any State tax levied for that purpose; from Federal aid and other contribution, sales of condemned property, fines, penalties or damages for violation of any law providing for the protection of roads. An amount equal to the State road tax shall be expended for the extension and construction of State highways. The remainder of State funds may be expended for State aid to counties and municipalities, as provided by law, in the improvement of roads, in maintenance and repair of improved roads and in the building and repair of bridges and culverts; and in acquisition of toll roads and bridges; for the maintenance and administration of the State Department of Public Roads, the salaries or wages of its lawful officers, clerical, office help and employees, and traveling expenses of such, actually and necessarily incurred while in discharge of their official duties, and such other reasonable and proper expenses itemized and reported to the department, incurred while actually on the business of the State, as the State Highway Commission shall direct and approve; <i>provided, however,</i> that no funds shall be expended for State aid to counties or other municipalities unless the roads constructed therewith shall conform to such standards as shall be prescribed by the State Highway Department, and the said county or other municipality shall have entered into an agreement or contract with the State through the said department agreeing that such road or roads shall be kept in repair or condition by patrol or such other methods of repair as shall be adopted by said department.
Use of fund.	
Proviso.	14. The term of office of the State Commissioner of Public Roads, of the members of the State Highway Commission and of the members of the Highway Commission shall terminate at the expiration of thirty days from the date this act takes effect.
Expiration of terms of present officials.	15. In case any clause, proviso or section of this act shall be attacked in any court of competent jurisdiction and shall be declared to be invalid or unconstitutional, the clause, proviso or section so declared to be invalid or unconstitutional shall be excised from this act, but the remainder of the act shall stand.
As to constitutionality of act.	

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16. All acts or parts of acts inconsistent herewith are repealed, and this act shall take effect immediately.

Approved March 13, 1917.

Repealer.

CHAPTER 16.

An Act to provide for the taxation of real and personal property in this State for State road purposes.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. There shall be annually, for a period of five years from the date of the passage of this act, assessed, levied and collected in each of the municipalities of the counties of this State, a tax of one mill on each dollar of the value of all the real and personal property in every such municipality upon which municipal taxes are or shall be assessed, levied and collected. Such tax shall be assessed, levied and collected in the same manner and at the same time as other taxes upon real and personal property are now assessed, levied and collected. It shall be the duty of the collector or other officer having the custody of the collected taxes, on or before the twenty-second day of December in each year, out of the first moneys collected, to pay to the county collector of the county such State tax required to be assessed in his taxing district, and the county collector shall pay the said State tax, which he shall have so received from the taxing districts, to the Treasurer of the State on or before the twentieth of the next January, and the said State Treasurer shall place the same in the State road fund.

Annual State tax assessed and collected.

Procedure.

Duty of municipal and county collectors.

Paid to State treasurer.

2. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed, and if any section, clause or proviso of this act shall be attacked in any court of competent jurisdiction and shall be declared to be unconstitutional and void, the said section, clause or proviso so declared to be unconstitutional and void shall be excised from the provisions of this act, but the remainder of this act shall stand, and this act shall take effect immediately.

Repealer.

As to constitutionality of act.

Approved March 13, 1917.

CHAPTER 43.

An Act to amend an act entitled (title amended by chapter 1 of the Laws of 1916) "An act to provide for the construction, permanent improvement and maintenance of public roads in this State" (Revision of 1912), approved April fifteenth, one thousand nine hundred and twelve.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Section twenty-seven of the act to which this is an amendment is hereby amended to read as follows:

Section 27 amended.

Unusual repairs or reconstruction.

Plans.

Amount devoted to work.

Action in case commissioner fails to approve.

Bonds may be issued.

27. Whenever any improved road in this State is in need of extraordinary repair or reconstruction, the public body of the county or other municipality charged with its care shall prepare specifications and any plans and cross-sections necessary to explain and describe the extraordinary repair or reconstruction contemplated, and forward the same to the State Commissioner of Public Roads. Said specifications, plans and cross-sections may include and provide for a paved surface of a type different from the existing road, either in materials or method of construction, or in width, and may also include and provide for guttering, curbing, the substantial reduction of grades or other matter incidental or appurtenant to said paved surface. The said commissioner is authorized, in his discretion, to approve of such specifications, plans and cross-sections, and to certify what amount of State moneys he will set aside for the repair of such roads. On his approval and issue of certificate, as this act provides, said public body shall advertise for bids and otherwise proceed as this act directs.

