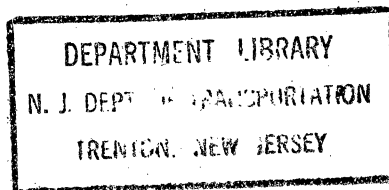


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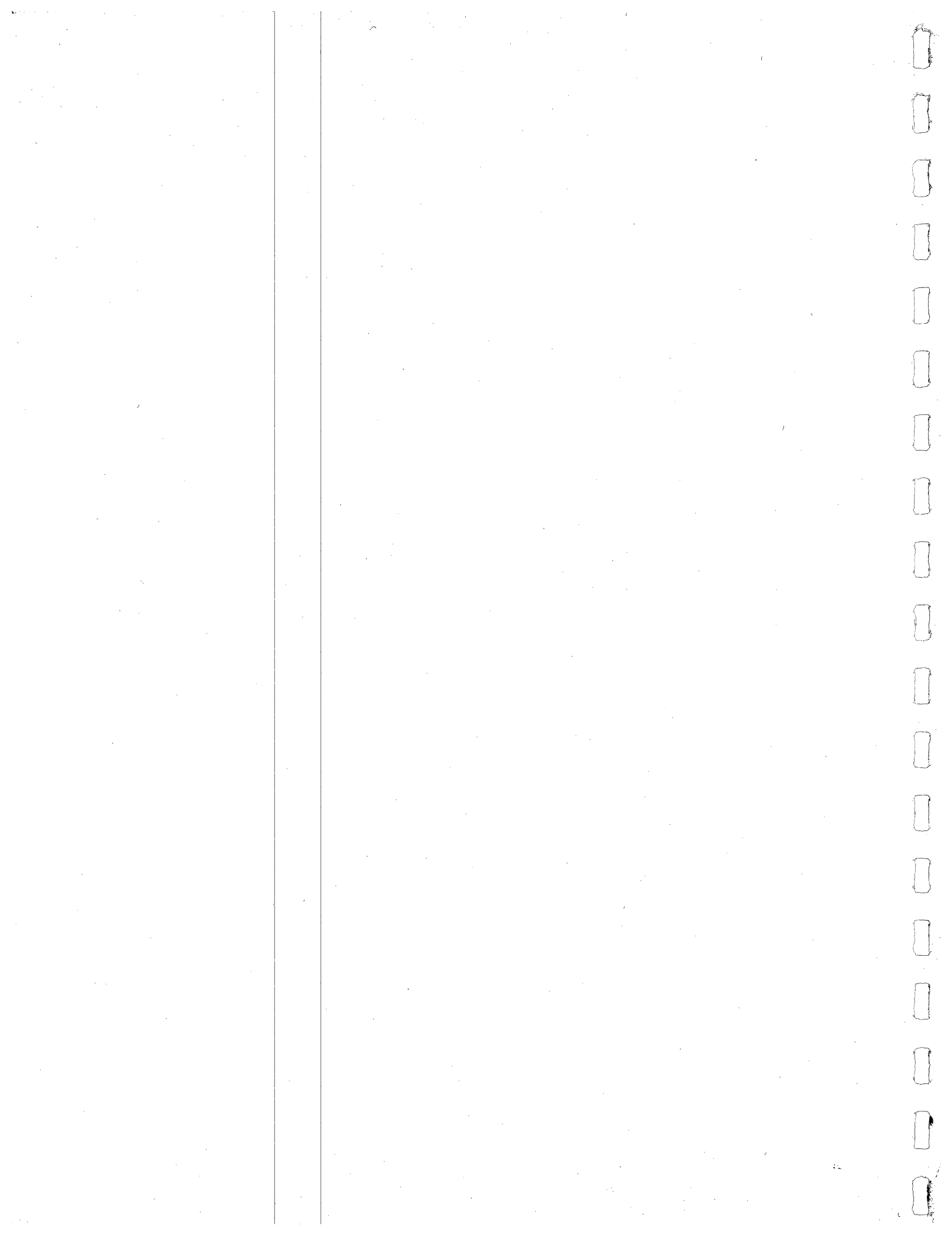
NEW JERSEY DEPARTMENT OF TRANSPORTATION

DRAFT
ENVIRONMENTAL IMPACT / 4(f) STATEMENT
OF
ROUTE 78
IN SPRINGFIELD, MOUNTAINSIDE, SUMMIT AND BERKELEY HEIGHTS
UNION COUNTY, NEW JERSEY



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NEW JERSEY DEPARTMENT OF TRANSPORTATION

DRAFT
ENVIRONMENTAL IMPACT / 4(f) STATEMENT

OF

ROUTE 78

IN SPRINGFIELD, MOUNTAINSIDE, SUMMIT AND BERKELEY HEIGHTS
UNION COUNTY, NEW JERSEY

URS
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

AND

NEW JERSEY DEPARTMENT OF TRANSPORTATION



DRAFT

ENVIRONMENTAL/SECTION 4(f) STATEMENT

ADMINISTRATIVE ACTION

for

Interstate Route 78-Sections 4N, 5P and 5N between the present termini of Interstate Route 78 in vicinity of Plainfield Avenue in Berkeley Heights and Baltusrol Road in Springfield, all in Union County, New Jersey.

THIS HIGHWAY IMPROVEMENT IS PROPOSED FOR FUNDING UNDER TITLE 23, U.S.C. THIS STATEMENT FOR THE IMPROVEMENT WAS DEVELOPED IN CONSULTATION WITH THE FEDERAL HIGHWAY ADMINISTRATION AND IS SUBMITTED PURSUANT TO:

42 U.S.C. 4332 (2)(C)

and

49 U.S.C. 1653 (f)

10-10-73
Date

J. F. Andrews
Director

Division of Economic and
Environmental Analysis

APPROVED AND ADOPTED BY THE F.H.W.A.

10/10/73
Date

Signature of FHWA Reviewing Official

SUMMARY SHEET

1. Administrative Action

Draft Combination Environmental/Section 4 (f) Statement.

2. Project Description

This project involves the construction of a six-lane highway with interchange ramps and extends five miles between the previously constructed termini in Berkeley Heights and Springfield. The entire project is within Union County, New Jersey.

The subject sections, 4N & 5P and 5N, comprise one of the remaining missing links in Interstate Route 78 which extends from New York City to the vicinity of Harrisburg, Pennsylvania. Its completion is necessary for both regional and local transportation needs.

Plan, Specification and Estimate approval was received in March, 1966 and subsequently rescinded, and a 4 (f) Statement for use of parklands from the Watchung Reservation had been submitted to the F.H.W.A. and returned to be combined with an Environmental Impact Statement. All of the right-of-way, with the exception of that required from the Watchung Reservation has been acquired or condemned.

3. Summary of Environmental Impacts

Route 78 will serve to divert through traffic movements from existing Route 22 thereby relieving its present congestion.

In addition many local traffic movements will be served by the freeway.

The communities along the route, particularly those near interchanges will benefit from the ready access to the New York Metropolitan area that Route 78 provides.

The traffic which will be diverted from existing roads, including the highly congested Route 22, will experience significantly safer conditions. There will also be a favorable impact of reduced road-user costs associated with expressway travel.

All the homes required for the right-of-way have been acquired, therefore, there will be no further dislocation of families involved in this project.

Increases in air pollution levels near the highway right-of-way are anticipated for the Watchung Reservation, John E. Runnells Hospital, the Regional High School, and the abutting residential areas. By 1981, the air quality in most cases will not exceed Environmental Protection Agency standards outside the highway right-of-way.

Noise levels will be higher for most areas, ranging from minor to severe impact.

Lands presently used for park purposes in the Watchung Reservation will be taken. Lake Surprise and Blue Brook in Watchung Reservation will be affected to some extent by the highway contaminants reaching them, although all the highway runoff will be discharged into sedimentation basins before flowing into the lake and stream.

4. Alternatives

The following major alternatives and variations of the recommended alignment were studied:

The rehabilitation of Route 22, for 42 miles, was studied at the outset of the interstate highway program and found unacceptable because of the excessive disruption to adjacent properties, difficulties in maintenance of traffic during construction, and high right-of-way and construction costs. Route 78 was selected and has now been constructed on a separate alignment from Route 22.

An alignment on the north slope of the Second Watchung Mountain, which avoids both the Reservation and the Hospital but requires about 240 homes and office buildings to be taken was considered.

A route on the north slope of the Second Watchung Mountain between Plainfield Avenue and Diamond Hill Road, which then crosses the mountain and follows the recommended alignment through the Reservation would avoid the Hospital but take about 35 homes.

The alternative of not constructing this last section of Route 78 entails forcing through traffic onto inadequate local streets in order to span the gap left in Route 78. The results would be traffic chaos, severe air and noise pollution inflicted on surrounding residential neighborhoods, and dislocation due to the requisite widening of local streets.

The variations in the recommended alignment that were considered include locating the highway farther to the north of Glenside Avenue, to the south of Glenside Avenue, and to the north of the stables in the Reservation.

All the alternatives and variations, including not constructing the project, have overall adverse impacts more severe than the recommended route.

5. Comments Requested From:

N.J. Department of Environmental Protection

N.J. State Clearing House

Tri-State Regional Planning Commission

U.S. Department of Agriculture

U.S. Department of Commerce

U.S. Department of Interior

U.S. Department of Housing and Urban Development

U.S. Department of Transportation

Federal Aviation Administration

U.S. Coast Guard

U.S. Environmental Protection Agency

Union County Park Commission

Union County

Somerset County

Township of Berkeley Heights

City of Summit

Borough of Mountainside

Township of Springfield

Borough of New Providence

Borough of Watchung

6. The Draft Statement was made available to the Council on Environmental Quality and the public on NOV 7, 1973

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I. PROJECT DESCRIPTION AND BACKGROUND

This Environmental Impact Statement has been prepared in compliance with the requirements of Section 102 (2) (c) of the National Environmental Policy Act of 1969, and provides an evaluation of the effects of the proposed sections of Interstate Route 78, referred to as Sections 4N & 5P and 5N, on a wide range of natural and man-made aspects of the surrounding area.

Interstate Route 78 extends from the Holland Tunnel in New York City to Interstate Route 81, near Harrisburg, Pennsylvania. (See Plate 1.) With the exception of a section near Still Valley, east of Phillipsburg, on the New Jersey-Pennsylvania border to the west of Allentown, the route is open to traffic from this project westward. The route is under construction to the east and is expected to be open to traffic by 1976.

Route 78 will serve several regional and local transportation needs when it is completed and opened to traffic. It will be both an east-west arterial, connecting the New York Metropolitan area with points west, and an inter-city facility handling high local traffic volumes. Completion of the subject section is vital to the fulfillment of those purposes.

The estimated 1975 average daily traffic on this portion of Route 78 is 64,000 vehicles per day and 6,000 vehicles per hour both ways during peak periods, suggesting that Route 78 will be one of the more heavily traveled elements in the Federal Interstate System.

Route 78 is generally parallel to Route 22 which is primarily a land service road, with extensive industrial, commercial and residential

development along its corridor. The through traffic movements removed by Route 78 will increase the effectiveness of Route 22. In addition there are numerous traffic movements on other local streets which will be attracted to Route 78, thereby improving traffic and safety conditions.

The section of Route 78 covered by this report, referred to as Sections 4N & 5P and 5N, extends from the John E. Runnells Hospital in Berkeley Heights to a point east of Baltusrol Road in Springfield, a distance of 5.2 miles.

Route 78 is paved up to the western terminus of this section, and is currently open to traffic from Plainfield Avenue westward. The Plainfield Avenue overpass was completed in September 1967. The easterly terminus is under construction, however, Route 78 bridges over Quarry Road in the Houdaille Quarry were completed in July 1968 as part of a separate first stage contract for Route 78.

The project is located in the Townships of Berkeley Heights and Springfield, Borough of Mountainside and the City of Summit, very closely following the municipal boundaries. There is a planned interchange with Diamond Hill Road and McMane Avenue, a partial interchange with Glenside Road and ramps to Glenside Avenue. These interchanges will provide the necessary access to the highway from the adjacent commercial and residential areas.

The area surrounding this section of Route 78 can be characterized as suburban with several large campus type industrial establishments interspersed among well defined residential neighborhoods. The route traverses the northerly side of the Watchung Reservation, a large public park operated by Union County, as well as the John E. Runnells Hospital grounds.

Background

Planning for Route 78 from Newark to Annandale N.J., which includes this project, began in 1957 with location studies. These studies resulted in a recommended alignment's being presented at a public hearing held in June 1958.

Subsequently an alignment was selected and final design work was advanced on the various sections of the route.

The present status of the design right-of-way acquisition and construction is shown on Plate 2. The final contract plans for an earlier design of this section were completed and received Plan Specifications and Estimate approval in March 1966 from the Bureau of Public Roads which was rescinded due to the long delay in obtaining the concurrence of the Union County Park Commission. A memorandum of understanding, executed on April 10, 1972 between U.C.P.C. and N.J. DOT, has since been obtained and is included in the appendix of this report.

Therefore, this project must be considered unusual with regard to this Environmental Impact Statement in that all the right-of-way has been acquired or condemned with the exception of that required in the Watchung Reservation. In fact, Route 78 has been an established feature in the municipal planning processes of the affected communities since 1958.

The selection of the recommended alignment for this 5-mile section of Route 78 was the result of location studies of various alternative routes, which will be described in more detail in a later section of this report. In general, the possible corridors were as follows:

1. Rehabilitate existing Route 22 while maintaining a land service road for adjacent properties. Route 22 is heavily developed with roadside businesses in the vicinity.

2. The corridor on the northerly side of the Second Watchung Mountain, which involves highly developed suburban areas in Summit, Berkeley Heights and New Providence.

3. The corridor between the First and Second Watchung Mountains which traverses the northerly edge of the Watchung Reservation and the northern portion of the John E. Runnells Hospital. This is the corridor which is recommended.

The basic corridor between the two Watchung Mountains was selected because damage to the affected communities could be minimized by utilizing the undeveloped areas, thereby avoiding the extensive dislocation associated with the other corridors. Within the basic corridor numerous possibilities were studied in detail to assure the maximum benefit to the local communities with the least adverse effect on the Watchung Reservation.

The location of the Interchange with Diamond Hill Road was set at the request of local officials so that the heavy rush hour traffic generated by Bell Telephone Laboratory and other nearby commercial establishments would have direct access to Route 78 and not overload local streets.

A public hearing was held on June 30, 1958 in Springfield, New Jersey at which the present alignment for Route 78 was presented. The comments expressed by those attending were primarily in two categories: 1) civic groups opposed to the alignment in Springfield which did not pertain to the subject section of Route 78, and 2)

individuals opposed to taking Watchung Reservation land. There were also comments from the Union County Park Commission (Watchung Reservation), the Union County Board of Chosen Freeholders, Township of Springfield, Common Council of the City of Summit, The Board of Managers of the John E. Runnells Hospital, and the Houdaille Construction Material Inc., objecting to various aspects of the proposed highway project.

Numerous meetings were held with Municipal officials of the affected communities, School and Hospital officials, and the Union County Park Commission in order to secure their comments and recommendations concerning the route location and design features. As a consequence of these meetings the configuration of the interchanges and the alignment of the mainline were significantly modified to reduce the adverse impact of the highway and to improve its usefulness to local traffic. Recently, meetings were held with public officials of Summit, Springfield, Mountainside, Berkeley Heights, Watchung, New Providence and the Union County Planning Board to discuss with them the status of this project. The resolutions passed by the communities as a result of these meetings are included as Appendix numbers 5 through 9.

An agreement was reached with the John E. Runnells Hospital administration providing a water main to replace the water tanks that previously served as the water supply. This improvement is in operation at present.

Agreement was reached with the Union County Park Commission and a Memorandum of Understanding was signed by the Commission and the New Jersey Department of Transportation, concerning Route 78 as it affects the Watchung Reservation. Included in the agreed-upon

design features are: a series of sedimentation basins which prevent runoff from Route 78 from discharging silt into Lake Surprise; construction of an underpass at the old Nike Site road in order to provide access to Park Commission land on the northerly side of Route 78; reduction by as much as possible of the area of park land required by the Diamond Hill-McMane Interchange; and replacement of the existing stables within the Reservation.

Several reports which explore various aspects of the Route 78 project were used as background information including: 1) "An Evaluation of the Impact of FAI 78 on the Watchung Reservation" by Kathryn P. Harmon, PhD, which is a comprehensive study of the effect of the freeway on the flora, fauna, and overall use of the Reservation; 2) "Watchung Drainage Control Study" by Richard J. Jeske, Inc., which recommends the use of settling basins and additional piping in the Reservation to handle the Route 78 runoff; 3) "Study and Report for the Rehabilitation of U.S. Route 22" by Madigan-Hyland, which sets forth the reasons why it was not feasible to upgrade Route 22 to Interstate standards; and 4) "Traffic Study" by Travers Associates Consultants, an evaluation of traffic patterns and needs with respect to the Regional High School, which includes the projected impact of Route 78 on the School.

A list of coordination meetings and correspondence is included in this report as Appendix 1.

II. DETAILED DESCRIPTION OF PROJECT

General

Plates 1, 2 and 3 show the overall Interstate Route 78 and the section covered by this report. The subject section is 5.2 miles long, 3.3 miles of which is within Watchung Reservation. It has six lanes, controlled access, and separate roadway profiles designed to Interstate Standards. The right-of-way varies from a minimum of 300 feet to a maximum of approximately 850 feet at the Diamond Hill Road interchange. Plate 4 shows the typical section of the highway where it is in side hill cut. This condition prevails for about 3 1/2 miles from the westerly end of the project to the easterly part of the Watchung Reservation. The rest of the project is primarily on fill.

Route 78 will be constructed with 90% Federal funds and 10% State funds. The estimated cost of construction for this five mile section, including the interchange, is \$20,000,000. The State of New Jersey will maintain the highway upon completion as well as provide the required snow and ice removal services.

Construction of other facilities over the highway is not practical due to the extreme cost involved, and such intense use of air space is not warranted in this part of New Jersey. Multiple use of the right-of-way would not be compatible with the surroundings.

Alignment

The project begins at the existing roadway at the John E. Runnells Hospital property. The highway continues across the Hospital

property on a 4% downgrade to a low point and then proceeds upgrade at 2%, past the residences on Ghost Pony Road to a high point. The route continues on a downgrade of 1.4% to a bridge over Diamond Hill Road. Within this 1 mile length the highway has separated roadways, as shown on Plate 4. The westbound roadway cuts range from 0 to 70 feet and the east bound roadway fills vary from 0 to 20 feet. There is a partial interchange at Diamond Hill Road.

Proceeding along the southerly slope of the Second Watchung Mountain for 1/2 mile to a bridge under relocated McMane Avenue, the highway has separated roadways on an upgrade of 2.4% to 4%. The westbound roadway cuts vary from 30 feet to 100 feet and the east-bound fills vary from 0 to 50 feet. There is a partial interchange between McMane Avenue, Route 78 and Glenside Avenue. Glenside Avenue is relocated in the vicinity of the McMane Avenue interchange and Glenside Road.

Between the bridge under McMane Avenue and the bridge under Glenside Road, a distance of 2/3 mile, the highway continues with separated roadways with upgrades of 3% to 4% changing to a 1.5% downgrade at Glenside Road. The westbound roadway cuts vary from 0 to 70 feet and the eastbound roadway fills vary from 0 to 38 feet. There is a partial interchange with Glenside Road.

Eastward from the Glenside Road bridge, the highway traverses Watchung Reservation property on separated roadways, across a bridge over the former Nike Site Road, to the bridge over Relocated Glenside Avenue. There are ramp connections with Glenside Avenue. Between Glenside Road and the Nike Site Road the highway touches the

Governor Livingston Regional High School property. The grades of this 1-1/2 mile length vary from an upgrade of 0.5% near the School to 3% downgrade at Glenside Avenue. The westbound cuts range from 10 to 60 feet and the eastbound fills range from 0 to 20 feet. Glenside Avenue is relocated in this area.

Continuing eastward from the bridge over Glenside Avenue, the alignment veers away from the slope of the Second Watchung Mountain, into the valley to a bridge over Baltusrol Road. The highway crosses the northeast corner of the Watchung Reservation, to the south of the stables, and through the marsh at the head of Lake Surprise. The highway passes along the southern edge of a housing development near Baltusrol Road. The grades for this 3/4 mile portion vary from a downgrade of 1.5% to the east of Glenside Avenue to a 3% upgrade at Baltusrol Road. Both roadways are in fill of 15 to 25 feet throughout this stretch.

Continuing eastward for approximately 2/3 mile from Baltusrol Road to the end of the project the highway is in an alternately shallow cut and fill. The route passes along the northerly edge of a housing project. The grades in this portion vary from a 3% upgrade at Baltusrol Road to a 2% downgrade at the eastern terminus.

Traffic Movements

The turning traffic movements to and from this section of Route 78 are accomplished through a combined interchange at Diamond Hill Road, McMane Avenue, Glenside Road and at Glenside Avenue.

At Diamond Hill Road there is an off-ramp from Route 78

westbound to Diamond Hill Road southbound, and a connection from Diamond Hill Road to Route 78 eastbound. Between Diamond Hill Road and McMane Avenue there is an off-ramp from Route 78 eastbound to McMane Avenue which also connects to Glenside Avenue.

From McMane Avenue there is a connection to Route 78 eastbound and to Glenside Avenue. There is also a connection between Glenside Avenue and McMane Avenue.

From Glenside Road there is an entrance ramp to Route 78 westbound and an exit ramp from Route 78 westbound. The intersection between Glenside Road and Glenside Avenue is relocated.

There is an exit ramp from Route 78 eastbound to Glenside Avenue northbound and southbound. Entrance ramps to Route 78 eastbound and westbound are provided from Glenside Avenue northbound and southbound respectively.

III. PROBABLE IMPACT ON THE ENVIRONMENT

Terrain

Description

The Route 78 corridor generally follows the valley between the First and Second Watchung Mountains, proceeding out of the valley beyond the limits of the section of freeway covered by this report. The Watchung Mountains are a unique feature in this part of New Jersey, which is primarily a flat plain. The Watchungs rise about 250 ft. above the level of the surrounding plain to an elevation of 540 ft. The First Watchung Mountain is the southerly of the two; its south slope faces existing Route 22, and is developed for housing. The ridge's northerly slope, the valley floor, and part of the opposite slope constitute the Watchung Reservation for most of the length of this section of Route 78. At the westerly end of the Reservation the north slope is developed for housing and the valley contains some campus type industry.

The north slope of the Second Watchung Mountain is extensively developed with private housing, the Bell Telephone Laboratories and the Regional High School. The south slope, which is very steep and not suitable for housing, is owned in large part by the Union County Park Commission and is at present in a natural state. Glenside Avenue runs along the south slope of the Second Watchung, below the steep portion of the escarpment, for the length of the Watchung Reservation. Route 78 will be located on the undeveloped south slope for the westerly 75% of the project, from the John E. Runnells Hospital to a point opposite Park Drive, the main entrance to the picnic area of the Reservation.

The alignment then moves across the valley toward Baltusrol Road, filling in a large part of the swamp that forms the head of Lake Surprise. Adjacent to the right-of-way on the north side is the Commonwealth Water Co. well field which is not affected by the highway. From Baltusrol Road eastward to the end of this section the alignment follows the valley which is flat, wooded and largely undeveloped, except for a housing development at Baltusrol Road.

Blue Brook, which occupies the valley between the First and Second Watchung Mountains, has been dammed to create Lake Surprise.

There are several water courses that flow down the southerly slope of the Second Watchung Mountain, which direct runoff from the upper reaches of the watershed to Lake Surprise and Blue Brook. These water courses will be crossed by Route 78.

Impact

The construction of Route 78 will increase the quantity of storm water carried by Lake Surprise, Blue Brook and Green Brook due to increasing the area of impervious surface in the watershed. The highway runoff will reach the lake and streams before the upland portions of the watershed are fully contributing. Therefore, the peak flow in the streams will be only slightly greater than at present, although the near peak flow rate will continue for a longer period than at present.

The possibility that flooding, erosion or unstable embankments or slopes would be a danger to life and property is rated negligible, since with normal design procedures these incidents would have an extremely low probability of occurrence.

Route 78 will have an impact on the terrain because it cuts into the south slope of the Second Watchung Mountain with a "side hill section". This consists of two separate roadways, eastbound and westbound, which are at different elevations. The westbound is higher and is cut into the hillside, whereas the eastbound is lower and in fill. The right-of-way taking and the amount of cut and fill are minimized by this design. The natural vegetation will be removed within the cut and fill area and be replaced with side slopes of grass or other vegetation. However, the lower eastbound freeway will be partially screened by the dense growth on the downhill side. The westbound roadway is too high to be screened by the trees on the down hill side of the lower roadway.

The primary impact of the easterly part of this section of Route 78 is that a large part of the marsh at the head of Lake Surprise will be filled in by the highway embankment. The impact on the marsh as habitat is discussed in the section on Flora and Fauna. In order to avoid the marsh the alignment would have to be shifted northward into a well field(which presently has three active gravity wells) causing a possible loss of all or part of the potable water supply now being withdrawn. There is no guarantee that new wells drilled to replace the existing ones would be productive. The above variation is discussed in detail under the Alternatives section of this report.

East of the marsh the alignment crosses Baltusrol Road between two housing developments and then passes through a wooded undeveloped area to the end of this section. Two small ponds of about one and three acres located in the wooded area will be filled in by the highway embankment.

Geology

Description

Geologically, the two ridges represent one, or more, magmatic (lava) intrusions into the Brunswick Formation (a red sandstone with shale interbeds) which forms the base of the valley floor. Erosion has exposed the hard lava ridges by differentially removing the softer, sedimentary rocks. The rock forming the ridges is a dark gray, very fine grained basaltic lava, which will be exposed in the cuts for the highway. It is highly jointed and, in many instances, contains vesicles formed by escaping gas when the lava was molten. These factors create a sensitivity to frost cracking, particularly on the slopes which face south, and result in deep disintegration of the rock. Accordingly, the south slope of the Second Watchung Mountain (the slope on which the highway is to be constructed) has a deep soil cover and badly weathered rock. These are favorable factors with regard to the cost of the excavations necessary for the highway, and influence the appearance of the final project to the extent that the north slopes will support more vegetation and show less bare rock cuts. A negative factor will be the spalling of rock fragments from exposed faces which will necessitate ample shoulders and ditches and periodic scaling. The Brunswick Formation will not be a significant factor in the construction or effect of the highway.

Mineral Resources - Known mineral resources in the area are limited to quarrying basalt and related rock for use as broken stone and aggregate. Some copper mining is known in the area, but not in the immediate environs of the highway, and not in recent years.

Impact

The availability of quarry area will be reduced by the presence of the highway to the extent that potential quarry areas are contained within the right-of-way, particularly at the east end of the project. However, the overall magnitude and importance of the effect is considered to be negligible, because large reserves of suitable stone exist in the area.

The ground water elevation in the vicinity of Route 78 will not be affected by the proposed construction. The highway side hill cut along the mountain slope is not expected to draw down the ground water because the cut is in basalt. In the marsh area at the headwater of Lake Surprise, where the ground water is at the surface, the highway is on fill and will, therefore, have a negligible effect on the ground water elevation.

The highway is in shallow cut in other areas, which may lower the ground water near the highway a negligible amount.

Flora and Fauna

Description of Vegetation

The vegetation found within the proposed right-of-way is typical of that found in the area in general and in Watchung Reservation in particular. The principal species of trees to be removed for the highway are Tulip, Red Oak, White Oak, Dogwood, Sassafras, Red Maple and White Ash. None of the above species are rare or unusual for this part of New Jersey.

Impact on Vegetation

Based on the area occupied by the highway in comparison to the remainder of the Reservation, it is estimated that approximately 5% of the trees in the Reservation will be destroyed by the highway construction. The extent of herbs and shrubs destroyed by the highway are in a similar small proportion to the total in the area.

The project will not reduce any species of trees in the park to the point of rarity and there will be no long term deleterious effect on the remaining tree population due to reduction in numbers of the various species contained in the right-of-way. Also the shrubs and herbs cleared from within the right-of-way represent no particular long term adverse impact in view of their existence elsewhere in the Reservation.

There are no rare species of trees, shrubs or herbs which will be destroyed by the highway nor any unusually large specimens of more common species.

The Reservation contains an extensive display of Rhododendrons, which is in the loop area along Tracey Drive, and is not affected by the highway. Route 78, however, will aid more people to visit the display. The Reservation also features a nursery which cultivates trees and shrubs for use in other county parks as well as for a year-round exhibit for visitors.

Description of Fauna

The wildlife in the Watchung Reservation is typical of that found in northeastern woodland and includes deer, fox, racoons, possums, weasels, mink, skunk, squirrels and several other small mammals. Over 100 species of birds have reportedly been observed in the Reservation. No rare species of wildlife are known to exist within the area of this project.

The woodland areas near the proposed highway have plant and wildlife communities similar to those found in the Reservation, except where they touch on the surrounding housing and industrial developments.

Impact on Fauna

Route 78 will take most of the Reservation marsh land (approximately 3 acres) at the head of Lake Surprise, therefore, the plant and animal life associated with it will be dislocated from the Reservation. This marsh is the only one within the Reservation. Although this is a significant local impact, the wetlands affected represent a small portion of the wet lands in the area since there are thousands of acres of swamp to the north of the Passaic River, approximately 4 miles from Lake Surprise.

With the exception of the marsh land wildlife which will be displaced, the highway will not be deleterious to any of the species of mammals or birds. A dislocation of habitat for some species can be expected because of highway noise, since the noise level in that part of the Reservation adjacent to the freeway will be significantly increased above the ambient levels. The exact extent of sensitivity of particular species to the actual noise generated by the highway cannot be determined, however, it is not anticipated that any significant impact will result. The removal of trees, shrubs and herbs in the right-of-way will tend to reduce the number of several species; however, those affected are essentially separated from the main body of the Reservation at present by Glenside Avenue. The quality of Watchung Reservation as a place to observe wildlife will not be seriously compromised.

The overall impact of the freeway on wildlife and plant communities varies from tract to tract. Between the hospital and Diamond Hill Road, the wooded area to the north of the road is on high ground above the highway and will be little affected. On the southside the wooded slope falls away from Route 78 and will be subjected to an increase in noise level with the attending disturbance to wildlife. Similarly, the open areas between Glenside Avenue and Baltusrol Road, and the low areas to the east of Baltusrol Road will have increased noise levels after the highway is constructed.

As many trees and shrubs as possible will be left undisturbed within the right-of-way. These will be supplemented by planting

replacement trees and shrubs as part of the landscaping measures incorporated in the final construction contract.

The entire right-of-way will be permanently fenced for the protection of wildlife in the area, as well as for highway users and nearby residents.

Noise

Introduction

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. The magnitude of the fluctuation is related to the intensity of the sound and the number of fluctuations per second is the frequency. The intensity is measured by a logarithmic scale due to the very large range of pressures encountered. The unit of measure is the decibel (abbreviated dB), which, because it is a logarithmic scale, cannot be added as ordinary numbers. For instance, a 65dB sound added to another 65dB sound results in a 68dB level.

The human perception of sound covers a wide range of frequencies, however, sensitivity is not the same for the audible range. The human ear is generally less sensitive to frequencies below 1000 cycles per second or hertz (Hz). Since most sounds do not consist of a single frequency but a range of frequencies each with a different intensity, an element of subjectivity enters into the response of individuals to particular sound. A method weighing the intensity of sound at various frequency which correlates well with human response is commonly in use and is referred to as the "A weighted sound level". (2,3,4) *

* Numbers in parentheses refer to references at the end of this section.

The "A" - level is expressed "dBA" and is used throughout this report.

The A-level adequately describes the noise level at any instant, however, the actual level is continuously varying. Superimposed on the slowly varying background noise level is a succession of noises of short duration, such as individual vehicles and aircraft. In order to account for this variation between background and peak noises, a statistical description has become generally accepted, which is expressed as a noise level exceeded for a stated percentage of the time. (4,5,6) These noise levels are abbreviated L_{10} , L_{50} and L_{90} , the subscript referring to the percentage of time the stated dBA level is exceeded. (For example, L_{10} is that level of noise exceeded 10% of the time under consideration. L_{90} is considered to be the background noise level, L_{50} the average noise level, and L_{10} is a peak noise level.)

Development of Criteria

The U.S. Department of Transportation standards apply to all projects submitted under Federal-Aid Highway Act of 1970 for location approval after July 1, 1972 and projects which have not received design approval prior to July 1974. The D.O.T. standards are design goals for traffic-generated noise which may not be achieved in cases where it "would be impractical to apply corrective measures in the best overall public interest." The standards, which are presented in Table 1, are expressed in L_{10} noise level and are based on peak hour traffic.

Table I

DESIGN NOISE LEVEL/LAND-USE RELATIONSHIPS

LAND-USE CATEGORY	DESIGN NOISE LEVEL - L ₁₀	DESCRIPTION OF LAND-USE CATEGORY
A	60 dBA (Exterior)	Tracts of lands in which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of these qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	70 dBA (Exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	75 dBA (Exterior)	Developed lands, properties or activities not included in categories A and B above.
D	--	For requirements on undeveloped lands, see paragraphs 5.a(5) and (6) of PPM 90-2.
E *	55 dBA	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

* See PPM 90-2, paragraph 1c of Appendix, for method of application.

The U.S. Department of Housing and Urban Development standards are presented in Table 2 and are used by H.U.D. regional administrators in approving proposed H.U.D. supported projects including F.H.A. loans. The standards, which are based on L_4 and L_{33} noise levels and average traffic volume, do not discriminate as to land use category since the primary concern is assuring suitable living quarters. In this analysis, the H.U.D. standards are not used as design guidelines, but rather, are presented for comparison purposes.

Table 2

SUMMARY OF HUD NOISE CRITERIA

GENERAL EXTERNAL EXPOSURES
dB(A)

Unacceptable

Exceeds 80 dB(A) 60 minutes
per 24 hours (L_4)

Exceeds 75 dB(A) 8 hours
per 24 hours (L_{33})

(Exceptions are strongly discouraged and require a 102(2)C
environmental statement and the Secretary's approval)

Discretionary - Normally Unacceptable

Exceeds 65 dB(A) 8 hours
per 24 hours (L_{33})

Loud repetitive sounds on site

(Approvals require noise attenuation measures, the Regional
Administrator's concurrence and a 102(2)C environmental
statement)

Discretionary - Normally Acceptable

Does not exceed 65 dB(A) more than
8 hours per 24 hours (L_{33})

Acceptable

Does not exceed 45 dB(A) more than
30 minutes per 24 hours

Present Noise Environment

Noise level measurements were made during the week of March 6, 1973 to determine the current noise environment in the general vicinity of the proposed right-of-way. Measurements were made with a battery-powered General Radio Type 1151-C noise survey meter equipped with a wind screen. Output of the meter was recorded by a paper-strip recorder which was also battery-powered for portability. Continuous records were obtained of the dBA level as a function of time for a sampling period of 10-15 min. for each site at representative periods of the day. A total of over 7 hours of records were obtained during a 72-hour period at 18 sites. The site locations are described in Table 3; they can be located on Figures 2-7 as well as on Plate 3. Table 4 presents the results of the survey.

Table 3

LOCATION OF NOISE SURVEY SITES

SITE NO.	LOCATION (approximate distances from ROW)	Corresponding Figure
1	Near Greenhill Road, 30 ft from Summit Road	2
1A	On Skylark, 650 ft from Summit, 70 ft from ROW	2
2	On Malvern Drive, 10 ft from Baltusrol Road	2
2A	End of Ascot Way, 550 ft from Baltusrol Road, 150 ft from ROW	2
3	South end of riding stable parking lot, 375 ft from ROW	3
4	North of Lake Surprise, 20 ft from W.R. Tracy Drive	4
4A	North of Lake Surprise, 100 ft from W.R. Tracy Drive	
5	South side of parking lot, Regional High School	5
6	In park off of Cataract Hollow Road, 800 ft south of ROW	5
7	End of Tip Top Way, 900 ft from Diamond Hill Road	6
7A	On Ridge Drive E., 850 ft from McMane Ave., adjacent to ROW	6
8	10 ft from Diamond Hill Road, 400 ft south of ROW	6
8A	480 ft west of Diamond Hill Road	6
9	Easterly terminus of existing westbound Rt. 78 pavement	7
9A	On hospital grounds, 150 ft. south of ROW fence	7
10	Museum in park	
11	End of Orion Road	
12	150 ft south of Mountain Avenue, on Diamond Hill Road	

Table 4
RESULTS OF NOISE SURVEY

SITE	TIME	DURATION (min)	NOISE LEVELS (dBA)			REMARKS
			L ₉₀	L ₅₀	L ₁₀	
1	5:22 PM	12.8	60	66	72	Noise influenced by upgrade
1A	9:51 AM	12.1	46	48	52	
1A	2:22 PM	11.4	46	48	54	
1A	11:15 PM	12.1	38	39	44.5	
2	4:35 PM	8.9	58.5	64	70	
2A	10:25 AM	11.6	46	49.5	56.5	
2A	1:59 PM	11	44	46	51	
3	11:06 AM	11.3	47.5	49	51.5	Traffic on Glenside Ave. dominates
3	3:15 PM	10.7	50	52	55	
3	8:37 PM	12.3	42	45.5	48	
4	6:10 PM	14.6	48	51.5	60.5	
4A	11:40 AM	11.3	46.5	49	53.5	
5	1:25 PM	10.9	52	54	58	School activity dominates
5	4:50 PM	10.8	44	45	49	Traffic on Glenside Ave. dominates
6	7:20 AM	10.5	42	43.5	49	
6	12:37 PM	10.8	44	46	52	
6	9:57 PM	12.3	35	41	47.5	
7	3:12 PM	10.2	44	45	47	
7A	4:18 PM	14.6	49	50.5	54	Traffic on Diamond Hill Road discernible
7A	9:07 PM	10.6	42	44	47.5	
7A	11:53 PM	11.1	39	42	47.5	
8	4:12 PM	10.1	58.5	64	71	Heavy truck traffic
8A	7:43 AM	17.2	51	52.5	62	
8A	9:44 AM	12.2	48	52.5	57.5	
8A	3:45 PM	10.3	56	59	62	
8A	9:27 PM	10.8	41	44	49	
9	0:26 AM	10.9	38	39	41.5	
9	1:58 PM	14.3	47	48	49	
9	4:57 PM	10.3	45	48.5	55	
9	10:30 PM	11.1	40	41	43.5	
9A	10:54 AM	10.0	54	56	57.5	Some construction activity on grounds; intermittent Jackhammer about 200 ft away
10	10:27 PM	11.3	39.5	41	42.5	
11	11:27 AM	10.1	44	45	46.5	
11	2:35 PM	14.1	43	46	50	
12	3:35 PM	17.4	67	72	77.5	
12	5:25 PM	13.3	65.5	69	72.5	

A review of Table 4 in terms of the specific areas of development adjacent to the proposed alignment of Route 78 permits characterization as to the existing noise environment.

The residential areas along Summit Road (Baltusrol Rd.) on either side of Route 78 have a noise environment (48dBA to 68dBA) typical of suburban areas (see sites 1, 1A, 2 & 2A), except that the homes contiguous to Summit Road experience L_{10} noise levels in excess of the 70dBA D.O.T. design goals during the afternoon rush hour. During the remainder of the day the noise level throughout both residential areas is on the high scale of the suburban range indicated in Table 5, about 48dBA during day and about 39dBA at night. The night time exterior noise level is sufficiently low, that with the generally accepted 10dBA reduction in noise associated with a frame building with open windows, the interior noise levels are below those which cause sleep interference.

Measurements of noise were made in several locations in the Watchung Reservation, and the primary source of noise is traffic on Glenside Avenue and in the Park. Near the roads the daytime average noise level is up to 52dBA and about 45dBA in the more remote areas. The ambient noise level, even in the most remote areas is not as low as that associated with a wilderness (see Table 5), however, it is sufficiently quiet to be acceptable for the recreational activities available in the Reservation. The nighttime noise levels in the interior of the park are about 41dBA while near Glenside Avenue, they are about 45dBA.

The noise environment of the Governor Livingston Regional High School is influenced more by school activities than by outside sources, as indicated by the 54 dBA average noise level in the early afternoon compared to 45dBA during the evening peak traffic. The ambient noise level is in any event substantially below the D.O.T. Standards for school use.

The residential area in the vicinity of McMane Avenue and Ridge Drive have a daytime noise environment (of 45 dBA to 50dBA) which is significantly quieter than that prevailing in the Summit Road area. The daytime noise level falls generally in the mid-range of the suburban category shown in Table 5, although the afternoon peak traffic on Diamond Hill Road increases the noise above the average. The night time noise level of 42 dBA to 44 dBA is somewhat higher than in the Summit Road area, falling within the urban residential category of Table 5.

The measured ambient night time noise when reduced by 10dBA for buildings with open windows is below the sleep interference level. The L_{10} noise level of 47.5 dBA is substantially less than the D.O.T. criteria of 70dBA for residential land use.

The residential area on either side of Diamond Hill Road to the south of Route 78 has the highest ambient noise levels of the three principal residential neighborhoods along the subject sections of the highway. Both the daytime (52.5dBA to 59dBA) and night time (about 44dBA) levels are typically in the high end of the urban residential category of Table 5 for those homes set back from Diamond Hill Road, however, the ambient L_{10} levels are below the D.O.T. standard.

The dwellings along Diamond Hill Road are subjected to relatively high daytime noise levels of about 64dBA due to the relatively heavy truck traffic. These homes have L_{10} noise of 71dBA which exceeds the D.O.T. standards for residential areas. The night time noise is higher than in the Summit Road neighborhood and comparable to the McMane Avenue - Ridge Drive area, and below the sleep interference level.

The ambient noise level at the John E. Runnells Hospital is similar to the residential area near Summit Road and is eminently satisfactory for the hospital's operation. The daytime level is 48dBA and the nighttime level is about 40dBA. The nighttime exterior noise of 40dBA when reduced by 10dBA due to the buildings with open windows results in an interior noise of about 30dBA which is below the sleep interference threshold.

General Effect of Noise

Most criteria currently in use to evaluate or control environmental noise are based on combinations of data on physiological effects and community complaint and annoyance data. (6,7,8,9) However, it is instructive to initially consider the preferences of the general population. (9)

Table 5

POPULATION PREFERENCES REGARDING NOISE LEVELS

TYPE OF AREA	NOISE LEVELS (dBA)			
	Day		Night	
	Want	Accept	Want	Accept
Rural	35	45	25	35
Suburban	40	50	30	40
Urban, residential	45	55	35	45
Urban, residential plus shops	50	60	40	50
Commercial	55	65	45	55
Industrial	60	70	50	60
Water recreation, restricted	45	45	35	35
Water recreation, unrestricted	55	55	45	45
Wilderness	30	30	20	20

These preferences are given in Table 5. Of greatest interest are the preferences for the following types of areas: (1) urban; residential; (2) suburban, and (3) rural. These are the types of areas within the vicinity of the proposed project where impacts from the project may occur.

The physiological effects of noise normally considered in establishing standards of criteria are hearing damage, speech interference, sleep interference, physiological stress, and task interference. Information from a number of sources is summarized in Table 6. (3,10, 11, 12) The degree of certainty in the dBA levels given in Table 6 varies from good to poor.

Table 6
ESTIMATES OF MAGNITUDES OF NOISE EFFECTS

EFFECTS	MODERATE	APPRECIABLE
Hearing Damage Risk	70	90
Speech Interference	45	60
Sleep Interference	40	70
Physiological Stress	70	90
Task Interference	55	75

The levels given for hearing damage are well documented with the upper limit of 90 dBA being the eight-hour continuous exposure limit allowed under the Occupational Safety and Health Act of 1970. This situation, or degree of certainty, does not exist for task interference in that not all tasks are similarly affected by a particular noise level.

The extent and type of community response which may be expected from various average noise levels is shown in Fig. 1. (2,14)

This information is based on community complaint and survey data.

