Report Number FHWA - NY - EIS - 72 - 10 - D

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
AND
METROPOLITAN TRANSPORTATION AUTHORITY AND
NEW YORK STATE DEPARTMENT OF TRANSPORTATION

DRAFT

Environmental / Section 4 (f) Statement

ADMINISTRATIVE ACTION

for

Long Island Sound Crossing and Approach Highways
New England Thruway (I-95) and the Cross Westchester Expressway (I-287)
to the Seaford-Oyster Bay Expressway (Route NY 135) at Jericho Turnpike (Route NY 25)
Westchester and Nassau Counties

THE PROPOSED BRIDGE WILL BE FINANCED FROM THE SALE OF REVENUE BONDS. THE APPROACH HIGHWAYS AT EITHER END OF THE TOLL BRIDGE ARE PROPOSED FOR FUNDING UNDER TITLE 23, UNITED STATES CODE. 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)

METROPOLITAN TRANSPORTATION AUTHORITY

NOV 20 1972 — Date

By: William J. Ronan

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

NOV 20 1972 — Date

By: R. T. Schuler

APPROVED AND ADOPTED BY THE FHWA

NOV 21 1972 — Date

James J. Barakos — Signature of FHWA Reviewing Official

DRAFT ENVIRONMENTAL/SECTION 4(f) STATEMENT

SUMMARY SHEET

a. Administrative Action

(X) Draft ( ) Final

( ) Environmental Statement

(X) Combined Environmental/ Section 4(f) Statement

b. Brief Description of Highway Improvements

A bridge crossing of Long Island Sound together with approach highways; connecting the intersection of the Cross Westchester Expressway (I-287) and the New England Thruway (I-95) in the City of Rye, Westchester County, New York with the intersection of the Seaford-Oyster Bay Expressway (Route NY 135) and Jericho Turnpike (Route NY 25) in Syosset, Town of Oyster Bay, Nassau County, New York; a distance of approximately 16-1/2 miles.

c. Summary of Environmental Impacts

1) The proposed facility will result in regional growth benefits to Westchester, Nassau and Suffolk counties in New York and Fairfield County in Connecticut, while having both beneficial and adverse impacts adjacent to the facility.

2) The facility will enhance the quality of the physical environment of the general area by reducing congestion and resulting noise and air pollution as traffic is relieved at critical points of the regional transportation network.

The proposed facility will have certain adverse effects on the immediate physical environment, including a small unavoidable increase in ambient noise, increased automotive emissions to local areas, and slight impacts upon the natural environment and ecological systems.

3) The bridge will require a slight change in navigation and recreation boating patterns on Long Island Sound.

4) The described facility will effect a number of local communities. While disruption of these communities is not insignificant, the basic fabric and life styles of these communities will not be severely affected in the short term. Longer term effects will depend upon sound community planning and local land use controls.

d. Alternatives Considered

Four location alternatives are considered including:

a. a bridge parallel to the Throgs Neck Bridge.

b. a bridge between Sands Point and New Rochelle.

c. a bridge between Glen Cove and Rye

d. a bridge between Lloyd Neck and Stamford, Connecticut.

Additionally, consideration is given to the "do nothing" alternative, mass transportation, ferry and tunnel alternatives; and certain other locations across eastern Long Island Sound are discussed.

For the proposed bridge crossing location between Rige and Oyster Bay, consideration is being given to four alternative approach routes in Westchester County and three in Nassau County. Certain other approach routes that were investigated are also discussed.

e. Partial List of Governmental Agencies and Other Organizations From Which Comments are Being Requested

Federal agencies

Department of Transportation
Federal Highway Administration
Coast Guard

Environmental Protection Agency

Council on Environmental Quality

Department of the Interior

Department of Commerce

Department of Agriculture

U. S. Army Corps of Engineers

Department of Housing and Urban Development

Department of Health, Education and Welfare

Regional Organizations

Tri-State Regional Planning Commission (A95 Clearinghouse)

New England River Basins Commission

State of New York

Department of Environmental Conservation

Department of Commerce

Office of Planning Services

Department of Health

Office of Parks and Recreation

Office for Local Government

New York State Thruway Authority

The Executive Chamber

State of Connecticut

Department of Transportation

Local Agencies

City of New York, Office of the Mayor

Nassau County Executive

Nassau County Board of Supervisors

Nassau County Planning Commission

Suffolk County Executive

Westchester County Executive

Westchester County Legislature

Westchester County Planning Commission

Westchester County Playland Commission

Nassau-Suffolk Regional Planning Board

Westchester Cities, Towns and Villages:

- City of Rye
- City of White Plains
- City of Mount Vernon
- City of New Rochelle
- Town of Rye
- Town of Harrison
- Town of Mamaroneck
- Village of North Pelham
- Village of Port Chester
- Village of Pelham
- Village of Pelham Manor

Nassau and Suffolk Cities, Towns and Villages:

- Town of Oyster Bay
- Town of Brookhaven
- Town of Riverhead
- Town of Southold
- Town of North Hempstead
- Town of Huntington
- Village of Bayville
- Village of Mill Neck
- Village of Upper Brookville
- Village of Oyster Bay Cove
- Village of Centre Island

Village of Cove Neck

Village of Lattingtown

Village of Port Jefferson

Village of Sands Point

Village of Lloyd Harbor

Town of Greenwich, Connecticut

Other Organizations

Regional Plan Association

Long Island Sound Yacht Racing Association

Local Chambers of Commerce

Local Environmental Conservation Organizations

Other Professional and Community groups upon request.

Copies for inspection and review will be available at area public libraries, government offices, and local university libraries.

f. Date Draft Statement was Made Available to Council on Environmental Quality (date mailed) and Date the Draft Statement was Made Available to Public

November 28 , 1972

TABLE OF CONTENTS

Section	Page

LIST OF EXHIBITS

List of Exhibits (cont'd)

List of Exhibits (Cont'd)

List of Exhibits (Cont'd)

(Note: Oblique aerial view photographs by Skyviews.)

LIST OF TABLES

A. INTRODUCTION

1. Origins Of The Sound Crossing Proposals

Growth in the New York metropolitan area has followed the classic pattern of a maturing region. The population of the inner core has virtually stabilized while the expansion areas have moved ever outward. Portions experiencing the most rapid growth are located as far as forty to fifty miles from the city center.

As the region has grown, demands for land have intensified. Recent residential development, characterized by low density and large lots spread out over an expanding area increasingly remote from traditional transportation corridors, has to be serviced. Campus type office complexes and industrial plants were located in suburban settings with large parking lots, helping to create the need for additional transportation facilities in fringe areas.

As the growth areas on the mainland and on Long Island became increasingly separated by water barriers, a number of major bridges and tunnels were built crossing the East River, the Hudson River, the Harlem River and the Narrows. The most recent include the Verrazano-Narrows and the Tappan Zee Bridges, which have closed major gaps in the road system that links the separate parts of the metropolis; and the Throgs Neck Bridge over the eastern end of the East River, which ties together the northeastern quadrant of the New York City highway network.

The network of modern expressways, parkways and water crossings in which the New York region pioneered has greatly increased the individual mobility of its residents and has made it possible for them to enjoy the benefits of a great metropolis and of lower density suburban style living at the same time. With the expansion of the region, however, the maintenance of relatively low population densities in the outer areas has led to increased dependence on the motor vehicle for all travel purposes. These trends have created problems of congestion, of pollution and of impact on communities that did not arise when the region was more compact. As expansion continues and additional transportation services are required, each proposal must be viewed in the light of its overall effects on the region and on the communities through which it passes, within the context of a rational development plan.

The Long Island Sound constitutes a major impediment to travel between Nassau and Suffolk Counties, on one hand, and Westchester County and Southern Connecticut on the other. Substantial numbers of vehicles are presently forced to travel over congested routes through New York City in order to move between these divided sections of the metropolitan region. The delays inherent in such out-of-direction travel and the attendant costs, both economic and environmental, are becoming greater and greater as a result of major congestion caused in part by the limited capacity of the existing bridges over the East River and the arterials and expressways connecting with them.

Consequently, various proposals have been made over a number of years to connect Long Island with the mainland by building one or more bridges across the Sound. The need for such a crossing and the proper course of action to be followed must be evaluated in the light of its total impacts and its compatibility with the overall development and transportation plans for the region.

Recent planning efforts have recognized the problems inherent in increasing dependency on the automobile, particularly for trips to the central urban core of the region. The objective of all transportation planning for the metropolitan region is to create a balanced transportation system, with a revitalized mass transportation component handling the bulk of travel to the central business district, especially journey-to-work trips. To do this, transit services and amenities must be sufficiently attractive and economical to entice people out of their cars for these trips.

Paralleling the strengthening of mass transportation is the concept of reorienting the general development patterns in the region toward the concentration of basic facilities in metropolitan subcenters. By encouraging the grouping of businesses, services and housing in a number of separate community centers, a more orderly growth process can be achieved. Such centers will add to the feasibility of both rail and bus public transportation, and the provision of mass transportation services between centers will lead to a more integrated transportation system.

The Regional Plan Association, in setting its goal for the Second Regional Plan,[a] formulated the following basic goal:

1. <u>Urban Centers and Metropolitan Communities</u>

   To change the amorphous spread of urbanization into genuine metropolitan communities capable of supporting high-quality services in health, retailing, the arts, entertainment (including professional sports), libraries, and adult education (including job training) and to provide a real community framework for civic and political action. The Second Regional Plan proposes the creation of about two dozen partially self-contained metropolitan communities within the Region."

Within the objective of creating a balanced system, it is clear that highways will continue to comprise the major part of the transportation network. Those millions of diverse trips, short and long, local and intercounty, made at all times of the night and day by automobile and truck depend on a strong and efficient highway system.

Some of these person trips can be handled by expanded bus service but the great majority will continue to be made by automobile. In either case they will be made by road.

(a) "The Second Regional Plan - a draft for discussion", Regional Plan Association. November, 1968.

The further development of our highways must be progressed as part of a balanced transportation system with the following objectives clearly in sight:

1) Reduction of congestion on existing arterials by eliminating bottlenecks and adding to capacity within present rights-of-way.

2) Avoidance of major new arteries directed toward Manhattan.

3) Strengthening of circumferential routes that will permit traffic not destined for New York City to avoid travel into the City and to facilitate travel between regional sub-centers.

The Tri-State Regional Planning Commission endorses these general objectives as do the New York State Department of Transportation, New York City Planning Commission, the Metropolitan Transportation Authority, Nassau-Suffolk Regional Planning Board and the Regional Plan Association. For example, the New York City Planning Commission states in its Plan for New York City (b):

> "In planning for highways one thing is clear. They should not be routed toward Manhattan's business districts. Any attempt to bring more cars into Manhattan will be extremely costly, undercut efforts to expand mass transit and further choke the streets. We believe that the use of cars in the business districts should be limited to the few people for whom they are a necessity, and to those who are willing to pay handsomely for the privilege.....More highway capacity is needed for industrial areas. The City's outer circumferential loop should be completed. Additional links should be added to close gaps in the existing arterial network and to provide expressway access to areas that do not have it.

The primary goal of the Metropolitan Transportation Authority, the agency charged with expanding and operating mass transportation in the area, is to create a balanced transportation system consistent with major development and planning goals for the New York metropolitan region. MTA recognizes the need to give first priority to mass transportation improvement in order to bring the total transportation system into balance. MTA also recognizes

(b) Plan for New York City - A Proposal, New York City Planning Commission 1969.

the vital role of the present highway system in the total transportation network of the region, and the need for strategic service additions. As an important step in furthering a balanced transportation system, the State Legislature has designated the MTA as the agency responsible for planning, constructing and operating a Long Island Sound crossing as a toll facility. The responsibility for providing the approach highways connecting with the Sound crossing has been assigned to the New York State Department of Transportation.

Accepting the fact that any new highway construction must be consistent with the above objectives, MTA recognizes that any new construction has its potential costs in terms of impact on the environment and the general quality of life. Potential adverse effects must be seriously regarded, and opportunities for remedial action and for positive impacts should be identified and implemented.

This draft environmental impact statement is the result of joint efforts by the Metropolitan Transportation Authority and the New York State Department of Transportation, cooperatively with the Federal Highway Administration, to examine and evaluate the practicality and the impacts of the proposed Long Island Sound crossing.

Before any final recommendations are made, full consideration will be given to the views and comments by all interested public and private agencies, official and non-official community representatives, organizations and individuals. Opportunities will also be afforded for full expression of views at public hearings to be scheduled in the areas affected by the proposed project where interested officials and citizens may raise questions, offer information and further discuss their views. In addition, comments, suggestions, and additional information from all citizens of the metropolitan community will be welcomed either before or following the public hearings. A detailed description of the planning process is given in Section B.

2. Scope of Investigations

Crossings of Long Island Sound have been proposed at several locations and the MTA's legislative authority permits consideration of various sites. In the most recent study conducted by the New York State Department of Transportation,[(c)] eight separate bridge locations were compared in detail. These ranged from the most westerly location between Sands Point in Nassau County and New Rochelle in Westchester County, involving an overwater crossing 3.3 miles in length, to a 24.6 mile crossing at the easterly extremity from Orient Point in Suffolk County to Watch Hill, Rhode Island.

Examination of these alternatives reveals that only the three most westerly crossing locations give immediate promise of satisfying transportation needs and reducing highway congestion within the New York metropolitan area. None of the more easterly crossings will serve the purpose intended. They will neither provide significant relief of highway traffic within the region, nor will any of them attract sufficient numbers of vehicular trips to come even close to achieving financial feasibility as self-liquidating projects.

On the basis of the data presented in the Creighton, Hamburg study, the New York State DOT[(d)] reached the following conclusions regarding the proposed central and eastern Long Island Sound crossing:

(c) A Comprehensive Transportation Study for Proposed Bridge Crossings, December, 1971, including detailed report by Creighton, Hamburg, Inc. and associated consultants.

(d) A Comprehensive Study of Proposed Bridge Crossings of Long Island Sound, Page 69, NYSDOT, January, 1972.

"These crossings are not recommended. The reason for this decision is their high construction costs coupled with the relatively small traffic load they would carry, the consequent lower toll revenues that could be expected, their resultant infeasibility from a finance standpoint, and their relative inability to relieve present and future traffic congestion on highway and bridge facilities in New York City, western Long Island, and Westchester County. The study did note, however, that the Old Saybrook-East Marion crossing has the highest level of financial feasibility of the central and eastern crossings, adding that in another ten years it may be desirable to review the need for building this bridge."

In 1965 investigations of several central and easterly bridge locations were conducted by a team of well-known engineers and these were updated in 1968.[(e)] These studies showed that traffic diverted from the existing East River bridges would not be large enough to reduce anticipated congestion to any meaningful degree. The easterly crossings, beginning with the Port Jefferson - Bridgeport site, are in reality not true alternatives to the crossings within New York State as they do not fulfill the same functions.

Of the three westerly crossings, the one considered most favorable by the State and the Creighton, Hamburg study was the crossing between the vicinities of Rye in Westchester County and Oyster Bay in Nassau County. The report reaches the following conclusion (Page S-22):

"In choosing between the three western bridges, the following factors were dominant. The approach roads to Bridge 1 (New Rochelle-Sands Point) severely impact the communities through which they pass. Bridges 1 and 2 (Rye-Glen Cove) fit poorly into the regional expressway network. Bridge 3, (Rye-Oyster Bay) if built, would immediately complete a metropolitan circumferential expressway from Suffern to Wantagh. This is a material advantage since it means that heavy expenditures would not have to be made to permit the regional highway system to accommodate bridge traffic.

We recommend Bridge 3 as the best choice for the first bridge crossing of Long Island Sound."

(e) A series of reports covering various sites for a proposed Long Island-New England Bridge and Connecting Highway was prepared in 1965 by a team consisting of Bertram D. Tallamy Associates, Wilbur Smith and Associates, and Sverdrup & Parcel. The reports were updated in 1968.

As a basis for developing these investigations, therefore, the proposed project is identified as the construction of a bridge across Long Island Sound between Rye and Oyster Bay and necessary approach highways. In addition, a number of alternatives have been examined and the relative advantages, disadvantages and impacts of each are discussed in later sections of this statement. In all cases, the elements of primary concern include the effects of the various proposals on community values and environmental conditions as well as on the achievement of a balanced transportation system for the region.

B. THIS STATEMENT IN THE CONTEXT OF THE PROJECT DEVELOPMENT PROCESS

This draft environmental impact statement is prepared pursuant to the National Environmental Policy Act of 1969 as implemented by Federal Highway Administration Policy and Procedure Memorandum (PPM) 90-1 issued pursuant thereto. This statement presents the environmental implications of the proposed highway project, a crossing of the westerly portion of Long Island Sound, and of various alternatives to it. This statement is issued prior to the corridor location public hearing to be conducted pursuant to PPM 20-8. The location public hearing is one of the many opportunities given to interested citizens to participate in and contribute to the consideration of transportation project proposals. The planning for the proposed projects to which this statement relates is authorized by the laws of New York State.[a]

The Long Island Sound crossing itself will be built by the Metropolitan Transportation Authority with monies raised through the sale of revenue bonds, pursuant to Chapter 717 of the 1967 Session Laws of New York State. New York State Department of Transportation will build the approach roads to the crossing. The approach roads and Sound crossing are being analyzed together in this draft environmental impact statement for better understanding of the environmental implications of the whole transportation development.

To fully comprehend the context in which this draft environmental impact statement is issued, it is necessary to understand the lengthy and open nature of the project development process under Federal and State regulations. Most major transportation projects in this country are developed with Federal financial assistance. In New York State, highways which are planned in accordance with the requirements of Federal regulations qualify for Federal

(a) Chapter 717, 1967 Session Laws, as amended.

reimbursement to the State for a certain percentage of the planning, design, relocation, construction and other costs incurred by the State. Federal-aid highways are State projects.

Potential transportation projects are first conceived as a product of regional transportation system planning, during which policy issues related to regional growth and identification of transportation needs generate development of specific projected transportation patterns. From this continuing comprehensive transportation planning process, carried on cooperatively by State, regional and local officials, determinations are made to investigate transportation projects which meet identified needs.

If the need is for a highway facility, the broad corridor of a proposed project is defined in accordance with the transportation plan after extensive pre-feasibility and feasibility work. At this point, various alternative locations within the corridor are examined. During this location stage basic economic and traffic data are compiled and analysis of social, economic and environmental effects of the route alternatives is undertaken leading to the preparation of a draft environmental impact statement. Views of private citizens and government agencies are solicited, informal informational meetings and briefings are held, and formal location public hearings are conducted. The public is encouraged to submit information and comments.

After the formal hearings, further study and restudy of the various alternatives is undertaken in light of and in response to comments received from the public and other agencies, written responses to all issues raised are prepared and, finally, the final environmental impact statement is prepared in close coordination with the U. S. Department of Transportation. On the basis of this extensive technical, open and coordinative project development process, the agency with jurisdiction over the project makes the route-location decision, which is forwarded to the U.S. Department of Transportation for its approval. The Long Island Sound crossing project is presently in the location study phase.

After the necessary approval of the general route location has been received, preliminary design of the project begins. During this phase, specific alignments and their design details are established and cost and engineering determinations made. Preliminary plans and other engineering investigations related to the design of the facility are undertaken. Further analysis concerning environmental implications of those project details which could only be identified at the location stage is undertaken. As a result, the environmental consequences of a project, impacts on specific parcels of land, opportunities for joint development and multiple use are refined and alternative design options are evaluated and ordered.

During this stage, extensive coordination with private individuals, local community organizations, businesses and local government agencies continues. Design public hearings are held, during which the environmental, social and community implications of the project are further explored. After this work and in light of evaluation of all comments received, a preliminary design decision is made. This tentative design decision, together with accompanying documentation on all aspects of the Federal-aid project, are submitted to the Federal Highway Administration for its approval.

Upon approval of the preliminary design of a highway project, detailed design work progresses to the preparation of plans, specifications and estimates (PS&Es) for the construction of the project, which are submitted to the Federal Highway Administration for approval. Upon approval, the Federal government enters into a contractual relationship with New York State Department of Transportation to reimburse the State for a portion of the funds expended in constructing the project. It is only at this point that construction of the project may begin. Major projects then take from two to three years to construct before they can be opened to traffic.

During this process, numerous environmental and technical reviews are required. For example, concurrently with the preparation of this environmental impact statement pursuant to Section 102 (2) (c) of the National Environmental Policy Act of 1969, any impact or infringement upon public lands devoted to parks, recreation areas, wildlife and waterfowl refuge or to historic sites is analyzed independently pursuant to Section 4(f) of the U. S. Department of Transportation Act of 1966, as amended. Many other specific items, such as displacement of people and businesses, air quality, noise, and soil erosion are the subject of specific analysis and approval at differing stages of the project development process. Because detailed design work cannot be done until later in the project development process, it is impossible to know precisely at the location stage the specific environmental implications of the project. The draft environmental impact statement treats the range of known environmental implications of the project and its alternatives in the detail which is presently possible, as well as commits the Metropolitan Transportation Authority and the State Department of Transportation to taking appropriate steps to minimize adverse impacts.

This draft environmental impact statement has been issued prior to location public hearings. It is being released publicly and being circulated to a large number of governmental agencies and is being made available to the general public so that new facts, insights and other comments on the environmental implications of the proposed project may be assured of consideration in route location deliberations. For example, this statement is being circulated to local, State and Federal Agencies, including the State Department of Environmental Conservation, the Federal Environmental Protection Agency and Department of the Interior, whose technical experts will evaluate and comment upon the environmental analyses contained herein. The U. S. Coast Guard, which has jurisdiction over the issuance of permits for location and clearances of bridges, is consulted. Copies of this statement are available for public inspection and review at the offices of the State Department of Transportation, the Metropolitan Transportation Authority and elsewhere.

Responsible officials will be available at public hearings to offer fuller explanations on matters contained in this statement and other matters related to the proposed project. For example, great attention will be given at the public hearing to relocation problems and the various programs and services available to the people and businesses which may have to be relocated as a result of this proposed project. Additionally, comments received at the hearings and from individuals and agencies will be analyzed and responded to in the final environmental impact statement when it is prepared following the public hearing.

The environmental impact statement is a key part of the decision making process being undertaken by the Metropolitan Transportation Authority and the State Department of Transportation.

No final decision related to the specific location of the Long Island Sound crossing has yet been made. Project decisions will not be made until all interested citizens, groups and governmental agencies and units have had an opportunity to study and comment on the various proposals. The Metropolitan Transportation Authority and the Department of Transportation are legally committed to considering all comments brought forth formally or informally prior to reaching any decisions.

C. EVALUATION OF NEED FOR THE PROPOSED LONG ISLAND SOUND CROSSING

1. Increasing Travel Demands

Transportation needs in any metropolitan area are influenced primarily by regional developments. The basic forces shaping the needs of a region are population growth, economic development and the social activities in which people engage. As the original core area of the region increases in density, population growth spreads outward to newer sections where more land is available and less congestion exists. With the enlargement of the developed area, demands arise for a more complex transportation network adapted to the varied types of trips that must be made - journeys to work and school, shopping and visiting trips, recreational travel and trips for many other purposes. Transportation of goods within the region is an especially important function that affects the welfare of all residents in their roles as customers as well as in their economic activities.

In order to consider the transportation network with proper perspective, it is necessary first to define the extent of the region under study and then to become familiar with the prevailing patterns of population and economic activity. The report prepared for the New York State Department of Transportation[a] in 1971 contains extensive information that will be freely drawn upon in this and ensuing sections of this environmental impact statement.

(a) A Comprehensive Transportation Study for Proposed Bridge Crossings, December 1971, Creighton, Hamburg, Incorporated.

a. The Region's Population Growth

The New York Metropolitan Region is defined for purposes of this study as the Tri-State Region covered by the Tri-State Regional Planning Commission. It encompasses the five boroughs of New York City plus seven other counties in New York State, ten counties in New Jersey and six planning regions in Connecticut. These are:

New York Counties (outside N. Y. C.)	Connecticut Planning Regions	New Jersey Counties
Nassau	Central Naugatuck	Bergen
Suffolk	Greater Bridgeport	Passaic
Westchester	Housatonic Valley	Hudson
Putnam	South Central	Essex
Dutchess	South Western	Morris
Rockland	Valley	Union
Orange		Middlesex
		Somerset
		Monmouth
		Mercer

Exhibit C-1 identifies the counties included in the study area and shows the limits of the region. The total area included is 7,886 square miles, or about 0.2% of the surface of the United States.

The region's population, according to the 1970 Census, was 19,032,000, which was 9.4% of the nation's total. Overall density was 2,410 persons per square mile, but the range of density went from 67, 160 persons/sq.mi. in Manhattan (New York County) down to 245 persons/sq.mi. in Putnam County.

Actually the distribution of population in the region and the relative growth of specific areas is of more interest than overall totals. Table C-1 shows the Census figures for the region's components for 1950 to 1970, and includes projections for 1980 to 2000. The projections are based on estimates in the Creighton, Hamburg, Inc. report adjusted to reflect final 1970 Census figures instead of the preliminary data available to them.

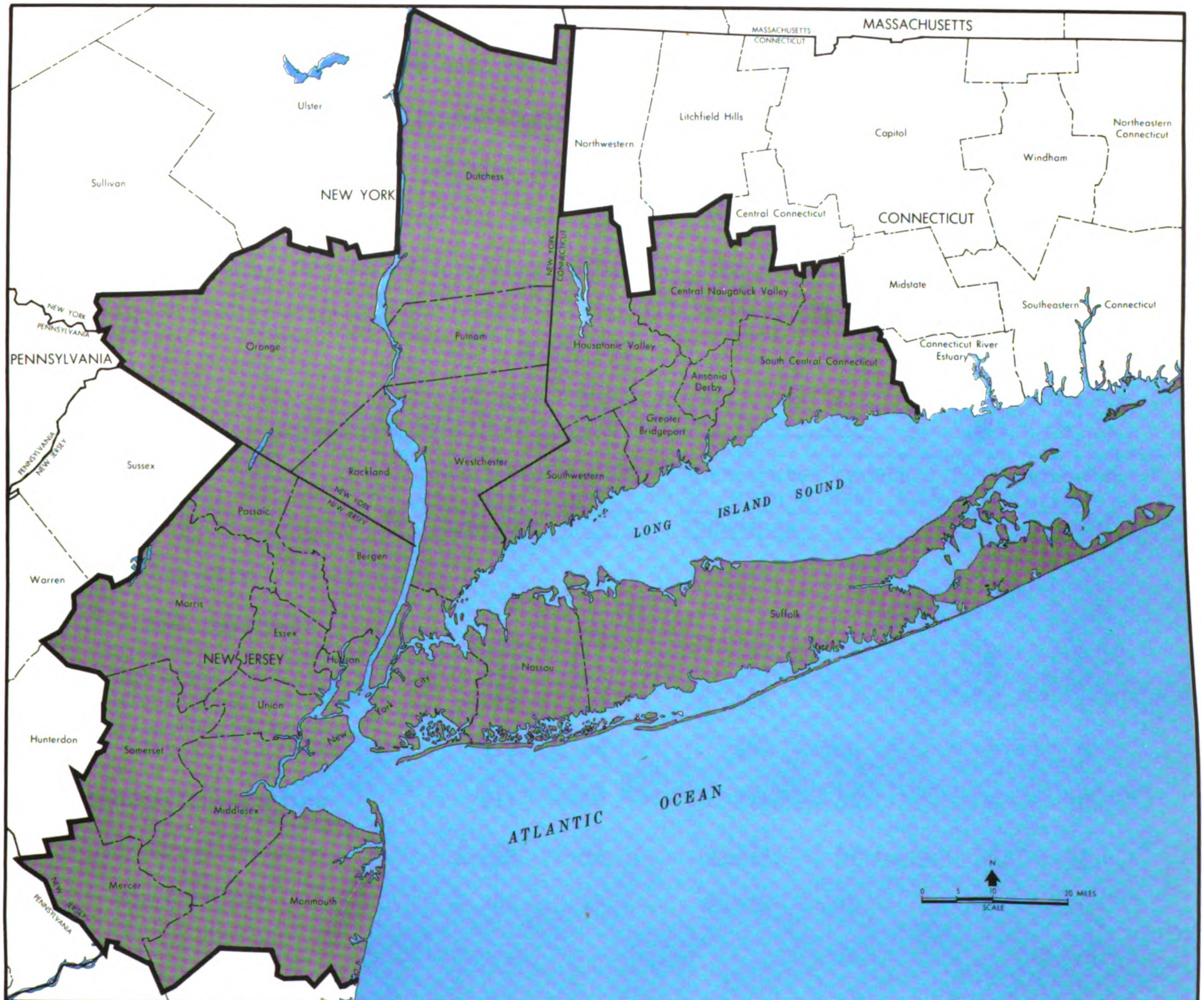
TABLE C-1

NEW YORK METROPOLITAN REGION
POPULATION WITH PROJECTIONS TO 2000

Area	Thousands of Persons					
	1950	1960	1970	1980	1990	2000
New York City	7,892	7,782	7,896	7,980	8,060	8,140
New York Counties:						
Nassau	673	1,300	1,429	1,510	1,560	1,610
Suffolk	276	669	1,127	1,600	2,090	2,590
Westchester	626	809	894	1,010	1,150	1,320
Rockland, Orange, Putnam, Dutchess	398	529	731	980	1,280	1,640
Connecticut Portion	1,075	1,349	1,586	1,820	2,110	2,460
New Jersey Counties	3,810	4,666	5,369	6,120	7,040	8,160
TOTAL REGION:	14,750	17,104	19,032	21,020	23,290	25,920

The dynamics of the region are intimately related to population growth. Changing needs for community facilities, schools, hospitals, parks and transportation are highly dependent on the rate and distribution of growth. Conversely, growth rates in individual areas are influenced by the degree to which the needs for services are satisfactorily met, but the primary force is the continuing increase in population.