In case the State Commissioner of Public Roads shall fail for thirty days after the receipt by him of such specifications, plans and cross-sections to certify and set apart any State moneys for such extraordinary repair or reconstruction, or shall, within said thirty days, notify such public body of his refusal or inability to make such appropriation, it shall thereupon be lawful for such public body forthwith to proceed to make such extraordinary repair or reconstruction to such road, in accordance with the specifications, plans and cross-sections so submitted, and to award a contract for the doing of the work, first having advertised for bids therefor in two public newspapers printed or circulating in such county or other municipality for two weeks successively, at least once in each week, before the date fixed therein for the receipt of bids; and said extraordinary repair shall be made or said road shall be reconstructed under the supervision of the engineer of such county or other municipality.

If such county or other municipality shall not have sufficient funds wherewith to pay for the cost of such extraordinary repair or reconstruction or its share thereof, then it shall be lawful for said public body of such county or other municipality to issue certificates of indebtedness and bonds in a sum not exceeding the amount of the cost of such extraordinary repair or reconstruction or its share thereof.

2. This act shall take effect immediately.

Approved March 16, 1917.

Appendix A

CONTRACT FOR STATE AID for the Bridge over the

IN THE.....ROAD

Between the
STATE COMMISSIONER OF PUBLIC ROADS
and the
BOARD OF CHOSEN FREEHOLDERS,
COUNTY OF

WHEREAS, The State Commissioner of Public Roads, under authority conferred on him by section 4, chapter 395, laws of 1912, deems the following bridge in the a road to be improved, namely,
to be.....

and the cost of the structure yet unbuilt to replace the said bridge as too great for the public body charged with its construction;

AND WHEREAS, The Board of Chosen Freeholders, the body so charged, desires to replace the said structure with.....

NOW, THEREFORE, It is agreed between the said parties, the Board of Chosen Freeholders of.....county and the State Commissioner of Public Roads, that the said Board will erect, or cause to be erected, the structure above described at a location to be approved by said State Commissioner of Public Roads and in strict compliance with plans and specifications likewise to be approved by the said Commissioner.

The said Board further agrees that the contract for the erection of said structure shall specify that payments on account shall be not more than 80 per cent. of the cost of the work, at the prices named in the contract, and that the final payment shall not be made until the structure has been accepted by the Commissioner of Public Roads, as complying in all respects with the plans and specifications therefor.

The said Board further agrees to advertise for and receive bids as required in section 3, chapter 395, laws of 1912, in the case of roads.

The said Board further agrees that all of the provisions as to the contract and bond and its approval and as to the approval of the plans and specifications, as provided in section 2 of said act, shall be enforced as to the planning and letting of the contract for the structure aforesaid.

In consideration of the construction by the said Board of the structure under the conditions above set forth, the said State Commissioner of Public Roads agrees, on behalf of the State, to pay to said Board, on completion of the work and its acceptance by said Commissioner, a sum equal to.....per cent. of the contract price therefor.

IN WITNESS WHEREOF, The said Commissioner has signed and sealed these presents, and the said Board has caused the same to be signed by their Director and their corporate seal to be attached thereto and attested by its Clerk thisday of....., 191....

.....
State Commissioner of Public Roads.

.....
Director Board of Chosen Freeholders,
County of.....

Attest:

[Seal.]

Clerk.

Appendix B

NUMBER OF TONS OF STONE PER MILE REQUIRED TO BUILD THE FOLLOWING DEPTHS AND WIDTHS.

For the information of intending road builders, we have compiled the following tables, which approximate the number of tons of thoroughly rolled stone necessary to construct each mile at the designated depths and widths.