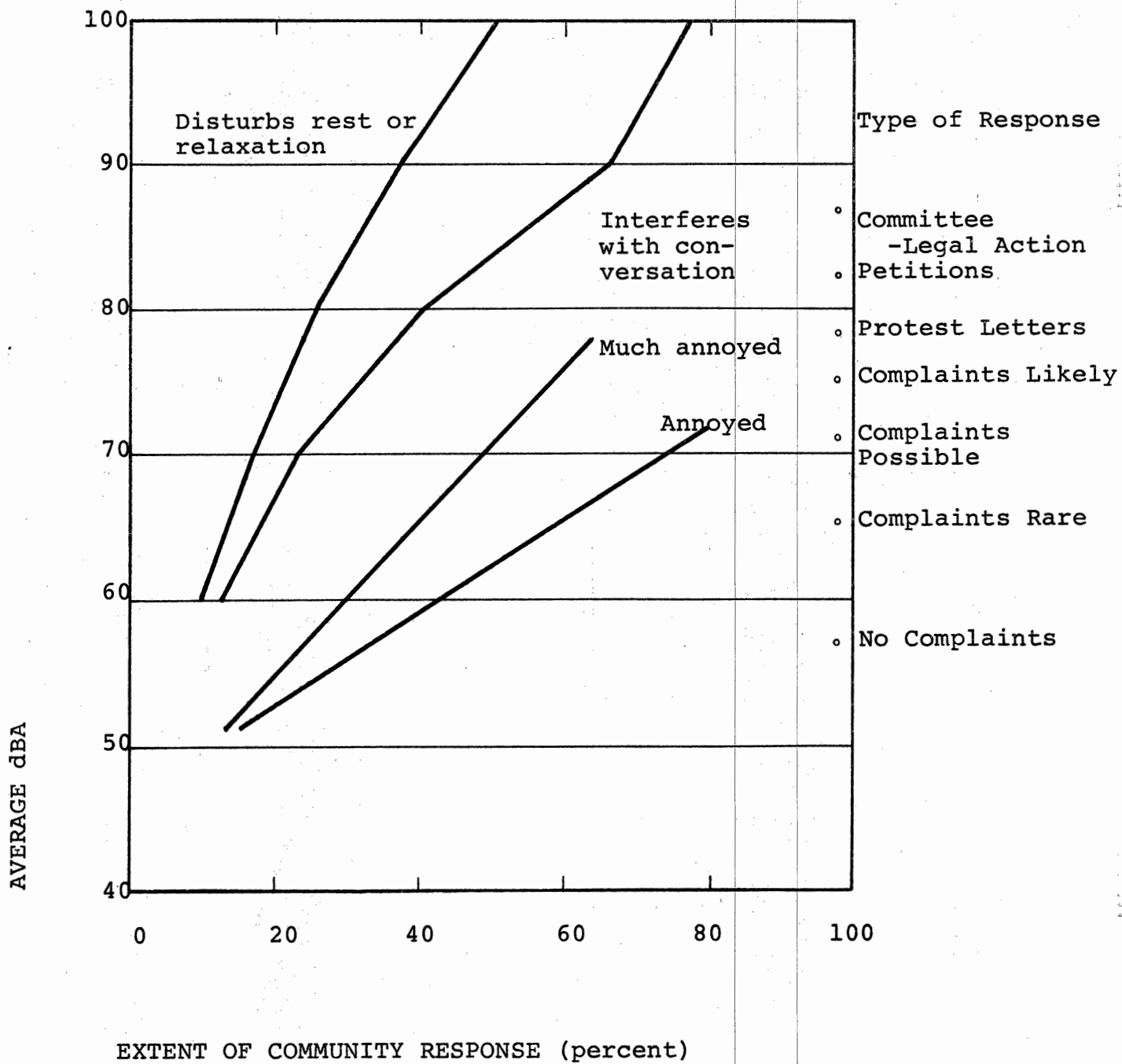


Fig. 1. Community Response to Highway Noise

Table 7 indicates the effect of L_{10} traffic noise on the ability to communicate by voice at various distances.

Table 7

EFFECTS OF TRAFFIC NOISE ON VOICE COMMUNICATIONS

NOISE LEVEL EXCEEDED <u>10% OF TIME</u>	MAXIMUM DISTANCE <u>AT WHICH COMMUNICATION CAN OCCUR</u>			
	<u>Normal Voice</u>	<u>Raised Voice</u>	<u>Very Loud Voice</u>	<u>Shouting</u>
75 DB (A)	2 feet	5 feet	9 feet	19 feet
65 dB (A)	9 feet	17 feet	40 feet	60 feet
60 dB (A)	17 feet	38 feet	70 feet	--
55 dB (A)	34 feet	60 feet	--	--
50 dB (A)	50 feet	--	--	--

NOISE PREDICTION

Computer Model. The highway noise prediction method is a computer model based upon the approved model contained in a United States Department of Transportation (Transportation Systems Center) report. The analysis is based on an assumption of a peak hour of 6000 vehicles on Route 78 (two way traffic), with 2667 vehicles per hour as a 1975 average. The assumption includes a vehicle mix of 10% trucks, and a traffic speed of 60 mph. Grade, terrain, vegetation and cross sections were the other principal inputs to the computer model. Detailed calculations were performed for the sensitive areas at the major residential areas near Route 78, the Regional High School, the Watchung Reservation and the John E. Runnells Hospital.

The noise prediction method used is one of two approved by the Federal Highway Administration to predict noise levels. Both methods are considered state of the art and as such are limited by the present technology to an accuracy of two or three decibels. The method used in this report is the more conservative of the two, yielding somewhat higher predicted noise levels than the alternative method, due to differing assumptions for the relationships of noise and distance.

Predicted Noise Levels

The residential areas south of Route 78 near Summit Road (Baltusrol Road) would generally experience a noise level exceeding DOT standards (70dBA - L_{10}) some 300-500 feet from the right-of-way, with the greater impact east of Summit Road. There are approximately 20 residences in this zone. On the north

side of Route 78 at Summit Road, a level of L_{10} greater than 70dBA would be experienced at distances 300' to 600' from the right-of-way; about 30 residences would experience noise levels exceeding the DOT standard. Figure 2 shows the L_{10} -70dBA band as it relates to this residential area.

In the area north of Route 78 that is now used for stables, the area within 600 feet of the right-of-way would experience noise levels greater than 70 dBA as indicated on Figure 3. These stables will be relocated to another part of the Watchung Reservation south of Route 78. For the areas south of Route 78 in the Reservation, the noise level of 70 dBA would extend up to 500 feet from the right-of-way. As shown on Figure 4, the greatest impact area is north of Lake Surprise and west of W. Tracy Drive. The closest facility to Route 78, an auto stopping spot near the east end of Lake Surprise, would experience a noise level of 65 dBA, at some 350 feet from the right-of-way.

The predicted noise levels at the Regional High School shown on Figure 5, range from about 63dBA to 73dBA at building edges facing Route 78, with the greatest impact at the corner of the building where a newly constructed band room stands.

The residential area at Roland Way (north of Rt. 78 and west of the High School) would experience noise levels ranging from 69dBA to 72dBA with some 6 houses having noise levels exceeding DOT standards, as shown in Figure 5.

The noise levels at the residential development north of Route 78 on McMane Avenue would exceed DOT standard at distances 200 feet to 300 feet from the right-of-way.

Approximately 10 residences stand within this zone. South of Route 78, near Diamond Hill Road, about 35 residences located within the zone would experience noise levels exceeding DOT standards. Both of these areas are shown on Figure 6.

Two residences on Ghost Pony Road, on the north side of the freeway between Diamond Hill Road and the hospital, are 150 feet and 75 feet from the westbound roadway. It is predicted that they would experience an L_{10} noise level of 80 dBA and 77 dBA respectively which exceed DOT standards.

At the John E. Runnells Hospital, the predicted noise levels range from 66dBA to 78dBA on hospital property. The DOT design standards would be exceeded in that part of the property adjacent to the roadway, which includes most of the hospital's buildings. This is indicated on Figure 7.

Tables 8-14 show predicted noise levels at particular points with the areas previously discussed.

Noise Abatement Procedures

In general, there are four ways to alleviate the problem of noise produced by a highway.

- 1) At the source, noise can be lessened by changing the amount of traffic, the type of traffic, or by the redesign of the noise-producing vehicle.

- 2) Between the source and the receiver, noise can be alleviated by the particular design of the highway, the terrain near the roadway, or the placement of noise screens (man-made or vegetation) at the roadway's edge.

3) At the receiver, interior noise can be lessened by the re-design or improvement of the structure where noise levels appear to be a problem.

4) At the receptor areas, a buffer zone can be created around the highway by removing all structures that would experience great impact due to noise.

At the source. Since the major component of traffic noise is truck traffic, two major proposals can be conceived to lessen the noise impact of Route 78: the use of quieter trucks, and the banning of truck traffic entirely. Federal regulations defining a limit on truck noise have not been established at this writing, however, they are expected in the near future.

In general, the noise from a single truck is equivalent to that generated by about 30 automobiles. The banning of commercial traffic, until the truck noise levels are reduced to an acceptable level, would result in an 8-15 dBA decrease in L_{10} noise at most locations. For example, the houses in the residential area nearest to Route 78 near Summit Road would experience noise level decreases from 68 - 74 dBA to 59 - 66 dBA. The acceptable DOT design standard would closely follow the right-of-way of the highway. The banning of trucks, however, is not a desirable solution since the design purpose of an interstate highway is to facilitate movement of goods as well as people. It would also present difficulties in enforcement and perhaps place inordinant truck traffic on local streets and Route 22.

The assumption made in the analysis for regular trucks is that exhaust noise is dominant and not a function of speed. This results in a noise source about eight feet above the pavement. Thus, not only

do trucks contribute greatly to high noise levels, but the height of the noise source makes it difficult in some cases to produce an effective noise screening system. The current state-of-the-art allows the assumption that the noise spectrum for quieter trucks is primarily constituted of sound generated by tire-pavement interaction. For an individual truck, the L_{10} sound level at 50 feet is reduced by approximately 5-10 dBA. For the section of Route 78 under consideration, the impact of quieter trucks would be nearly the same as that of banning trucks, that is, almost all areas outside the right-of-way would not exceed the DOT standards. While quieter trucks are not in use now, it is reasonable to assume a significant number of these trucks will be in operation by 1980, based on the new E.P.A. standards currently being considered for adoption.

Between the source and the receiver. Recognizing that noise levels will be detrimental to certain areas, a series of noise screens were designed to alleviate the problem; then, predictions of the effect of these noise abatement procedures were carried out. Where predictions show appreciable effects in the abatement of noise, such screens will be incorporated in the design of Route 78. The configuration of the noise screens in general was an eight-foot high barrier placed near the edge of the right-of-way, except at Ghost Pony Road where a 15' high screen is required to effect the desired noise reduction. (See Plate 4)

These noise screens are not concrete walls through which, horizontally, no noise would pass, but are metal or even wooden paneled barriers of light construction. The screens, which would be located typically near the edge of shoulders or in place of the right-of-way fence, serve to interrupt the line of sight between noise source and receiver.

At Summit Road, the housing development south of Route 78 will experience a minor decrease in noise impact, so that only about 3 houses will experience levels greater than 70 dBA. The effect on the residential area north of Route 78 is to move the 70 dBA zone back to the right-of-way, so that no residences will experience noise levels exceeding DOT standards.

In Watchung Reservation, screens will affect the northern section by moving the 70dBA zone to the right-of-way. South of Route 78, the 70dBA line will recede from 450 feet to 150 feet from the right-of-way line.

At the auto stop at the eastern end of Lake Surprise, the L_{10} noise level will decline from 65 dBA to 59dBA.

At the Regional High School, the 70dBA noise level would be at the edge of the building, a minor improvement.

At Roland Way, a noise shield will have minor effects, reducing noise levels by about 5dBA at distances greater than 700 feet from the highway. The same 6 houses will still experience noise levels exceeding DOT standards as ~~without~~ the shield.

A noise barrier north of Route 78 near Diamond Hill Road will have minor effects on the McMane Avenue residential area, reducing the noise levels in most locations about 1 - 2 dBA. About 6 homes will still experience L_{10} noise in excess of 70 dBA. South of Route 78, the Diamond Hill Road housing area will experience a significantly improved noise situation, with the DOT design standard not being exceeded outside of the right-of-way.

The two houses on Ghost Pony Road will greatly benefit from a noise screen, whose impact will lessen the noise levels 10 - 15dBA,

so that neither residence will experience noise levels greater than DOT standards.

The John E. Runnells Hospital will benefit significantly by the installation of a noise screen, so that no buildings on the property will experience noise levels greater than DOT standards.

Figures 2-7 show the difference between predicted noise levels, and the levels after installation of noise screens. These figures are not continuous; they show only the noise sensitive areas. Summaries of noise predictions at particular points are given in Tables 8-14. The predictions of noise abatement by screens are not based upon particular designs, but upon general design criteria. The specific configurations will consider present technology as well as future innovations that come to light.

At the receiver. If necessary, it is possible to "soundproof" particular structures. However, the installation of the noise barrier should alleviate the noise problems to such a degree that such extra measures would not be necessary.

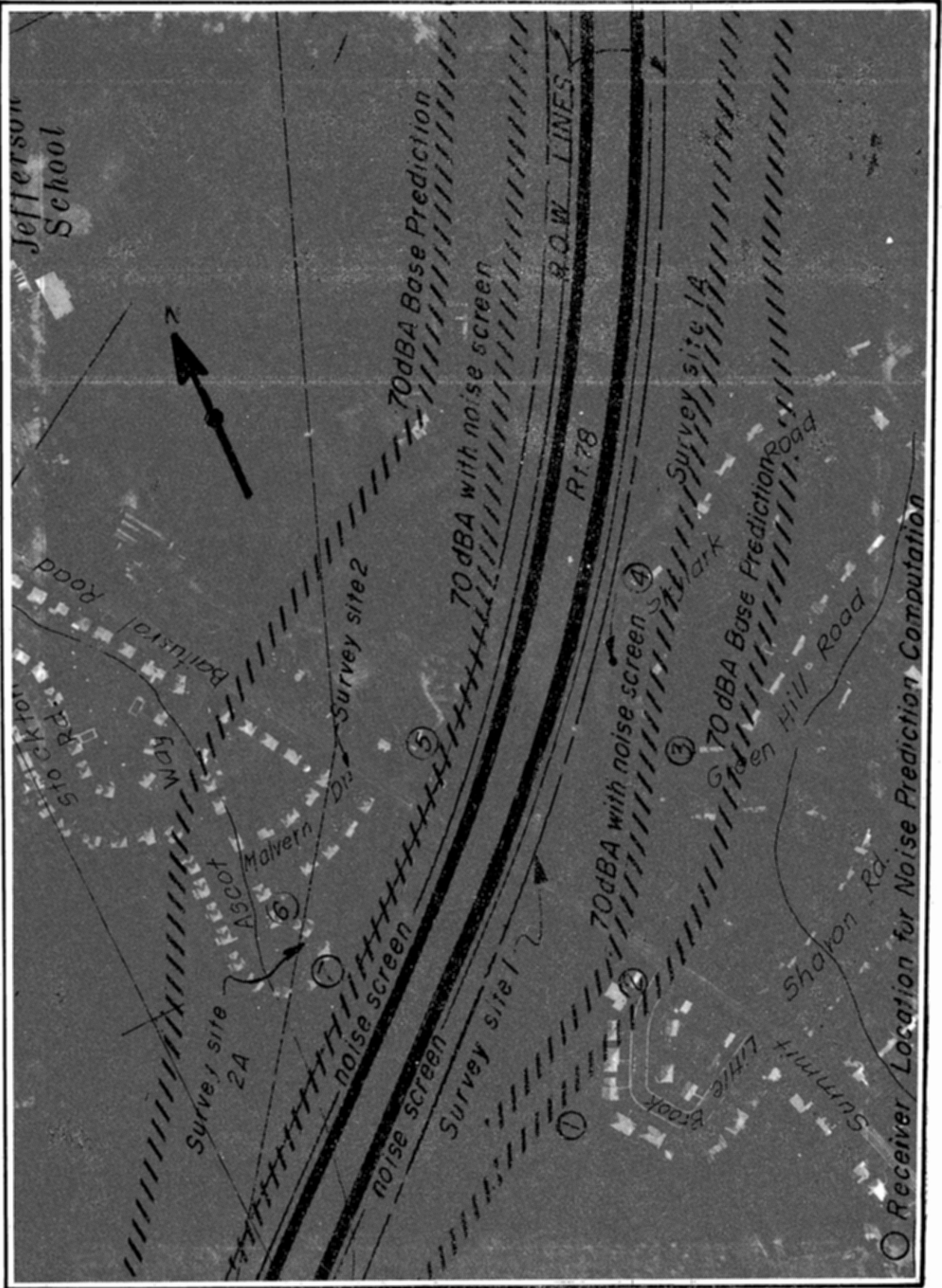
Remove receptor. By extending the right-of-way to include more homes near the highway, a buffer zone can be created so that no residences will experience major impacts due to an increase in noise levels. Since the design of the noise shields should mitigate noise problems, such extreme measures are not necessary in this area.

TABLE 8

NOISE PREDICTION (SEE FIGURE 2)

RESIDENTIAL DEVELOPMENT AT SUMMIT (BALTUSROL) ROAD

<u>LOCATION</u>	<u>BASE PREDICTIONS</u>			<u>WITH NOISE BARRIER</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
1	62.9	65.2	67.5	61.2	63.3	65.5
2	64.2	67.9	71.6	64.6	67.0	69.5
3	68.6	71.3	74.0	59.8	64.1	68.4
4	70.8	75.2	79.5	68.9	73.5	78.1
5	68.7	74.1	79.5	58.6	64.6	70.5
6	67.0	70.4	73.7	58.8	61.9	65.1
7	68.1	72.9	77.8	57.3	61.8	66.3
	<u>WITHOUT TRUCKS</u>			<u>WITH QUIETER TRUCKS</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
1	56.7	57.6	58.5	58.2	59.3	60.4
2	59.7	61.3	62.8	60.9	62.7	64.5
3	63.6	64.6	65.6	64.8	66.0	67.2
4	67.5	69.3	71.0	68.5	70.6	72.7
5	61.6	63.2	64.9	62.8	66.7	70.7
6	57.2	58.1	59.0	60.0	62.3	64.7
7	57.0	58.8	60.7	60.2	64.2	68.3



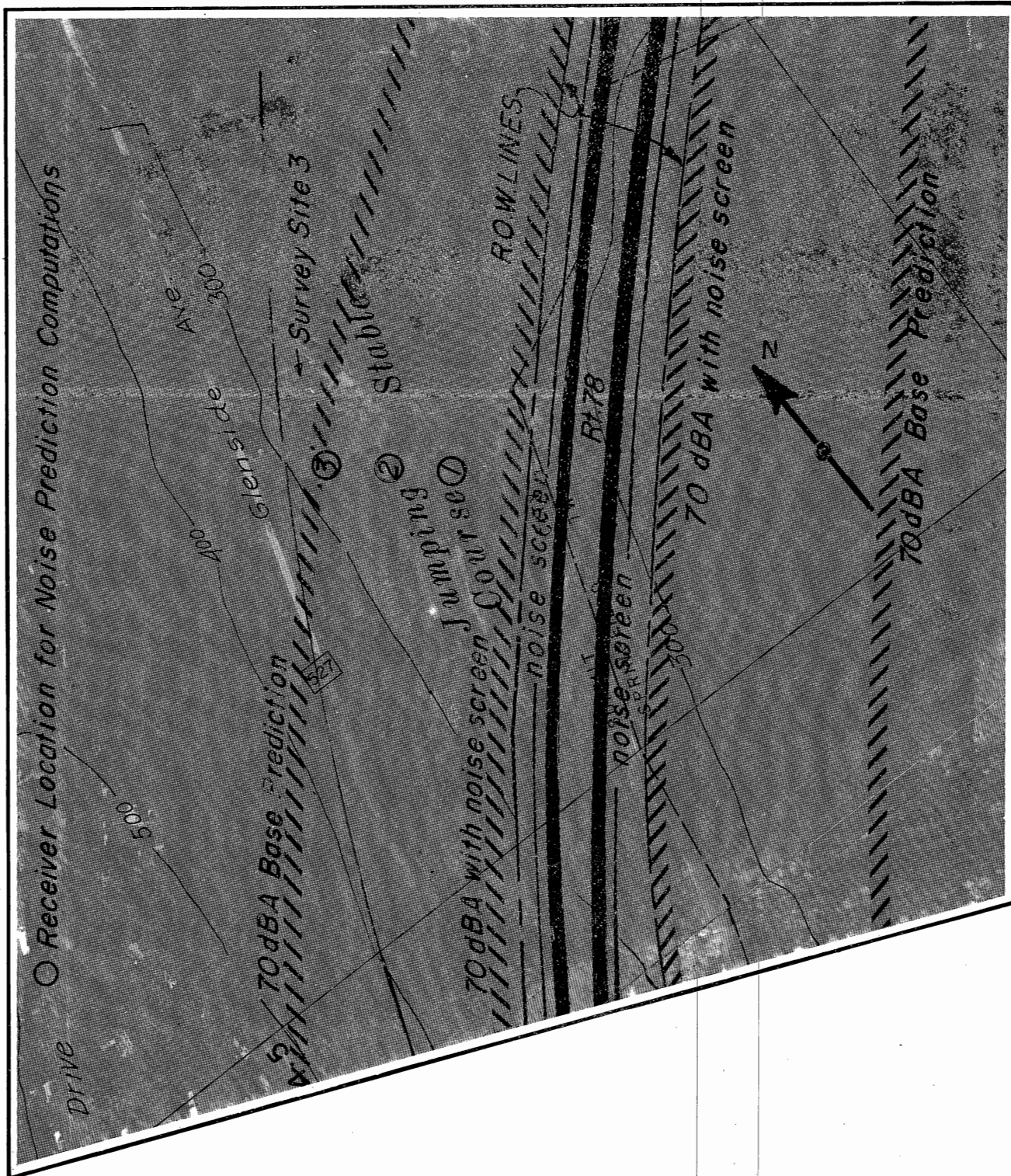
SUMMIT (BALTUSROL) ROAD AREA

PREDICTED NOISE LEVELS
FIGURE 2

TABLE 9
NOISE PREDICTIONS (SEE FIGURE 3)
PRESENT STABLE AREAS

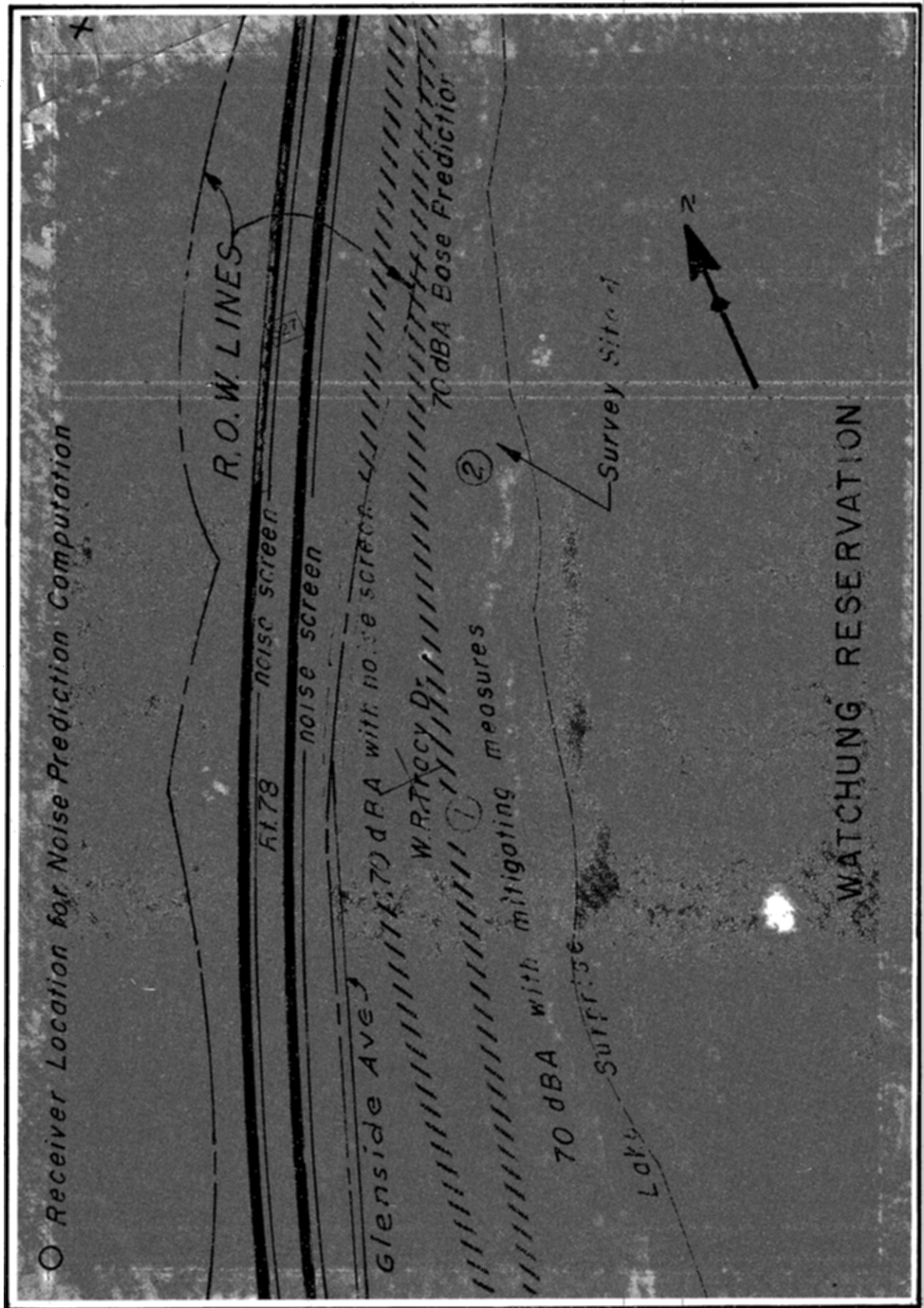
<u>LOCATION</u>	<u>BASE PREDICTIONS</u>			<u>WITH NOISE BARRIER</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
1	69.5	72.8	76.2	60.4	63.8	67.2
2	67.7	70.5	73.3	60.7	63.5	66.4
3	65.6	68.0	70.3	60.5	63.8	67.1

<u>LOCATION</u>	<u>WITHOUT TRUCKS</u>			<u>WITH QUIETER TRUCKS</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
1	59.7	61.0	62.2	62.1	64.5	66.9
2	58.2	59.1	60.1	60.0	61.9	63.9
3	56.3	57.0	57.8	58.3	59.8	61.3



PRESENT STABLE AREA

PREDICTED NOISE LEVELS
FIGURE 3



WATCHUNG RESERVATION
AT LAKE SURPRISE

PREDICTED NOISE LEVELS
FIGURE 4

TABLE 11

NOISE PREDICTIONS (SEE FIGURE 5)

GOV. LIVINGSTON REGIONAL HIGH SCHOOL

<u>LOCATION</u>	<u>BASE PREDICTIONS</u>			<u>WITH NOISE BARRIER</u>		
	L90	L50	L10	L90	L50	L10
1	66.1	71.5	77.0	63.2	69.1	75.0
2	50.0	58.0	66.0	49.5	57.6	65.8
3	56.8	63.5	70.2	48.9	56.4	63.9
4	43.4	52.2	61.0	42.9	51.8	60.8
5	70.0	74.7	79.4	67.9	72.5	77.0
6	63.1	68.3	73.4	57.8	64.3	70.8

	<u>WITHOUT TRUCKS</u>			<u>WITH QUIETER TRUCKS</u>		
	L90	L50	L10	L90	L50	L10
1	59.1	61.0	62.9	60.5	64.3	68.1
2	46.8	51.2	54.2	48.2	53.5	60.3
3	50.7	52.5	54.3	55.9	60.4	65.0
4	38.2	43.8	47.1	40.4	46.2	54.2
5	64.3	65.7	67.0	64.6	67.4	70.2

TABLE 12

NOISE PREDICTIONS (SEE FIGURE 5)

ROLAND WAY RESIDENCES AND PARK AT GLENSIDE ROAD

<u>LOCATION</u>	<u>BASE PREDICTIONS</u>			<u>WITH NOISE BARRIER</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
7	61.7	64.8	67.9	-	-	-
8	63.2	66.3	69.5	-	-	-
9	64.1	67.5	70.9	-	-	-
10	57.5	63.4	69.2	53.9	59.2	64.4
11	61.8	67.0	72.3	59.8	65.6	71.5
12	59.6	64.7	69.7	59.4	64.5	69.6
13	59.8	64.3	68.8	59.2	63.8	68.5
	<u>WITHOUT TRUCKS</u>			<u>WITH QUIETER TRUCKS</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
7	49.9	51.1	52.2	53.7	56.1	58.5
8	51.3	52.4	53.5	55.1	57.6	60.1
9	52.3	53.2	54.2	56.0	58.7	61.4
10	51.3	52.7	54.0	51.5	55.9	60.3
11	55.8	57.4	59.1	57.3	60.7	64.1
12	60.3	61.5	62.7	61.3	63.1	64.8
13	53.9	54.9	55.8	55.4	58.0	60.6

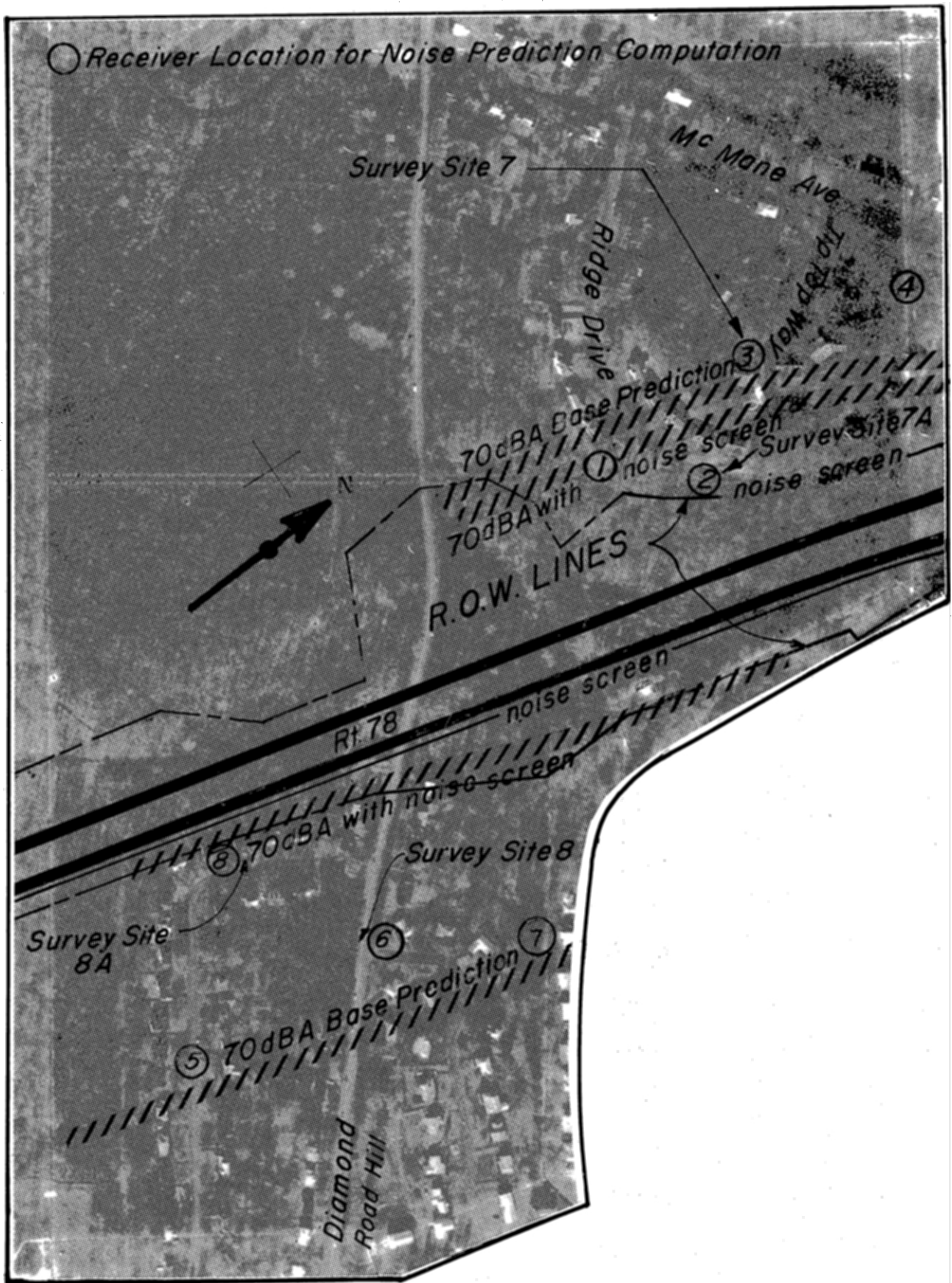
TABLE 13

NOISE PREDICTIONS (SEE FIGURE 6)

RESIDENTIAL AREA AT DIAMOND HILL ROAD & McMANE AVENUE

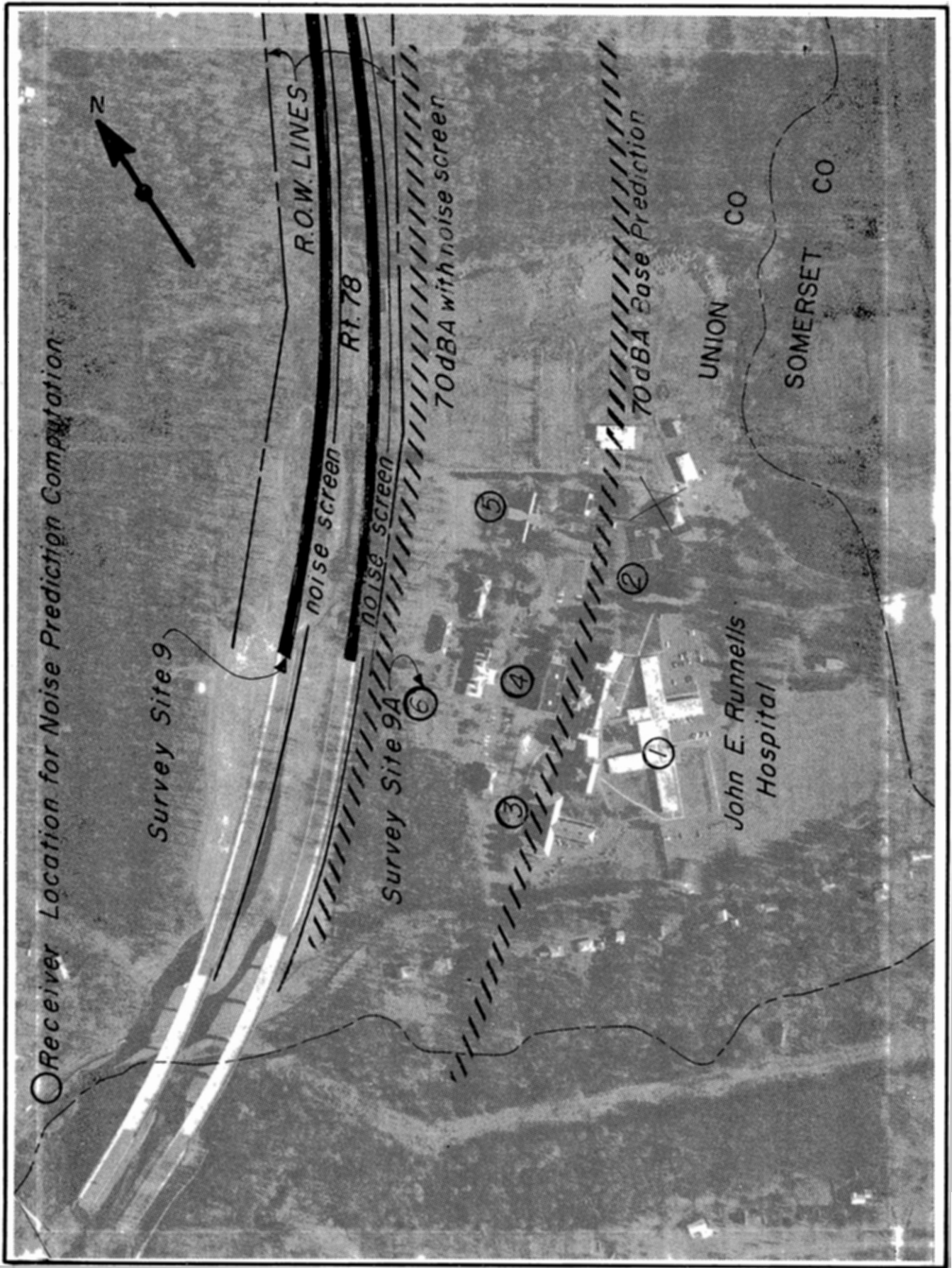
<u>LOCATION</u>	<u>BASE</u>			<u>WITH NOISE BARRIER</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
1	65.8	69.2	72.6	65.2	68.5	71.8
2	66.4	70.6	74.8	65.9	70.3	74.7
3	58.0	63.3	68.5	56.8	62.3	67.9
4	59.7	62.8	65.8	57.8	61.4	65.0
5	64.6	68.0	71.5	55.1	57.8	60.5
6	67.5	70.5	73.5	56.0	58.6	61.3
7	66.6	69.2	71.8	53.6	58.4	63.3
8	61.7	70.4	79.1	53.7	60.6	67.4

	<u>WITHOUT TRUCKS</u>			<u>WITH QUIETER TRUCKS</u>		
	L ₉₀	L ₅₀	L ₁₀	L ₉₀	L ₅₀	L ₁₀
1	60.3	61.6	62.9	61.6	63.3	65.0
2	56.0	59.1	62.1	60.5	63.4	66.4
3	46.7	49.0	51.2	49.2	54.1	58.9
4	53.9	54.3	54.8	55.6	57.3	59.0
5	53.7	54.7	55.7	57.3	59.5	61.6
6	55.4	56.3	57.2	58.7	61.1	63.5
7	54.8	55.7	56.6	58.7	60.6	62.5
8	58.1	61.5	64.9	59.0	63.4	70.8



DIAMOND HILL ROAD AND
Mc MANE AVENUE AREA

PREDICTED NOISE LEVELS
FIGURE 6



JOHN E. RUNNELLS HOSPITAL AREA

PREDICTED NOISE LEVELS
FIGURE 7

Summary of Noise Impacts

The residential areas north and south of Route 78 near Summit Road would generally experience a noise level exceeding DOT Standards some 300-600 feet from the right-of-way. About 65 houses are within this range. With the installation of an eight-foot noise shield, however, fewer than 10 residences will experience this impact. Since there are areas within this development which already experience noise levels in excess of DOT standards during the afternoon rush hour, it is expected that the impact upon this area would be slight.

For Watchung Reservation, the northern areas would be affected the most, with an increase in noise in the 5 - 10dBA range. Noise barriers will be particularly effective in the northern areas, reducing the peak highway-generated noise levels to less than is experienced currently with present Glenside Avenue traffic, and the average noise levels to less than 5dBA above those experienced now. The interior portions of the Reservation will notice an increase in noise levels, although in the summer months, when the Reservation is used most heavily, the vegetation will alleviate some of the noise problem.

Noise predictions for the Regional High School indicate that the south corner of the high school will be within the boundary of the 70dBA noise level. This situation will not be alleviated by a noise shield located at the top of the cut slope since such a shield provides only a marginal attenuation of the highway noise. Since peak traffic conditions should not coincide with the school hours,

the real impact should be several decibels less than that predicted. During school hours, the playing fields will have average noise level L_{10} of 55 dBA, which is the ambient noise level presently.

The residences at Roland Way will experience significant noise impacts from Route 78, with some 6 houses having noise levels exceeding DOT standards. Noise shields will have only minor effects, and only in the areas beyond the 6 impacted residences.

The residential areas in the vicinity of McMane Avenue would experience significant impact due to Route 78 with some 10 residences experiencing noise levels exceeding the DOT standards. Noise barriers will have little effect, reducing levels in most cases only by 1 - 2dBA.

The residential areas along Diamond Hill Road will generally experience minor impact from Route 78, since the area already has high ambient noise levels. The installation of a noise shield will be effective, such that traffic noise on Diamond Hill Road would dominate and no residences would experience noise levels exceeding DOT standards.

Two residences on Ghost Pony Road would experience noise levels of 77dBA and 80dBA respectively, both exceeding DOT standards. Noise barriers will ameliorate the situation significantly, reducing the noise levels by some 10 - 15dBA, below DOT standards.

At the John E. Runnells Hospital, the predicted noise levels range from 66dBA to 78dBA on hospital property, exceeding DOT design standards up to 600 feet. However, the hospital will benefit significantly with the installation of a noise screen, so that no

buildings on the property will have noise levels exceeding DOT design standards. The range of L_{10} levels will be 60 - 67dBA, an increase of less than 10dBA for peak levels and about 4dBA for average noise levels.

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Water Quality

Description

Lake Surprise, Blue Brook and Green Brook (see Plate 3) are the bodies of water which will be affected by the storm runoff from Route 78.

Green Brook, which is joined by Blue Brook near Diamond Hill Road, receives the runoff from the highway and upland area between the hospital and Diamond Hill Road. The watershed for this runoff extends from the roadway north to the ridge of the Second Watchung Mountain. The runoff from the highway will be discharged into natural water courses at the right-of-way and then will flow overland to Green Brook, approximately 1,000 feet from the highway.

Lake Surprise and Blue Brook will experience a more pronounced impact on water quality from the introduction of highway runoff because the drainage will be piped directly into them from the sedimentation basins (see Plate 5).

At present, the clarity of the water in Lake Surprise is very poor and the fish population supported by the lake is limited. There is extensive growth of bottom-rooted aquatic plants along the shore line. The lake has silted through the years so that now it is only about 6 feet deep at the center.

Tests of existing water quality were made by the Union County Park Commission in the fall of 1971 and the summer of 1972 and included measurements of turbidity, color, ph, hardness, dissolved oxygen, chloride silica, various heavy metals, organic compounds and coliform bacteria. The measurements indicated that the quality was within water supply standards except for color, turbidity and, to a lesser

extent, iron. The dissolved oxygen was measured to be above the minimum level required to sustain life. Further monitoring of water quality is planned for the future by the Union County Park Commission as part of a program to preserve the lake as a recreational focal point.

Impact

Due to the long travel distance in the water courses and the relatively large flow in Green Brook, the organic and inorganic contaminants emanating from the highway are not expected to have a significant impact on the water quality in Green Brook.

Several contaminants will be introduced into Lake Surprise and Blue Brook in the highway runoff which may adversely affect the water quality. These are in the categories of inorganic substances such as heavy metals, asbestos, salts, chloride and solid material, and organic compounds such as potassium and nitrates.

The heavy metals that have been found in analyses of highway runoff of similar facilities in various parts of the country are thought to be produced directly by the vehicles using the road, although some heavy metals may be tracked to the site on tires. The organic material found in the highway runoff analyses is assumed to be brought to the site on tires alone. The mechanism of transfer of these contaminants is not thoroughly understood at this time, however, chemical tests of runoff confirm their presence.

The effects of several pollutants contained in the highway runoff which may alter the quality of the water in the lake and stream are described below:

Salt - The winter de-icing program anticipated for this section of highway is based upon past experience with storm frequency and assumes an application rate of 250 pounds of salt (sodium chloride and calcium chloride) per lane-mile. This program is expected to contribute approximately 45,000 pounds of salt to the roadway length that drains into Lake Surprise and 25,000 pounds of salt to the roadway length that drains into Blue Brook. Considering minimum dilution, that is, stream flow which is predominately storm runoff plus the approximately 3 million gallons in Lake Surprise, there is a possibility that within 5 years the water in the lake may become brackish. This increase in salinity could threaten the survival of the existing species of fish in the Lake.

Organic Load - The introduction of increased amounts of PO_4 and NO_3 into the lake and brook will increase the organic load to the extent that the eutrophication process, already in progress, will be accelerated. It can be expected that additional algal growth will occur in Lake Surprise and Blue Brook. A timetable for this process cannot be predicted with a reasonable degree of accuracy.

Silt - During the construction of Route 78 a large amount of silt will be generated, most of which will be kept from entering the lake and brook by a series of sedimentation basins (see Plate 5). These basins will be constructed on each of the natural water courses, into which all highway runoff will be directed, prior to the advent of construction on Route 78. The basins are designed to detain the storm runoff long enough for the silt to settle out. The basins will be retained as a permanent feature and periodically cleaned by N.J.D.O.T. in order

to prevent particulate material from the highway and upland area from reaching the lake and brook.

The basins are not effective against the pollutants which are in solution, such as the organic material and salts. The heavy silt load for which the basins are designed will only occur during and shortly after construction.

Heavy Metals - The heavy metals will be carried to the lake and brook by storm runoff. Some of these will settle out prior to reaching the lake; the extent of settlement is governed by the length of time the water remains in the sedimentation basins. The amount of heavy metals that will be trapped by the basins cannot be predicted. The heavy metals and salts washed off the highway may result in reducing the ability of the lake to sustain the life forms now supported by it.

The overall impact of Route 78 on Lake Surprise and Blue Brook can be summarized as advancing the rate of eutrophication and possibly reducing the marine life in the lake.

The winter salting program will continue to be studied with the intent of reducing the quantity of salt employed. The possibility exists that a non-polluting alternate to salt will be developed by the time the highway is opened to traffic.

Air Quality

The major considerations in the analysis of the degradation of air quality due to Route 78 are as follows:

- the determination of the ambient air quality in the study area.
- the analysis of the dispersion of air pollution from highway-generated traffic
- the determination of the sum of the highway pollution added to the ambient quality of the region as it applies to air quality standards and to impacted areas.

The particular areas under consideration for this analysis are the Watchung Reservation, the Regional High School, the John E. Runnells Hospital and several residential areas near the roadway.

