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# NEW JERSEY TURNPIKE AUTHORITY



REVENUE AND ENGINEERING COST ESTIMATES

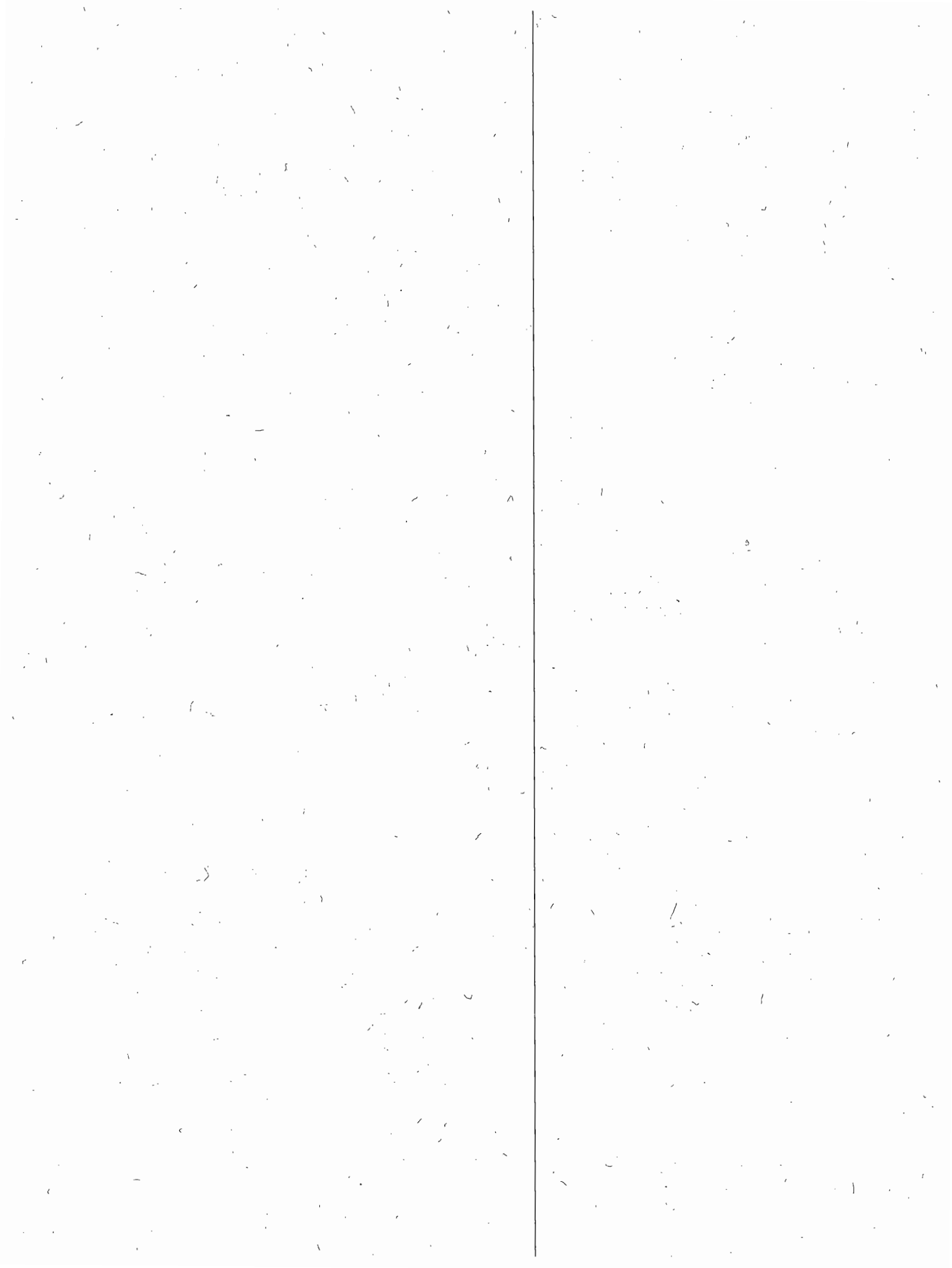
NEW JERSEY TURNPIKE

**Consolidated Report**

September 1949

**HOWARD, NEEDLES, TAMMEN & BERGENDOFF**  
General Consultants to the Authority

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September 15, 1949

New Jersey Turnpike Authority  
Paul L. Troast, Chairman  
George F. Smith, Vice-Chairman,  
Maxwell Lester, Jr., Treasurer  
The State House  
Trenton, New Jersey

Gentlemen:

We present herewith the results of our review and analysis of the reports of your other engineers, together with a report of our determinations, pertaining to the proposed New Jersey Turnpike.

All of your engineers have collaborated fully during the intensive investigations, surveys and studies of the past four months and we believe that the resulting reports are unusually comprehensive, factual and thorough for the purpose of reaching initial conclusions.

We participated in the general treatment of the project, the establishment of design criteria, the selection of traffic and service facilities and all major phases of studies to produce a superior traffic artery in accord with the latest theory, practice and experience.

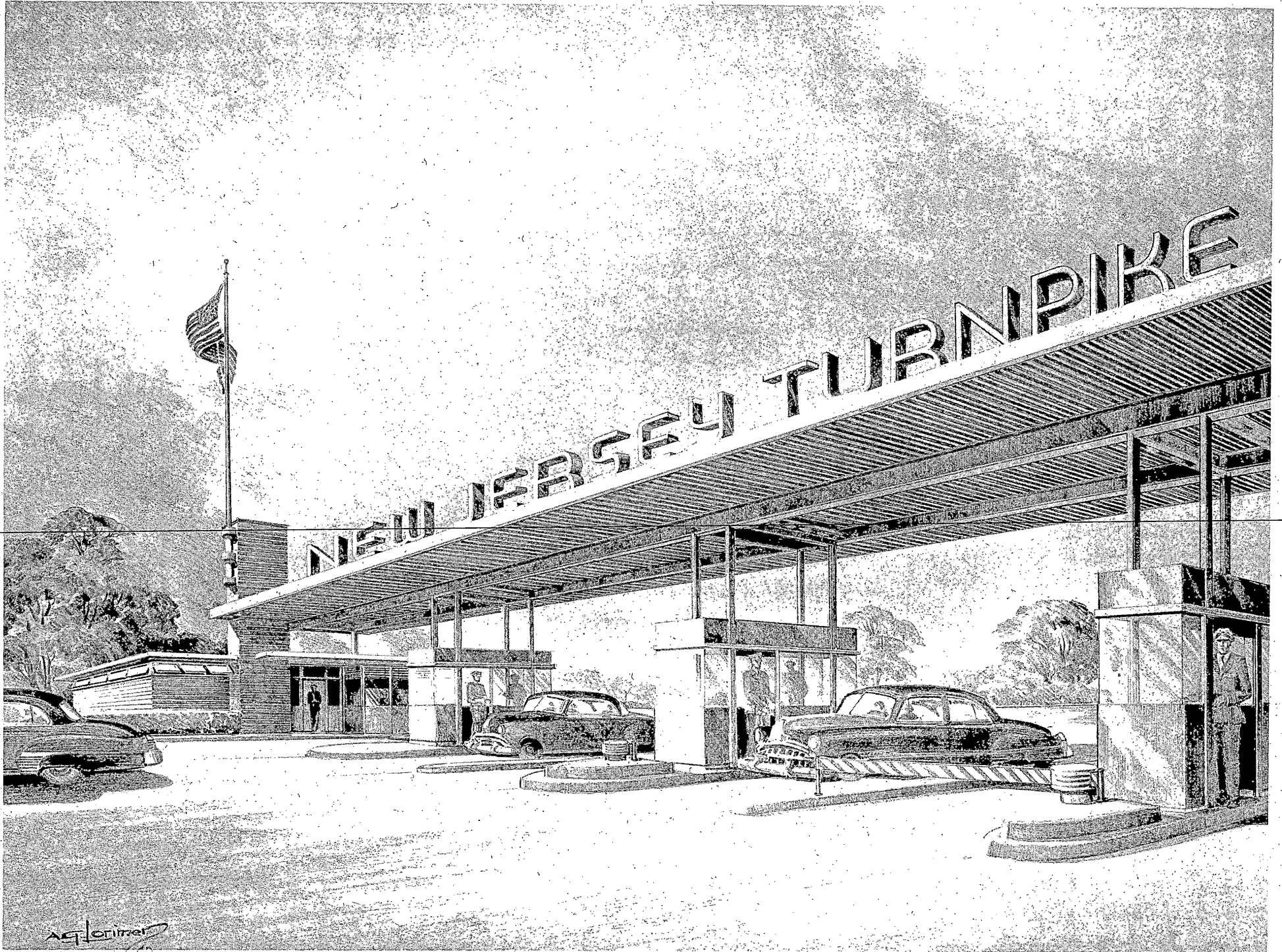
We have reviewed carefully all engineering studies and designs, the estimates of construction and other costs which are a part of the project, the traffic studies, the estimates of prospective revenue, and the estimated costs of operation and maintenance for the completed project. We consider the traffic and revenue studies to be thoroughly conservative. We believe you may rely on the soundness and integrity of the findings of your engineers.

The need for the New Jersey Turnpike is so great and so obvious, and its financial soundness appears to be so clear, based on estimated costs and anticipated traffic and revenue from tolls, that the building of this Turnpike will prove to be a most notable accomplishment in serving highway transportation within the State of New Jersey and throughout the eastern states.

Very sincerely yours,

HOWARD, NEEDLES, TAMMEN & BERGENDOFF  
General Consultants to the Authority

*E.R. Needles*



AGL  
LITNER

# NEW JERSEY TURNPIKE

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REVIEW AND REPORT ON ENGINEERING STUDIES  
ESTIMATES OF CONSTRUCTION AND OTHER COSTS, AND  
ESTIMATES OF TRAFFIC AND REVENUE

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## NEW JERSEY TURNPIKE AUTHORITY

PAUL L. TROAST, *Chairman*  
GEORGE F. SMITH, *Vice-Chairman*  
MAXWELL LESTER, JR., *Treasurer*

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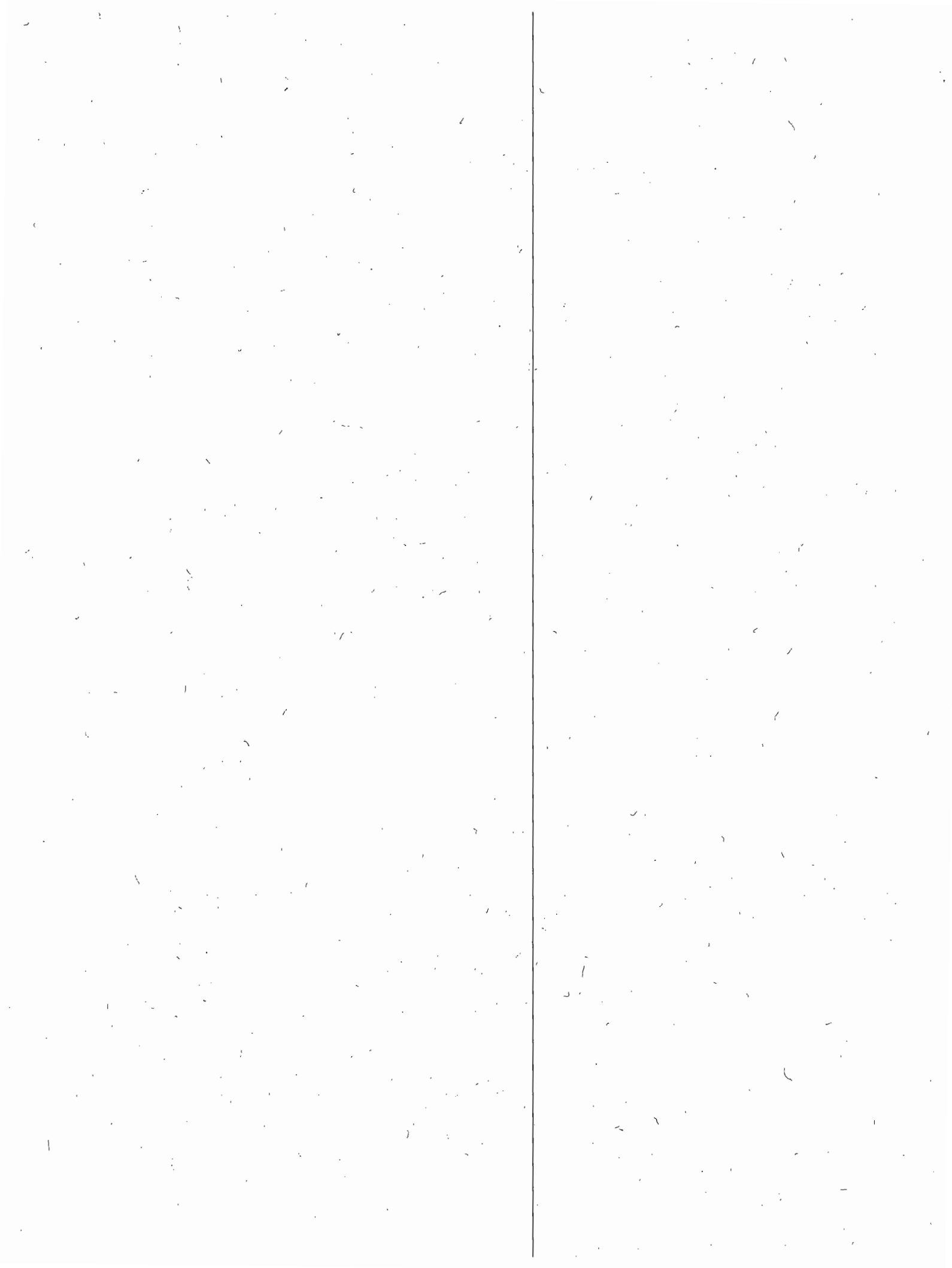
CHARLES M. NOBLE, *Chief Engineer*

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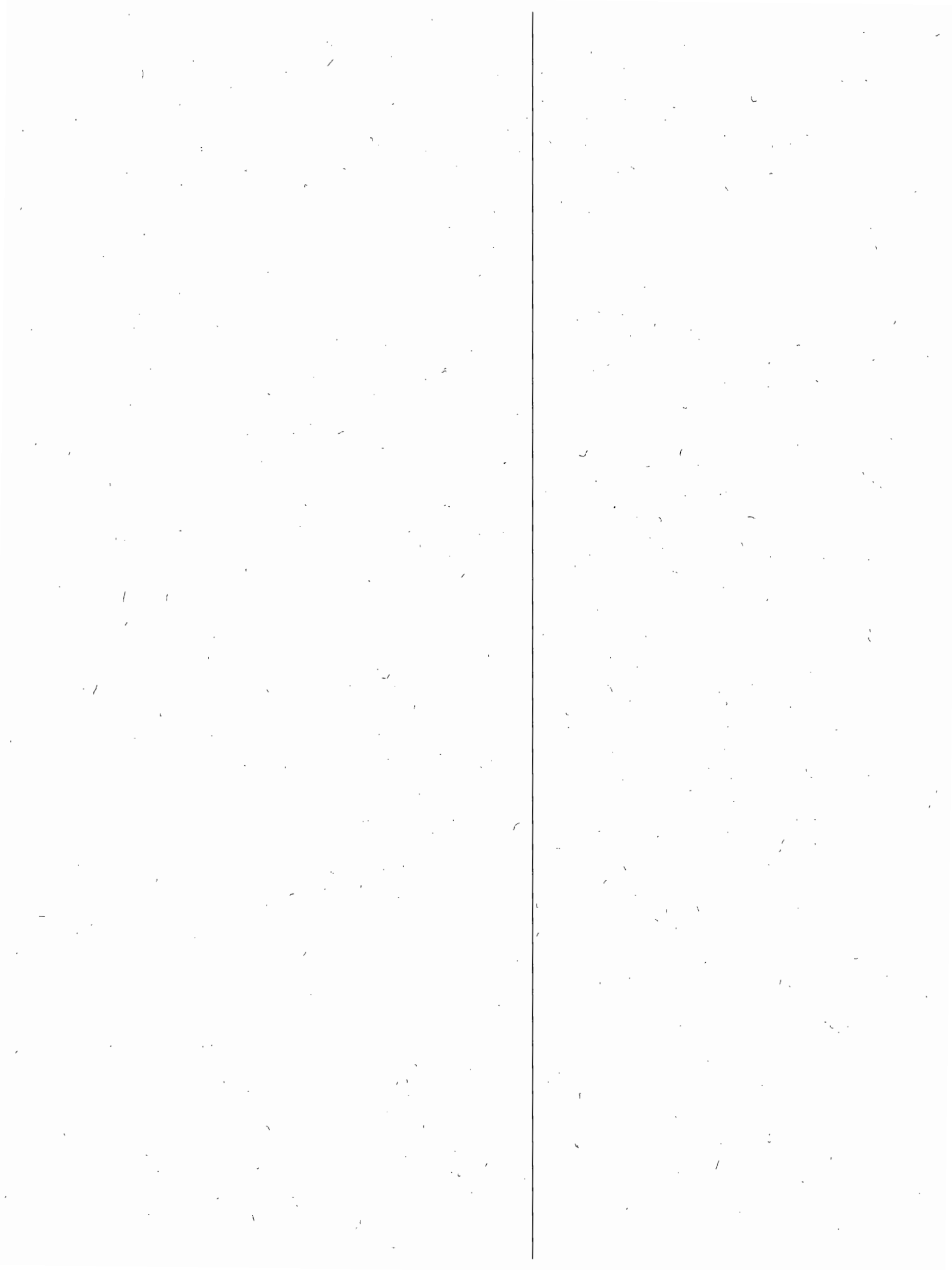
HOWARD, NEEDLES, TAMMEN & BERGENDOFF  
*General Consultants To The Authority*