The basis is 3,000 tons of loose stone or 3,500 tons of compressed stone for a road one mile long, sixteen feet wide and eight inches deep. A road eight inches deep, when finished, will have required at least ten inches of stone. It should be placed in two layers of five inches each, and each layer rolled down to four inches. Then the application of the three-quarter inch and screenings will bring the road to the prescribed depth; for other thickness the stone should be placed in proportion to the intended finished depths.

An observance of this rule will insure the contract thickness for the roadbed, and save the sometimes necessary expense of resurfacing before acceptance from the contractor.

A road	8 feet wide and	4 inches deep will require	875	tons of stone per mile.
" 8	" "	6	1,312 $\frac{1}{2}$	" " "
" 8	" "	8	1,750	" " "
" 8	" "	10	2,187 $\frac{1}{2}$	" " "
" 8	" "	12	2,625	" " "
" 9	" "	4	984 $\frac{3}{8}$	" " "
" 9	" "	6	1,476 $\frac{9}{16}$	" " "
" 9	" "	8	1,968 $\frac{3}{4}$	" " "
" 9	" "	10	2,460 $\frac{15}{16}$	" " "
" 9	" "	12	2,953 $\frac{1}{8}$	" " "
" 10	" "	4	1,093 $\frac{3}{4}$	" " "
" 10	" "	6	1,640 $\frac{5}{8}$	" " "
" 10	" "	8	2,187 $\frac{1}{2}$	" " "
" 10	" "	10	2,734 $\frac{3}{8}$	" " "
" 10	" "	12	3,281 $\frac{1}{4}$	" " "
" 11	" "	4	1,203 $\frac{1}{8}$	" " "
" 11	" "	6	1,804 $\frac{11}{16}$	" " "
" 11	" "	8	2,406 $\frac{1}{4}$	" " "
" 11	" "	10	3,007 $\frac{13}{16}$	" " "
" 11	" "	12	3,609 $\frac{3}{8}$	" " "
" 12	" "	4	1,312 $\frac{1}{2}$	" " "
" 12	" "	6	1,968 $\frac{3}{4}$	" " "
" 12	" "	8	2,625	" " "
" 12	" "	10	3,281 $\frac{1}{4}$	" " "
" 12	" "	12	3,937 $\frac{1}{2}$	" " "

A road 13 feet wide and				4 inches deep will require	1,421½	tons of stone per mile.
"	13	"	"	6	"	2,132 ¹⁸ / ₁₆
"	13	"	"	8	"	2,843¾
"	13	"	"	10	"	3,554 ¹¹ / ₁₆
"	13	"	"	12	"	4,265¾
"	14	"	"	4	"	1,531¾
"	14	"	"	6	"	2,296¾
"	14	"	"	8	"	3,062½
"	14	"	"	10	"	3,828¾
"	14	"	"	12	"	4,593¾
"	15	"	"	4	"	1,640¾
"	15	"	"	6	"	2,460 ¹⁵ / ₁₆
"	15	"	"	8	"	3,281¾
"	15	"	"	10	"	4,101 ⁹ / ₁₆
"	15	"	"	12	"	4,921¾
"	16	"	"	4	"	1,750
"	16	"	"	6	"	2,625
"	16	"	"	8	"	3,500
"	16	"	"	10	"	4,375
"	16	"	"	12	"	5,250
"	17	"	"	4	"	1,859¾
"	17	"	"	6	"	2,789 ¹ / ₁₆
"	17	"	"	8	"	3,718¾
"	17	"	"	10	"	4,648 ⁷ / ₁₆
"	17	"	"	12	"	5,578¾
"	18	"	"	4	"	1,968¾
"	18	"	"	6	"	2,953¾
"	18	"	"	8	"	3,937½
"	18	"	"	10	"	4,921¾
"	18	"	"	12	"	5,906¾
"	19	"	"	4	"	2,078¾
"	19	"	"	6	"	3,117 ⁸ / ₁₆
"	19	"	"	8	"	4,156¾
"	19	"	"	10	"	5,195 ⁵ / ₁₆
"	19	"	"	12	"	6,234¾
"	20	"	"	4	"	2,187½
"	20	"	"	6	"	3,281¾
"	20	"	"	8	"	4,375
"	20	"	"	10	"	5,468¾
"	20	"	"	12	"	6,562¾

TABLES.