Ambient Air Quality for the Watchung Area

A short-term ambient air quality monitoring effort was conducted in the Watchung Valley from March 6 through April 5, 1973. The first week a mobile van instrumented with a particulate analyzer (integrating nephelometer) and a dispersive infrared analyzer to measure carbon monoxide, hydrocarbons and sulfur oxides was driven throughout the valley to determine the spatial and time distribution of these pollutants. The following three weeks, a high volume particulate sampler and an impinging sampler (to measure nitrogen oxides and sulfur oxides) was located on the hospital grounds in an area removed from any local transportation and point sources. A data reduction technique was developed

to correlate available nearby air pollution data with that gathered during the monitoring effort.

Occurrence distribution curves were constructed for each of the pollutants monitored for the time they were sampled. From these curves, the average (50% occurrence) and peak (10% occurrence) values were obtained. Additional curves were made using Morristown and Somerville data from August 1970 through February 1973, as available. The values for the month of March during these years were found on the occurrence curves. This value was then compared to the March value obtained at Watchung, and the positions of the annual curves were then adjusted to account for the different locations. From these curves, average and peak hourly values were obtained. Further data reduction of the State data for Morristown and Somerville established approximate ratios between the average months in the year, the high months in the year and the average high hour of each month. Possible oxidant values were obtained by comparing the amount of hydrocarbon and nitrogen dioxide values to simplified scheme on the production of photochemical reactions.^{1*} Morristown and Somerville measured COHS (Coefficient of Haze) and RUDS (Reflectance Unit Density) instead of suspended particulates, but the conversion factor for all three of these particulate indexes is approximately linear for the range of concern here. The values for NO₂ and HC are based on the measurements taken at Watchung, and their ranges are based on the values obtained during that testing period. The values which may be expected during periods of extremely adverse conditions for NO₂ , HC and O_x , are arbitrarily

* All superscripts refer to references at the end of this section.

chosen, based on the trends of the other pollutants which were measured (CO, SO₂ and particulates) and data from other areas. The values which were used in the analysis were those which occur equal to or less than 50% and 90% of the time, for average and peak conditions, respectively, and are considered most reasonable estimates.

The approximate air quality for Watchung along with values for Morristown and Somerville are shown in Table 15. It is seen that the CO values for Watchung are intermediate between Morristown and Somerville, while the SO₂ values for Watchung are less than at the other two sites. This would be due to the presence of automobiles, which produce CO, in all three areas and the lack of SO₂ sources at Watchung. The traffic through the southwest end of the valley

Table 15

AMBIENT AIR QUALITY FOR STUDY AREA

		% of Hours Each Year This Value or Less Occurs		Particulates		CO	NO ₂	SO ₂	HC	O _x
				RUDS	ug/m	COHS	ppm	ppm	ppm	ppm
Average Month										
Watchung	50%	-	30	-		3	0.005	0.005	0.1	0.03
Morristown		-	-	1.6		2	-	0.015	-	-
Somerville		1.0	-	-		3.3	-	0.007	-	-
High Month in Year										
Watchung	90%	-	40	-		6	0.01	0.016	0.4	0.03
Morristown		-	-	2.0		4	-	0.025	-	-
Somerville		1.2	-	-		5	-	-	-	-
Average High Hour of Each Month										
Watchung	97%	-	100	-		10	0.03	0.04	-	(to 0.1)
Morristown		-	-	.5		9	-	0.05	-	-
Somerville		3.2	-	-		17	-	0.06	-	-

is substantial during commutation hours, especially on Plainfield Ave. and Diamond Hill Road which would account for the fairly high values. During the spatial surveys of the first week of the testing, it was found that the air pollutant values were noticeably greater in the southwest end of the valley, as compared to the values obtained in the Reservation. The stationary sampling was conducted at this "higher" end of the valley near the hospital.

Table 16 lists the applicable ambient air quality standards for New Jersey. New Jersey has incorporated the Federal ambient air quality regulations, so there is no difference between the State and Federal Standards. It is further assumed that the State standards will be changed when the Federal standards are changed. Recent indications by the EPA assume that the NO_2 standards will be relaxed for certain areas of the country along with long-term SO_2 standards, while three hour (6 AM to 9AM) SO_2 standards will be more stringent.² By comparing Tables 1 and 2, it is seen that the Watchung area has light to moderate air pollution potential, where some of the standards may occasionally be exceeded. The particulate values are about one half the standards, the CO values vary between 1/3 and 2/3 of the standards, the NO_2 values are about 1/5 the standards, and the SO_2 values are 1/6 to 1/2 the standards for the appropriate time frame. It is expected that the reactive hydrocarbon standards may be exceeded along with occasional high oxidant levels. In specific "hot" spots near the major roadways, it is expected that the CO standards are being exceeded, but not over large areas in the valley. The HC measured are total hydrocarbons of which only 10% to 40% are reactive and therefore comparable to the standards in Table 16.

Table 16

NATIONAL AND NEW JERSEY AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING TIME	NATIONAL AND NEW JERSEY STANDARDS		
		PRIMARY	SECONDARY	HAZARD
Photochemical Oxidants (corrected for NO ₂)	1 hour	160µg/m ³ (0.08ppm)	Same as Primary Standard	--
Carbon Monoxide (CO)	8 hour	10µg/m ³ (9ppm)	Same as Primary Standards	73 µg/m ³ (66 ppm)
	1 hour	40µg/m ³ (35 ppm)		--
Nitrogen Dioxide (NO ₂)	Annual Average	100µg/m ³ (0.05ppm)	Same as Primary Standard	4000 µg/m ³ (2.0 ppm)
	24 hour	--		
Sulfur Dioxide (SO ₂)	Annual Average	80µg/m ³ (0.03ppm)	60 µg/m ³ (0.02 ppm)	--
	24 hour	365 µg/m ³ (0.14ppm)	260 µg/m ³ (0.10ppm)	---
	3 hour	--	1300 µg/m ³ (0.5 ppm)	
Suspended Particulate Matter	Annual Geo-metric Mean	75µg/m ³	60 µg/m ³	--
	24 hour	260 µg/m ³	150 µg/m ³	--
Hydrocarbons (corrected for Methane) (HC)	3 hour (6-9a.m.)	160 µg/m ³ (0.24 ppm)	Same as Primary Standard	--

Air Pollution Dispersion Analysis

In addition to the ambient air quality conditions, the level of air pollution in the vicinity of any highway depends upon:

1. Dispersion patterns which in turn depend upon the combination of meteorologic conditions and the topography which together determine the micro-meteorology, the local movements of air.
2. Traffic: the number and type of vehicles emitting for the various time periods under consideration and the general traffic conditions.
3. The quantity of pollutants emitted per vehicle, which depends on traffic mix, engine characteristics and operational mode.

The dispersion analysis was conducted using a computer program developed from dispersion analysis techniques⁴ using the inputs detailed above, and checked by additional technological methodologies.⁵

Watchung Valley Micro-Meteorology

A mechanical weather station (Weather Measure WS755) was operated near the John E. Runnells Hospital (approximately 500' NE of administration building on a grass field at an elevation of about 7 feet above ground) from early March to early April, 1973. The station was equipped to continuously monitor and record wind direction, wind speed, relative humidity, temperature and rainfall. These data were compared to the weather records taken at the Newark Airport during the same time period. By using these data, simultaneous wind speeds and directions were compared to determine the relationships between

the weather patterns at the test area and those at the airport. As an example, it was found that the wind speeds at Watchung were one half the values at Newark for wind speeds from 2 to 8 meters/sec, as measured at Newark. This analysis was extended to include the long term weather records at Newark to obtain the probable long term weather situations at Watchung.

Figures 8 and 9 present the results of this analysis for wind speed. These figures show the annual occurrences of different wind speeds. It is seen that the annual average wind speed (50% occurrence) for Newark is about 2.5 m/sec, while at Watchung, it is 1.0 m/sec. The worst case wind speed, which occurs less than 10% of the time, for Newark is 1 m/sec, while at Watchung it is 0.1 m/sec. Since the dispersion of pollutants is generally greater as wind speeds increase, it is seen that Watchung does not have as great a pollutant dispersive potential as Newark. These wind speed differences are probably due to the increased roughness and topographic relief at Watchung as compared to Newark, which would tend to reduce the surface speed of the wind.

Table 17 shows the results of the wind direction analysis.

Table 17

WIND DIRECTION OCCURRENCES

Newark, % occurrence			Watchung, % occurrence (Assumed)		
<u>Direction</u>	<u>March 1973</u>	<u>Annual Avg.</u>	<u>Direction</u>	<u>March 1973</u>	<u>Annual Avg.</u>
45°	13%	10%	45°	-	5%
90	7	8	90	-	5
135	13	6	135	2	5
180	10	13	180	15	5
225	6	19	225	32	20
270	11	17	270	12	10
315	7	15	315	5	20
360	33	12	360	34	40

WIND SPEED

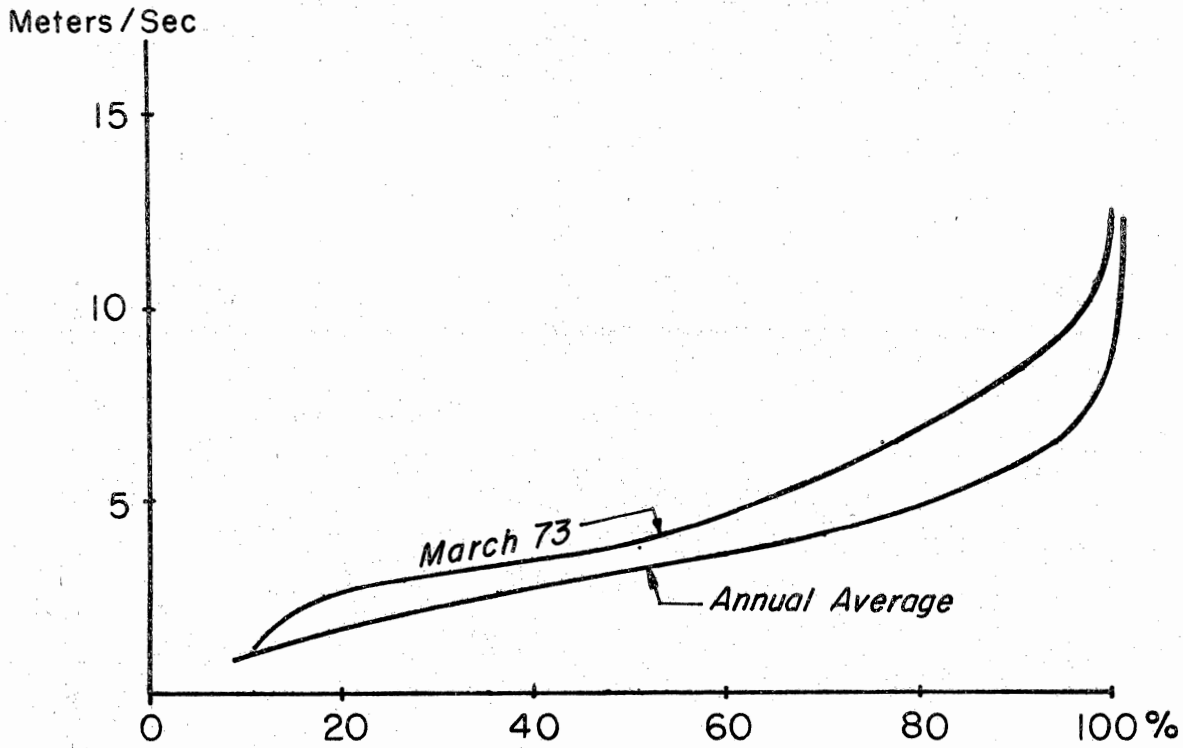


Fig.8(% Occurrence of Speed equal to or less than Corresponding value for Newark Airport.)

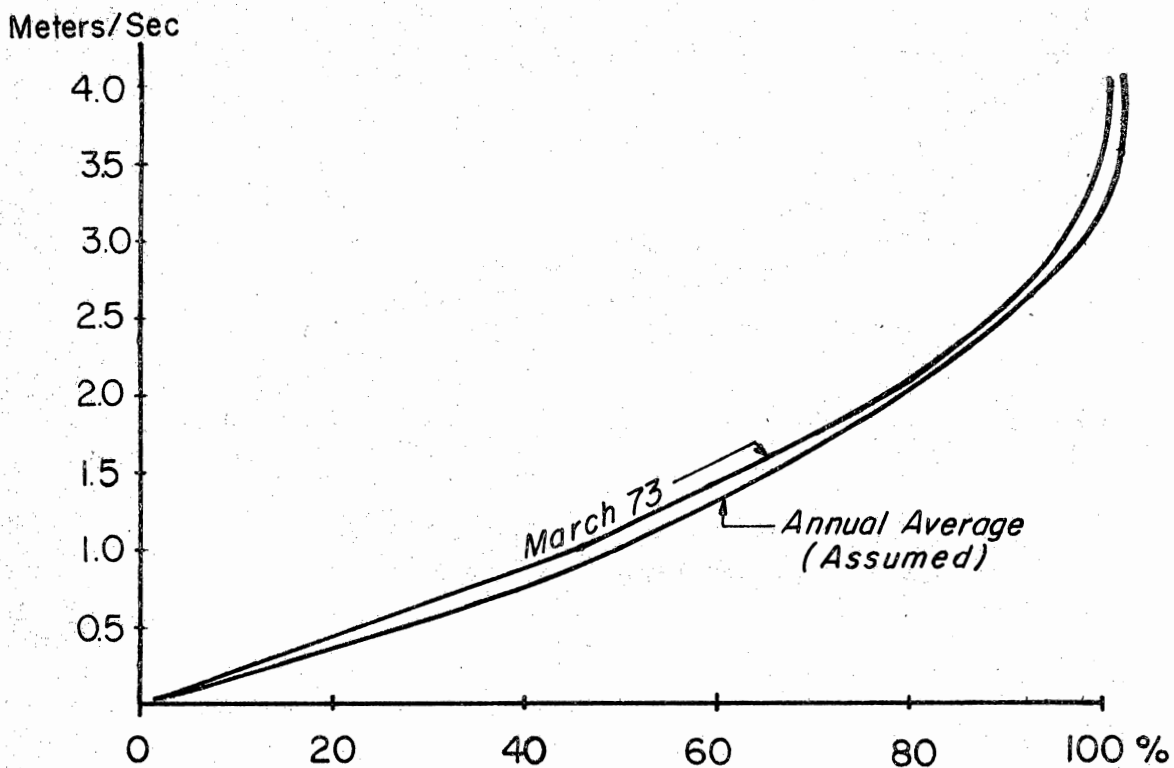


Fig.9(Same as fig.8,except for Watchung.)

The most striking result was that during the sampling period, no winds were found to blow from 22° to 110° at Watchung, while the wind blew from all directions at Newark. It was found that during the simultaneous analysis, the differences in direction of Watchung were compressed into a narrower range. This is most likely due to the effect of the local topography near the hospital. It is apparent that a local eddy effect exists near this site which channels the wind in a more specific direction. It is seen that most of the wind comes in a N - NW direction which is roughly perpendicular to the road alignment. Some wind comes from the SW which is approximately parallel to the alignment. These two directions were chosen for analysis as being representative. It is thought that, besides the local eddy, these directions are indicative of the wind flows along the entire road.

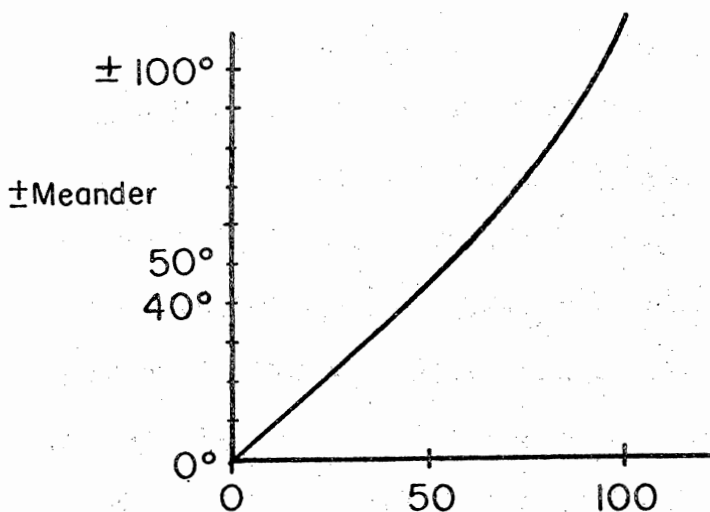


Fig.10 Meander Occurrence
(% of time meander is less than
or equal to the corresponding
value.)

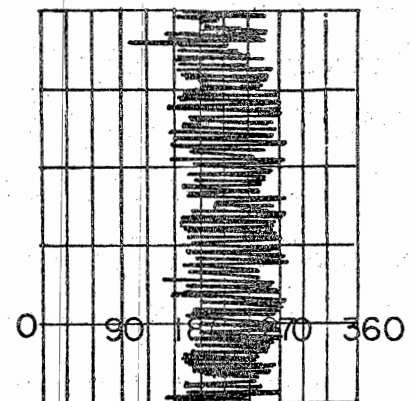


Fig.11 Meander of wind
on April 4, 1973

The meander of the winds was also analyzed to determine appropriate factors to be used in conjunction with the dispersion analysis. It was found that the average meander for every wind direction was about $\pm 40^\circ$. This meander occurrence is shown in Figure 10. These values occurred over very short time periods as shown in Figure 11, an example from the weather station recordings for 5 hours on April 4, 1973.

These values reduce the predicted air pollutant levels because of additional dilution. The "centerline" concentrations would not remain over the same area for long periods of time due to this shifting wind. The effect is much more pronounced for point source, but also reduces the predicted downwind concentrations for line sources.

Figure 12 shows the occurrence of stability classifications over northern New Jersey, as determined from Newark airport data. It is seen that stable conditions occur for a majority of the time, further decreasing the air pollutant dispersion potential of the area. These conditions are thought to be applicable to the Watchung area, with a possible increase in the occurrence of more stable conditions, due to the topography and low winds.

Figure 13 portrays the typical wind flows expected at the hospital for a northwesterly wind. In a valley with a cross breeze, it is common to have a turbulent eddy at the bottom which can trap and concentrate pollutants. Because the hospital buildings and the proposed roadway are positioned up the side of the valley, it is not expected that this effect would alter the predicted concentrations appreciably. This situation is more likely to occur in part of the Watchung Reservation.

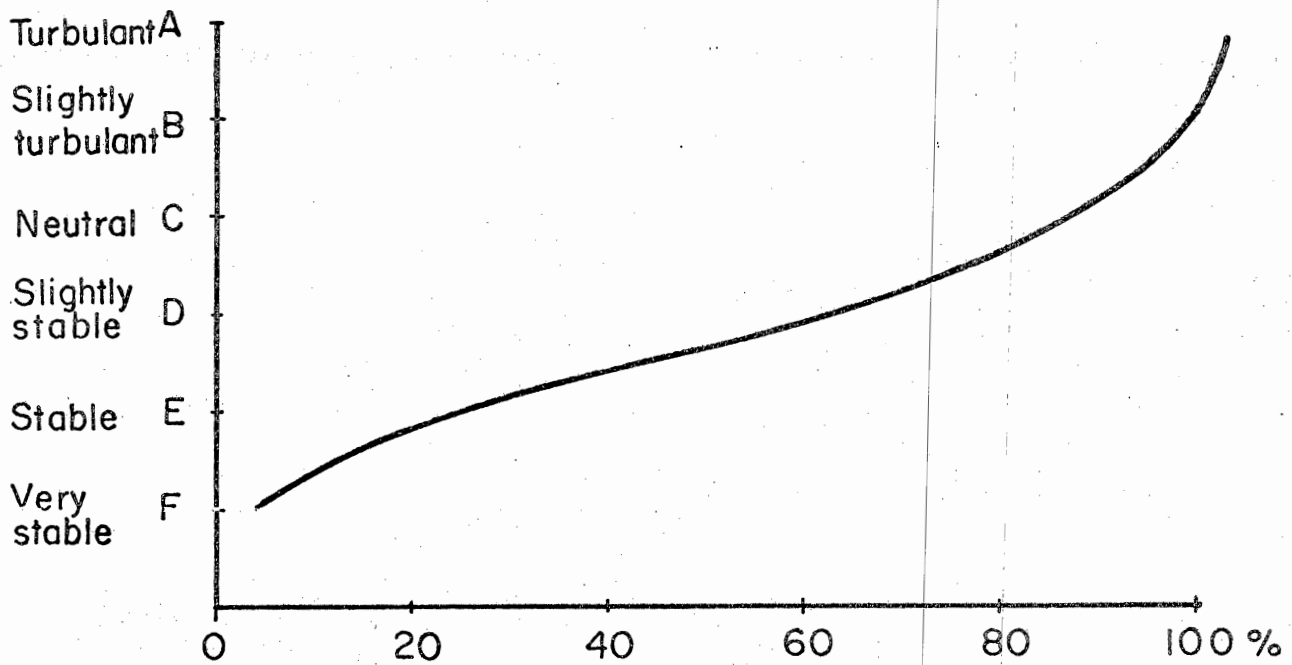


Fig.12 Stability classification in northern N.J.
(% of time the stability is less than or equal to the
corresponding value.)

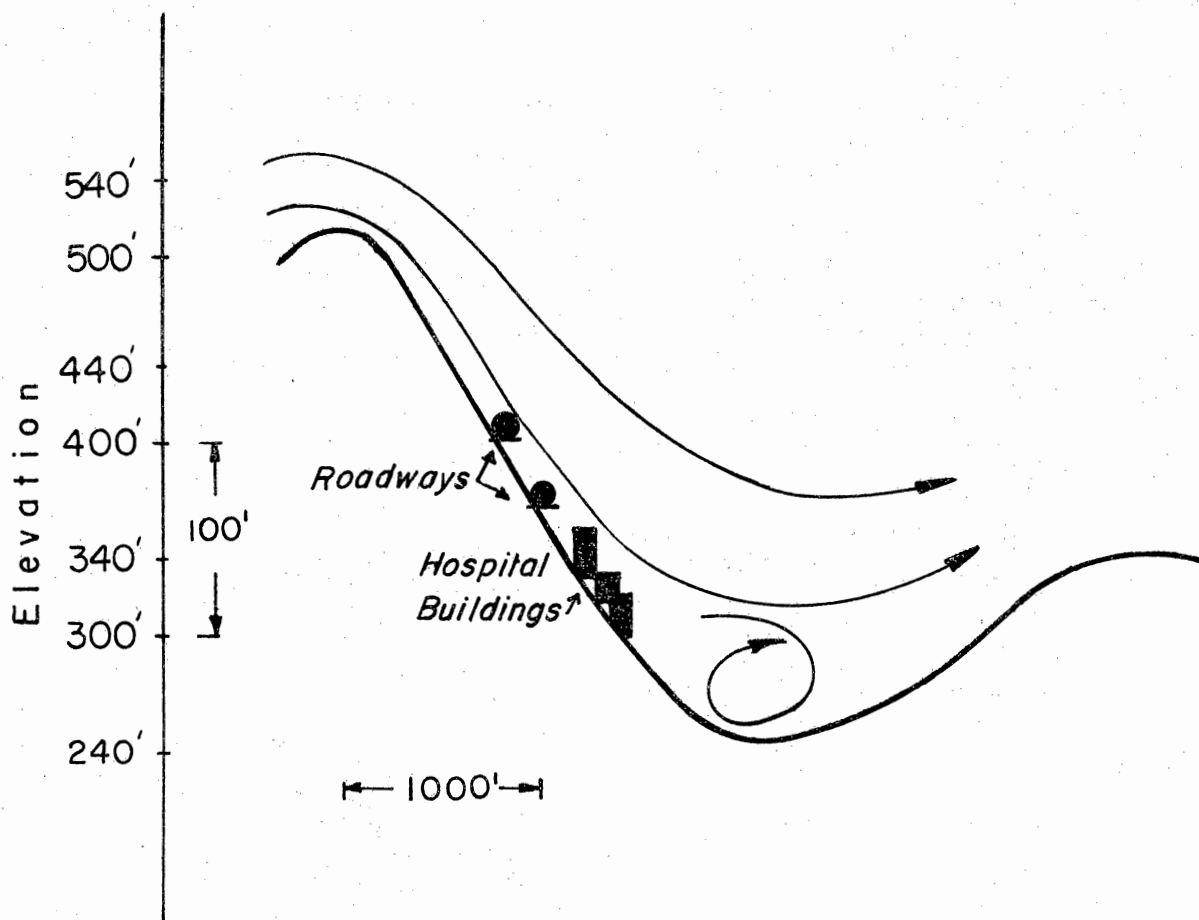


Fig.13(Wind flows at hospital for NW wind.)

The meteorological parameters used in the air pollutant analysis are shown in Table 18. It is seen that the average condition would occur for about 50% of the time, while the peak condition would occur about 10% of the time. Local topographic effects and predicted turbulent areas were manually adjusted to account for these effects. Because the dispersion techniques are not accurate below 1 m/sec, the peak condition was actually analyzed at 1 m/sec and given a conservative factor to make them apply to 0.1 m/sec.

Table 18

METEOROLOGICAL PARAMETERS USED IN AIR POLLUTANT DISPERSION ANALYSIS

Condition	Percent (%) Occurrence	Wind Speed	Wind Direction	Stability	Mixing Depth
"average"	50%	1.0 m/sec	NW, SW	C	1000 meters
"peak"	10%	0.1 m/sec	NW, SW	F	300 meters

Traffic

The expected hourly traffic volume along Route 78 for a 1975 design base is shown in Figure 14. The expected annual average daily traffic (AADT) is 64,000 vehicles with about a 10% truck mix. The peak hour, which would be exceeded 30 times in one year, is 6,000 vehicles. A typical daily morning peak would be about 4,200 vehicles while the typical afternoon peak hour would be about 5,100 vehicles. It is expected that these values would change for other years but they were used as the common base values.

Emission Factors (grams/mile)

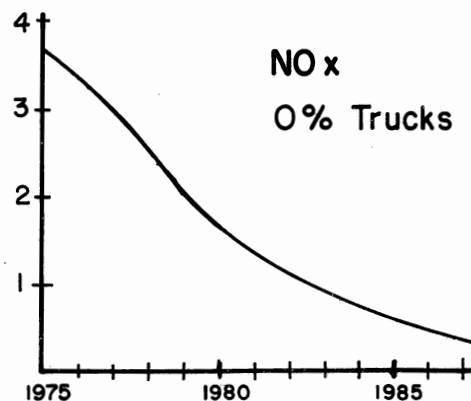
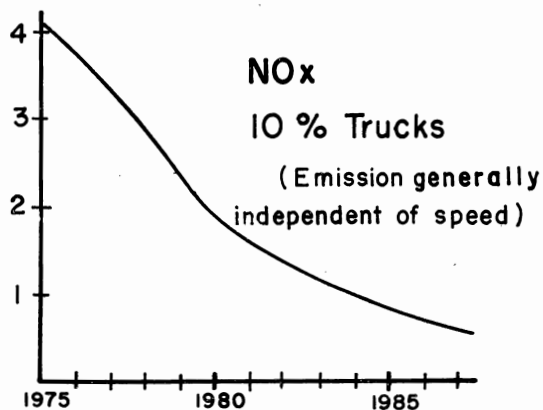
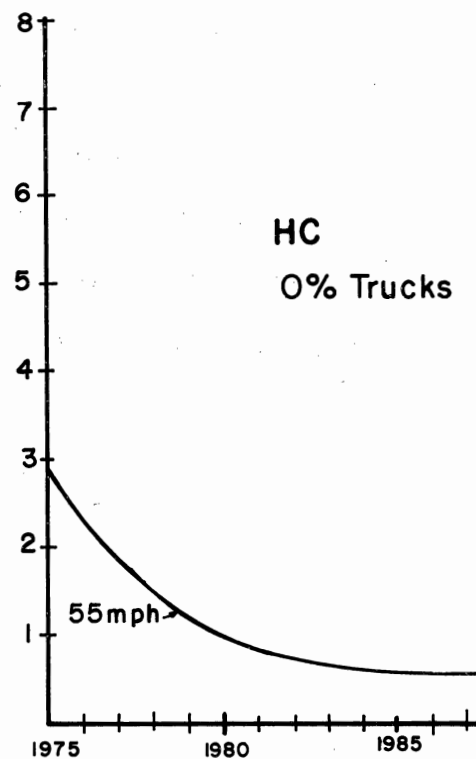
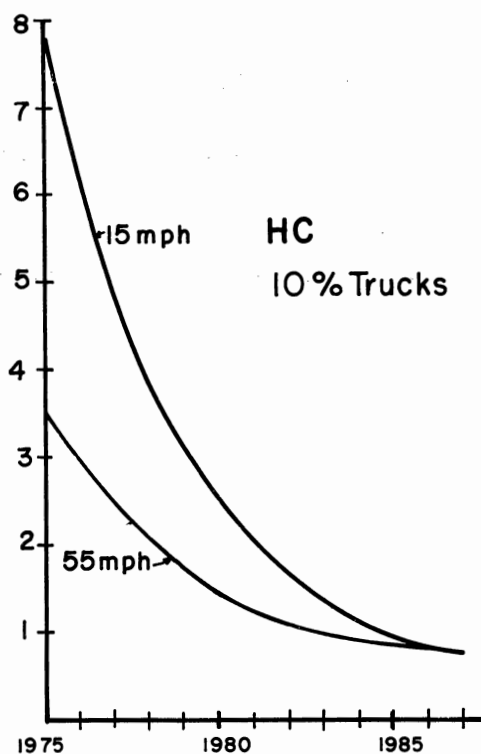
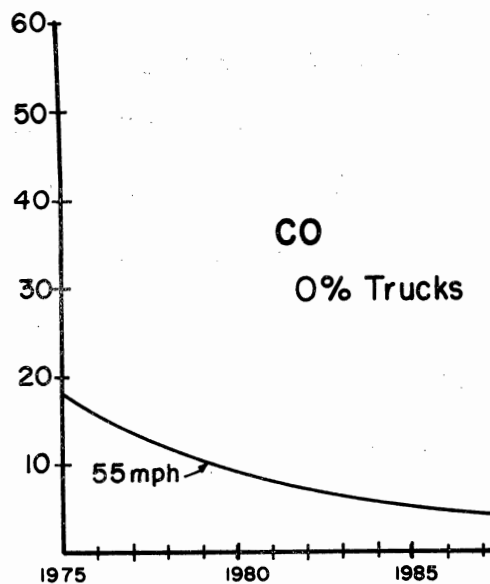
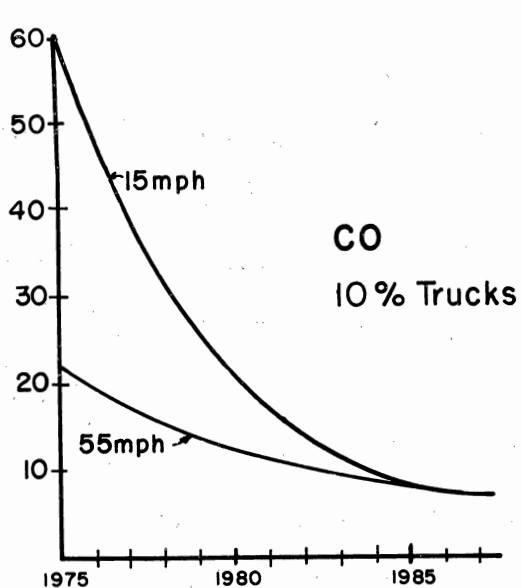


Fig.15 (Air Pollution Emission Factors for New Jersey)

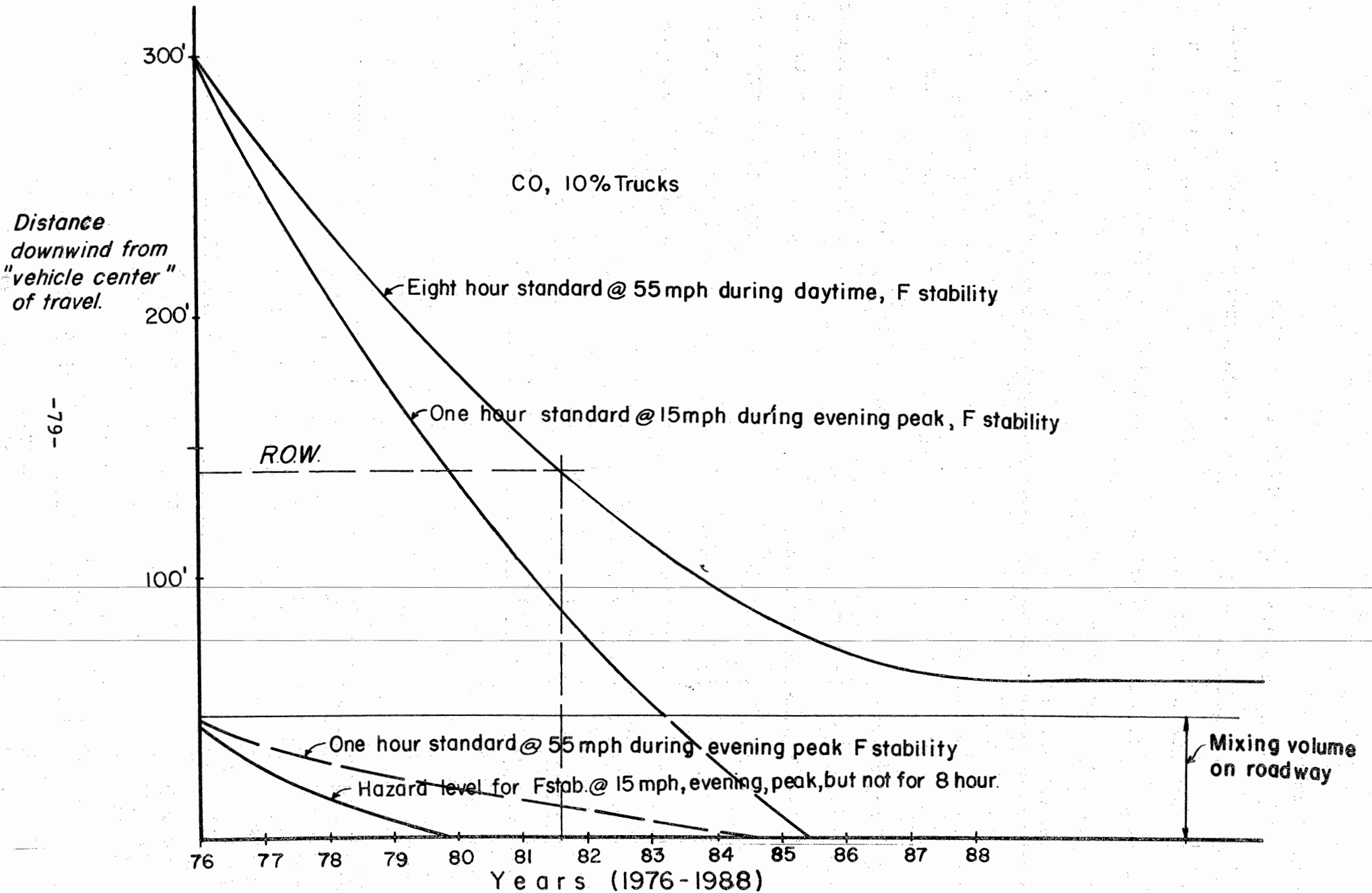


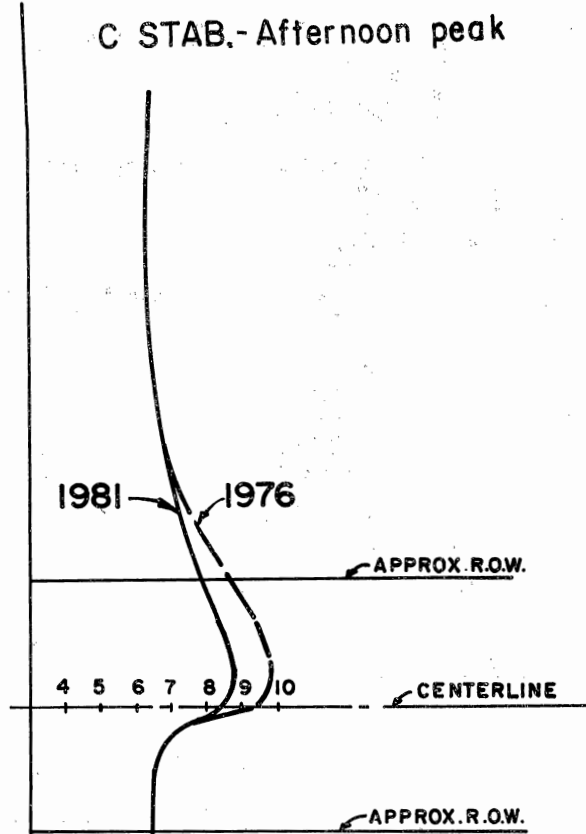
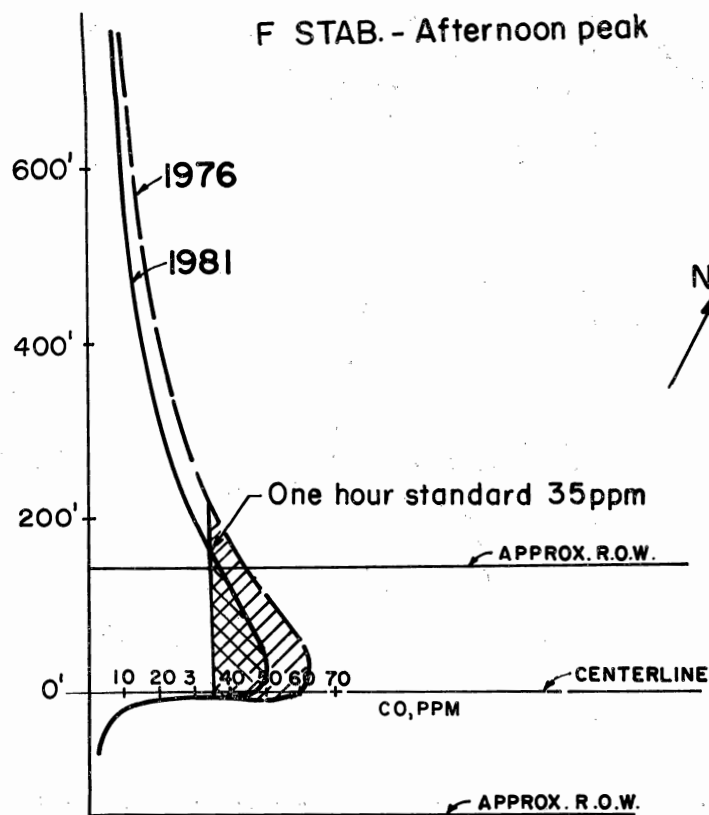
Fig.16 (Distance downwind where certain standards will be exceeded.)

SW wind

Zone 3 - Lake Surprise to Baltusral Rd.

F STAB. - Afternoon peak

C STAB. - Afternoon peak



F STAB. - 8 hour average

C STAB. 8 hour average

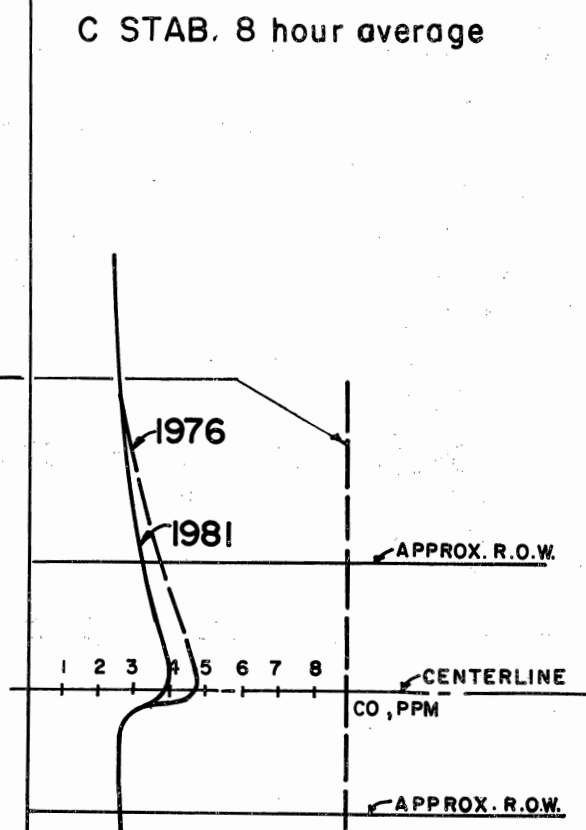
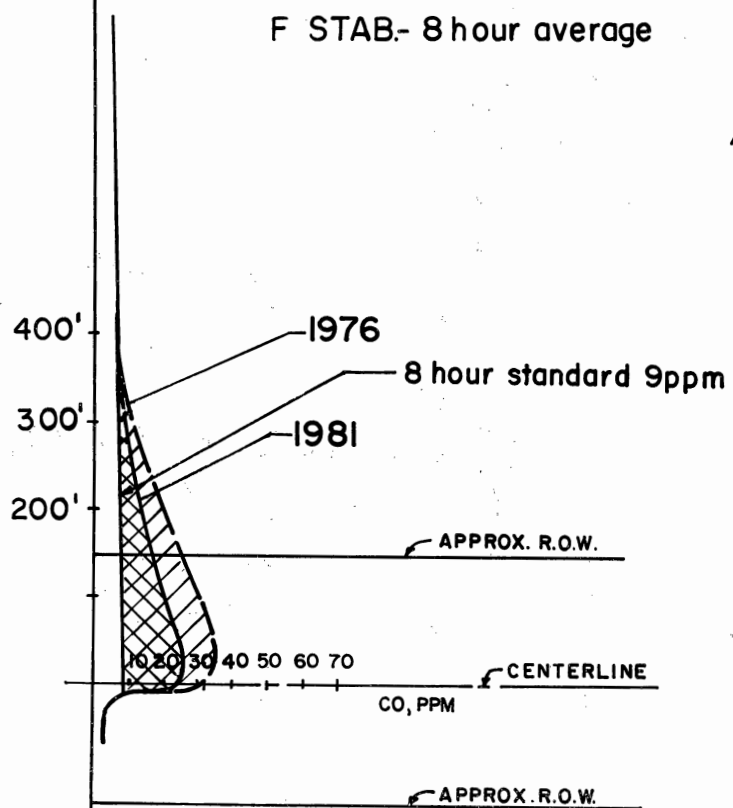


Fig. 19 (Same as 17, except for zone 3)

NW wind - Zones 1 and 2

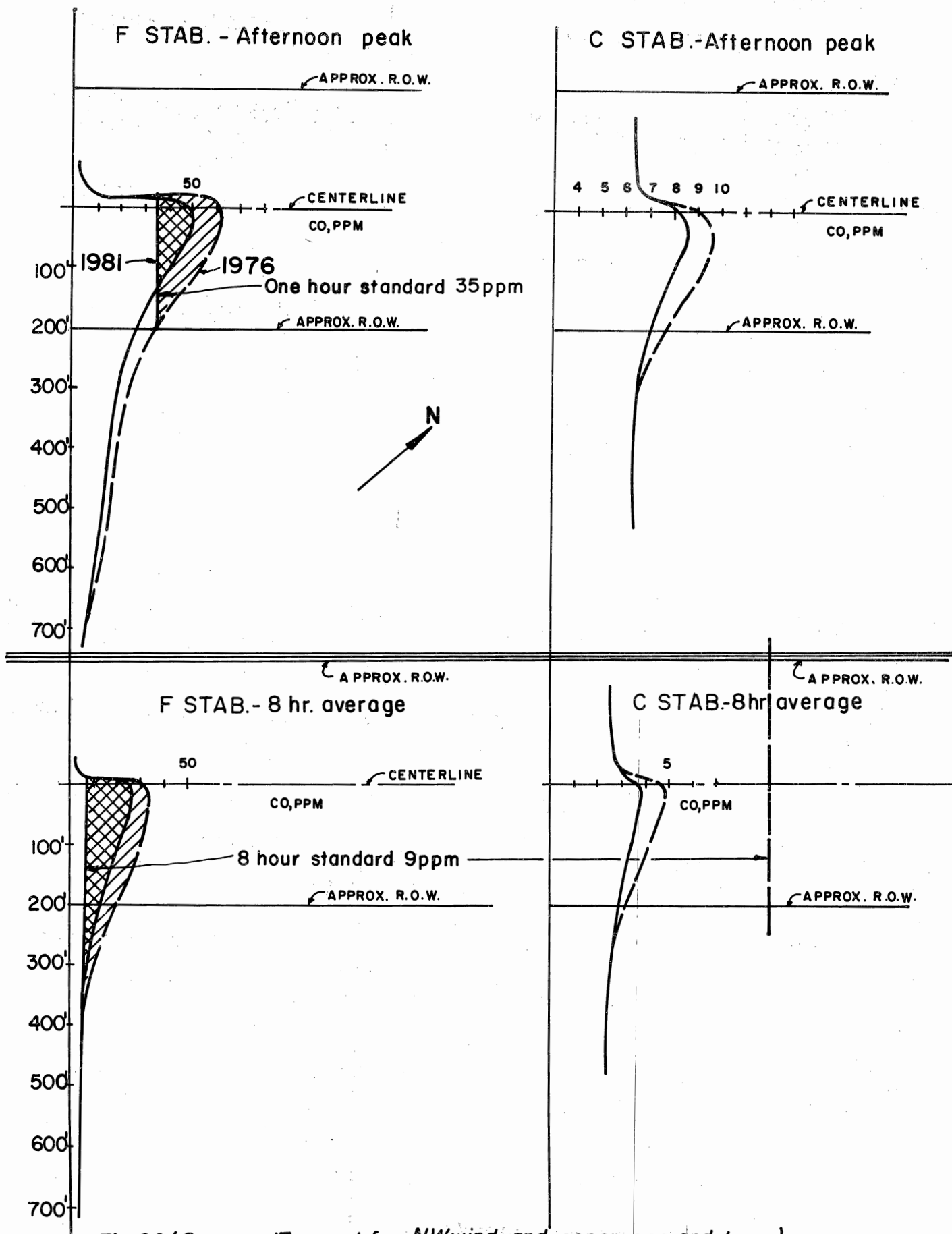


Fig 20 (Same as 17, except for NW wind and zones one and two.)

all traveling at 55 mph. Considering the fact that more than three-quarters of the Route 78 trips are diverted from other routes rather than new traffic, one can assume that the impact of Route 78 upon the county-wide emission level will be negligible.