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September 1949

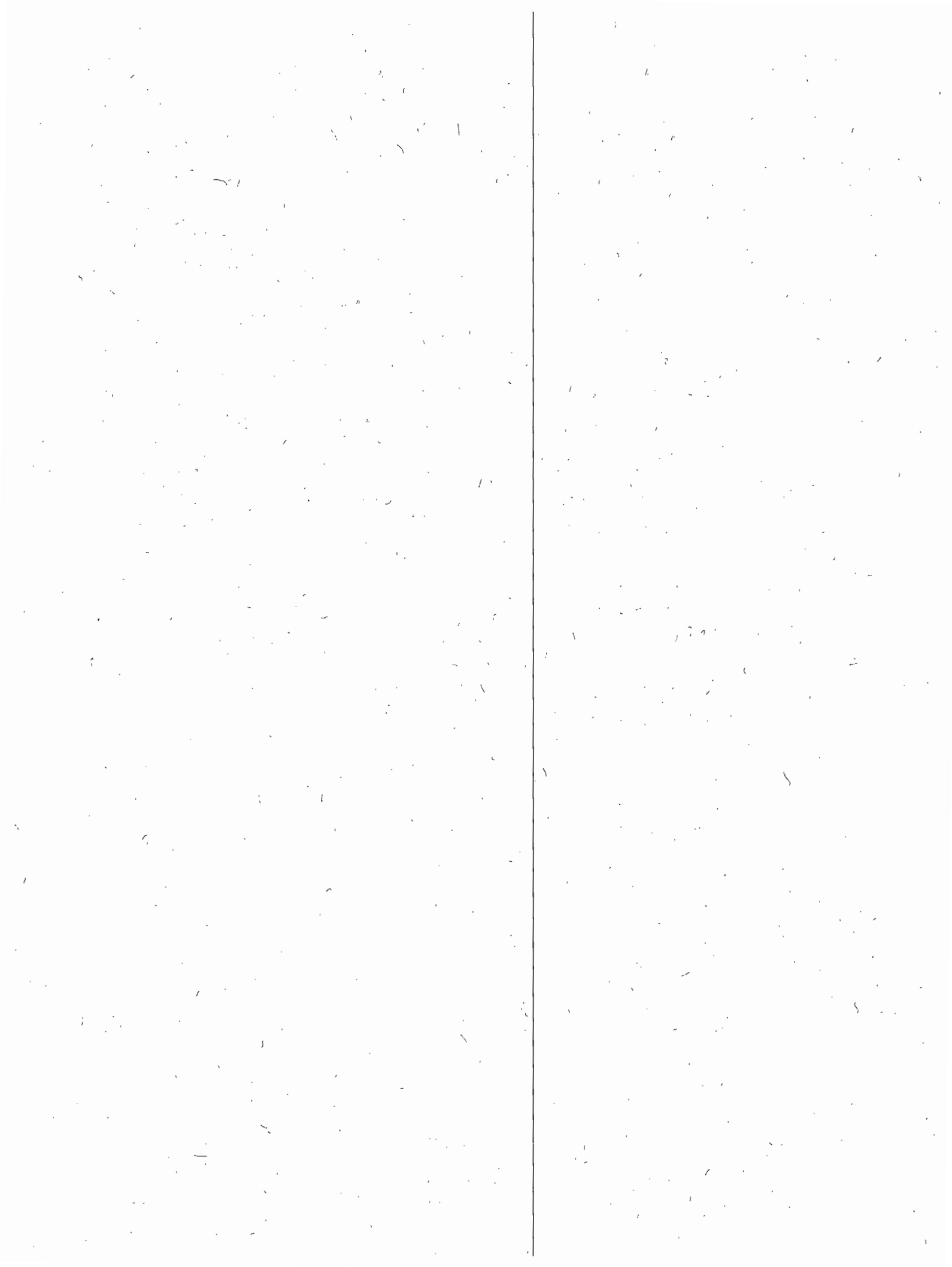


**CONSOLIDATED REPORT**  
**ON**  
**NEW JERSEY TURNPIKE**



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# NEW JERSEY TURNPIKE

## GENERAL STATEMENT

As authorized by Acts of the New Jersey Legislature and approved by the Governor, the New Jersey Turnpike Authority has completed the preliminary or initial stage of undertaking the construction of the New Jersey Turnpike. This Turnpike will be a revenue-producing traffic artery extending from the Delaware Memorial Bridge over the Delaware River, near Deepwater, to a connection with the George Washington Bridge over the Hudson River at New York. The northern terminus will be at State Highway No. 6, west of the George Washington Bridge. The southern terminus will provide access for highway traffic now crossing the Delaware River by the ferry at Pennsville, but which will be replaced by the Delaware Memorial Bridge upon its completion in June 1951. Appropriate tolls are to be collected from the users of this Turnpike to pay for its construction, operation and maintenance. These tolls will be in accord with customary charges for the usage of similar facilities.

Traffic congestion on the major New Jersey highways, particularly in the metropolitan areas and on routes carrying week-end and holiday travel, is undoubtedly as great as can be found. The adjectives "notorious," "tremendous" or "terrific" can be used without criticism as over-statement. All motorists who have ever visited the New York-New Jersey-Philadelphia areas have been exposed to these conditions. Lines of stopped or slow-moving vehicles for miles in length are usual at many places, not only at intervals throughout the day and week, but throughout the year. Photographs which appear as an exhibit in this report are merely indicative of the widespread existence of traffic bottle-necks which have been impossible of elimination in any feasible manner under the usual state highway program for the State of New Jersey.

The building of the New Jersey Turnpike as an express traffic artery will permit the safe and rapid movement of traffic throughout the length of the State in a manner never before possible. Authorities agree that the building of this artery under the present state highway program and with usual state highway funds would be only a theory and impossible of practical accomplishment. The building of the Turnpike as a toll project, with only the user paying for its construction and maintenance, will permit the normal state highway program to be much more effective in caring for the

normal highway needs of the State. The sale of revenue bonds for obtaining construction funds will not involve the credit of the State, by terms of the basic legislation, and thus the Turnpike construction will not harm the normal state highway program in any way; in fact it will greatly aid and supplement the service to be obtained from the other highways in the State. The building of this Turnpike as a complete unit, from end to end, and as a single project all opened to traffic at one time, would never be possible under the usual highway construction program.

Extending virtually the entire length of the area of greatest population density within the State of New Jersey, this Turnpike will provide direct highway connections to the cities of Wilmington, Philadelphia, Camden, Trenton, New Brunswick, Elizabeth, Newark, Jersey City, Passaic, Paterson, the great metropolitan area of New York City, and all of the many smaller cities and communities contiguous to the above cities. There is no highway of equivalent length within the entire United States which could compare with this Turnpike in its direct connection with tremendous concentrations of people, buildings, industries, wealth, commercial activity, and highway traffic movements. With a total length of approximately 117 miles, points of entrance and exit will be provided at strategic points to serve the cities along its route.

In addition to the service this Turnpike will render to the State of New Jersey by providing a connection between the cities of New York and Philadelphia, it will also provide a major highway connection between existing important highways, which has long been needed in the opinion of both highway authorities and motorists. Highway movements of great magnitude are established facts between the cities along the eastern seaboard and from the eastern cities to the mid-west. Relatively free traffic movements are now possible from the New York City area, northward up the Hudson River Valley, and eastward through U. S. Route No. 1, across Connecticut by Merritt Parkway and Wilbur Cross Parkway, through Massachusetts by highways existing and in process of extension, along the New Hampshire Turnpike soon to be completed, and along the Maine Turnpike as far as Portland. To the southward from the Delaware Memorial Bridge location are the duPont Boulevard through Delaware, U. S. Route No. 40 to Baltimore, and thence to Washington, Richmond and points south. The journey by motor vehicle across New Jersey between these routes to the north and east and to the south, has long been known as difficult, hazardous, slow and nerve-racking. The New Jersey Turnpike will contribute in a remarkable way to free-flowing highway movement along the entire Atlantic seaboard.

It is inevitable that in a few years the New Jersey Turnpike will connect directly with the Pennsylvania Turnpike at a point north of Philadelphia. With the easterly and westerly extensions of the existing Pennsylvania Turnpike completed, and a further connection with the proposed Ohio Turnpike south of Cleveland, legislation for which has been enacted, the movement of highway traffic to and from the middle west, and along the east coast by way of the New Jersey Turnpike, will be very greatly facilitated.

Southward from New Brunswick, the New Jersey Turnpike will traverse rolling land which is essentially agricultural. From these lands come the vegetables, grains, fruits and dairy products which typify "The Garden State." Northward from New Brunswick, the Turnpike will pass through the intensive industrial development of north Jersey, being located through the heart of the famed Jersey meadows from Newark to its terminus at Route No. 6. Thus the Turnpike will afford a notable view of the varied phases of activity and development in New Jersey, highly scenic in the south and intensely interesting all the way, presenting a fresh and striking picture of the State which is not to be had by any means of travel available today.

Starting with the southern terminus at the Delaware Memorial Bridge, the first interchange, or point of entrance and exit, will be near Swedesboro, where traffic to and from the Chester ferry across the Delaware River will be served. At Camden there will be two interchanges, one south and the other north of Camden. The south interchange will provide access between the south and the Philadelphia-Camden area, and between the New York and north Jersey areas and the agricultural and beach resort areas of southern New Jersey. The north Camden interchange will provide essential access to the Philadelphia-Camden area, including the Tacony-Palmyra Bridge over the Delaware River, from the northward. The Mt. Holly interchange will provide access to and from the Burlington-Bristol Bridge over the Delaware River. The Bordentown interchange will provide access to the Trenton area from the southward, and, of significant importance, will serve as a logical junction point with the extended Pennsylvania Turnpike in the future. The Hightstown interchange will provide access to the Trenton area from the northward. The New Brunswick interchange will provide access to the New Brunswick area from both the northward and the southward.

All interchanges from New Brunswick to the south, and also the southern terminus of the Turnpike, will provide means for access to and from the rich agricultural areas of central and southern New Jersey, offering the products of these areas direct and quick movement into the metropolitan area of New York. In addition, the movement of traffic between all New Jersey beach

resorts and the densely populated areas of north Jersey and New York will be greatly expedited by these interchanges, particularly during heavy holiday movements.

The interchanges at Route 4 Parkway and at Route No. 35 will provide access to and from New Brunswick, and particularly to the north Jersey beach resorts. The continued extension of Route 4 Parkway toward Irvington and the Oranges will cause this Parkway to become an increasingly important feeder to the Turnpike. These interchanges, together with the Turnpike itself, including a proposed new bridge over the Raritan River about one mile east of New Brunswick, will provide an alternate route to that of the Thomas Edison Bridge over the Raritan River, so that the very severe bottle-neck to highway movement through the Amboys during holiday and week-end periods should be very greatly alleviated. The Route 35 interchange will also provide access to and from the Outerbridge Crossing to Staten Island.

The Elizabeth interchange will provide access to the important industrial area and communities adjacent to Elizabeth, and in addition will provide access to and from the Goethals Bridge to Staten Island.

The Port Street-Newark interchange will serve as a most important collecting and distributing point for traffic to and from Route No. 29 toward western New Jersey and Pennsylvania, the Newark Airport, The Port of New York Authority truck terminal now under construction, and a large portion of the city of Newark. It is most probable that the highest density of travel over the Turnpike will develop adjacent to this interchange. A major factor should be the heavy movement of passenger vehicles to and from Pulaski Skyway and the Holland Tunnel by way of the Route 25 viaduct north of Newark Airport, also to this interchange would be connected the proposed Newark Bay Bridge to Jersey City and Bayonne, which has been very seriously proposed.

The Raymond Boulevard-Newark interchange will provide access to and from the Newark business and industrial districts, the Jersey City area by way of Communipaw Avenue and Tonnelle Circle, and also the Holland Tunnel.

The Route 3 interchange at Secaucus will provide direct access to and from the Lincoln Tunnel to New York on the east and to points along Route 3 to the west and north. Important truck terminals are located at Secaucus. South of Route 3 interchange and north of the Raymond Boulevard-Newark interchange are to be the high-level Passaic River and Hackensack River bridges, the most important structures along the route of the Turnpike.

Between these bridges will be an excellent location for an interchange to connect in the future with the proposed 14th Street Tunnel under the Hudson River, as planned by The Port of New York Authority.

The northern terminus of the Turnpike at Route No. 6 will provide access to and from the George Washington Bridge over the Hudson River to the eastward and to points along Route No. 6 to the west and northward. From this terminus south to Elizabeth, the Turnpike is located in virtually the center of the Jersey meadows. Although real estate costs in this area are less than in developed industrial areas, the construction costs are relatively very high; but the service to be rendered by this new route in relieving traffic congestion along existing highways such as U. S. Route 1 in Jersey City will unquestionably prove to be so great that such heavy construction expense will be more than justified.

The relation of the New Jersey Turnpike to the existing and future highways of the New Jersey State Highway Department, as shown by their "Proposed Comprehensive State Highway System", dated August 1948, is of highest importance. The interchanges on the Turnpike will serve as collecting and distributing points for traffic between the areas of greatest population density, both within and without the State, the highly important agricultural areas of southern and central New Jersey, and the famous resort and beach areas from Cape May and Atlantic City to Asbury Park and Sea Bright. Whether farm products are moving to large city markets or city dwellers are rushing to vacation and resort points along the entire Jersey coast, the Turnpike and its highway connections will perform a vital service in the movement of this traffic with greatest speed, safety and satisfaction.

The construction of the New Jersey Turnpike will clearly have a tremendous effect on highway travel within and through the State of New Jersey. This will prove particularly true of truck movements. Since the Turnpike will carry both passenger and commercial vehicles, the truck movements will be so materially expedited that greater volume and speedier movements should logically follow. Truck revenue should constitute a very large portion of the total for the Turnpike, particularly in the future as the opportunities for service are developed. Aside from diverting traffic from existing congested routes, the Turnpike will unquestionably develop large traffic volumes which do not now exist. The motorists will find it possible to make many trips over the Turnpike with convenience, satisfaction and pleasure which are now foregone simply because so many trips over existing congested highways are now limited quite strictly to those of major importance or virtual necessity.

The construction of the New Jersey Turnpike will likewise have a profound effect on the design, location and construction of new highways, both within and adjacent to the State. New highways will be located to take advantage in highest degree of the excellent traffic artery which the Turnpike will afford. Highway trends and movements will become more logical because of the easier flows which will follow the Turnpike construction. Usage of the Turnpike will grow very substantially in future years as these new connecting facilities are provided. Any reasonable present estimate of future traffic over the Turnpike will probably prove to be materially below the actual traffic which will develop. The experiences of years past in respect to highway movements in New Jersey have shown that any new major artery which has been constructed in the past thirty years has become burdened with traffic very quickly after completion, and many of the most important arteries have become overloaded and congested in a very few short years. Building a complete major highway to provide adequate capacity for even ten years in the future has not been possible of accomplishment in New Jersey since the motor vehicle came to be a dominant factor in our economy and life. The New Jersey Turnpike will be a complete major artery constructed as a unit, instead of section by section over a period of many years, as so commonly is mandatory in the usual state highway program.

#### **ARRANGEMENTS FOR COST AND REVENUE STUDIES**

The engineering surveys, studies and reports which have been prepared in the past four months relative to construction costs and traffic and revenue estimates for this Turnpike represent one of the most intensive efforts of their kind, considering the scope of the work, the great detail in which the work has been done and the accuracy and comprehensiveness of the reports which have been submitted. The application, determination and cooperation of the members of the Authority and their Chief Engineer have been most outstanding and are chiefly responsible for what has been accomplished. The organizations of seven engineering firms were utilized on this work.

The engineering and construction cost report on the north section of the Turnpike from Bonhamtown to the terminus at Route No. 6 was prepared by the following firms working jointly: Ammann & Whitney, Edwards and Kelcey, Frederic R. Harris, Inc., O. J. Porter & Company. The engineering and construction cost report on the south section from Bonhamtown to the terminus at the Delaware Memorial Bridge was prepared by DeLeuw, Cather & Co. The report on traffic and revenue from tolls for the entire project was prepared by Coverdale and Colpitts. Mr. T. R. Lowrie served as manager

of real estate appraisals for the entire project. Mr. A. Gordon Lorimer served as architectural consultant to the Authority, working through the general consultants. This report sets forth the results of our review and approval of the work of all of the above engineering firms. This report combines the results of the reports of the other firms on both construction costs and traffic and revenue, to present under one cover the soundness and feasibility of the project for financing.

The engineering investigations of the past four months have utilized fully the previous extensive work of the New Jersey State Highway Department on the specific and general problems which bear relation to this Turnpike, both as to location and service and also in respect to basic traffic data.

All feasible alternate routes for all sections of the Turnpike have been carefully investigated. The extent and scope of the field surveys, foundation borings, soil investigations, and real estate studies, preliminary to the engineering studies on which the reports are based, are notable and justify particular confidence in the reports themselves. The cost of these engineering and traffic investigations and reports will approximate \$300,000 which gives clear evidence of the thoroughness and care with which the Authority has administered these activities preliminary to financing. It is important to state that the engineering work done to date will be utilized fully in the final design and construction to follow, and that later steps will be very greatly expedited by reason of the careful and extensive work done to this time.

### **DESIGN CHARACTERISTICS**

The New Jersey Turnpike will be the highest type of highway design and construction which modern techniques, advanced theory and fullest experience can produce. Because of current high prices for labor, materials, equipment, real estate and all other factors affecting construction cost, the demand for economy is very great. However, the necessity of constructing the Turnpike to carry a very large volume of highway traffic, to serve for future years as well as for the present, and to assure the motorist a superior highway which will more than justify the collection of the toll which must be charged, requires that there must be no question of adequacy, but without extravagance. The design, usage and experience relating to the Pennsylvania Turnpike have been utilized to the fullest. The same is true for the Maine Turnpike and other major highways of latest design and construction. Using the designs contemplated in these initial reports, the New Jersey Turnpike will be the finest traffic artery which has ever been constructed under comparable conditions and for comparable heavy duty service.

Beginning at the southerly terminus, the New Jersey Turnpike will be a four-lane divided highway, two lanes in each direction. Each two-lane roadway will be separated from the other by a central mall or median strip which will be 26 feet in width between inner edges of pavement. Northward from the north Camden interchange and continuing to the Route 35 interchange, the structures built over the four-lane divided highway will be wide enough to accommodate two additional lanes, to permit the future construction of a six-lane divided highway.

From Route 35 interchange to the Route 3 interchange at Secaucus, the Turnpike will be built as a six-lane divided highway, three lanes in each direction, and the median strip to be 20 feet in width unless restrictions of right-of-way in industrial areas require less. Where six lanes are constructed initially, overhead structures will be built to accommodate a future eight-lane Turnpike of the dual-dual type; meaning that there may be four two-lane roadways, two roadways in each direction, each of the four roadways to be separated from the other by median strips.