As many persons interested in the construction of stone roads are asking questions about their cost, we enclose a table to show at a glance the number of square yards at different widths in a mile of road; also the cost at different widths, and various prices per square yard. Any variations from these prices can be quickly ascertained by adding, subtracting, multiplying and dividing for a less or greater width. For example, a road eight feet wide has 4,693½ square yards in one mile. To obtain the number of square yards in a road having a width of nine feet, add one-eighth to the foregoing figures, and in one having a width of seven feet, subtract one-eighth; in one of twice the width given in the table, multiply by two.

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SQUARE YARDS IN ONE MILE OF

8 feet in width.	4,693 $\frac{1}{3}$	square yards.
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 feet wide, or 4,693 $\frac{1}{3}$ square yards, at 25c. per square yard.	\$1,173	33 $\frac{1}{3}$
10 "	1,466	66 $\frac{2}{3}$
12 "	1,760	00
14 "	2,053	33 $\frac{1}{3}$
16 "	2,346	66 $\frac{2}{3}$
18 "	2,640	00
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 "	4,693 $\frac{1}{3}$	30c.
10 "	5,866 $\frac{2}{3}$	30c.
12 "	7,040	30c.
14 "	8,213 $\frac{1}{3}$	30c.
16 "	9,386 $\frac{2}{3}$	30c.
18 "	10,560	30c.
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 "	4,693 $\frac{1}{3}$	35c.
10 "	5,866 $\frac{2}{3}$	35c.
12 "	7,040	35c.
14 "	8,213 $\frac{1}{3}$	35c.
16 "	9,386 $\frac{2}{3}$	35c.
18 "	10,560	35c.
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 "	4,693 $\frac{1}{3}$	40c.
10 "	5,866 $\frac{2}{3}$	40c.
12 "	7,040	40c.
14 "	8,213 $\frac{1}{3}$	40c.
16 "	9,386 $\frac{2}{3}$	40c.
18 "	10,560	40c.
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 "	4,693 $\frac{1}{3}$	45c.
10 "	5,866 $\frac{2}{3}$	45c.
12 "	7,040	45c.
14 "	8,213 $\frac{1}{3}$	45c.
16 "	9,386 $\frac{2}{3}$	45c.
18 "	10,560	45c.
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 "	4,693 $\frac{1}{3}$	50c.
10 "	5,866 $\frac{2}{3}$	50c.
12 "	7,040	50c.
14 "	8,213 $\frac{1}{3}$	50c.
16 "	9,386 $\frac{2}{3}$	50c.
18 "	10,560	50c.
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 "	4,693 $\frac{1}{3}$	55c.
10 "	5,866 $\frac{2}{3}$	55c.
12 "	7,040	55c.
14 "	8,213 $\frac{1}{3}$	55c.
16 "	9,386 $\frac{2}{3}$	55c.
18 "	10,560	55c.
8 feet wide, or 4,693 $\frac{1}{3}$ square yards, at 60c. per square yard.	\$2,816	00
10 "	3,520	00
12 "	4,224	00
14 "	4,928	00
16 "	5,632	00
18 "	6,336	00
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"
8 "	4,693 $\frac{1}{3}$	65c.
10 "	5,866 $\frac{2}{3}$	65c.
12 "	7,040	65c.
14 "	8,213 $\frac{1}{3}$	65c.
16 "	9,386 $\frac{2}{3}$	65c.
18 "	10,560	65c.
8 "	4,693 $\frac{1}{3}$	"
10 "	5,866 $\frac{2}{3}$	"
12 "	7,040	"
14 "	8,213 $\frac{1}{3}$	"
16 "	9,386 $\frac{2}{3}$	"
18 "	10,560	"