In the New York Metropolitan Region, the most rapid growth in the past 20 years has occurred in the intermediate ring just beyond the surburban counties immediately adjacent to the New York City - Newark - Jersey City core. For example, Rockland and Putnam Counties increased by 179% and 157%, respectively, between 1950 and 1970, whereas closer Westchester showed an increase of 43% during the same period. However, northern Westchester increased by 96% against a rise of only 32% in the southern part of the County.



NEW YORK METROPOLITAN REGION
AS DEFINED BY TRI-STATE REGIONAL PLANNING COMMISSION.

On Long Island there was an increase of 112% in Nassau County in the 20 years prior to 1970, with most of the growth occurring during the 1950's. As Nassau began to fill up and taper off in the 60's, Suffolk County received the surging waves of in-migration that more than doubled its population between 1950 and 1960, and then went on at nearly the same rate in the 60's. The western portion of Suffolk has already passed its peak rate of growth and is slowing down, whereas the central Town of Brookhaven has more than doubled in the last decade. On the other hand, the eastern towns remain sparsely settled and increased only 24% between 1960 and 1970, but they are expected to show a dramatic rise in the next few years.

Table C-2 presents a summary of population growth in the metropolitan region from 1950 to 1970. It also shows the anticipated population increases by counties between 1970 and the year 2000, as well as the expected shift in percentage distribution of residents during the same period.

TABLE C-2

NEW YORK METROPOLITAN REGION
POPULATION GROWTH AND DISTRIBUTION, 1950 - 2000

	Population Growth 1950 - 1970		Anticipated Growth 1970 - 2000		% of Region's Population	
Area	Thousands	%	Thousands	%	1970	2000
New York City	4	0.1	244	3.1	41	32
New York Counties:						
Nassau	756	112.	181	13.	8	6
Suffolk	851	308	1,463	130	6	10
Westchester	268	43	426	48	5	5
Rockland, Orange, Putnam, Dutchess	333	84	909	124	5	5
Connecticut Portion	511	48	874	55	8	10
New Jersey Counties	1,559	41	2,791	52	28	31
TOTAL REGION	4,282	29	6,888	36	100	100

b. Land Use Trends and Policies

In past years, regional development has been left largely to private initiative and local government entities. With growing awareness of the need for some form of coordinated planning, attention has focused to a large degree on land use policy. In general, controls over land use have been exercised by local zoning boards operating as an arm of local government.

Planning agencies at the county and regional levels within the New York Metropolitan Region have in recent years been formulating broad-based goals for their areas of concern, and have published many reports containing both vital information on the characteristics of their study areas and plans for development.

The Tri-State Regional Planning Commission, which is the official planning agency for the entire region, has formulated the following goals[a] for its regional development plan:

1. Preserving open lands widens opportunities for recreation, enhances natural endowments and creates variety in the urban environment. The plan reserves generous areas of open land where nature will predominate, situated primarily in the hills and along the shores of the Region. Public ownership or control and zoning would protect these areas from normal pressures of urban expansion. The open lands would enclose the Region's major parks, reservoirs, watersheds and natural features, interspersed with a thin scattering of residences compatible with open uses.

   Conversely, all areas not so reserved would be subject to more intensive human settlement. In those places also a sufficiency of recreation and open space must exist as an integral part of urban development for the local daily use of the population.

2. Gathering ecomomic activities into a hierarchy of concentrations or "clusters" furthers the goal of smoother performance and greater efficiency, by bringing larger quantities and a greater variety of activities closer together. Almost all such clusters should occur within areas designated for urban development to places where it is wanted.

   Conversely, clusters should not occur in areas of predominantly open land. Their absence there will reduce development pressures in the places where it is not wanted.

(a) Regional Development Guide, Tri-State Transportation Commission (now renamed as in text), November 1969.

3. Dispersing residential activities provides improved housing in keeping with rising incomes and predominant tastes. American society prefers by far the detached single-family dwelling, even though multi-family dwellings have predominated in the Tri-State Region primarily because of the special historic characteristics of New York City. Single-family dwellings should therefore predominate at middle densities in most new development on vacant land. High-rise or garden apartments, always endowed with private open space for the use of their residents, as well as townhouses at equivalent densities, should concentrate within and around the economic clusters. The Region's open land areas would contain residential development only on large lots or in scattered villages surrounded by the open countryside, to accommodate those who prefer or can afford this kind of environment. These policies imply the renewal and thinning out of older areas, with a gradual elimination of the obsolete "walk-up" tenement predominant in the ghettos of older cities.

The Nassau-Suffolk Regional Planning Board has stated similar goals in its development plan:(a)

1. The direction of the pattern of development and the rate of growth.

2. The provision of adequate housing and jobs linked by a balanced transportation system.

3. The elimination of deterioration and obsolescence.

4. The preservation of open space and the natural environment.

The same report goes on to state:

> "Three concepts - corridors, clusters, and centers - are the essence of the Plan. These concepts are the guideposts against which individual projects should be judged. In deciding on the merits of a specific proposal, each community should be guided by the goals, the three concepts, and the local criteria derived from them."

According to a Tri-State Regional Planning Commission survey,(b) the land in urban use within the region amounts to 2,564 square miles, or about 33% of the total area. The rest is either vacant or in swamps and watersheds. The distribution of land uses in the urban portion is as follows:

(a) Nassau-Suffolk Comprehension Development Plan Summary, Nassau-Suffolk Regional Planning Board, July 1970.
(b) Measure of a Region, Tri-State Transportation Commission (now renamed as in text), May 1967.

TABLE C-3

LAND IN URBAN USE WITHIN THE METROPOLITAN REGION

Land Use	Sq. Mi.	Percentage
Residential	1,277.6	49.9
Streets	467.8	18.4
Public Open Space	465.1	17.9
Public Buildings	114.2	4.4
Commercial, Mfg., Transportation	239.7	9.4
TOTAL IN URBAN USE:	2,564.4	100.0

Source: Tri-State Regional Planning Commission

It is expected that as further vacant lands in the region are developed, the distribution of land use will continue to approximate the percentages in the areas already developed. The application of the general principles formulated by the planning agencies will probably not materially change the overall distribution for the region, but the observance or disregard of these principles by specific areas may have considerable effect on their future abilities to preserve the amenities and quality of life in their communities. A continuation of unrestrained "spread city" development, in other words, could lead to serious imbalances in land use in the future.

The area of most spectacular growth within the region during the past 20 years is Nassau and Suffolk Counties. After its post-war explosion in the 1950's, development in Nassau County slowed down during the sixties as the supply of developable lands decreased. It is expected to continue to grow at a relatively slow rate from now on, with some redevelopment taking place in the older areas. Suffolk County, however, has a total area of 897 square miles, of which vast tracts are undeveloped. The county is presently experiencing major increases in population, and in such circumstances the planning decisions made for the area could have considerable impact on the ultimate population, and more particularly on the life styles of the residents.

Analysis of present trends suggests that Suffolk will surpass Nassau County in population by 1980. Where it will be by 2000 is problematical and dependent in part on permitted densities and other decisions yet to be made. A reasonable estimate would be in the range of 2,600,000, so that the combined population of the two counties will probably approximate 4,200,000. The manner in which Long Island develops from now on will have a major effect on its ability to cope with the problems of metropolitan growth and to provide a pleasing and comfortable environment for all of its citizens.

An overall picture of land use development and its relation to the proposed Long Island Sound Crossing is given in the NYSDOT Summary of the Creighton, Hamburg study previously referenced:

> "While the use of land in Nassau and southern Westchester is either already dense or is heavily restricted, the availability of land is not seen as a critical factor in the further development of the area. In field interviews, countywide business associations pointed out that there is room for development resulting from such a bridge, often putting it in terms of continuing the past rate of development, implying that the rate of growth would slow down without a bridge. Firms on both sides of the Sound have indicated that location immediately adjacent to bridges is less significant than ease of access to the bridges over the highway network. The continued development of Mitchell Field in Nassau and additions to the office complexes along Interstate Route 287 in Westchester can be considered to be a partial function of a Nassau-to-Westchester crossing. In both of these counties, little development close to the bridgehead itself is likely."

c. Transportation Implications of Regional Growth

As the geographical limits of intensive development push farther from the region's core, trips to the inner city become longer and longer. Since residential patterns tend to shift faster than employment patterns, a move to the suburbs frequently means a round trip to Manhattan or some other center of economic activity.

More than one-half of all person-trips made within Manhattan have one end of the trip in another county. This is a remarkable phenomenon in view of the fact that in all other parts of the region, except The Bronx, intra-county movements far surpass inter-county movements in number. Despite the establishment of many business offices and plants in various parts of the region, Manhattan is still the site of 31% of the region's non-agricultural jobs. In terms of office jobs, 52% are located in the Manhattan Central Business District.

Besides local trips and core-oriented trips, there are large numbers of inter-zone trips between all parts of the metropolitan region. Approximately 86% of all person trips in the region are made entirely outside New York County (Manhattan). These trips are widely dispersed with no obvious dominant pattern. One widely held theory likens trip generation to the laws of gravitation, with trips between areas varying roughly in direct proportion to the "attractions" between them but inversely proportional to the difficulties of travel between them. Travel patterns in the region are highly complex and depend upon trip purpose as well as time of day, week, and season.

Up to a point, trips can be lengthened without undue hardship or discomfort. People in the New York Metropolitan Region will accept a daily trip to work of 60 minutes or a bit longer without too much complaint. Once the trip gets into the range of 80 minutes or more, whether it be by car or by public transportation, it becomes a major segment of the active day and a considerable drain on personal energies. Longer trips are also more subject to delay, with an exponential rise in the aggravation factor. Excessive trip times clearly represent an economic cost to the individual and to the community at large.

Longer trips made by automobile add a disproportionate load to main traffic arteries. Only 3 per cent of all vehicular trips in the metropolitan area are longer than 20 miles, but they account for about 20 per cent of all vehicle-miles of travel.

Past patterns of regional growth along the traditional lines of outward movement from the core have intensified the problem of congestion. It is estimated that vehicular trips in the metropolitan region will nearly double the present level by the year 2000, reflecting an increase in automobile registrations about 1.7 times the increase in population.

With increasing vehicular travel will come an even faster increase in longer trips, because (1) people can move their residences outward faster than job centers can follow, and (2) the larger size of the developed region will induce more long trips for visiting, shopping, recreation and other purposes. These trends toward greater mobility may be expected to grow if present development patterns continue, placing increased loads on the highway system and causing greater problems of congestion.

One school of thought, recognizing the problems caused by increased vehicular traffic, seeks to restrict traffic growth by limiting development and "keeping things as they are." Such efforts can ultimately lead to a limit on improved standards of living for large segments of the population, even for those already established in the suburbs. Arbitrary and artificial constraints against growth merely displace the growth into less desirable and more congestive patterns. The pressures of population growth cannot be denied, and changes will come whether they are wanted or not. The only question is whether the changes will be planned to accommodate the new conditions and serve people, or whether they will simply be allowed to take shape in a haphazard manner. The impulse to freeze things against change cannot be satisfied without imposing serious restraints on the opportunities for people to improve their life situations through their own efforts.

2. A Balanced Transportation System as an Instrument for Balanced Regional Development

The section on Land Use summarizes several basic principles for regional development that have been generally agreed upon by virtually all the responsible agencies engaged in planning the region's future course. These principles set forth a method by which the region can continue to develop as a cohesive unit and accommodate in a rational manner the increasing numbers of people who are expected to live here.

An essential corollary of a plan for balanced regional development is a balanced transportation plan. The central idea of grouping certain types of activities in clusters or centers is intimately related to the provision of adequate transportation between these centers. Through the medium of concentrating some business, shopping and housing, mass transportation modes can become a viable element of a balanced plan.

A number of principles underlying a balanced transportation plan have been developed by the region's responsible planning agencies. In this respect, the Nassau-Suffolk Regional Planning Board has formulated the following goals statement:[a]

"The goal of the Transportation Plan is to develop a balanced system, provide more efficient mass transportation, and at the same time, overcome existing congestion on the roads. A central concept of the Land Use Plan discussed above is the encouragement of the use of mass transportation through the development of centers. The present trend toward ever-increasing reliance upon the automobile must be reversed, if we are to retain open space and protect the natural environment."

The Tri-State Regional Planning Commission has adopted a similar overall philosophy, and has formulated a more explicit set of objectives applicable to the highway network within a balanced transportation plan.[b]

1. The regional highway system should effectively serve existing development and promote the implementation of adopted development plans.

2. The regional highway system should be an interconnected, balanced network of high quality arterial roads well coordinated with other modes of transportation to serve the various travel requirements of the region. Expressways and other principle arterials should provide high quality access in all directions to serve the region's diverse travel patterns and thereby modify rather than reinforce the present directional bias in regional expressway routes (i.e., the concentration of radial routes leading to Manhattan)..... Expressways and other principal arterials should not be located to serve the same travel desires as existing or planned rapid transit lines.

(a) Nassau-Suffolk Comprehensive Development Plan, Nassau-Suffolk Regional Planning Board, July 1970.

(b) Regional Highway System Objectives, Tri-State Regional Planning Commission, July 1971.

3. The regional highway system should be designed to promote a balance between the supply of arterials and their anticipated level of use.

4. The regional highway system should minimize disruption to existing community facilities and land use patterns, and should enhance the surrounding areas.

5. The regional highway system should be designed to avoid harmful impact on the natural environment and to assist in improvement of the aesthetics of the environment.

6. The regional highway system should be economical and efficient, seeking to increase user benefit while minimizing facility costs.

Through the application of the principles set forth for balanced regional development and a balanced transportation system, it will be possible to provide for the anticipated rise in regional population. By following a more rational policy of land use and then enabling people to move around in an efficient manner, the standards of life can continue to improve even while population continues to increase. On the other hand, lack of a plan to accommodate future population growth and provide the needed services will lead to increasing congestion, longer and more intolerable trips, and ultimately to large scale economic loss and its consequent social effects.

In applying the principles stated to the transportation network, it is clear that the primary solution for travel routes leading to the central core of the region is mass transportation. This will come about chiefly through upgrading of existing rail routes. The major aim is to provide rapid, comfortable commuter rail service at fares that will attract more commuters out of their cars. Local feeder bus lines, the provision of transportation centers for transferring from one mode to another, and park-and-ride facilities are additional means of supporting and supplementing travel via rail transportation.

In some instances express bus lines can provide needed service in areas where rail service is not feasible.

For the many diverse trips between points not served by the radial routes into New York City, reliance will have to be placed on high quality highway connections. Circumferential rail lines do not exist, and there are no prospects that sufficient concentrations of travel demand will build up to justify the construction of such new routes. Therefore this service must necessarily be provided by belt highway routes spaced at reasonable intervals to serve the needs for circumferential movement within and around the outer portions of the metropolitan area.

Within New York City, a highway ring of this type is available via the Belt Parkway, Throgs Neck Bridge and Cross Bronx Expressway connecting with the George Washington Bridge to New Jersey routes (Exhibit C-2). Further east on Long Island, only limited transverse access is available. The Meadowbrook and Wantagh State Parkways for passenger cars and the Seaford-Oyster Bay Expressway for mixed traffic are incomplete routes that presently feed their traffic into the radial arterials.

In Westchester County, the Cross County Parkway is part of an inner ring connecting with New York City routes via the Saw Mill River and Hutchinson River Parkways. Further north, the Cross Westchester Expressway intercepts all the north-south highways and connects on the west with the New York State Thruway and the Tappan Zee Bridge across the Hudson River to upstate New York and northern New Jersey.

Between Westchester County and Long Island, however, the Long Island Sound acts as a water barrier preventing the two areas from effective interaction as part of a regional unit. The outer circumferential ring is incomplete. The Long Island Sound Crossing has been proposed as a link to make the connection between its Westchester and Long Island segments. By connecting the counties of Nassau and

Westchester directly, the crossing would make it unnecessary for drivers to travel into New York City and then out again on the heavily used radial routes.

The Long Island Sound Crossing, as a cross link between two important parts of the metropolitan region, is clearly consistent with the principles of a balanced transportation plan for the region. This is the reason that such a crossing has been included in the Tri-State Regional Planning Commission's comprehensive transportation plan.[a] The Nassau-Suffolk Regional Planning Board has also included this link in its transportation plan[b] with the proviso:

> "Before any bridge plans are complete, however, the generally low-intensity development of the North Shore of both counties should be protected."

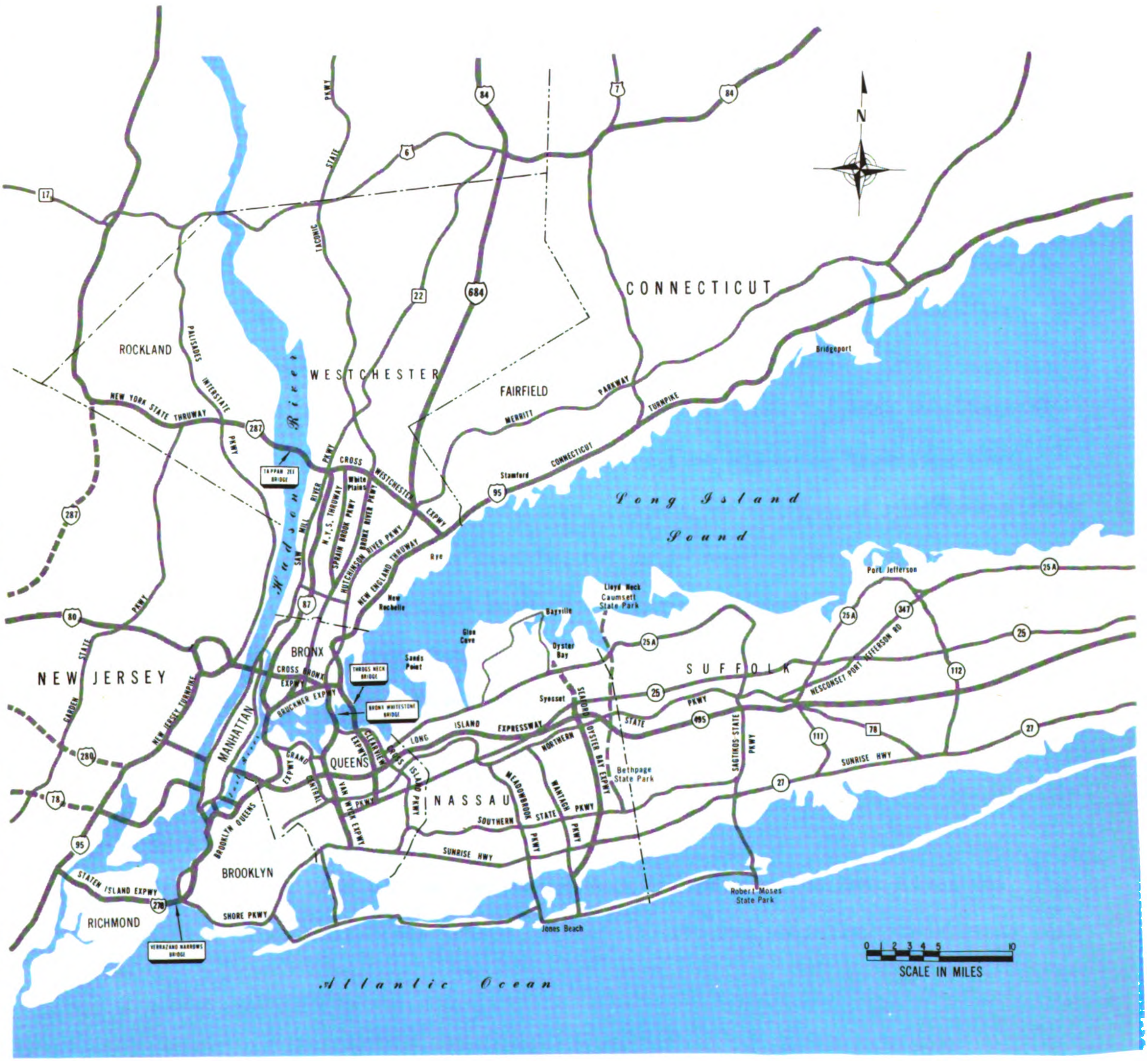
In its Statewide Master Plan for Transportation in New York (July 1972) the New York State Department of Transportation has included the Rye-Oyster Bay Bridge with the following comment:

> "Department study recommends construction of Long Island Sound Bridge between Rye and Oyster Bay and finds eastern crossings unfeasible in current planning period."

The proposed Bridge will serve the objectives set forth by the Tri-State Regional Planning Commission and the Nassau-Suffolk Regional Planning Board. Moreover, these objectives can be accomplished without altering the low density development of the North Shore, since only the local communities and their citizens have control over local land use. The bridge cannot alter this fact.

The compatibility of the Long Island Sound Crossing with the regional transportation plan lies chiefly in its ability to provide a needed circumferential route linking two important parts of the metropolitan region that have up to now been separated by a major water barrier. By diverting some trips from the congested radial arteries leading to New York City, it will complement efforts to accomplish the same objective by improving the mass transportation systems.

(a) Regional Development Guide, Tri-State Transportation Commission (now renamed as in text), October 1968; also Tri-State Transportation 1985 - An Interim Plan, May 1966.
(b) Transportation volume of Comprehensive Plan Series, June 1970, Nassau-Suffolk Regional Planning Board.



METROPOLITAN REGION ARTERIAL HIGHWAY SYSTEM.

While most of the relief will be accomplished by diverting vehicular trips from the crowded radial routes to the shorter and less congested circumferential route, it should not be overlooked that the opportunitywill exist for a significant number of persons to use bus services across the bridge. The establishment of transportation centers at such points as White Plains, Port Chester and Mitchel Field, as now being planned, will enhance the opportunities.

In assessing regional growth implications, the movement of goods must be considered as well as movement of people. Because all surface transportation to Long Island must pass through New York City, freight shipments routinely suffer substantial delays and freight-rates reflect surcharges above the normal rates based on distances traveled. Rail freight service to Long Island is minimal, so that the area is largely dependent on truck haulage. Direct truck access between Long Island and the mainland without passing through New York City, therefore, is an element of a balanced transportation system of considerable importance both from the standpoints of improved service and of cost reduction.

A commuter's cost in economic and environmental terms is quite overwhelming and hence obvious to him as he spends excessive time and money traveling over overloaded facilities. The economic loss, present and future, of poor commodities access by truck or rail is less visible, but it is nevertheless real and substantial. The importance of improved truck access, and its relationship to regional economic needs, including more diverse and numerous job opportunities, is discussed in a later section on "Economic Development Needs."

3. Need for Relief of Congestion

a. East River Crossings

In 1960, the year before the Throgs Neck Bridge over the East River was opened, the Bronx-Whitestone Bridge carried 33,196,098 vehicles. Conditions were intolerable. Extended delays occurred at all rush hours and at many other times as well. Through the day, traffic was sensitive to the slightest tie-up, and congestion rapidly resulted. With the opening of the parallel Throgs Neck crossing in January 1961, these conditions were immediately eased. Following are the annual traffic volumes on these two crossings since 1960:

TABLE C-4

ANNUAL TRAFFIC VOLUMES

Year	Bronx-Whitestone Bridge	Throgs Neck Bridge	Total
1960	33,196,098	-	33,196,098
1961	19,891,118	16,443,721	36,334,839
1962	17,159,313	28,065,387	40,224,710
1963	16,372,110	28,702,088	45,074,198
1964	23,310,110	28,973,466	52,284,118
1965	26,011,772	29,547,948	55,559,720
1966	25,769,311	30,645,646	56,414,957
1967	26,688,591	30,869,828	57,558,419
1968	28,437,272	31,780,548	60,217,920
1969	28,669,144	32,569,127	61,238,271
1970	29,451,147	31,819,496	61,270,643
1971	31,253,392	32,025,654	63,279,046

Source: Triborough Bridge and Tunnel Authority

It is clear that traffic volumes on the Bronx-Whitestone Bridge are again approaching the peak levels that prevailed in 1960. Throgs Neck traffic is even greater, though due to wider lanes and freer approaches it has somewhat greater capacity. Delays are already prevalent, and it is evident that within two or three years the traffic volumes on both bridges will exceed the level that can be carried with a tolerable level of service. Toll plaza improvements now being planned for both bridges will only partly relieve this situation.

Analysis of origin and destination traffic surveys made for the proposed Rye-Oyster Bay Bridge has shown that in 1970 there were approximately 5,800,000 trips made via the upper East River bridges that would have been diverted to the Sound crossing if it had been in operation, taking into account the proposed schedule of tolls.[a] All these trips would be removed from the existing bridges, with consequent relief of congestion there as well as substantial travel savings.

Allowing for growth to the assumed first year of operation of the new bridge, it is estimated[b] that some 7,750,000 trips per year will be diverted from the existing crossings to the new one. This is equivalent to a reduction of 21,000 trips per day of which nearly 20,000 will come from 190,000 daily trips (on the average) that would otherwise use the Bronx-Whitestone and Throgs Neck Bridges. Together with improvements to the approaches and toll plazas that are now under way or planned, relief will be provided for a number of years.

b. Radial Routes

The major highway routes leading into the central core of New York City are heavily overloaded during many hours of the year. Service delays occur not only at rush hours, but at many other times, and a breakdown or accident can cause tie-ups that take an hour or more to untangle. Following are the average daily traffic figures for several of the more important radial routes leading into New York City.

TABLE C-5

TRAFFIC VOLUMES-RADIAL ROUTES

Route	Area	1971 AADT Volume (1)
Northern State Parkway	Long Island (2)	78,000
Long Island Expressway	" "	140,000
Southern State Parkway	" "	120,000
Sunrise Highway - Route 27	" "	71,000
New England Thruway	Westchester (3)	55,000
Hutchinson River Parkway	"	28,000
New York State Thruway	"	38,000
Saw Mill River Parkway	"	29,000

(1) Average annual daily traffic
(2) At New York City line
(3) In vicinity of I-287, Cross Westchester Expressway

Source: Operating Agencies.

(a) Base toll for passenger cars assumed at $1.75.

(b) See Section D-5 following

All of the 21,000 vehicles per day that can be diverted are now using the major approach roads on both sides of the East River to reach the bridge spans. On Long Island, approximately 62% of the diverted vehicles have one trip end east of the proposed crossing, and these will reduce their travel on main approach roads by approximately 14 miles. The rest of the diverted vehicles will average about 5 miles of net travel reduction on Long Island express routes, so the total unnecessary travel eliminated will approximate 222,000 vehicle-miles per day or 81,000,000 vehicles miles per year. The major share of this relief will be on the Long Island Expressway, Northern State Parkway and Cross Island Parkway.