From Route 3 interchange to the northerly terminus of the Turnpike at Route 6, a four-lane divided highway will be constructed, with provision in the overhead structures for future six-lane divided construction for the Turnpike.

The construction of six lanes for the Turnpike between Route 35 and Route 3 should provide adequate capacity in the section where traffic density is expected to be greatest. This six-lane section, together with four lanes throughout the remainder of the Turnpike, should allow traffic to move freely, safely and swiftly for a number of years in the future. To construct greater capacity at this time would create such an initial financial burden that sound economics justifies the provision of increased capacity in the future when the demand for such capacity develops.

The design of pavement and structures will accommodate the heaviest modern highway loadings, thus caring for all reasonable requirements of the future. The loading designated as H20-S16 has been adopted. This loading will take care of any reasonable number of 20-ton trucks with trailers, having 32,000-pound axle loads, together with all legal loadings permitted on the highways.

All details of the design criteria will not be presented in this report since they appear in the other engineering reports. However the salient points are presented here. The Turnpike design will call for flat curves, long sight distances and low gradients throughout, such as will permit the highest speeds

of travel which the Turnpike Authority may later authorize as permissible. This design will care for speeds of 70 miles per hour and over. Every step will be taken to provide safety, comfort, convenience and satisfaction for the motorist at any reasonable speed. Wide side shoulders will be provided so that disabled or parked vehicles will be well off the travelled pavement. Ample widths of rights-of-way will be secured throughout the length of the Turnpike. Of course there will be no access to the Turnpike except at controlled points, the termini and the interchanges; thus avoiding crossing lines of traffic as well as opposing lines of traffic.

The Turnpike will be constructed on well-compacted and selected materials of permeable type below the pavement, which, together with deep side drainage ditches, will assure freedom from frost action and highest stability for the pavement itself. Seeding or planting with top soil will be used for erosion control. All steps will be taken to keep maintenance costs at a minimum.

The pavement to be constructed will be of the extra-heavy-duty type and can be expected to serve from 20 to 30 years without a major maintenance or reconstruction charge. Reconditioning of the pavement surface at some time in the future is of course to be expected, but any such work, up to a complete resurfacing, will cost a great deal less than the initial pavement construction.

The major bridges and stream crossings will provide clearances for both navigation and flood purposes which will meet the approval of both the appropriate state authorities and those of the United States.

### **PRINCIPAL FEATURES AND FACILITIES**

Although the Turnpike will traverse a great portion of the length of the State of New Jersey, noted for its variety and extremes in terrain, the topography is generally in but two categories. From the southerly end of the Turnpike to a point quite near to Rahway, the country is gently rolling and highly favorable for highway location and construction. Throughout this distance of approximately 95 miles there should be no problems other than those which are generally associated with standard highway construction. No rock work of any consequence is anticipated in the entire distance. For the northerly 22 miles or so from Rahway to the northerly terminus, the country is very low and flat and the greater portion of the distance consists of tidal flats and meadow marsh only slightly above sea-level.

The construction of the Turnpike through the north Jersey meadows constitutes a major problem of unique type. The depth of the meadow mud varies

from a few feet to very substantial amounts, 60 to 100 feet. Adjacent to the Turnpike location are depths up to approximately 200 feet. The building of embankments over such depths of mud creates special problems in soil stabilization which have required very special attention. Embankment materials must be placed in thin layers, with sufficient time intervals between placement of layers to prevent overloading and rupture of the soil structure beneath, until sufficient consolidation of the supporting soil has taken place to carry safely the total imposed load. Where embankments are high and consolidation of the mud must be expedited in order to secure stable embankments within the allotted time, vertical sand drains must be installed in the mud to assure quick drainage of the water from the mud, so that firm supporting material for the embankment may be attained. The construction of stable embankments in sufficient time to permit pavement construction before the opening of the Turnpike to traffic is of course mandatory.

There will be approximately 240 structures required for this Turnpike; consisting of bridges, overpasses and underpasses. The principal bridges are those over the Hackensack, Passaic and Raritan Rivers and one over Rancocas Creek. The Hackensack and Passaic River Bridges will be rather notable in size and cost. All bridges are planned to be of the deck type, without any overhead steel work to interfere with vision over the sides of the bridge. No serious foundation problems will be experienced with any of the structures, the deepest foundations being supported on long steel piles driven to bed rock or equivalent material. There will be no movable spans in any of the bridges on the Turnpike. The Hackensack and Passaic River bridges will be of the high-level type.

The roadway grades on the approaches to the Hackensack and Passaic River Bridges will be 3%, the longest continuous grades of that degree of steepness on the Turnpike. Many other very important bridges now in service have approach grades of 3.5% or steeper, but it is commonly accepted that grades of not over 3.5% are preferable for modern highway traffic of all types. Hence these 3% grades should prove particularly satisfactory.

Careful study has been given to possible icing conditions on these bridge approaches in winter. The heating of extensive roadway slabs to cause melting of ice and snow, either by steam or hot water pipes or electric wiring, has not yet been developed economically. Small trial sections of such heated pavements or sidewalks have been installed, but the heating of a long, major bridge approach is quite another matter. Immediate removal of ice and snow will be planned by the Authority and will be readily attainable by proper use of the personnel and equipment which will be available. Other arrange-

ments may include the use of heated cinders or sand, and the possible development of an ice meltant which will be noncorrosive to the steel beneath the roadway. These bridge approaches are to be kept safe for travel at all times, whatever the means.

The underpasses, overpasses and viaducts will be of rather standard construction and should present no great problem. Some of the interchanges will be expensive and rather difficult because of the traffic volumes and movements which must be cared for, but the engineering problems involved will not be difficult. Deceleration lanes will be provided for traffic leaving the Turnpike at interchanges, as well as acceleration lanes for traffic entering the Turnpike.

The restaurant and service station facilities planned for this Turnpike are to be more complete and convenient for motorists than any provided elsewhere to date. All appointments will be of the most modern, pleasing and serviceable character. Substantial revenue should result from these concessions in view of the large volume of traffic to be served.

Administration and maintenance buildings will be provided. Snow removal and maintenance equipment will be of sufficient quantity and suitable type to assure prompt and thorough removal of snow and to provide Turnpike maintenance at minimum cost. The latest toll collection methods and equipment will be provided; the motorist receiving a ticket upon entering the Turnpike, and surrendering the ticket and paying the appropriate toll upon departure from the Turnpike. A communication system between interchanges, terminals and other buildings will be provided, with communication available also to cruising police. The Turnpike itself will be well marked with reflectorized roadway striping and other delineations, and directional and other signs will be provided to aid the motorist as fully as possible. All details pertaining to adequate service to motorists on the Turnpike will be given most careful attention.

### **CONSTRUCTION PROGRAM**

The construction of the Turnpike must proceed at high speed in order to minimize the amount of bond interest to be paid during the construction period, and to permit the production of revenue as promptly as possible. It is planned that the Turnpike will be completed by November 1951, all construction being accomplished during the working seasons of 1950 and 1951. Early in 1950 it is contemplated that contracts will be let for all grading operations and major bridge foundations. Major bridge superstructure contracts will follow, as well as contracts for overpasses, underpasses and similar structures. The working season of 1950 will be devoted primarily to grading and drainage and to major

foundation construction. In the fall of 1950 the major paving contracts should be let, along with contracts for buildings, toll plazas, necessary equipment and similar items. The working season of 1951 will be devoted largely to paving operations, construction of bridge superstructures, and completion of all minor structures, buildings and other features to permit opening to traffic in November 1951.

The above program will be possible only through the employment of a very large number of engineering organizations to whom appropriate portions of the work are to be assigned. In addition, all portions of the construction work must be handled in proper sequence, with a large number of contractors working on separate portions of the work, so that as each contractor finishes his part, the other parts are completed at the same time; and thus the entire length of Turnpike can be placed in operation at one time. The engineers and contractors required to accomplish this program are considered to be available.

#### **ENGINEERING STUDIES AND COST ESTIMATES**

The obtaining of field data and the preparation of preliminary designs, cost estimates, and studies which entered into the engineering reports for the New Jersey Turnpike have been in the hands of highly qualified engineering organizations. The bridge and highway studies have been prepared by firms which are outstanding in their fields. The important problems relating to the construction of embankments across the Jersey meadows from Rahway to the northerly terminus of the project were dealt with by a firm which has had unusual experience in the solution of soil and embankment problems. The work of this firm has been supported by an associated firm which also has had wide separate experience in soils and foundation problems.

We have worked very closely with all of the firms preparing these engineering reports during the past four months, together with your Chief Engineer, and we are in position to state that their work has been done carefully and intelligently and that their cost estimates are wholly appropriate for financing purposes.

Unusually extensive field surveys and other investigations have preceded the selection of the Turnpike location upon which the present estimates are based, and we concur in the determination that the selected location is economic and most appropriate for service to highway traffic. The quantities which appear in the estimates have been verified by spot checks, comparisons and considerable detailed calculation, and all of the unit prices which appear in

the estimates have been reviewed and agreed upon by all of the engineers identified with these engineering reports. We consider these unit prices to be both realistic and appropriate.

The details which appear in both of the engineering and cost reports are considered complete and self-explanatory. Only the summaries of quantities and costs will be presented in this report, insofar as necessary to develop the overall cost of the project.

The appraisal of real estate throughout the length of the project was under the direction of a thoroughly qualified appraisal consultant, experienced in appraisals in New Jersey. He was assisted by other qualified appraisers who were selected in each of the counties through which the Turnpike passes for their particular fitness and knowledge of real estate prices and conditions. The appraisal of real estate for financing purposes has been unusually thorough and should provide a sound basis on which to estimate the total costs of real estate to be acquired for construction of the Turnpike.

The following summaries of cost are taken from the reports of the engineering firms which were engaged to report on their designated sections of the total Turnpike project:

**New Jersey Turnpike  
Estimate of Cost  
South Section — 87.2 Miles**

From Southern Terminus of Turnpike at Deepwater to Bonhamtown  
From Report by DeLeuw, Cather & Company

<i>Item</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total</i>
Clearing and Grubbing .....	483	Acres	\$300.00	\$ 145,000
Earthwork				
Remove Muck Soils and Backfill with Earth ...	250,000	Cu. Yds.	1.40	\$ 350,000
Excavation .....	7,500,000	Cu. Yds.	0.60	4,500,000
Borrow .....	5,750,000	Cu. Yds.	0.60	3,450,000
Selected Base Fill .....	4,150,000	Cu. Yds.	1.00	4,150,000
Pavement				
Approach Slabs on Turnpike and Intersecting Crossroads .....	47,860	Sq. Yds.	7.00	\$ 335,000
Turnpike and Interchange Pavement including Acceleration and Deceleration Lanes .....	2,600,000	Sq. Yds.	5.00	13,000,000
Pavement at Restaurants, Service Stations and Maintenance Buildings, including Accelera- tion and Deceleration Lanes .....	150,000	Sq. Yds.	Variable	610,000
Paving at Access Roads and Intersecting Cross- roads .....	380,000	Sq. Yds.	Variable	930,000
Shoulders				
Turnpike .....	1,500,000	Sq. Yds.	1.00	\$ 1,500,000
Interchange and Intersecting Crossroads .....	225,000	Sq. Yds.	1.00	225,000
Drainage .....		Lump Sum		2,700,000
Culverts .....		Lump Sum		200,000
Topsoil, Fertilizing and Seeding .....		Lump Sum		2,825,000

Structures					
	Raritan River Bridge .....			\$ 1,235,000	
	Rancocas Creek Bridge .....			580,000	
	Other Bridges and Large Stream Crossing Structures .....			16,485,000	\$18,300,000
				<hr/>	
	Utilities — Maintenance and Restoration Thereof		Lump Sum		1,350,000
	Maintenance of Traffic During Construction .....		Lump Sum		500,000
	Guard Rails .....	245,000	Lin. Ft.	2.00	490,000
	Right-of-Way Fence .....	933,300	Lin. Ft.	0.30	280,000
	Delineators .....		Lump Sum		70,000
	Signs .....		Lump Sum		160,000
	Monuments .....		Lump Sum		5,000
	Line Striping .....		Lump Sum		40,000
	Toll Booths at Eight Interchanges .....		Lump Sum		360,000
	Lighting at Eight Interchanges .....		Lump Sum		250,000
	Borings .....		Lump Sum		210,000
	Maintenance Buildings .....		Lump Sum		220,000
15	Equipment				
	Maintenance .....		Lump Sum	\$ 490,000	
	Shop .....		Lump Sum	140,000	
	Police .....		Lump Sum	20,000	
	Communications .....		Lump Sum	100,000	
	Office .....		Lump Sum	6,000	
	Uniforms .....		Lump Sum	14,000	770,000
				<hr/>	
	Concessions				
	Two Restaurants, including Four Gas Stations		Lump Sum	\$ 1,050,000	
	Six Gas Stations and Snack Bars .....		Lump Sum	250,000	1,300,000
				<hr/>	
			TOTAL CONSTRUCTION COST .....		\$59,225,000
			REAL ESTATE COST .....		4,650,000
					<hr/>
			TOTAL COST OF SOUTH SECTION—87.2 MILES— INCLUDING CONSTRUCTION & REAL ESTATE		\$63,875,000

**New Jersey Turnpike  
Estimate of Cost  
North Section — 30.1 Miles**

From Bonhamtown to Northern Terminus of Turnpike at Route 6  
From Report by Ammann & Whitney, Edwards and Kelcey, Frederic R. Harris Inc., O. J. Porter & Company, Associated

<i>Item</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>		<i>Total</i>
Removal of Structures .....		Lump Sum			\$ 255,000
Utilities — Maintenance and Restoration thereof		Lump Sum			2,221,000
Grading and Stabilization					
Clearing and Grubbing .....	760	Acres	\$300.00	\$ 228,000	
Unclassified Roadway Excavation .....	883,000	Cu. Yd.	.60	530,000	
Rock Excavation .....	225,000	Cu. Yd.	5.00	1,125,000	
Muck Excavation .....	161,000	Cu. Yd.	1.25	202,000	
Borrow (in Place) .....	10,560,000	Cu. Yd.	Variable	17,138,000	
Overload Removal .....	2,044,000	Cu. Yd.	.50	1,022,000	
Sand Blanket .....	2,197,000	Cu. Yd.	2.80	6,152,000	
Vertical Sand Drains .....	3,288,000	Lin. Ft.	.90	2,960,000	
Excavation and grading Gasoline Stations .....	283,000	Sq. Yds.	3.50	996,000	30,353,000
Drainage					
Culverts .....		Lump Sum		229,400	
Catch Basins and Drains .....		Lump Sum		558,600	788,000
Pavement					
Turnpike including Interchanges, Acceleration and Deceleration Lanes, and Intersecting Roads .....	1,094,000	Sq. Yds.	5.00	5,468,000	
Pavement at Gasoline facilities including Acceleration and Deceleration Lanes and Access Roads .....	187,200	Sq. Yds.	5.00	936,000	
Sub-base .....	504,000	Cu. Yds.	1.50	757,000	7,161,000
Shoulders					
Turnpike including Interchanges and Intersecting cross roads .....	575,000	Sq. Yds.	1.00		575,000
Curbing					
Concrete at Interchanges .....	34,000	Lin. Ft.	2.00	68,000	
Sod .....	288,000	Lin. Ft.	.20	58,000	126,000

		17					
Bridges							
Passaic River .....		Lump Sum		10,649,000			
Hackensack River .....		Lump Sum		8,020,000			
Turnpike over Streams .....		Lump Sum		3,290,200			
Roads over Turnpike .....		Lump Sum		\$ 4,288,000			
Turnpike over Roads .....		Lump Sum		5,117,000			
Railroads over Turnpike including Track changes .....		Lump Sum		2,233,000			
Turnpike over Railroads .....		Lump Sum		2,510,600			
Turnpike over Road and Railroad .....		Lump Sum		4,591,100			
Other Bridges .....		Lump Sum		1,749,100		\$42,448,000	
Buildings							
Administration (1) .....		Lump Sum		450,000			
Maintenance (2) .....		Lump Sum		362,000			
Restaurants and Snack Bars (6) .....		Lump Sum		1,044,000			
Filling Stations (6) .....		Lump Sum		600,000			
Toll Booths .....		Lump Sum		309,000		2,765,000	
Utility Services							
Power and Light .....		Lump Sum		273,500			
Gas, Water and Sewer .....		Lump Sum		157,500			
Telephone .....		Lump Sum		34,000		465,000	
Traffic Aid and Safety Devices							
Reflector Delineation .....		Lump Sum		17,800			
Signs .....		Lump Sum		195,500			
Pavement Marking .....		Lump Sum		15,700			
Guard Rail .....	201,750	Lin. Ft.	2.00	403,500			
Right-of-Way Fence .....	214,800	Lin. Ft.	.30	64,500		697,000	
Top Soil, Fertilizer and Seeding .....		Lump Sum				697,000	
Subsurface Explorations .....		Lump Sum				360,000	
Equipment							
Maintenance, Snow Removal, De-icing, etc. ....		Lump Sum		544,500			
Shop .....		Lump Sum		12,500			
Administration and Office .....		Lump Sum		25,500			
Toll Collection .....		Lump Sum		170,900			
Police .....		Lump Sum		35,600			
Radio .....		Lump Sum		105,000		894,000	
				TOTAL CONSTRUCTION COST .....		\$89,805,000	
				REAL ESTATE COST .....		5,495,000	
				TOTAL COST OF NORTH SECTION—30.1 MILES—			
				INCLUDING CONSTRUCTION AND REAL ESTATE		\$95,300,000	

It is to be noted that the foregoing summaries of construction cost include allowances for the construction of administration and maintenance buildings, and the provision of equipment and all necessary facilities for the collection of tolls, the removal of ice and snow, and the maintenance of the Turnpike itself. In addition, these estimates include the cost of restaurant, snack bar, service station and other facilities which are to serve the users of the Turnpike. The construction and ownership of these service facilities by the Turnpike Authority are expected to prove a very important factor in the satisfactory and successful operation of the Turnpike. In addition, this ownership will secure the payment of greater revenues to the Authority by the concessionaires than would be possible if such concessionaires were required to finance and build their own facilities. Undoubtedly the Authority can finance and construct these facilities more advantageously than could any concessionaire.