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8 feet wide, or 4,693 $\frac{1}{3}$ square yards, at 70c. per square yard,						3,285	33 $\frac{1}{3}$ %
10	"	5,866 $\frac{2}{3}$	"	70c.	"	4,106	66 $\frac{2}{3}$ %
12	"	7,040	"	70c.	"	4,928	00
14	"	8,213 $\frac{1}{3}$	"	70c.	"	5,749	33 $\frac{1}{3}$ %
16	"	9,386 $\frac{2}{3}$	"	70c.	"	6,570	66 $\frac{2}{3}$ %
18	"	10,560	"	70c.	"	7,392	00
8 " 4,693 $\frac{1}{3}$ " 75c. "						3,520	00
10	"	5,866 $\frac{2}{3}$	"	75c.	"	4,400	00
12	"	7,040	"	75c.	"	5,280	00
14	"	8,213 $\frac{1}{3}$	"	75c.	"	6,160	00
16	"	9,386 $\frac{2}{3}$	"	75c.	"	7,040	00
18	"	10,560	"	75c.	"	7,920	00
8 " 4,693 $\frac{1}{3}$ " 80c. "						3,754	66 $\frac{2}{3}$ %
10	"	5,866 $\frac{2}{3}$	"	80c.	"	4,693	33 $\frac{1}{3}$ %
12	"	7,040	"	80c.	"	5,632	00
14	"	8,213 $\frac{1}{3}$	"	80c.	"	6,570	66 $\frac{2}{3}$ %
16	"	9,386 $\frac{2}{3}$	"	80c.	"	7,509	33 $\frac{1}{3}$ %
18	"	10,560	"	80c.	"	8,448	00
8 " 4,693 $\frac{1}{3}$ " 85c. "						3,989	33 $\frac{1}{3}$ %
10	"	5,866 $\frac{2}{3}$	"	85c.	"	4,986	66 $\frac{2}{3}$ %
12	"	7,040	"	85c.	"	5,984	00
14	"	8,213 $\frac{1}{3}$	"	85c.	"	6,981	33 $\frac{1}{3}$ %
16	"	9,386 $\frac{2}{3}$	"	85c.	"	7,978	66 $\frac{2}{3}$ %
18	"	10,560	"	85c.	"	8,976	00
8 " 4,693 $\frac{1}{3}$ " 90c. "						4,224	00
10	"	5,866 $\frac{2}{3}$	"	90c.	"	5,280	00
12	"	7,040	"	90c.	"	6,336	00
14	"	8,213 $\frac{1}{3}$	"	90c.	"	7,392	00
16	"	9,386 $\frac{2}{3}$	"	90c.	"	8,448	00
18	"	10,560	"	90c.	"	9,504	00
8 " 4,693 $\frac{1}{3}$ " 95c. "						4,458	66 $\frac{2}{3}$ %
10	"	5,866 $\frac{2}{3}$	"	95c.	"	5,573	33 $\frac{1}{3}$ %
12	"	7,040	"	95c.	"	6,688	00
14	"	8,213 $\frac{1}{3}$	"	95c.	"	7,802	66 $\frac{2}{3}$ %
16	"	9,386 $\frac{2}{3}$	"	95c.	"	8,917	33 $\frac{1}{3}$ %
18	"	10,560	"	95c.	"	10,032	00
8 " 4,693 $\frac{1}{3}$ " \$1.00 "						4,693	33 $\frac{1}{3}$ %
10	"	5,866 $\frac{2}{3}$	"	1.00	"	5,866	66 $\frac{2}{3}$ %
12	"	7,040	"	1.00	"	7,040	00
14	"	8,213 $\frac{1}{3}$	"	1.00	"	8,213	33 $\frac{1}{3}$ %
16	"	9,386 $\frac{2}{3}$	"	1.00	"	9,386	66 $\frac{2}{3}$ %
18	"	10,560	"	1.00	"	10,560	00

TABLE FOR GRAVEL.

Table showing number of cubic yards of gravel required in the construction of one mlle of gravel road, of widths varying from 6 feet to 20 feet, and depths from 6 to 12 inches. The within quantities should be multiplied by $1\frac{1}{2}$ to give the number of cubic yards of loose gravel required to make the within depths of compact gravel.