Because of the sensitivity of traffic movements to increased volumes when highway capacity limitations are being reached, this degree of diversion is significant even though it represents a fairly small percentage of the total movements on the arterial routes. For long range relief, however, this reduction would have to be supplemented by diversion of automobile riders to improved mass transportation services. For a balanced transportation system to work effectively, all phases must be progressed in an integrated manner.

On the northern side of the Sound there will be similar relief to the main radial arteries, principally the New England Thruway and Hutchinson River Parkway, amounting to about 280,000 vehicle-miles per day or 102,000,000 vehicle-miles per year.

4. Economic Development Needs

The total output of goods and services in the New York Metropolitan Region (as defined by the Tri-State Regional Planning Commission) was approximately 11.9% of the Gross National Product in 1970. While this represented a 1.0% loss of the national share since 1958, there was an increase in output of 48.5% measured in constant dollars.

The metropolitan region provided approximately 10.7% of the nation's employment in 1970 as against 11.2% twelve years earlier. During the period, there was a growth of 18.6% in regional employment, compared with 24.7% for the nation as a whole.

The region's share of the Gross National Product has been higher than its share of employment because productivity per worker in the area is considerably higher than the national average.

The distribution of employment within the metropolitan region by major industries is shown in Table C-6.

TABLE C-6

NEW YORK METROPOLITAN REGION*
EMPLOYMENT BY MAJOR INDUSTRIES, 1958 AND 1970

Industry	Thousands Employed		Per Cent of Total	
	1958	1970	1958	1970
Construction	261.5	287.5	3.7	3.4
Manufacturing	1,989.2	1,981.1	28.1	23.6
Transportation & Public Util.	513.9	569.2	7.3	6.8
Wholesale & Retail Trade	1,235.4	1,556.2	17.4	18.5
Finance, Ins., & Real Estate	488.6	634.3	6.9	7.5
Services	917.5	1,425.6	12.9	17.0
Government	736.4	1,127.9	10.4	13.4
Agriculture	41.5	20.6	0.6	0.2
Mining	4.3	3.9	0.1	0.1
All Other	894.4	797.8	12.6	9.5
Totals	7,082.7	8,404.1	100.0	100.0

*Source of Data: Tri-State Regional Planning Commission

It is seen from the table that the principal growth in employment within the region has occurred in services, government, trade, finance, insurance, and real estate. Manufacturing, still the largest employer, declined slightly in numbers but represents a considerably smaller share of the total than it did previously. Employment in construction, transportation and public utilities increased moderately in numbers, but did not keep up with the overall trend. The other industry sectors all showed losses.

From the foregoing a shift is evident in the economic mix of the region. Manufacturing, once the mainstay of economic stability and still the most important single activity, is gradually being replaced in part by service-oriented sectors. In one sense this opens the door to higher incomes and greater productivity per worker, but it also creates a potential danger of unemployment for semi-skilled and unskilled personnel.

The Tri-State Regional Planning Commission has developed estimates of probable employment by industries in the New York Metropolitan Region for the year 2000. The total number of workers anticipated is 11,484,000, an increase over the 1970 level of 3,080,000 or 37 per cent. The breakdown is show in Table C-7.

TABLE C-7

NEW YORK METROPOLITAN REGION
ESTIMATED EMPLOYMENT CHANGE BY INDUSTRIES, 1970-2000

Industry	Thousands Employed		Per Cent of Total	
	1970	2000	1970	2000
Construction	287.5	293.9	3.4	2.6
Manufacturing	1,981.1	2,098.0	23.6	18.3
Transportation & Public Util.	569.2	664.2	6.8	5.8
Wholesale & Retail Trade	1,556.2	2,260.0	18.5	19.7
Finance, Ins. & Real Estate	634.3	914.1	7.5	8.0
Services	1,425.6	2,578.9	17.0	22.4
Government	1,127.9	2,031.0	13.4	17.7
Agriculture	20.6	4.1	0.4	*
Mining	3.9	3.3	0.1	*
All Other	797.8	636.5	9.5	5.5
TOTALS:	8,404.1	11,484.0	100.0	100.0

*Less than 0.05%

The projections indicate that manufacturing in the region will continue to grow at a slower pace than the general economy, so that in the year 2000 it will no longer be the nation's largest employment sector. Services will take over the most important position by virtue of a rapid expansion in the last quarter of this century. Wholesale and retail trade will also exceed manufacturing in total employment and will provide approximately one job in five. Governmental employment (including education) is expected to increase by more than 80 per cent. The fields of finance, insurance and real estate, which expanded rapidly in importance during the 60's will continue to increase substantially. Construction, transportation and public utilities, being subject to automation, will play a declining role in the employment picture, according to the estimates.

The location of economic activity and growth within the metropolitan region is an important element in planning for transportation services. Following is the distribution of employment among major areas within the region.

TABLE C-8

NEW YORK METROPOLITAN REGION
DISTRIBUTION OF EMPLOYMENT BY AREAS, 1970

Area	Employment by Place of Work
New York City:	
Manhattan	2,589,400
Other 4 Boroughs	1,489,000
New York Counties	
Nassau	523,300
Suffolk	347,700
Westchester	367,600
Rockland, Orange, Putnam, Dutchess	250,000
Connecticut Portion	673,400
New Jersey Counties	2,163,700
TOTAL REGION	8,404,100

Source: Tri-State Regional Planning Commission

The foregoing table demonstrates the continued importance of New York City as the major employment center within the region, despite recent decentralization trends. Although only 40.8% of the region's residents live in New York City, it it the site of 48.6% of the jobs. According to the Creighton-Hamburg study, over 400,000 workers travel into the City for employment. All the surrounding counties export workers, and most of them head for New York. It is important to note, however, that more than half the jobs, over 4,325,000, are located outside New York City, and these are filled principally by suburban residents.

Forecasts presented in the Creighton report indicate that New York City will continue to be a major importer of workers, with the number rising to over 500,000 by the year 2000. The increase in New York City employment, however, is not expected to be as rapid as in the surrounding areas. New York City jobs are expected to rise by only 8% in the last 30 years of the 20th Century (still a significant 300,000), but much greater percentages are expected in all other areas. Suffolk County is listed for 438,000 new jobs, Nassau for 122,000, Westchester for 185,000 and Fairfield County, Connecticut for 228,000. In areas that would be most directly served by the Long Island Sound Crossing, the total number of new jobs by the year 2000 is expected to reach 973,000.

As we have seen in the preceding paragraphs, the economy of the New York Metropolitan Region is in a changing state. As manufacturing levels off, services and other activities will have to be expanded to absorb the load. The New York region as a whole has not expanded as rapidly as other major urbanized areas of the country.

Further, within the region there are trouble spots with special problems. During the recession period of 1970-71, unemployment rates in Nassau and Suffolk substantially exceeded the average for the region. During the partial recovery that has occurred in 1972, Long Island has lagged behind. Following are the monthly unemployment rates beginning with 1970.

TABLE C-9

UNEMPLOYMENT RATES IN NASSAU AND SUFFOLK COUNTIES COMPARED WITH NEW YORK METROPOLITAN REGION*

Month	Nassau			Suffolk			N.Y. Region		
	1970	1971	1972	1970	1971	1972	1970	1971	1972
January	3.8 %	5.7 %	6.3 %	5.6 %	7.1 %	8.3 %	3.7 %	5.0 %	5.9 %
February	4.1	6.1	6.5	5.9	7.9	9.0	3.7	5.2	6.2
March	3.6	5.8	5.9	5.4	7.1	7.7	3.5	5.1	5.7
April	3.8	5.7	5.9	5.4	6.6	7.5	3.8	5.0	5.8
May	4.4	6.0	5.9	5.5	6.8	7.1	4.0	5.1	5.7
June	4.8	6.4	6.2	5.7	7.2	7.4	4.2	5.3	5.7
July	5.4	7.2	6.7	6.6	7.6	7.9	4.4	5.5	6.0
August	5.3	6.0	6.4	6.2	7.2	7.4	4.3	5.2	5.4
September	5.0	6.1	5.9	5.8	7.2	6.7	4.3	5.3	5.1
October	5.0	5.9		4.9	6.8		4.1	5.2	
November	4.8	6.2		6.9	7.8		4.4	5.5	
December	4.7	5.9		6.4	7.6		4.5	5.6	

*New York Standard Metropolitan Statistical Region
Source: New York State Department of Labor

The unemployment rates shown above are in no small measure attributable to a narrow economic base largely built on aircraft, instruments, electronics and related industries. The economy is too sensitive to the loss of a few government contracts, as recent experience has shown. Thus Long Island remains heavily dependent on New York City for employment. An economic base clearly capable of supporting a larger proportion of the area's population must be developed if living standards and life styles are to be maintained in the image pictured by the residents when they moved in.

In order for the Long Island economy to develop to the extent needed to support its population, it must foster the establishment of new enterprises. With its long, narrow shape, the only access to the entire area is presently through New York City. This has been a major impediment to the location of new activities on the Island, particularly those that require transportation of materials and products, and this condition will continue until alternative access is provided. As the thorough review of the Long Island economy[a] by the Nassau-Suffolk Regional Planning Board states, "The location of manufacturing activities in urban areas is influenced by the need to be accessible to potential markets, suppliers and productive inputs." The report continued, "The prosperity of a local area economy is largely a function of the productivity of its manufacturing sector."

The transportation impediment has long been a major stumbling block in the way of Long Island's economic development. Many businessmen are not willing to build into their operation the extra costs and delay entailed by transporting goods to and from Long Island plants. This condition is responsible at least in part for the narrow base of the economy and the unfavorable unemployment rates previously cited.

The need for increased economic activity on Long Island clearly requires improved transportation links with the mainland. Manufacturing industries must diversify, and new services, trade establishments and other types of activities must be expanded if the anticipated economic growth is to be realized. Many of these activities will depend upon regional and even broader markets for their success. In recent years, for example, there has been a trend for wholesale distributors to locate outside the central city rather than in it. These activities are entirely dependent on efficient and economical transportation.

Services include many activities that go beyond local borders. While a certain number are limited to their own neighborhoods in scope, the larger enterprises seek a wide clientele that may be scattered all over the region as well as in other areas beyond the region. This applies to such services as recreational facilities, sports, hotels, convention centers, professional services, medical centers, advertising and many others. To attract a regional clientele, such services are dependent upon convenient transportation.

(a) The Long Island Economy: Anatomy of Change, by Pearl M. Kamer, Chief Economist, Nassau-Suffolk Regional Planning Board, 1971.

All of these factors point a need for unlocking Long Island and making it accessible to the mainland without the necessity of traversing the congested arteries of New York City. The Long Island Sound Crossing was conceived to answer this need. As part of a balanced transportation plan providing circumferential highway distributors to connect all parts of the region, the proposed crossing plays a key role in the overall development of the area. For the Long Island economy it is a vital link.

The impact of Long Island Sound Crossing will reach much farther than Long Island itself. In every metropolitan region, there is a natural impetus for the region to function as a unit. Business activities generally thrive on a wider market. Just as Long Island enterprises will become more viable through access to the mainland, some activities in Westchester County and Connecticut will have greater scope by virtue of access to Long Island.

On both sides of the Sound, workers will have greater freedom of choice in seeking job opportunities over a wider area. Unemployment rates are frequently influenced by the difficulty of matching jobs with the skills available, so greater diversity of employment opportunities could have an important effect on placements. A Sound Crossing would make it possible for many workers to consider opportunities that would not otherwise be feasible without uprooting families and moving.

5. Summary of Needs for Proposed Crossing

For a metropolitan region to fulfill its potential, it must function as a cohesive unit. Utilization of the resources of the entire region in accordance with a balanced development plan affords the best opportunity for orderly development, preservation of environmental quality, and a rising standard of living for the people.

An essential ingredient of balanced development is a balanced transportation system. This means essentially the appropriate use of all modes of transportation in an integrated manner to provide the service required efficiently and economically.

Within the New York Metropolitan Region, emphasis on mass transportation is needed to carry more of the journey-to-work load and trips to concentrated activity centers including the urban. The most rapid growth of economic activity and employment, however, will occur in the suburban sections of the region where the radial transportation routes do not provide the needed service. To carry the many diverse trips between areas outside the core area, reliance must be placed on high quality highways which will reduce travel distances and relieve the radial arteries as much as possible.

The proposed Long Island Sound Crossing is a key step in this direction. By filling a gap in the major outer ring of existing expressways, the proposed project will provide direct access between two important parts of the region that are now separated from each other, with no inter-connection except via congested routes through New York City. The Sound Crossing will reduce travel by 20 to 30 miles for most users, and will at the same time remove substantial volumes of traffic from the overburdened radial routes into New York City.

The needs for a Long Island Sound Crossing from the viewpoints of transportation and the economy are summarized as follows:

1. The crossing is needed as a vital link in a balanced transportation plan, to provide an inter-connection between two important parts of the metropolitan region.

2. The crossing is needed to relieve congestion on existing crowded routes leading into the New York urban core and on existing East River crossings within New York City. Millions of trips per year presently made on these routes will be diverted to the proposed crossing, with major distance and time savings.

3. The crossing is needed to foster the healthy economic development of Long Island by providing a direct link to the mainland without passing through the congestion of New York City. It will enable business enterprises on both sides of Long Island Sound to broaden their markets and serve a larger clientele by facilitating the movement of both trucks and passenger cars.

4. The crossing is needed to make possible broader employment opportunities for workers on both sides of Long Island Sound.

The importance of the Sound Crossing to the transportation network and the economy of the region is clear. In considering a project of this magnitude, however, its impact on other values must also be examined. The neighborhoods through which the project will pass have legitimate concerns about the effects of a new highway on the quality of life in adjoining communities. Potential social and environmental changes are vital matters that must be given serious consideration along with transportation and economic benefits to arrive at equitable decisions regarding the project. In the balance of this report, these subjects will be discussed in detail.

D. DESCRIPTION OF THE PROJECT AND SURROUNDINGS

1. The Project as a Part of the Highway Network

a. Role in Regional Transportation Network

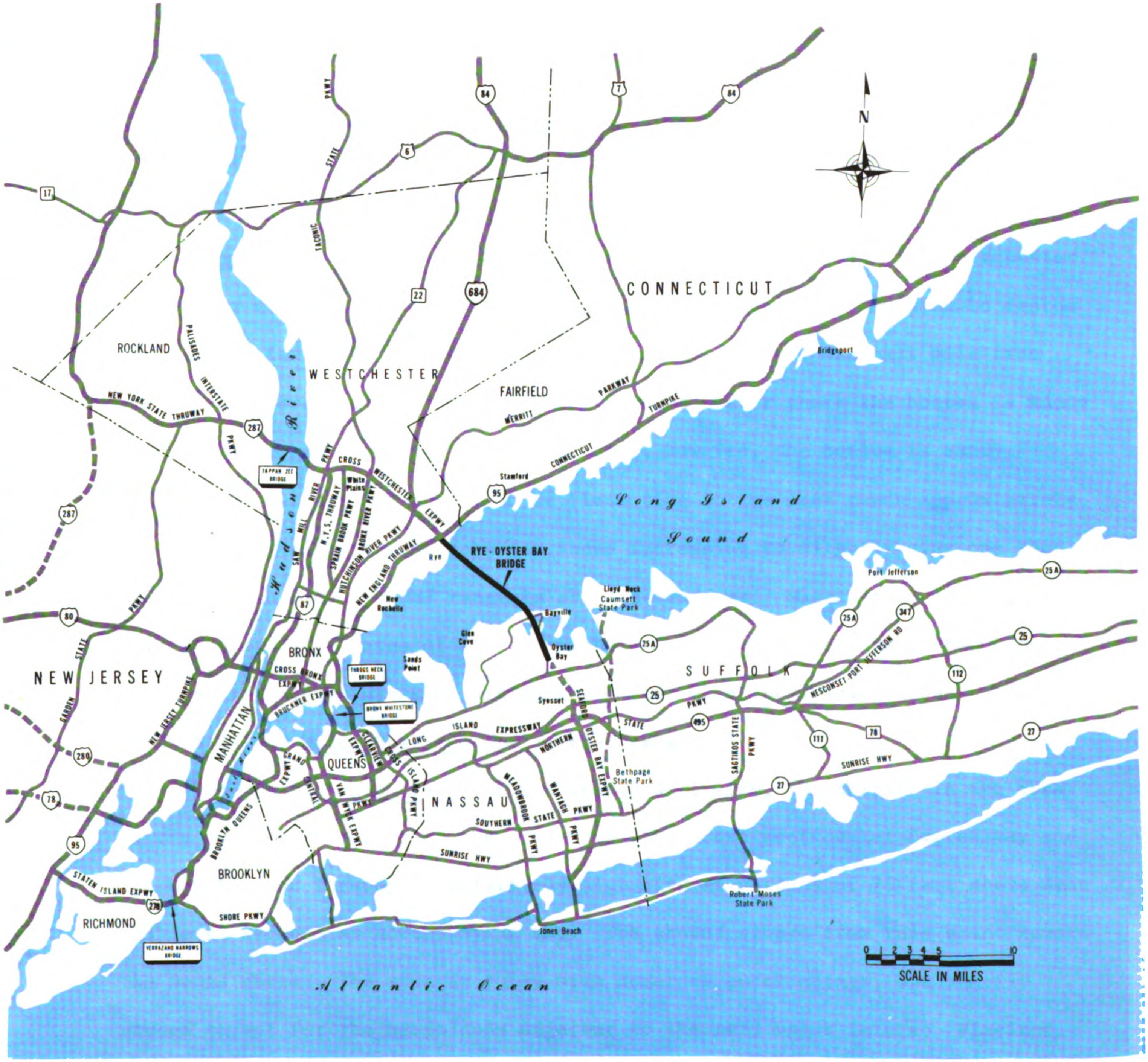
A principal objective of the proposed Long Island Sound Bridge is to strengthen the regional transportation system by providing circumferential connections between the routes serving the major areas now separated by Long Island Sound. The natural termini of the project, therefore, are the points of connection with the Cross Westchester Expressway, the major east-west route in Westchester; and the Seaford-Oyster Bay Expressway, the principal north-south expressway in the Nassau-Suffolk area. The role of the bridge in providing the needed connecting link is shown on the map in Exhibit D-1.

As is evident on exhibit, these routes at each end of the bridge provide convenient interchange with all major intersecting arteries on both sides of the Sound. On the north side, connections are provided to routes serving New England, Westchester and counties to the north; Rockland County, and Upstate New York and points beyond. On the south side convenient access is provided for all Nassau and Suffolk users.

b. Project Definition

The proposed Long Island Sound Bridge project will connect the Cross Westchester Expressway (Interstate Route I - 287) in Westchester County to the Seaford-Oyster Bay Expressway in the eastern part of Nassau County. The total length of the project is approximately 16½ miles.

The Westchester Section, in the City of Rye, will run generally south from the interchange of the Cross Westchester Expressway with the New England Thruway, (Interstate Route I-95) to the shore of the Sound. The overwater section crosses the Sound in a northwest-southeast orientation, reaching the



RYE-OYSTER BAY BRIDGE IN RELATION TO ARTERIAL HIGHWAY SYSTEM.

Nassau shore in the Village of Bayville. The route then will run generally southerly to the hamlet of Oyster Bay where it connects with the northerly end of the Seaford-Oyster Bay Expressway at Route 106.

The 4-3/4 mile section of the Seaford-Oyster Bay Expressway from Route 106 southward to its present completed interchange at the Jericho Turnpike (Route 25) is also the subject of this environmental impact statement.

2. Area Traversed by Project

a. Terrain

The physical areas consist of the water crossing of the Sound and the land areas on both the north and south sides.

Long Island Sound. The Sound bed slopes off rapidly from the Westchester shore to a depth of 35 to 40 feet. It then slopes gradually downward to depths of 55 to 60 feet half way across, rising to about 40 feet one half mile from the Nassau shore near Oak Point. Near the Westchester shore the bottom is muddy with rock outcroppings. On the Nassau side, however, the bottom is sandy.

Tidal currents in the Sound at flood tide in the area reach approximately one half knot along the Westchester shore increasing to slightly over one knot on the Nassau side. Tidal range is about seven feet. Wave action is generally moderate with waves of short amplitude except when there is a strong east wind causing higher waves of six to seven feet with longer amplitudes. (See Section E-1-c, Water Quality, for further details.)

Westchester Land Area. On the Westchester side, the terrain in the area of the northern terminus of the project at the Cross Westchester Expressway and the New England Thruway is relatively high with elevations of 70 feet above mean sea level as seen on accompanying map. The ground slopes from this point toward the Sound shore. The area is rocky with numerous outcroppings, but heavily wooded except for the marshlands adjacent to the salt water inlets. Playland

Lake and Kirby Pond in the area are brackish bodies of water connected to the Sound. The physical contours are shown on the reproduction of U.S. Geological Survey Map (Exhibit D-2).

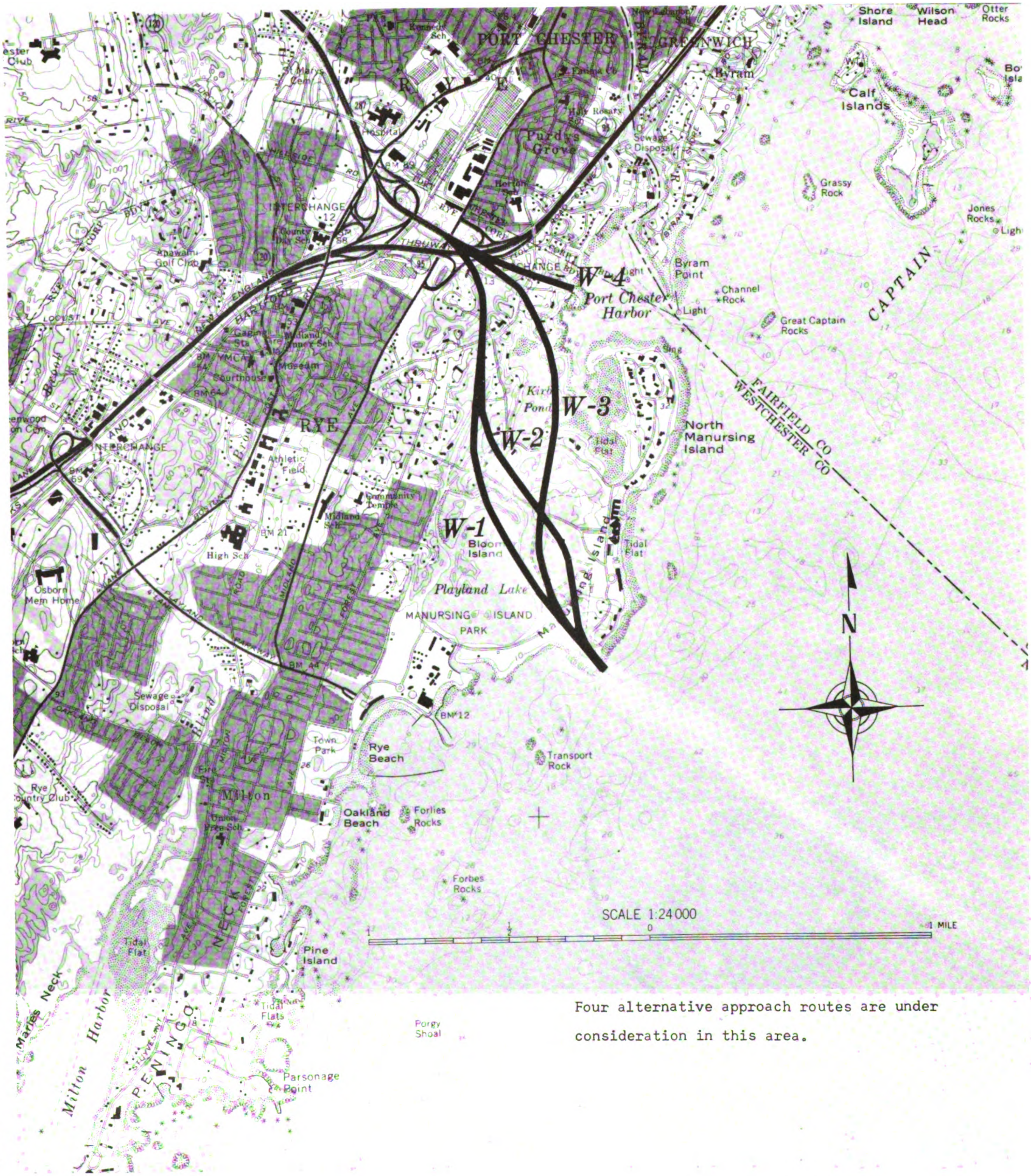
The shore line itself is very irregular with the promontory of Manursing Island creating the southwestern side of Port Chester Harbor. The northeast side is formed by Byram Point in Connecticut. The Byram River flows into the harbor and constitutes the border between the two States at this point. The shore line is generally rocky although beaches have been created at Rye Town Beach, Playland Park, and at the private country clubs on Manursing Island.

Nassau Land Area. From its terminus with the Seaford-Oyster Bay Expressway at Route 106, the Nassau approach route will pass through a hilly area of the village of Oyster Bay where there are large sand deposits that have been mined for construction material. Further northward in Mill Neck the terrain becomes higher with larger hills and Mill Neck itself is composed of open land together with some wooded areas. The Mill Neck peninsula slopes sharply down from the high ground to the shores of Oyster Bay. (Exhibit D-3).

In Bayville the land south of Oak Neck Point promontory is relatively high, with steep slopes just north of Mill Neck Creek. To the east of the Oak Neck Point area the Bayville peninsula narrows to a low-lying beach area and then widens at Centre Island, an area with rolling terrain.

To the west of Oak Neck Point the Bayville peninsula also slopes down to a narrow, low area with sandy beaches between the Long Island Sound and Mill Neck Creek. The shore line along Oak Neck Point is covered in places with boulders in front of steep cliffs.

Seaford-Oyster Bay Expressway Area. Between Jericho Turnpike (Route 25) and Route 106, the Seaford-Oyster Bay Expressway route passes through relatively flat terrain with some wooded areas and gently rolling hills. (Exhibit D-4).



Four alternative approach routes are under consideration in this area.

CORRIDOR TOPOGRAPHICAL MAP - WESTCHESTER APPROACH.

Three alternative approach routes are under consideration in this area.

CORRIDOR TOPOGRAPHICAL MAP - NASSAU APPROACH.

The extension of the Expressway has been under study and design for some years and much of the property has been acquired. One routing only, therefore, is under consideration.

CORRIDOR TOPOGRAPHICAL MAP - SEAFORD-OYSTER BAY EXPRESSWAY EXTENSION.

b. Geology

The topography of the area, described above, fundamentally is the result of differential erosion, probably occurring in the latter portion of Tertiary period, between rocks of different hardness. Sea level during portions of this period was somewhat lower than at present and it is postulated that the depression which is Long Island Sound was created at this time, perhaps as the valley of some large river.

Bedrock on the mainland shore is principally a gneiss and, generally, at relatively shallow depth (say, 100 ft., or less), with several outcroppings. The bedrock floor drops off in elevation to the southeast, lying a substantial depth (say, 300 to 400 ft.) under Long Island.

Based on available evidence (principally from records of wells on Long Island) the following sequence of sediments is found:

(a) Bottom of the Sound: recent river sediments, sands, gravels, clays.

(b) Sound bottom to - 100: deposits of glacial and inter-glacial origin; mainly sands and gravels, with some silts and clays.

(c) Elevation -100 to -150: Cretaceous silts and clays. They may be expected to be thin near the mainland and thicken toward Long Island.

(d) Elevations -150 to -200: medium to coarse sands, occasionally with gravel.

(e) -200 down to bedrock: Cretaceous silts and clays.

From the point of view of support of foundations, these materials vary in quality but no unusual subsurface problems are anticipated. Pile support of piers is anticipated, possibly using caissons for the larger piers.

c. Land Use

Westchester Approach. The City of Rye is primarily a residential community. Information as to the present land use of the City and parts of the Village of Port Chester are shown on the accompanying map. (Exhibit D-5).