We present below a Grand Summary of the Total Project Costs for the completed Turnpike. The items which appear in this grand summary are self-explanatory except for the item "Repayment to New Jersey State Highway Department". Up to the present time, the State Highway Department has purchased real estate and has done a large amount of embankment and other work on Route No. 100 in the vicinity of Rahway. It is proposed that the Turnpike shall be located in this vicinity along the present location of Route No. 100 and that the cost of acquiring the real estate and the expenditures under the construction contracts now in force shall be reimbursed to the State Highway Department by the Turnpike Authority. In addition, the State Highway Department is now completing arrangements for the purchase of certain important right-of-way through the plant of the Standard Oil Company in the vicinity of Elizabeth, negotiations for which have been in progress the past two or three years. It is contemplated that the Turnpike Authority shall likewise reimburse the State Highway Department for the acquisition of this right-of-way when the Turnpike is formally located thereon. In accord with the provisions of the basic legislation, the Turnpike Authority has also received an advance of \$500,000 from the State Highway Department for use in securing engineering reports and undertaking other steps preliminary to the construction of the Turnpike. The sum of these expenditures may amount to \$11,150,000 and represents the maximum amount which the New Jersey Turnpike Authority will be expected to repay to the New Jersey State Highway Department under present arrangements.

**New Jersey Turnpike**  
**Grand Summary of Total Project Costs**  
**Total Length — 117.3 Miles**

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South Section — 87.2 Miles	
Construction Costs, Including Buildings and all Equipment.	\$59,225,000
North Section — 30.1 Miles	
Construction Costs, Including Buildings and all Equipment.	89,805,000
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Total Construction Costs for Completed Turnpike — 117.3 Miles	\$149,030,000
Total Real Estate Costs — 117.3 Miles	10,145,000
Repayment to New Jersey State Highway Department	11,150,000
Engineering Costs	13,600,000
Administration and Legal Costs	1,000,000
Allowance for Contingencies	22,075,000
Net Interest During Construction (3 years allowed) and Financing Costs	23,000,000
<hr/>	
TOTAL PROJECT COST and ASSUMED AMOUNT OF REVENUE BONDS TO BE ISSUED	\$230,000,000

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**TRAFFIC AND REVENUE STUDIES**

We have reviewed carefully the traffic and revenue studies which have been prepared by Coverdale and Colpitts for this project. We are impressed by the thoroughness and detail of the surveys and studies which have entered into the preparation of their findings. The origin and destination surveys which have been made to determine present sources of traffic and the total volume of traffic on nearby competitive routes are considered logical and complete for the purpose. We believe that the determination of available traffic for the proposed Turnpike and the determination of traffic which will be induced to use the Turnpike, together with the future growth of such traffic, have all been determined conservatively. We also believe that the revenue which has been estimated as coming from the concessionaries on the Turnpike for gasoline and oil sales and restaurant privileges has been estimated conservatively.

The toll schedule which has been submitted in the report of Coverdale and Colpitts has been prepared essentially for the purpose of making a conservative estimate of the revenue which is to be secured from toll collections. When the Turnpike is being completed and is about ready to be placed in operation, the Turnpike Authority will of course then make a more exhaustive study of a comprehensive toll schedule which will prove most equitable to all

classes of vehicles for the different lengths of travel which may be undertaken between the different interchanges. The final toll schedule to be adopted later will be designed to produce a total revenue for the Turnpike which will be not less than that shown in the Coverdale and Colpitts report, but it is considered most probable that a final toll schedule can be devised which will be entirely equitable and at the same time will show a greater return to the Authority than would come from the schedule indicated by the Coverdale and Colpitts report. We believe that the toll schedule shown in the Coverdale and Colpitts report is both satisfactory and conservative for financing purposes.

The reports of the engineers to determine construction costs on the north and south sections of the Turnpike have shown their estimates of cost for operation and maintenance of the Turnpike. The cost of operation and maintenance thus shown for the north section, including administration costs for both sections, is \$1,131,400 for the first year and \$1,259,800 for the tenth year. The similar cost for the south section is shown to vary from \$420,000 in the first year to \$525,000 in the tenth year. By comparison with other operating facilities, these estimates are clearly liberal. In order to deal with round figures, the Coverdale and Colpitts report has used the uniform amount throughout of \$1,500,000 per year for operating expenses, including maintenance. We consider this amount to be appropriate and conservative for financing purposes.

The Coverdale and Colpitts report dwells in detail with the service the Turnpike will offer the motorists in respect to safety, convenience, satisfaction and time saving. Their report also presents their views as to usage of the Turnpike by trucks as well as passenger cars. We consider their statements on these points to be of a conservative character.

We present below the tabulation which appears in the Coverdale and Colpitts report showing anticipated traffic and revenue for the Turnpike, together with a deduction for operation and maintenance costs to produce the balance available for debt service in each year following the completion of the Turnpike. It is to be noted that this tabulation shows the earnings in the first year of operation to be substantially lower than would be the average for the first five years of operation. We believe it is conservative and realistic to show the earnings during the first year on a modest basis since it will not be possible for a large new facility of this character to attain its normal earning power immediately upon opening to traffic. Experience has shown that a facility of this character attains a normal earning power only after the motorist has become acquainted with the facility and what it will do for him,

and after directional signs, connections to existing highways and other advantages to travel are fully in operation. The first few years of operation of the Turnpike will thus show larger increases in revenue per year than can be expected to continue in later years. The foregoing points are recognized in the tabulation by Coverdale and Colpitts which appears below:

**New Jersey Turnpike  
Estimated Results of Operation  
From Report by Coverdale & Colpitts**

<i>Year</i>	<i>Vehicles</i>	<i>Vehicular Revenue</i>	<i>Concession Revenue 7½%</i>	<i>Total Revenue</i>	<i>Operating Expenses</i>	<i>Balance Available for Debt Service</i>
1952	7,600,000	\$ 7,150,000	\$ 536,000	\$ 7,686,000	\$1,500,000	\$ 6,186,000
1953	8,750,000	8,250,000	619,000	8,869,000	1,500,000	7,369,000
1954	10,100,000	9,500,000	713,000	10,213,000	1,500,000	8,713,000
1955	11,100,000	10,450,000	784,000	11,234,000	1,500,000	9,734,000
1956	12,000,000	11,300,000	848,000	12,148,000	1,500,000	10,648,000
1957	12,500,000	11,800,000	885,000	12,685,000	1,500,000	11,185,000
1958	13,000,000	12,300,000	923,000	13,223,000	1,500,000	11,723,000
1959	13,500,000	12,800,000	960,000	13,760,000	1,500,000	12,260,000
1960	14,000,000	13,300,000	998,000	14,298,000	1,500,000	12,798,000
1961	14,500,000	13,800,000	1,035,000	14,835,000	1,500,000	13,335,000
1962	15,000,000	14,300,000	1,072,000	15,372,000	1,500,000	13,872,000
1963	15,500,000	14,800,000	1,110,000	15,910,000	1,500,000	14,410,000
1964	16,000,000	15,300,000	1,148,000	16,448,000	1,500,000	14,948,000
1965	16,500,000	15,800,000	1,185,000	16,985,000	1,500,000	15,485,000
1966	17,000,000	16,300,000	1,222,000	17,522,000	1,500,000	16,022,000
1967	17,500,000	16,800,000	1,260,000	18,060,000	1,500,000	16,560,000
1968	18,000,000	17,300,000	1,297,000	18,597,000	1,500,000	17,097,000
1969	18,500,000	17,800,000	1,335,000	19,135,000	1,500,000	17,635,000
1970	19,000,000	18,300,000	1,374,000	19,674,000	1,500,000	18,174,000
1971	19,500,000	18,800,000	1,410,000	20,210,000	1,500,000	18,710,000
1972	20,000,000	19,300,000	1,448,000	20,748,000	1,500,000	19,248,000
1973	20,500,000	19,800,000	1,485,000	21,285,000	1,500,000	19,785,000
1974	21,000,000	20,300,000	1,523,000	21,823,000	1,500,000	20,323,000
1975	21,500,000	20,800,000	1,560,000	22,360,000	1,500,000	20,860,000

**AMORTIZATION OF PROJECT COSTS**

The Grand Summary of Total Project Costs shows the amount of revenue bonds to be issued for this project as \$230,000,000. The traffic and revenue studies of Coverdale and Colpitts have determined the amounts available for debt service on the proposed bond issue year by year.

We present below a quotation and tabulation from the report of Coverdale and Colpitts which outlines the anticipated amortization of the proposed bond issue.

“The following tabulation shows the approximate rate at which an issue of \$230,000,000 three per cent bonds could be retired, assuming all of the earnings were available for interest and amortization and the bonds retired at par. The retirement of the bonds at a reasonable premium would postpone the final maturity date about one year.”

**New Jersey Turnpike**  
**Approximate Amortization Schedule**  
**From Report by Coverdale & Colpitts**

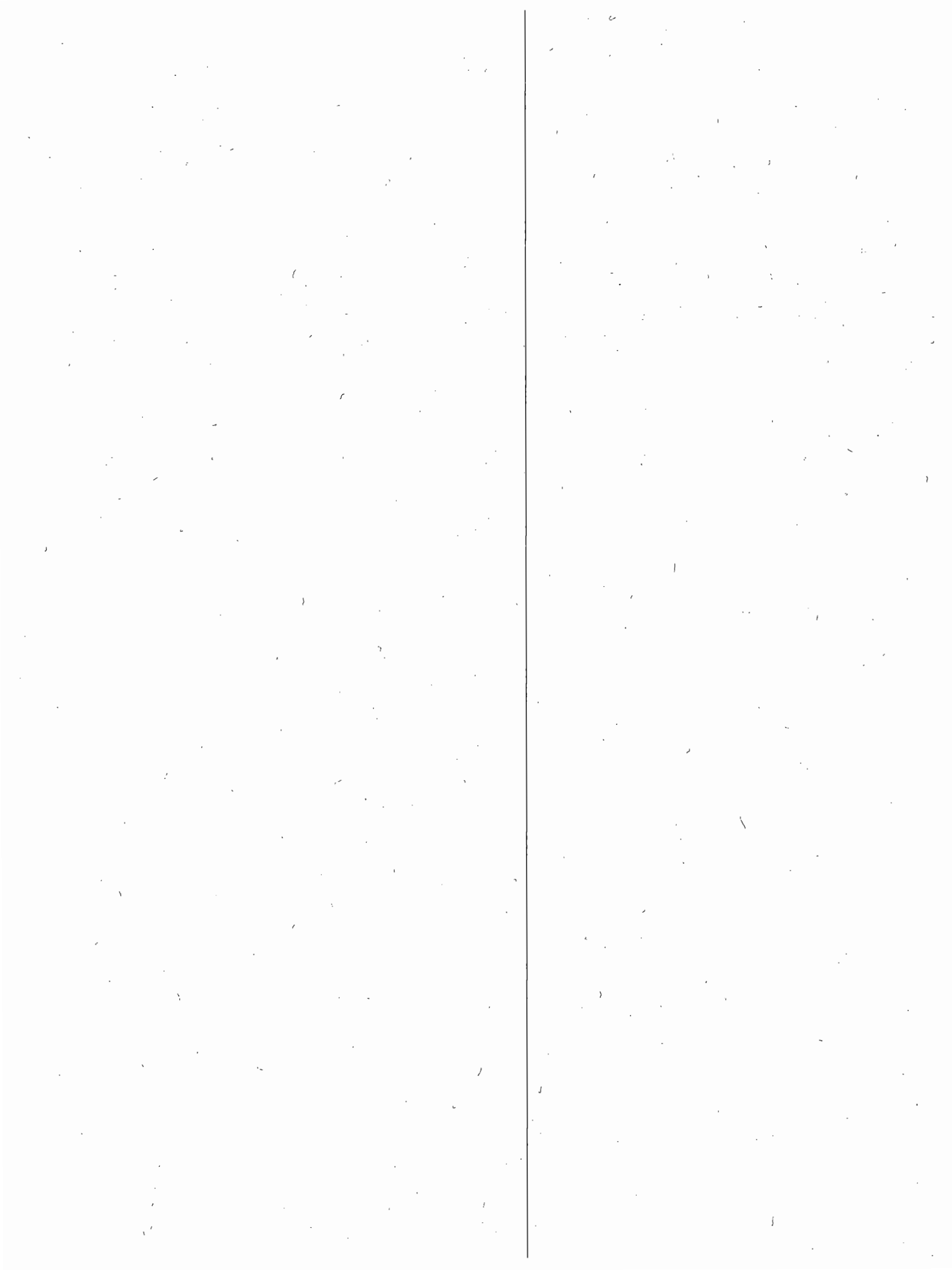
<i>Year</i>	<i>Balance Available for Debt Service</i>	<i>Interest at 3 Per Cent</i>	<i>Available for Amortization</i>	<i>Bonds Outstanding \$230,000,000</i>
1952	\$ 6,186,000	\$6,900,000	\$—714,000	
1953	7,369,000	6,900,000	+469,000	
1954	8,713,000	6,900,000	1,813,000	\$228,432,000
1955	9,734,000	6,850,000	2,884,000	225,548,000
1956	10,648,000	6,765,000	3,883,000	221,665,000
1957	11,185,000	6,648,000	4,537,000	217,128,000
1958	11,723,000	6,513,000	5,210,000	211,918,000
1959	12,260,000	6,357,000	5,903,000	206,015,000
1960	12,798,000	6,180,000	6,618,000	199,397,000
1961	13,335,000	5,982,000	7,353,000	192,044,000
1962	13,872,000	5,761,000	8,111,000	183,933,000
1963	14,410,000	5,518,000	8,892,000	175,041,000
1964	14,948,000	5,251,000	9,697,000	165,344,000
1965	15,485,000	4,960,000	10,525,000	154,819,000
1966	16,022,000	4,645,000	11,377,000	143,442,000
1967	16,560,000	4,303,000	12,257,000	131,185,000
1968	17,097,000	3,936,000	13,161,000	118,024,000
1969	17,635,000	3,541,000	14,094,000	103,930,000
1970	18,174,000	3,118,000	15,056,000	88,874,000
1971	18,710,000	2,666,000	16,044,000	72,830,000
1972	19,248,000	2,185,000	17,063,000	55,767,000
1973	19,785,000	1,673,000	18,112,000	37,655,000
1974	20,323,000	1,130,000	19,193,000	18,462,000
1975	20,860,000	554,000	20,306,000	—

The above table shows that the assumed bond issue of \$230,000,000 would be amortized in 1975, or within a period of 24 years after the opening of the Turnpike to traffic. If tolls were kept in force for a period of 35 years after the date of issuance of the bonds, continuing the above annual increments in total revenue, the debt service would be earned 1.62 times.

## CONCLUSION

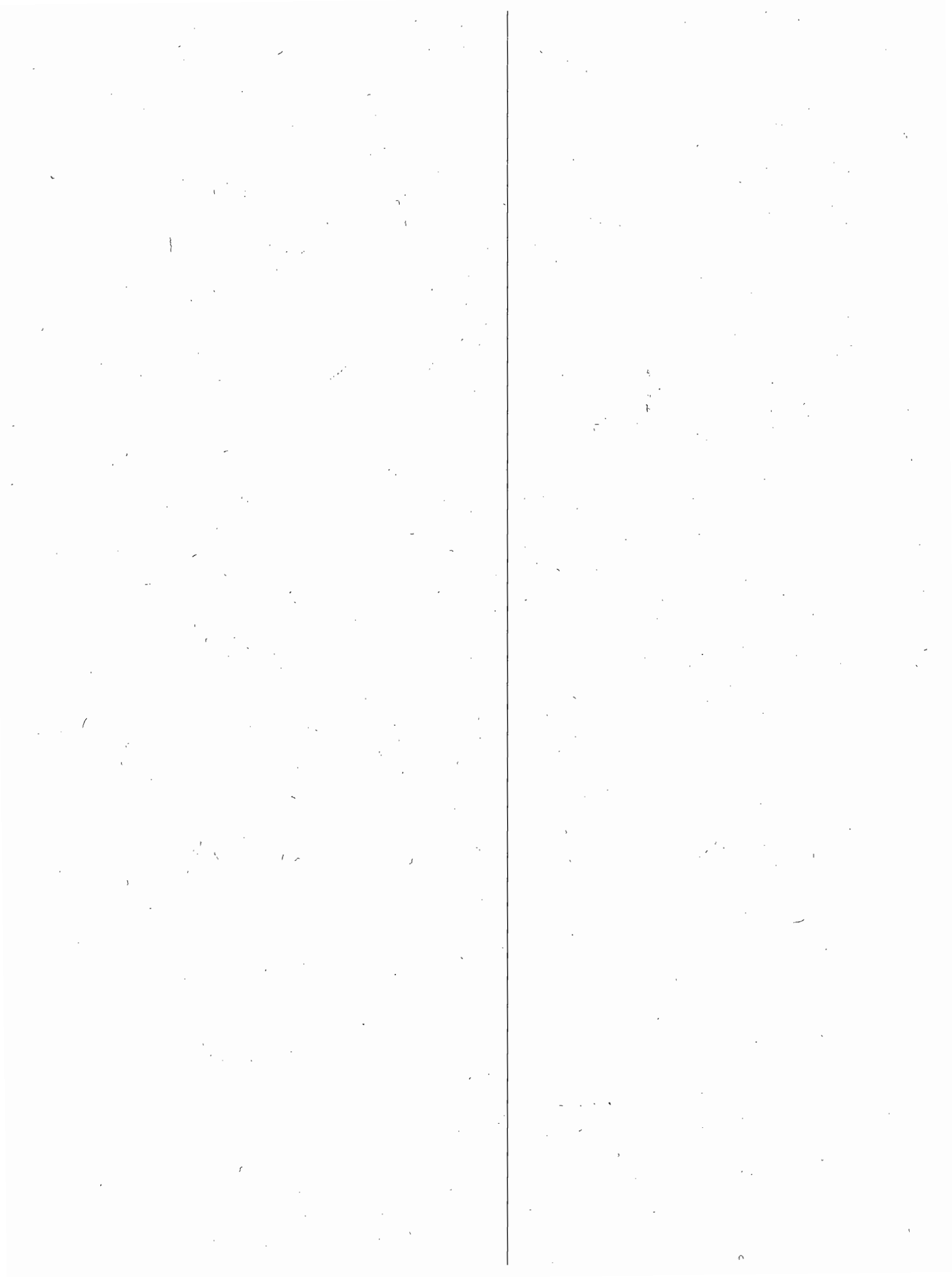
We consider the determinations with regard to the total project cost for the New Jersey Turnpike, the prospective traffic and revenue for the Turnpike and the amortization of the project cost, to be realistic, authoritative and conservative for financing purposes.