One Mile in Length.	Number of feet in width.	Number of cubic yards in road 6 inches deep.	Number of cubic yards in road 7 inches deep.	Number of cubic yards in road 8 inches deep.	Number of cubic yards in road 9 inches deep.	Number of cubic yards in road 10 inches deep.	Number of cubic yards in road 11 inches deep.	Number of cubic yards in road 12 inches deep.
One mile,	6 feet wide,	586 ² / ₃	684 ⁴ / ₉	782 ² / ₉	880	977 ⁷ / ₉	1,075 ⁵ / ₉	1,173 ¹ / ₃
One mile,	7 feet wide,	684 ⁴ / ₉	798 ¹⁴ / ₂₇	912 ¹⁰ / ₂₇	1,026 ² / ₃	1,140 ²⁰ / ₂₇	1,254 ²² / ₂₇	1,368 ⁸ / ₉
One mile,	8 feet wide,	782 ² / ₉	912 ¹⁰ / ₂₇	1,042 ²⁰ / ₂₇	1,173 ¹ / ₃	1,303 ¹⁰ / ₂₇	1,434 ² / ₂₇	1,564 ⁴ / ₉
One mile,	9 feet wide,	880	1,026 ² / ₃	1,173 ¹ / ₃	1,320	1,466 ² / ₃	1,613 ¹ / ₃	1,760
One mile,	10 feet wide,	977 ⁷ / ₉	1,140 ²⁰ / ₂₇	1,303 ¹⁰ / ₂₇	1,466 ² / ₃	1,629 ¹⁷ / ₂₇	1,792 ¹⁶ / ₂₇	1,955 ⁵ / ₉
One mile,	11 feet wide,	1,075 ⁵ / ₉	1,254 ²² / ₂₇	1,434 ² / ₂₇	1,613 ¹ / ₃	1,792 ¹⁶ / ₂₇	1,971 ²⁸ / ₂₇	2,151 ¹ / ₉
One mile,	12 feet wide,	1,173 ¹ / ₃	1,368 ⁸ / ₉	1,564 ⁴ / ₉	1,760	1,955 ⁵ / ₉	2,151 ¹ / ₉	2,340 ² / ₃
One mile,	13 feet wide,	1,271 ¹ / ₃	1,482 ²⁵ / ₂₇	1,694 ²² / ₂₇	1,906 ² / ₃	2,118 ¹⁴ / ₂₇	2,330 ¹⁰ / ₂₇	2,542 ² / ₃
One mile,	14 feet wide,	1,368 ⁸ / ₉	1,597 ¹ / ₂₇	1,825 ⁵ / ₂₇	2,053 ¹ / ₃	2,281 ¹⁸ / ₂₇	2,509 ¹⁷ / ₂₇	2,737 ⁷ / ₉
One mile,	15 feet wide,	1,466 ² / ₃	1,711 ¹ / ₉	1,955 ⁵ / ₉	2,200	2,444 ⁴ / ₉	2,688 ⁸ / ₉	2,933 ¹ / ₃
One mile,	16 feet wide,	1,564 ⁴ / ₉	1,825 ⁵ / ₂₇	2,085 ²⁵ / ₂₇	2,346 ² / ₃	2,607 ¹¹ / ₂₇	2,868 ⁴ / ₂₇	3,128 ⁸ / ₉
One mile,	17 feet wide,	1,662 ² / ₃	1,919 ⁷ / ₂₇	2,216 ⁸ / ₂₇	2,493 ¹ / ₃	2,770 ¹⁰ / ₂₇	3,047 ¹¹ / ₂₇	3,324 ⁴ / ₉
One mile,	18 feet wide,	1,760	2,053 ¹ / ₃	2,340 ² / ₃	2,640	2,933 ¹ / ₃	3,226 ² / ₃	3,520
One mile,	19 feet wide,	1,857 ⁷ / ₉	2,167 ¹¹ / ₂₇	2,477 ¹ / ₂₇	2,786 ² / ₃	3,096 ⁸ / ₂₇	3,405 ²⁶ / ₂₇	3,715 ⁵ / ₉
One mile,	20 feet wide,	1,955 ⁵ / ₉	2,281 ¹⁸ / ₂₇	2,607 ¹⁷ / ₂₇	2,933 ¹ / ₃	3,259 ⁷ / ₂₇	3,585 ⁵ / ₂₇	3,911 ¹ / ₉

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