Summary

The air quality in the area of Route 78 will not exceed EPA primary and secondary standards for nitrogen oxides, hydrocarbons, oxidants, sulphur or particulate emissions.

Concentrations of carbon monoxide will exceed EPA primary and secondary standards within 300 feet of the roadway centerline at the Hospital, the Diamond Hill Road residential area, and at the Baltusrol Road residential area in 1976. By 1981, however, the standards will be only marginally exceeded north of Route 78 in the Diamond Hill Road and Baltusrol Road residential areas within 300 feet of the centerline. In the unusual case of a "tight" inversion, the 8-hour carbon monoxide standard will be exceeded slightly throughout the valley.

Table 21

ANNUAL PRODUCTION OF POLLUTANTS IN UNION COUNTY (1970)
(ton/year)

		Parti- culates	SO _x	CO	HC	NO _x
POINT SOURCES	Process Combustion	481	5,641	700	2,663	
	Fuel Combustion	2,110	27,475	14	925	18,909
	Solid Waste	63	7	23	10	12
	Total Point Source	2,654	33,292	742	3,598	18,921
AREA SOURCES	Domestic Heating	886	3,697	1,461	396	856
	Commercial and Institutional	137	599	41	34	504
	Misc. Transpor- tation	371	1,105	3,278	2,911	3,545
	Autos	979	594	302,676	50,196	29,717
	Non Point Misc.	3,339	5,686	2,618	1,665	3,199
	Total Area Source	5,712	11,681	311,074	55,202	37,730
TOTAL		8,366	44,973	311,816	58,800	56,651
Portion produced by all auto traffic (percent).		12	1.3	97	85	52

Table 22

EMISSIONS OF ROUTE 78 SECTION

YEAR	Tons/Year		
	CO	HC	NO _x
1976	2,400	440	660
1981	1,600	200	240
1986	1,000	100	100

References

- 1 Stern, A.C., Air Pollution, 2nd ed., 1968, Academic Pres.
- 2 Chemical Engineering, May 28, 1973. pg. 46, "Chemenator."
- 3 Motor Vehicle Emission Factors for Estimates of Highway Impact on Air Quality, California Division of Highways, April 1972
- 4 Turner, D.B. Workbook of Atmospheric Dispersion Estimates, 1970
- 5 Barad and Elliott, Operational Predictions of Diffusion Downwind from Line Sources, Air Force Survey in Geophysics, No. 156, March 1964.

Transportation

Highways

Description - The proposed section of Route 78 through the Watchung Mountains is a vital link in the transportation picture of the New York-New Jersey Metropolitan Area. See Plates 1 and 2. The principal through routes in this network within the State of New Jersey are the Garden State Parkway, New Jersey Turnpike (Interstate Route 95) and Interstate Routes 80 and 78. With the Parkway extending north-south along the eastern limits of the state and the Turnpike connecting to the south through the Camden-Philadelphia Metropolitan Area, only Routes 78 and 80 remain as the major links to and from the west through the northern half of the State of New Jersey and into Pennsylvania. Connections to the north and north-east include the Palisades Interstate Parkway, the Garden State Parkway, Route I-95 and the network of urban routes through New York City and Westchester County. The network of major interstate routes radiating from and/or crossing the core of the New York - New Jersey Metropolitan Area is connected by Route 287, a metropolitan circumferential expressway which skirts the heavily built urban area. Route 287 interchanges with Route 78 at a point about 10 miles west of this project.

West of Route 287, the metropolitan by-pass, Route 78 has been completed through New Jersey and Pennsylvania except for a gap from west of Allentown to near Phillipsburg, and Route 80 has been completed or is under construction through New Jersey and has been completed through Pennsylvania. From the I-287 by-pass to the core of the Metropolitan Area, I-80 is now complete or under construction

and only this section of I-78 remains to be completed, with the balance of I-78 to the east now under construction or in final design. See plate 2. As it can be readily visualized, the section of Route 78 treated herein is the missing link and is vital to the completion of the roadway network. It is within the densely populated region of the New York-New Jersey Metropolitan Area that the Interstate routes acquire multiple significance because of the transportation service provided and their relation to other transportation modes.

As the Interstate routes which connect major cities approach the suburban sprawl of the city, their value as through travel routes becomes more important. In the case of this section of Route 78 under consideration, the alternative for both local and through traffic is to compete for space along Route 22. The interaction between the generally faster through travel and the slower and usually weaving local travel generates an unavoidable accident potential. Because of heavy volumes on Route 22, approximately 58,000 vehicles/day, major delays and congestion are prevalent throughout the day. The delays are costly both to the private car drivers and passengers and to commercial carriers. Value of time lost and higher operating costs along Route 22 are much more significant to the heavy truck traffic and intercity bus travel.

Impact

With the construction of this missing link of Route 78, virtually all through interstate travel will be removed from Route 22. The essential separation between local and through travel will be attained and savings in time and operating costs will be

Transportation

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Impact

With the construction of this missing link of Route 78, virtually all through interstate travel will be removed from Route 22. The essential separation between local and through travel will be attained and savings in time and operating costs will be

realized. Some local travel will use the interstate route, but because of the longer distances between interchanges, and the better highway design standards of the interstate route, the local trips would assume the performance characteristics of through travel.

In general, I-78 will provide an essential link among all transportation modes. Because of its unique geographical location and its function as a link to all other modes of travel, I-78 plays an important role in the National Defense. It will provide the needed connections among major routes within the region in times of national emergency.

An improvement in air quality along Route 22 will be realized when the through traffic is diverted to Route 78. The generation of air pollutants varies linearly with the number of vehicles and will result in a significant reduction.

A secondary reduction will result from the more efficient engine operation associated with free moving traffic.

Safety - The 64,000 vehicles per day which are estimated to use the highway will benefit from the improved safety standards of an interstate highway as compared to an unlimited access land service road such as Route 22. The average highway fatalities for land service roads is about three times that of limited access freeways. On a typical 5-mile stretch this would mean a reduction from about 1.3 to 0.4 deaths per year.

The local traffic remaining on Route 22 will enjoy substantially fewer accidents because of the reduction in volume

caused by the removal of through traffic from this heavily traveled route. Removal of through traffic from Route 22, resulting in the separation of the present mix of local and through traffic movements, will also significantly lower the accident rate.

Local Roads - The local roads in the subject area carry the major east-west movement, with only minor north-south access to these arterials. Route 22 is the major east-west arterial, having an average daily traffic of 50,000 to 60,000 vehicles in this area; it is a land service facility serving both through traffic and commercial service oriented traffic. It is expected that when Route 78 is completed, an interim drop in traffic volumes will be noticed on Route 22, but that in about 20 years the traffic will increase to nearly the present day volumes. Mountain Avenue and Springfield Avenue are minor east-west land service arterials, serving mainly local traffic; both should experience minor decreases in traffic after the completion of the interstate due to removal of the commuters. The north-south movement is handled by Plainfield Avenue - Bonnie Burn Road, Diamond Hill Road, South Street - Glenside Road, and Baltusrol Road - Summit Road. Since partial interchanges will be at Diamond Hill Road - McMane Avenue - Glenside Avenue - Glenside Road, these local roads are expected to have significant traffic increases. The design of the interchange attempts to disperse traffic, as evenly as possible, to avoid overloading any one local road with traffic bound to and from Route 78.

Expected average daily traffic for design year 1975 along these roads is (both directions):

	<u>1975</u>	<u>(1972 Ave. Daily Traffic)</u>
Diamond Hill Road	- 27,200 vehicles	(14,700)
McMane Avenue	- 10,100 vehicles	(1,700)
Glenside Road	- 16,000 vehicles	(3,800)
Glenside Avenue	- 11,200 vehicles	(5,700)

The comparison of design year traffic to present volumes shows an increase for all these local roads, although the design attempts to minimize congestion at any one road. During peak hours Diamond Hill Road and Glenside Road will operate at or near capacity.

Railroad - At present, a commuter railroad line on the Erie-Lackawanna Railroad has stops at Berkeley Heights, Murray Hill, New Providence and Summit with parking facilities at each. The access provided by Route 78 to the New York Metropolitan Area could decrease patronage from the area, although there is potential to increase the usage of park-and-ride railroad service if the line can provide adequate service.

Bus - Local bus service on Route 22, Springfield, Mountain and Morris Avenues should be improved somewhat due to construction of Route 78. Along with the increase of access to the New York area provided by the highway is the potential for high-speed bus commuter service to the Newark Airport and New York City, which is not presently available or feasible. Although no specific plans have been developed as yet, express bus service using interstate highways is a proven practical approach.

Air Travel - I-78 will tie in with a major interchange connecting with other principal routes in the vicinity of Newark International Airport. This airport, one of the three principal air terminals in the region, will be directly accessible via I-78.

Employment

Description

Area Wide - The western part of Union County is close enough to the highly industrial portion of New Jersey and New York to be within commuting range of one of the nation's most important job markets. The range of employment opportunities covers the full spectrum of industrial, commercial and professional positions and, in general, pay scales are high on a national basis. This favorable employment picture makes Union County a prime residential location.

Local - The employment picture at present in the vicinity of Route 78 is not typical of an affluent suburban area since several major employers are interspersed in the residential neighborhoods. The largest employer is Bell Telephone Laboratories which presently employs approximately 4,000 people. It is located on Mountain Avenue and Glenside Road. The proposed right-of-way passes through the rear of its property but does not interfere with the company's operation. An expansion of 50% is under construction. Other major employers in the immediate vicinity of this section of Route 78 are Englehard, Inc. on Mountain Avenue, C.F. Braun Company on Mountain Avenue and Oakite on Valley Road. The above firms combined with the Regional High School represent the major traffic generators in the area. There are numerous mercantile establishments along Route 22 which account for limited employment. These businesses are typical of road side development and include service stations, retail outlets, diners, and other such service establishments.

The Township of Springfield, typical of the communities in the area, has 60% of its residents working outside Union County. Since the area is relatively affluent, it cannot supply a wide range of labor skills. Thus it is valid to conclude that the communities will continue to develop in a suburban fashion, that is, with residents commuting to jobs outside the area.

Impact

Route 78 will increase the employment opportunities for residents by expanding the area that is within reasonable commuting time. In addition, employment opportunities should increase in the area, especially in professional, managerial and commercial fields, since Route 78 will provide modest commuting time to residents of other areas, as well as easy truck access from many points. Many of the services now provided for the traveler on Route 22 will suffer, as their exposure to the traveling public will be diminished.

The campus type industrial development can be expected to increase, particularly in the vicinity of the interchange. The vacant land along Valley Road, between Diamond Hill Road and Plainfield Avenue, is already zoned for campus industry which, coupled with the completion of Route 78, presents an attractive situation for new industrial development.

Utilities

During construction of any highway project, the contractor performing the work is required to maintain utility services for all areas if the construction interferes with existing utility lines. This may require temporary services or relocation of existing lines; however, utility service is maintained as required.

Water Supply - The Commonwealth Water Company supplies water to the residents of the communities in the vicinity of this section of Interstate Route 78. One of the available sources of water is a well field located south of Glenside Avenue and west of Baltusrol Road. The field consists of three active wells, (pumped or gravity) producing about 2 million gallons daily, and five standby wells used in emergency situations.

In order to minimize the impact on the Watchung Reservation, the alignment of Route 78 was located as close as possible to the well field without infringing on any of the wells, since the wells cannot be reliably replaced with new ones drilled in the same area. Experience with wells' running dry in this field suggests that new wells may not be sufficiently productive. The highway is located downhill from the well field. Roadway drainage, therefore, will be directed away from the field toward Lake Surprise, and will have no opportunity to contaminate the aquifer.

As a result of an agreement between the New Jersey Department of Transportation and the John E. Runnells Hospital, a new water main was constructed at state expense to replace the water tank that had formerly supplied water to the hospital, and which had been cut off from the hospital buildings by Route 78. The water main is considered

an improvement because it provides a more dependable and abundant supply and it also relieves the hospital of having to maintain the water tank. In addition, several homes on Plainfield Avenue that previously used individual wells are supplied with water by this main.

Water mains that are encountered in the construction of the highway will be maintained.

Sanitary Sewers - Berkeley Heights and Mountainside maintain sanitary sewers in Baltusrol, Glenside, and Diamond Hill Roads. The Diamond Hill Road and Baltusrol Road sewers are force mains which ultimately discharge into the Joint Meeting Sewer. The highway will necessitate relocation of the above sewers which will be accomplished as part of the construction contract.

Electric and Telephone - The communities in the area of Route 78 have typical suburban distributive facilities. Electric and telephone service is supplied via conduits, pole and pipe lines by the Jersey Central Power and Light Company, New Jersey Bell Telephone Company, and Western Union Telegraph Company.

Users will experience no effects on electric and telephone services caused by the highway, as all utilities will function during and after construction. Whereas some transmission lines will have to be replaced, others will require only protection during construction.

Gas - Gas is supplied to the area by mains which are maintained by the Public Service Electric and Gas Company.

The highway will have no effect on gas service, since any mains that will be disturbed will be replaced or reconnected.

Solid Waste Disposal - Plans exist for the construction of a high temperature incinerator in Linden, New Jersey, and for compaction stations in various municipalities. Trucks will be used to transport the garbage to the stations, and then to the incinerator in Linden in southeastern Union County.

At present, disposal facilities are remote from Route 78 and will not be affected. The highway will have a favorable impact on disposal when the high temperature incinerator and compaction stations are constructed, since Route 78 can be used as a collector road for the large trucks hauling compacted garbage thus avoiding the use of local town streets and reducing the cost of disposal.

Construction of the proposed highway will result in the clearing of many trees and brush along the route. Construction operations also generate moderate amounts of rubble in the shape of old wood forms, leftover concrete, and other wastes. The N.J. Air Pollution Control Code prohibits open burning after January 1, 1973, making it necessary for the Contractor, whose responsibility it is, to dispose of much of the rubble, shredded trees and brush off the site. The masonry rubble could be used in the formation of relatively high embankments by placing it in the bottom layers of the embankment. Wood chips could be used for slope protection and some could probably be sold.

Storm Sewers - The storm drainage in the vicinity of the highway consists of cross culverts and highway drains under Glenside Avenue, directing flow into water courses leading to Blue Brook and Lake

Surprise, and a storm drain in Diamond Hill Road ultimately discharging into Green Brook. Between Diamond Hill Road and the Hospital the drainage flows by natural water courses into the brook. Special drainage design for energy dissipation will be considered to reduce the velocity of water entering Green Brook in the Diamond Hill Road vicinity.

Construction of Route 78 from Diamond Hill Road to the eastern end of the Reservation entails discharging the runoff from both the highway and upland areas into sedimentation basins, which in turn outlet into Lake Surprise and Blue Brook. These basins (see Plate 5) are located in the natural water courses. At Diamond Hill Road a portion of the highway drainage is piped into the existing storm sewer. From the vicinity of Diamond Hill Road to the Hospital, the highway drainage is discharged into the natural water courses which in turn outlet into Green Brook.

Construction

The principal effects on the surroundings will be in the areas of hauling materials to the site, blasting, noise, and traffic disruption.

The hauling of materials, including earth, concrete, steel, pavement materials and pipes will introduce a substantial number of trucks on the local roads during limited periods of the construction phase. This trucking will be subject to all municipal as well as Federal regulations and permits in effect at the time. Approximately 150,000 cubic yards of earth must be obtained from borrow pits and trucked to the site. The location of the borrow pit is to be determined by the contractor. The contractor, as part of this project, must maintain and restore the borrow pit to a condition that is satisfactory to the owner and must obey all local regulations pertaining to his excavation.

Blasting of rock will be required along the slope of the Second Watchung Mountain, in the vicinity of the Bell Telephone Laboratories micro-wave tower. Provisions will be made to protect the micro-wave equipment including the coordination of the blasting operation by a Bell Telephone Laboratories engineer.

The Union County Park Commission will be notified of blasting operations as far in advance as possible for the protection of equestrians and other park users.

During the working hours there will be intermittently high noise levels in the immediate vicinity due to blasting and other major earthmoving operations.

The bridle paths will be maintained in operation throughout the construction period.

The increased noise at the Hospital will be mitigated by the highway's already being constructed about half-way across the property, thus reducing the amount of work near the buildings.

The residential areas near the project will be adversely affected by the construction noise, however, this condition will occur only during working hours.

Traffic movements on local roads will be maintained throughout the construction period by using temporary roads where required. Minor inconveniences are expected when temporary roads are utilized.

IV. PROBABLE IMPACT ON SPECIFIC AREAS

Watchung Reservation (See Plates 3,5,9,10 & 11)

Description

The Watchung Reservation is an outstanding recreational resource, the largest of Union County's many parks. Its 1,811 wooded acres straddle the First and Second Watchung Mountains and include the valley between them. More than a million people a year enjoy the Reservation's natural beauty, making use of its scenic roads, footpaths, picnic areas, bridle trails, observation tower, ponds, lakes and historical setting. The center of earliest activity in the Reservation is the site preserved today as Deserted Village, which contains the ruins and cemeteries from Revolutionary War days. The Trailside Nature and Science Center has a full program of nature study and recreation, using the Reservation as a field laboratory with various specimens of animal and plant life.

Park Features - a ten-acre nursery containing thousands of labeled trees and shrubs is maintained, as well as teaching trails, and a quarter-mile Nature Trail which contains a large variety of trees, including cedars, dogwood, black birch, sassafras, red maple, red and white pine, gray birch, shrubs, ferns, flowers and mosses. Other horticultural features include a 250-year-old stand of hemlocks, asiatic chestnut trees, old black, red and white oaks, and a fine stand of American beech trees growing under undisturbed natural conditions. An old chestnut oak measuring 51 inches in diameter is thought to be the largest tree in girth in the area.

There are rhododendron, herb, and fern gardens, the latter comprising as many species and varieties of native and exotic ferns as can be grown here.

The Reservation features an extensive array of horseback riding activity including instruction and boarding. The stables and ring are located in the northeast corner of the park. Bridle paths radiate from the stables to nearly all parts of the Reservation.

Lake Surprise - A major focal point in the Reservation is Lake Surprise, which was formed by damming up Blue Brook before the Civil War. In the past the lake was used for swimming and boating as well as fishing; however, the water quality is now too poor to permit swimming and the boat facilities have been abandoned. The lake has silted over the years to the extent that it is only about six feet deep in the center and, for a large distance from the shore, is shallow enough to sustain bottom-rooted aquatic plants. Lake Surprise exhibits the characteristics equated with eutrophic ponds. At present, the lake is used for fishing and as a pleasant setting for walking and riding along its shore.

Impact

Route 78 will pass along the northerly side of Glenside Avenue crossing the northeasterly corner of the Reservation towards Baltusrol Road. The part of the Reservation to the north of Glenside Avenue which is already separated from the main body of the park, will be even more isolated after the construction of Route

78. An underpass at the Nike Site Road is planned in order to provide access to the remaining parcel of the Reservation land at the easterly end of the Regional High School.

The Route 78 right-of-way requires 116 acres of Watchung Reservation land and leaves approximately 130 acres on the north side of the highway and Glenside Avenue separated from the remainder of the park. The northerly acres have not been developed, in part due to their steepness and to the natural boundary line formed by Glenside Avenue.

An observation tower, planned to be located on park land west of the school, will no longer be feasible after construction of Route 78, because the land will be acquired for the highway project.

The alignment passes to the south of the stables, thus isolating them from the rest of the Reservation and from the bridle paths. Relocating the stables to a location within the main body of the Reservation will be necessary because an underpass crossing Route 78 was ruled out as unacceptable for use by equestrians.

Route 78 will fill most of the marsh at the head of Lake Surprise, which is the only marsh in the Reservation. Several plant and animal communities will thereby be displaced.

Since the siltation of Lake Surprise has been a matter of concern for some time, extensive drainage studies were undertaken on the part of the N.J.D.O.T. and the Union County Park Commission.

A scheme was developed and agreed upon to protect the lake from siltation due to the highway. The method involves discharging all the highway cross culverts into sedimentation basins which will be constructed in the natural water courses between Route 78 and Lake

Surprise. (see Plate 5.) These basins will be constructed prior to the highway and maintained indefinitely by the N.J.D.O .T., and are expected to provide adequate protection for Lake Surprise and Blue Brook from silt.

For quantitative assessment of the factors affecting water quality, see the section entitled Water Quality.

NOISE:

As previously noted in the section entitled Noise, ambient noise level measurements were made at four locations within Watchung Reservation, the results of which are presented in the section entitled Noise. The noise environment varies significantly between day and night and to a lesser extent between the measurement sites. The day time average L_{10} noise level is approximately 55dBA while the night-time average is approximately 45dBA. The variance between sites ranges between a daily average of about 55dBA at Lake Surprise to about 50dBA near Cataract Hollow Rd. All the sites that were monitored had higher noise levels in the afternoon than in the morning, the difference being typically 7 dBA. The observed variation of L_{10} noise levels is due primarily to the changes in traffic on Glenside Avenue, and affects most of the utilized portions of the Reservation.

The predicted noise levels in Watchung Reservation are tabulated and depicted graphically in the Noise section of the report. Of the areas of the Reservation adjacent to the highway, Lake Surprise is the least severely impacted. This is due in part to the topography, the highway being about 80' higher than the lake, and to the fact that the existing noise environment is the highest recorded in the park. The predicted L_{10} level of 70.3dBA with present day trucks

and no abatement measures incorporated would be as great an increase over the measured L_{10} of 60.5dBA as occurs elsewhere along the R.O.W. in the park. This increase of 10dBA while being noticeable would not impair the recreational value of the lake. With the introduction of a noise shield, and even more, in the future, when truck noise will be restricted by law, the predicted L_{10} will be only slightly higher than the ambient condition and well below the D.O.T. design criteria.

At Cataract Hollow Road the predicted L_{10} would be about 68dBA 800' from Glenside Avenue as compared to the ambient condition of about 52dBA in the same area. The difference represents a significant increase in noise and will intrude on the solitude of this portion of the park. However, with a noise shield constructed along the highway, and more, with the future quieter trucks, the predicted noise level at this location will be reduced to the point where increase over the ambient condition will be noticeable but not obtrusive. The predicted noise levels would exceed the D.O.T. design guide of 70dBA up to approximately 400' from Glenside Avenue with no noise shield, and with present day trucks. With the introduction of a noise shield, the D.O.T. standard will not be exceeded outside of the Route 78 right-of-way. For the future condition of quieter trucks, the predicted L_{10} will be well below 65dBA in the Reservation which is significantly less than the D.O.T. standard.

The present stables area will experience L_{10} noise levels up to about 76dBA, although with future quieter trucks the level would drop to approximately 67dBA. This represents a major increase over the ambient L_{10} of 55dBA measured in the afternoon; however, the effect on the usefulness of this portion of the Reservation is not possible to assess since the stables are planned to be relocated.

In general, the noise impact on the function of the Watchung Reservation is seen to be primarily restricted to those facilities near Glenside Avenue which include Lake Surprise, the Boy Scout Cabins, the Girl Scout Cabins and the stable area, although there will be some increase in noise levels throughout the park. Also, the advent of effective control of truck noise emissions will reduce the overall impact on the Reservation to a point well within the D.O.T. guide lines for park use. Noise shielding will provide a reduction in noise impact which is particularly important in the interim before quieter trucks become a reality.

AIR:

The air pollution for the Watchung area is detailed in the Air Pollution section of this report. It is expected that EPA primary and secondary standards will not be exceeded for most of the year. In the unusual case of a 'tight' inversion for one day prior to 1981, the 8 hour carbon monoxide standard would be only marginally exceeded throughout the valley. The air pollution generated by the highway will not adversely affect the utility of the Reservation as regards recreational activity.

The completion of Route 78 will provide convenient access to the Reservation from the densely populated metropolitan area, therefore, weekend use of the park can be expected to increase. Any additional housing development likely to result from this project may also increase usage of the Reservation.

A memorandum of understanding between the Union County Park

Commission and the New Jersey Department of Transportation, which is included as Appendix 3, has been executed. This document establishes an agreed-upon alignment and interchange layout through the park, as well as the steps the N.J.D.O.T. will take to protect the Watchung Reservation and compensate the U.C.P.C. for the right-of-way.

Housing

(See Plates 3, 9, 10, 11 & 12)

Because the status of this project is so advanced, the houses that were required to be taken for the right-of-way have all been acquired. Therefore, there are no people to be relocated, hence, no placement housing is needed.

Mountainside - The Borough of Mountainside housing in the vicinity of Route 78 is primarily located between the Watchung Reservation and Route 22, on the southerly slope of the First Watchung Mountain. These homes will be shielded from traffic noise and the visual intrusion of Route 78 by the mountain, and will therefore experience virtually no adverse impact. The homes in the Sylvan Avenue area are on the northerly slope of the First Watchung Mountain and therefore overlook Route 78 across the valley. (See Plate 3.) During the Spring, Summer and Fall, the highway will be visually screened, however, during the winter when the leaves are off the trees, the highway will be visible. These homes will experience higher ambient noise levels which is an adverse impact although the noise will be substantially below the D.O.T. standard. Air quality will not exceed EPA standards except during a period of 'tight' inversion where the entire valley will be affected.

Springfield - The easterly end of this section of Route 78 touches the Township of Springfield on the northwesterly corner of the Town, near Summit Rd., where a single family subdivision has been developed adjacent to and on the southside of the right-of-way. The highway

crosses over Summit Rd. and continues on a fill past the subdivision, except for a short length of depressed section. Both the fills and depressed section are in general only a few feet above or below existing grade. The homes in this area were constructed after Route 78 had reached an advanced planning stage and was a matter of public knowledge. The topography of the development features a hillside sloping up from the highway.

The impact of the highway on this development will be primarily in the matter of noise and visual intrusion with particular emphasis on noise. The present ambient noise level for those homes along Summit Rd. exceeds D.O.T. standard (70dBA). The Route 78-generated noise at these homes is about the same level without mitigating measures and will be less than present levels with a noise screen along the highway. Therefore, since the traffic on Summit Road will be the dominating traffic noise, the homes along Summit will not experience a very significant noise impact. However, the highway, which will be on a relatively high fill where it crosses over Summit Rd., will cause these homes a significant visual impact.

The homes that are located back from Summit Rd. have at present a much quieter environment, a 53dBA (L_{10}) day time average versus 72 dBA along Summit Rd. These homes will experience a major noise impact, even with the noise screen; those closest to the highway will have noise levels in excess of the D.O.T. standard. The noise level throughout the subdivision will be higher than at present, thereby affecting the tranquility of the neighborhood. Most of the homes will be screened by vegetation; however, during the winter, the highway will be visible to many.

The air pollution generated by Route 78 is predicted to exceed the 8 hour EPA standard for carbon monoxide at the dwellings immediately adjacent to the right-of-way. This will affect approximately 9 homes in 1976 and about 5 homes by 1981. During the unusual cases of a tight inversion, the entire valley will be affected by carbon monoxide exceeding EPA standards.

Summit - The principal residential area in the City of Summit is located on the westerly side of Baltusrol Rd., adjacent to the right-of-way. This is a recent subdivision, having been constructed after Route 78 was in advanced design and the proposed alignment a matter of public record. In fact, some homes were started in the designated right-of-way which was subsequently acquired by the State of New Jersey and the construction removed.

In the vicinity of this development, Route 78 will be on a relatively high fill, caused by having to cross over Summit Rd. (Baltusrol Rd.) and by the flat terrain.

The highway embankment will cause a visual impact to a large part of the neighborhood, however, the most severe impact will be increased noise for those homes remote from Baltusrol Rd.

These homes have a present noise level (L_{10}) in the mid-50dBA range whereas with a noise screen, the level will increase to about 66dBA. Without a noise screen, the noise level would be between 74dBA and 78dBA.

Along Baltusrol Rd. the existing ambient L_{10} noise level is 70dBA while the highway-generated noise with a noise screen will be about 70dBA near the R.O.W., diminishing with distance from

Route 78. Without a noise screen, the predicted noise would be 79.5dBA at the right-of-way. Similar to the situation described for the Springfield homes along Summit Rd. (Baltusrol Rd.), the addition of the highway noise to the measured present noise level will not be a significant impact.

The air quality in this neighborhood will exceed 8 hr. E.P.A. standards for carbon monoxide occasionally up to 200' from the right-of-way. Approximately 16 homes are affected in 1976. The magnitude of this impact will diminish with time as vehicular emissions improve.

The rest of the housing along the Interstate Highway in Summit is located between Mountain Avenue and the ridge of the Second Watchung Mountain. This area has been established for many years and the houses are large and varied in design. The highway will be screened from view by the dense growth of trees and shrubs, however, the highway will be visible from the houses along the ridge when the leaves are off the trees. The highway will be audible at the houses on the ridge, although they are approximately 170 ft. above the road and the noise level will be far below D.O.T. standards. The majority of dwellings in the area are on the north slope of the mountain and will therefore be virtually unaffected by the presence of Route 78.

Berkeley Heights - The homes directly affected by Route 78 in the Township of Berkeley Heights are in three areas: 1) In the vicinity of Roland Way, off Glenside Road; 2) The Ridge Drive area; and 3) Diamond Hill Road south of Route 78.

The homes in the Roland Way area are located along the ridge of the Second Watchung Mountain and are about 60 feet above the highway, therefore only those homes closest to Route 78 will experience a significant visual impact. With an increase in traffic on Glenside Rd., the disturbance associated with the increase will be restricted principally to the adjacent homes. The noise impact on the homes nearest the right-of-way is predicted to exceed D.O.T. standards (70dBA) with or without a noise screen, although the noise screen does reduce highway noise marginally. The present ambient noise level is about 50dBA, therefore the highway causes a major increase which will have an adverse effect on the peaceful residential quality of the neighborhood.

The air quality in this area will not exceed EPA standards outside the right-of-way except during the unusual periods of a 'tight' inversion when air quality in the entire valley will exceed standards.

The residential area at Ridge Drive is located about 100' above Route 78 and except for the homes closest to the right-of-way will not experience a severe visual impact. The present noise level (L_{10}) is typically 47dBA except for late afternoon when nearby Diamond Hill Rd. traffic causes a peak 54dBA. This can be characterized as a very quiet residential area. The Route 78 traffic noise with noise screen installed is predicted to be as high as 74dBA at the nearest house to about 65dBA near McMane Avenue. This represents a very large increase, with the homes nearest the high-

way being exposed to noise levels in excess of D.O.T. standards. A change of the above magnitude alters the character of neighborhood.

The air quality in this residential area will be adversely affected shortly after Route 78 is opened, however, by 1981 there will be no adverse impact. In 1976, the 8 hour EPA carbon monoxide standards will be exceeded approximately 200' from the right-of-way which affects about 5 homes. By 1981, the EPA standards will not be exceeded outside the highway right-of-way.

On either side of Diamond Hill Rd. (south), residences will be subjected to visual impact due to the interchange and to a modest noise impact. The present ambient (L_{10}) noise levels vary from 71dBA along Diamond Hill Rd. to about 60dBA at the farthest residences. With a noise screen, Route 78 will generate L_{10} noise ranging from 67dBA near the right-of-way to about 61dBA in the middle of the development. This will not cause a noticeable increase in the L_{10} noise level and therefore Route 78 will not have significant noise impact on this neighborhood.

Without a noise screen, the predicted L_{10} noise would vary from 79dBA near the right-of-way to 70dBA about 800' from the roadway. This would cause about 35 dwellings to be exposed to noise levels in excess of D.O.T. standards and those away from Diamond Hill to significantly higher levels than at present.

On occasion the EPA 8 hour carbon monoxide standard will be exceeded up to 150' from the right-of-way. This will affect about

10 dwellings. The magnitude of this impact will diminish with time as vehicle emissions improve.

There are two residences on Ghost Pony Rd. which are close to the right-of-way. The highway is close to grade in the vicinity of these homes and will therefore have a significant visual and noise impact. The predicted noise levels with a 15' noise screen are within D.O.T. standards although that is a major increase over the present quiet of about 45dBA. The noise screen will also become a visual barrier for these residences; however, proper architectural treatment along with the decrease in noise level should minimize this impact. The construction of Route 78 will have the most severe impact on these two homes in that their present remoteness will be totally destroyed.

Air quality will not exceed EPA standards outside the right-of-way at this location except during those rare times when a 'tight' inversion exists and the entire valley will be affected.

Community

Description

New Jersey, the fourth smallest state in land area, is the eighth largest in population. It is the most urban state, with approximately 86% of the state's population living in urbanized municipalities of more than 25,000 persons, the highest percentage in any state.

Union County's population in the 1970 census was 543,116 and is contained in an area of 103.4 square miles. Although it is the second smallest county in New Jersey in land area, it is the third most populous. Extending from New York harbor to 30 miles westward, the county lies within the so-called "inner ring" of the New York metropolitan area. Since population growth tends to follow transportation access, the population density of the county becomes smaller as one proceeds westward.

General Area (see Plate 6&7)-The character of the communities in which the project is located, namely Berkeley Heights, Mountainside, Summit and Springfield can be described as suburban, with a sprinkling of campus-type industry. The four communities have grown dramatically in recent years, mainly from in-migration. The housing is primarily single family dwellings on quarter to half acre lots, ranging in value from moderate to relatively high cost. Pleasant surroundings and good access to suburban and urban services make the area a prime target for continued in-migration.

One of the most appealing features of the western part of

Union County is the public recreational facilities, of which Watchung Reservation is an outstanding example. It is estimated to be used by over 1 million people annually. Its large tracts of undeveloped lands are a focal point in terms of recreation and beauty for surrounding communities. There are several other large parks in Union County, two of which have golf courses, that round out the recreational facilities. Other principal parks, of 50 acres or more, in Union County include:

Ash Brook Reservation
& Golf Course
Briant Park
Cedar Brook Park
Echo Lake Park
Elizabeth River Park
Galloping Hill Park
& Golf Course

Green Brook Park
Lenape Park
Milton Lake Park
Passaic River Park
Rahway River
Parkway
Nomahegan Park
Warinanco Park

Planning - The Master Plans of Berkeley Heights, Mountainside, Springfield, and Summit were developed after Route 78 was proposed and the public hearing held in 1958, and thus include the interstate as an integral part of their planning process. For Berkeley Heights and Springfield, these plans consider the alignment of Route 78 to be a positive benefit to their traffic situation in that through traffic will be removed from local streets. The Master Plan of Summit considers the location of Route 78 "ideal". The Master Plan of Mountainside recognizes that the interstate will relieve Route 22 of through traffic, but only slightly reduce commuter traffic generated from the heavily populated area to the south; hence a large effect on the Route 22 situation is not anticipated in Mountainside.

The section of highway passes through an area in Berkeley Heights zoned for 20 acre campus-type industrial development, which also permits single family dwellings on 10,000-square foot lots. In Summit, the land near the freeway is zoned for 25,000, 15,000, 10,000 and 6,000-square foot lots for single family dwellings. In Springfield, the zoning is 22,000-square foot lots for single family dwellings. There is still available space in Berkeley Heights for more single family residential developments on the northerly slope of the Second Watchung Mountain and for additional industrial development along Valley Road. Although Summit and Mountainside have little available land near the highway for further building, Springfield contains a considerable area of undeveloped land on both sides of the highway between Baltusrol Road and Shunpike Road. At present the land to the north of Route 78 is in the process of being acquired by the Union County Park Commission to create the proposed Hidden Valley Park sometime during 1973. This park will be contiguous to Watchung Reservation and Briant Park, and will be part of the Union County Park Commission system.

Impact

The alignment of Route 78 closely follows municipal boundaries, and consequently will not represent a barrier dividing any community; in fact, all of the local streets are continued across the freeway so that no disruption of local movements, such as fire, ambulance, and police services will result.

The highway will remove much of the traffic generated by Bell Telephone Labs and other employers in the vicinity from the local streets, thereby improving the flow of traffic. This improvement may be partially offset by the traffic generated by future increased development. Route 78 will serve to speed fire apparatus from nearby towns in the event of a major fire, which is a beneficial impact of the highway. Additionally, the highway will increase mobility for police and ambulance services. Glenside Road and Diamond Hill Road will experience an increase in traffic after construction of the freeway because they will become the primary connections with Route 78.

The highway will be disruptive to those dwellings adjacent to the right-of-way in the vicinity of Baltusrol Road and Diamond Hill Road. However, the highly developed residential area on the north slope of the Second Watchung Mountain will be spared most of the noise and view associated with the freeway. The dwellings near the ridge will experience more noise from the highway than those on the north slope.

Because most of the right-of-way for the subject section of Route 78 is through public land, i.e., John E. Runnells Hospital and Watchung Reservation, the effect of the highway on the tax base of the municipalities is slight. The private land required for the right-of-way has already been acquired or condemned and, therefore, has established its impact on the municipalities. Mountainside and Summit list no ratables because the highway takes only public land within their boundaries. Berkeley Heights suffered the most from

the loss of undeveloped land because of the relatively long length of road and the interchange being located within its limits. When viewed in relation to the overall size and degree of development of Berkeley Heights, the removal of undeveloped taxable land required by Route 78 had only a minor impact on the tax base. The land acquired for the highway would have been difficult to develop due to topography. The long-term impact of the Interstate on the local tax picture may well be beneficial, due to new industrial development which will inevitably be attracted by the highway.

Future Development - It is an observed fact that increased housing, commercial and industrial development can occur following the construction of a major arterial highway. The clear dependence of development on travel time to the central core of a city is applicable here. Route 78 will provide fast, safe access to the New York metropolitan area, which will increase the rate of residential development. Since the original route studies prior to the public hearing, large areas have been built up. With the construction of Route 78, the remaining open land can be expected to develop rapidly.

Travel time to New York, a major factor in a commuter's choice of a place to live, must be within generally acceptable limits. When Route 78 reduces the travel time to New York and Newark, the area will be within commuting range of a great many more employment opportunities. Development will be particularly spurred in the vicinity of interchanges. This section of Route 78 has an interchange at Diamond Hill Road, McMane Avenue and Glenside Road, which is in the area zoned for 20-acre campus industrial use along Valley

tance. (See Plate 3.) This work was finished in September 1967 in anticipation of the construction of this section of Route 78.

The freeway has separated roadways through the hospital property, the westbound being 30 ft. above the eastbound. The eastbound roadway is approximately 75 ft. north of the nearest hospital building, which is a frame structure used for office purposes. The buildings used for housing patients range between 300 ft. and 900 ft. from the eastbound roadway.

The buildings that house patients are generally two or three story concrete constructions, with air-conditioning.

The impact of bisecting the hospital property is mitigated because future development on the steep sloped northerly area for hospital buildings would be difficult at best, therefore its separation from the remainder of the property will not seriously limit future expansion of the facility's capacity. Access to the northerly segment of the property on the ridge of the mountain is from Horseshoe Road. The open land belonging to the hospital between the present buildings and Valley Road is the gently sloping valley floor and, therefore, quite suitable for building construction.

Condemnation has been concluded and a final settlement has been awarded the hospital for the right-of-way taken and damages to the remainder of the property.

A water main was constructed at state expense to replace a water tank which formerly supplied water to the hospital, and which was cut off from the hospital buildings by Route 78. This water main is considered an improvement since it supplies a more dependable and abundant supply as well as relieving the hospital of having to maintain the water tank.

NOISE:

The ambient noise level at the John E. Runnells Hospital is typical of the many residential areas in the region and is eminently satisfactory for the hospital's operation. Average daytime noise levels range from 48dBA to 56dBA, with peak noise levels slightly higher due to traffic on Plainfield Avenue.

At night, the average noise levels are about 40dBA; assuming a 10dBA reduction for the effect of an open window on interior noise levels, the noise levels are around 30dBA which is far below the sleep interference threshold.

The predicted noise level of the highway-generated traffic would range from 66dBA to 78dBA on hospital property without a noise barrier. The D.O.T. design standards would be exceeded in that part of the property within 600 feet of the roadway, including most of the hospital buildings. However, the installation of noise screens will be particularly effective, moving the 70dBA zone to the right-of-way. The average noise levels would range from 55dBA to 59dBA, an increase from the existing noise situation of only 4dBA to 8dBA. Thus, only minor impact is expected due to the noise from Route 78 traffic.

AIR:

The impact of Route 78 on air pollution, as computed in the section of this report so entitled, indicates that although the 8 hour carbon monoxide EPA standard will be marginally exceeded in 1976, this extends less than 150 feet from the right-of-way of the roadway, encompassing no buildings on the hospital grounds that are active facilities. By 1981, no part of the hospital property will exceed standards.

Glenside Road because it will function as a direct connection to Route 78. This additional traffic will be superimposed on the present patterns. The school bound traffic will have to turn across the increased volume, as was previously noted. In addition, there is concern that traffic exiting from Route 78 onto Glenside Road will exceed the 30 mph safe-operating speed, thereby creating a potentially dangerous situation for school bound vehicles. To mitigate this situation, the N.J.D.O.T. is studying means to improve the sight distance at the intersection as part of this project.

Suggestions for alternate school approach routes have included: an overpass to Watchung Boulevard from Glenside Road at the Route 78 exit ramp; rerouting school buses along Glenside Avenue to the Nike Site Road underpass; and improving the vertical alignment of Murray Hill Boulevard. The improvement of Murray Hill Boulevard has been advanced as the most feasible inasmuch as the cost would be comparatively low and the residual capacity of the street is high. The Nike Site route would be an emergency access to the school and would be available for use at any time.

An overpass at the old Nike Site Road will be provided in the project in order to provide that additional access to the school be available. It is intended that this be a major route for school buses as well as emergency vehicles. Use of the Nike Site Road by school buses will, to a large extent, mitigate the Glenside Road access problem caused by the expected increased traffic. The Board of Education has a perpetual easement for the Road, thus insuring its continuing and uninterrupted use once the Route 78 overpass is constructed.

Noise

The ambient noise levels measured at the high school are presented in the section of this report entitled Noise, indicating that the existing noise environment is entirely compatible with school use. In fact, the school activity is the primary source of noise. The predicted noise levels, also presented in the noted section, indicate that at the southwesterly corner of the building, the noise generated by Route 78 would exceed the 70 dBA D.O.T. design guide. This situation will not be alleviated by a noise shield located at the top of the cut slope since such a shield provides only a marginal attenuation of the highway noise. The profile of the proposed highway cannot be lowered in order to mitigate the noise due to the proximity of the Glenside Road overpass. However, in the future, when quieter trucks replace the present noisy ones, the L_{10} level at the corner of the building will drop below the D.O.T. criteria.

Only the southwesterly corner of the high school building and the adjacent part of the parking lot will experience noise in excess of 70 dBA; the remainder of the building and grounds are below that level.

There is no feasible screening that will reduce the L_{10} noise level at this corner of the building to below 70 dBA, although with the windows closed, the 25 dBA attenuation due to the masonry building with single glazing will result in an interior noise level substantially below the D.O.T. criteria of 55 dBA. It must be borne in mind that the predicted L_{10} noise levels were computed for the peak traffic condition which does not coincide with school hours. The morning peak is expected to end by 8:00 a.m. to 8:30 a.m., therefore

when school is in session, the traffic on Route 78 will be considerably less than that used in the computation. The actual L_{10} noise level at the corner of the building will be several dBA below the computed values, and within the D.O.T. standard when school is in use. During the afternoon peak traffic, the school will normally not be in session and therefore not be affected by highway noise. The southwesterly corner of the high school building comprises a new wing which is intended as a band room, a room currently used for band instruction, and a metal working shop on the first floor. On the second floor, there is a drama classroom.

There is an auxiliary building in the rear parking lot which contains classrooms which will also be exposed to L_{10} noise levels in excess of standards.