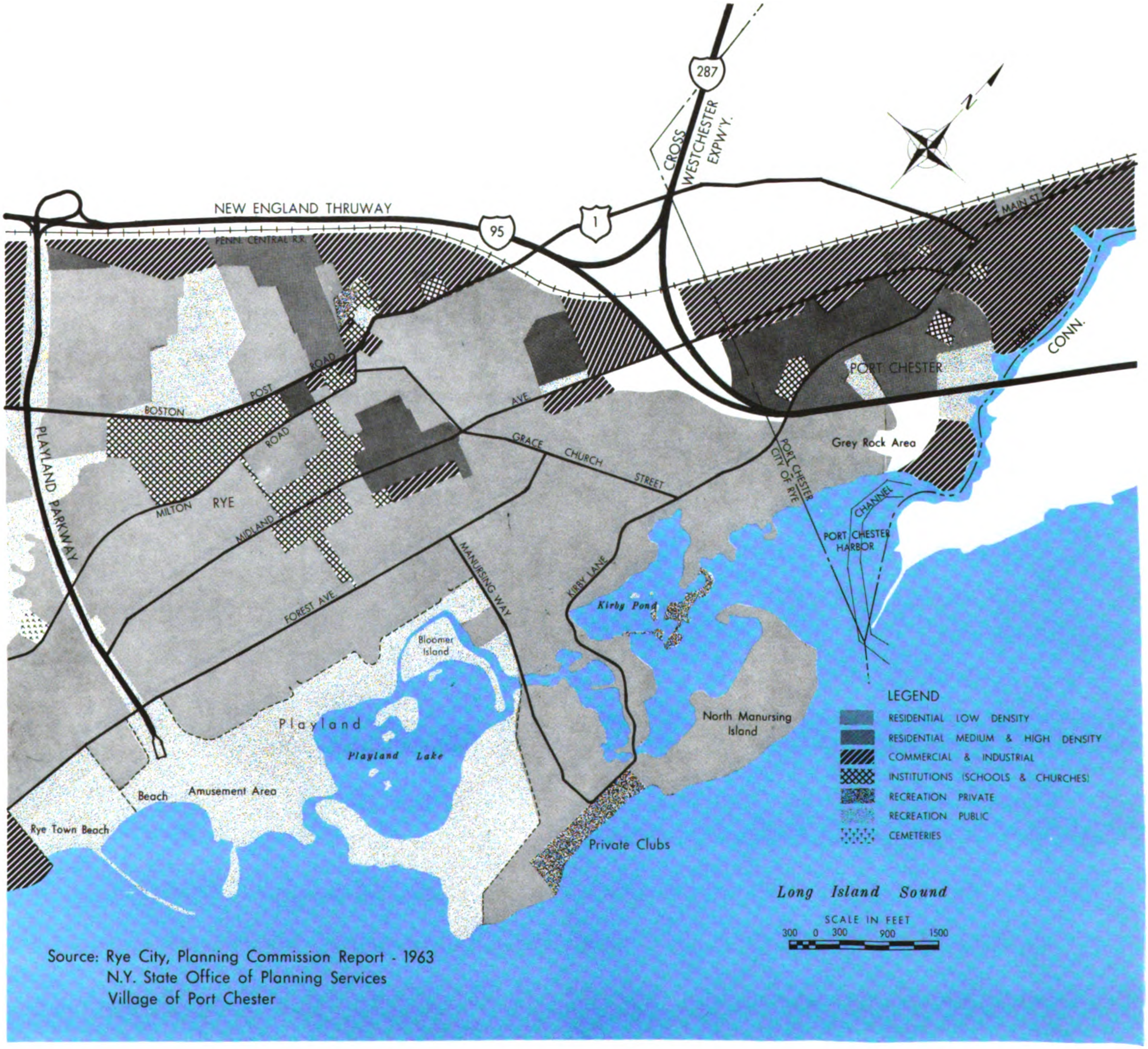
In the immediate area of the project the usage is all residential. The residences are of high quality. Zoning in that immediate area presently calls for a minimum of one acre although many of these plots have a greater acreage than the minimum zoning. In the adjacent section of Port Chester the homes are also of high quality. There are no churches or municipal facilities in the immediate area. The closest school is the Horton Elementary School north of the Thruway in Port Chester. United Hospital is adjacent to the Cross Westchester Expressway north of the Boston Post Road.

On the Sound shore in the project area there is a 273 acre tract occupied by Playland Park. This park, which is operated by the County of Westchester, includes a swimming pool, beach, amusement area and an enclosed skating rink open to the public and used by local schools. The developed section of the park is in the southwestern end of the park property. The northeastern area is lightly used and includes a lake with a small number of paddle boats operated by the park and flat undeveloped land. The undeveloped area represents about one half of the park area. The park also has some maintenance facilities in this area. There are plans to develop this area of the park to include two 18-hole par-three golf courses, but at the present time these plans have not been funded.

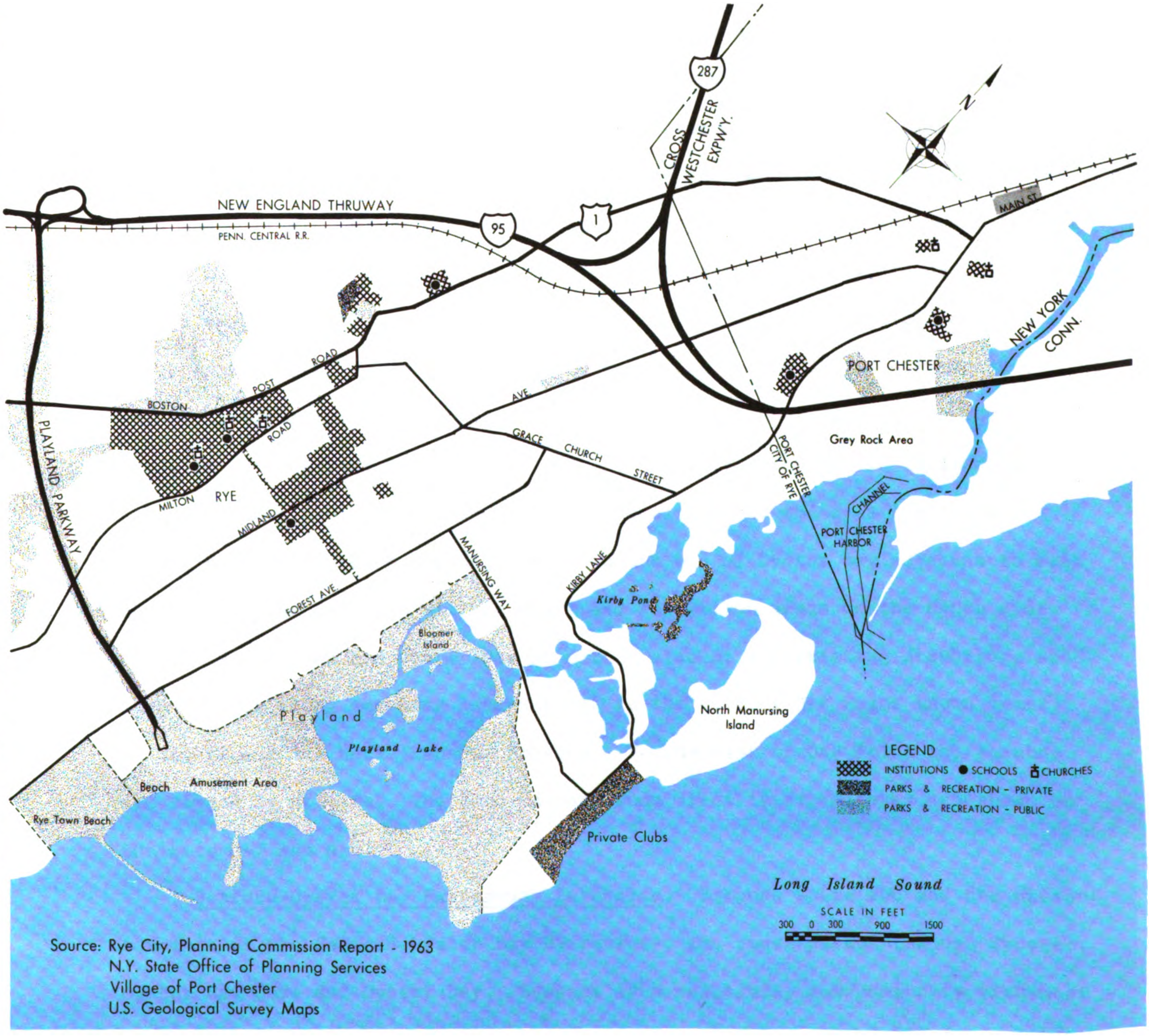
Farther to the northeast there are two private beach clubs. Between the beach clubs and Playland Park there is a group of seven large houses. Some of these are on the Sound and all of the houses are of excellent quality. Beyond the club, North Manursing Island is a residential community with some 30 homes of very high quality. The homes in the area between the shore and the Cross Westchester Expressway are also of good to excellent quality.

Exhibit D-6 shows the location of some of the significant features in the area.

<u>Nassau approach</u>. The community of Oyster Bay is an established community with both commuting and locally oriented elements. The community is primarily residential, although there is some industry including a moderate sized shipyard.



LAND USE - WESTCHESTER APPROACH AREA.



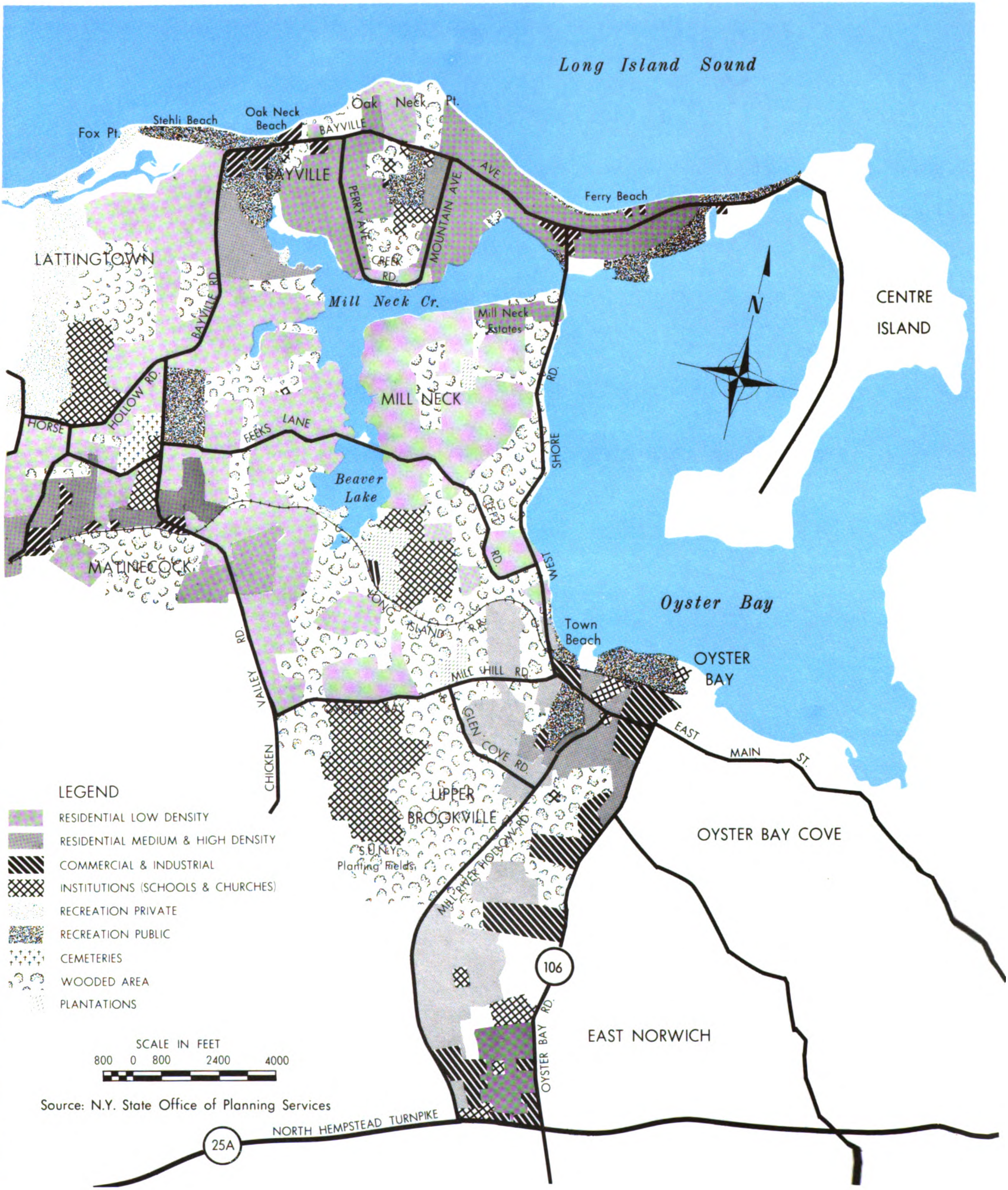
LOCATION OF SIGNIFICANT FEATURES - WESTCHESTER APPROACH AREA.

The area of the approachroute northward from Route 106 is a relatively old section of Oyster Bay where homes are on small plots. A complex of garden apartments is located on Route 106 north of the approach route. There is a small park in the area adjacent to Mill Pond. Mill Neck to the north, is completely residential, and is composed of houses on large plots - some with up to 5-10 acres. The average population density is only about 0.6 persons per acre, as compared with 6.7 in Bayville and 7.9 in Nassau County as a whole. Mill Neck Estates in the northeast portion of Mill Neck is composed of a group of homes closely spaced on small plots. The village of Bayville is generally an older community. The downtown area consisting of local commercial establishments is just north of the existing drawbridge across Mill Neck Creek. In this area there is also an oyster harvesting industry. In the Oak Neck Point section to the west, there was a hospital but this has recently been abandoned. Further to the west the beach area has some restaurant and other commercial facilities.

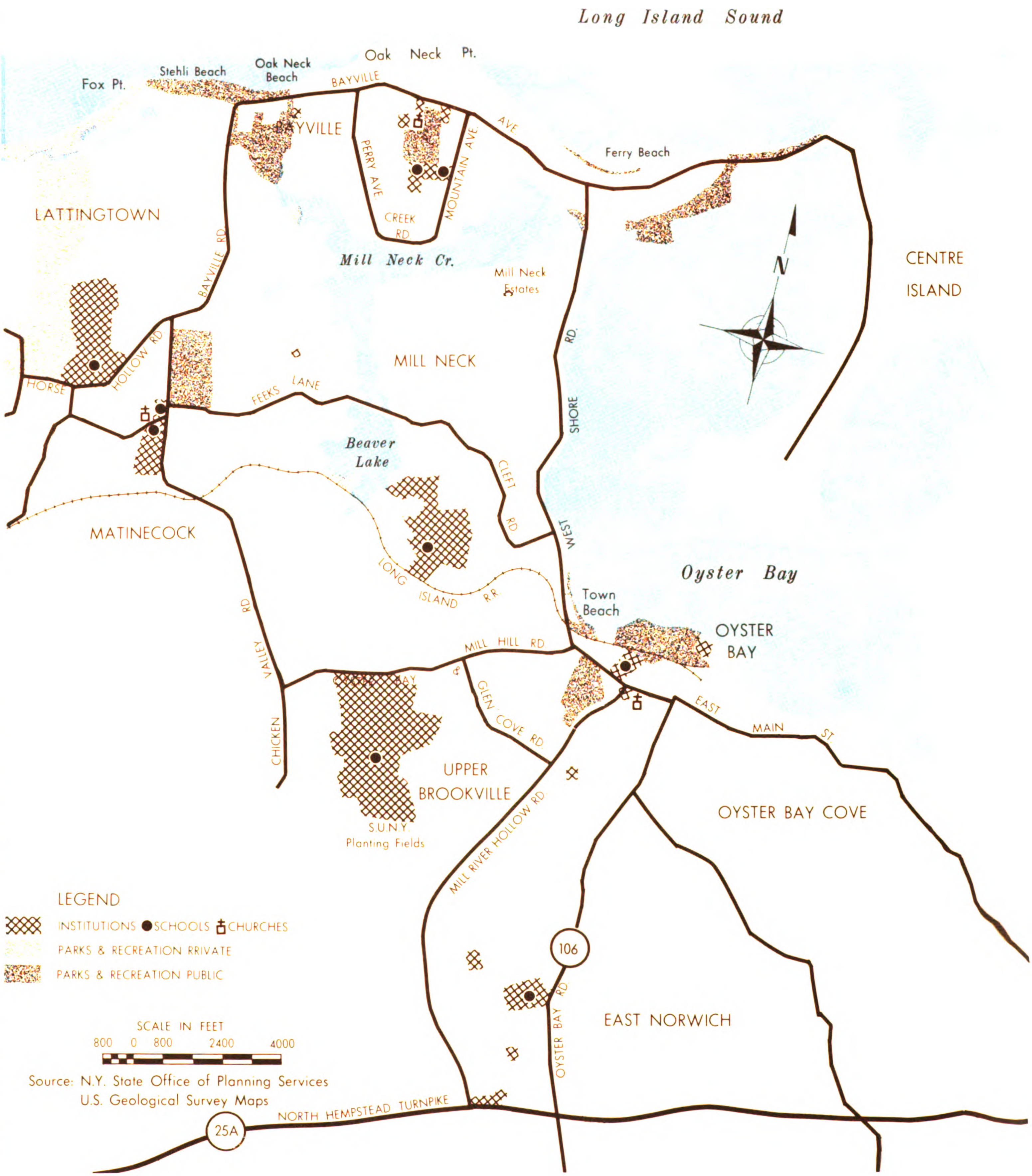
In Bayville, south of Oak Neck Point, there is the Bayville Elementary School. (accompanying map). Municipal facilities in the same area include the Bayville offices just north of the school. A church property is located just north of these facilities. Recreational facilities in the area include the Oyster Bay public beach which is on the south end of Oyster Bay adjacent to West Shore Road, the Bayville Village Beach and recreation areas on the north side of Mill Neck Creek and Oyster Bay on either side of the existing drawbridge and Town beaches along the Long Island shore to the west of Oak Point known locally as Stehli and Oak Neck (Ransom) Beaches. To the east of Oak Point the beaches are signed as private. The land use and some significant features are shown on Exhibits D-7 and D-8.

Seaford-Oyster Bay Expressway Extension. Between Route 106 and the present terminus of the Seaford-Oyster Bay Expressway, the route passes through Syosset, Oyster Bay Cove and Oyster Bay. Syosset is a relatively new community with most of the development occurring in the post World War II period. The Expressway route is largely residential and passes through Central School District No. 2. (See Exhibits D-9 and D-10). In Oyster Bay Cove, the area through which the Expressway is routed is residential although there are few homes in the immediate vicinity. In Oyster Bay, adjacent to Route 106, there is a new community of homes on small plots.

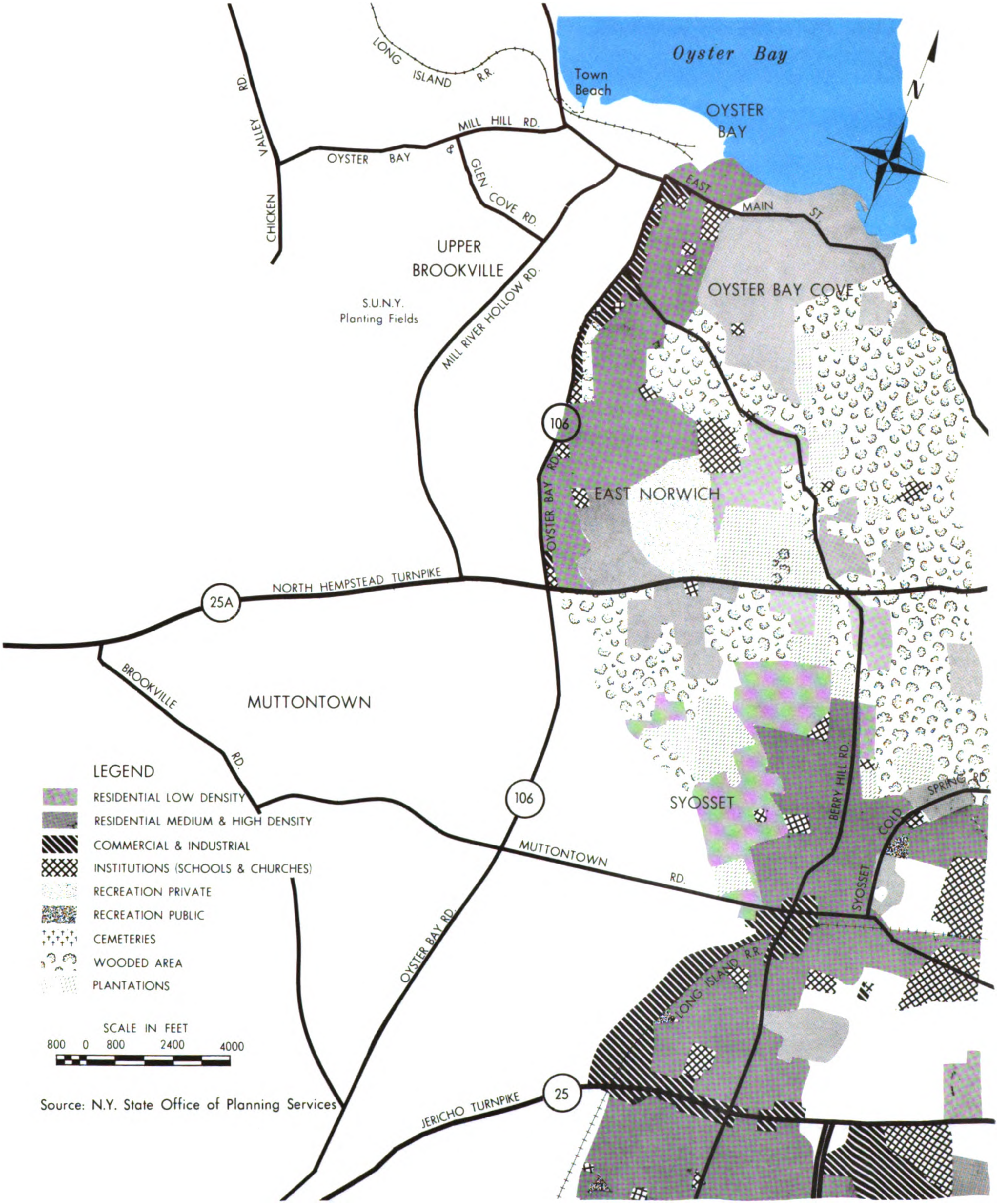
Recreation facilities in the area include the Pine Hollow Country Club on North Hempstead Turnpike.



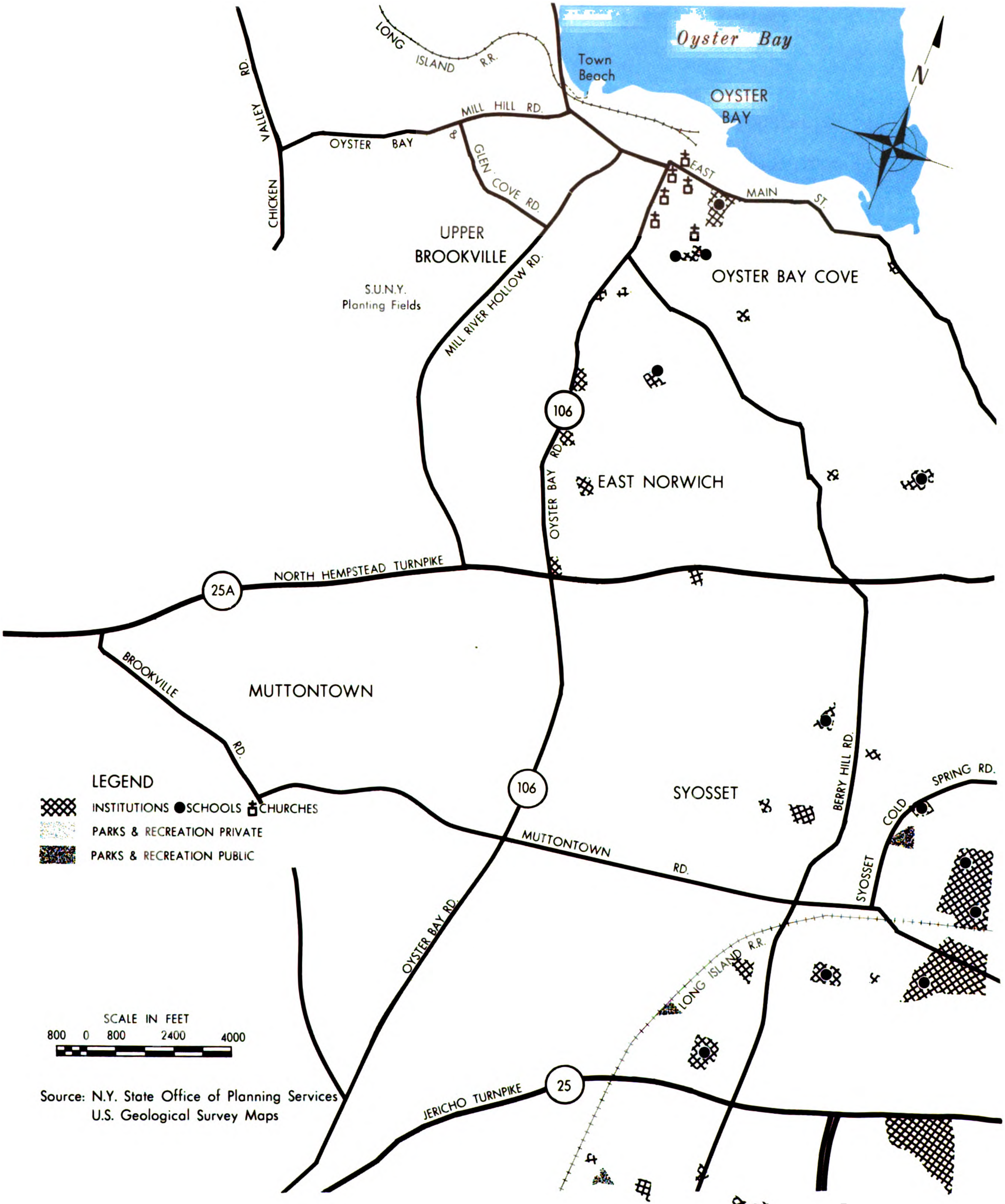
LAND USE - NASSAU APPROACH AREA.



LOCATION OF SIGNIFICANT FEATURES - NASSAU APPROACH AREA.



LAND USE - SEAFORD-OYSTER BAY EXPRESSWAY EXTENSION AREA.



LOCATION OF SIGNIFICANT FEATURES - SEAFORD-OYSTER BAY EXPRESSWAY EXTENSION AREA.

d. Socio-Economic Description of the Area Adjacent to the Project

Westchester County Portion

Characteristics of the Population and Economy. The 1960 population of Westchester County was 808,900; in 1970 it was 894,100; in the year 2000 it is expected to be approximately 1,320,000. The average annual increase in population is expected to be 1.3%, a rate slightly in excess of the region-wide average of .9%. In some ways, the county really consists of two different parts: the southern portion, consisting of the older cities of Yonkers, Mount Vernon, New Rochelle, Rye, White Plains plus intermediate suburban areas; and the northern section which includes smaller localities like Peekskill, Mount Kisco and Briarcliff Manor as well as large areas of open or sparsely developed lands. The northern part of the county is expected to experience the largest growth of the two in the future, while the southern portion will experience comparatively modest growth. The White Plains area has special significance as the county seat and a growing center for commerce, culture and light industry.

Westchester is a wealthy county; according to the 1970 census it is the seventh richest in the nation, with an average family income of $13,784. The median value for a house in 1970 was $40,500.