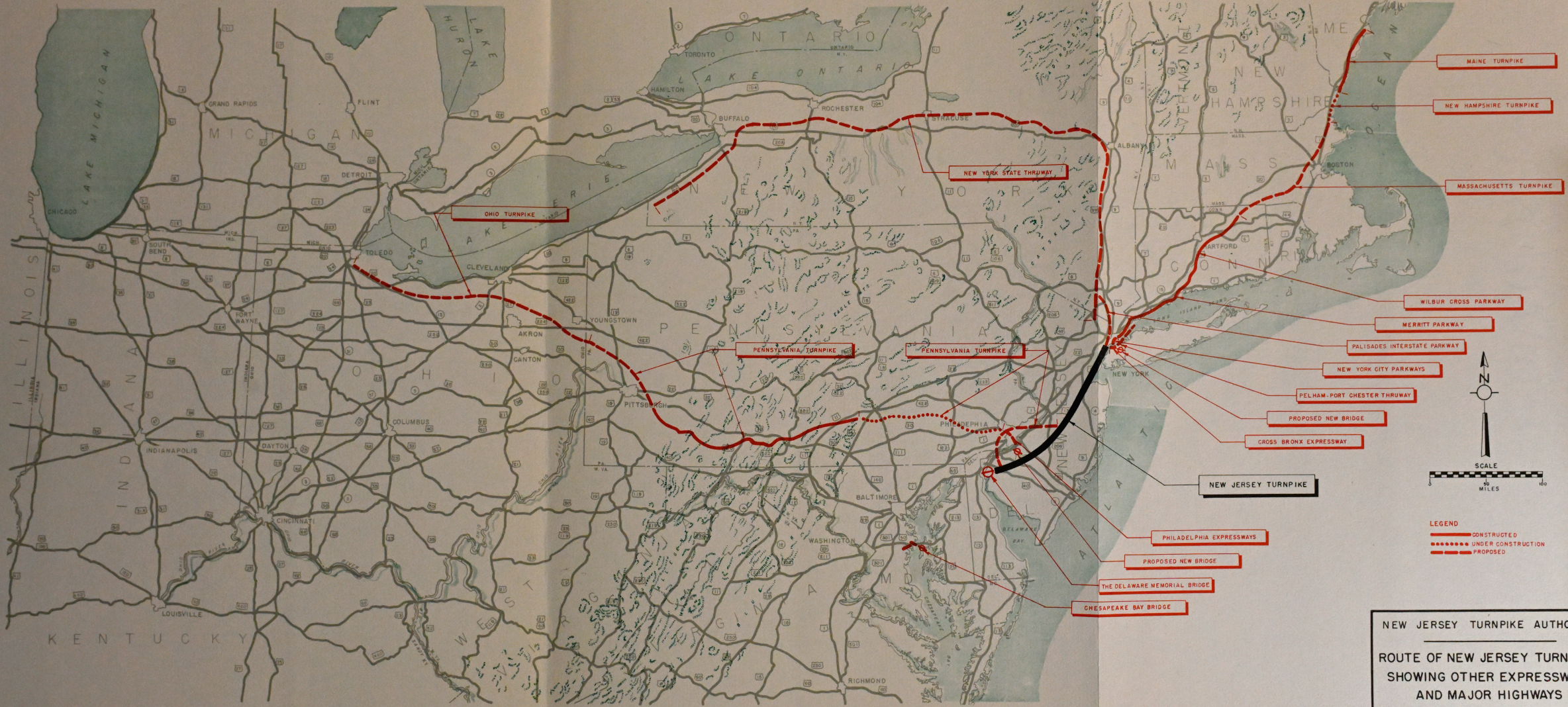
HOWARD, NEEDLES, TAMMEN & BERGENDOFF  
*General Consultants to the Authority*



### List of Exhibits

- Plate 1 Major highways in eastern United States
- Plate 2 Turnpike in relation to feeder highways in New Jersey and adjacent states
- Plate 3 Turnpike alignment and toll interchanges
- Plate 4 Estimated completion schedule of other turnpikes and major highways
- Plate 5 Typical underpass, northern section
- Plate 6 Typical underpass, southern section
- Plate 7 Typical interchange
- Plate 8 Typical elevations and cross sections, southern section
- Plate 9 Typical cross sections, northern section
- Plate 10 Bridge over Hackensack River
- Plate 11 Drivers-eye view of roadway on major bridges
- Plate 12 Railing and parapet for major bridges
- Plate 13 Perspective of restaurant and gas station
- Plate 14 Plan of restaurant and gas station
- Plate 15 Perspective of restaurant near Route 35
- Plate 16 Administration building at Route 35
- Plate 17 Air photo of 6.55 mile section of Turnpike graded by New Jersey Highway Department from Route 4 Parkway to Morse's Creek. Inset shows graded portion of Route 35 interchange in more detail
- Plate 18 Traffic congestion on New Jersey Route 25
- Plate 19 New Jersey Turnpike and Present and Proposed State Highway System