The playing fields will have L_{10} noise of about 65dBA or less, however, during school hours the L_{50} of 55dBA or average noise level is more applicable. This compares closely with the recorded ambient L_{50} noise level of 54dBA. It can be concluded that the function of the high school will not be impaired by Route 78 noise and that with the exception of the southwest corner of the building and the adjacent parking lot, the school building and grounds will experience noise levels only slightly higher than at present.

Air

Computations indicate that EPA primary and secondary standards will not be exceeded for any pollutant at the regional high school.

Aesthetics

Description

The design of Route 78 is intended to provide the most attractive highway possible, consistent with the terrain through which it passes. The project includes such features as separated roadways with different profiles to best fit the mountain slope, a wide median which will be landscaped, and the right-of-way outside and beyond the highway prism landscaped in conformity to the surroundings. Measures will be incorporated in the landscaping and architectural treatment of structures to make the highway blend into the surroundings and to make the structures as attractive as possible.

Impact

The highway will not be visible from most of the Watchung Reservation during the summer and early fall, the period of maximum park usage. During the winter months, since the trees are almost entirely deciduous, the highway will be visible from a large part of the Reservation.

The residential areas along the route will have an aesthetically displeasing view of the highway throughout the year. The highway will be in view of some dwellings along the ridge of the Second Watchung Mountain and on the opposite slope during the winter months. Although the highway traverses the Hospital property within about 300 feet of the buildings, the major portion of the highway will be screened by relatively dense growth during the warm months when the patients would be out of doors.

The motorist traveling along Route 78 will encounter a view both beautiful and unique. The Watchung Reservation will provide an uninterrupted vista of wooded hills which will be a pleasant relief from the flat, highly urbanized area to the east. This section of Route 78 is planned to be one of the most attractive highways in New Jersey from the motorist's point of view.

V. PROBABLE UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Watchung Reservation

Route 78 will have significant unavoidable adverse effects upon the Watchung Reservation. The right-of-way will remove 116 acres of woods, marsh and vegetation. In addition, 130 acres, separated at present from the main body of the Reservation by Glenside Avenue, will be more isolated by the construction of Route 78. The stables will have to be relocated, with an attendant decrease in length of bridle paths. A proposal to build an observation tower on the Second Watchung Mountain will be cancelled because the land will be acquired for the highway project.

In general, the noise impact on the function of the Watchung Reservation is primarily restricted to those facilities near Glenside Avenue, including Lake Surprise, the Boy Scout Cabins, the Girl Scout Cabins and the stable area, although there will be some increase in noise levels throughout the park.

It is expected that EPA primary and secondary air pollution standards will not be exceeded for most of the year, except in the unusual case of a "tight" inversion.

Changes in quality of runoff that flows into Lake Surprise may increase eutrophication and reduce present forms of marine life due to the introduction of organic material, salt and heavy metals from the highway.

Thus, the character of the part of the Watchung Reservation near Route 78, especially as an area of quiet retreat, will be changed.

Housing

In the Borough of Mountainside, there are no residences which experience noise levels greater than D.O.T. standards. Air quality will not exceed EPA standards except during a period of a "tight" inversion when the entire valley will be affected.

In the Township of Springfield, the Route 78-generated noise is about the same level as that generated on Summit Road for those residences close to Summit Road, while those further away from Summit Road will experience a greater impact. The air pollution generated by Route 78 is predicted to exceed the 8-hour EPA standard for carbon monoxide for about 9 homes in 1976 and 5 homes in 1981. During the unusual case of a "tight" inversion, standards will generally be exceeded over the entire valley.

In the City of Summit, the residential area near Baltusrol Road will experience severe noise impacts for the area farthest from Baltusrol Road, with a lesser impact for those closer. The air quality in this neighborhood will exceed the EPA standard for carbon monoxide in 1976 affecting about 16 homes, although the magnitude of this impact will diminish with time as vehicular emissions improve. The rest of the housing in Summit will be virtually unaffected by the presence of Route 78.

The homes directly affected by Route 78 in the Township of Berkeley Heights are in three areas. In the vicinity of Roland Way, the homes nearest the right-of-way will experience a noise impact exceeding DOT standards. Near Ridge Drive, a similar noise impact is expected. For those areas, EPA primary and secondary standards for air quality will not be exceeded after 1981 except in the

unusual case of a 'tight' inversion. The residences at Diamond Hill Road will be subjected to a modest noise impact due to the relatively high ambient noise levels. On occasion, the EPA eight-hour carbon monoxide standard will be exceeded, affecting about 10 dwellings; the magnitude of this impact will diminish as vehicular emissions improve.

The two residences on Ghost Pony Road will have noise levels within DOT standards with the installation of a noise screen. Air quality will not exceed EPA standards except during a tight inversion. The most severe impact on these two homes is the loss of their present remoteness.

John E. Runnells Hospital

The noise generated by Route 78 traffic will not exceed DOT standards with the installation of a noise barrier; for the most part, there will be only a minor impact on noise levels.

It is expected that by 1981, no part of the hospital property will exceed EPA primary and secondary standards for most of the year, except in the unusual case of a 'tight' inversion.

Governor Livingston Regional High School

Route 78 will take about 60 parking spaces from the school property for right-of-way purposes. Increased traffic on Glenside Avenue due to Route 78 may prompt the revision of bus routes, although none will be interrupted because of the alignment of the highway.

The southwesterly corner of the high school building and the adjacent part of the parking lot will experience noise levels in excess of the 70 dBA design standard, while the remainder of the building and grounds are below that level.

EPA primary and secondary standards will not be exceeded for any pollutant at the regional high school.

VI. ALTERNATIVES

The alternative to constructing Route 78 on a newly acquired right-of-way was to rehabilitate Route 22. This was studied at the outset of the interstate program and was rejected.

Three other principal alternatives have been considered with respect to the alignment for the route through this area. These included: an alignment along the north side of the Second Watchung Mountain; an alignment along the north side of the Second Watchung, and crossing to the south side near Diamond Hill Road; and, the possibility of not constructing the route through this area at all. In addition, alternatives to the present alignment within its corridor were considered.

Rehabilitation of Route 22 (See plate 2)

General

Since U.S. Route 22 presently carries almost all the through traffic which will eventually use the proposed interstate route, the obvious first consideration for an interstate route was the rehabilitation of existing Route 22 to provide for the separation of the through travel from the local trips, taking advantage of the existing right-of-way. This alternative was studied in detail and estimates of cost were prepared comparing the alternative with the present alignment. The decision was made to construct Route 78 on a new alignment, therefore, rehabilitating Route 22 is not an alternative at this time, but is of historical significance.

western end of the Watchung Reservation in the Township of Scotch Plains.

By far, the most serious impact on the environment would have been the major disruption and dislocation of the highly developed business, industrial and residential property adjacent to Route 22. The additional right-of-way which was to be acquired would have eliminated entirely all businesses and other establishments along a side of Route 22 throughout its 42-mile length.

Experience with similar designs has proven that traffic which is ordinarily served by the local service roads (in this case Route 22) would use the Interstate roadways for short distances. Thus, Rt. 78 would have carried traffic which otherwise belonged to Route 22. This would have placed a burden on the interstate route, a facility designed for an entirely different type of traffic. The interaction between local and long distance travel, with its attendant speed differentials and the increased weaving and merging movements, would have imposed an unnecessary accident potential.

The problem of rehabilitating Route 22 to incorporate the interstate route was magnified by the necessity of maintaining the essential traffic service now provided by this heavily traveled truck route, and also maintaining access to abutting properties which would remain and to other nearby areas during the entire period of construction.

Finally, preliminary cost comparisons indicated that the construction costs of this alternative would have been higher than

the proposed project in the order of magnitude of \$50,000,000 to \$70,000,000 (at 1958 prices when the comparison was made) not including the high cost of maintenance of traffic. The air pollution and noise caused by the combined interstate and land service road would have affected a larger number of persons due to concentrating the traffic in a highly developed corridor.

Because of the above detailed considerations, namely displacement of businesses and residential properties along Route 22, adverse impact on the park land traversed, disruption to local and through traffic during construction, inferior service for through and local traffic movements, air and noise pollution and excessive costs, rehabilitation of Route 22 was discarded and Route 78 was advanced along the present alignment.

Alternate A (See Plate 3)

The first major alternate considered was to route the alignment along the northerly slope of the Second Watchung Mountain, generally parallel to and south of Mountain Avenue, from existing Route 78 west of the Plainfield Avenue overpass to the existing overpass in Houdaille Quarry.

Description

This alignment departs from the existing Route 78 west of the Plainfield Avenue interchange and diverges northwesterly through a residential neighborhood near Horseshoe Road, crossing to the north side of the mountain. The route then passes through another

Finally, the Regional High School, which is located on the ridge east of Glenside Road, would be isolated from the rest of the community by the interstate highway which would pass in the vicinity of the Regional High School below the ridge.

The design of an interchange with Diamond Hill or Glenside Road would require taking even more homes and property from Bell Telephone than has been previously described. The grades for the access ramps in the interchange would of necessity be steep since it would be constructed on a hillside. The steep grades would cause increased noise levels which would affect a large number of homes, particularly to the north.

If an interchange is not planned as part of this alternative, the service to the locality would be seriously compromised, and the large traffic movements from Bell Telephone Laboratories would have to travel on local roads for considerable distances to reach an existing interchange.

Because of the advanced state of the construction of Route 78, two bridges and about two-thirds of a mile of highway at Plainfield Avenue which have already been constructed would have to be abandoned (see Plate 3).

In conclusion, because of the removal of such a large number of very valuable residential properties, the serious impact on residential neighborhoods, the isolation of the Regional High School, and because of the adverse impact on Braun, Englehard, Jefferson School, and Bell Telephone Laboratories, the alignment along the north slope of the Second Watchung Mountain is considered an unacceptable alternative.

Alternate B (see Plate 3)

Description

This second alternate includes the western part of the northerly alternate and the eastern part of the recommended alignment with the connection between them near Diamond Hill Road. The route follows the northerly alternate west of Plainfield Avenue interchange, across the Second Watchung Mountain to the northerly slope, through the residential section along Mountain Avenue. Between this last group of houses and the Braun Engineering Building the alternate curves eastward, crossing the Second Watchung Mountain in the vicinity of Diamond Hill Road, where it joins the recommended alignment.

Impact

The principal reason for this alternate is to avoid the John E. Runnells Hospital by being on the opposite side of the mountain. The air pollution and noise at the hospital caused by the highway would thereby be eliminated by this alternate.

The Watchung Reservation would not derive any benefit from this alignment since it is coincident with the recommended one through the parkland.

Air pollution and noise levels at the homes on either side of Diamond Hill Road would be reduced in comparison to the recommended alignment.

However, approximately 35 additional homes would have to be taken on the north slope with this alternate as compared to the

recommended one. Another 80 homes would be sufficiently close to this alignment as to be affected by highway noise and air pollution. The homes along Ridge Drive, off McMane Avenue, would have higher air pollution and noise levels than for the present route.

Officials of Berkeley Heights have expressed their desire that Rt. 78 not be located on the northerly slope of the mountain because of the large number of homes which would be taken and the associated destruction of a quiet residential section. Taking these homes also would represent a loss in tax base for the township.

Where the highway leaves Mountain Avenue, and crossing the mountain to join the recommended route, there would, of necessity, be undesirably sharp curves resulting in a poor alignment for high speed traffic.

The interchange with local roads would be handled similarly to the recommended design.

This alternate, as is true for the northerly one, would require abandoning two bridges and two-thirds of a mile of highway already constructed at Plainfield Avenue.

No benefit would accrue to the Reservation since this alternate is coincident through the park with the recommended alignment.

Although the hospital would benefit by this alternate in that noise and air pollution problems are relieved, the 35 additional homes that would be taken, the large number of remaining homes that would experience higher noise and air pollution

levels, the destruction of a neighborhood, and the poor alignment are deemed the overriding concerns, and render this alternative unacceptable.

Not Constructing This Section (see Plate 2)

The third major alternative considered was not constructing the section of Rt. 78 through the Watchung Mountain area at all. In this case, Rt. 78 to and from the west would terminate at its present location with ramps leading to Plainfield Avenue. The portion to and from the east, now under construction, would terminate at the interchange with the Route 24 freeway, to the east of the subject section in Springfield.

Alternate Routes

Several possible routes are available for traffic to span the gap left by not completing Route 78. One would be the distribution of traffic among a series of alternatives to minimize the impact on any one particular route. However, practical considerations, mainly the sign system for the routes, the higher cost of maintenance work on various routes, and the inevitable confusion generated among the drivers, dictate the signing of only one route. In the selection of a single route to connect the two ends of Rt. 78 various possibilities are considered. The most obvious one would be using Route 22 (see Plates 13 & 14). Traffic to and from the west on Rt. 78 would use Plainfield Avenue and Bonnie Burn Road to reach Route 22, and then travel along Route 22 to Mountain Avenue or Springfield Avenue, and then along either one

of these two to return to the eastern portion of Rt. 78 to and from Newark. Total distance traveled along local roads would be about 8-1/2 miles, as compared to about seven miles using the proposed section of Rt. 78.

Not constructing this section of Route 78 would entail abandoning about one mile of highway now under construction in Springfield. In addition, the two viaducts over Plainfield Avenue and the two bridges in the Houdaille Quarry would have to be abandoned.

A second possible route would be to use a short section of Plainfield Avenue connecting to Horseshoe Road to reach Mountain Avenue in Berkeley Heights, and then follow along Mountain Avenue to Morris Avenue and Route 24 Freeway to the eastern portion of Route 78. The distance along this other route, which would also require going through the center of Summit, would be about eight miles. About 2/3 of a mile of Rt. 78 would have to be abandoned at the westerly end as would approximately 1 mile presently under construction at the easterly end.

The third and fourth possibilities would rely on roads traversing the Watchung Reservation. Either Valley Road to Glenside Avenue or Wood Road - Skytop Drive - Coles Avenue - Summit Lane - Baltusrol Road could be used as connections between Plainfield Avenue and Morris Avenue. The Valley Road - Glenside Avenue route would be about 8-1/2 miles long and the Wood Road and Summit Lane route would be about 9-1/2 miles long.

The fifth route would be to reach Route 78 from Route 22 along Plainfield Avenue, and follow along Route 22 to the interchange with the Garden State Parkway. Passenger cars would proceed along with the Parkway to reenter Route 78 about three miles to the north. A distance of about eleven miles of Route 78 from Plainfield Avenue to the Garden State Parkway would not be utilized by this route. Trucks could continue along Route 22 to Newark. This would leave the eastern section of Route 78 to the almost exclusive use of passenger cars which would be an underutilization of the highway.

Since the projected traffic volume for Route 78 is larger than all of these connecting routes can handle collectively, traffic would choose among them according to the path of least resistance. The route which is signed would be used primarily by those travelers unfamiliar with the area.

The impact of not constructing the route and using any one of the alternative routes mentioned above, or other combination of alternatives, is assessed from the point of view of the users of Route 78 and from the point of view of the communities and areas to be affected.

User Cost

For the users of Route 78, not constructing the section through the Watchung Mountains would mean added travel distance, lost time, increased accident exposure due to frequent stops, starts and speed changes, and unnecessary delays. The additional mileage traveled would represent additional vehicle miles per

year, ranging from 20 million added vehicle miles for the shortest alternative to 60 million added vehicle miles for the longest alternative. In added operating costs to the public this would represent from about two to six million dollars of added expenses to the users of Route 78 in a single year. The estimate of loss is based on an operating cost per passenger car of 10 cents per mile, including fuel, maintenance, depreciation and other costs prorated by vehicle miles of travel. Operating costs of trucks, which are much higher than for passenger cars, are not included in the above estimates.

In terms of time, the use of alternative routing would represent a time loss for each individual driver of about 15 minutes. Translated into total yearly cost figures, the value of time lost to passenger car drivers would be more than 4.5 million dollars per year. This does not make allowance for time lost to passengers. The cost of time varies rather widely with the generally accepted value of \$0.86 per passenger car driver per hour used as the basis for the above estimate. Recent studies by the Highway Research Board indicate a value of \$2.82 per hour per commuter, which is more than three times the amount used in the estimate.

The value of time lost by passenger car drivers is not directly measurable and its impact is varied according to the driver's trip purpose. However, of much greater impact on the economy is the effect of time loss to trucks and buses. The value of time to these vehicles has been established as \$5.16 per hour for trucks and \$4.97 per hour for intercity buses (1967 values for Middle Atlantic ICC Regions by the National Cooperative Highway Research Council). Assuming 10 percent commercial vehicles at \$5.16 per hour, the value of time lost would amount to four million dollars per year.

Not considered in the above order-of-magnitude estimates are the added costs of operating the trucks (fuel, maintenance, repairs, etc.) which, with the steep grades encountered in almost all of the alternatives, could be substantial. Also excluded is the added cost to all users of increased accidents, both in damage to vehicles as well as injury to drivers, passengers and pedestrians.

An immediate impact on the driver would be the discomfort and annoyance of being forced to leave the interstate highway to travel along congested, unsafe detours for longer distances and with numerous delays because of a missing link in the interstate route of only five miles.

Impact on Communities

If Route 78 is not completed through the Watchung area, the impact on residential and business areas located between the two

open sections of Route 78 would be extremely severe. Two conditions are considered: first, the impact on existing routes with no improvements or changes; second, the impact on routes with improvements as required.

Proposed Route 78 is estimated to carry a daily volume of 64,000 vehicles through the Watchung section. About 10 percent of this volume would be trucks. Other roads would then be forced to handle an additional volume of about 57,600 passenger cars and 6,400 trucks on an average day. In terms of capacity, the trucks operating on high grades and poor alignment, such as those encountered along Bonnie Burn, Summit, and Baltusrol Roads, would be more nearly equivalent to 25,000 passenger cars. The added volumes would be far in excess of the capacity of the local roads.

Peak hour volume along Route 78 is estimated to be about 4,100 vehicles (one direction); three lanes are required to handle this amount of traffic. With only two lanes in each direction along Route 22, and with most local roads having one lane in each direction, the effect of increased traffic, if Route 78 is not fully constructed, would be devastating. In all probability, congestion at the western interchange would force local traffic onto present east-west arterials until these would all become used to their maximum capacity. Added through traffic would badly overtax any directed "to Route 78" arterial, especially at the interchange in the east and west of the subject sections. The east-west arterials likely to be affected adversely would be: Route 22, Springfield Avenue, Mountain Avenue, Glenside Avenue and Wood Road - Skytop Drive - Summit Lane. Spring-

field Avenue and Mountain Avenue are presently used as local through routes proceeding through densely populated sections of Berkeley Heights, New Providence and Summit. Increased traffic would push present rush hour congestion to extremes. Route 22 has significant rush hour congestion presently; any addition of Route 78 traffic would further overburden the highway. The two local roads traversing Watchung Reservation would at times be so congested as to discourage use of the park.

The impact on the homes along the alternate routes would be devastating in terms of noise and air pollution. The noise resulting from the gear changes required on the steep grades and the continued use of lower gears for trucks would create an intolerable situation. The air pollution emissions from vehicles traveling in stop and go traffic are greater than for freeway traffic, therefore it is possible homes along the congested alternates would experience much higher levels of air pollution.

The second condition, namely widening local streets to handle the Route 78 traffic, would require taking the homes along one side of the route selected in order to perform the required widening and realignment.

The residential character of the areas which has been retained in spite of the existing amount of local commercial travel could not be retained once the existing roads were widened to provide added lanes. The increased heavy traffic with its attending noise and air pollution spreading beyond the limits of the area taken by

the road would further deteriorate remaining residential areas along both sides of the corridor.

The same condition with respect to the effect on residential areas would prevail along all alternatives. Along Mountain Avenue the character of residential development is much more defined and denser. The intensity of development reaches full urban properties at the eastern end, within the limits of the City of Summit. In this area, physical improvements along the routes to provide for added traffic would result in severe damage to property. Furthermore, traffic noise and air pollution would affect a larger segment of the population because of the urbanization. The impact would not be limited to residential developments but would extend as well to other essential community services such as schools, hospitals, and churches which are established along Mountain and Morris Avenues in the City of Summit. The inevitable result of the added traffic would be the desertion of private homes and property and the ultimate transformation of a number of corridors of presently prime residential areas either into strips of deteriorated vacant properties or dense commercial, business, and industrial developments, a major change in land use which is expressly against the interests of the affected municipalities.

The alternative which would use Route 22 would still affect local roads. As mentioned previously, Bonnie Burn Road and Mountain Avenue or Summit Roads would have to be transformed into connecting routes to the detriment of the residential character of these routes. Route 22, which presently carries the burden of the interstate travel

would not be able to handle the added volumes of the completed sections of the interstate route. Public pressure might eventually force the widening of the local route at the expense of the intense business and industrial development, as well as the homes still fronting on it.

The do-nothing alternate to constructing the missing link of Route 78 is concluded to be so destructive to the communities and so unworkable for traffic flow that it cannot be considered a feasible approach.

Variations of the Recommended Alignment

In addition to the three principal alternatives previously discussed, four variations of the recommended alignment were considered. They are; 1) realign the highway to pass north of the stable area; 2) shift alignment further to the north of Glenside Avenue; 3) shift the alignment to the south of Glenside Avenue; 4) follow the recommended alignment but do not construct the interchange ramps.

First Variation (see Plate 3)

The first variation, which was suggested by the Union County Park Commission, entails moving the alignment of Route 78 to the north of the stables. This variation would meet the recommended alignment at the Houdaille Quarry at the easterly end and near the park entrance at the westerly end.

The advantage of this alignment is that it would take 20

acres less parkland although the stables would have to be relocated.

On the negative side would be the effect of this variant on the well field of the Commonwealth Water Company. There are ten wells of which five are in continual use and the other five are standby. Of the five wells in continual use, four would be destroyed by the proposed variant. The fifth well would probably have to be abandoned because of its severance from the rest of the well system. Of the five remaining standby wells one would be covered by the variant and another would be severely affected because of the need for relocating the access road to the Water Company pump house. Only three standby wells would remain. About 2,000,000 gallons are pumped from this field daily and the standby wells are used to supplement that demand.

The replacement of the well field may not be possible since there is no assurance that new wells in the remaining open land would produce the quality, quantity and continued volume of water required.

Another property affected by the variant would be the Houdaille Quarry beyond the eastern end of the proposed alignment. In order to comply with minimum requirements of curve radii and tangents, the variant considered would have required shifting of the alignment just west of the Route 78 bridge in the quarry, taking an additional seven acres of quarry property. Since the right-of-way has been acquired through the Houdaille Quarry, excavation operations have proceeded in the remainder of the quarry adjacent to the right-of-way. This situation would result in expensive construction.

Another serious impact would be on the housing development

that straddles the recommended route on the west side of Baltusrol Road. The houses were built since the public hearing, and the right-of-way was acquired in the vicinity years ago. At least 20 homes would have to be taken for this revised alignment.

A park is planned for the open land between Baltusrol Road and the Quarry on the north side of Route 78. This variation would pass through the open land precluding the park development.

This variant would bring the highway within about 300 feet of the Jefferson School. At this distance the noise and air pollution levels would be significantly higher than at present.

Although there is a benefit to the Watchung Reservation, it would be offset by the probable destruction of the well field, the taking of 20 additional homes, the increased costs in the quarry and the termination of plans for the new park. This variant therefore cannot be considered a feasible alternative.

Second Variation

The second variation consists of shifting the alignment between the High School and relocated Glenside Avenue northward into the escarpment of the Second Watchung Mountain. The reason for this variation is to reduce the amount of parkland separated from the main body of the Reservation. Moving the highway back into the mountain would result in a large increase in rock cut and would extend the side slope closer to the school and the substantial homes along the ridge. The highway profile grades would have to be increased beyond desirable limits to make this scheme workable. The

advantage to the Reservation would consist of saving a strip of land between Route 78 and Glenside Avenue for park purposes. However, Glenside Avenue already separates this northerly land from the body of the park. This marginal advantage is outweighed by the additional expense, steeper grades and greater encroachment of the highway slope on the ridge of the mountain.

Third Variation

An alignment on the southerly side of Glenside Avenue through the Reservation was considered. This variation diverges from the recommended route at Diamond Hill Road and rejoins it near the stables.

The advantage of this alignment is that it is nearer the valley floor and therefore the profile grades of the roadways would be less steep and there would be less required earthwork. These factors would result in a quieter vehicle operation and less expensive construction respectively. In addition, the cut slope for the westbound roadway would be less damaging to the Second Watchung Mountain than for the recommended alignment.

The principal disadvantage, which is judged to be the dominant consideration, is that more park land would be separated from the main body of the Reservation. In addition to isolating a larger area of the Reservation and taking the right-of-way from one of the most heavily used park areas, the noise and air pollution associated with the highway would affect a greater area of developed park. The alignment is deemed unacceptable because of the

severe impact on the Reservation.

Fourth Variation (See Plate 2)

The possibility of constructing this section of Route 78, along the recommended alignment, without the interchange ramps has been considered. The nearest full interchanges are at Route 24 Freeway in Springfield and at Hillcrest Road in Watchung, which are about 8 miles apart. There is a partial interchange at Plainfield Avenue which does not provide for access to eastbound Route 78 or exit from westbound Route 78. Plainfield Avenue is approximately 1.3 miles east of Hillcrest Road.

Omitting the Diamond Hill Road-McMane Avenue-Glenside Road-Glenside Avenue ramps would reduce the amount of park land required from the Watchung Reservation by about 25 acres, most of which is in the vicinity of McMane Avenue. There would also be less taking on the north side of Glenside Avenue near the Glenside Avenue underpass.

The residences near Diamond Hill Road and McMane Avenue would experience less noise and air pollution if the ramps are not constructed.

One of the important functions of an urban Interstate Highway is to serve intercity traffic movements which suggest interchanges located sufficiently close together to avoid concentrating highway bound traffic on local collector roads. Without the recommended interchange, the local movements to and from Route 78 would use Hillcrest Road, Plainfield Avenue, Route 24 Freeway or Springfield

Avenue interchanges which would burden the feeder roads to those locations. Mountain Avenue, Glenside Avenue and Plainfield Avenue would be among the roads most seriously affected. The problem would be particularly acute during the peak hours when the commuter traffic associated with the various major employers in the area seek access to Route 78.

The recommended interchange is essential to the project if Route 78 is to serve the local transportation requirements as well as the through movements.

The noise and air pollution impacts at the John E. Runnells Hospital would not be improved by deleting the interchange. In fact, the situation might be worse due to increased traffic on Plainfield Avenue. The impact on the Watchung Reservation in terms of air, noise and water would be virtually the same with or without the interchange.

Similarly, the residences adjacent to the highway, with the exception of those noted at Diamond Hill Road and McMane Avenue would experience the same noise and air pollution impact.

In order for Route 78 to adequately serve the local transportation needs, the recommended interchange is considered essential and therefore is included in the recommended alignment.

VII. SHORT-TERM USES OF ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The primary short-term use of man's environment for the construction of this roadway includes removing trees, altering traffic near the school, cutting into the mountain slope, taking park, hospital, school and private property, and disrupting the nearby area during the length of the construction.

Completion of Route 78 will afford a series of long-term advantages. It will complete a link in the interstate network connecting industrialized, metropolitan and residential areas, allowing the rapid movement of people and goods. It will relieve Route 22 of through traffic thereby making it more effective as a land service road. It will provide monetary savings due to removal of delays, and in general make operations more economical. In addition to increasing economic activities near the highway, particularly at interchanges, Route 78 will generally increase property value, providing a more sound economic base for nearby municipalities. It will expand employment opportunities for residents of the surrounding communities due to improved access to the New York metropolitan area. In addition, the interstate will increase highway safety.

In consideration of the above, the long-term productivity provided by Interstate 78 far outweighs the short-term uses of man's environment.

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Right-of-Way

The right-of-way required for this project has been acquired or condemned with the exception of the Watchung Reservation property. As a consequence the private lands that were taken for the highway have been removed from the tax rolls of the municipalities and title to the land is held by the State of New Jersey.

Land

The Watchung Reservation land and the High School land are public resources to be committed to this highway project. Private properties as well as the Hospital property have already been committed to this project.

Marsh

The marsh area at the head of Lake Surprise, which is to be filled in by the highway, is the only such area in the Reservation. Its loss and that of the plant and animal communities supported by it represent a committed resource.

Trees

It is estimated that approximately 20,000 trees are within the right-of-way, a substantial portion of which will be removed by the construction of Route 78. Numerous shrubs and herbs are also to be cleared.

Minerals

The only mineral resource involved with the highway is the potential rock quarrying that is obviated by the right-of-way. Since most of the rock encountered by the highway is within the limits of Watchung Reservation, there was virtually no chance to exploit this resource in any event.

Construction

The construction of the highway entails the commitment of materials, not the least of which is the 150,000 cubic yards of earth that must be acquired from off the site. Pavement materials, concrete and steel are among the other major construction materials required.

Money

Additionally, there is the expenditure of approximately 20 million dollars required to construct this road section, and the large labor force to be used, both of which must be considered as resources committed to this project.

IX. STEPS TAKEN TO MINIMIZE ADVERSE EFFECTS

The selection of the present corridor represents the culmination of a series of major decisions in an effort to select the alternative that was least damaging to the area. Of the possible alternatives, this corridor took the fewest number of homes, has a significant impact of noise and air pollution on the least number of houses, and has the smallest adverse effect on the economic bases of the surrounding communities. In addition, it avoids community division and protects a vital water resource. In consideration of the impact on the physical area, community and social impact, and impact on the natural and man-made environment, this alignment minimizes the adverse effects to the area.

The present profile of the highway was set to minimize damage to the Second Watchung Mountain, reducing excessive cuts and fills.

Minor shifts in the recommended alignment were made during the planning to reduce the taking of housing and parkland, while preserving such resources as the well field.

Several designs for the Diamond Hill Road-McMane Avenue-Glenside Road interchange were studied in order to best meet the traffic needs and to minimize land taken from the park.

The traffic entering or exiting from the highway is dispersed to four locals roads, so that no one road is overburdened.

An underpass at the Nike Site Road was included to provide access to the 130 acres of parkland north of Route 78 and to the Governor Livingston Regional High School.

The N.J. DOT is studying methods to improve the sight distance at the Glenside Road-Hunterdon Boulevard intersection so as to minimize the impact on school bound traffic from the increased volume and possibly higher-speed traffic exiting from Route 78.

A series of measures are required to be taken during the period of construction to minimize effects on the environment. The vehicles used for shipping and transporting materials must be tight and clean to prevent material from falling onto the roadway, be in good repair, and be approved for safety, and the contractor must make provisions to remove spilled material promptly.

Explosives and highly inflammable material must be stored safely under lock and key, have a watchman on duty at all times, and flagmen must be employed to warn persons and traffic away from danger areas.

Soil erosion will be controlled by means of such measures as berms, dikes, dams, netting, sediment basins, mulches, grasses and slope drains. In addition, contractors must submit schedules for accomplishment of the applicable measures before work may start. Soil erosion control specifications are included in Appendix 4.

With regard to site clearing, a four-foot fence is to be erected around trees and areas of vegetation to be preserved. The Landscape Bureau of the DOT will be consulted before any trees are removed and the Department of Agriculture consulted before removal of any elm trees. Burning of any waste material including plant life is prohibited by N.J. Air Pollution Control Code.

To prevent accidents, the equipment used will be guarded in accordance with Federal and State codes. The contractor will be

required to adhere to the provisions of the Occupational, Safety and Health Act.

The blasting operations in the vicinity of Bell Telephone Laboratories will be coordinated by its personnel to assure that no damage is done to the Microwave Tower. The U.C.P.C. will also be advised of the blasting operations.

Five-foot temporary fences with locked gates will be used at all potentially hazardous areas to protect pedestrians.

Borrow pits will be graded to blend into the general topography of the area; pit areas will be stabilized so as not to silt adjacent ditches. When the borrow operation is complete, the pits will be seeded and fenced around the periphery. In addition, the written releases from the owners of the borrow pits will be secured to assure that the area will be left in a satisfactory condition.

For the protection and maintenance of traffic, signs, barricades and warning lights will be set up. Flagmen will be used for direction of traffic and temporary sidewalk laid where required. Provisions will be made to control dust.

The entire right-of-way will be permanently fenced for the protection of the highway users, the nearby residents and wildlife.

For the final cleaning-up operation the following steps will be required:

- a) all equipment and debris removed.
- b) all damage to fencing and walls repaired.
- c) all waterway obstructions caused by operations removed.

- d) sites left in neat and presentable condition.
- e) statements from property owners indicating the fulfillment of the above obligations.
- f) all disturbed areas top soiled and seeded.

A series of noise screens was designed to alleviate the impact of noise pollution on areas and activities adjacent to Route 78. The effect of this noise abatement measure is that very few areas outside the right-of-way exceed D.O.T. design standards.

A series of sedimentation basins was designed for the Watchung Reservation area to minimize the effect of changing the drainage patterns, as discussed in the following section.

X. MINIMIZATION OF HARM TO SECTION 4 (f) LANDS

There is no feasible and prudent alternative to the recommended alignment which takes approximately 116 acres from the Watchung Reservation. Although the northerly alternate alignment and the alternate of not constructing this section do not involve taking 4 (f) land, they would be so disruptive in terms of homes to be taken, noise, air pollution, and community disruption inflicted on the adjacent properties, that they cannot be considered feasible. The rehabilitation of Route 22 would have had no appreciable impact on Watchung Reservation but would have had a severe adverse impact on several other 4 (f) lands.

The Diamond Hill Road alternate would have the same impact on the Reservation as the recommended alignment since they coincide through the park. The alternate through the well field does not require as much taking from the Watchung Reservation but would risk destruction of the water supply and would require more homes to be taken. It therefore is not considered feasible or prudent.

Where the alignment of Route 78 traverses the Reservation, all the measures detailed in the previous sections relating to cleanliness of the operation, equipment condition, storage of explosives, soil erosion, clearing the vegetation from the site, safety and final clean-up will be applied.

The alignment of the highway through the park has been extensively studied in terms of minimization of impact. The recommended alignment on the north side of Glenside Avenue, although more expensive to build than on the south side, takes less 4 (f) land and is less

restrictive to utilization of the park.

The separate profiles of the highway are set to fit into the hillside with minimum destruction due to cuts and fills.

The Diamond Hill Road-McMane Avenue-Glenside Road-Glenside Avenue interchange which received Plan, Specification and Estimate Approval from the Bureau of Public Roads in 1965 and 1966 was subsequently restudied at the behest of the Union County Park Commission. The studies carried out by the New Jersey Department of Transportation were closely coordinated with the Federal Highway Administration and the Union County Park Commission. The resulting design, which entails an additional bridge, requires approximately 2.8 acres less park land. This interchange was made a part of the Memorandum of Understanding with the U.C.P.C. and is included in Appendix 3.

Since Route 78 changes the drainage patterns of the area whose runoff now comes down the south slope of the Second Watchung Mountain, a study was undertaken to determine the effect of these changes. The recommendations contained in the study will be incorporated in the design to remove the silt from the highway runoff before it is discharged into Lake Surprise and Blue Brook. The design consists of a series of sedimentation basins, constructed in the natural water courses feeding the lake and brook, which will detain the storm runoff, allowing the silt load to settle out. (See Plate 5) The basins will be constructed prior to the commencement of work on Route 78 to ensure maximum protection for the lake and brook during the highway construction period. The basins will be maintained in perpetuity in order to remove particulate matter washed off the high-

way.

The New Jersey Department of Transportation will relocate the riding stables, ring, and related facilities prior to the highway construction, thus providing for uninterrupted stables and trail operations.

The right-of-way will be fenced throughout the Reservation to prevent children and animals from entering the roadway.

Where appropriate in the Reservation area, noise screens will be designed to keep the impact of higher noise levels to a minimum.

When technology in the abatement of water and air pollution advance sufficiently to develop practical control devices, the New Jersey Department of Transportation will install and maintain them at the request of the Union County Park Commission.

An underpass for the Nike Site Road has been included in order to provide access to the 130 acres of Reservation land on the north side of Route 78.

ROUTE 78

SECTIONS 4N & 5P and 5N

4(f) REPORT

4(f) Report

The State of New Jersey Department of Transportation is requesting approval of a proposed highway project which requires the taking of land from the Watchung Reservation in Union County, New Jersey.

Accordingly, approval of the project is prohibited by Section 4(f) of the Department of Transportation Act (49 U.S.C., §1653 (f)) and Title 23, U.S.C., Section 138, unless...

1. there is no feasible and prudent alternative to the use of such land and;
2. such program includes all possible planning to minimize harm resulting from such use.

This statement, therefore, will set forth the New Jersey Department of Transportation's determination pursuant to Section 4(f) of the Department of Transportation Act.

Statement of Problem

Interstate Route 78 is part of the national interstate highway system established by the Federal Highway Act of 1956. This section is one of the final links in the completion of Interstate Route 78 in New Jersey, connecting the New York Metropolitan Area with Harrisburg, Pa. and points west.

The recommended corridor for Route 78 traverses the northern edge of the Watchung Reservation, an 1811 acre park operated by the Union County Park Commission.

Description of Project (See Plates 3, 5, 9, 10, 11)

The project within the Watchung Reservation comprises a 6-lane highway, with separate roadway elevations, set into the southerly slope of the Second Watchung Mountain. The route is within the Reservation for approximately 3.2 miles and includes an interchange whose traffic movements are divided between Diamond Hill Road, McMane Avenue and Glenside Road. There are also two ramp connections with Glenside Avenue within the Reservation. Tracy Drive, the north-south route through the park will not have any direct connections to the highway in order to discourage additional use of the park roads.

Route 78 passes along the northerly side of Glenside Avenue crossing the northeasterly corner of the Reservation towards Baltusrol Road. The portion of the Reservation to the north of Glenside Avenue, which is already separated from the main body of the park, will be even more isolated after the construction of Route 78. An underpass at the Nike Site Road is planned in order to provide access to the remaining Reservation land at the easterly end of the Regional High School.

The Route 78 right-of-way requires 116 acres of Watchung Reservation land and leaves approximately 130 acres on the north side of the highway.

The impact of Route 78 on the Reservation is in several areas which will subsequently be explored.

Watchung Reservation - Its 1,811 wooded acres straddle the First and Second Watchung Mountains and include the valley between them. More than a million people a year enjoy the Reservation's natural beauty, making use of its scenic roads, footpaths, picnic areas, bridle trails, observation tower, ponds, lakes and historical setting. The center of earliest activity in the Reservation is the site preserved today as Deserted Village, which contains the ruins and cemeteries from Revolutionary War days. The Trailside Nature and Science Center has a full program of nature study and recreation, using the Reservation as a field laboratory with various specimens of animal and plant life.

Park Features - A ten-acre nursery containing thousands of labeled trees and shrubs is maintained, as well as teaching trails, and a quarter-mile Nature Trail which contains a large variety of trees, including cedars, dogwood, black birch, sassafras, red and white pine, gray birch, shrubs, ferns, flowers and mosses. Other horticultural features include a 250-year-old stand of hemlocks, Asiatic chestnut trees, old black, red and white oaks, and a fine stand of American beech trees growing under undisturbed natural conditions. An old chestnut oak measuring 51 inches in diameter is thought to be the largest tree in girth in the area. There are rhododendron, herb, and fern gardens, the latter comprising as many species and varieties of native and exotic ferns as can be grown here.

The Reservation features an extensive array of horseback riding activity including instruction and boarding. The stables and ring are located in the northeast corner of the park. Bridle paths radiate from the stables to nearly all parts of the Reservation.

Lake Surprise - A major focal point in the Reservation is Lake Surprise which was formed by damming up Blue Brook before the Civil War. In the past the lake was used for swimming and boating, as well as fishing; however, the water quality is now too poor to permit swimming and the boat facilities have been abandoned. The lake has silted over the years to the extent that it is only about 6 feet deep in the center, and, for a large distance from the shore, is shallow enough to sustain bottom-rooted aquatic plants. Lake Surprise exhibits the characteristics equated with eutrophic ponds. At present the lake is used for fishing, and as a pleasant setting for walking and riding along its shore.

Impact

Route 78 will pass along the northerly side of Glenside Avenue crossing the northeasterly corner of the Reservation towards Baltusrol Road. The part of the Reservation to the north of Glenside Avenue, which is already separated from the main body of the park, will be even more isolated after the construction of Route 78. An underpass at the Nike Site Road is planned in order to provide access to the remaining parcel of the Reservation land at the easterly end of the Regional High School.

The Route 78 right-of-way requires 116 acres of Watchung Reservation land, and leaves approximately 130 acres on the north side of the highway and Glenside Avenue separated from the remainder of the park. The northerly acres have not been developed, in part due to their steepness and to the natural boundary line formed by Glenside Avenue.

An observation tower, planned to be located on parkland west of the school, will no longer be feasible after construction of Route 78 because the land will be acquired for the highway project.

The alignment passes to the south of the stables, thus isolating them from the rest of the Reservation and from the bridle paths. Relocating the stables to a location within the main body of the Reservation will be necessary because an underpass crossing Route 78 was ruled out as unacceptable for use by equestrians.

Route 78 will fill most of the marsh at the head of Lake Surprise, which is the only marsh in the Reservation. Several plant and animal communities will thereby be displaced. This marsh represents a small area of the wetlands in the vicinity, since four miles to the north are the several thousand acres of Chatham Swamp.

Since the siltation of Lake Surprise has been a matter of concern for some time, extensive drainage studies were undertaken on the part of the New Jersey State Department of Transportation and the Union County Park Commission. A scheme was developed and agreed upon to protect the lake from siltation due to the highway. The method involves discharging all the highway cross culverts into sedimentation basins which will be constructed in the natural water courses between Route 78 and Lake Surprise. (See Plate 5.) These basins will be constructed prior to the highway and maintained indefinitely by the N.J.D.O.T. and are expected to provide adequate protection for Lake Surprise and Blue Brook from silt.

Noise - Ambient noise level measurements were made at four locations within Watchung Reservation. The noise environment varies significantly between day and night and to a lesser extent between the measurement sites. The daytime average L_{10} noise level is approximately 55 dBA while the nighttime average is approximately 45 dBA. The variance between sites ranges between a daily average of about 55 dBA at Lake Surprise to about 50 dBA near Cataract Hollow Road. All the sites that were monitored had higher noise levels in the afternoon than in the morning, the difference being typically 7 dBA. The observed variation of L_{10} noise levels is due primarily to the changes in traffic on Glenside Avenue, which affects most of the utilized portions of the Reservation.

Of the areas of the Reservation adjacent to the highway, Lake Surprise is the least severely impacted. This is due in part to the topography, the highway being about 80' higher than the lake, and to the fact that the existing noise environment is the highest recorded in the park. The predicted L_{10} level of 70.3 dBA with present day trucks and no abatement measures incorporated is as great an increase over the measured L_{10} of 60.5 dBA as occurs elsewhere along the R.O.W. in the park. This increase of 10 dBA while being noticeable will not impair the recreational value of the lake. With the introduction of a noise shield, and more, in the future when truck noise will be restricted by law, the predicted L_{10} will be only slightly higher than the ambient condition and well below the D.O.T. design criteria.

At Cataract Hollow Road the predicted L_{10} is about 68dBA 800' from Glenside Avenue as compared to the ambient condition of about 52dBA in the same area. The difference represents a significant increase in noise and will intrude on the solitude of this portion of the park. However, with a noise shield constructed along the highway, and moreover, with future quieter trucks, the predicted noise level at this location will be reduced to the point where increase over the ambient condition will be noticeable but not obtrusive. The predicted noise levels will exceed the D.O.T. design guide of 70dBA up to approximately 400' from Glenside Avenue with no noise shield, and with present day trucks. With the introduction of a noise shield, D.O.T. standards will not be exceeded outside of the Route 78 right-of-way. For the future condition of quieter trucks, the predicted L_{10} will be well below 65dBA in the Reservation which is significantly less than the D.O.T. standard.

The present stable area will experience L_{10} noise levels up to about 76dBA, although with future quieter trucks the level would drop to approximately 67dBA. This represents a major increase over the ambient L_{10} of 55dBA measured in the afternoon; however, the effect on the usefulness of this portion of the Reservation is not possible to assess since the stables are planned to be relocated.

In general, the noise impact on the function of the Watchung Reservation is seen to be primarily restricted to those facilities near Glenside Avenue which include Lake Surprise, the Boy Scout Cabins, the Girl Scout Cabins and the stables

area, although there will be some increase in noise levels throughout the park. Also, the advent of effective control of truck noise emissions will reduce the overall impact on the Reservation to a point well within the D.O.T. guide lines for park use. Noise shielding will provide a reduction in noise impact which is particularly important in the interim before quieter trucks become a reality.

Air - It is expected that EPA primary and secondary standards will not be exceeded for most of the year. In the unusual case of a 'tight' inversion for one day prior to 1981, the 8 hour carbon monoxide standard would be only marginally exceeded throughout the valley. The air pollution generated by the highway will not adversely affect the utility of the Reservation as regards recreational activity.

The completion of Route 78 will provide convenient access to the Reservation from the densely populated metropolitan area, therefore, weekend use of the park can be expected to increase. Any additional housing development likely to result from this project may also increase usage of the Reservation.