Character of the Local Neighborhood. The City of Rye is located along the Long Island Sound shoreline of Westchester County, mostly south of the New England Thruway and the Cross Westchester Expressway. It is an area of single-family dwellings; only 3.4% of the total Rye acreage is zoned for multi-family units, as opposed to 84.9% of it zoned for single family residences.

Rye had its fastest rate of growth in the 20's, when the first large-scale suburban migrations took place. Since then the growth of the City has been steady but unspectacular. In 1960 the population was 14,755, in 1970 it it was 15,869. The Rye City Development Plan, prepared in 1963 by the Rye City Planning Commission, has shown estimates of the development capacity of the City. These estimates pointed to a "full development" population of approximately 17,500.

Rye is a wealthy residential town, a bedroom community for professional and business people. The City has mostly single family homes and over 50% of these were valued in the 1970 census at above $50,000. While there are corporate headquarters of at least 6 nationally important companies located in Rye, the majority of the people who live there commute to Manhattan, White Plains, or to parts of Connecticut, either by car or by train.

The business and industrial portions of Rye straddle the New England Thruway. That part of the City between the Thruway and the Sound is of irregular wooded topography, becoming less densely inhabited as it slopes toward the water. The low valley between Midland Avenue and Kirby Pond, through which alternative bridgehead approach routes W-1 and W-2 pass, is the least densely populated portion of Rye south of the Thruway. The houses are of moderate size, in good condition on well situated sites.

The City is very well aware of its strongly residential character and has several times gone on record as wishing to preserve it. The 1963 plan listed nine objectives emphasizing the preservation of the existing character of Rye as a residential community, in which single family homes are the dominant characteristic, with other activities encouraged only to the extent they serve the residents. Allocation of additional lands to non-taxable uses was discouraged. Attention was called to the need for minimizing adverse impact of traffic from superhighways, arterial roadways and main roads to the extent possible.

The City has worked hard to meet these objectives. For instance, in the downtown area the City has planted trees, buried overhead wires, provided rear entrance loading access to stores and continuously worked at providing plentiful and attractive parking spaces. The adjacent area of the Village of Port Chester southeast of the Thruway, locally known as Grey Rock, has many of the same characteristics as Rye. The section of Port Chester across the Thruway is an older community with a substantial amount of commercial and industrial establishments.

Nassau County Portion

Characteristics of the Population and Economy. Nassau County experienced extremely rapid growth after World War II as people moved out on the Island and new families were formed. In 1950 the Nassau County population was 672,675. By 1970 it had increased to 1,428,838, or 112% within twenty years. Significantly, most of the growth occurred between 1950 and 1960 and was due to in-migration. Over four-fifths of the growth between 1960 and 1970 was due to natural increase rather than in-migration.[a] Estimates for the year 2000 show a population in Nassau of 1,610,000[b] indicating an expectation that population growth in Nassau will continue at a very moderate pace. Suffolk County has become the major growth area on Long Island and is expected to reach a population of nearly 2,600,000 by the year 2,000.

The Nassau County economy is shifting from a basic manufacturing goods, producing orientation to service-oriented industries, such as trade, finance, services and government. For example, during 1969-1970, manufactured jobs declined by 10,600 while non-manufacturing jobs increased by 31,900. Recent tabulations available on employment characteristics reveal that 104,400 members of the labor force from Nassau County are employed in manufacturing jobs, while 345,000 hold positions in non-manufacturing activities.[c]

In 1960, 44.2% of the Nassau County labor force were employed in job outside of the county. Almost all of the commuting was to jobs in the New York City core.[d]

(a) Regional Net Migration Patterns, Tri-State Regional Planning Commission, August, 1972
(b) See Section C, Table C-2
(c) Tri-State Regional Planning Commission
(d) See Section C, Table C-7

The fact that non-manufacturing activity continues to increase is a sign of hope for the county. It reflects a diversification away from over-dependency on defense and aerospace activities. It also reflects an increasing demand for services, by businesses and industries as well as by residents.

On the other hand, Nassau County's unemployment rate has recently been well above the average metropolitan region, reaching a high of 7.2% in July of 1971 and continuing at over 6% in 1972. This high level of unemployment is attributed partially to cutbacks in defense and aerospace spending at a time of national economic recession, but the continuing lag in recovery as compared with the region is an indication of some basic shortcomings in the local economy. Most affected by unemployment has been the southwestern corner of the county, mostly west of Meadowbrook Parkway.

Efforts are under way, however, to strengthen Nassau's economic base. A major new employment center is emerging within commuting distance of southwestern Nassau. The Hicksville-Bethpage-Farmingdale area, which straddles the route of the Seaford Oyster Bay Expressway, received two-thirds of the new industrial jobs created in Nassau and Suffolk counties between 1963 and 1969.[e] County and regional development plans further expect the development of office and service jobs in this area, thus implementing a strategy of regional centers within the metropolitan region. The proposed bridge crossing would aid in this development plan by improving accessibility to the points served directly by the Seaford-Oyster Bay Expressway which interchanges with all major radial routes into the urban core.

Between 1960 and 1970 Nassau County accounted for 47% of total regional expenditures on suburban office construction; more office buildings, hospitals

(e) Kamer, p. 80 (The Long Island Economy: Anatomy of Change Pearl Kamer for the Nassau-Suffolk Regional Planning Board, December 1971) and churches were built in the county than in any other suburban county in the region.[f] Almost $132 million was spent in construction or expansion of industrial facilities.[g]

While housing starts declined from 7,582 in 1960 to 2,835 in 1970, there was a net increase in new dwelling units over the decade of 57,389, or over 20%. It is significant that, of the new units, 35,013 were single family and 20,084 were for five or more families. The remainder were for 2, 3 or 4 families.[h]

The 1970 Census shows a median income per family in Nassau County of $14,632, the third highest county in the nation. Because the level of family income is extremely high, purchasing power is also high. Department store sales, for example, rose by 5% in dollar volume in 1971.[i] Mutual savings bank deposits increased by 20% between April 1970 and April 1971.[j]

Character of the Local Neighborhood. Bayville, East Norwich, Oyster Bay, Oyster Bay Cove, Mill Neck and Upper Brookville, the communities directly on the proposed access route had a total 1966 population of 16,513 in an area of 9,477 acres resulting in a density of 2.5 persons/acre. Such a thinly distributed population gives this area of Long Island a semi-rural atmosphere, in contrast to the controlled suburban development of Rye.

The following figures show recent population trends in the specific Nassau County communities that would be adjacent to the approaches of an Oyster Bay-Rye bridge crossing:

(f) Kamer, Op. Cit., p. 31
(g) Kamer, Op. Cit., p. 87
(h) Kamer, Op. Cit., p. 85
(i) Kamer, Op. Cit., p. 25
(j) Kamer, Op. Cit., p. 25

TABLE D-1

POPULATION TRENDS IN COMMUNITIES ADJACENT TO PROPOSED LONG ISLAND SOUND CROSSING AND ITS ACCESS ROUTES

Community	1960	1970	Population Increase	% Increase
Bayville	3,962	6,147	2,185	55.
Bayville (Unincorp. Area)	208	500	292	140.
Mill Neck	701	982	281	40.
Oyster Bay	6,096	6,882	786	12.
Oyster Bay Cove	988	1,320	332	34.
Syosset	8,560	10,084	1,524	18.
Upper Brookville	1,045	1,182	137	14.

Source: Nassau - Suffolk Regional Planning Board, U. S. Census '70 Vol. I. October, 1971.

A sampling of the 1970 Census shows that median family income in Oyster Bay Cove was just over $28,000; in Mill Neck it was $24,812; in Syosset $17,759. In Oyster Bay village it was $13,052; and in Bayville, $12,957, or below the county's median family income of $14,632.

A significant share of the labor force in Bayville, Oyster Bay and Mill Neck works in locations easily reachable from their residences. A moderate percentage commutes to the New York City core to work. Thus, for the most part, these communities have been somewhat isolated from the commuting and economic activity pressures which dominate many suburban New York communities.

There are several working farms in this area, and these, combined with businesses and commercial enterprises owned and operated by residents, make up a small, but significant portion of the labor force.

The pressures of urbanization which have been creeping in on Long Island over the past 30 years have increased to some extent on Bayville, Oyster Bay and the nearby communities of Lattingtown and Locust Valley, although they have retained their essential small town character.

The village of Bayville has seen changes in its composition from resort and vacation emphasis to a community of year round residents. Several small groups of individual homes of good quality have been constructed in recent years. At Oyster Bay there has been a fairly large development of garden apartments.

The areas west and south of Bayville and north of Oyster Bay, principally Mill Neck through which the approach highway would be located, still include some large estates whose owners have kept them intact.

Density has increased steadily since 1920 for the county. In 1950, population per acre was 3.73; in 1960, 7.22; and 1970, 7.93. Nassau County has the sixth highest density of all New York counties. Oyster Bay Town has paralleled the experience of the county, growing from .97 persons/acre in 1950, to 4.19 in 1960, and currently standing at 4.81 persons/acre. Population pattern projections up to the year 2000 indicate that density will continue to increase, albeit, at a very slow pace.

In the area of primary concern, however, density is markedly less than of the Town of Oyster Bay, with the exception of Bayville and Oyster Bay Village. While there has been a decided increase of units around the North Hempstead Turnpike/Oyster Bay Road area, the predominant characteristic of these villages and townships is one of greenness. There are several large holdings with some new estates under construction. New housing starts in the Bayville/ Mill Neck area have one and two acre lots. While there are mini-centers of population, there are also vast wooded tracts and green space.

Zoning is the responsibility of local governments in New York State. Each village, town or city in the county is free to develop its own zoning ordinance. The villages of Oyster Bay Cove, Upper Brookville, Lattingtown, and Mill Neck have only residential and residential-service (schools, churches, clubs) zoning districts. In each of these villages, all vacant land not otherwise designated is zoned residential use. The minimum lot size varies from 6,000 sq. ft. in Oyster Bay Cover to 5 acres in Upper Brookville and Mill Neck.

The villages of Bayville and Matinecock have districts zoned for business and residential uses. The Town of Oyster Bay has zoning for residential uses on lots ranging in size from 6,000 sq. ft. to 2 acres. There is also a special garden apartment district and some public housing for the elderly.

3. Engineering Description of Project

a. Basic Considerations

Studies of the bridge project have been progressed through the use of aerial photographs, property maps, on-the-ground investigations and other pertinent information available. Alternative routings were studied throughout the area as described in a later section of this report. The details of the route location given herein represent the current status of the continuing design process. They are, therefore, subject to modification based on input from the communities and other responsible agencies and on further detailed design considerations.

The proposed Long Island Sound bridge project from Interstate Route I-287 in Westchester to the end of the Seaford-Oyster Bay Expressway at Route 106 in Nassau is planned as a limited access expressway with two lanes in each direction, separated by a median area. The median on the land approaches will be wide enough to provide for adding one lane in each direction if the need develops in the future. The Seaford-Oyster Bay Expressway from its present completed connection at Jericho Turnpike to Route 106 is to be constructed as a continuation of the present six-lane facility with three lanes in each direction.

The determination of the route location on either side of the Sound was based on consideration of the social and environmental impacts of various alternatives considered, as well as good highway planning principles. Clearly, the most desirable routing is that which has the least negative impacts while still providing the basic service required to fulfill the goals of the project.

The principal effect the alternative approach routings have on the over-water crossing is on the length of the facility. Obviously certain alternative bridgeheads will result in longer bridge crossings than others. The bridge structure, in all cases, is planned with the same main span and clearances as noted herein with only the length and therefore the number of secondary spans changing.

To minimize property takings, retaining walls will be constructed in built-up areas where slopes would have a substantial adverse effect on the neighboring properties. Thus the right-of-way required will vary from 100' to 300' in width.

It is the policy of the State Dept. of Transportation to take all reasonable measures to minimize any adverse effects of the new highway on the surrounding area. Where feasible, the roadways will be put in a depressed section and other measures will be taken to preserve community amenities. Roadways with separate profiles will also be used in areas where the topography permits this. In cases where there are no feasible and prudent alternatives to the taking of recreational and other public lands, positive contributions will be provided to offset the effects to the fullest extent feasible.

Access to and from the route will be provided only at specified interchanges. These will generally be at the crossings of main highways and will be determined through consultation with the local communities. Acceleration and deceleration lanes meeting modern standards will be built at each entrance and exit.

At locations where the route interrupts existing roadways or pedestrian ways, replacement crossings will be provided by building overpasses, underpasses, or convenient connections to other crossings so that present continuity will be maintained.

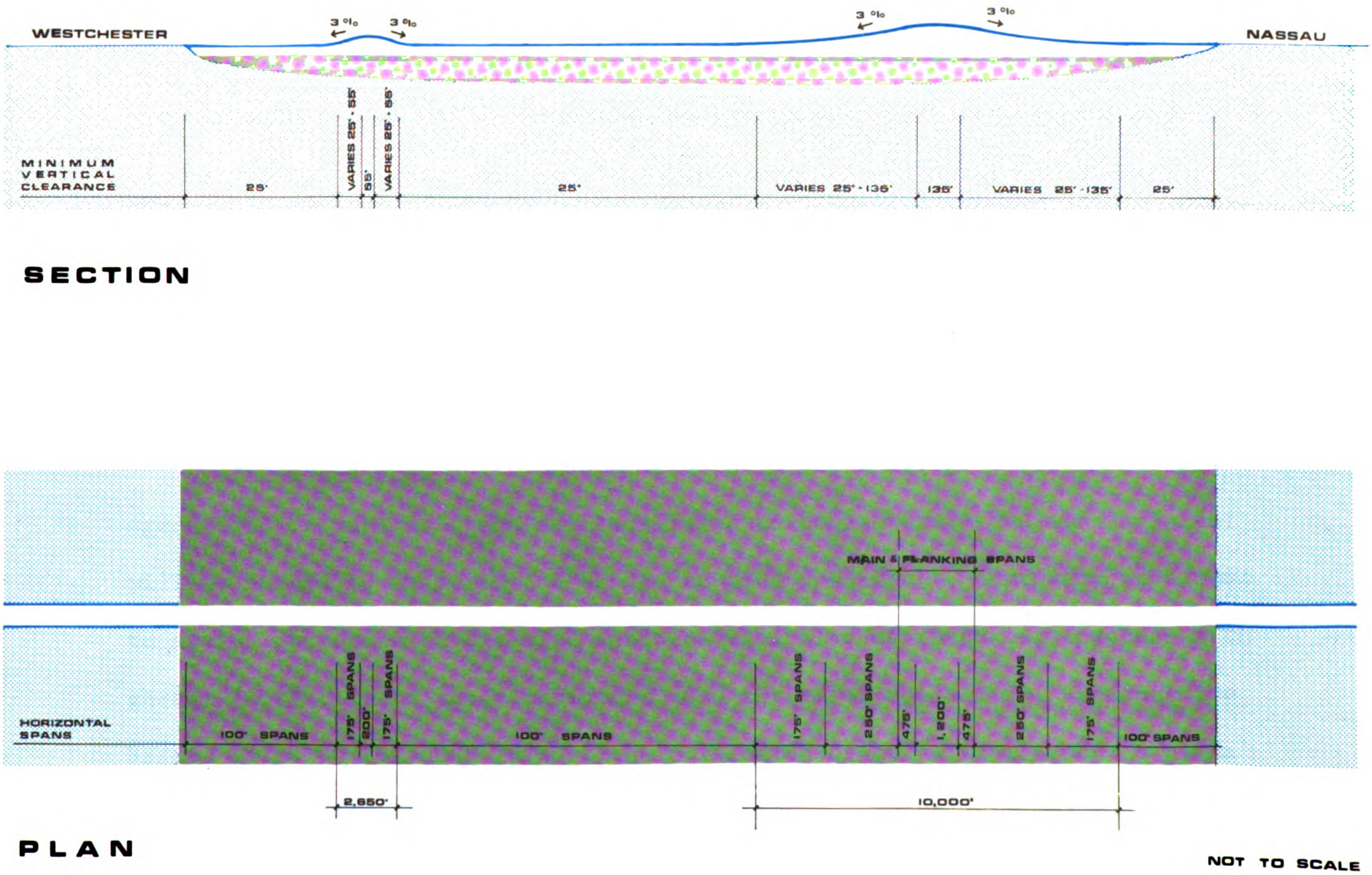
b. Detailed Description of the Bridge

The bridge across the Sound will be six to seven miles in length. The exact length will be determined by the selection of the approach routes which fix the bridgeheads.

Clearances. The clearances have been developed based on existing main channel clearances on other facilities in the area and on a study of the commercial and recreational boating on the Sound. These requirements have been related to the economic considerations of the bridge project.

The main span is to be centered 1-½ to 2 miles north of the Long Island Shore where the majority of the commercial vessels now pass. This main span will be 1200' center to center of towers and will provide a minimum of 135' vertical clearance (see accompanying Exhibit D-11). These channel clearances are not less than those now provided by the existing crossings of the East River, which is continuous with Long Island Sound.
On either side of the main span there are to be 475' flanking spans followed by nine 250' spans as the roadway slopes down at a 3% gradient. Beyond these, as the bridge continues to slope downward, there will be 175' spans until a 25' vertical clearance is reached. The remainder of the crossing will be on 100' spans and the minimum vertical clearance would be 25' above mean high-water level. In order to accommodate sail boats near the Westchester shore, it is planned that there will be a section which will provide greater clearances including a 200' center span with a vertical clearance of 55'.

All clearances and the locations of spans are subject to approval by the U.S. Coast Guard. Final determination cannot be made until the Coast Guard has granted approval after soliciting comments from users of the Sound and considering the various factors affecting recreational and commercial shipping.



HORIZONTAL AND VERTICAL BRIDGE CLEARANCES.

Appearance. The appearance of man-made features is subjective and is influenced by the views of the observer. The design of the bridge has only reached the preliminary study state and a detailed description of the appearance, therefore is not available at this time. It is intended that the most modern technology will be utilized to produce a structure that will present a pleasing appearance in the view of most of those observing and using it. It is a policy of the Metropolitan Transportation Authority to utilize expert architectural talents as appropriate in the design in order to achieve this goal.

Based on the preliminary studies it is planned that the bridge structure will carry a total of four lanes of traffic. The main span will be a cable-stiffened box girder, and several variations of structural possibilities are illustrated in the accompanying Exhibits. This design results in a clean, simple structure that does not require massive anchorages or elaborate trusses, as seen in the various renderings. The flanking spans and all other minor spans will likewise present clean lines and pleasing proportions. Modern techniques will be utilized to design a graceful structure that will add interest to the Sound without being visually obtrusive. Alternative designs under consideration are shown in Exhibits D-12 through D-14 .

Service Facilities. The operation of a major bridge requires service operations of various types and facilities to house them. Men and equipment will be needed to maintain the bridge in good condition. Emergency equipment to assist patrons with disabled vehicles will also be required, together with garage facilities to house equipment used for these operations. Because the bridge is to be financed through the collection of tolls from users, a plaza will also be needed, providing toll booths and a service building for the toll collectors. In order to concentrate the use of personnel and buildings, it is intended to combine the toll plaza and garage facilities.

Alternative locations for these facilities are to be studied further and consideration is being given to placing them near the shore line in Nassau County. The possibility of placing the facilities on the bridge structure or at the Westchester shore is also under study. Modern design techniques will be utilized to minimize the impact of these facilities on the surrounding areas.

Special Features. The bridge roadway will be lighted for its full length. Near the shore lines, the design of the lighting will incorporate measures to avoid adverse effects on nearby properties. Navigation lighting will also be provided for the guidance and safety of shipping and aircraft.

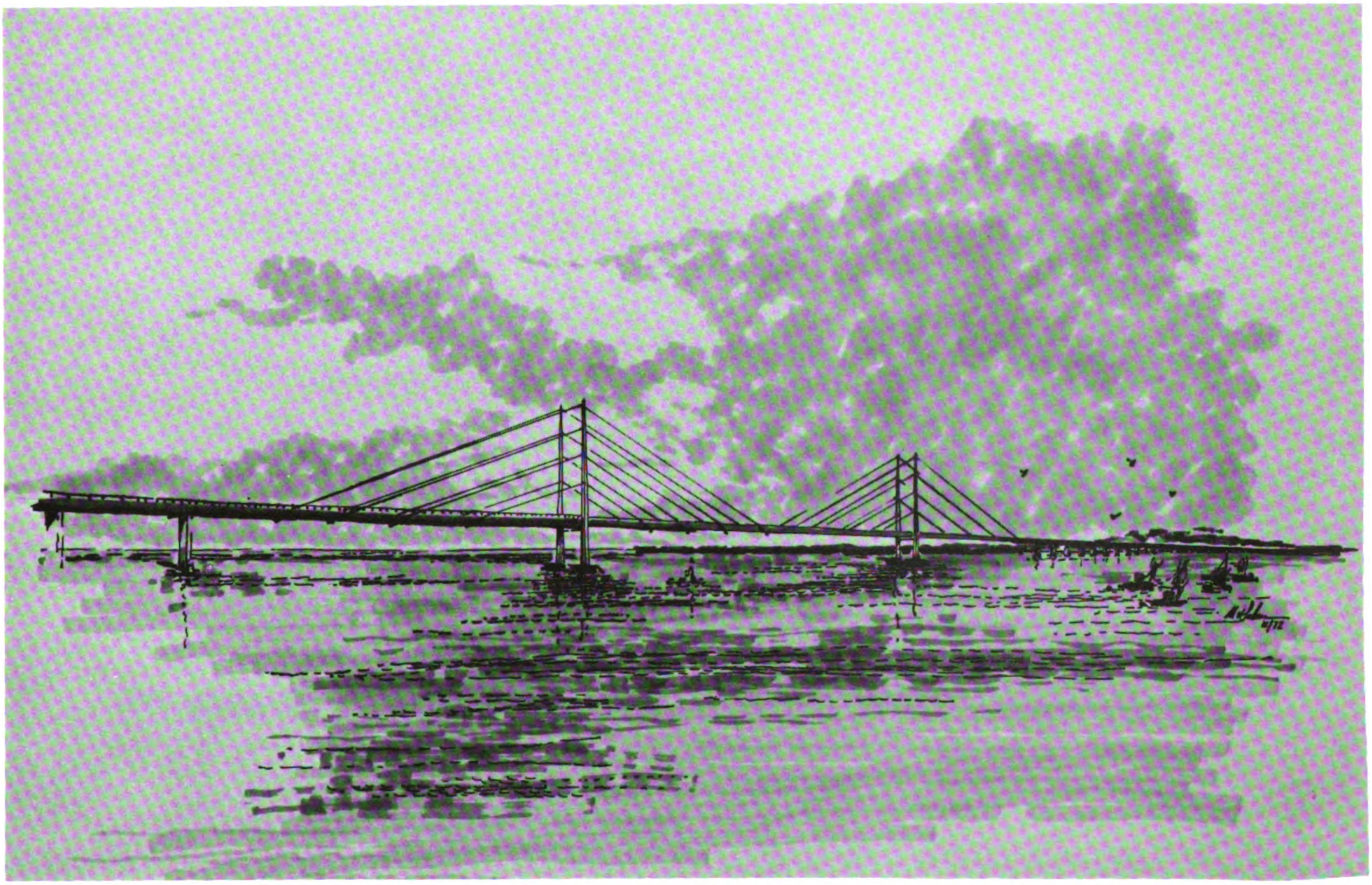
Emergency call boxes will be installed at convenient intervals for motorists in need of assistance. A surveillance system will also be installed in order to monitor and respond promptly to emergency conditions.

c. Detailed Description of Westchester Approach

From the existing interchange of the New England Thruway (Interstate Route I-95) and the Cross Westchester Expressway (Interstate Route I-287) the route proceeds in a generally southward direction within the City of Rye to the Sound shore. Of the four route alternatives under consideration, (W-1, W-2, W-3 and W-4 shown on Exhibit D-15)[a], three run between the common points of the expressway interchange and a common bridgehead on Manursing Island at the northeasterly edge of property owned by the County of Westchester and designated as Playland Park. The fourth alternative has its bridgehead in Port Chester Harbor.

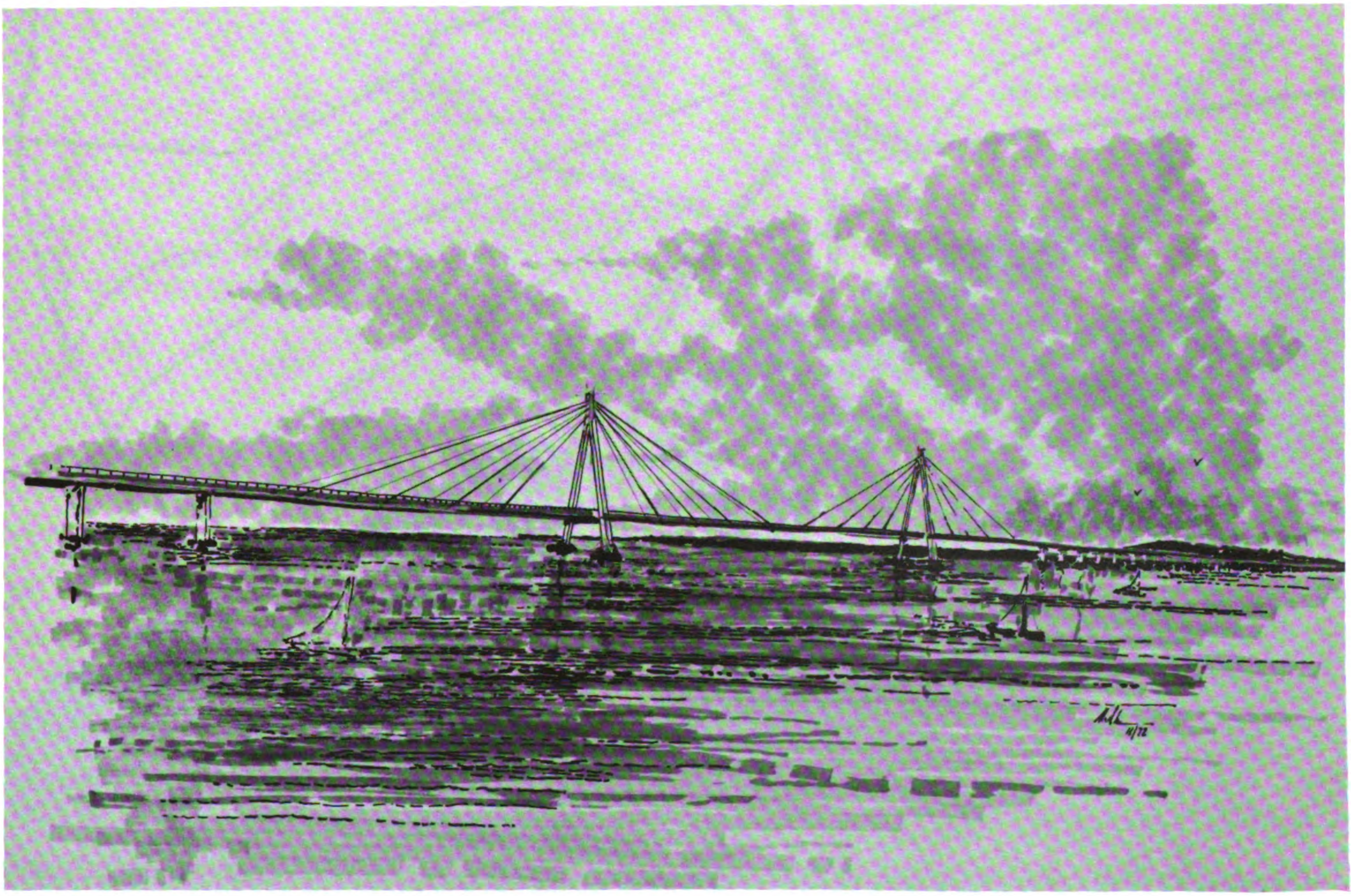
Alternative W-1 shown on aerial photograph, Exhibit D-16, proceeds southward under Grace Church Street and passes through a wooded shallow swale flanked

(a) These alternatives are modifications of alignments previously designated as C, C-1, C-2 and D in earlier studies which were made public.