MAINE TURNPIKE

NEW HAMPSHIRE TURNPIKE

MASSACHUSETTS TURNPIKE

WILBUR CROSS PARKWAY

MERRITT PARKWAY

PALISADES INTERSTATE PARKWAY

NEW YORK CITY PARKWAYS

PELHAM-PORT CHESTER THRUWAY

PROPOSED NEW BRIDGE

CROSS BRONX EXPRESSWAY

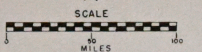
NEW JERSEY TURNPIKE

PHILADELPHIA EXPRESSWAYS

PROPOSED NEW BRIDGE

THE DELAWARE MEMORIAL BRIDGE

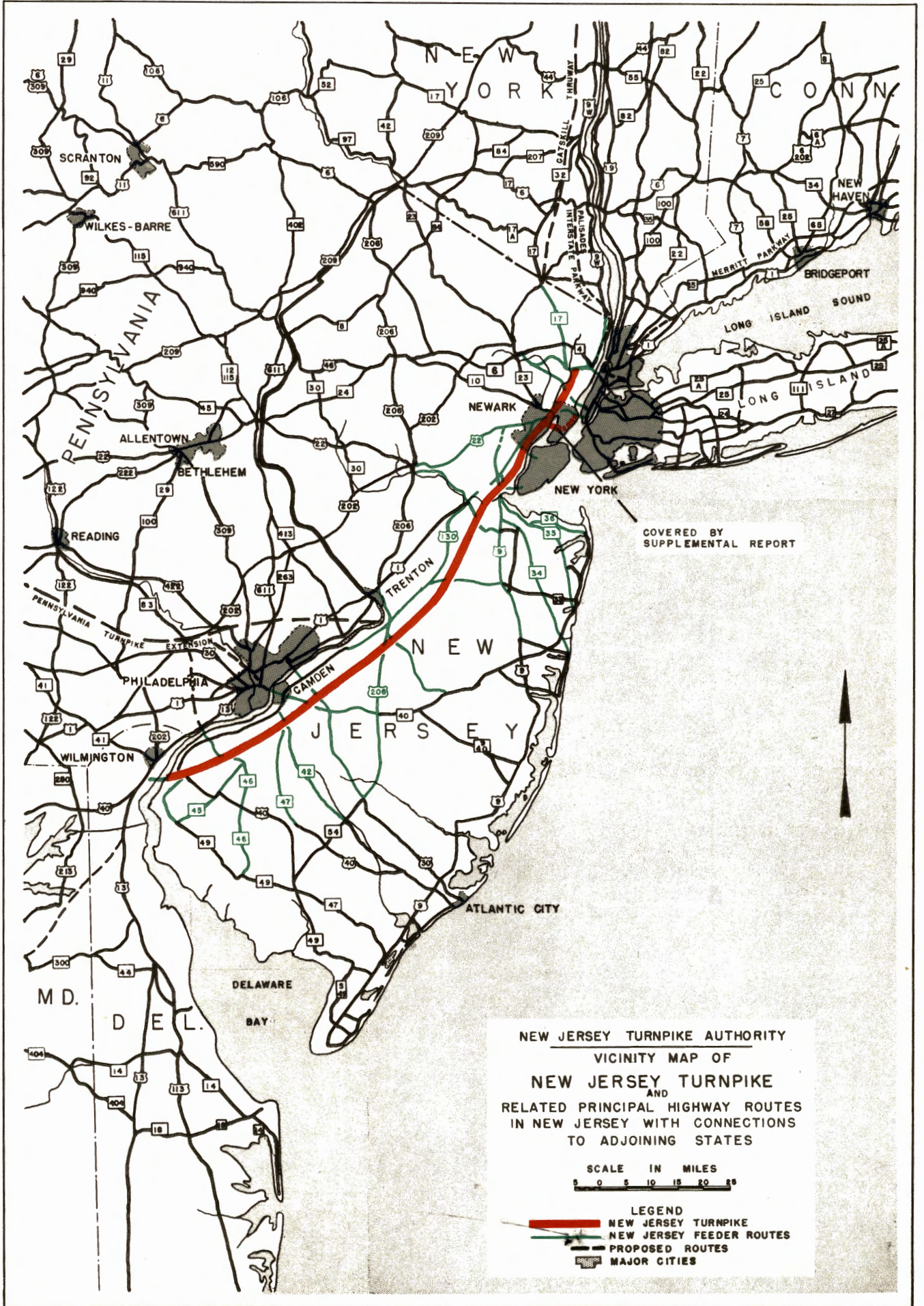
CHESAPEAKE BAY BRIDGE

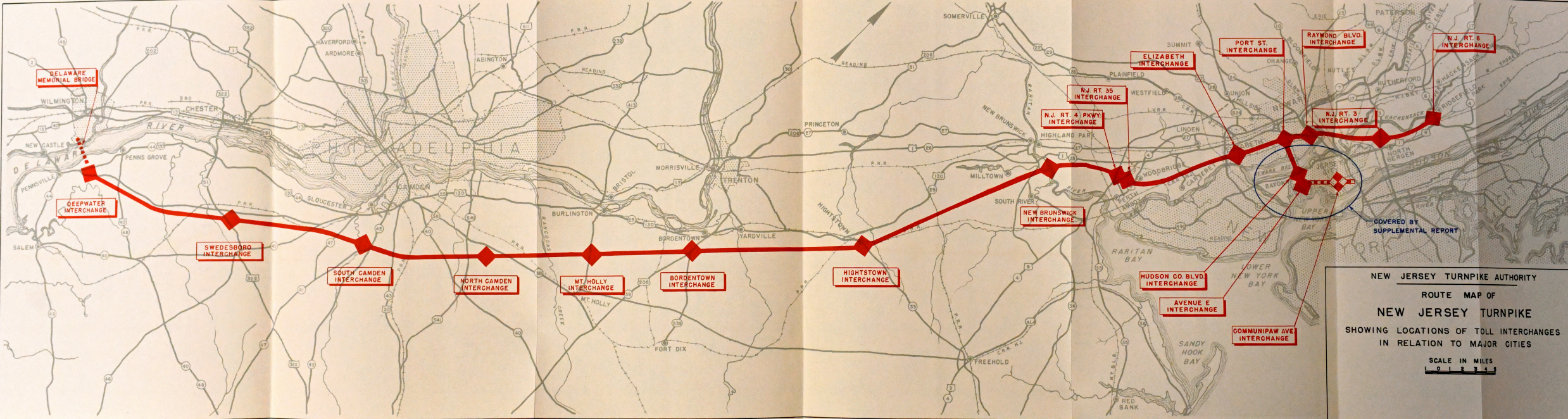


LEGEND

- CONSTRUCTED
- ..... UNDER CONSTRUCTION
- - - - - PROPOSED

NEW JERSEY TURNPIKE AUTHORITY  
 ROUTE OF NEW JERSEY TURNPIKE  
 SHOWING OTHER EXPRESSWAYS  
 AND MAJOR HIGHWAYS





DELAWARE MEMORIAL BRIDGE

DEEPWATER INTERCHANGE

SWEDSBORO INTERCHANGE

SOUTH CAMDEN INTERCHANGE

NORTH CAMDEN INTERCHANGE

MT. HOLLY INTERCHANGE

BORDENTOWN INTERCHANGE

HIGHTSTOWN INTERCHANGE

NEW BRUNSWICK INTERCHANGE

N.J. RT. 4 PKWY. INTERCHANGE

N.J. RT. 35 INTERCHANGE

ELIZABETH INTERCHANGE

PORT ST. INTERCHANGE

RAYMOND BLVD. INTERCHANGE

N.J. RT. 3 INTERCHANGE

N.J. RT. 6 INTERCHANGE

HUDSON CO. BLVD. INTERCHANGE

AVENUE E INTERCHANGE

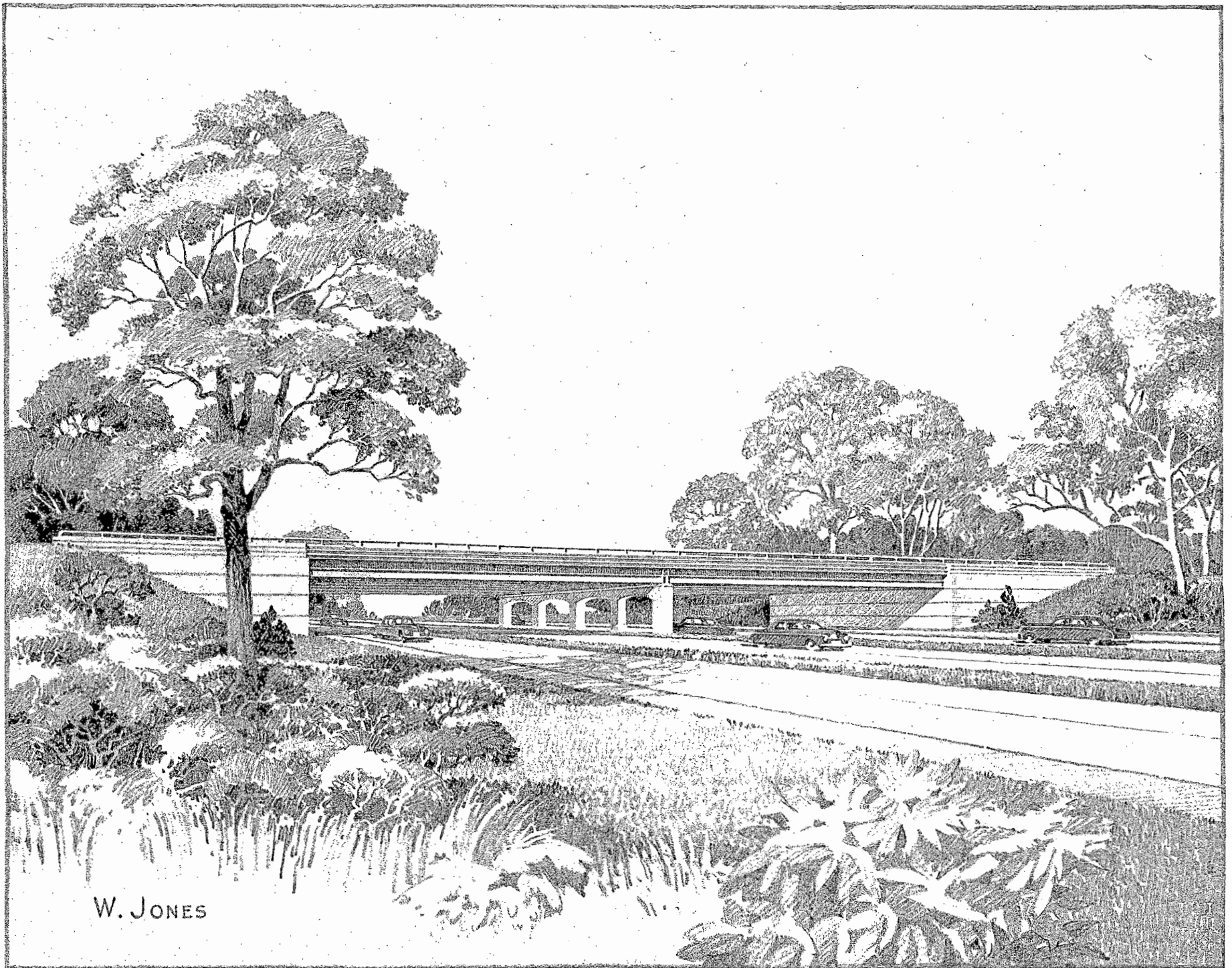
COMMUNIPAW AVE INTERCHANGE

NEW JERSEY TURNPIKE AUTHORITY

ROUTE MAP OF  
**NEW JERSEY TURNPIKE**  
 SHOWING LOCATIONS OF TOLL INTERCHANGES  
 IN RELATION TO MAJOR CITIES

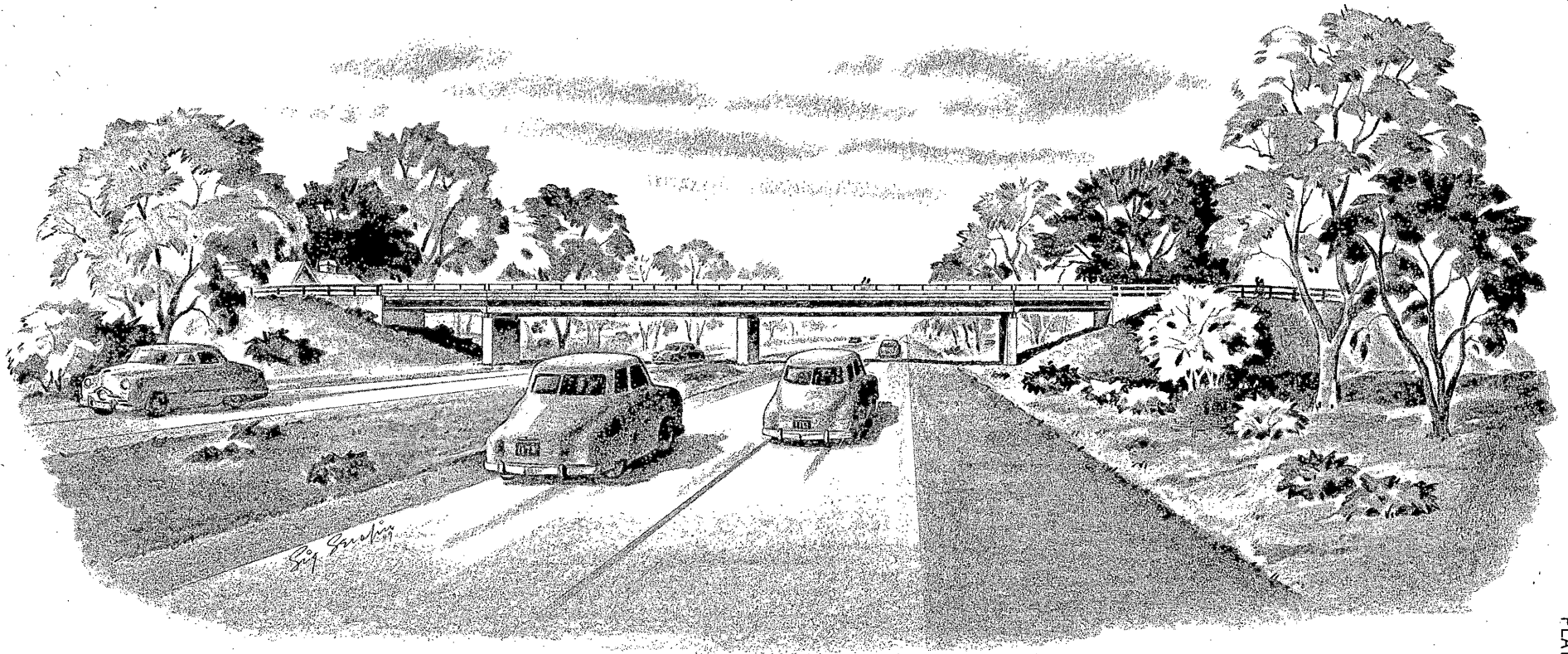
SCALE IN MILES  
 0 1 2 3 4



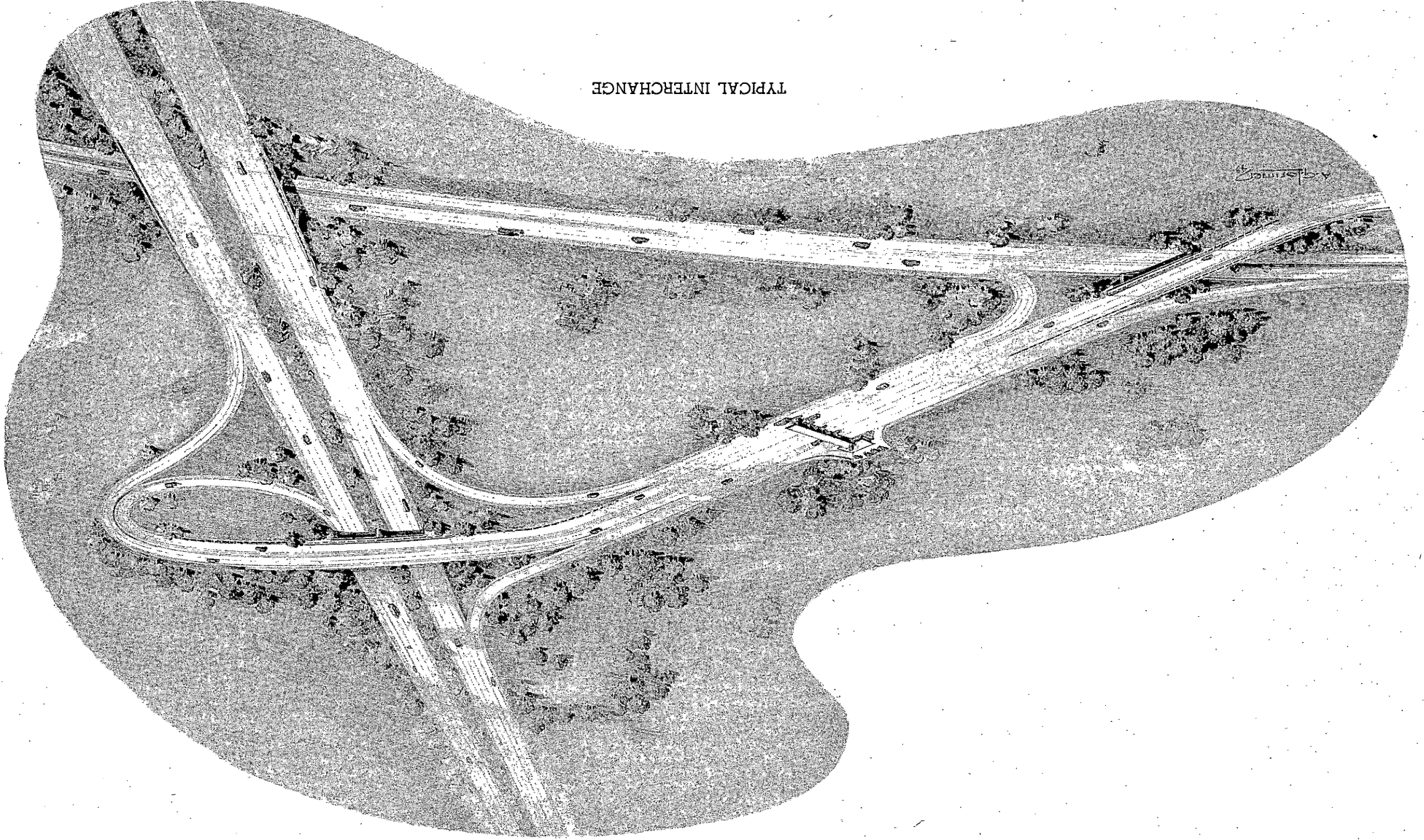


W. JONES

TYPICAL BRIDGE CARRYING LOCAL TRAFFIC OVER TURNPIKE

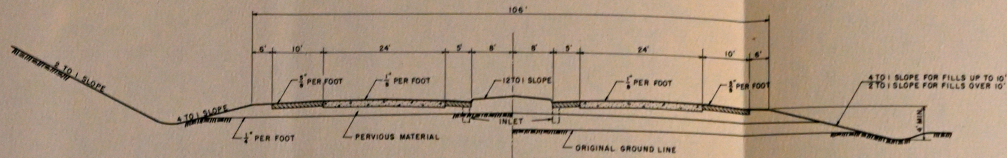


TYPICAL UNDERPASS, SOUTHERN SECTION

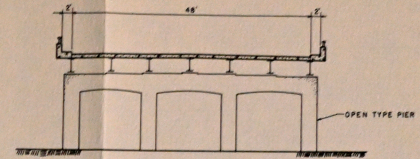


TYPICAL INTERCHANGE

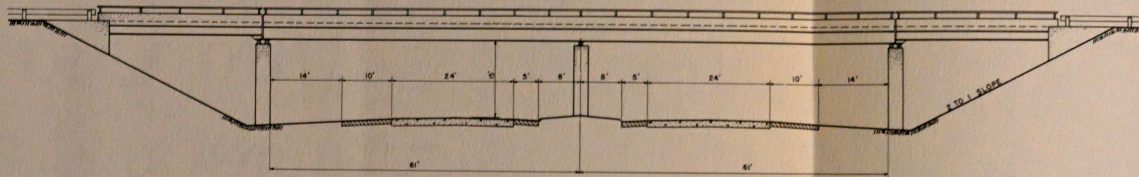
© 1954



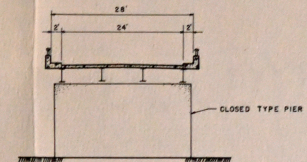
**CUT SECTION**  
**FILL SECTION**  
**TYPICAL ROADWAY CROSS SECTIONS**



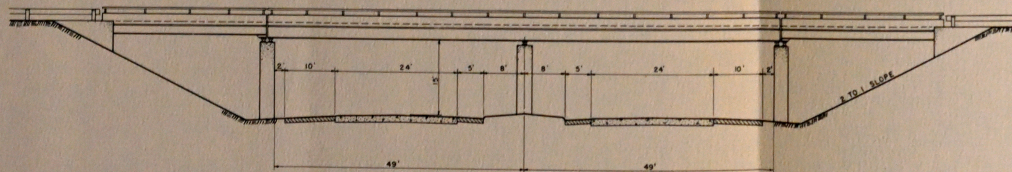
**4-LANE UNDIVIDED ROAD OVER TURNPIKE**  
**TRANSVERSE SECTION**



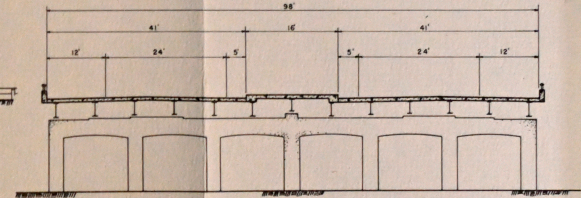
**UNDERPASS - NORTH OF NORTH CAMDEN INTERCHANGE**  
**ELEVATION**



**2-LANE SECONDARY ROAD OVER TURNPIKE**  
**TRANSVERSE SECTION**

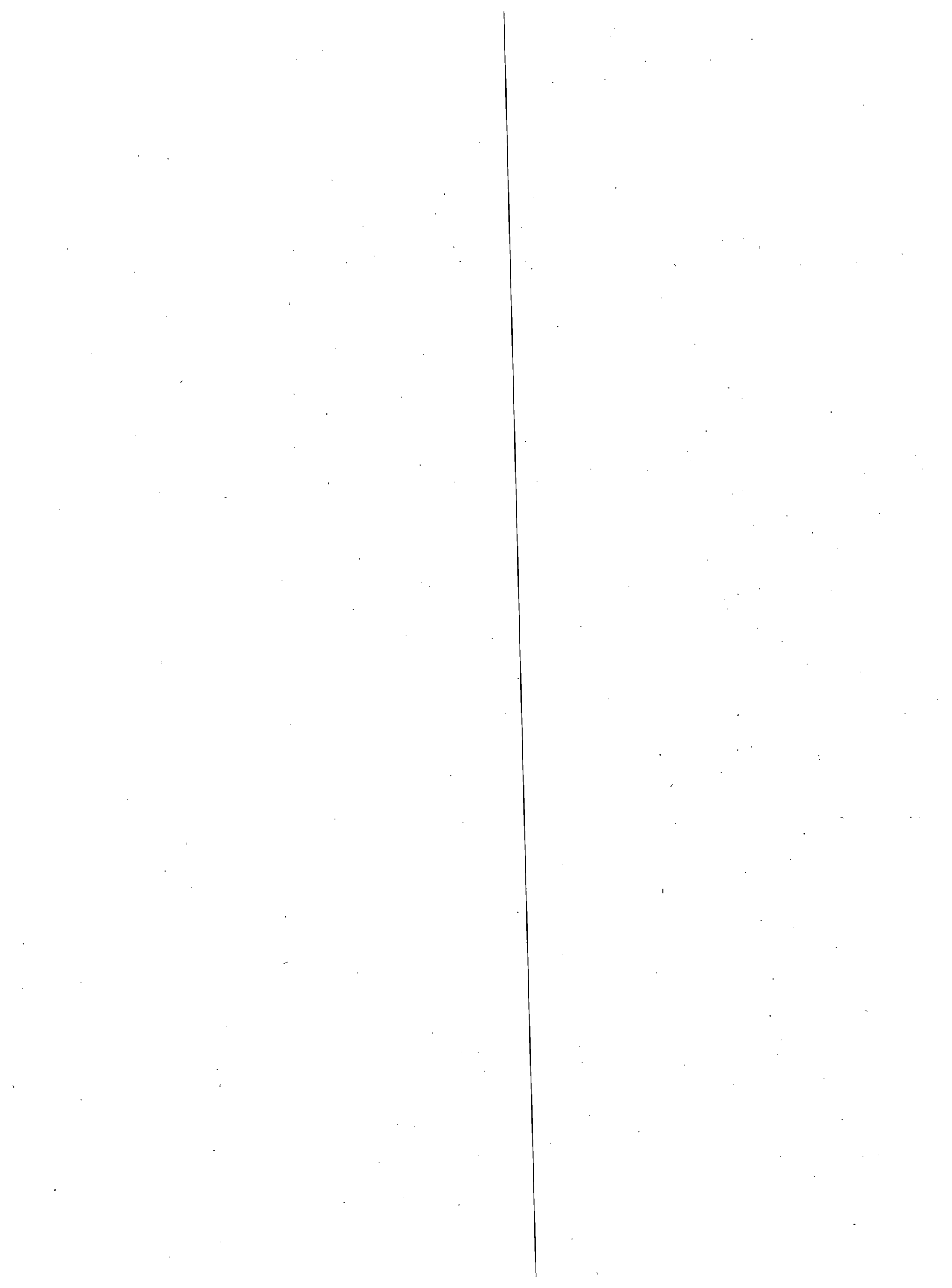


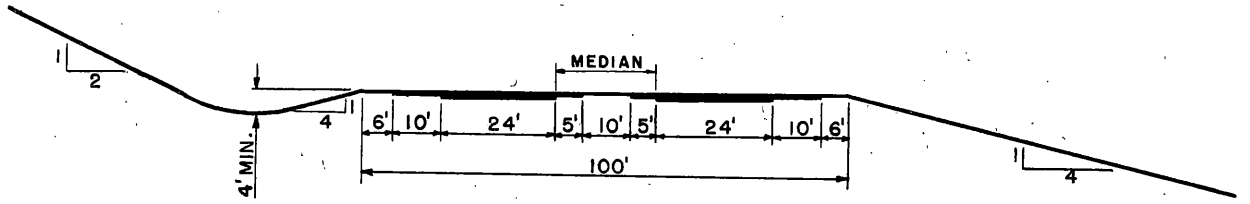
**UNDERPASS - SOUTH OF NORTH CAMDEN INTERCHANGE**  
**ELEVATION**



**TYPICAL TURNPIKE OVERPASS & 4-LANE DIVIDED HIGHWAY OVER TURNPIKE**  
**TRANSVERSE SECTION**

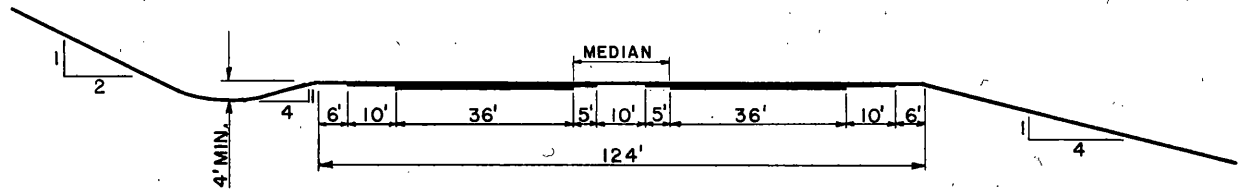
**NEW JERSEY TURNPIKE AUTHORITY**  
**NEW JERSEY TURNPIKE**  
**TYPICAL ELEVATIONS AND**  
**CROSS SECTIONS**





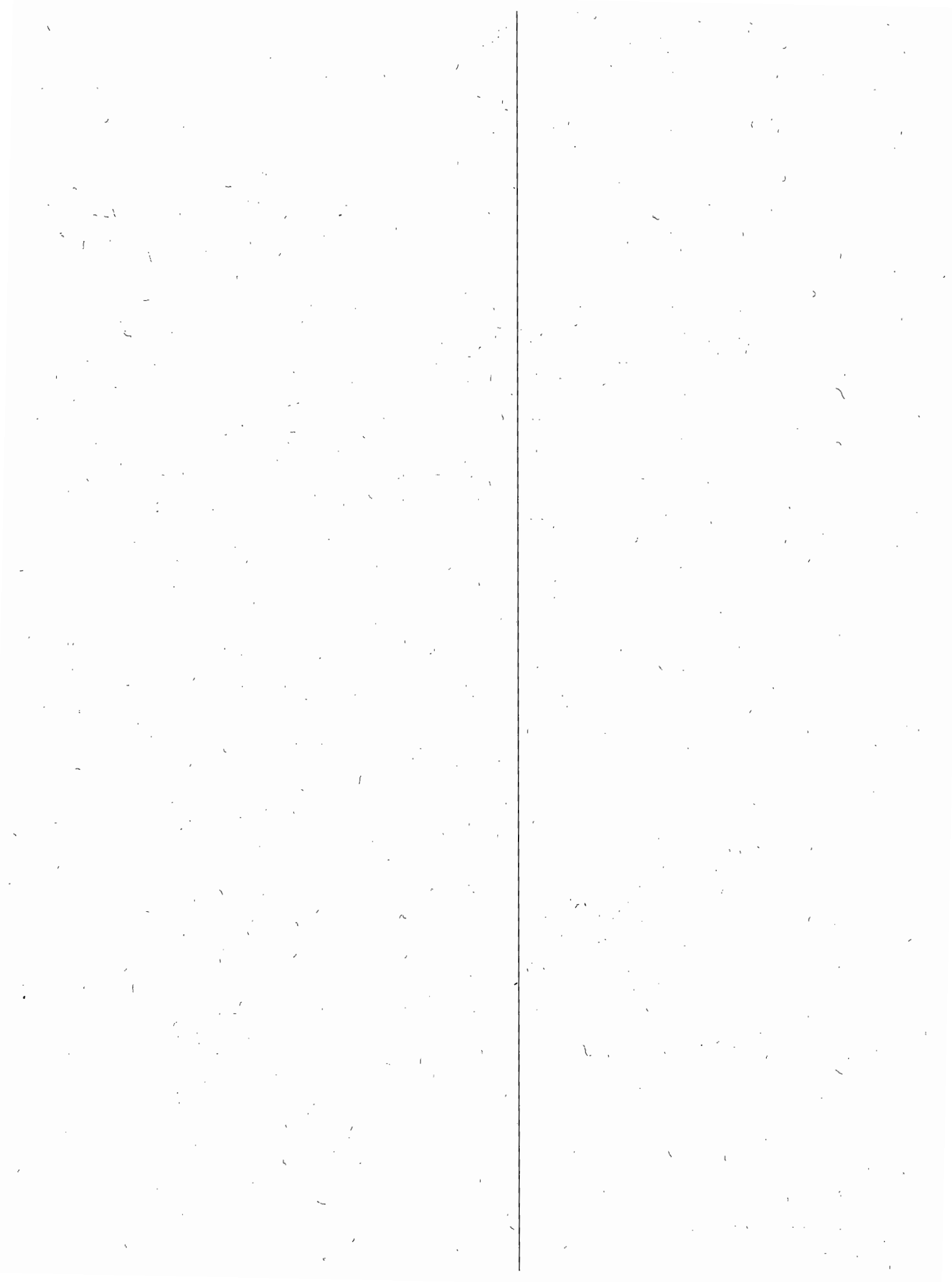
NOTE:  
SOUTH OF ROUTE 35 THE MEDIAN STRIP WILL BE  
26 FEET WIDE