A memorandum of understanding between the Union County Park Commission and the New Jersey Department of Transportation, which is included as Appendix 3, has been executed. This document establishes an agreed-upon alignment and interchange layout through the park, as well as the steps the New Jersey Department of Transportation will take to protect the Watchung Reservation and compensate the U.C.P.C. for the right-of-way.

Probable Unavoidable Adverse Effects

Route 78 will have significant unavoidable adverse effects upon the Watchung Reservation. The right-of-way will remove 116 acres of woods, marsh, and vegetation. In addition, 130 acres, separated at present from the main body of the Reservation by Glenside Avenue, will be more isolated by Route 78. The stables will have to be relocated, with attendant decrease in length of bridle paths. A proposal to build an observation tower on the Second Watchung Mountain will be cancelled because the land will be acquired for the highway project.

In general, the noise impact on the function of the Watchung Reservation is primarily restricted to those facilities near Glenside Avenue, including Lake Surprise, the Boy Scout Cabins, the Girl Scout Cabins and the stable area, although there will be some increase in noise levels throughout the park.

It is expected that EPA primary and secondary air pollution standards will not be exceeded for most of the year, except in the unusual case of a 'tight' inversion.

Changes in the quality of runoff that flows into Lake Surprise may increase eutrophication and reduce present forms of marine life due to the introduction of organic material, salt, and heavy metals from the highway.

Thus, the character of the part of the Watchung Reservation near Route 78, especially as an area of quiet retreat, will be changed.

Alternatives

The alternative to constructing Route 78 on a newly acquired right-of-way was to rehabilitate Route 22. This was studied at the outset of the interstate program and was rejected.

Two other principal alternatives have been considered with respect to the alignment for the route through this area. These included an alignment along the north side of the Second Watchung Mountain, and the possibility of not constructing the route through this area at all. In addition, alternatives to the present alignment within its corridor were considered.

Rehabilitation of Route 22 (See Plate 2)

General - Since U.S. Route 22 presently carries almost all of the through traffic which will eventually use the proposed interstate route, the obvious first consideration for an interstate route was the rehabilitation of existing Route 22 to provide for the separation of the through travel from the local trips, taking advantage of the existing right-of-way. This alternative was studied in detail and estimates of cost were prepared comparing the alternative with the present alignment. The decision was made to construct Route 78 on a new alignment, therefore rehabilitating Route 22 is not an alternative at this time, but is of historical significance.

The main reason for considering this alternative was that the existing Route 22 right-of-way could accommodate additional roadways although additional land-taking would have been required to accommodate both the through lanes and the land service roadways.

The study was based on the widening of the existing right-of-way of Route 22 so as to accommodate the added lanes of the proposed interstate route. Because of the built-up character of the land on either side of Route 22, the plan was to place the main roadways of the interstate route in the center of the east and west-bound roadways of Route 22. In effect, Route 22 would be two service roads, on either side of the interstate route, providing frontage for the intensive development through the area. Slip ramps would have been provided for interchanging between the interstate route and the service roads. Sufficiently wide strips would permit slopes between each roadway to reduce retaining walls to a minimum.

The alignment along Route 22 would have extended for about 42 miles from Newark Airport to Annandale, or about three miles longer than the present alignment.

Description - For the first section of the rehabilitation alternative from Newark Airport to Route 21, a distance of 1.5 miles, the alternative and the recommended alignment were to be parallel. From Route 21 to the west, the alternative was on a new viaduct along the north side of existing Route 22 to the vicinity of Meeker Avenue. From this point the new construction would cross to the south side of Route 22 through Weequahic Park and along the north side of the Weequahic Lake. Through the park, two subalternatives were considered. One was a viaduct over Route 22 and the other was a new roadway on "fill" through the north side of the lake.

Where the route entered Hillside, it would have crossed to

the north side of Route 22, in a viaduct, gradually descending to grade. The line continued along the north side to the approach to the interchange with the Garden State Parkway where it crossed Route 22 and was placed on a separate right-of-way south of Route 22 to avoid disruption of the existing interchange; the Route would have passed through the north tip of Galloping Hill Park and Golf Course taking about 15 acres of the park land. The alignment then would have utilized the wide median in the Springfield and Union area, requiring the removal of the extensive business development. Between the end of the wide median and Summit Road, the alignment crossed to the south then to the north of existing Route 22. From that point to the terminus at Annandale the alignment was on the north side.

Impact- One of the locations adversely affected by this alternative was the Weequahic Park and its lake. Both solutions for passing near the park would have had serious adverse effects on the park by taking land and increasing noise and air pollution levels.

Other park land adversely affected included the northeast portion of Galloping Hill Park and its Golf Course and the southwestern end of the Watchung Reservation in the Township of Scotch Plains.

By far, the most serious impact on the environment would have been the major disruption and dislocation of the highly developed business, industrial and residential property adjacent to Route 22. The additional right-of-way which was to be acquired would have

eliminated entirely all businesses and other establishments along the side of Route 22 throughout its 42-mile length.

Experience with similar designs has proven that traffic which is ordinarily served by the local service roads (in this case Route 22) would use the Interstate roadways for short distances. Thus, Route 78 would have carried traffic which otherwise belonged to Route 22. This would have placed a burden on the interstate route, a facility designed for an entirely different type of traffic. The interaction between the local and long distance travel, with its attendant speed differentials and the increased weaving and merging movements, would have imposed an unnecessary accident potential.

The problem of rehabilitating Route 22 to incorporate the interstate route was magnified by the necessity of maintaining the essential traffic service now provided by this heavily traveled truck route, and also maintaining access to abutting properties which would remain and to other nearby areas during the entire period of construction.

Finally, preliminary cost comparisons indicated that the construction costs of this alternative would have been higher than the proposed project in the order of magnitude of \$50,000,000 to \$70,000,000 (at 1958 prices when the comparison was made) not including the high cost of maintenance of traffic. The air pollution and noise caused by the combined interstate and land service road would have affected a larger number of persons due to concentrating the traffic in a highly developed corridor.

Because of the above detailed considerations, namely dislocation of businesses and residential properties along Route 22, adverse impact on the park land traversed, disruption to local and through traffic during construction, inferior service for through and local traffic movements, air and noise pollution and excessive cost, the rehabilitation of Route 22 was discarded and Route 78 was advanced along the present alignment.

Alternate A (See Plate 3)

The first major alternate considered was to route the alignment along the northerly slope of the Second Watchung Mountain, generally parallel to and south of Mountain Avenue, from existing Route 78 west of the Plainfield Avenue overpass to the existing overpass in the Houdaille Quarry.

Description - This alignment departs from the existing Route 78 west of the Plainfield Avenue interchange and diverges northwesterly through a residential neighborhood near Horseshoe Road, crossing to the north side of the mountain. The route then passes through another residential area, then parallels Mountain Avenue, taking the Braun Engineering offices and the front of the Bell Telephone Laboratories property in succession. The main line crosses over Glenside Road and takes the Englehard Building; then proceeding eastward, it passes through a highly developed residential area comprised of expensive established dwellings for the next 2-1/2 miles. The route then crosses over Glenside Avenue to the north of the well field and passes through a housing

development. The highway crosses over Baltusrol Road, through the area to be acquired for Hidden Valley Park and meets the existing Route 78 alignment at the overpass in Houdaille Quarry.

Impact - This alignment was studied as an alternative to taking Watchung Reservation and hospital property. This route places the highway on the other side of the mountains from the John E. Runnells Hospital and would thereby minimize the noise and air pollution levels at the Hospital. For the same reason the Reservation would be spared significant noise and air pollution impact from the highway. The Commonwealth Water Company well field would not be touched and could continue to function.

However, the north slope alternative would require the taking of about 240 homes and leave hundreds more exposed to the air pollution, noise and visual impact of the highway. The Braun Engineering and Englehard buildings would be taken along with part of the Bell Telephone Laboratories property. The area along the ridge of the Second Watchung Mountain has become one of the most attractive residential areas, both because of its proximity to the Watchung Reservation and its unique high location. An interstate highway north of the ridge, besides taking the above mentioned properties, would bisect those well developed and well defined residential neighborhoods. The homes on the ridge would be isolated in small enclaves of houses with little or no relation to the rest of the nearby communities and their original identity and character would be lost. The effect of the highway would extend beyond the immediate vicinity of the highway to the main residential areas remaining on the north side.

In addition to the disruption of the above mentioned residential areas, there would be added cost of right-of-way. Also, these private properties have a high assessment and their loss to the tax rolls would be a severe adverse impact on the municipalities.

With the alternative alignment, a substantial portion of the Bell Telephone property would be taken. Bell Telephone is presently the largest employer in the region, being a major source of income for the surrounding residential communities. A major expansion of the laboratories is presently underway and taking most of the property between the building and Mountain Avenue would seriously affect that program.

This alignment would pass within 200 feet of the Jefferson School, thereby causing higher noise and air pollution levels to prevail on the school grounds.

Finally, the Regional High School, which is located on the ridge east of Glenside Road, would be isolated from the rest of the community by the interstate highway which would pass in the vicinity of the Regional High School below the ridge.

The design of an interchange with Diamond Hill or Glenside Road would require taking even more homes and property from Bell Telephone than has been previously described. The grades for the access ramps in the interchange would of necessity be steep since it would be constructed on a hillside. The steep grades would cause increased noise levels which would affect a large number of homes, particularly to the north.

If an interchange is not planned as part of this alternative, the service to the locality would be seriously compromised, and the large traffic movements from Bell Telephone Laboratories would have to travel on local roads for considerable distances to reach an existing interchange.

Because of the advanced state of the construction of Route 78, two bridges and about two-thirds of a mile of highway at Plainfield Avenue which have already been constructed would have to be abandoned. (See Plate 3).

In conclusion, because of the removal of such a large number of very valuable residential properties, the serious impact on residential neighborhoods, the isolation of the Regional High School, and because of the adverse impact on Braun, Englehard, Jefferson School, and Bell Telephone Laboratories, the alignment along the north slope of the Second Watchung Mountain is considered an unacceptable alternative.

Not Constructing This Section (See Plate 2) - The other major alternative considered was not constructing the section of Route 78 through the Watchung Mountain area at all. In this case, Route 78 to and from the west would terminate at its present location with ramps leading to Plainfield Avenue. The portion to and from the east, now under construction, would terminate at the interchange with the Route 24 freeway, to the east of the subject section in Springfield.

Alternate Routes - Several possible routes are available for traffic to span the gap left by not completing Route 78. One would be the distribution of traffic among a series of alternatives to minimize the impact on any one particular route. However, practical considerations, mainly the sign system for the routes, the higher cost of maintenance work on various routes, and the inevitable confusion generated among the drivers, dictate the signing of only one route. In the selection of a single route to connect the two ends of Route 78 various possibilities are considered. The most obvious one would be using Route 22 (see Plates 13 & 14). Traffic to and from the west on Route 78 would use Plainfield Avenue and Bonnie Burn Road to reach Route 22 and then travel along Route 22 to Mountain Avenue or Springfield Avenue and then along either one of these two to return to the eastern portion of Route 78 to and from Newark. Total distance traveled along local roads would be about 8-1/2 miles, as compared to about seven miles using the proposed section of Route 78.

Not constructing this section of Route 78 would entail abandoning about one mile of highway now under construction in Springfield. In addition, the two viaducts over Plainfield Avenue and the two bridges in the Houdaille Quarry would have to be abandoned.

A second possible route would be to use a short section of Plainfield Avenue connecting to Horseshoe Road to reach Mountain Avenue in Berkeley Heights, and then follow along Mountain Avenue to Morris Avenue and Route 24 Freeway to the eastern portion of Route 78. The distance along this other route, which would also require going through the center of Summit, would be about eight miles. About 2/3 of a mile of Route 78 would have to be abandoned at the westerly end as would approximately 1 mile at the easterly end.

The third and fourth possibilities would rely on roads traversing the Watchung Reservation. Either Valley Road to Glenside Avenue or Wood Road-Skytop Drive-Coles Avenue-Summit Lane-Baltusrol Road could be used as connections between Plainfield Avenue and Morris Avenue. The Valley Road-Glenside Avenue route would be about 8½ miles long and the Wood Road and Summit Lane route would be about 9½ miles long.

The fifth route would be to reach Route 78 from Route 22 along Plainfield Avenue, and follow along Route 22 to the interchange with the Garden State Parkway. Passenger cars would proceed along the Parkway to reenter Route 78 about three miles to the north. A distance of about eleven miles of Route 78, from Plainfield Avenue to the Garden State Parkway, would not be utilized by this route. Trucks could continue along Route 22 to Newark. This would leave the eastern section of Route 78 to the almost exclusive use of passenger cars which would be an underutilization of the highway.

Since the projected traffic volume for Route 78 is larger than all of these connecting routes can handle collectively, traffic would

choose among them according to the path of least resistance. The route which is signed would be used primarily by those travelers unfamiliar with the area.

The impact of not constructing the route and using any one of the alternative routes mentioned above, or other combination of alternatives, is assessed from the point of view of the users of Route 78 and from the point of view of the communities and areas to be affected.

User Cost - For the users of Route 78, not constructing the section through the Watchung Mountains would mean added travel distance, lost time, increased accident exposure due to frequent stops, starts and speed changes, and unnecessary delays. The additional mileage traveled would represent additional vehicle miles per year, ranging from 20 million added vehicle miles for the shortest alternative to 60 million added vehicle miles for the longest alternative. In added operating costs to the public this would represent from about two to six million dollars of added expenses to the users of Route 78 in a single year. The estimate of loss is based on an operating cost per passenger car of 10 cents per mile, including fuel, maintenance, depreciation and other costs prorated by vehicle miles of travel. Operating costs of trucks, which are much higher than for passenger cars, are not included in the above estimates.

In terms of time, the use of alternative routing would represent a time loss for each individual driver of about 15 minutes. Translated into total yearly cost figures, the value of time lost to passenger car drivers would be more than 4.5 million dollars per year. This does not make allowance for time lost to passengers. The cost of time

varies rather widely with the generally accepted value of \$0.86 per passenger car driver per hour used as the basis for the above estimate. Recent studies by the Highway Research Board indicate a value of \$2.82 per hour per commuter, which is more than three times the amount used in the estimate.

The value of time lost by passenger car drivers is not directly measurable and its impact is varied according to the driver's trip purpose. However, of much greater impact on the economy is the effect of time loss to trucks and buses. The value of time to these vehicles has been established as \$5.16 per hour for trucks and \$4.97 per hour for intercity buses (1967 values for Middle Atlantic ICC Regions by the National Cooperative Highway Research Council). Assuming 10 percent commercial vehicles at \$5.16 per hour, the value of time lost would amount to four million dollars per year.

Not considered in the above order-of-magnitude estimates are the added costs of operating the trucks (fuel, maintenance, repairs, etc.) which, with the steep grades encountered in almost all of the alternatives, could be substantial. Also excluded is the added cost to all users of increased accidents, both in damage to vehicles as well as injury to drivers, passengers and pedestrians.

An immediate impact on the driver would be the discomfort and annoyance of being forced to leave the interstate highway to travel along congested, unsafe detours for longer distances and with numerous delays because of a missing link in the interstate route of only five miles.

Impact on Communities - If Route 78 is not completed through the

Watchung area, the impact on residential and business areas located between the two open sections of Route 78 would be extremely severe. Two conditions are considered: first, the impact on existing routes with no improvements or changes; second, the impact on routes with improvements as required.

Proposed Route 78 is estimated to carry a daily volume of 64,000 vehicles through the Watchung section. About 10 percent of this volume would be trucks. Other roads would then be forced to handle an additional volume of about 57,600 passenger cars and 6,400 trucks on an average day. In terms of capacity, the trucks operating on high grades and poor alignment, such as those encountered along Bonnie Burn, Summit and Baltusrol Roads, would be more nearly equivalent to 25,000 passenger cars. The added volumes would be far in excess of the capacity of the local roads.

Peak hour volume along Route 78 is estimated to be about 4,100 vehicles (one direction); three lanes are required to handle this amount of traffic. With only two lanes in each direction along Route 22, and with most local roads having one lane in each direction, the effect of increased traffic, if Route 78 is not fully constructed, would be devastating. In all probability, congestion at the western interchange would force local traffic onto present east-west arterials until these would all become used to their maximum capacity. Added through traffic would badly overtax any directed "to Route 78" arterial, especially at the interchange in the east and west of the subject sections. The east-west arterials likely to be affected adversely would be: Route 22, Springfield Avenue, Mountain Avenue, Glenside

Avenue and Wood Road - Skytop Drive - Summit Lane. Springfield Avenue and Mountain Avenue are presently used as local through routes proceeding through densely populated sections of Berkeley Heights, New Providence and Summit. Increased traffic would push present rush hour congestion to extremes. Route 22 has significant rush hour congestion presently; any addition of Route 78 traffic would further overburden the highway. The two local roads traversing Watchung Reservation would at times be so congested as to discourage use of the park.

The impact on the homes along the alternate routes would be devastating in terms of noise and air pollution. The noise resulting from the gear changes required on the steep grades and the continued use of lower gears for trucks would create an intolerable situation. The air pollution emissions from vehicles traveling in stop and go traffic are greater than for freeway traffic, therefore homes along the congested alternates would experience much higher levels of air pollution.

The second condition, namely widening local streets to handle the Route 78 traffic would require taking the homes along one side of the route selected in order to perform the required widening and re-alignment.

The residential character of the areas which has been retained in spite of the existing amount of local commercial travel could not be retained once the existing roads were widened to provide added lanes. The increased heavy traffic with its attending noise and air pollution spreading beyond the limits of the area taken by the road would further deteriorate remaining residential areas along both sides of the corridor.

The same condition with respect to the effect on residential areas would prevail along all alternatives. Along Mountain Avenue the character of residential development is much more defined and denser. The intensity of development reaches full urban properties at the eastern end, within the limits of the City of Summit. In this area, physical improvements along the routes to provide for added traffic would result in severe damage to property. Furthermore, traffic noise and air pollution would affect a larger segment of the population because of the urbanization. The impact would not be limited to residential developments but would extend as well to other essential community services such as schools, hospitals, and churches which are established along Mountain and Morris Avenues in the City of Summit. The inevitable result of the added traffic would be the desertion of private homes and property and the ultimate transformation of a number of corridors of presently prime residential areas either into strips of deteriorated vacant properties or dense commercial, business, and industrial developments, a major change in land use which is expressly against the interests of the affected municipalities.

The alternative which would use Route 22 would still affect local roads. As mentioned previously, Bonnie Burn Road and Mountain Avenue or Summit Roads would have to be transformed into connecting routes to the detriment of the residential character of these routes. Route 22, which presently carries the burden of the interstate travel would not be able to handle the added volumes of the completed sections of the interstate route. Public pressure might eventually force the widening of the local route at the expense of the intense business and industrial development, as well as the homes still fronting on it.

The do-nothing alternate to constructing the missing link of

Route 78 is concluded to be so destructive to the communities and so unworkable for traffic flow that it cannot be considered a feasible approach.

Variations of the Recommended Alignment - In addition to the two principal alternatives previously discussed, four variations of the recommended alignment were considered. They are: 1) realign the highway to pass north of the stable area; 2) shift alignment further to the north of Glenside Avenue; 3) shift the alignment to the south of Glenside Avenue; 4) follow the recommended alignment but do not construct the interchange ramps.

First Variation (See Plate 3) - The first variation, which was suggested by the Union County Park Commission, entails moving the alignment of Route 78 to the north of the stables. This variation would meet the recommended alignment at the Houdaille Quarry at the easterly end and near the park entrance at the westerly end.

The advantage of this alignment is that it would take 20 acres less parkland although the stables would have to be relocated.

On the negative side would be the effect of this variant on the well field of the Commonwealth Water Company. There are ten wells of which five are in continual use and the other five are standby. Of the five wells in continual use, four would be destroyed by the proposed variant. The fifth well would probably have to be abandoned because of its severance from the rest of the well system. Of the five remaining standby wells one would be covered by the variant and another would be severely affected because of the need for relocating the access road to the Water Company pump house. Only three standby wells would remain. About 2,000,000 gallons are pumped from this

field daily and the standby wells are used to supplement that demand.

The replacement of the well field may not be possible since there is no assurance that new wells in the remaining open land would produce the quality, quantity and continued volume of water required.

Another property affected by the variant would be the Houdaille Quarry beyond the eastern end of the proposed alignment. In order to comply with minimum requirements of curve radii and tangents, the variant considered would have required shifting of the alignment just west of the Route 78 bridge in the quarry, taking an additional seven acres of quarry property. Since the right-of-way has been acquired through the Houdaille Quarry, excavation operations have proceeded in the remainder of the quarry adjacent to the right-of-way. This situation would result in expensive construction.

Another serious impact would be on the housing development that straddles the recommended route on the west side of Baltusrol Road. The houses were built since the public hearing, and the right-of-way was acquired in the vicinity years ago. At least 20 homes would have to be taken for this revised alignment.

A park is planned for the open land between Baltusrol Road and the Quarry on the north side of Route 78. This variation would pass through the open land precluding the park development.

This variant would bring the highway within about 300 feet of the Jefferson School. At this distance the noise and air pollution levels would be significantly higher than at present.

Although there is a benefit to the Watchung Reservation, it would be offset by the probable destruction of the well field, the taking of 20 additional homes, the increased costs in the Quarry and

the termination of plans for the new park. This variant therefore cannot be considered a feasible alternative.

Second Variation - The second variation consists of shifting the alignment between the High School and relocated Glenside Avenue northward into the escarpment of the Second Watchung Mountain. The reason for this variation is to reduce the amount of parkland separated from the main body of the Reservation. Moving the highway back into the mountain would result in a large increase in rock cut and would extend the side slope closer to the school and substantial homes along the ridge. The highway profile grades would have to be increased beyond desirable limits to make this scheme workable. The advantage to the Reservation would consist of saving a strip of land between Route 78 and Glenside Avenue for park purposes. However, Glenside Avenue already separates this northerly land from the body of the park. This marginal advantage is outweighed by the additional expense, steeper grades and greater encroachment of the highway slope on the ridge of the mountain.

Third Variation - An alignment on the southerly side of Glenside Avenue through the Reservation was considered. This variation diverges from the recommended route at Diamond Hill Road and rejoins it near the stables.

The advantage of this alignment is that it is nearer the valley floor and therefore the profile grades of the roadways would be less steep and there would be less required earthwork. These factors would result in a quieter vehicle operation and less expensive construction

respectively. In addition, the cut slope for the westbound roadway would be less damaging to the Second Watchung Mountain than for the recommended alignment.

The principal disadvantage, which is judged to be the dominant consideration, is that more parkland would be separated from the main body of the Reservation. In addition to isolating a larger area of the Reservation and taking the right-of-way from one of the most heavily used park areas, the noise and air pollution associated with the highway would affect a greater area of developed park. The alignment is deemed unacceptable because of the severe impact on the Reservation.

Fourth Variation (see Plate 2) - The possibility of constructing this section of Route 78, along the recommended alignment, without the interchange ramps has been considered. The nearest full interchanges are at Route 24 Freeway in Springfield and at Hillcrest Road in Watchung, which are about 8 miles apart. There is a partial interchange at Plainfield Avenue which does not provide for access to eastbound Route 78 or exit from westbound Route 78. Plainfield Avenue is approximately 1.3 miles east of Hillcrest Road.

Omitting the Diamond Hill Road-McMane Avenue-Glenside Road-Glenside Avenue ramps would reduce the amount of parkland required from the Watchung Reservation by about 25 acres, most of which is in the vicinity of McMane Avenue. There would also be less taking on the north side of Glenside Avenue near the Glenside Avenue underpass.

The residences near Diamond Hill Road and McMane Avenue would experience less noise and air pollution if the ramps are not constructed.

One of the important functions of an urban Interstate Highway is to serve intercity traffic movements which suggest interchanges located sufficiently close together to avoid concentrating highway bound traffic on local collector roads. Without the recommended interchange, the local movements to and from Route 78 would use Hillcrest Road, Plainfield Avenue, Route 24 Freeway or Springfield Avenue interchanges which would burden the feeder roads to those locations. Mountain Avenue, Glenside Avenue and Plainfield Avenue would be among the roads most seriously affected. The problem would be particularly acute during the peak hours when the commuter traffic associated with the various major employers in the area seek access to Route 78.

The recommended interchange is essential to the project if Route 78 is to serve the local transportation requirements as well as the through movements.

The noise and air pollution impacts at the John E. Runnells Hospital would not be improved by deleting the interchange. In fact, the situation might be worse due to increased traffic on Plainfield Avenue. The impact on the Watchung Reservation in terms of air, noise and water would be virtually the same with or without the interchange.

Similarly, the residences adjacent to the highway, with the exception of those noted at Diamond Hill Road and McMane Avenue would experience the same noise and air pollution impact.

In order for Route 78 to adequately serve the local transportation needs, the recommended interchange is considered essential and therefore is included in the recommended alignment.

Minimization of Harm to Section 4(f) Lands

There is no feasible and prudent alternative to the recommended alignment which takes approximately 116 acres from the Watchung Reservation. Although the northerly alternate alignment and the alternate of not constructing this section do not involve taking 4(f) land, they would be so disruptive in terms of homes to be taken, noise, air pollution, and community disruption inflicted on the adjacent properties that they cannot be considered feasible. The rehabilitation of Route 22 would have had no appreciable impact on Watchung Reservation, but it would have had a severe adverse impact on several other 4(f) lands.

The alternate through the well field does not require as much taking from the Watchung Reservation but risks destruction of the water supply and requires more homes to be taken. It, therefore, is not considered feasible or prudent.

The alignment of the highway through the park has been extensively studied in terms of minimization of impact. The recommended alignment on the north side of Glenside Avenue, although more expensive to build than on the south side, takes less 4(f) land and is less restrictive to utilization of the park.

The separate profiles of the highway are set to fit into the hillside with the minimum destruction due to cuts and fills.

The Diamond Hill Road - McMane Avenue - Glenside Road - Glenside Avenue interchange which received Plan, Specification and Estimate approval from the Bureau of Public Roads in 1965 and 1966 was subsequently restudied at the behest of the Union County Park

Commission. The studies carried out by the New Jersey Department of Transportation were closely coordinated with the Federal Highway Administration and the Union County Park Commission. The resulting design, which entails an additional bridge, requires approximately 2.8 acres less parkland. This interchange was made a part of the Memorandum of Understanding with the U.C.P.C. and is included in Appendix 3.

Since Route 78 changes the drainage patterns of the area whose runoff now comes down the south slope of the Second Watchung Mountain, a study was undertaken to determine the effect of these changes. The recommendations contained in the study will be incorporated in the design to remove the silt from the highway runoff before it is discharged into Lake Surprise and Blue Brook. The design consists of a series of sedimentation basins, constructed in the natural water courses feeding the lake and brook, which will detain the storm runoff allowing the silt load to settle out (see Plate 5). The basins will be constructed prior to the commencement of work on Route 78 to ensure maximum protection for the lake and brook during the highway construction period. The basins will be maintained in perpetuity in order to remove particulate matter washed off the highway.

The N.J. DOT will relocate the riding stables, ring, and related facilities prior to the highway construction, thus providing for uninterrupted stables and trail operations.

The right-of-way will be fenced throughout the Reservation to prevent children and animals from entering the roadway.

Where appropriate in the Reservation area, noise screens will be designed to keep the impact of higher noise levels to a minimum.

When technology in the abatement of water and air pollution advances sufficiently to develop practical control devices, the New Jersey Department of Transportation will install and maintain them at the request of the Union County Park Commission.

An underpass for the Nike Site Road has been included in order to provide access to the 130 acres of Reservation land on the north side of Route 78.

A series of measures are required to be taken during the period of construction to minimize effects on the environment.

The vehicles used for shipping and transporting materials must be tight and clean to prevent material falling onto the roadway, be in good repair, be approved for safety, and the contractor must make provisions to remove spilled material promptly.

Explosives and highly inflammable material must be stored safely under lock and key, have a watchman on duty at all times, and flagmen must be employed to warn persons and traffic away from the danger area.

Soil erosion will be controlled by means of such measures as berms, dikes, dams, netting, sediment basins, mulches, grasses, and slope drains. In addition, contractors must submit schedules for accomplishment of the applicable measures before work may

start. Soil erosion control specifications are included in Appendix 4.

With regard to the site clearing, a four-foot fence is to be erected around trees and areas of vegetation to be preserved. The Landscape Bureau of the Department of Transportation will be consulted before any trees are removed and the Department of Agriculture consulted before removal of any elm trees. Burning of any waste material including plant life is prohibited by New Jersey Air Pollution Control Code.

To prevent accidents, the equipment used will be guarded in accordance with Federal and State codes. The contractor will be required to adhere to the provisions of the Occupational, Safety and Health Act.

The U.C.P.C. will be advised of the blasting operations.

Five-foot temporary fences with locked gates will be used at all potentially hazardous areas to protect pedestrians.

For the protection and maintenance of traffic, signs, barricades and warning lights will be set up. Flagmen will be used for direction of traffic, and temporary sidewalk laid where required. Provisions will be made to control dust.

The entire right-of-way will be permanently fenced for the protection of the highway users, the nearby residents and wildlife.

For the final cleaning-up operation the following steps will be required:

- a) all equipment and debris removed.
- b) all damage to fencing and walls repaired.
- c) all waterway obstructions caused by operations removed.
- d) sites left in neat and presentable condition.
- e) all disturbed areas topsoiled and seeded.

That there is no feasible and prudent alternative to constructing the recommended alignment, and that all possible planning has been carried out, is amply demonstrated in the text and Appendices of this report. The extensive coordination between the U.C.P.C. and the New Jersey Department of Transportation resulted in the letter of April 10, 1972 and the Memorandum of Understanding included as Appendices 2 and 3.

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Appendix 1

List of coordination meetings and letters between the N.J. Department of Transportation, Union County Park Commission and the Federal Highway Administration for Route 78 through the Watchung Reservation.

- 12-3-57 Meeting at Union County Park Commission. Mr. Green of Madigan-Hyland explained to Commission representatives the preliminary studies being prepared for Route FAI 102 (Route 78) and requested available maps from the Union County Park Commission.
- 1-22-58 Madigan-Hyland Report on Route location studies for FAI 102 from Vaux Hall Road in the Township of Union to Snyder Avenue in the Township of Berkeley Heights.
- 6-17-58 Resolution from the Park Commission opposing the construction of FAI 102 through public park lands.
- 6-23-58 Bulletin from the Park Commission asking friends of the Park Commission to protest the taking of lands from the Watchung Reservation for highway purposes.
- 6-30-58 Public Hearing for proposed Route FAI 102 from Berkeley Heights to Union Township. Hearing attended by various officials of the affected municipalities, the Union County Park Commission, Union County Board of Chosen Freeholders and interested private citizens.

- 12-18-58 Madigan-Hyland "Study and Report for the Rehabilitation of U.S. Route 22" to accommodate proposed FAI 102.
- 11-15-62 Meeting with representatives of the Park Commission to discuss their requirements and suggestions regarding the proposed alignment of Route 78. The Commission was shown the proposed alignment through the Park and was told that if the Army gave up the Nike Site, the Department would not construct an underpass to provide access, but that alternate access might be provided by a marginal road from Glenside Avenue. The Commission representatives stated:
- (1) The riding stables would have to be relocated to the southerly side of Route 78. (2) A bridle path underpass was unsatisfactory. (3) Route 78 would cut off the Park's access to Baltusrol Road and that it would have to be restored. The Department asked if it would be satisfactory to discharge the Route 78 drainage into normally dry gullies, and the Commission representatives indicated no objection.
- 12-17-65 Department received P.S. & E. approval from the Bureau
and
3-30-66 of Public Roads for construction projects Route 78, Section 5N and Route 78, Sections 4N and 5P.
- 1-23-67 Meeting with representatives of the Union County Park Commission. The Park Commission requested the Department to review the alignment of Route 78.

2-1-67 Preliminary construction plans and right-of-way prints forwarded to the Union County Park Commission as requested at a meeting on 1-23-67.

3-15-67 N.J. Department of Transportation letter to the Union County Park Commission regarding studies made for shifting Route 78 alignment in the Watchung Reservation.

3-22-67 Union County Park Commission letter to the Department of Transportation requesting additional studies to reduce the severed lands in the Watchung Reservation.

4-11-67 Meeting with representatives of the Park Commission to commence right-of-way negotiations. Representative of the Park Commission stated that offer was premature due to pending studies for shifting alignment of Route 78.

8-1-67 Union County Park Commission letter to the New Jersey Department of Transportation requesting the right-of-way acquisitions for Route 78 abutting the Watchung Reservation, while a shift in proposed Route 78 alignment was being studied.

9-6-67 New Jersey Department of Transportation to Union County Park Commissioner summarizing previous coordination meetings and studies made for Route 78 in the Watchung Reservation. The Department's letter indicated that a model and exhibits were being prepared of the various studies, to be presented to Park Commission at a forthcoming meeting.

- 11-27-67 Meeting with representatives of the Union County Park Commission to present studies and model for Route 78. The Commission requested that the alignment be shifted northerly to leave 10 more acres of park land. The reasons for the present alignment were explained apparently to the satisfaction of the Commission. The Commission was told that if access were to be provided to the Nike Site it would be by a marginal road or an underpass, but not both. The Commission requested a redesign of the McMane Ave. interchange to reduce the acquisition of park land. They also requested an interchange at Baltusrol Road to reduce traffic through the park. Mr. Lafferty complained of the proposed large drainage pipes discharging into other than natural water courses.
- 12-7-67 N.J. Department of Transportation letter to the Park Commission transmitted copies of aerial photos, re-alignment study, earthwork summary, traffic volumes and model which were presented at the meeting held on 11-27-67.
- 12-27-67 Union County Park Commission to N.J. Department of Transportation regarding Commonwealth Water Company's plans for erection of water storage tank on the Park Commission's land in the vicinity of Route 78.

- 1-5-68 New Jersey Department of Transportation letter to the Union County Park Commission denoted the Department's impression of what occurred at the meeting with the Park Commission on 11-27-67.
- 1-15-68 N.J. Department of Transportation letter to Park Commission answering letter of 12-27-67. Department indicated that the proposed water storage tank laid outside the present right-of-way requirements for Route 78, but that the proposed relocation of the Nike Site Road may have effect on the water mains planned for the facility.
- 2-19-68 Meeting with representatives of the Park Commission to discuss a possible revision of the plan for Route 78 in the vicinity of McMane Avenue. A revised scheme which reduced Park property-taking for Route 78 was presented. The Commission indicated acceptance of this scheme. Also questioned at this meeting was the construction of the Nike Site Road Bridge. The Department stated that this may possibly be included in Route 78 plans providing such construction would mitigate the severance damage to Park lands. Relocation of the riding stables was to be included in the right-of-way settlement. The Commission expressed its concern for an interchange at Baltusrol Road.

- 3-28-68 The Department met with the Commission again and informed it that the Baltusrol Road interchange was still under review, but was not likely to be approved. It also told the Commission that the eastbound entrance ramp from Glenside Avenue was not to be built at the present time. The Commission submitted a revised alignment of Glenside Avenue, which left more land undisturbed in the Park. The Nike Site Bridge and access road were discussed as needed to reduce damage in the park.
- 4-11-68 Revised drawings of relocated Glenside Avenue, which were discussed at a meeting on 3-28-68 were forwarded to the Park Commission consultant.
- 7-31-68 A meeting was held with the Union County Park Commission. Park Commission representatives asked that a letter be forwarded to them stating the Department's position relative to the proposed revision at the interchange of McMane Avenue and the revised scheme for Glenside Avenue. It was stated that the Department would not submit to the Bureau of Public Roads any revisions of the present Route 78 plan until the Park Commission had approved the schemes.
- 8-1-68 Department of Transportation letter to the Park Commission, which itemized in writing the matters discussed at meeting held on 7-31-68.

- 8-22-68 Park Commission letter to Department of Transportation asking questions regarding drainage outlets, Nike Site Road, stables, protection of plant and animal life and slope protection.
- 8-30-68 Department of Transportation letter to the Park Commission answering the questions raised in the Park Commission's letter of 8-22-68.
- 9-20-68 Park Commission letter to Department of Transportation requesting a field trip to inspect the proposed storm water outlets to be discharged into the Watchung Reservation. The Commission also questions the planning for the Nike Site Bridge, relocation of stables and nature of landscaping and slope stabilization for Route 78.
- 10-15-68 The Department and the Commission met in the Watchung Reservation to discuss the drainage of Route 78. The Commission contended that the construction of Route 78 would increase the runoff to the park and cause serious silting of Lake Surprise. The Commission approved the proposed Glenside Avenue realignment and again stated that access to the Nike Site was necessary.
- 10-25-68 Department of Transportation letter to the Park Commission which answered the questions submitted in

the Park Commission's letter of 9-20-68, and transmitted updated schemes for access in the vicinity of the stables, and proposed eastbound ramp to Route 78.

- 11-4-68 Park Commission letter to the Department of Transportation concurred in schemes submitted on 10-25-68 to be incorporated in construction plans for Route 78. The Commission again raised questions on the Nike Site Road Bridge and storm drainage as elements of damage in the park.
- 11-14-68 Park Commission letter to Department of Transportation requested joint meeting in December, 1968 with the Union County Board of Chosen Freeholders to discuss Route 78 through the Watchung Reservation.
- 11-21-68 Department of Transportation letter to the Park Commission arranging date in December, 1968 for a meeting to discuss Route 78 in the Watchung Reservation and execute a Memorandum of Understanding regarding alignment of Route 78 through the Park.
- 11-25-68 The Department of Transportation forwarded draft copies of the Memorandum of Understanding to the Union County Park Commission for their review prior to a meeting in December, 1968.
- 12-11-68 Meeting in Commissioner Goldberg's office with members of the Park Commission and the Department. General

discussion on the Memorandum of Understanding. Park Commission objected to some of Department's conditions. It was decided that a new Memorandum of Understanding should be prepared and submitted to the Park Commission prior to another meeting.

- 12-12-68 Department of Transportation letter to the Park Commission confirming that plans for the revised alignment of Route 78 through the Watchung Reservation, to be referred to in pending Memorandum of Understanding, were hand delivered at the meeting held on 12-11-68.
- 12-12-68 Department of Transportation letter to the Park Commission requesting a letter from Park Commission indicating general approval of Route 78 revised alignment through the Park.
- 12-19-68 Park Commission letter to the Department of Transportation stated that Commission deferred action requested in Department's 12-12-68 letter, pending receipt of revised Memorandum of Understanding from the Department of Transportation.
- 12-27-68 The Department of Transportation transmitted revised draft of the Memorandum of Understanding to the Park Commission for their review prior to a meeting in January, 1969.

- 1-10-69 Meeting held with representatives of the Park Commission to discuss revised Memorandum of Understanding. The Park Commission requested money be made available for relocation of stables. The Commission indicated a consultant was studying the drainage outfalls from Route 78.
- 2-25-69 Plans were submitted to the Bureau of Public Roads reflecting the Park Commission's suggested revision of the McMane Avenue and Glenside Avenue interchange area, addition of an overpass to Old Nike Site and addition of a ramp from Glenside Avenue to Route 78 E.B.
- 5-16-69 The Bureau of Public Roads withheld concurrence of the Department's February 25, 1969 submission which reflected the scheme suggested by the Park Commission. The Bureau of Public Roads submitted a sketch for a suggested revision of the interchange area to improve operational and safety features.
- 5-27-69 The Bureau of Public Roads transmitted another study sketch to the Department combining features of original and revised plans to improve directional movements within a reduced right-of-way area at McMane Avenue.
- 8-28-69 Meeting held with the Park Commission to present revised scheme "J" developed by the Department for the

McMane Avenue interchange which improved traffic movement from McMane Avenue to E.B. Route 78 and reduced the taking of park land by about two acres. The Park Commission offered no objection to Scheme "J". The Commission requested that drainage problems which will occur during the construction of Route 78 be resolved.

- 10-3-69 The Park Commission wrote to D. A. Biederman, Deputy Attorney General for the Transportation Department, indicating its acceptance of Scheme "J". Some qualifications were indicated in this letter regarding geometric designs which were minor and could be resolved. The Commission's main concern, however, was the treatment of the drainage in the area of Route 78.
- 10-8-69 D. A. Biederman of the Department of Transportation acknowledged the Park Commission's letter of October 3.
- 1-20-70 Department of Transportation letter to the Park Commission requesting written concurrence to Scheme "J" presented at meeting on 8-28-69.
- 2-2-70 Park Commission letter to Department of Transportation stated that it had answered the request made on 8-28-69 for concurrence to Scheme "J" on 10-3-69 and requested a reply to the drainage problems raised in letter dated 10-3-69.

- 2-3-70 Department of Transportation letter to the Park Commission acknowledged the Park Commission letter of 2-2-70 and apologized for the misunderstanding created by the Department's letter dated 1-20-70.
- 2-16-70 Scheme "J" submitted to the Bureau of Public Roads for comments and approval. The Department recommended the sedimentation basins requested by the Union County Park Commission be considered for inclusion in the Route 78 plans.
- 3-6-70 The Bureau of Public Roads responded to the Department's February 16 submission and approved Scheme "J" with minor revisions. The Bureau of Public Roads also stated that a Section 4(f) report is required to be submitted to the Secretary of Transportation for his approval of the use of park land for highway purposes.
- 4-8-70 Park Commission letter to the Department of Transportation requesting the Department's concurrence for the Nike Road underpass and funds for constructing special drainage facilities prior to the construction of Route 78.
- 4-16-70 Department of Transportation letter to the Park Commission acknowledging letter of 4-8-70 and advising that the Department must submit additional data to the

Bureau of Public Roads in order to receive design approval for the alignment of Route 78, Nike Road Bridge and special drainage treatment in the Park. The Department also requested the Park Commission to submit a copy of its engineering drainage reports.

- 5-11-70 The Park Commission submitted to the Department of Transportation a copy of the Drainage Control Study dated February, 1969, prepared by Richard J. Jeske, Inc. along with a copy of Mr. Jeske's supplemental letter dated 9-15-69, regarding drainage revisions required for Scheme "J".
- 5-13-70 Section 4(f) report with documentation and maps of Route 78 alignment studies through the Watchung Reservation submitted to the Bureau of Public Roads as required by the Department of Transportation Act of 1968.
- 5-20-70 Department of Transportation letter to the Park Commission acknowledging receipt of hydraulic report submitted on 5-11-70.
- 5-21-70 Department of Transportation letter to the Bureau of Public Roads to supplement Section 4(f) report submitted on 5-13-70, stating that no feasible or prudent alternative is available for the construction of Route 78 through park land.

- 6-30-70 Park Commission letter to the Department of Transportation requesting copies of final construction drawings and specifications for Route 78 through the Watchung Reservation.
- 7-8-70 Bureau of Public Roads requested additional information on the treatment of drainage on park lands. A statement from the Park Commission agreeing with design features was also requested to document that all possible planning was done to minimize harm to park land.
- 7-15-70 The Department of Transportation forwarded copies of preliminary drawings developed for Route 78 to the Park Commission.
- 7-23-70 Park Commission letter to the Department of Transportation. The Park Commission indicated that preliminary plans received did not provide details as to drainage and erosion. The Park Commission also indicated that the proposed Nike Road Bridge was required for access to the Regional High School and therefore, is not an element to mitigate damages to severed park land.
- 7-24-70 The Department of Transportation acknowledged the Park Commission's letter of 7-23-70 and advised that a meeting would be arranged to discuss drainage details for Route 78.

- 7-31-70 The Bureau of Public Roads rescinded P.S. & E. approval issued four years earlier for the Route 78, Section 5N and Route 78, Sections 4N and 5P construction projects, due to the time lapse and significant revisions required within the Watchung Reservation.
- 11-5-70 Meeting held with the Park Commission to discuss the status of Route 78 through Park lands. General topics discussed were right-of-way procedures, Nike Road Bridge and relocation of stables. It was agreed that a special meeting between the engineers would be arranged to discuss drainage details. The Department requested a letter from the Park Commission to indicate a current determination as to the acceptability of the Highway through Park land.
- 11-13-70 Meeting held with the Park Commission's engineers to discuss drainage treatments for Route 78. The Department questioned the treatment proposed of drainage pipes for various drainage systems extended to the brook. It was agreed that the proposed sedimentation basins would be included in the Route 78 plans and that special provisions would be provided in Supplementary Specifications to protect against erosion and pollution.
- 12-22-70 The Department of Transportation transmitted preliminary drainage study plans for Route 78 to the Park

Commission. The Department requested the Park Commission to review the concept of a reduced number of drainage pipes to Blue Brook to minimize excavation in the Park land.