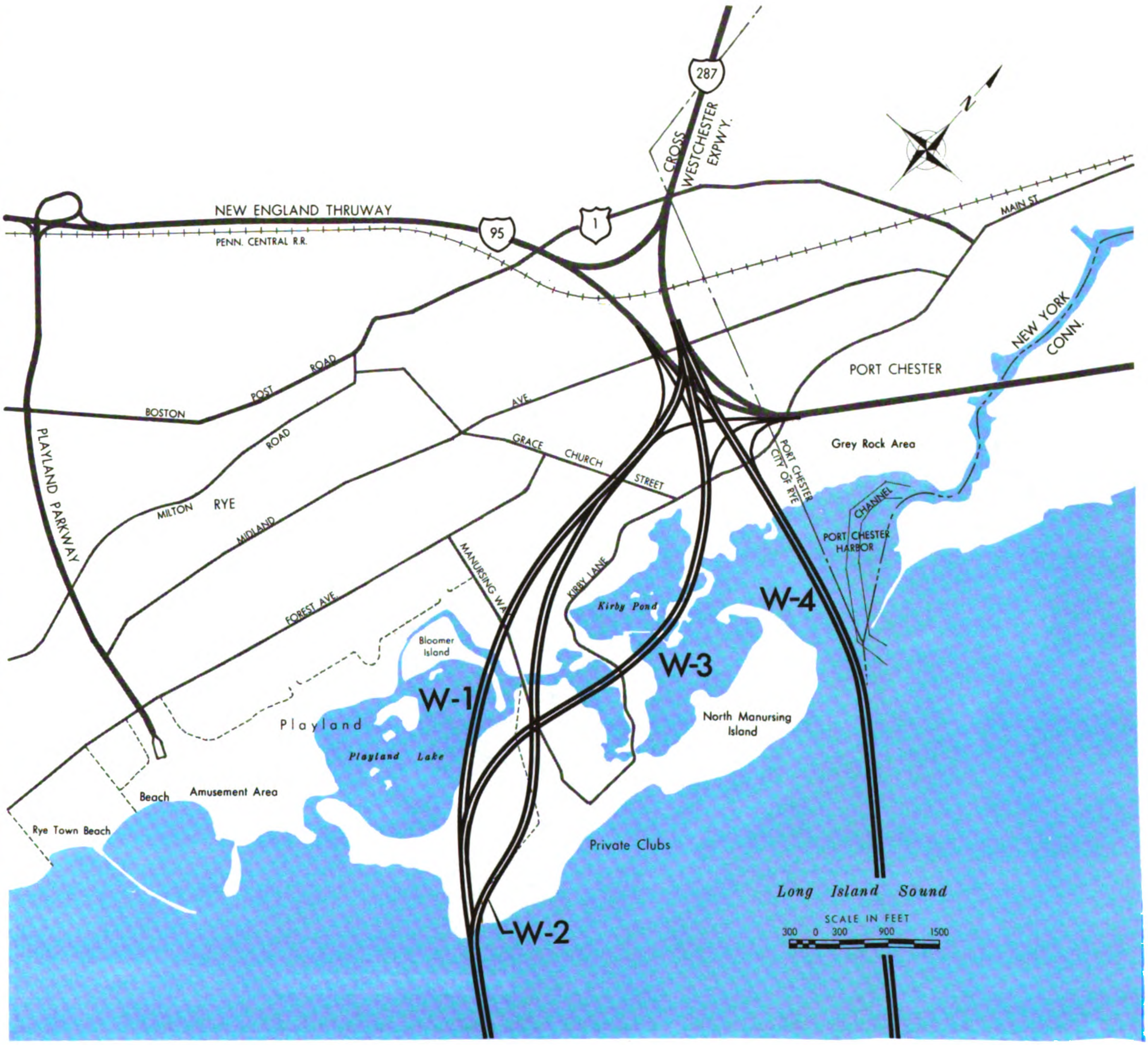


MAIN SPAN SCHEMATIC - VARIATION A.

MAIN SPAN SPAN SCHEMATIC - VARIATION B.



MAIN SPAN SCHEMATIC - VARIATION C.



ALTERNATIVE APPROACH ROUTES - WESTCHESTER.

WESTCHESTER APPROACH ROUTE W-1.

by higher lands occupied by residences. It then goes under Manursing Way and swings to the southeast, passing over the eastern edge of Playland Lake, proceeding across a presently undeveloped portion of Playland Park and reaching the Sound at the point on the eastern edge of the Playland property and just to the south of a small group of residential homes.

From its connections with I-95 and I-287, Alternative W-2 (Exhibit D-17) follows the same swale as W-1, but it swings eastward before reaching Manursing Way and crosses under that street and then passes through the undeveloped portion of the private beach club. The route then swings southward onto vacant Playland parkland and reaches the same bridgehead as Alternative W-1.

Alternative W-3 (Exhibit D-18) also connects with the interchange of I-95 and I-287 but heads in a more southeasterly direction than the other alternatives before turning southward. It follows a narrow spit of land between an inlet of Port Chester Harbor and Kirby Pond. There are no homes along this spit of land although there is a small boat yard and marina which would have to be relocated. As the route continues it crosses a small salt water pond passing under Manursing Way behind the private beach clubs belonging to the Westchester Country Club and Manursing Island Club and swinging to the south behind a group of residences and reaching a common point with Alternative W-1 in Playland Park.

The three routes will be constructed on generally elevated structure through the northeastern end of Playland Park, slowly rising from ground level near Manursing Way until they reach the bridge height at the shore line where some 25 feet of clearance will be provided. The length of these routes from the center of the interchange area to the shore is about 1-1/2 miles.

The fourth alternative, (Exhibit D-19), W-4 goes from the intersection of the Cross Westchester Expressway with the New England Thruway directly southeast into Port Chester Harbor. This route provides the shortest land approach for the northern end of the bridge, but requires a longer water crossing. The overwater portion must pass between the present channel into Port Chester Harbor and North Manursing Island, a residential community. The southwesterly edge of the channel is less than 500' from the North Manursing shore line and the route therefore is close to both the channel and the residential community. The length of W-4 on land is about 1/4 mile. The bridge structure, with this northern approach alternative will be one mile longer than with W-1, W-2 or W-3.

The accompanying oblique aerial photographs (Exhibits D-20 and D-21) show the location of the four alternatives.

Connections to local streets and other design features remain to be determined. The design process is a continuing one and the input received from the local community will be reflected in developing the plans.

d. Detailed Description of Nassau Approach

From the end of the Seaford-Oyster Bay Expressway at Route 106, the approach route will cross over Mill River Hollow Road, swinging northward and passing west of Mill Pond and crossing Mill Hill Road and the Long Island Railroad. The route then continues to the west of West Shore Road in the Village of Mill Neck. Three route alternatives, N-1, N-2, and N-3[a] shown on Exhibit D-22 are under consideration from Mill Neck northward across Mill Neck Creek and through the Village of Bayville to the shore of the Sound, as shown on the accompanying map.

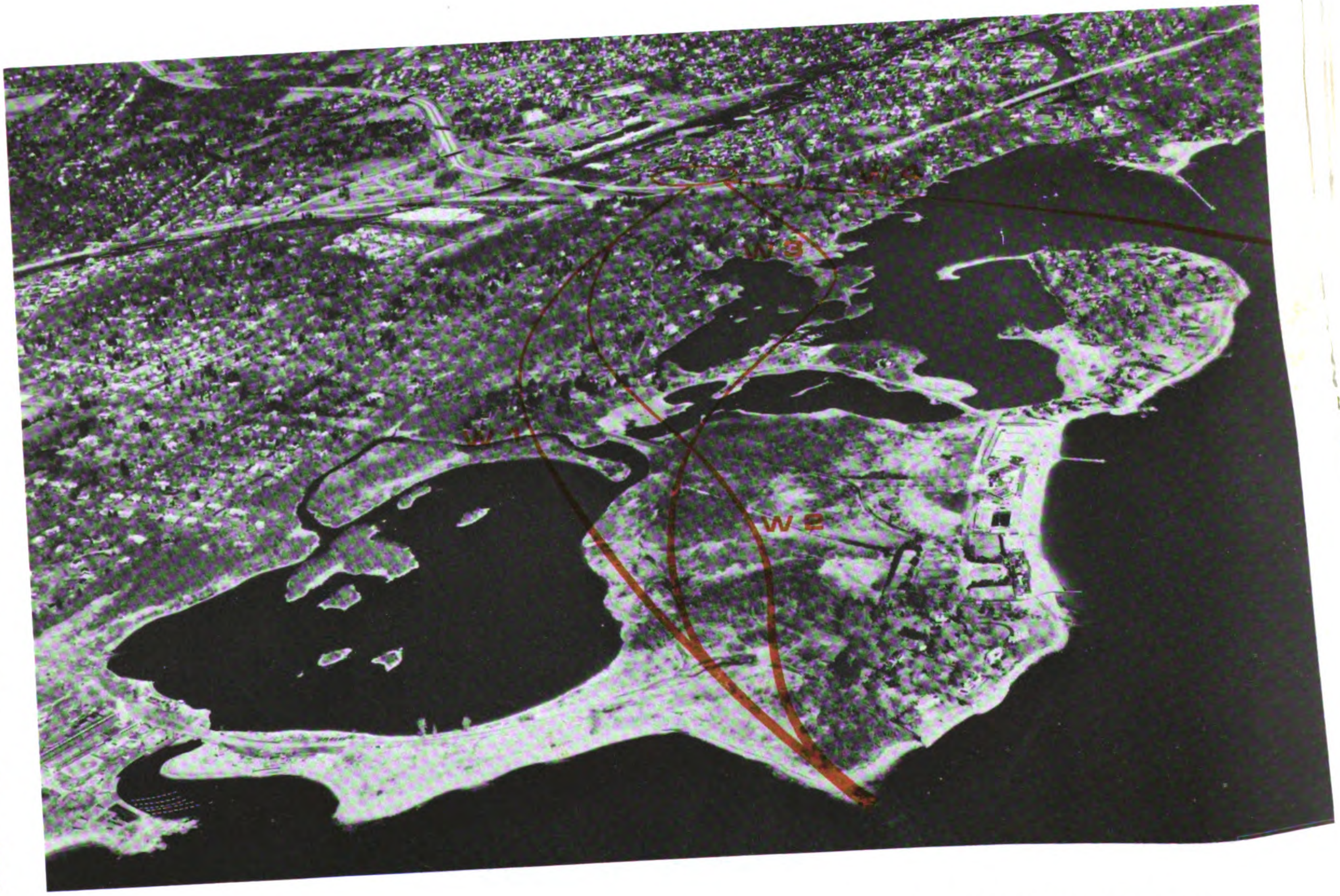
Alternative Route N-1 (Exhibit D-23) swings slightly inland on Mill Neck, passing to the northwest through a high area in the deep cut crossing Roger Canoe Hollow Road and reaching the shore of Mill Neck Creek to the west of Mill Neck Estates. From here Alternative N-1 crosses Mill Neck Creek on a high level structure some 60 feet above mean high water to Bayville on the north. The structure also crosses Creek Road just west of Mountain Avenue on the north side of the Creek.The route then continues northward in a deep cut under Godfrey

(a) These alternatives are modifications of alignments previously designated as K, H and J in earlier studies which were made public.

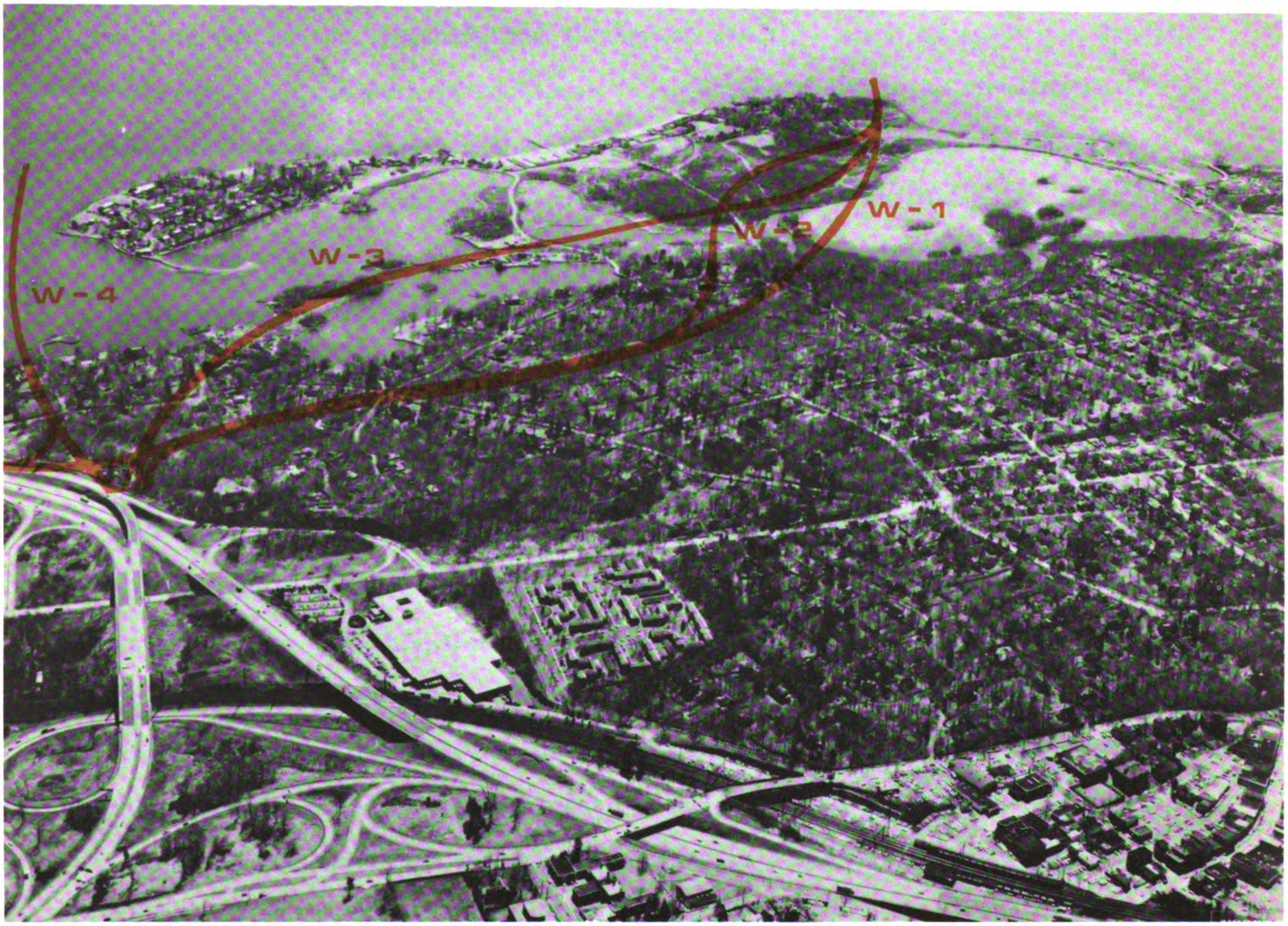
WESTCHESTER APPROACH ROUTE W-2.

WESTCHESTER APPROACH ROUTE W- 3.

WESTCHESTER APPROACH ROUTE W-4.



AERIAL VIEW OF WESTCHESTER APPROACH AREA LOOKING NORTH



AERIAL VIEW OF WESTCHESTER APPROACH AREA LOOKING SOUTH

Avenue, passing to the west of the Bayville Elementary School and the Bayville Village facilities, crossing under Bayville Avenue and reaching the Long Island Sound shore line between Wayaawi Avenue and Oakpoint Drive West.

Much of the existing ground along Alternative N-1 is high, thus permitting the roadways to be hidden by depressing them below the surrounding terrain. North of Bayville Avenue the route will rise in order to provide 25 feet of clearance at the shore line. Alternative N-1 is 4.2 miles long from Route 106 to the Long Island Sound shore line.

From its common point with Alternative N-1 in Mill Neck, Alternative N-2 (Exhibit D-24) continues northward along the shore of Oyster Bay on the west or inland side of Shore Road. It then swings slightly northwest through Mill Neck Estates and crosses Mill Neck Bay on a structure with about 35' vertical clearance at the center, reaching the Village of Bayville south of Adams and Washington Avenues. From here it continues in a northwest direction crossing under Bayville Avenue and passing through the former Williams Estate reaching the Sound at Oak Neck Point. The roadway will be at grade at this point which is some 30 feet above the water level. The route is 4.1 miles from Route 106 to the shore at Oak Neck Point.

Alternative N-3 follows the line of N-2 prior to the divergence of the latter line through Mill Neck Estates. Alternative N-3 then continues northward paralleling West Shore Road until it reaches the northern end of Mill Neck where it crosses over that road and continues over the edge of Oyster Bay on a viaduct providing some 30 feet clearance. It proceeds on fill and structure over Bayville Avenue to Ferry Beach on the Sound. The main bridge structure would then take off from this point, curving to the northwest. From Route 106, this alternative is about 3.2 miles to the bridgehead. Because this take-off point is some distance east and slightly south of the N-1 and N-2 locations, the structure over the Sound will be 1.0 miles longer with Alternative N-3 than with the other alternatives, (Exhibit D-25).

Aerial views of the alternative routes are shown on Exhibits D-26 and D-27.

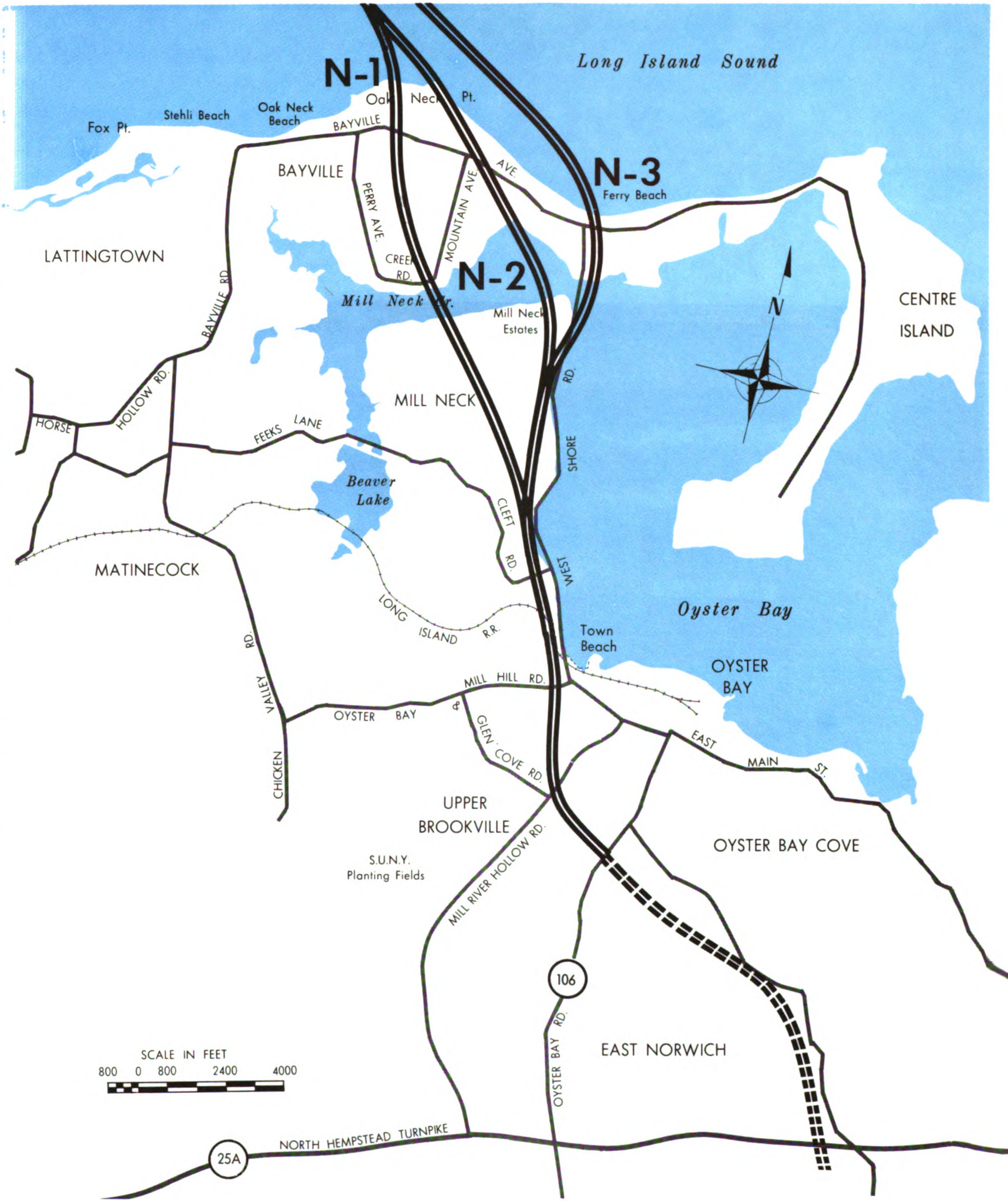
e. Detailed Description of Seaford-Oyster Bay Expressway Extension.

From the present terminus at Route 25, Jericho Turnpike, the Seaford-Oyster Bay Expressway extends in a generally northward direction in Syosset to Route 25-A, North Hempstead Turnpike, crossing under and interchanging with this east-west highway; and continues northward through lightly developed land in the western portion of Oyster Bay Township and crosses Sunken Orchard Lane. The route then curves to the west, crossing Berry Hill Road, which is relocated along a new right-of-way. The Expressway continues in a northwest direction through wooded land to Singworth Road and then curves northward through a settled residential area to the crossing over Route 106, Oyster Bay Road. This routing, shown on the accompanying map and photograph (Exhibits D-28 and D-29) is 4-3/4 miles and was developed some years ago. Much of the property acquisition between Route 25 and Route 25-A has been completed.

f. Estimated Project Costs and Construction Time

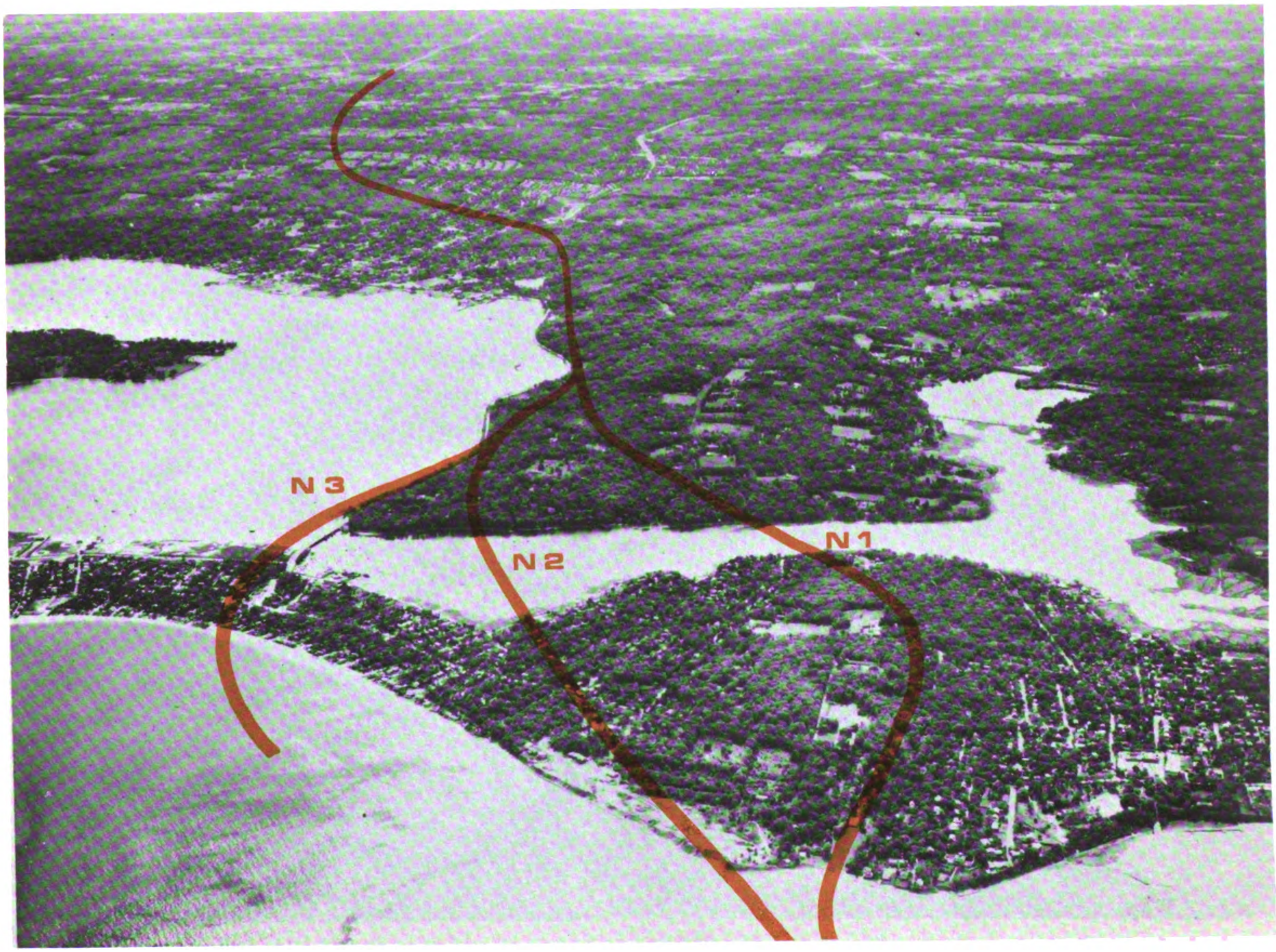
Project Costs. Estimates of cost have been prepared based on the preliminary data concerning the alternatives under consideration. Because of the early stage in the project development process, these costs figures have been determined by analyzing other construction projects recently bid within the area and comparing similar work elements. Escalation factors were then applied in recognition of present trends of increasing prices. It was assumed, for purposes of these estimates, that the bids would be received in the period between mid-1974 and the end of 1975.

When the project design has progressed into the final stage, and prior to advertising for bids, detailed estimates will be prepared based on the quanti-



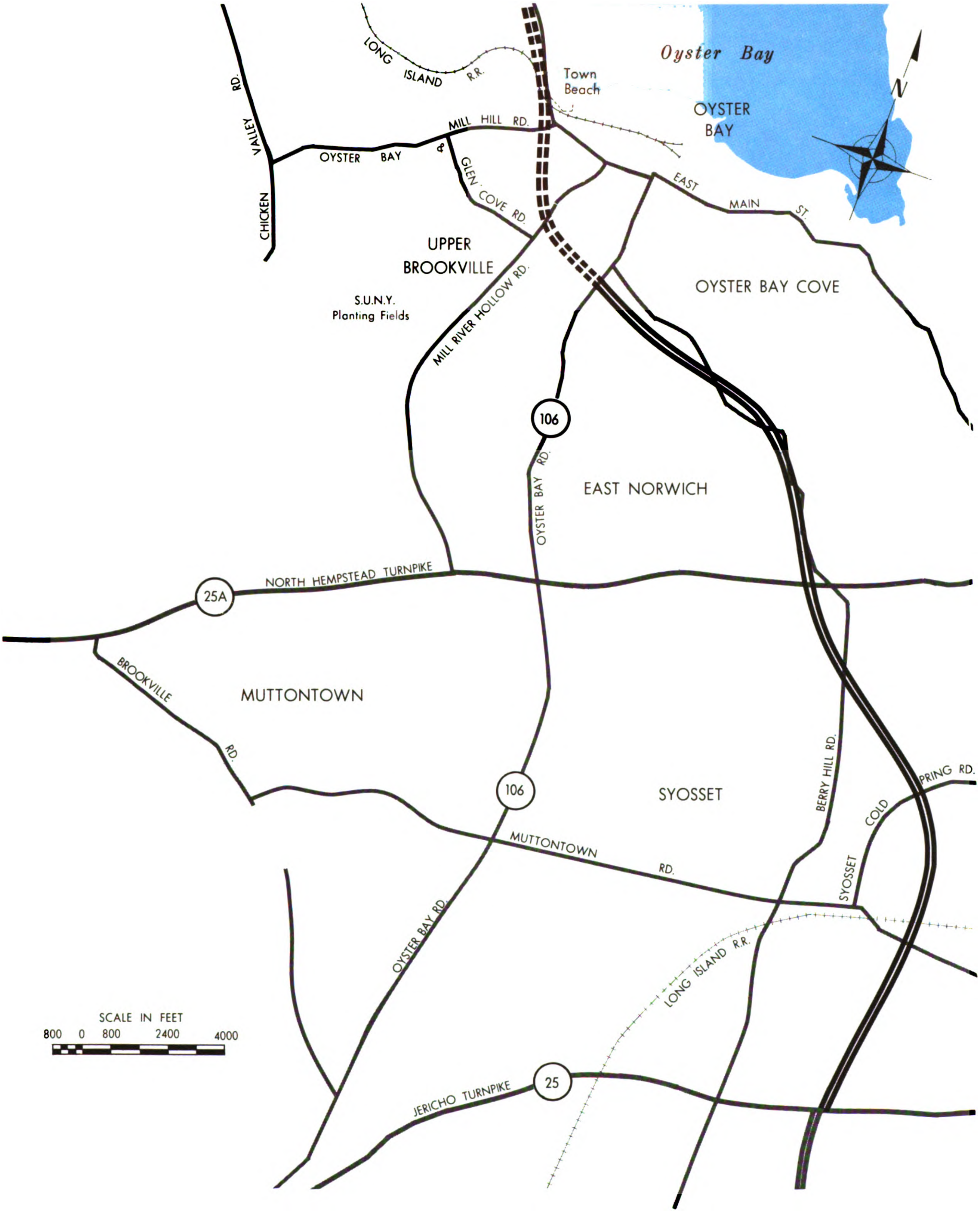
ALTERNATIVE APPROACH ROUTES - NASSAU.