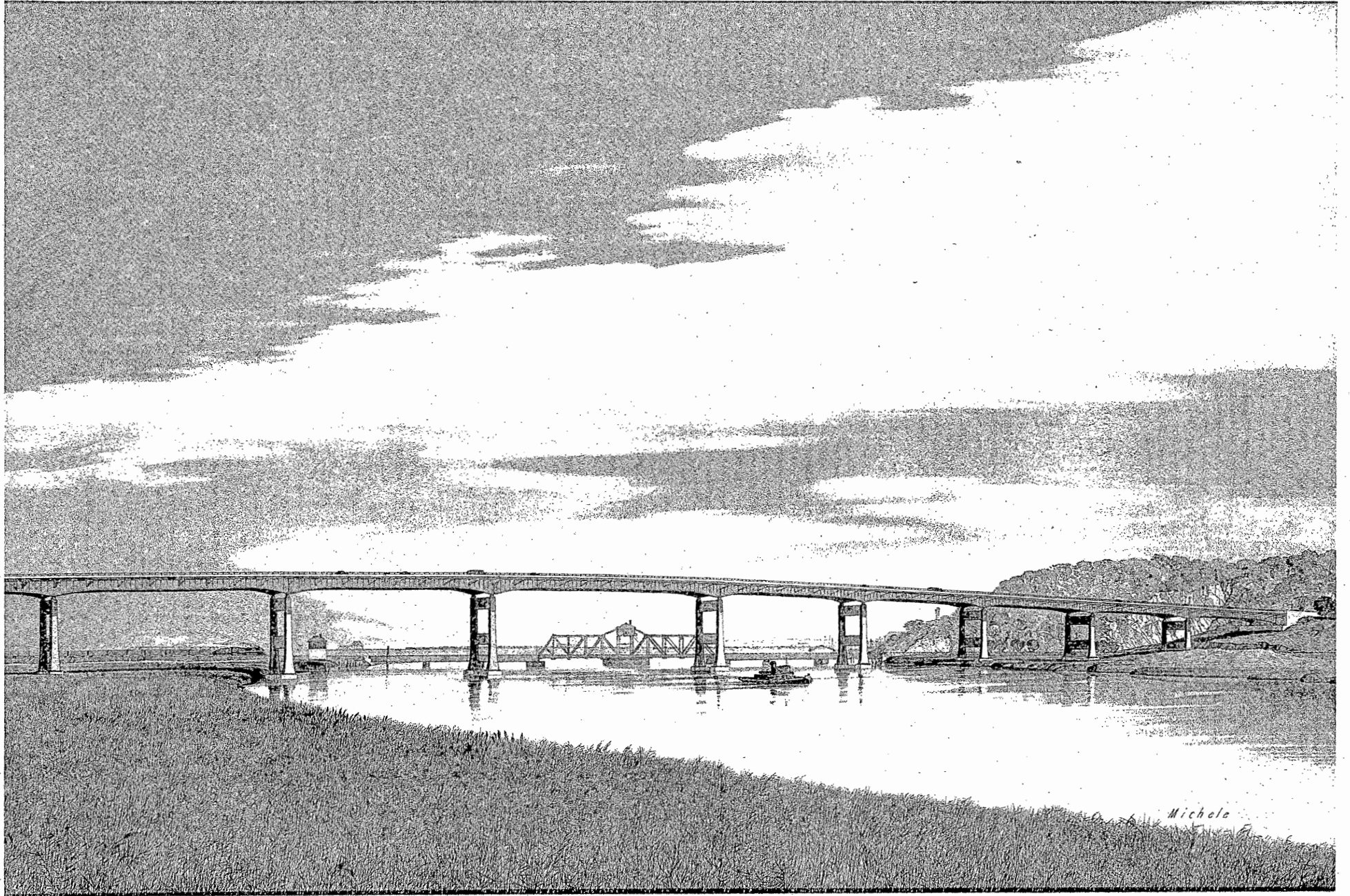
### TYPICAL SECTION FOR 4 LANES



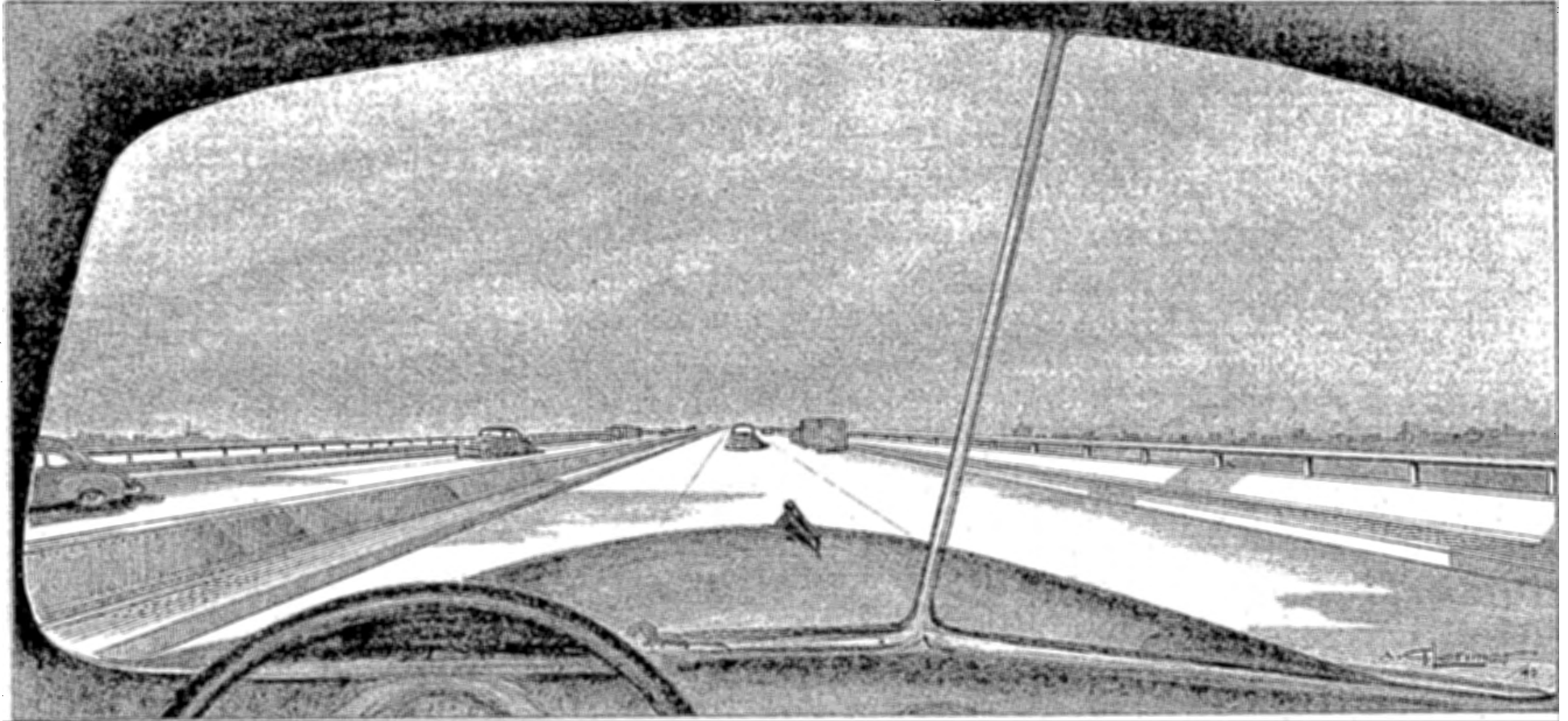
NOTE:  
SLOPES FOR HIGH FILLS ARE 2:1

### TYPICAL SECTION FOR 6 LANES

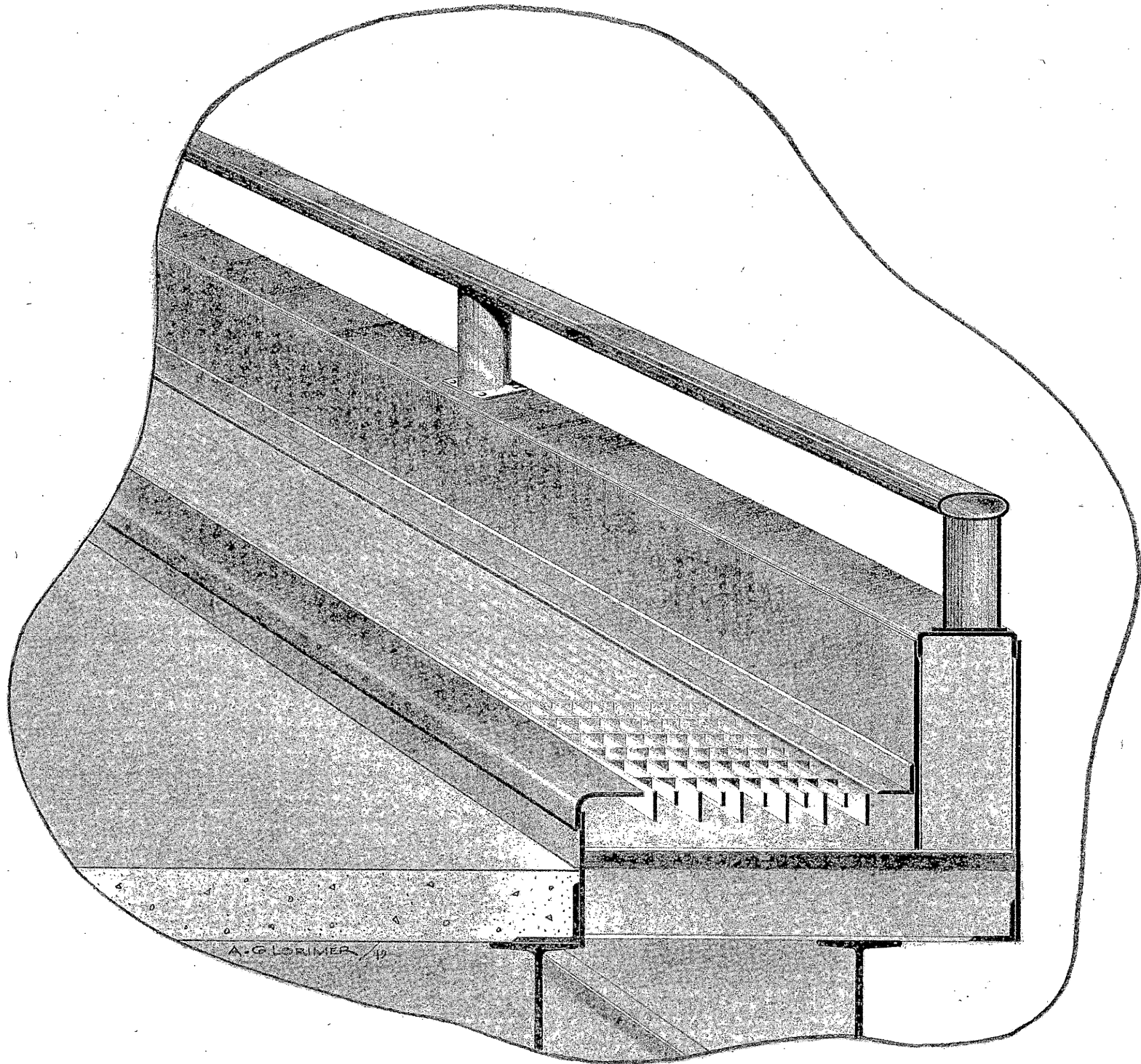




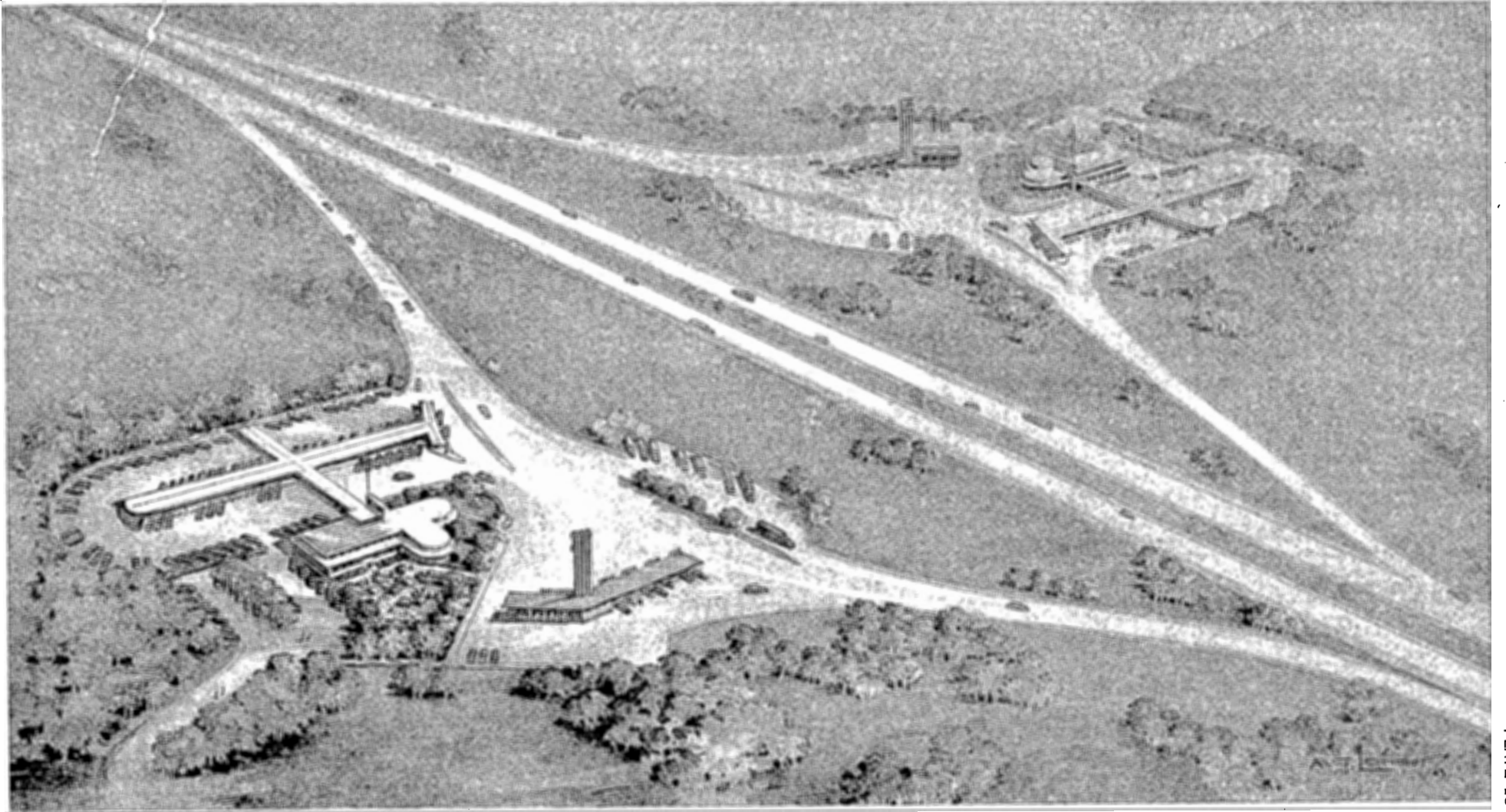
BRIDGE OVER HACKENSACK RIVER



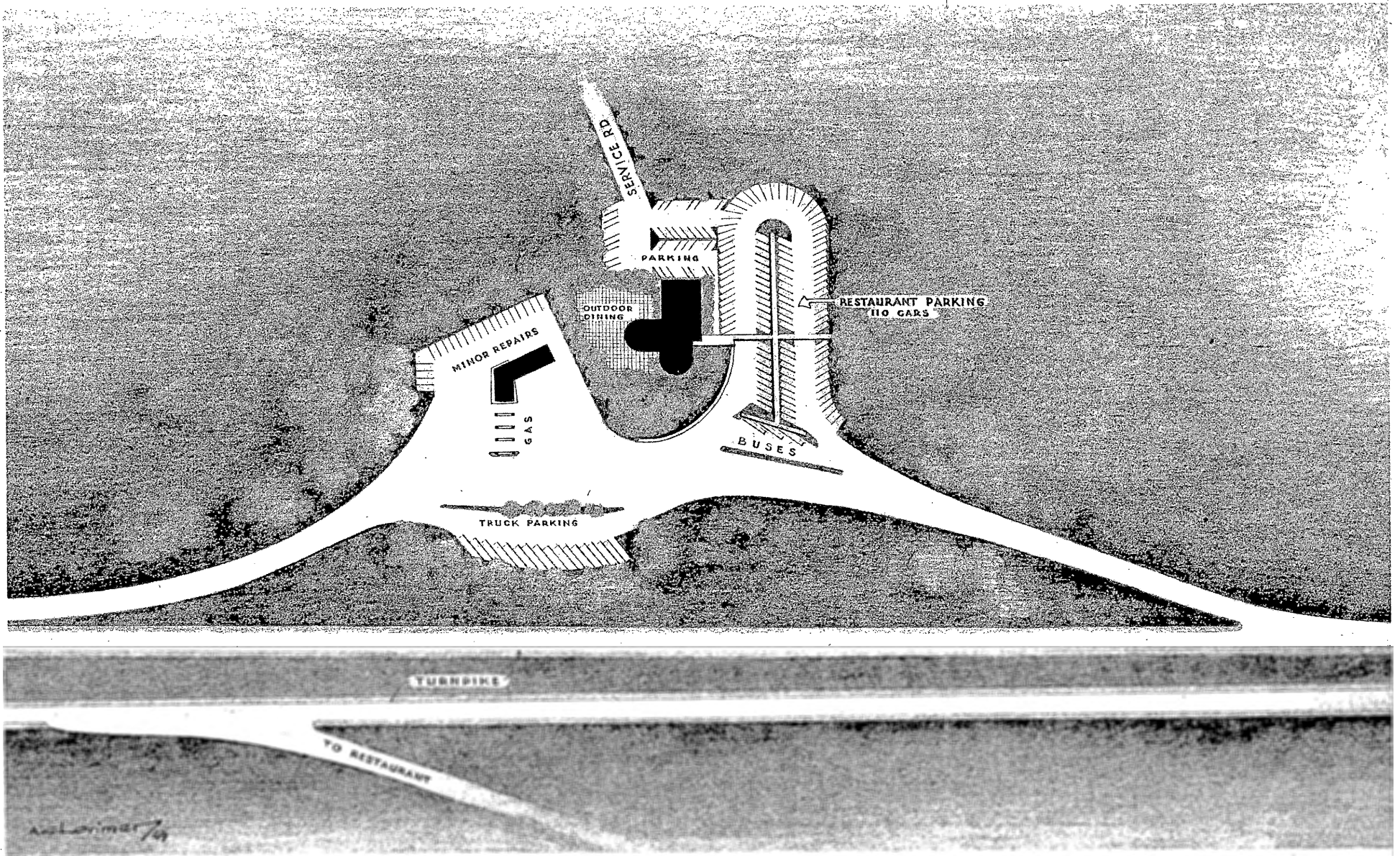
DRIVERS—EYE VIEW OF ROADWAY ON MAJOR BRIDGE