- 2-1-71 The Park Commission's letter to the Department acknowledged receipt of preliminary drainage study plans. The Commission indicated that a more detailed study is needed of the lower approach areas to the lake.
- 4-1-71 The Federal Highway Administration returned the Section 4(f) report submitted on 5-13-70 and requested a joint Section 4(f) Environmental Impact Statement be prepared and submitted for the alignment of Route 78 through the Watchung Reservation.
- 4-5-71 Meeting held with the Park Commission to discuss the status and procedures to be taken to complete the Route 78 plans through the Watchung Reservation. The Commission stated that Dr. Harmon had prepared a report "An Envaluation of Impact of FAI 78 on the Watchung Reservation". The Commission requested that the easterly alignment of Route 78 be shifted to the north to reduce critical impact of Route 78 in the Park. The Department stated that a northerly alignment for Route 78 had initially been studied and that the

scheme would be reconsidered as to its effect on the Commonwealth Water Company well field and residential areas.

4-20-71 Meeting held with the Park Commission to present studies developed for alternate Route 78 alignment requested at meeting on 4-5-71. The Department stated that northerly alignment would: (1) Eliminate five wells and severely damage the remaining five wells of the Commonwealth Water Company; (2) Require the acquisition of 20 additional dwellings; and (3) Create critical construction problems at Houdaille Quarry due to recent quarry excavations in the vicinity of the Route 78 right-of-way. The Department added that approximately five years might be required to prepare plans, hold a public hearing, receive Federal approval and acquire right-of-way for the northerly alignment. The Commission stated they would accept the present alignment for Route 78 and agreed to implement an agreement with the Department.

5-25-71 Park Commission letter to the Department of Transportation transmitting a copy of the proposed Memorandum of Understanding for conditional approval of the alignment of Route 78 through the Watchung Reservation which was discussed at a meeting on 4-20-71.

- 5-26-71 The Park Commission's Consultant, Mr. Jeske, sent letter to Madigan-Hyland, Inc. requesting additional information as to Route 78 drainage facilities to complete his studies for the Park Commission.
- 6-16-71 Park Commission letter to the Department of Transportation confirming meeting to be held on 6-24-71 regarding pending Memorandum of Understanding.
- 6-24-71 Meeting with the Park Commission to discuss proposed Memorandum of Understanding for Route 78 through the Watchung Reservation. The Commission requested approximately \$1 million be made available for the construction of the relocated riding stables prior to the construction of Route 78. The Department indicated that present Federal Highway Administration regulations require Fair Market Value be established for Route 78 acquisition in the Park, prior to advance payment to the Park Commission to relocate the stables. The Commission questioned the basis for limiting money for drainage work to \$250,000, and the status of the Nike Road Bridge.
- 9-17-71 Meeting with the Park Commission to discuss development of drainage plans. Mr. Jeske presented revised concept for drainage treatment in the Reservation area. The Department questioned the need for "reinforced concrete" sedimentation basins and a dam.

The Department agreed to coordinate with the Federal Highway Administration as to the revised drainage concept, which was estimated to cost between 1/2 to 3/4 million dollars.

- 9-30-71 Revised concept for drainage treatment in Watchung Reservation submitted to the Federal Highway Administration for its information, evaluation and comments.
- 10-21-71 Federal Highway Administration letter to the Department of Transportation indicated that it was in accord with the necessity for special drainage system to control the Route 78 runoff to minimize the possibility of harm to the park. It indicated specific comments toward developing a more effective facility which is more practical to construct and maintain.
- 10-28-71 Department of Transportation letter to the Park Commission transmitted a copy of the Federal Highway Administration's drainage comments in a letter dated 10-21-71. The Department confirmed the date for a meeting to discuss the drainage comments for 11-5-71.
- 11-5-71 Meeting held with the Park Commission to discuss comments on proposed drainage system to control Route 78 runoff in the Watching Reservation. It was agreed that all the proposed drainage facilities required

outside of the Rt. 78 right-of-way on Park property would be done by the Commission at the expense of the Department.

- 11-22-71 The Park Commission's Consultant, Mr. Jeske, sent a letter to the Department listing detailed responses to various comments regarding the proposed drainage system. Mr. Jeske emphasized that his design criteria were based on grit chambers and that the preliminary drainage study must be updated when the plans are finalized for Scheme "J" interchange at McMane Avenue.
- 12-3-71 Mr. Jeske transmitted to the Department prints of the preliminary drainage plans and copy of design data of the proposed grit chambers.
- 1-5-72 Federal Highway Administration letters to the Department of Transportation submitting their detailed review comments on the drainage items proposed for the Watchung Reservation. A meeting was suggested to resolve any differences on the proposed drainage design.
- 1-11-72 Department of Transportation letter the Park Commission transmitted copies of the Federal Highway Administration's drainage comments in a letter dated 1-5-72 for the Commission's review prior to a joint meeting to discuss drainage plans.

1-13-72 Department of Transportation met with representatives of the Federal Highway Administration to discuss their drainage comments. The Federal Highway Administration stated that its comments were based on theoretical hydraulic calculations and that its main concern was that the hydraulic designs were adequate. It was agreed that a joint meeting would be arranged with the Park's drainage consultant to resolve the remaining drainage problems.

1-19-72 The Park Commission's letter to the Department requested a tri-agency meeting for the purpose of reaching an agreement on the proposed hydraulic system for the Watchung Reservation.

2-1-72 The Park Commission's consultant, Mr. Jeske, sent a letter to the Federal Highway Administration which offered detailed answers to the various comments denoted in the Federal Highway Administration's letter dated 1-5-72.

2-15-72 A joint meeting was held among the Department of Transportation, the Federal Highway Administration and the Park Commission to discuss drainage items proposed for the Watchung Reservation to minimize the effect of Route 78. Drainage plans were discussed in detail and the various comments were resolved. Mr. Jeske indicated that the present drainage design

concept amounted to approximately \$600,000. It was agreed that another meeting would be arranged to finalize the wording of the pending Memorandum of Understanding.

- 2-18-72 The Department met with representatives of the Federal Highway Administration to discuss general aspects of the Memorandum of Understanding to be finalized with the Park Commission for Route 78 in the Watchung Reservation.
- 3-7-72 The Department met with representatives of the Federal Highway Administration to discuss preliminary engineering services required for Route 78 in the Watchung Reservation. It was decided that the Department would submit to the Federal Highway Administration design approval letters for Route 78 through the Watchung Reservation.
- 3-10-72 The Department submitted design approval letters to the Federal Highway Administration for construction projects Route 78, Sections 5N and Route 78, Sections 4N and 5P. These denoted that the Federal Highway Administration had commented, on 5-16-69, on the design modifications to minimize the taking of Park land.
- 3-14-72 Representatives of the Federal Highway Administration indicated that a joint EIS - Section 4(f) submission

was required for Route 78 as specified in a letter dated 4-1-71 to the Department of Transportation. The Federal Highway Administration indicated that the EIS - Section 4(f) report must be approved prior to authorizing a program to participate in construction of drainage facilities by the Park Commission to reduce the impact of Route 78 on the Park lands.

3-21-72 The Department of Transportation's letter to the Federal Highway Administration recommended preparation of an environmental analysis be considered in lieu of a joint EIS - Section 4(f) report, since a Memorandum of Understanding relative to the alignment of Route 78 through the Watchung Reservation was expected to be executed shortly with the Park Commission.

4-10-72 A meeting was held with the Park Commission to discuss and finalize the Memorandum of Understanding. Questions regarding drainage systems and their maintenance, relocation of riding stables, and park expenses encountered to date for analysis, design, engineering and ecological work were discussed and resolved during the meeting. At the conclusion of the meeting a Memorandum of Understanding was prepared and executed by the Park Commission and the Department of Transportation.

- 4-10-72 The Park Commission's letter to Department of Transportation acknowledged general agreement reached for the alignment of Route 78 through the Watchung Reservation. The Commission stated that there was no feasible or prudent alternate for the alignment of Route 78 and that they were satisfied that the Department would take all action necessary to minimize any adverse impact on Park lands.
- 4-10-72 A joint news release as to execution of the Memorandum of Understanding between the Park Commission and the Department of Transportation.
- 4-12-72 The Department of Transportation's letter to the Federal Highway Administration transmitted copies of:
(1) Memorandum of Understanding executed 4-10-72 with the Park Commission; (2) Letter dated 4-10-72 from the Park Commission noting general agreement on construction of Route 78; (3) Joint news release noting agreement reached for the Route 78 alignment in the Watchung Reservation.
- 4-25-72 The Federal Highway Administration's letter to Department of Transportation stating that a determination had been made that an EIS must be prepared whenever there is Section 4(f) park land involved. The Federal Highway Administration indicated that a letter of understanding with the Park Commission

should materially expedite the processing and final approval of an EIS - Section 4(f) report.

- 5-26-72 The Department of Transportation's letter to the Park Commission transmitted right-of-way plans for Route 78 from Baltusrol Road to Shunpike Road for the Park Commission's use in acquiring land for proposed Hidden Valley Park.
- 6-3-72 The Park Commission's letter to the Department of Transportation requested an anticipated timetable for the construction of Route 78 in the Watchung Reservation, so that the Commission could plan for the replacement of the riding stables.
- 7-24-72 The Department of Transportation's letter to the Park Commission advised that the Department was preparing a draft EIS - Section 4(f) report for Route 78 as required by the Federal Highway Administration and that it was tentatively scheduled for distribution in late 1972. The Department stated that the final design for Route 78 was being held pending submission and approval of the required EIS - Section 4(f) report.
- 10-19-72 A meeting with representatives of the Park Commission was held to discuss the preparation of the draft EIS - Section 4(f) report. The Department explained that

the various alternates considered for Route 78 would be presented in the report and outlined the treatment of air, noise and water pollution also to be discussed in the report. The Park Commission supplied copies of water quality tests made in Lake Surprise.

10-24-72 The Department of Transportation's letter to the Park Commission transmitted a copy of the PPM 90-1 dated 8-24-71, which was requested at a meeting held on 10-19-72.

Appendix 2

UNION COUNTY PARK COMMISSION

April 10, 1972

Honorable John C. Kohl
Commissioner of Transportation
1035 Parkway Avenue
Trenton, New Jersey 08625

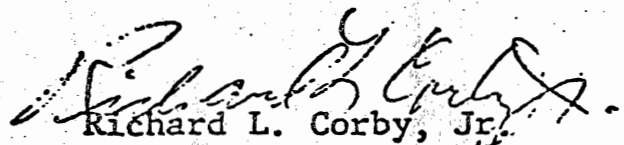
Dear Commissioner Kohl:

After many meetings, a general agreement on the alignment of Route 78 through the Watchung Reservation, the interchange at McMane Avenue, and the drainage treatment in the reservation lands was reached. We believe that satisfactory treatment has now been provided for the relocation of the riding stables and for drainage facilities to protect park lands.

It was agreed that the Department of Transportation would give particular emphasis to the protection of the natural environment in the preparation of its plans, specifications, and construction throughout the reservation. In preserving the reservation, special contractual provisions will be provided for landscaping, soil stabilization, erosion control, silt removal, and drainage facilities.

The Department and the Union County Park Commission recognize that at this date there is no feasible or prudent alternate for the alignment of Route 78 and the Park Commission is satisfied that the Department has agreed to take all action necessary to minimize any adverse impact of the construction on the park lands.

Very truly yours,


Richard L. Corby, Jr.
President

Appendix 3

THIS MEMORANDUM OF UNDERSTANDING, made this 10th day of April, 1972, between THE UNION COUNTY PARK COMMISSION, a body politic of the County of Union, State of New Jersey, with headquarters located at Warinanco Park, P. O. Box 275, Elizabeth, New Jersey 07207 (hereinafter referred to as the "Commission"), and the STATE OF NEW JERSEY, by the Commissioner of the Department of Transportation, 1035 Parkway Avenue, Trenton, New Jersey 08625 (hereinafter referred to as the "State").

W I T N E S S E T H :

WHEREAS, the Commission, as owner of a large area of virgin woodland and park area known as the Watchung Reservation (hereinafter referred to as the "Reservation"), pursuant to the provisions of N.J.S.A. 40:37-96 et seq., is responsible, as a public trust, for the acquisition, preservation, improvement and management of such area; and

WHEREAS, the Reservation will be traversed and affected by an interstate highway known as Route 78, it is deemed necessary that this Memorandum of Understanding, which constitutes the consent necessary pursuant to N.J.S.A. 27:7-36, clarify the basic relationship of the route to the Reservation so that the State can proceed with the changes to the detailed plans required to place this section of Route 78 under construction.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, the Commission and the State agree as follows:

1. Route 78 will traverse the Reservation as an interstate highway to which access is denied. No access to the roadway will be granted except at those interchanges designated by the Commissioner of Transportation, approved by the Federal Highway Administration (hereinafter referred to as "F.H.W.A.") of the United States Department of Transportation and approved by the Commission.

2. Pursuant to negotiations between the parties, the State prepared the following plans, annexed hereto and made a part hereof as:

(a) Development plan entitled "Route 78 200' Scale Development Plan From 'STA.W' 26 + 60 to 'STA.W' 150 + 50, Madigan-Highland, Engineers, New York City, 3-9-1970." (hereinafter Exhibit "A").

(b) Development Plan entitled "Route 78 200' Scale Development Plan From 'STA.W' 124 + 00 to 'STA.W' 303 + 00, Madigan-Highland, Engineers, New York City, 3-9-1970." (hereinafter Exhibit "B").

These two Exhibits shall form the basis for the preparation, by the State, of detailed construction plans and supporting contract documents.

3. Exhibits "A" and "B" are understood by both parties to be schematic in all respects. Final calculations in the preparation of detailed plans may necessitate slight revisions in these Exhibits.

4. The State shall submit Exhibits "A" and "B" to the F.H.W.A. for its approval for further development. If these Exhibits are approved for further development by the F.H.W.A., the State will immediately proceed with the preparation of revisions to its detailed plans and will forward the new preliminary construction plans and right-of-way documents so prepared to the Commission as soon as they are completed for the review and approval of the Commission as complying with this agreement, which approval shall not be unreasonably withheld. The Commission shall act with reasonable dispatch.

5. If the detailed plans revised in accordance with Exhibits "A" and "B" are approved by the Commission as being in conformity with this Memorandum of Understanding and are approved by the F.H.W.A., then and in such event:

(a) Upon notice from the Commission of approval of said plans the State shall make its appraisals promptly and then shall make its offer to the Commission for the acquisition of the land and payment of damages. If accepted by the Commission the parties shall enter into an agreement of sale and the State will make an immediate downpayment. Upon closing and delivery of deed the State shall promptly pay the amount so agreed upon to the Commission and shall take title to said premises.

(b) In the event the offer of the State is not accepted by the Commission within 30 days of its being made, State shall be entitled to a right of entry to perform all work necessary as determined by the State for the construction of Route 78 upon prior performance of the following:

(1) The State shall promptly file a Complaint, pursuant to 27:7-22 or N.J.S.A. 20:1-1 et seq., and Declaration of Taking with the Clerk of the Superior Court and shall deposit with the Clerk the full amount of the State's estimated compensation. Said deposit if withdrawn from Court would permit payment to the Commission the sum necessary to permit the design and construction of a replacement riding stable and related facilities prior to the commencement of highway construction with the further understanding that the State will stage its construction so as to minimize the interference with the existing stable and trail operations pending completion of the relocated facilities and shall cause the bridle trail located at approximately Station "E" 233+300 to remain open across the proposed right of way until such completion. The Commission shall proceed with its construction plans and specifications and to the advertising for construction contracts for its relocated stable facilities with reasonable dispatch upon the Commission's acceptance of the State's offer in lieu of condemnation or the State's making a deposit in Court.

(2) The State will supply to the Commission the additional details required to complete construction drawings and specifications for the Route 78 drainage collection system, Watchung Reservation, preliminary plans and specifications for which project have been prepared for the Commission by Richard J. Jeske, Inc., dated April 6, 1972, a true copy of which is annexed hereto as "Exhibit "C." Upon such completion

the plans and specifications will be submitted by the Commission to the State for approval. Upon such approval the Commission will advertise for bids. Prior to the award of contracts the State will pay to the Commission a sum equal to the total bids received from the lowest responsible bidders for the entire work acceptable to both the Commission and the State. The State reserves the right to inspect and approve the construction being performed under the contracts being so awarded. The Commission shall submit to the State its invoice for moneys actually expended to date in the analysis (surveys, investigations, research, design, etc.) including, but not limited to, engineering, ecological, planning and legal salaries, fees and for related costs. The State will reimburse the Commission for such moneys actually expended, not, however, to exceed \$50,000.00. For the repayment of sums hereafter to be paid by the Commission, the Commission shall submit to the State the proposed form of the agreements (where applicable) for which reimbursement is to be made (including all services in connection with the further completion of plans, specifications, contract documents, the awarding of contracts and the administration of construction) and shall submit monthly its invoices for moneys paid pursuant to such agreements. The State shall reimburse the Commission monthly for such amounts.

(3) The State undertakes to maintain the drainage system facilities including those outside its right of way (i.e., to regularly and periodically remove sediment and debris from the same). The Commission shall be responsible for any repair to such facilities located on its property.

6. In the event the detailed plans revised in accordance with Exhibits "A" and "B" are not approved for further development by the F.H.W.A. and subsequent recommendations

of the F.H.W.A. cause any additional effect upon lands and facilities of the Commission, the Commission shall be immediately notified by the State and such recommendation submitted for review and approval by the Commission.

7. The State shall install permanent monuments marking the right-of-way lines throughout the Reservation. These monuments shall be located at every angle point of the right-of-way lines and at intervals as to permit each monument to be seen from its adjacent monuments. They shall be installed prior to commencement of construction, and maintained through the course of construction and thereafter by the State.

8. The State shall provide specifically in its construction contracts, plans, and specifications for close cooperation and coordination with the work of the drainage contractor to be engaged by the Commission so as to minimize to the extent within State's control the damage to the premises of the Commission.

9. The State will give particular emphasis in the preparation of its plans, specifications and general conditions, and the site clearance and construction pursuant thereto through the Reservation, to the public interest of the Park Commission in preserving the Reservation and in that interest will undertake special contractual provisions as to landscaping, soil stabilization, erosion control, silt removal

and drainage works. The Commission will cooperate fully with the State in furtherance of these mutually agreed objectives.

10. When technology in abatement of water, air, noise or land pollution advances so as to reasonably permit the installation of control devices in conjunction with highways, the State shall install such device or devices so as to further minimize the adverse impact of Route 78 upon the Reservation. Such devices shall be installed and maintained at the expense of the State upon the request of the Commission.

11. The parties agree that this Memorandum of Understanding in no way is intended to fix and determine the amount of any condemnation award or payment to be made in lieu thereof for the taking of a portion of the Reservation for interstate Route 78.

UNION COUNTY PARK COMMISSION

STATE OF NEW JERSEY

By: Richard L. Corby, Jr.
Richard L. Corby, Jr.
President

By: J. C. Kle

By: George T. Cron
George T. Cron
Secretary

December 10, 1970

1.7.1. Commencement and Procedure

The following is added to this Article of the Standard Specifications:

TEMPORARY PROJECT WATER POLLUTION CONTROL (SOIL EROSION)

DESCRIPTION:

This work shall consist of temporary control measures as shown on the plans or ordered by the Engineer during the life of the contract to control water pollution, through use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

The primary objective of this special provision is to control soil erosion to the maximum extent practicable commensurate with reasonable and economical highway construction practices.

The temporary pollution control provisions contained herein shall be coordinated with the permanent erosion control features specified elsewhere in the contract to the extent practical to assure economical, effective and continuous erosion control throughout the construction and postconstruction period.

MATERIALS:

- a. Mulches may be hay, straw, fiber mats, netting, wood cellulose corn or tobacco stalks, bark, corn cobs, wood chips, or other suitable material acceptable to the Engineer and shall be reasonably clean and free of noxious weeds and deleterious materials.
- b. Slope drains may be constructed of pipe, fiber mats, rubble, portland cement concrete, bituminous concrete, plastic sheets, or other material acceptable to the Engineer that will adequately control erosion.
- c. Grass shall be a quick growing species (such as rye grass, Italian rye grass, or cereal grasses) suitable to the area providing a temporary cover which will not later compete with the grasses sown later for permanent cover.
- d. Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Engineer.
- e. Others as specified by the Engineer.

PRECONSTRUCTION CONFERENCE:

At the preconstruction conference or prior to the start of the applicable construction, the contractor shall submit for acceptance his schedules for accomplishment of temporary and permanent erosion control work, as are applicable for clearing and grubbing; grading; bridges and other structures at watercourses; construction; and paving. He shall also submit for acceptance his proposed method of erosion control on haul roads and borrow pits and his plan for disposal of waste materials. No work shall be started until the erosion control schedules and methods of operations have been accepted by the Engineer.

CONSTRUCTION REQUIREMENTS:

The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, the surface area of erodible earth material exposed by excavation, borrow and fill operations and to direct the contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, and use of temporary mulches, mats, seeding or other control devices or methods as necessary to control erosion. Cut slopes shall be seeded and mulched as the excavation proceeds to the extent considered desirable and practicable.

The contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in his accepted schedule. Temporary pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent pollution control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise temporary erosion control measures may be required between successive construction stages. Under no conditions shall the surface area of erodible earth material exposed at one time by clearing and grubbing, exceed 750,000 square feet without approval by the Engineer.

The Engineer will limit the area of excavation, borrow and embankment operations in progress commensurate with the contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent pollution control measures current in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified.

Under no conditions shall the amount of surface area of erodible earth material exposed at one time by excavation, borrow or fill within the right-of-way exceed 750,000 square feet without approval by the Engineer.

The limitations on the clearing and grubbing operation and the grading operation are separate. The maximum area that may be underway at one time, subject to modification by the Engineer as hereinafter specified, is 750,000 square feet of clearing and grubbing, and 750,000 square feet of grading.

The Engineer may increase or decrease the amount of surface area of erodible earth material to be exposed at one time by clearing and grubbing, excavation, borrow and fill operations as determined by his analysis of project conditions.

Project soil conditions and the demonstrated ability and performance of the contractor in controlling erosion will be the prime factors used by the Engineer in the determination of whether areas smaller or larger than 750,000 square feet are reasonable. If the contractor should have various separate grading units or subcontractors in operation, the 750,000 square foot limits may apply to each individual operation if finishing, mulching, seeding and other such erosion control features closely follow the rough grading operations in each instance.

When profile grades are less than 3 percent and soil conditions indicate to the Engineer that erosion probabilities are slight, the roadbed area will not be included in the 750,000 square foot limitation for grading.

In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal or State or local agencies, the more restrictive laws, rules, or regulations shall apply.

METHOD OF MEASUREMENT AND PAYMENT:

In the event that temporary erosion and pollution control measures are required due to the contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled, and are ordered by the Engineer, such work shall be performed by the contractor at his own expense. Temporary erosion and pollution control work required, which is not attributed to the contractor's negligence, carelessness or failure to install permanent controls, will be performed as ordered by the Engineer.

Where the work to be performed is not attributed to the contractor's negligence, carelessness or failure to install permanent controls and falls within the specifications for a work item that has a contract price, the units of work shall be paid for at the proper contract price. Should the work not be comparable to the project work under the applicable contract items, the contractor shall be ordered to perform the work on a force account basis, or by agreed unit prices.

In case of repeated failures on the part of the contractor to control erosion, pollution, and/or siltation, the Engineer reserves the right to employ outside assistance or to use his own forces to provide the necessary corrective measures. Such incurred direct costs plus project engineering costs will be charged to the contractor and appropriate deductions made from the contractor's monthly progress estimate.

Temporary pollution control may include construction work outside the right-of-way where such work is necessary as a result of roadway construction such as borrow pit operations, haul roads and equipment storage sites.

The erosion control features installed by the contractor shall be acceptably maintained by the contractor.

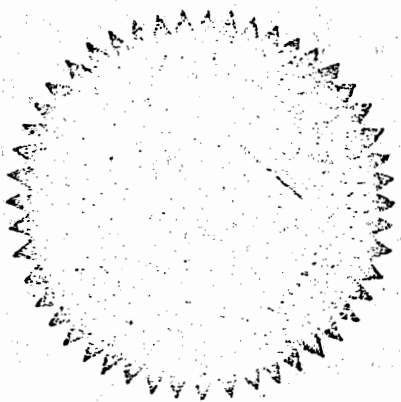
Appendix 5

Board of Chosen Freeholders

Union County, Elizabeth, New Jersey

I, MATILDA T. MCGOWAN, Clerk of the Board of Chosen Freeholders of the County of Union, do hereby certify that the annexed is a true copy of a Resolution, passed at a regular meeting of the Board of Chosen Freeholders, held on the 22nd day of November , 19..72..

In Witness Whereof, I have hereunto set my hand and the seal of the County of Union, this 24th day of November , 19..72..



Matilda T. McGowan
Clerk of the Board.

NOV. 22, 1972

RESOLUTION BY FREEHOLDER LONG FOR DEPT. OF ROADS AND BRIDGES

WHEREAS, the New Jersey Department of Transportation has plans to build Interstate Route 78 along an alignment through Union County as shown on their official alignment plan dated April 10, 1972; and

WHEREAS, Interstate Route 78 would pass through the length of the Union County Park Commission's Watchung Reservation; and

WHEREAS, the Union County Board of Chosen Freeholder would normally oppose the construction of such a facility through such a park; but

WHEREAS, it is understood that the New Jersey Department of Transportation intends to take special care in constructing Interstate 78 through the Watchung Reservation to minimize the impact of the facility and preserve the ecology to the furthest possible extent; and

WHEREAS, the New Jersey Department of Transportation has already completed or has under construction sections of Interstate Route 78 in Union County approaching the Watchung Reservation from both east and west; and

WHEREAS, the New Jersey Department of Transportation has already purchased the right-of-way for further implementation

of Interstate Route 78 to the Watchung Reservation boundaries,
and

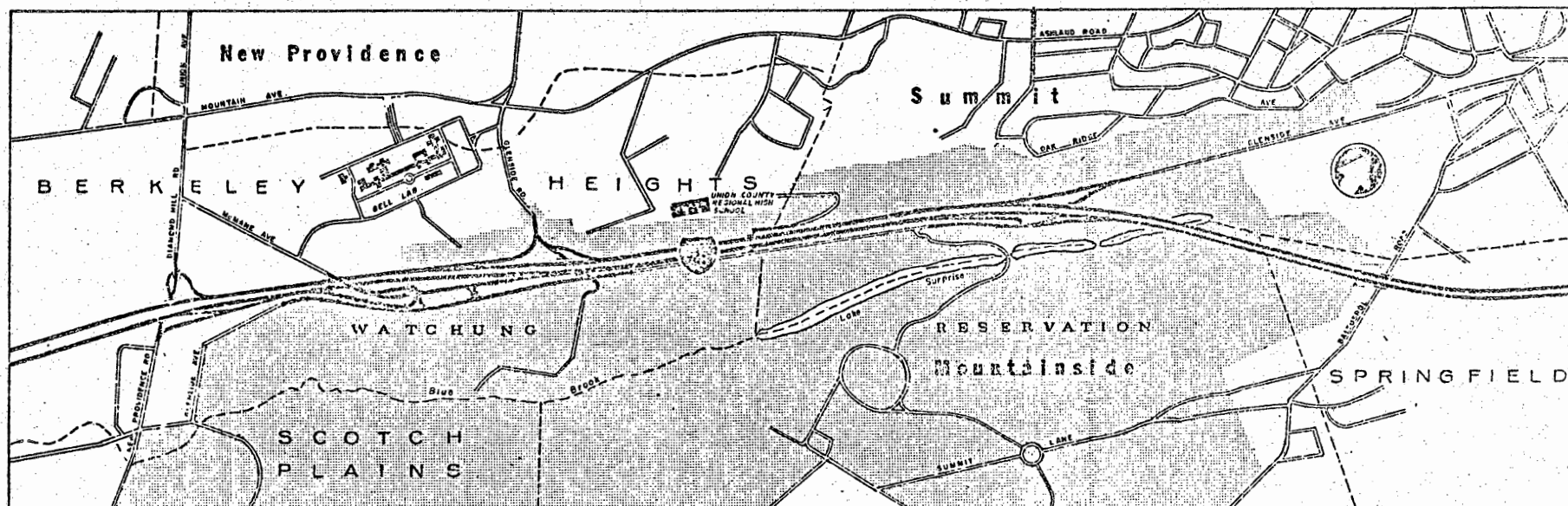
WHEREAS, this facility is greatly needed to relieve
traffic problems on U.S. Route 22 in Union County; and

WHEREAS, this facility has been planned for many
years and is shown on the Union County Planning Board's Interim
Road Plan adopted March 14, 1969; and

WHEREAS, the Union County Planning Board has endorsed
the Interstate Route 78 alignment plan dated April 10, 1972 in
their resolution adopted on September 20, 1972:

NOW, THEREFORE, BE IT RESOLVED, that the Union
County Board of Chosen Freeholders hereby endorses the New
Jersey Department of Transportation's proposed alignment of
Interstate Route 78 through Union County as shown on the official
plan dated April 10, 1972; and

BE IT FURTHER RESOLVED, that an attested copy of
this resolution be sent to the Union County Planning Board, the
Union County Park Commission, and the New Jersey Department of
Transportation.



April 10, 1972
(Map not attached to
Resolution - see)

RECEIVED

SEP 26 1972

OFFICE OF THE CHIEF
BUREAU OF
SURFACE DESIGN

UNION COUNTY PLANNING BOARD

Union County, New Jersey

RESOLUTION

WHEREAS, the Planning Board of the County of Union is currently carrying on comprehensive planning to guide the future growth of Union County; and

WHEREAS, the New Jersey Department of Transportation has plans to build Interstate Route 78 along an alignment through Union County as shown on their official plan dated April 10, 1972; and

WHEREAS, Interstate Route 78 would pass through the length of the Union County Park Commission's Watchung Reservation; and

WHEREAS, the Union County Planning Board would normally oppose the construction of such a facility through such a park; but

WHEREAS, the New Jersey Department of Transportation has already completed or has under construction sections of Interstate Route 78 in Union County approaching the Watchung Reservation from both east and west; and

WHEREAS, the New Jersey Department of Transportation has already purchased the right-of-way for further implementation of Interstate Route 78 to the Watchung Reservation boundaries; and

WHEREAS, this facility has been planned for many years and is shown on the Union County Planning Board's Interim Road Plan adopted March 14, 1969; and

2.

WHEREAS, this facility is greatly needed to relieve traffic problems on U.S. Route 22 in Union County;

NOW, THEREFORE, BE IT RESOLVED that the Union County Planning Board hereby endorses the New Jersey Department of Transportation's proposed alignment of Interstate Route 78 through Union County as shown on the official plan dated April 10, 1972; and

BE IT FURTHER RESOLVED that an attested copy of this resolution be sent to the Union County Board of Chosen Freeholders, the Union County Park Commission, and the New Jersey Department of Transportation.

I, George Cannon, Acting Secretary of the Union County Planning Board do hereby certify that the above is a true copy of the resolution passed at a regular meeting of the Union County Planning Board held on the 20th day of September, 1972.

By George Cannon
GEORGE CANNON
Acting Secretary

Attest Alfred H. Linden
ALFRED H. LINDEN
County Planning Director

RESOLUTION

WHEREAS, since the date of the opening of the Route 78 Interchange at Plainfield Avenue in Berkeley Heights in June of 1971, verified traffic counts reveal an increase in traffic of approximately 70% on Plainfield Avenue, in the Township of Berkeley Heights; and

WHEREAS, the bulk of the increased traffic are vehicles seeking to continue east bound into Newark and New York; and

WHEREAS, the said Plainfield Avenue is a "local" street and was not designed and is not adequate to serve as an access road from Interstate 78 to U. S. Route 22; and

WHEREAS, the best solution to the problem is to complete Interstate 78 to Newark at the earliest possible date.

NOW, THEREFORE, be it resolved by the Township Committee of the Township of Berkeley Heights, County of Union, State of New Jersey, that pursuant to the foregoing the Township Committee respectfully urges Governor Cahill to use his good offices to expedite the completion of Route 78 into Newark, it being the belief of the Township Committee that unnecessary delays have prevented extension of the highway beyond the aforesaid Plainfield Avenue.

BE IT FURTHER RESOLVED that a copy of this resolution be transmitted to Governor Cahill and the New Jersey Department of Transportation.

APPROVED this 20th day of MARCH, 1972.

ATTEST:

Caroline R. DeFreitas
Caroline R. DeFreitas,
Township Clerk

Roderick Anderson
Roderick Anderson, Chairman
(Mayor) Township Committee

RECEIVED

October 3, 1972

WHEREAS, the City of Summit is in agree- Resol.
ment that Route 78 should be completed between Ber- Completion
keley Heights and Springfield traversing through the Route 78
Union County Park Reservation and lands in the City
of Summit, and

WHEREAS, the Department of Transportation
has presented to representatives of the City of
Summit several alternate routes and a recommended
alignment for the completion of this section of
Route 78.

NOW, THEREFORE, BE IT RESOLVED BY THE
COMMON COUNCIL OF THE CITY OF SUMMIT:

That the City of Summit concurs in the
alignment of Route 78 as recommended by the Depart-
ment of Transportation in accordance with the attached
map dated April 10, 1972.

Dated: October 3, 1972

I, Harry C. Kates, City Clerk
of the City of Summit, do hereby
certify that the foregoing reso-
lution was duly adopted by the
Common Council of said City at
a regular meeting held on Tuesday
evening, October 3, 1972.

Approved:

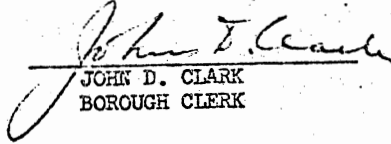
ELMER J. BENNETT

Mayor


City Clerk

Appendix 9

I DO HEREBY CERTIFY THAT THE FOLLOWING IS A TRUE AND CORRECT COPY OF A RESOLUTION WHICH WAS ADOPTED BY THE MAYOR AND COUNCIL AT A REGULAR MEETING HELD ON THE 10TH DAY OF OCTOBER, 1972.


JOHN D. CLARK
BOROUGH CLERK

Res. 72-83

RESOLUTION OPPOSING ALIGNMENT OF THE NORTHERLY
ALTERNATIVE FOR ROUTE I-78

WHEREAS, as a result of a meeting held on September 19, 1972, between representatives of the New Jersey Department of Transportation for Consulting Engineers and representatives of the Borough of New Providence, a report has been made to the Mayor and Council of the Borough of New Providence, indicating that consideration is being given to a northerly alternative for the alignment of Route I-78, all as shown and designated on a certain map attached hereto and made a part hereof; and,

WHEREAS, the northerly alternative, as designated on said map, will not be in the best interests of the Borough of New Providence or of the citizens of surrounding communities;

NOW, THEREFORE, BE IT RESOLVED by the Mayor and Council of the Borough of New Providence, in the County of Union and State of New Jersey, that they do hereby express their unalterable opposition to the alignment of the northerly alternative for Route I-78 as indicated by the broken line on the above-referenced map, and they do further express their approval of the proposed route indicated by the solid lines on said map; and they do further urge completion of this project as soon as possible.

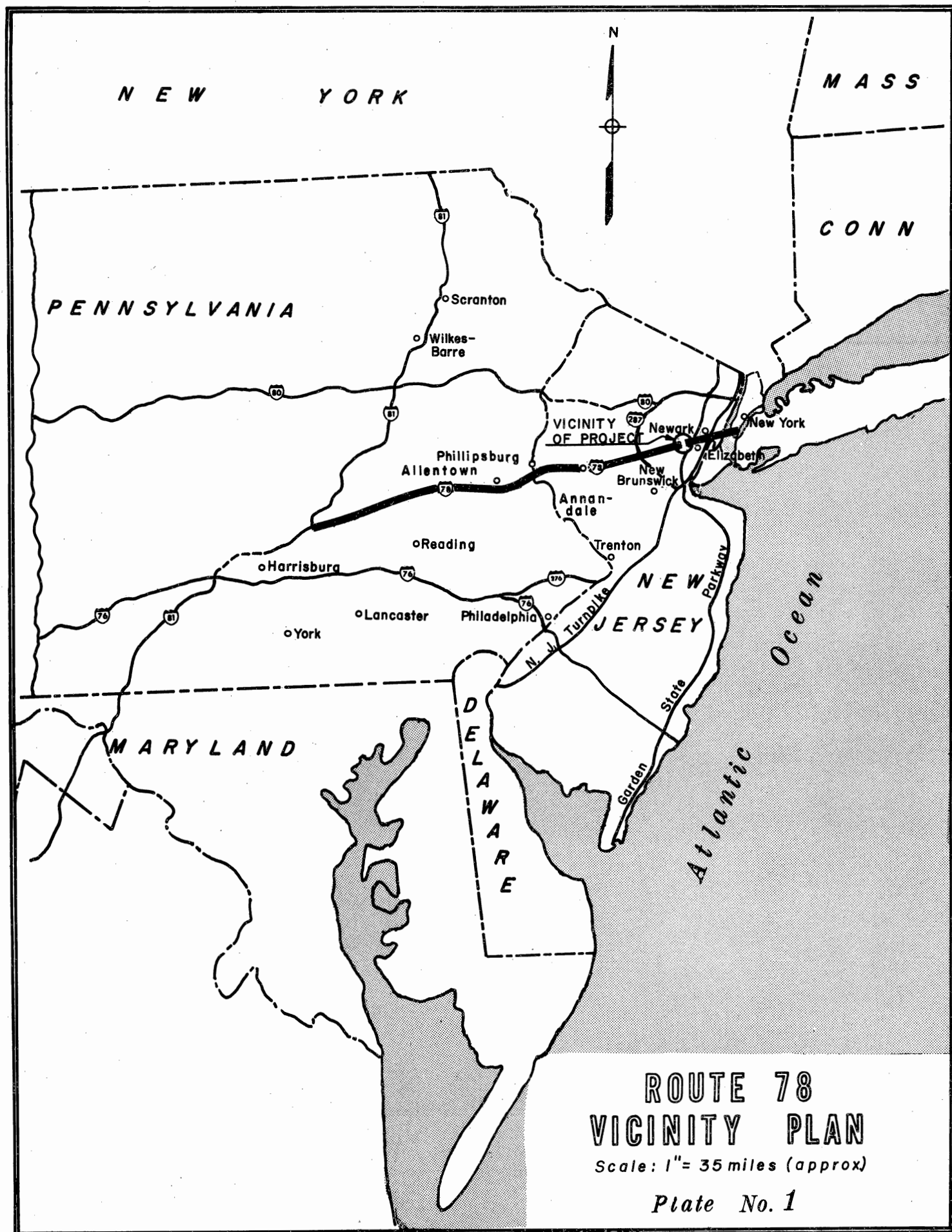
AND BE IT FURTHER RESOLVED that a copy of this resolution be transmitted to the New Jersey Department of Transportation.

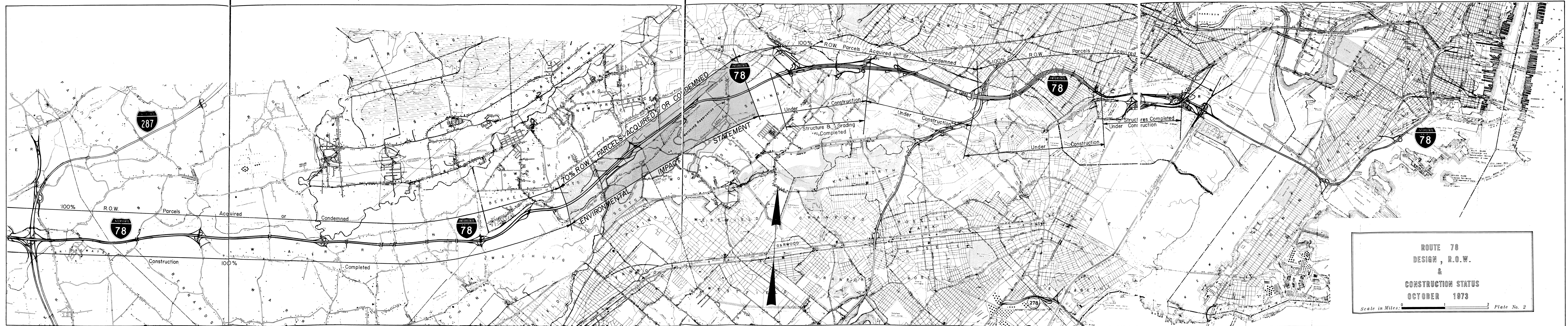
APPROVED, this 10th day of October, 1972.