NASSAU APPROACH ROUTE N-1.

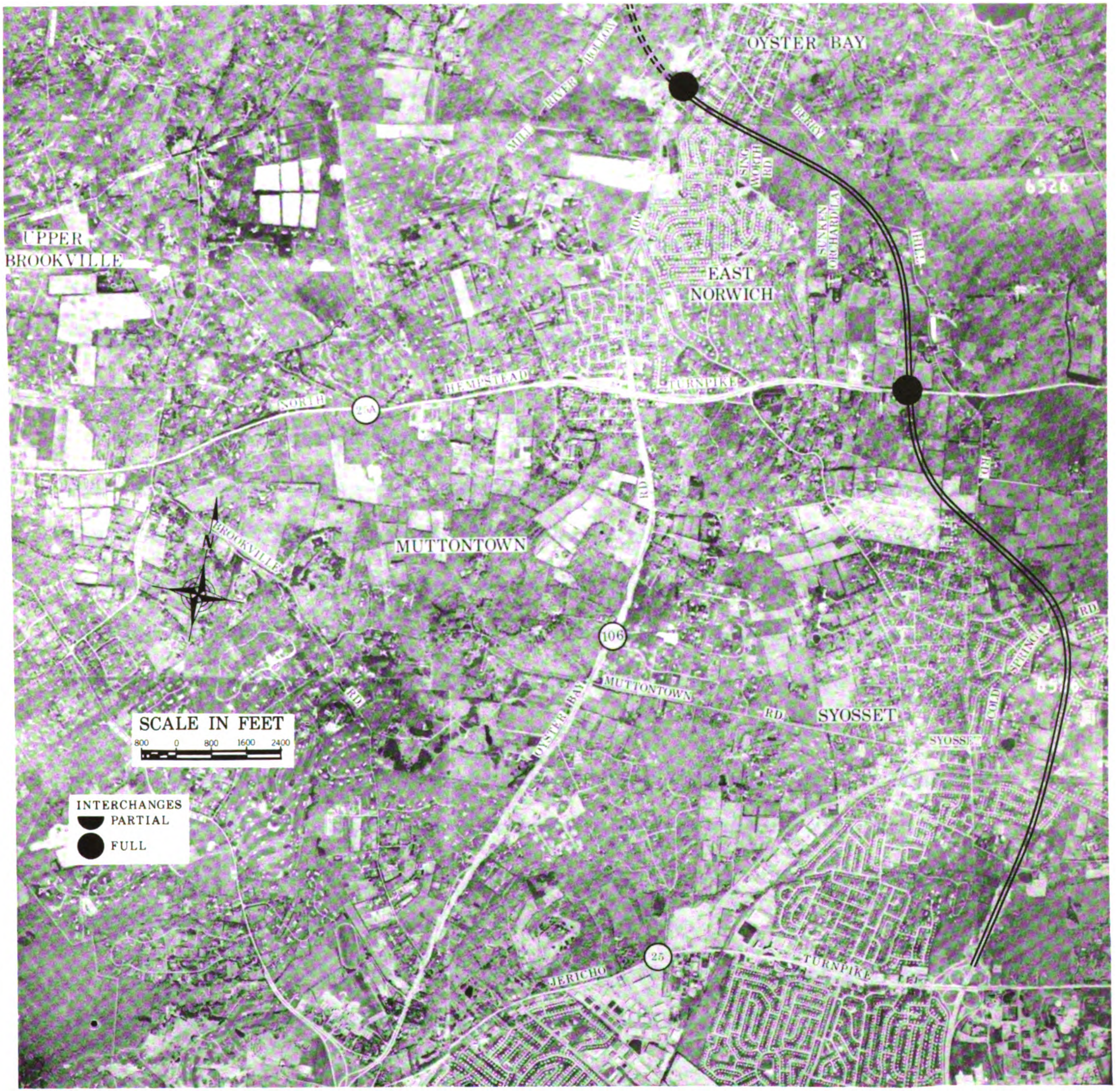


AERIAL VIEW OF NASSAU APPROACH AREA LOOKING SOUTH

AERIAL VIEW OF NASSAU APPROACH AREA LOOKING NORTH



SEAFORD-OYSTER BAY EXPRESSWAY EXTENSION LOCATION MAP.



SEAFORD-OYSTER BAY EXPRESSWAY EXTENSION.

ties of the individual construction items required, the current price levels for each item and the general evaluation of the construction industry.

The figures shown in the following table are the order-of-magnitude estimates of construction cost plus amounts for right-of-way, design, subsurface exploration, supervision of construction and general administration during the planning and construction period.

In order to estimate the financial feasibility of the bridge project as a revenue supported facility, those costs chargeable to the toll portion need to be identified. It has been the policy of the Federal agencies responsible for highway construction to limit federal funds on projects connecting with toll facilities to those areas where the users can enter or exit and travel free of toll. For the Rye-Oyster Bay bridge these limits would be at the New England Thruway-Cross Westchester Expressway interchange in Rye and at Bayville Avenue in Bayville.

Because the detailed design has not been made for the New England Thruway-Cross Westchester Expressway interchange, it has been assumed for purposes of these estimates that the access and egress to the toll-free highway system will be so located that one half the cost of the interchange will be chargeable to the toll project. All the construction between this interchange and the shoreline in Westchester County and the similar work between Bayville Avenue and the shore in Nassau County will also be a part of the toll project.

The costs of the approach roads beyond the toll project will be funded through federal and state highway programs. Federal funding will be by fund allocations which are distributed annually to each state for highway purposes based on a formula established by federal law.

The division of the approach costs between the toll project and the State-Federal share are estimated in the following table.

TABLE D-2

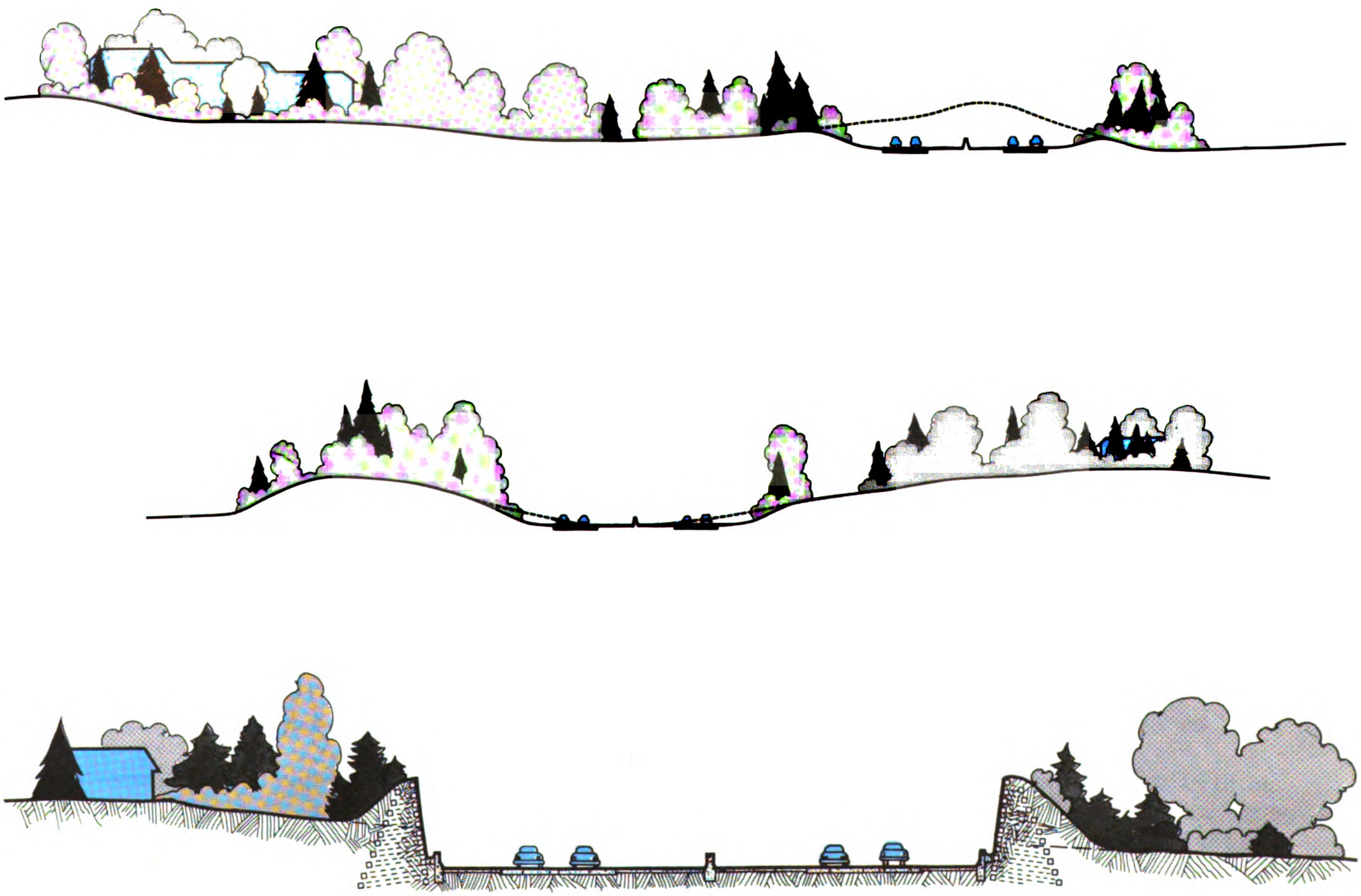
ESTIMATED PROJECT CONSTRUCTION COST, CROSS-WESTCHESTER EXPRESSWAY TO ROUTE 106
(Including Right-of-Way, Engineering and Administration)

Portion of Project	Approach Alternatives	Estimated Cost (millions of dollars) Toll Supported	State-Fed. Project*	Total
Bridge - Shore to Shore	W-1, W-2, W-3 to N-1 or N-2	163	-	163
	W-1, W-2, W-3 to N-3	176	-	176
	W-4 to N-1 or N-2	176	-	176
	W-4 to N-3	188	-	188
Westchester Approach	W-1	34	14	48
	W-2	33	14	47
	W-3	34	14	48
	W-4	18	14	32
Nassau Approach	N-1	5	45	50
	N-2	5	58	63
	N-3	5	38	43
Total Project	N-1 to W-1	202	59	261
	N-1 to W-2	201	59	260
	N-1 to W-3	202	59	261
	N-1 to W-4	199	59	258
	N-2 to W-1	202	72	274
	N-2 to W-2	201	72	273
	N-2 to W-3	202	72	274
	N-2 to W-4	199	72	271
	N-3 to W-1	215	52	267
	N-3 to W-2	214	52	266
	N-3 to W-3	215	52	267
	N-3 to W-4	211	52	263

*An additional $25 million in State and Federal funds plus the cost of land will be required for the extension of the Seaford-Oyster Bay Expressway from Jericho Turnpike to Route 106.

Source: Madigan-Praeger, Inc., Consulting Engineers, November, 1972.

Construction Time. On the basis of construction experience with other major water crossings and comparable highways, it is estimated that the time required between receiving the initial bids and completion will be about three years.



DESIGN STUDY EXAMPLES - HOUSE-HIGHWAY RELATIONSHIP.

4. Environmental Design Principles

For a highway project the overriding principle of environmental design is to provide a structure that serves the intended needs, and at the same time:

(1) is aesthetically pleasing and conforms to landscape and neighborhood environmental factors; and,

(2) responds to a perception of all environmental factors such as noise, air, water, and visual impacts.

Thus, the sponsors of the project are committed to fitting the road into the natural terrain. To accomplish this the topography and land use conditions are studied in detail. Perspective renderings are prepared by landscape architects to test various concepts from a visual and functional point of view. In addition, detailed cross-sectional studies are made of such design features as highway depressions, walls, overpasses, tree buffer lines, slopes, etc. so that engineering and visual considerations can be simultaneously studied. Some typical examples of cross section types are shown in Exhibit D-30. When complete, virtually every section of right-of-way will have been subjected to this kind of study. The response of individuals in the community to alternative "blending" concepts will constitute an important input to decisions on the final design.

One important principle is to meet applicable Federal and State Standards for Air Pollution and Noise Propagation relating to existing and likely future users of adjacent property. Implicit in this is a commitment to exceed established standards where reasonably possible; however, a commitment cannot be made to avoid any adverse effects without the completion of the more extensive individual site impact analyses currently in progress. Since the reduction of the effects often requires increased spacial separation from the highway, it may be necessary to acquire a wider than normal right-of-way in some locations.

Detailed consideration also will be given to preserving and enhancing natural drainage features and to assuring that the highway will not give rise to any local flooding problems. Design of culverts and drainage ditches will not be merely for hydraulic efficiency, but will be integrated with the landscaping and grading plans with a view to aesthetic considerations.

Finally, a number of joint development concepts will be explored with a view to the multiple use of right-of-way space in a manner consistent with the character and desires of the local communities. Here again, comments and suggestions from interested citizens, organizations, and business enterprises will be solicited to assure full and fair treatment of all joint development opportunities.

5. Traffic Volumes and Financial Feasibility

a. Traffic Studies

Estimates of traffic expected to use the Rye-Oyster Bay Bridge were first prepared in 1965 and have been updated several times since. The early studies were based on traffic surveys taken in 1964 on the Throgs Neck, Bronx-Whitestone and Triborough bridges. A second survey was made in 1969 and the recent estimates are based on data obtained from this source. The earlier survey used the return postcard method while the more recent survey utilized direct interviews of drivers. In each of the studies, answers were obtained from approximately one quarter of a million drivers.

The 1969 survey was made over a six-month period from June to December. A detailed controlled sampling procedure was developed in order to obtain representative data for each day of the week, each hour of the day, and each toll class on individual facilities. The survey data were expanded to annual volumes taking into consideration the different traffic patterns at various times of the day, week and year. The expanded traffic figures provided an accurate picture of traffic using the existing bridges.

b. Estimated Traffic

Traffic and revenue estimates contained herein are based upon estimates prepared by Madigan-Praeger, Inc., Consulting Engineers, for the Metropolitan Transportation Authority in November, 1972.

Diverted Traffic. Estimates of traffic expected to be diverted to the new facility were developed on the basis of the average time and distance savings that will be realized for each zone-to-zone movement. Actual test runs made at various times of the day established average driving times over the existing roads, whereas for the new bridge and approaches, estimates of driving time were used. As noted elsewhere, time and distance saving for traffic between eastern Nassau and Suffolk on Long Island and Westchester and points beyond will exceed 30 minutes and 20 miles. Virtually all of the drivers making trips where these savings can be realized can be expected to use the new bridge, taking into account the established tolls on existing facilities and proposed tolls on the new bridge. For trips with lesser savings, lower percentages of diversion can be expected. The analysis of all the zone-to-zone movements resulted in the estimates, summarized below, of the total traffic that would have been diverted to Rye-Oyster Bay bridge from the Throgs Neck, Bronx-Whitestone and Triborough Bridges had it been in operation in 1970.

Passenger Cars	5,619,000
Light Trucks	89,000
Heavy Trucks	87,000
Total......	5,795,000

The principal origins and destinations of the diverted passenger car traffic are shown in the following table, together with the percentage of total traffic traveling to or coming from these areas.

TABLE D-3

PRINCIPAL ORIGINS AND DESTINATIONS OF DIVERTED PASSENGER CAR TRAFFIC

North Side of Sound		South Side of Sound	
Area	% of Total	Area	% of Total
The Bronx	1%	Queens and Brooklyn	2%
Westchester	36%	Western Nassau	21%
Rockland	6%	Central & Eastern Nassau	39%
Upstate New York	17%	Western Suffolk	24%
Fairfield, Conn.	8%	Central & Eastern Suffolk	14%
Other Conn.	17%		
Other N.E.	11%		
New Jersey and Beyond	4%		
	100%		100%

It is evident that the majority of the trips are relatively local with half the trips ends on the north in Westchester, Rockland and nearby Fairfield County, and 84% of the ends on the south in Nassau or Western Suffolk County near the bridgehead. Of the total estimated trips, 95% are between mainland points in Western Fairfield County, Westchester or areas to the west and Long Island locations in western Suffolk, Nassau or Queens. Only one out of twenty are between Bridgeport, Conn. or points east on the north side of the Sound, and central or eastern Suffolk County. These estimates of usage indicate why a bridge further eastward would not be of benefit to most users of the Rye-Oyster Bay crossing.

It may also be noted that no measurable number of movements is anticipated from Manhattan, and the bridge is not expected to provide a by-pass route around New York City for through travelers from the south to Westchester or New England.

This is a circuitous path in comparison with other through routes available, and those few who may choose it will be in the category of tourists who are out to see the country rather to reach their destinations in the most advantageous manner. The estimates of traffic do not count on any such movements.

Generated Traffic. In addition to diverting traffic from existing bridges and highways, every new facility produces new travel that did not previously occur. This additional traffic is the result of both the pent-up demand that finally is released and the creation of new opportunities by the new facility. Examples of these new trips are commuting to jobs at locations that were previously too distant to consider, more frequent visits to friends and relatives because of reduced travel time, and additional visits to recreation and shopping facilities because of greater convenience.

A classic example is the Verrazano-Narrows Bridge between Brooklyn and Staten Island in New York. After its completion many families moved from Brooklyn to Staten Island in order to have a new home with more spacious property. The place of employment, however, continued to be in Brooklyn, and most of their friends and relatives were also in that borough. As a result, these families created commuter and other frequent trips across the bridge, none of which had been made before.

The Rye-Oyster Bay bridge can also be expected to carry additional traffic because of the opportunities created by its greater convenience.

With the new bridge, it will be possible for residents on either side of the Sound to hold jobs on the other side. Similarly, visits between friends and relatives in eastern Nassau or Suffolk County and Westchester or Fairfield County will be more frequent because of the reduced trip time and easier travel.

Estimates of this additional traffic were prepared based on studies of actual experience on the Verrazano-Narrows Bridge, Tappan Zee Bridge and other water crossings. It has been found that the development of this traffic does not occur immediately upon the opening of a new facility, but builds up gradually as new travel habits develop. In the case of Rye-Oyster Bay bridge it is estimated that this build-up will take place over five years when the additional traffic is expected to equal about 80% of the diverted traffic.

c. <u>Traffic Growth</u>

Growth of traffic on the bridge from year to year will result from a variety of causes: population increase in the tributary area, rising motor vehicle ownership, increased standards of living and expanded travel by the people in the area because of more leisure time, wider scope of interests and increased opportunities.

Estimates of annual growth were prepared utilizing population projections based on the 1970 census figures, trends of motor vehicle registrations, and experience factors for travel growth on main highways as compared with the increase in vehicle registrations.

From 1970 to 1977 the estimated growth for passenger car travel is 26.3% or an annual rate of 3.4% per year. The growth rate for commercial travel is slightly higher, as this has been the past trend which is expected to continue in the tributary area. These rates of growth were applied to the basic estimates of diverted traffic to arrive at the corresponding estimates for 1977, which for the purpose of these estimates is assumed to be the initial year of operation. However, should the opening be delayed, the traffic volumes will increase.

The estimated annual traffic volumes on the bridge for the assumed initial year and following periods to the 20th year after opening are shown below. These estimates reflect both diverted traffic and created traffic volumes. The average annual rate of growth anticipated is about 3.4% per year.

TABLE D-4

ESTIMATED ANNUAL TRAFFIC (000's)

Year of the Opening	Passenger Cars	Light Trucks	Heavy Trucks	Total
1st	11,373	185	200	11,758
5th	15,420	245	325	15,990
10th	17,800	285	450	18,535
15th	19,980	315	560	20,855
20th	22,050	350	645	23,045

Source: Madigan-Praeger, Inc. Nov., 1972. (Estimates of Creighton-Hamburg are somewhat lower, ranging from a small amount less in the first year to 17% less in later years.)

d. Estimated Revenues

Toll Revenues. The assumed toll rate for passenger cars using the new crossing is $1.75. Under present economic conditions, and taking into account the travel benefits of the bridge route and tolls on existing routes, this is considered to be the most reasonable base toll. For commercial vehicles higher graduated tolls based on vehicle size will be in effect. On the basis of vehicle distribution by size at the existing crossings, the average toll rate for the smaller trucks is expected to be $3.00 and for larger trucks $5.15.

The annual estimated toll revenues, using these rates and the estimated traffic, are shown below:

TABLE D-5

ESTIMATED ANNUAL TOLL REVENUE (000's)

Year of the Opening	Passenger Cars	Light Trucks	Heavy Trucks	Total
1st	$19,903	$555	$1,030	$21,488
5th	26,955	735	1,674	29,364
10th	31,150	855	2,317	34,322
15th	34,965	945	2,884	38,794
20th	38,587	1,050	3,322	42,959

Operating Expenses. The annual costs of maintaining the new bridge between the termini of the approaches, collecting tolls, and providing the required administrative, accounting and other necessary functions were estimated on the basis of current expenditures on similar facilities. Provisions for increased cost levels and higher traffic volumes were included in the estimate.

Operating expenses are expected to increase from $2,579,000 in the initial year to $3,670,000 by the fifth year, with the level gradually rising to $6,210,000 by the 20th year.

Net Revenues. By deducting the operating expenses from the anticipated toll revenues, the annual net revenues are derived as follows:

TABLE D-6

ESTIMATED TOLL REVENUES, OPERATING EXPENSES AND NET REVENUES (000's)

Year after Opening	Toll Revenues (Rounded)	Operating Expenses	Net Revenues
1st	$21,490	$2,570	$18,920
5th	29,360	3,670	25,690
10th	34,320	4,920	29,400
15th	38,790	5,630	33,160
20th	42,960	6,210	36,750

The net revenues shown are the amounts that will be available for payment of debt service on the bonds that will be sold to raise the funds to construct the Rye-Oyster Bay bridge.

e. Financial Feasibility

In order to determine the financial feasibility of the project, it is necessary to compare its expected annual net revenues with the annual amounts required for the interest and amortization payments on the bonds.

The estimated cost of the toll supported portion of the project including land, engineering and administration was noted in Section D-3-f to vary from $199,000,000 to $215,000,000 depending on the approach alternative adopted on each side of the Sound. These estimates will be continually revised and refined as investigations are progressed and design details developed. A comparative analysis of the expected revenue and costs at this stage of the project is useful only to indicate the anticipated order-of-magnitude financial feasibility. Since the cost estimates for the various alternatives were within a relatively narrow range, separate detailed analysis of the feasibility of each of these is not warranted. Eight of the alternatives are estimated to cost between $199 and 202 million and the feasibility analysis is therefore presented below on the basis of a $200,000,000 project cost.

Financing for the toll supported portion of the project is to be accomplished through the public sale of revenue bonds. The total amount of bonds sold must include, in addition to the cost of the bridge project, provision for interest during the construction period, an initial reserve fund, and an amount for financing charges. The actual cost of these additional items will depend on market conditions at the time of the bond sale. The interest rate that will be obtained obviously has a marked effect on these requirements, as well as on the total annual payments that will be required for debt service.

Estimates have been prepared on three alternative assumptions as to interest rates, namely 5%, 6% and 7%. The total amount of the bond issue required under these alternatives are estimated as follows for a bridge project of $200,000,000:

5%	$254,000,000
6%	$265,000,000
7%	$276,000,000

Schedules for repayment of these alternative bond issues and annual debt service requirements were developed according to standard practice based on 40-year term bonds with interest only payable for the first ten years and with level debt service thereafter. The following table shows the ratio of the annual net revenues to the annual debt service requirement at various interest rates for selected key periods.

TABLE D-7

ESTIMATED RATIO OF ANNUAL NET REVENUES TO DEBT SERVICE REQUIREMENTS

Period	5% Interest	6% Interest	7% Interest
2nd year of operation (6th year of bond issue)	1.83	1.46	1.20
6th year of operation (10th year of bond issue)	2.18	1.74	1.43
7th year of operation (11th year of bond issue)	1.72	1.47	1.28
10th year of operation (14th year of bond issue)	1.85	1.59	1.38
20th year of operation (24th year of bond issue)	2.30	1.97	1.71

It is seen that this ratio of annual net revenue to debt service requirements, known as coverage, well exceeds 1.00 in all cases, indicating that there will be sufficient revenues to repay the bonds. For the sale of these bonds, however, the buyer expects a margin of safety, and a coverage substantially in excess of 1.00 is required if other guarantees of the bonds are not available. The coverages at the 5% interest rate offer a large margin considerably beyond that necessary to assure sale of the bonds. At an interest rate of 6% the coverage is also ample to assure financial feasibility of the project. As the interest rates increase, the coverage lessens, although even at 7% the coverage is over 1.20 in the 2nd year and exceeds 1.50 in the later years.

On the basis of the estimates and information now available, the Rye-Oyster Bay bridge will earn sufficient net revenues to pay interest and amortization charges and provide a sufficient coverage margin to assure the financing of the project by the sale of revenue bonds. A definite determination of the marketability of the bonds can only be made when final plans are completed, accurate cost figures are available, and the bonds are offered for sale in the financial markets. In the light of the successful revenue bond financing of many similar projects in the past, there is every indication that the funds necessary for the bridge crossing and its immediate approaches can be obtained through the issuance of revenue bonds.

Since the bonds used to finance the Rye-Oyster Bay Bridge will be revenue bonds supported by the toll revenues of the project, the funds will become available only by virtue of the sale of such bonds issued in anticipation of the bridge's construction.

Although suggestions have been made to the effect that the bridge funds be used for other purposes, such as mass transit, it is evident that these funds can come into existence only for the purpose of financing the bridge as a self-liquidating toll project.

E. ASSESSMENT OF POTENTIAL IMPACTS

The potential impacts of the project are described and assessed in this section of the statement. Following sections note those adverse impacts that are unavoidable, describe steps to minimize them and indicate which resources would be committed to the project. Those impacts affecting Section 4(f) lands are also set forth in a separate part of the statement.

1. Physical Environment Impacts

a. Noise[a]

Fundamental Concepts of Highway Noise

This section provides background information to aid in understanding the results discussed in later sections.

Dimensions of Environmental Noise. Three dimensions of environmental noise are important in determining man's subjective response. These are:

1. The intensity or level of the sound;
2. The frequency spectrum of the sound;
3. The time-varying character of the sound.

Airborne sound is a rapid fluctuation of air pressure above and below atmosphere pressure. Sound level are usually measured and expressed in decibels (dB), with 0 dB corresponding roughly to the threshold of sensitivity of hearing.