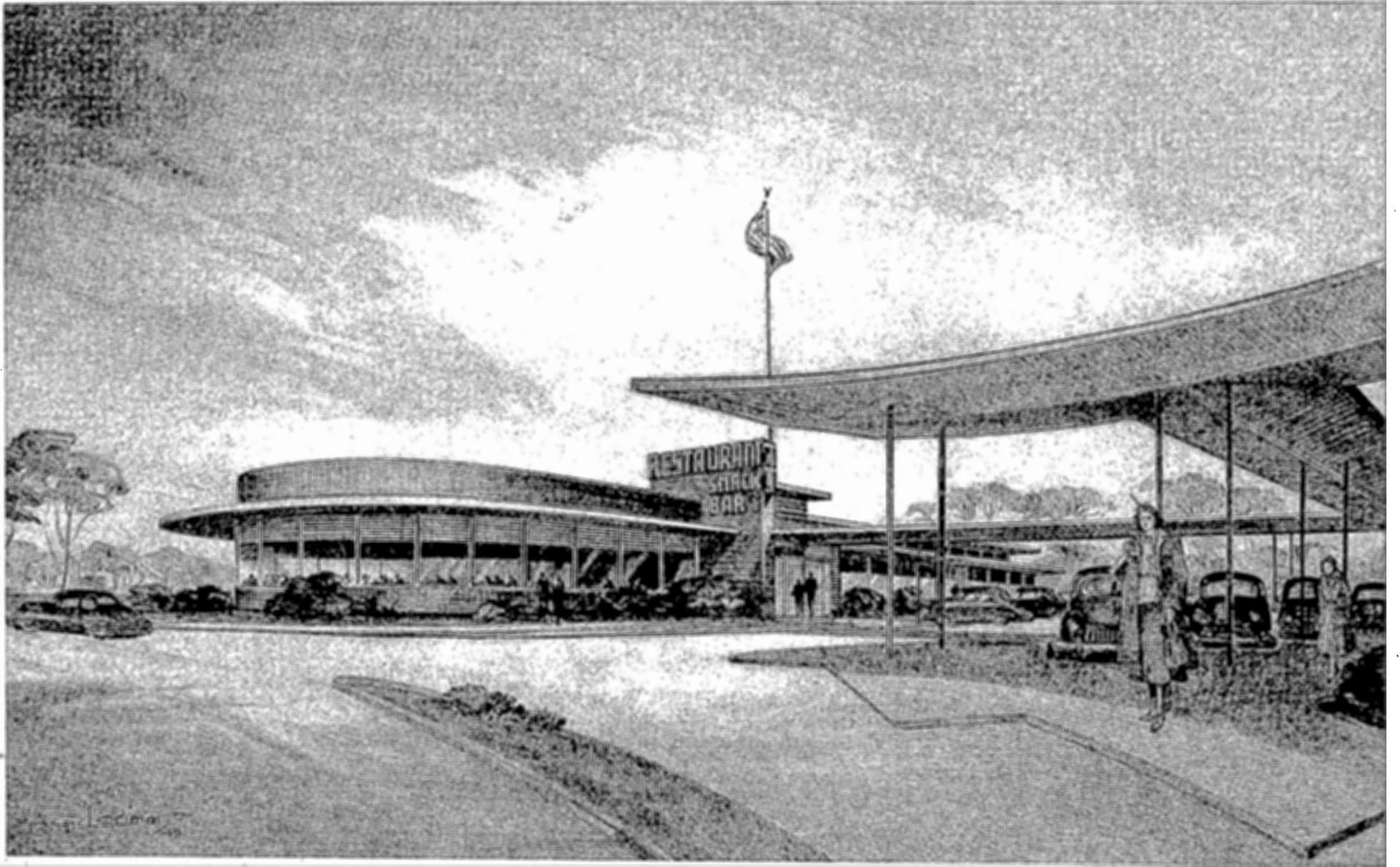
RAILING AND PARAPET FOR MAJOR BRIDGES



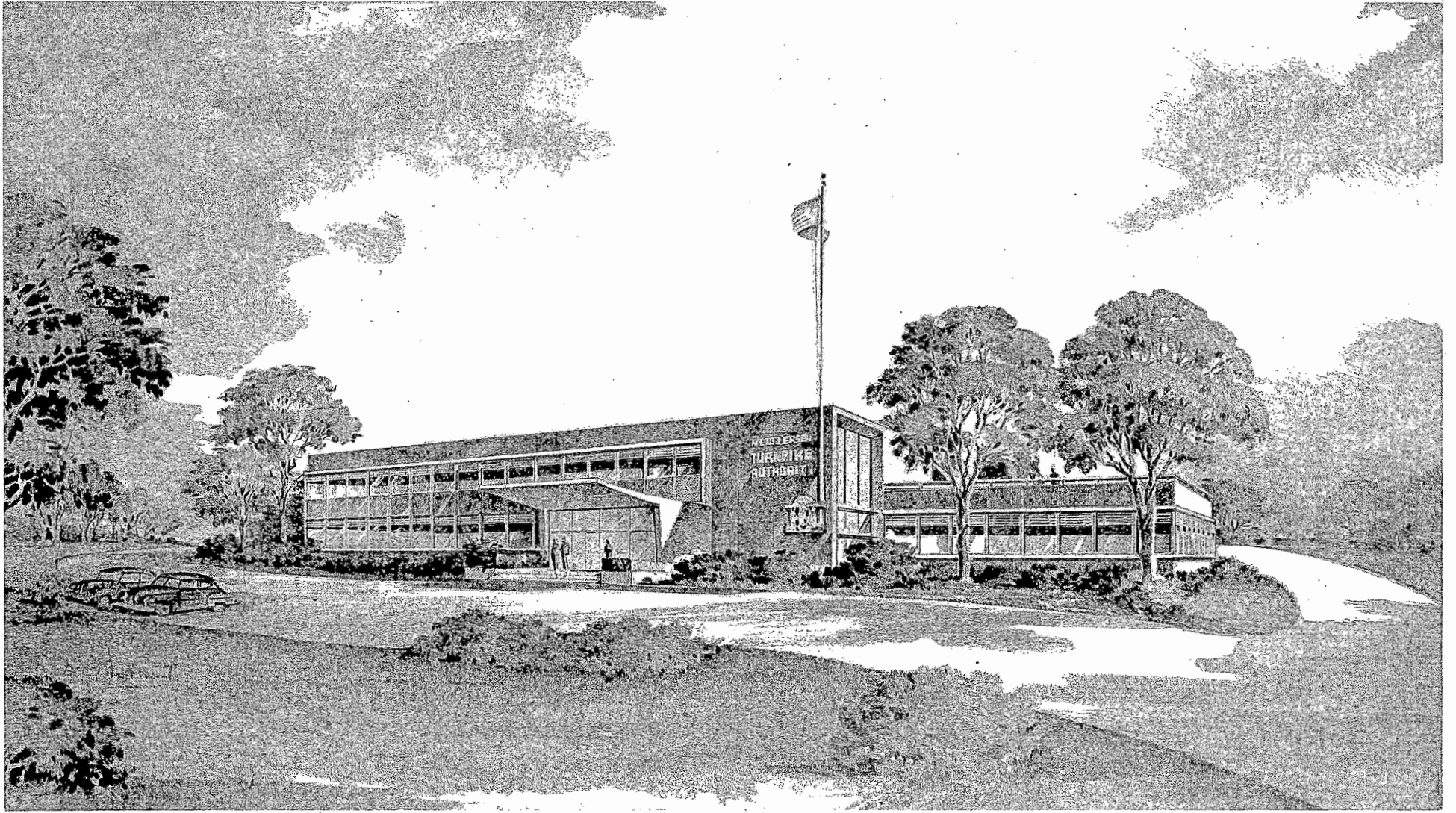
AERIAL PERSPECTIVE OF RESTAURANT AND GAS STATION



PLAN OF RESTAURANT AND GAS STATION



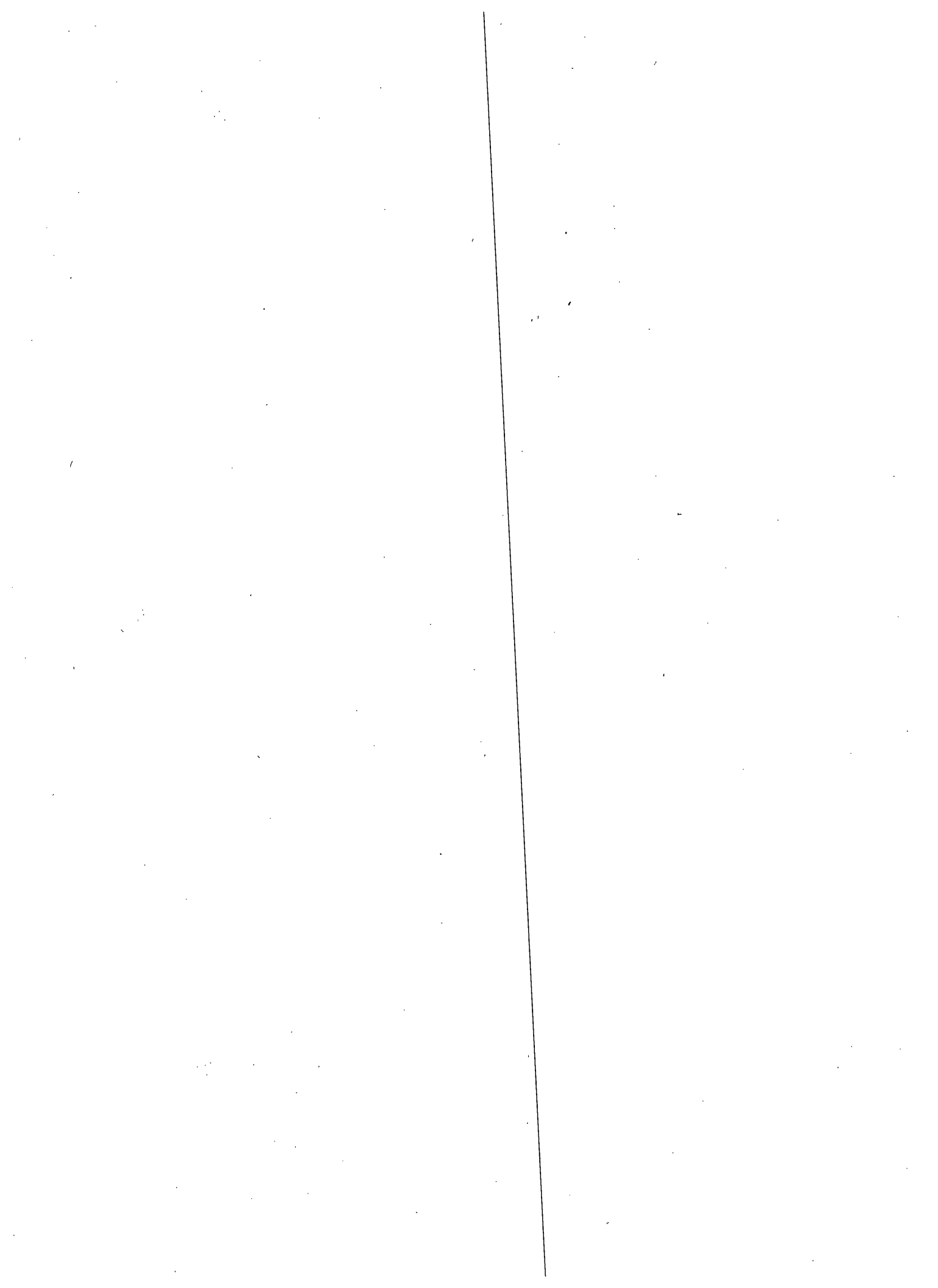
PERSPECTIVE OF RESTAURANT NEAR ROUTE 35



ADMINISTRATION BUILDING AT ROUTE 35

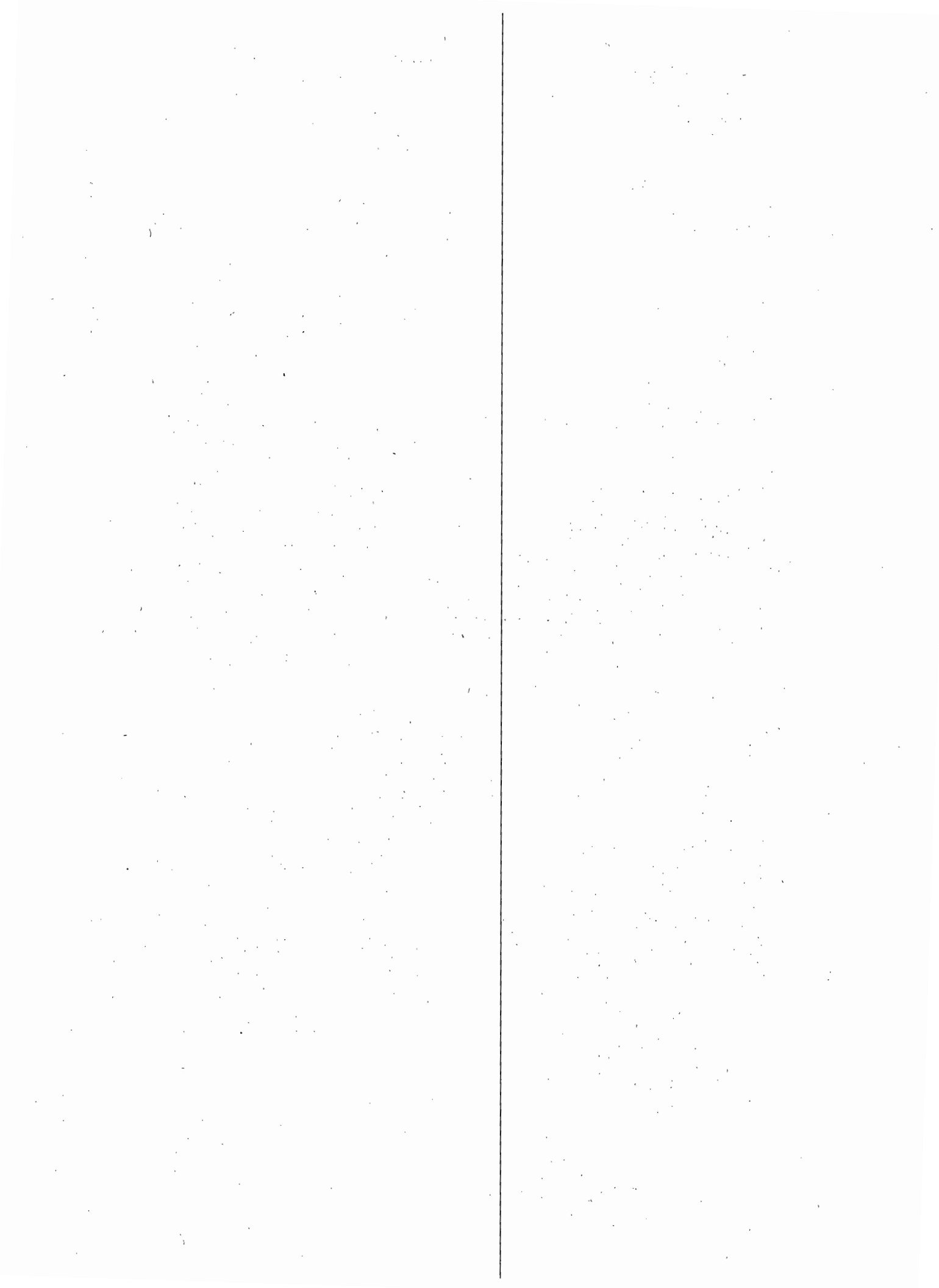


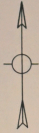
AIR PHOTO OF 6.55 MILE SECTION OF TURNPIKE  
Graded by New Jersey Highway Department from Route 4 Parkway to Morse's Creek.  
Inset shows graded portion of Route 35 interchange in more detail.





TRAFFIC CONGESTION ON NEW JERSEY ROUTE 25





### NEW JERSEY TURNPIKE AND THE PRESENT AND PROPOSED STATE HIGHWAY SYSTEM

TURNPIKE IN RELATION TO EXISTING STATE HIGHWAYS AND PROPOSED NEW CONSTRUCTION AND IMPROVEMENTS TO EXISTING ROUTES AS TAKEN FROM "PROPOSED COMPREHENSIVE STATE HIGHWAY SYSTEM", NEW JERSEY STATE HIGHWAY DEPARTMENT, AUGUST, 1948.

- LEGEND
- NEW JERSEY TURNPIKE
  - NEWARK BAY AND JERSEY CITY PORTLANDS NEW JERSEY TURNPIKE
  - EXISTING STATE HIGHWAY SYSTEM AND MAJOR CONNECTIONS
  - PROPOSED NEW CONSTRUCTION AND IMPROVEMENTS TO EXISTING ROUTES