S/ Edward M. Bien, Mayor
Edward M. Bien, Mayor

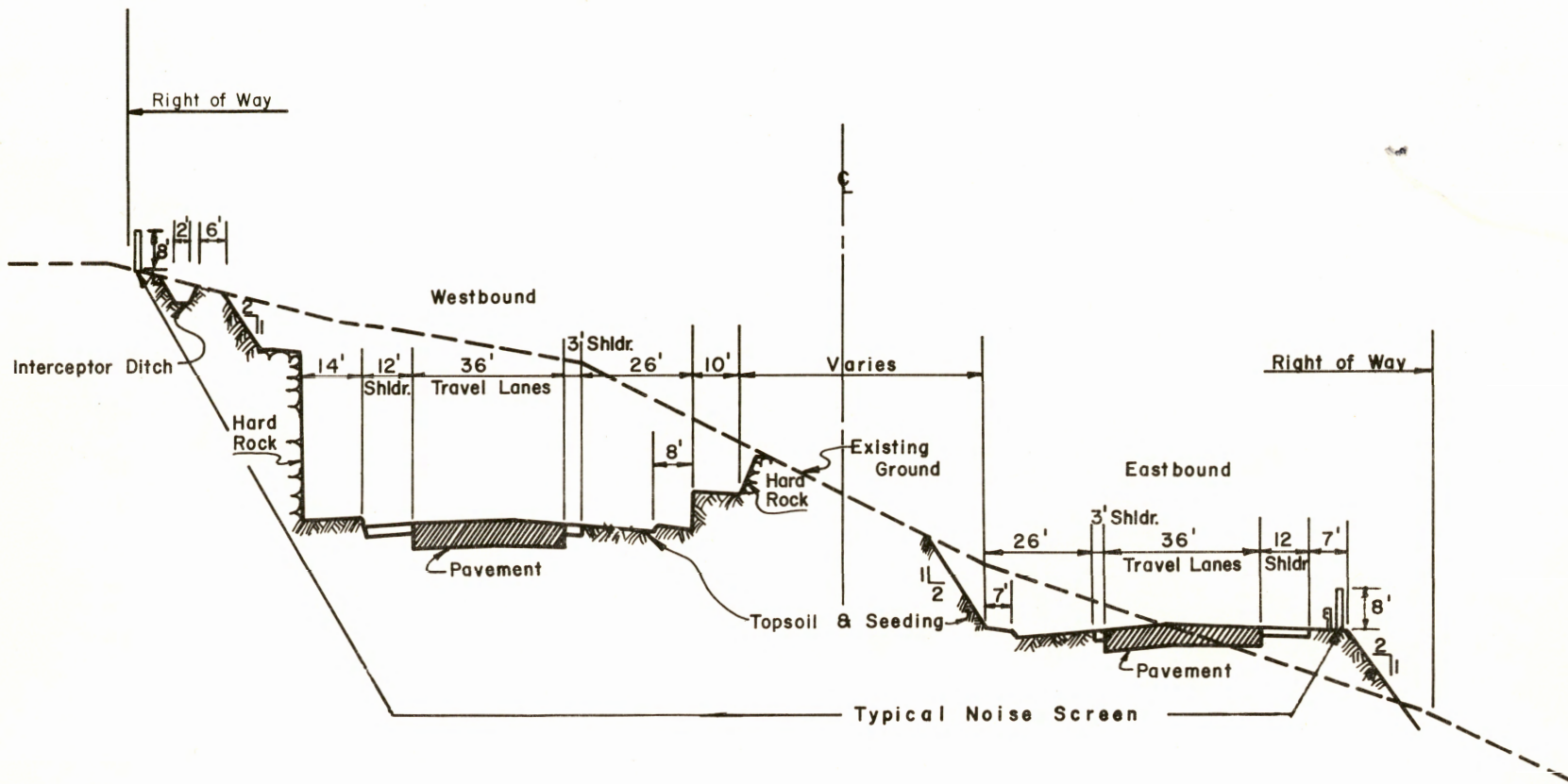
ATTEST:

S/ John D. Clark, Borough Clerk
John D. Clark, Borough Clerk



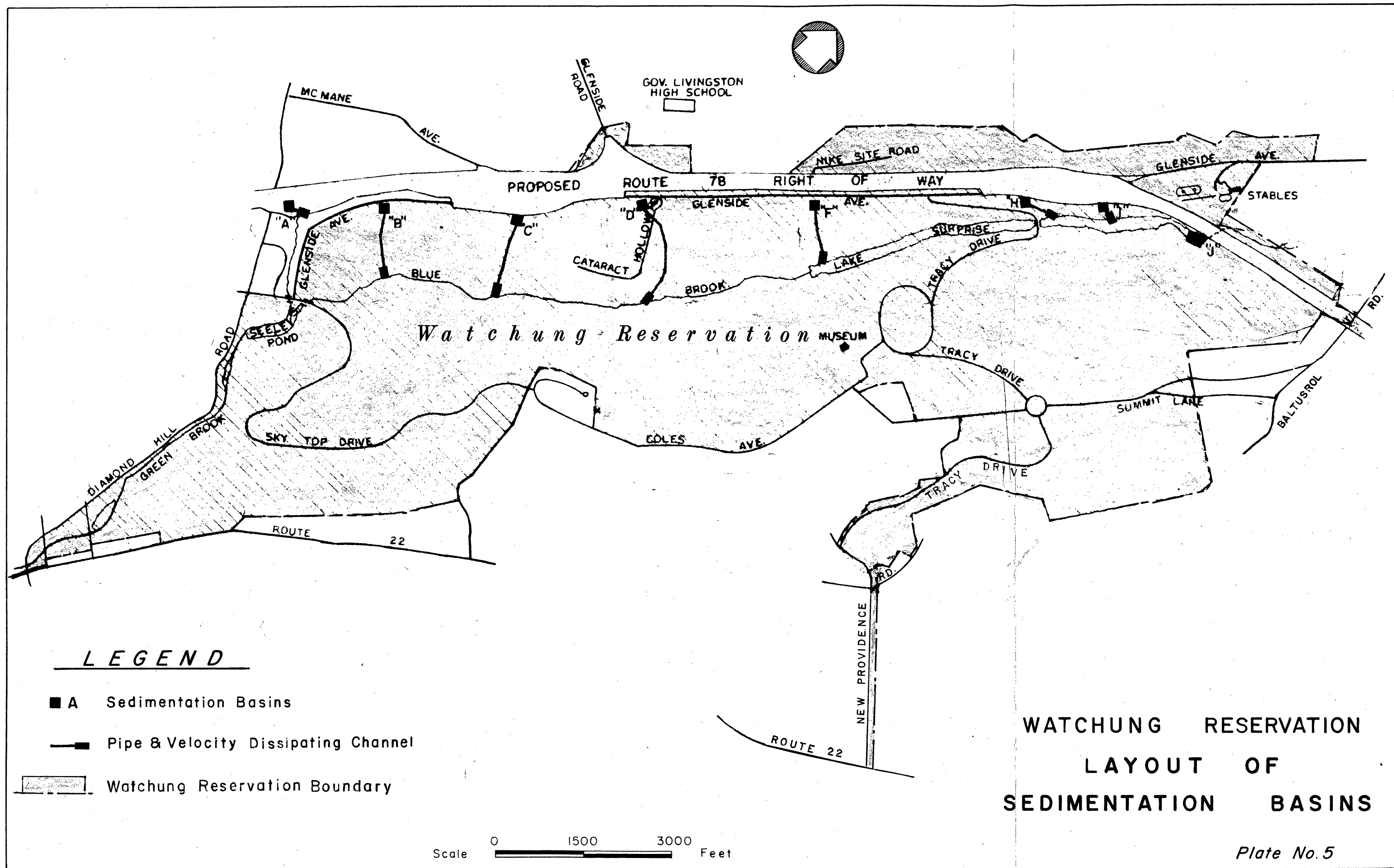


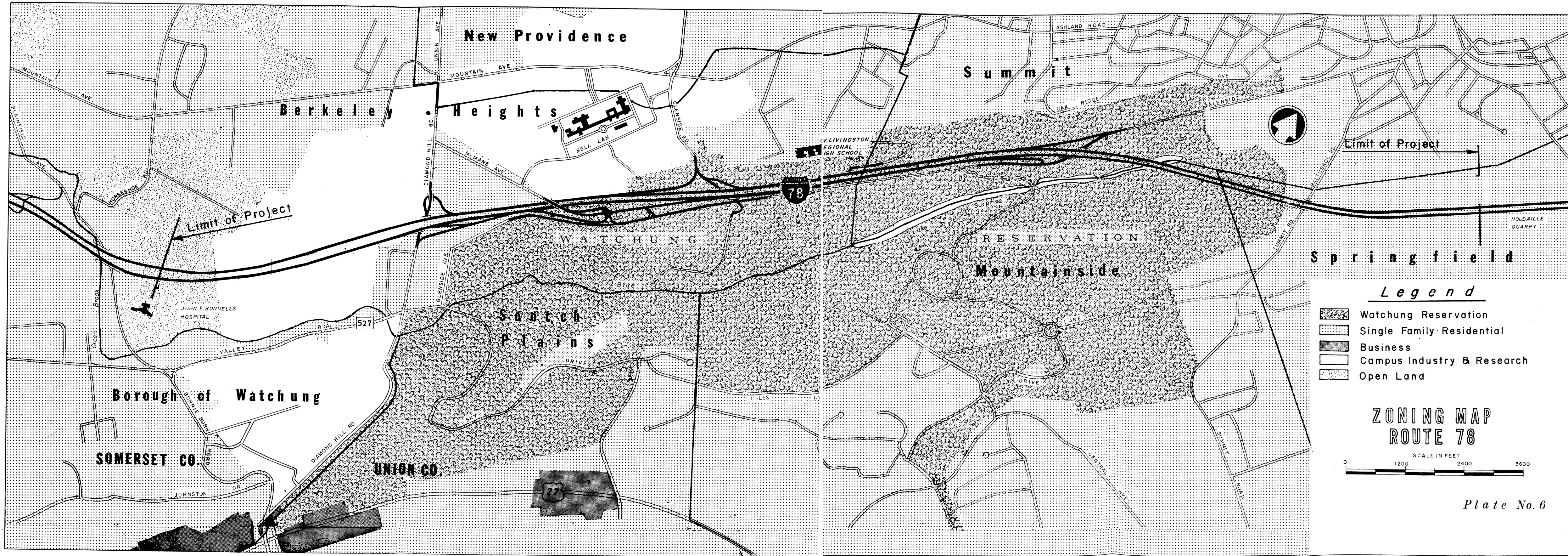




ROUTE 78 TYPICAL CROSS SECTION

NOT TO SCALE



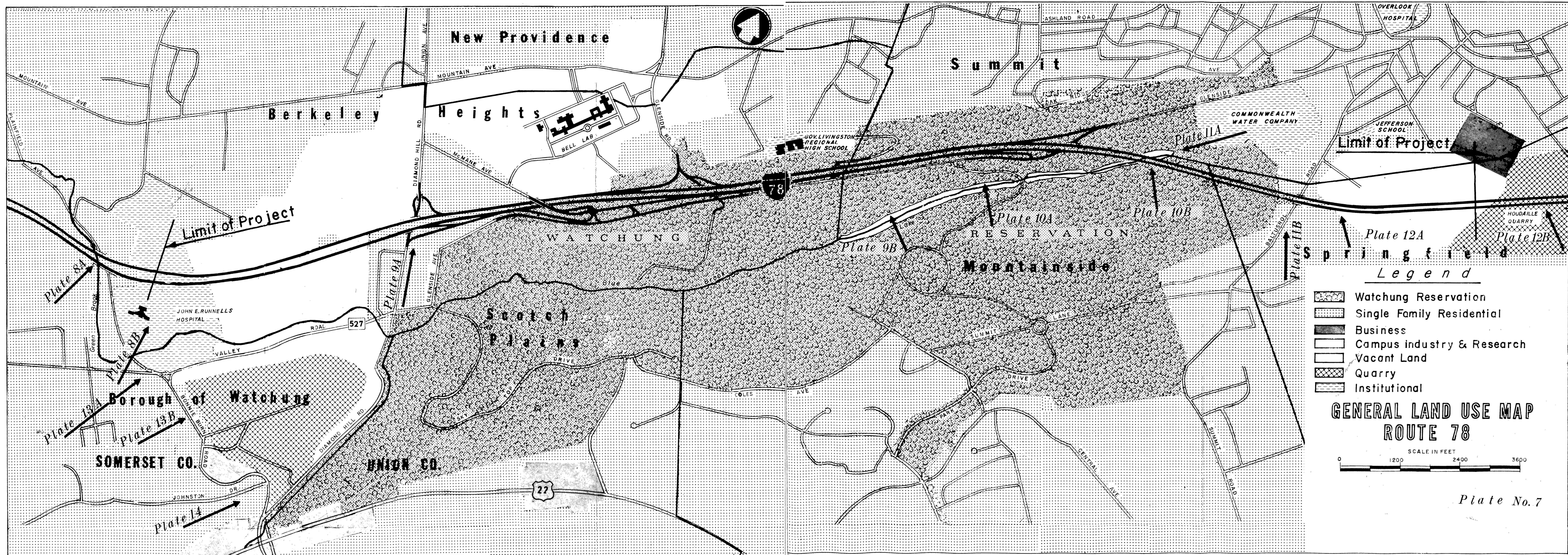


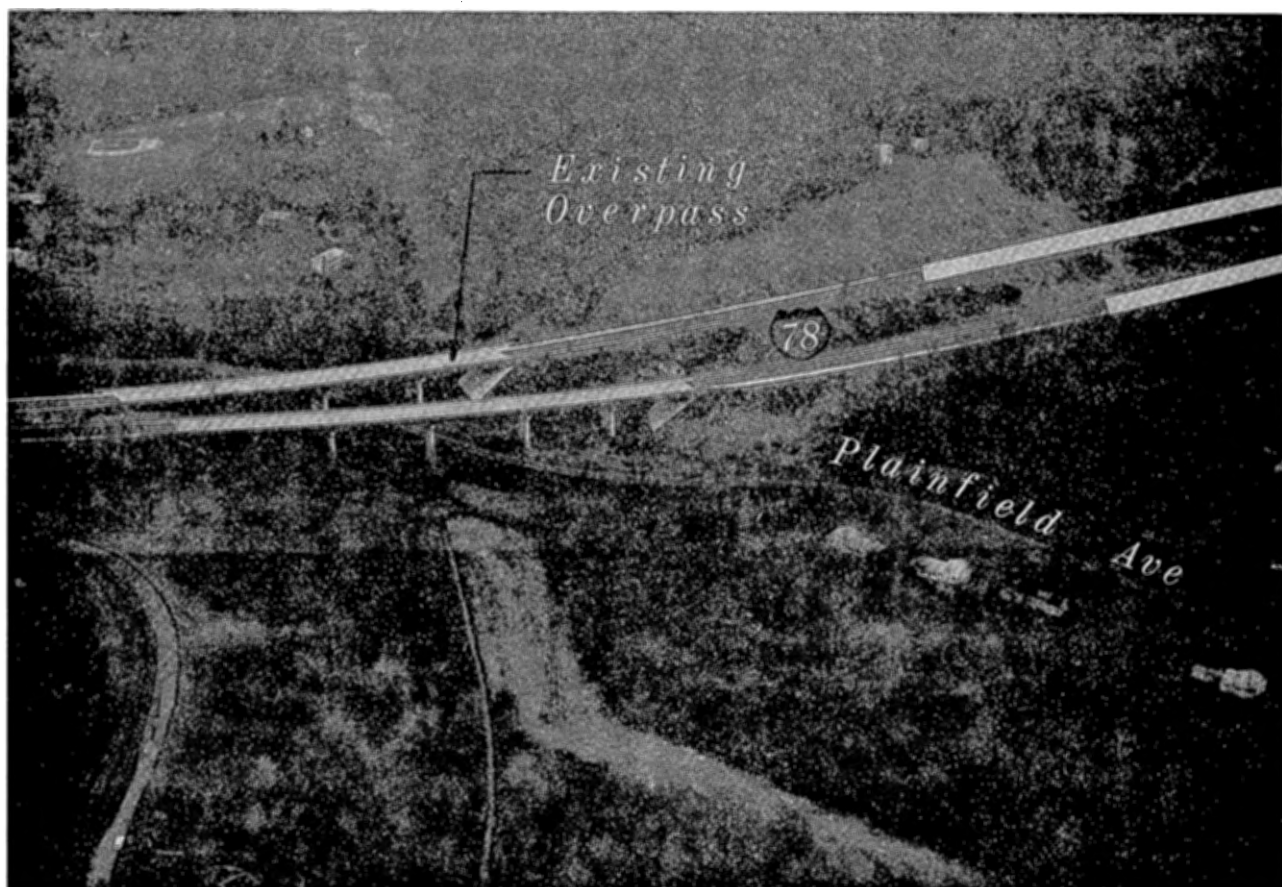
Legend

- Watchung Reservation
- Single Family Residential
- Business
- Campus Industry & Research
- Open Land

**ZONING MAP
ROUTE 78**





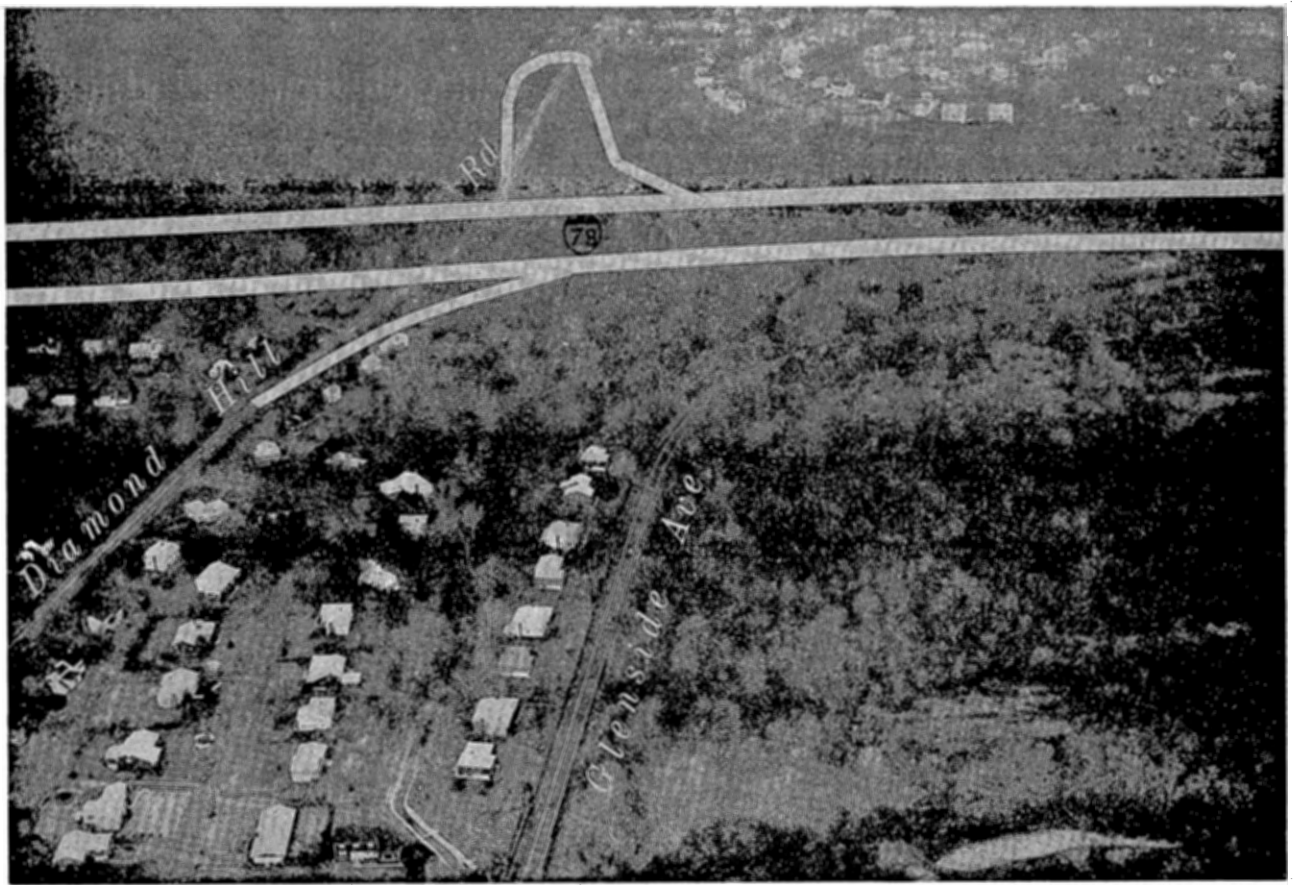


A



B

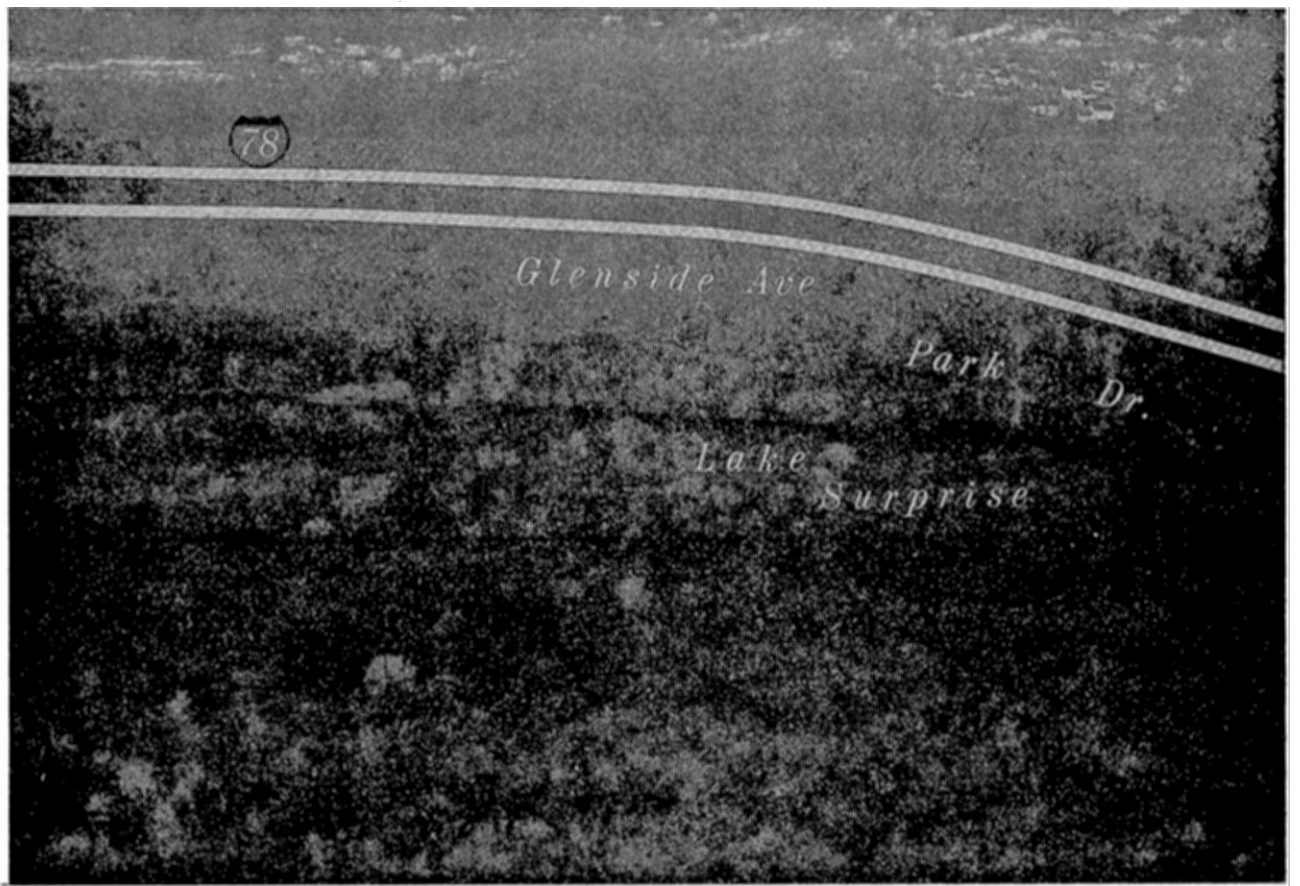
Aerial Photographs
Route 78



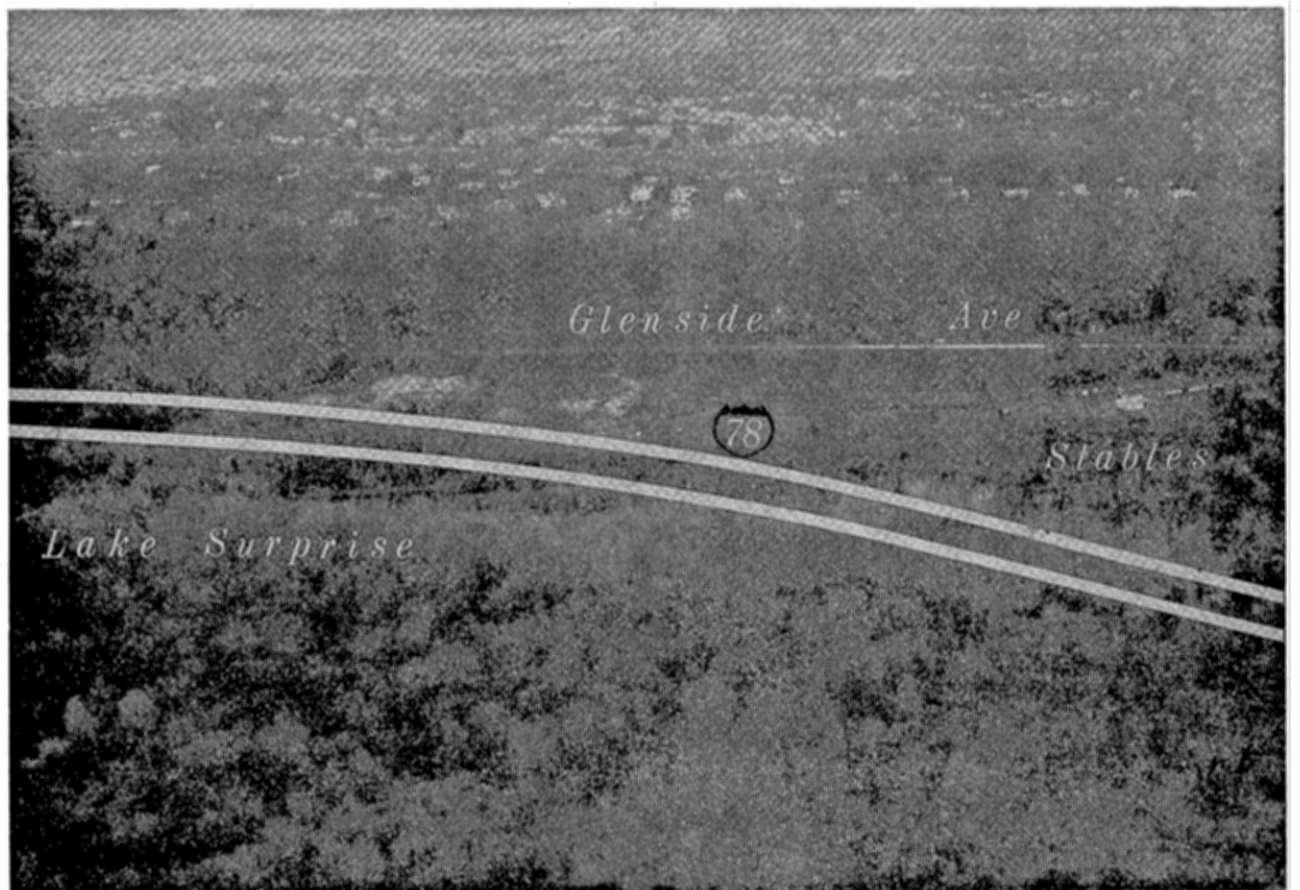
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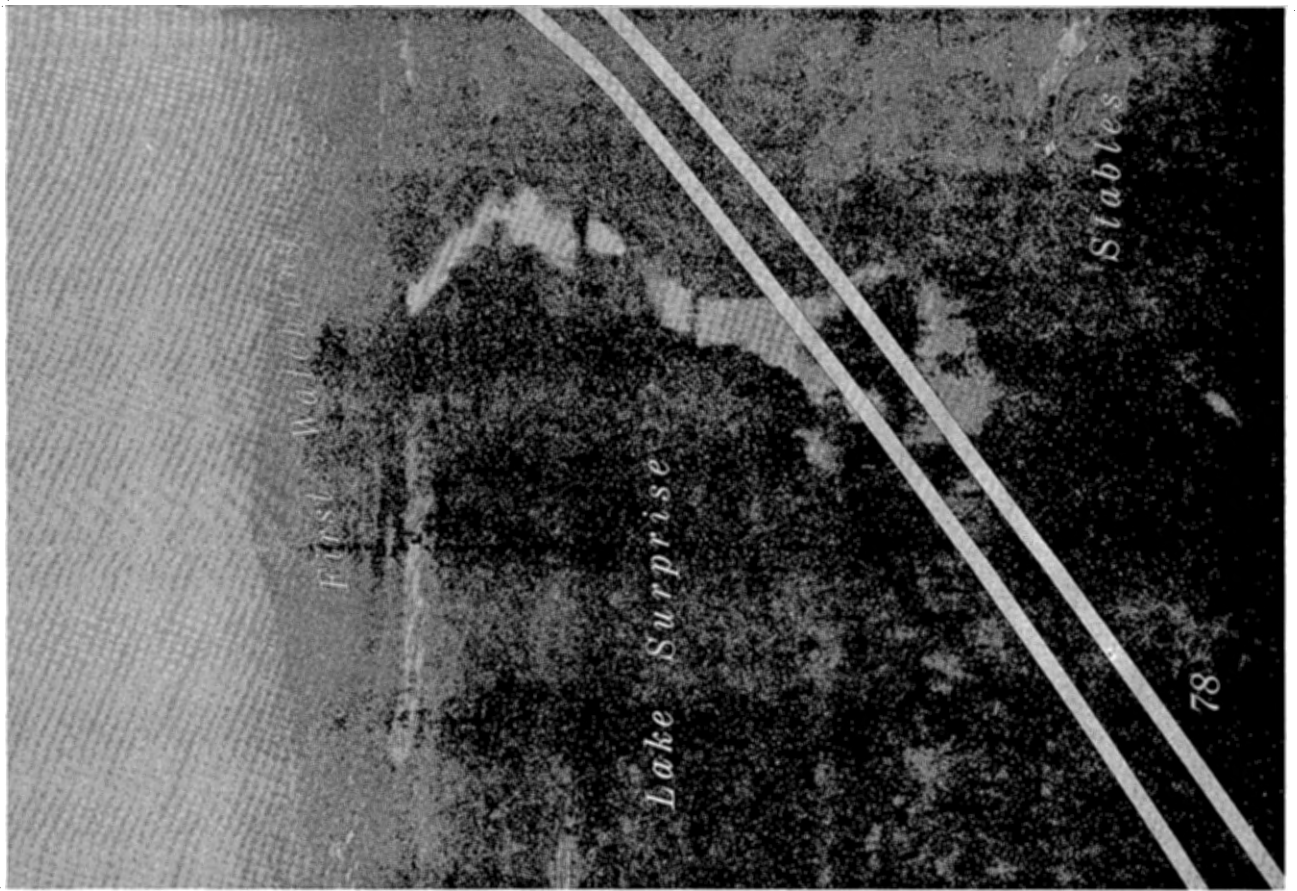
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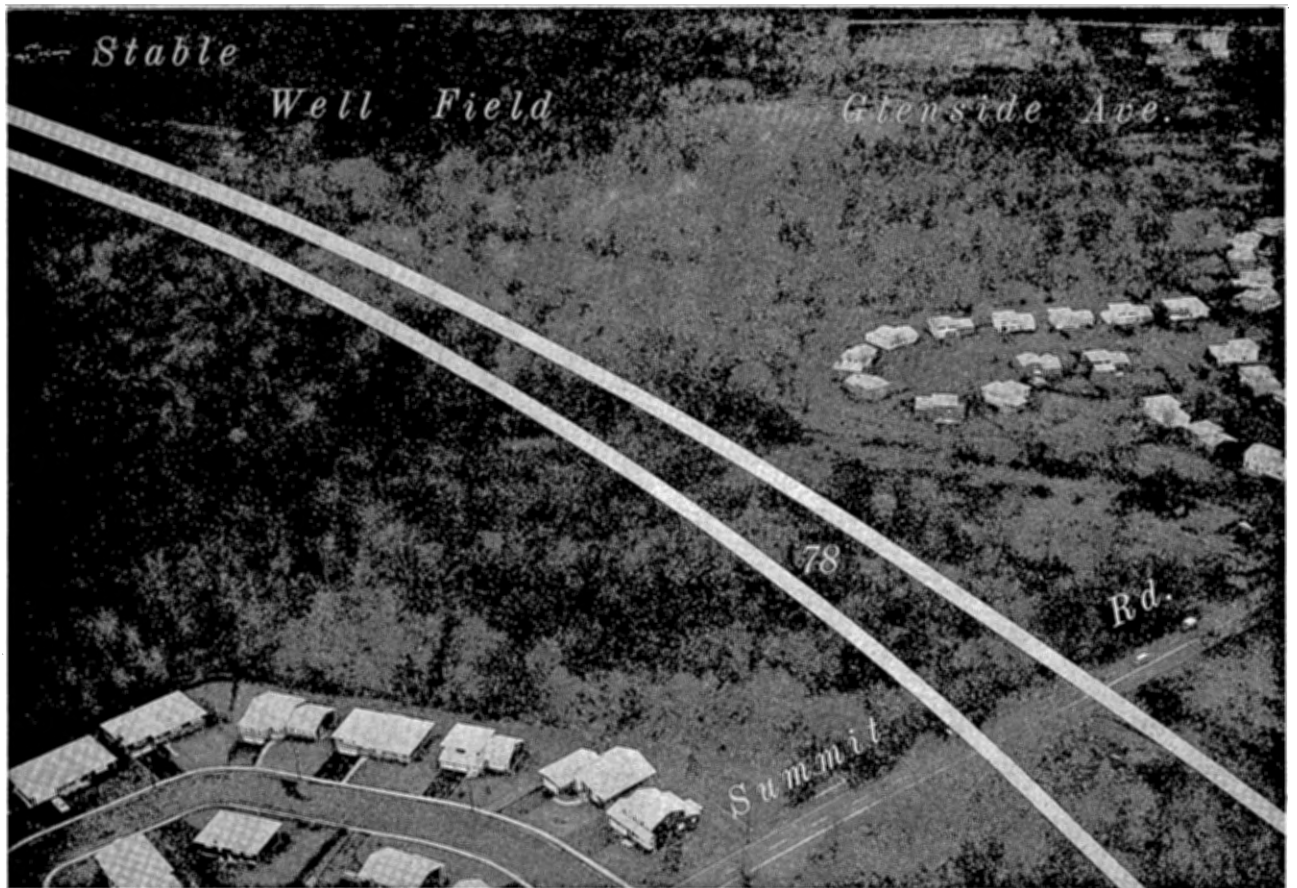
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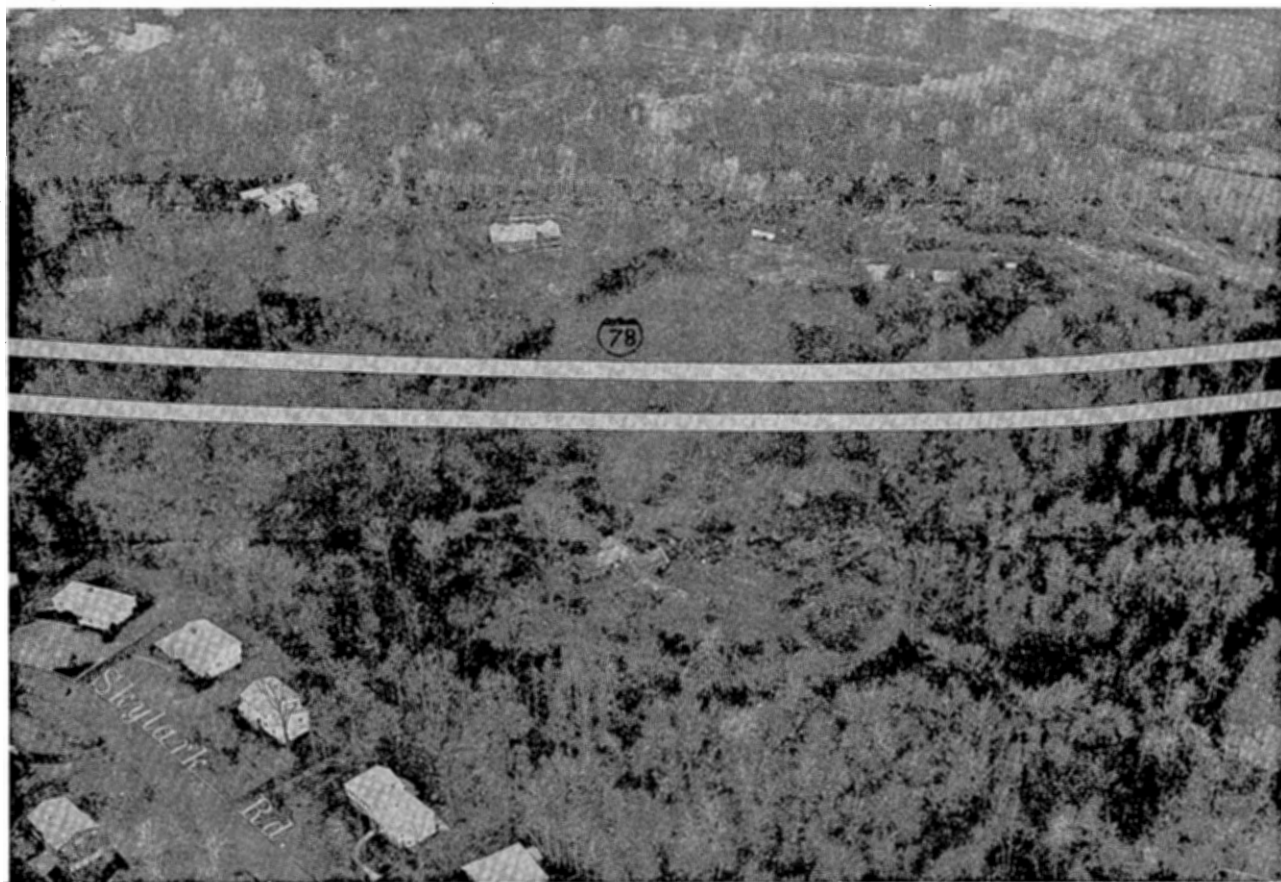
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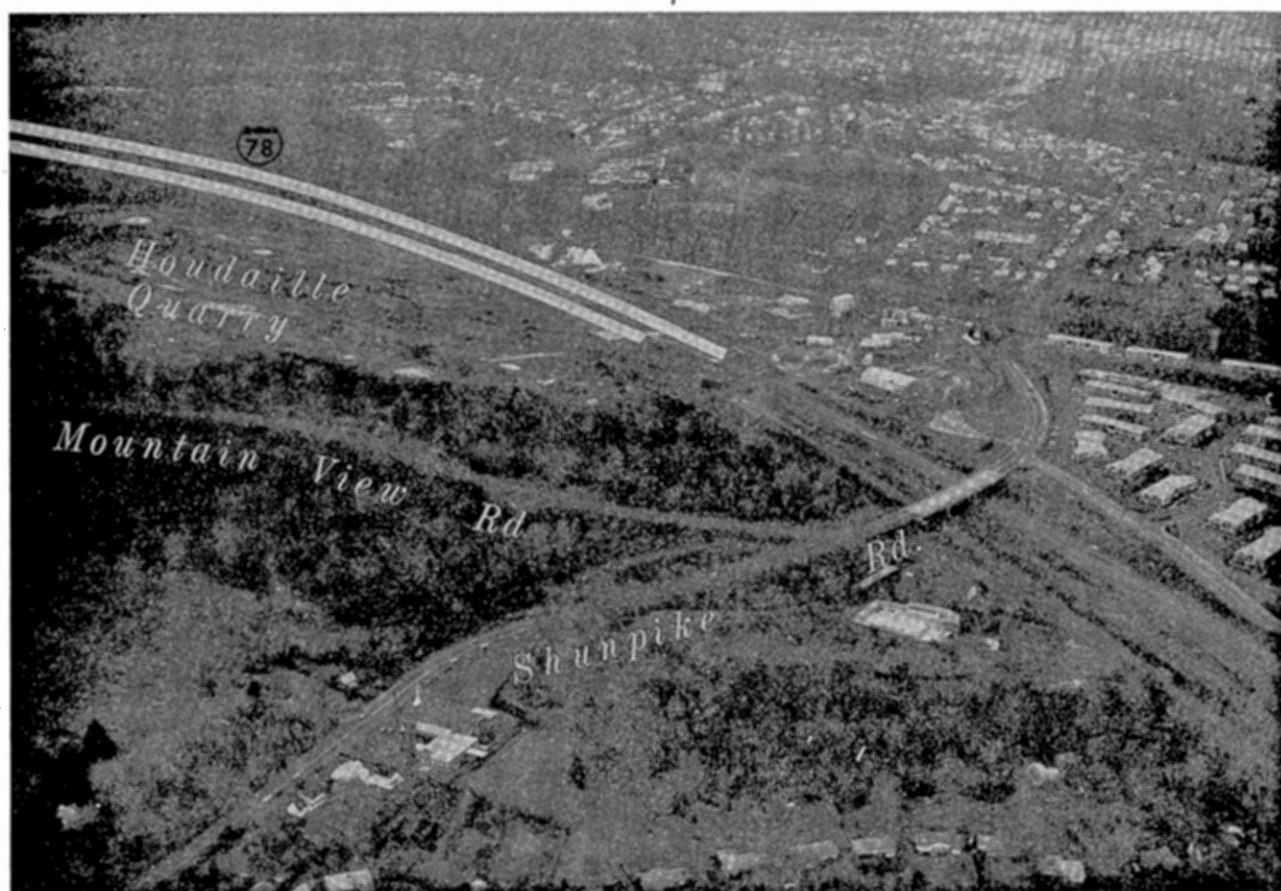
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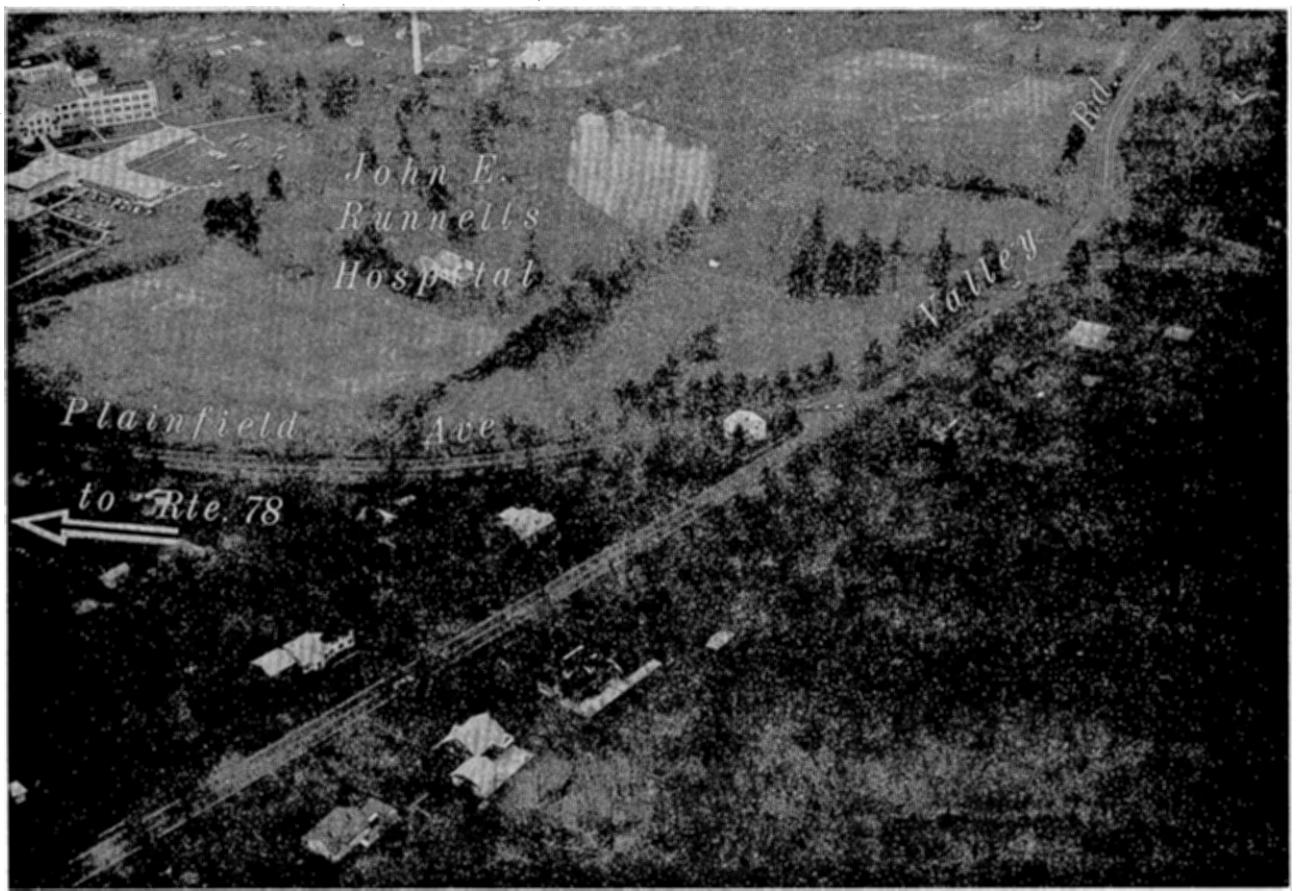
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A



B

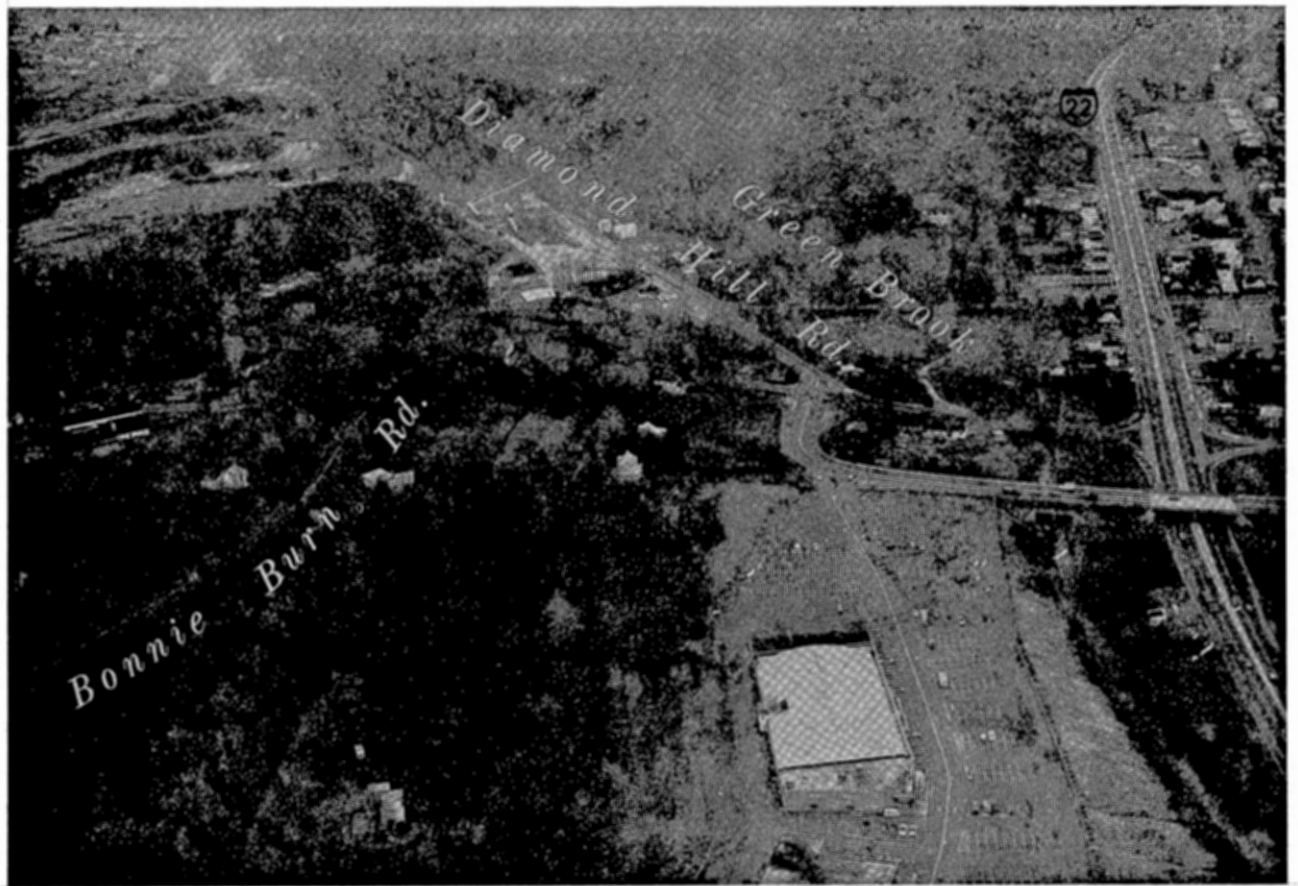


A



B

Aerial Photographs
Present Connection to Rte. 22



Aerial Photograph
Present Connection to Rte. 22