The "frequency" of a sound refers to the number of complete pressure fluctuations per second in the sound. The unit of measurement is the cycle per second or hertz (Hz). Most of the sounds which we hear in the environment do not consist of a single frequency, but of a broad band of frequencies, differing in relative level. The quantitative expression of the frequency and level content of a sound is its sound spectrum. Many rating methods have been devised to permit comparison of sounds having quite different spectra. Fortunately, the simplest method correlates with human response practically as well as the more complex methods (1,2,3,4). This method consists of evalu-

(a) This section is based upon a Noise Impact Study prepared by the firm of Bolt Beranek and Newman, Inc., October, 1972. (References noted are listed at end of section).

ating all of the content of a sound in accordance with a weighting that progressively and severely deemphasizes the importance of frequency components below 1000 Hz, with mild deemphasis above 5000 Hz. This type of frequency weighting reflects the fact that human hearing is less sensitive in the low and extreme high frequencies ranges than in the midrange. The weighting curve most often used is called "A" weighting, and the level so measured as called the "A-weighted sound level", or simply "A-level".

The A-level in decibels is expressed "dBA"; the appended letter "A" is a reminder of the particular kind of weighting used for the measurement. In practice, the A-level of a sound source is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting curve. All U.S. and international standard sound level meters include such a filter.

Although the A-level may adequately describe environmental noise at any instant in time, the fact is that the community noise level varies continuously. Most environmental noise include a conglomeration of distant noise sources which creates a relatively steady background noise in which no particular source is identifiable. These distant sources may include traffic, wind in trees, industrial or farming activities, etc. These noise sources are relatively constant from moment-to-moment, but vary slowly from hour-to-hour as natural forces change or as human activity follows its daily cycle. Superimposed on this slowly-varying background is a succession of identifiable noisy events of brief duration. These may include nearby activities or single vehicle passages, aircraft flyovers, etc., which cause the environmental noise level to vary from instant to instant.

In this report, as has become standard practice, the time varying character of environmental sound is accounted for statistically (5,6,7,8,9).

The statistical descriptor used in this report is the A-level that is exceeded 10% of the time, designated by the symbol "L_{10}". L_{10} is considered a good measure of "average peak" noise. Close to a highway, where noise levels vary from moment-to-moment, human response probably relates more to the noise peaks, such as from individual vehicle passages, rather than to the median sound level, L_{50}, the A-level that is exceeded 50% of the time.

L_{50} is easier to calculate than L_{10}, but its use as a predictor of human response to traffic noise is most appropriate at a distance from a heavily travelled roadway. At the other end of the statistical scale is L_{90}, the A-level exceeded 90% of the time. This is considered a good measure of the background noise at a site.

The proposed Federal highway noise standards (FHWA PPM 90-2) (10) use L_{10} exclusively; the use of L_{10} is also generally consistent with the procedures of the Highway Design Guide (9).

In summary, this study uses a single-number descriptor to account for the three dimensions of environmental noise: its level, frequency spectrum, and time-varying character. The descriptor is L_{10}, the A-level is dB exceeded for ten percent of the time.

Human Reaction to Environmental Noise. The effects of noise on people can be listed in three general categories:

1. Subjective effects of annoyance, nuisance, dissatisfaction;
2. Interference with activities such as speech, learning;
3. Physiological effects such as startle, hearing loss.

The sound levels associated with traffic noise, in almost every case, produce effects only in the first two categories. Unfortunately, there is as yet no completely satisfactory measure of the subjective effects of noise, or of the corresponding reactions of annoyance or dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance, and habituation to noise over differing individual past experiences with noise (11).

Thus, although absolute sound levels are important in determining the impact of noise on human activities, another important parameter in determining a person's subjective reaction to a new noise is the existing noise environment to which he has adapted - the so-called "ambient" noise. In general, the more a new noise exceeds the previously existing ambient, the less acceptable the new noise will be judged by the hearers (3).

The following relationships will be helpful in understanding the effects of increases in noise levels (11,12):

1. Except in carefully controlled laboratory experiments, an increase of only one dB in A-level cannot be perceived.

2. Outside of the laboratory, a three dB increase in A-level is considered a just-noticeable difference.

3. A change in A-level of at least five dB is required before any noticeable change in community response would be expected.

4. A ten dB increase in A-level is subjectively heard as approximately a doubling in loudness, and would raise local apprehension and concern.

Parameters of Highway Noise. The highway noise prediction method used in this study is as contained in the Highway Design Guide (9). This method is approved in FHWA Policy and Procedural Manual 90-2. In this procedure, three groups of parameters are analyzed, those relating to (1) the traffic, (2) the roadway, and (3) the observer.

Traffic:

The traffic parameters that affect noise are the number and type of vehicles which pass a point during a time period of interest and the average speed of the vehicles. Because speed affects the noise generated by cars and trucks differently, these vehicle categories are analyzed separately; the predicted noise levels from the two sources are then combined.

Highway noise increases as the number and the average speed of automobiles on it increase. For example, if the automobile traffic volume should double, the noise level from automobiles would increase by about 3 dB. Should the speed double, the noise level from automobiles would increase by about 6 dB. The engine-exhaust system and the tire-roadway interaction are prominent contributors to the overall automobile noise.

Truck noise behaves differently. An average truck generates A-level about 15 dB higher than a car; the noise contribution from a single truck is approximately equal to that from thirty cars. Because trucks are usually operated at nominally constant engine rpm, the engine-exhaust noise does not change with road speed; truck noise is therefore virtually independent of the vehicle speed (3). The condition of the truck muffler is very important, however; A-levels 15 dB higher than average can result from improperly muffled trucks (13).

Roadway:

The major roadway parameter that affects highway noise is the slope, or gradient. For example, a 3% road grade adds about 2 dB to truck noise (automobile noise is not affected by the roadway grade) (14). Noise resulting from the tire-roadway interaction can be influenced by the characteristics of the of the tires and the roadway surface. A "normal" surface is moderately rough asphalt or concrete. Variations in A-level of $\pm$ 5 dB can be expected for surfaces of rough asphalt with large voids or grooved concrete at one extreme, or very smooth, seal-coated asphalt at the other (3,15).

Observer:

The "observer" parameters are those that affect the relationship of the receiver's position to the vehicle-roadway noise source. The major factor in this category is the distance from the observer to the highway: the greater the distance, the lower the noise level. A doubling of the distance from the highway (for example, going from 200 ft to 400 ft, or from 2000 ft to 4000 ft) will reduce the traffic noise at the observer's position by about 4 to 5 dB. Beyond distances of a mile, the drop-off rate is about 6 dB per doubling of distance; the additional attenuation results in part from the effect of atmospheric absorption of sound (9).

Shielding barriers that block the line-of-sight from the observer to the highway are another "observer" factor affecting highway noise propagation. These include natural features such as hills or other changes in ground elevation and vegetation, including trees. Man-made shielding elements include houses or other structures, walls, earth berms, etc.

The acoustical effectiveness of the shielding depends upon the extent to which it blocks the line-of-sight to the highway, as well as upon the characteristics of the barrier itself. For example, if a barrier blocks only half the view of a length of highway which would otherwise be fully exposed, the noise level reduction would be limited to only 3 dB, regardless of the structure of the barrier itself.

If the view of the highway vehicles is completely shielded, the A-level attenuation by a solid barrier may vary from 5 dB for low barriers to a maximum of about 24 dB for very large barriers (16). A single row of houses may reduce highway noise about 5 dB; multiple rows of houses will provide a reduction of up to 10 dB (17,18). Trees, if densely planted, and at least 15 ft tall, provide a reduction of about 5 dB per 100 ft of woods depth, approaching a maximum of 10 dB (19,20,21).

Existing Ambient Noise Environment. In the land area traversed by the proposed Rye-Oyster Bay Bridge and its approaches, the existing ambient noise L_{10} is generated primarily by motor vehicle traffic on existing roadways and by light aircraft operations. There are no major industrial plants or commercial aircraft operations which provide significant noise impact. Over much of the approach area on the mainland side, noise from traffic on the New England Thruway (Interstate Route 95) dominates; over the longer approach route on the Long Island side, there is no single major source of vehicular noise.

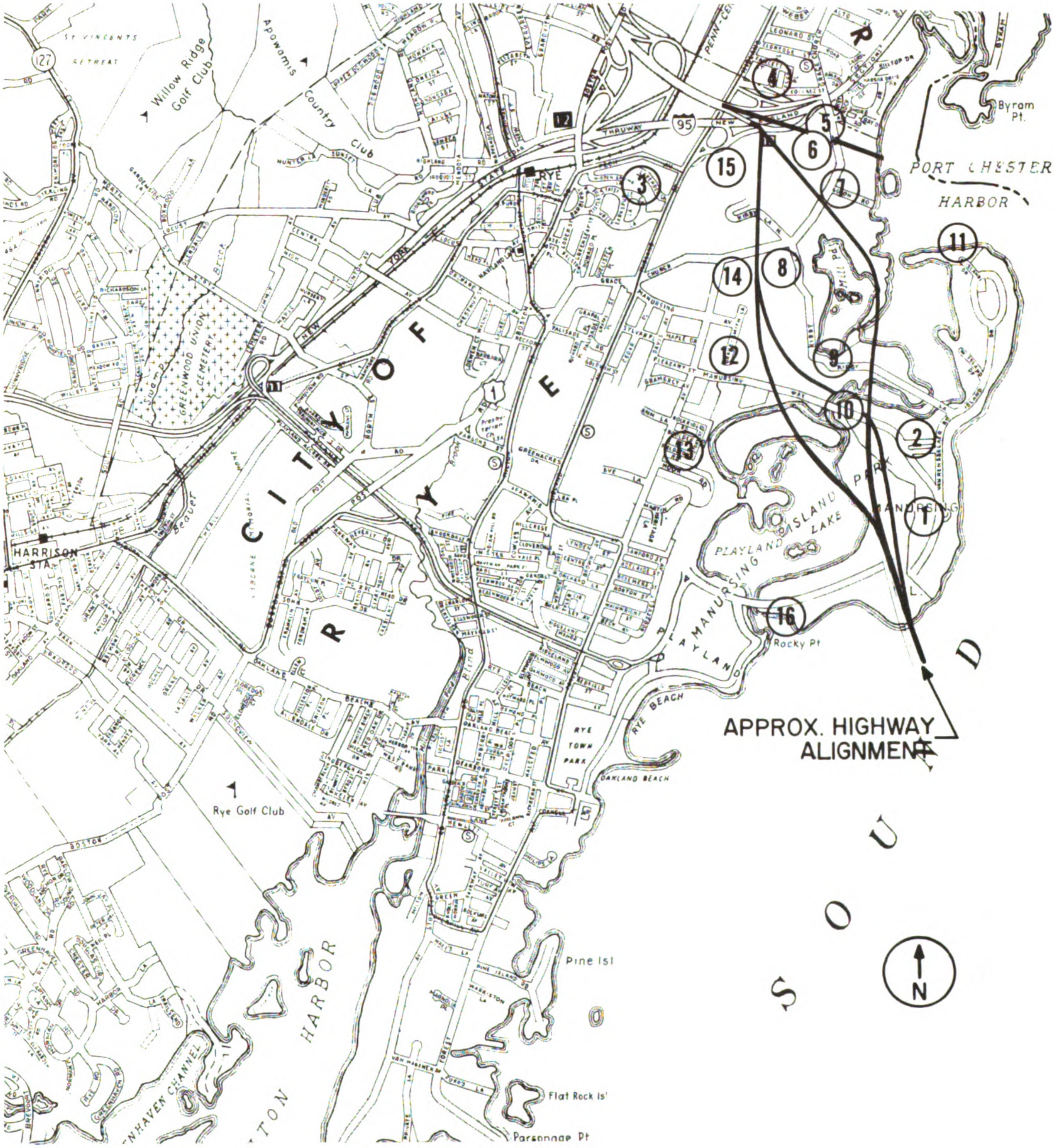
These findings are based upon observations made 28 September 1972 on the Long Island side followed up by acoustical measurements on 1 October 1972, and measurements performed 17 and 18 October 1972 on the mainland side. The ambient noise measurement locations are shown on Exhibits E-1 and E-2; the measurement results are shown in Table E-1.

The intent of the measurement program was to provide spot checks of the existing ambient noise in noise-sensitive areas near the proposed highway location. An existing ambient noise contour map for the study area could be developed based upon calculations of noise from traffic on all existing routes for which traffic data (vehicle counts, truck percentages, and vehicle speeds) can be provided, with adjustments for local street traffic and light aircraft operations.

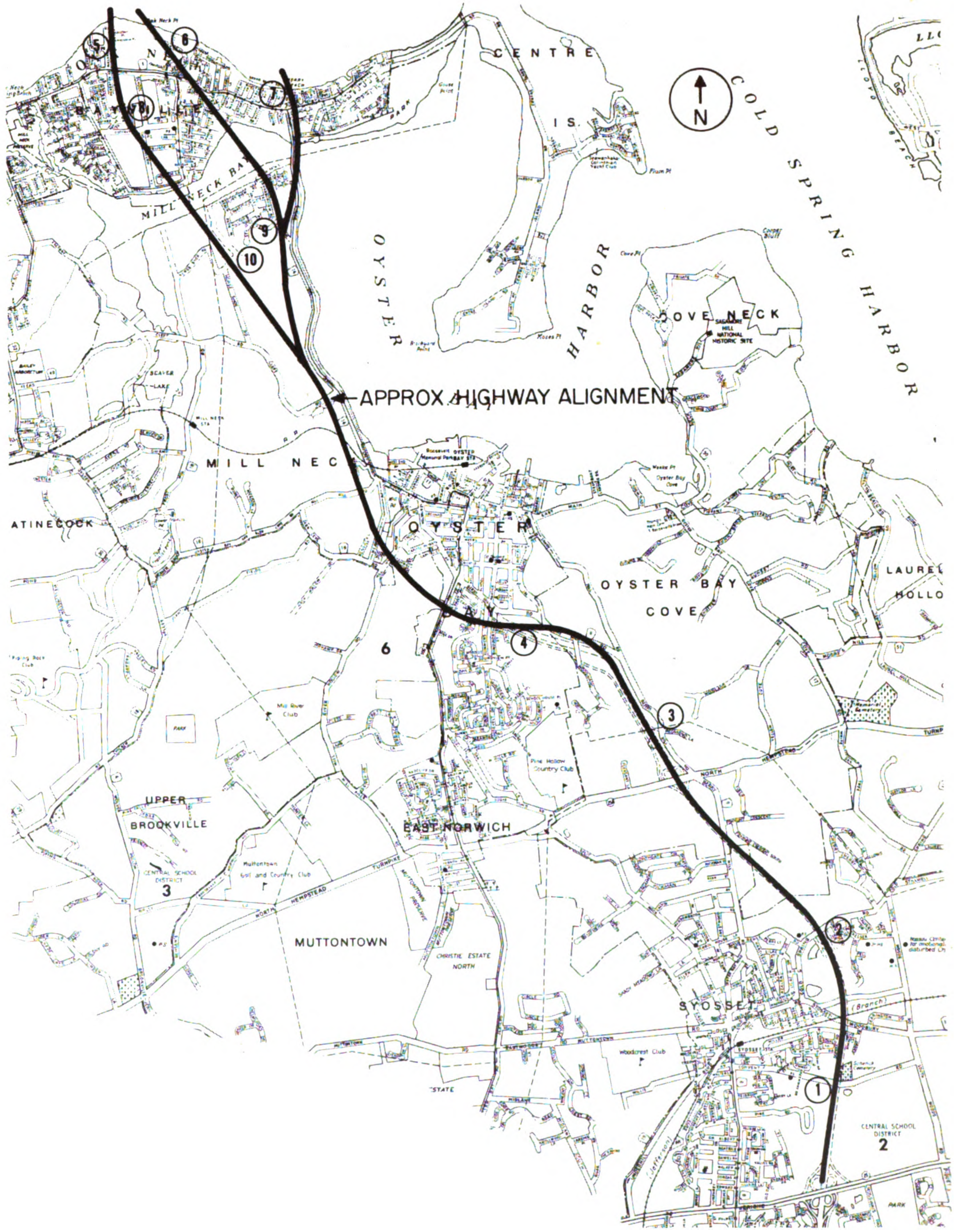
TABLE E-1

AMBIENT NOISE SURVEY SUMMARY 17-18 OCTOBER 1972

Site No.	Location	Date/Time	Level (L_{10})
Westchester County			
1	Van Rensselaer Rd. at Manursing Island Association Clubhouse	17 October 1:55 p.m.	55 dBA
2	Manursing Way at drive to beach club of the Westchester Country Club, Manursing Island	17 October 2:20 p.m.	57 dBA



AMBIENT NOISE MEASUREMENT LOCATIONS - WESTCHESTER APPROACH AREA.



AMBIENT NOISE MEASUREMENT LOCATIONS - NASSAU APPROACH AREA.

TABLE E-1

AMBIENT NOISE SURVEY SUMMARY 17-18 OCTOBER 1972 (Cont.)

Site No.	Location	Date/Time	Level (L_{10})
Westchester County (Cont.)			
3	40 ft from Peck Ave., 200 ft from corner of Midland Ave.	17 October 2:40 p.m.	67 dBA
4	Edgar Place at Cottage St.	17 October 3:10 p.m.	63 dBA
5	100 ft W. of intersection Grace Church St. and Greyrock Rd.	17 October 3:45 p.m.	69 dBA
6	600 ft S. of Site No. 5	17 October 4:05 p.m.	67 dBA
7	Guion Rd., 50 ft from Grace Church St.	17 October 4:40 p.m.	63 dBA
8	Kirby Lane, 500 ft S. of Grace Church St.	18 October 8:30 a.m.	59 dBA
9	Kirby Lane at S. Shore of Mill (Kirby) Pond	18 October 9:00 a.m.	55 dBA
10	At bridge on Manursing Way	18 October 9:15 a.m.	55 dBA
11	North Island Dr., N. Manursing Island	18 October 9:45 a.m.	55 dBA
12	Manursing Way, 1000 ft E. of Forest Ave.	18 October 10:00 a.m.	53 dBA
13	Boulder Rd., midway between Forest Ave. and Stonycrest Rd.	18 October 10:25 a.m.	49 dBA
14	Grace Church St. near Forest Ave.	18 October 10:50 a.m.	65 dBA
15	End of Kirby Lane North	18 October 12:20 p.m.	59 dBA
16	Road in Playland Park, Manursing Island	18 October 12:45 p.m.	55 dBA
Nassau County			
1	Convent Rd., 600 ft W. of St. Mary's Home	18 October 8:45 a.m.	65 dBA

TABLE E-1

AMBIENT NOISE SURVEY SUMMARY 17-18 OCTOBER 1972 (Cont.)

Site No.	Location	Date/Time	Level (L_{10})
Nassau County (Cont.)			
2	Townsend Dr., 150 ft from Cold Spring Rd.	18 October 9:40 a.m.	59 dBA
3	Redmond Lane, 200 ft from Berry Hill Rd.	18 October 10:20 a.m.	53 dBA
4	Marion St. at Oyster Bay Jewish Center	18 October 11:25 a.m.	47 dBA
5	Wayaawi Ave. at Sowanishin Place	18 October 1:30 p.m.	51 dBA
6	Oak Pt. Dr. N. at Beach Circle	18 October 2:05 p.m.	51 dBA
7	Sound Beach Rd. at Howard Rd.	18 October 2:50 p.m.	51 dBA
8	School St., 150 ft from Godfrey Ave.	18 October 3:30 p.m.	51 dBA
9	Seaview Dr., 700 ft from Shore Drive	18 October 4:30 p.m.	53 dBA
10	Roger Canoe Rd., 700 ft W. of Horseshoe Rd.	18 October 5:15 p.m.	53 dBA

Technique requires noting A-level sound every 10 seconds with enough samples accumulated to enable identification of L_{10} at 95% level of confidence generally with $\pm$ 3.dBA.

Source: Bolt Beranek and Newman, 1972

Probable Noise Impact

Criteria. The highway noise impact criteria used in this study are in accordance with FHWA PPM 90-2.

FHWA PPM 90-2 explicitly sets absolute design noise levels for various land uses "based upon a combination of annoyance and interference with speech communication". These levels are shown in Table E-2.

Implicitly, by requiring a comparison of existing noise levels with predicted noise levels from a proposed highway section, the Federal Standard recognizes the importance of the relationship of these noise levels. PPM 90-2 gives no quantitative criteria for judging this relationship; this study therefore uses the criteria recommended in the Highway Design Guide (22), as shown in Table E-3.

Traffic Noise "Worst Case" Prediction. "Short Method" procedure -- The "Short Method" procedure for highway noise prediction of the Highway Design Guide (9) was used for this study, augmented as required to predict L_{10}. This scheme accounts only for traffic characteristics (volume, speed, and automobile/truck mix) and distance, but does not account for other roadway (gradient, surface) or observer (shielding barriers, including highway cuts and buildings) parameters. This scheme is accurate only when the highway runs straight and level and when the observer's view of the highway is completely unoccluded. Its use is appropriate as a screening technique, to eliminate from detailed study areas where there is no noise impact, and to pinpoint trouble areas. It is not a substitute for the "Complete Method", which will be used later in conjunction with the detailed highway design to determine the noise impact more accurately and then to develop the means for reducing the impact.
Noise level differences between short and complete method predictions:

For the proposed Rye-Oyster Bay Bridge, the parameters neglected in the short method prediction could reduce the predicted noise levels from highway segments by as much as 12 dBA (feasible barriers) or increase it by 2 dBA (3% grades), assuming that the roadway surface will be of "normal" roughness. Comparing the length of roadway partially-shielded and the possible benefits of shielding vs the lengths where grades exceed 2% (2% = 0 dBA increase) permits the conclusion that, in general, the short method predicted noise levels are "worst case" levels and that levels in many areas will be lower than those given in this study.

TABLE E-2

DESIGN NOISE LEVELS/LAND USE RELATIONSHIPS (Absolute Noise Criteria)

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 those qualities is essential if the area is to continue to serve its intended purpose. For example, 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*	----	Undeveloped lands.
E*	55 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Federal Highway Administration, proposed Policy and Procedure Memorandum 90-2 (10).

*See text of PPM 90-2 for application.

TABLE E-3

PREDICTED IMPACT FROM INCREASE IN EXISTING AMBIENT NOISE LEVELS (Relative Noise Criteria)

Increase in L_{10}	Assessment	Expected Response
Less than 6 dBA	No Impact	Little comment or individual reaction
6 to 15 dBA	Some Impact	Some individual comment and reaction; no group action likely
More than 15 dBA	Great Impact	Strong individual comment and group action

Source: Federal Highway Administration, proposed Policy and Procedure Memorandum 90-2 (10)

The techniques used to preserve the "worst case" nature of the preliminary noise prediction is described below.

Noise levels:

The highway noise prediction was made for the peak traffic hour of an average day in the design year 1995.[a] Traffic volume much above this level would have to move slower, because of limitations of highway capacity; thus, the predicted noise levels are at or close to the loudest levels which can be anticipated, thus reinforcing the "worst case" nature of the prediction. Peak hour noise levels before 1995 would be 2 to 3 dBA lower; levels at other hours would be up to 10 dBA lower.

The short method "worst case" predicted peak hour noise levels are 80 dBA L_{10} at 85 ft. from the edge of the travelled pavement, 75 dBA L_{10} at 160 ft., 70 dBA L_{10} at 300 ft., 65 dBA L_{10} at 570 ft., and 60 dBA L_{10} at 1100 ft. (Some differences in traffic volume and speed are projected for different segments of

(a) Peak Hour Volumes are estimated to be 5,600 (2 directions).

the new highway. Neither these nor the differences between four and six lanes of traffic are sufficient to alter significantly the predicted distances and levels.) At interchanges, to preserve the "worst case" nature of the prediction, the predicted noise levels can be assumed at the predicted distances from the ramp, rather than from the highway proper. Careful design may significantly reduce, but not eliminate, the "interchange bulge" in the area of absolute noise impact.

At the bridge toll plaza, where the traffic flow is interrupted the Highway Design Guide and experimental studies conducted since the publication of the Guide indicate that the noise impact would be greater than for the same traffic freely-flowing. The correction for stop-and-go traffic remains, however, one of the areas in the comprehensive scheme for prediction of traffic noise which is least well validated. Acoustical measurements at an existing toll plaza where the traffic mix is similar to that expected at the new bridge will be made to determine accurately the noise impact of the toll plaza area.

Noise Impact Assessment. Areas of possible impact -- In order for an area to suffer noise impact defined in terms of human response, there must be a usual use for the area. Different human uses can tolerate different levels of noise before there is adverse impact. These commonly accepted principles are incorporated in the design noise levels proposed for promulgation in FHWA PPM 90-2 (10), as shown in Table 2. Thus, for example, residences and outdoor living areas associated with them can receive noise impact, but undeveloped woodlands surrounding a residence would not be considered affected by noise. A hospital within a noise zone would be affected, but its parking lot would not.

Highway noise in excess of design noise levels:

Most of the developed land use near the proposed bridge and approach roads falls into Category B as shown on Table 2, for which PPM 90-2 proposes a design noise level of 70 dBA L_{10}. Where such land uses are within 300 ft of the edge of the travelled pavement of the new highway, the area should be studied in greater detail to determine more accurately the predicted impact area, and to determine the total extent of the areas for which acoustical design will be required.

Highway noise greater than existing ambient noise levels:

From the spot checks of existing ambient noise levels shown on Table 1, ambient noise levels in the Westchester County study area hover around 65 dBA L_{10} near the New England Thruway, dropping down to approximately 55 dBA L_{10} toward and on Manursing Island. In most cases, therefore, the increase in ambient noise caused by the new bridge and its approaches would not reach the "great impact" category before the PPM 90-2 absolute level criterion of 70 dBA L_{10} was exceeded. Toward the southern end of the Westchester County segment, the area of "some impact" might extend as far as 1000 ft from the roadway edge under "worst case" conditions.

In most of the Nassau County study area existing ambient noise levels were in the low 50's dBA L_{10}. If there should be places where the highway is level and straight, completely open to the observation position, the area of "some impact" would extend out to 1200 ft from the highway; the area of "great impact" out to 425 ft. In Nassau County, therefore, the increase in ambient noise will be more important to people's reactions than the absolute criteria proposed in FHWA PPM 90-2.

The short method "worst case" predictions therefore identify the areas of "great impact." To repeat, these areas are so designated by virtue of predicted noise levels above 70 dBA or by virtue of an increase in noise level of more than 15 dBA above ambient. All such areas will be restudied in detail. In some cases, consideration of the actual terrain features will reduce the impact to the "some impact" category without special noise control. At other locations positive noise correction will be required.

The Department of Transportation has adopted design criterion for this project with the objective of keeping noise levels below the "great impact" category.

Example of corrected noise prediction:

A portion of proposed Route N-1 in Bayville was examined in greater detail to indicate the extent to which the highway noise impact might be reduced by provision of barriers and good use of existing terrain. The highway section examined runs south from Bayville Avenue to the intersection of the proposed route with Cat Hollow Road. In this area it seems feasible to combine a cut approximately 20 ft deep with a dense barrier wall approximately 5 ft high at the edge of the cut, resulting in an uniform 25 ft cut with its edge 5 ft above the surrounding terrain.

St. Gertrude's Church, approximately 400 ft from the alignment on Bayville Avenue at School Street, would be shielded from highway traffic south of Bayville Avenue, although there will be some effect from traffic across the road. Noise levels at the church would be reduced approximately 4 dB compared to the "worst case" prediction; the corrected prediction would be 62 dBA L_{10}, well below the absolute criterion shown on Table 2 for a church. The increase in ambient noise would put the church into the "some impact" category at peak traffic hours, but probably out of it for Sunday worship.

The library in the Bayville Municipal Facilities on School Street and the Bayville Elementary School at the corner of Cat Hollow and Godfrey Roads both would be 300 ft from the route and both completely shielded. For these buildings the reduction from the "worst case" prediction would be 10 dB, for a corrected prediction of 60 dBA L_{10}: no impact on the absolute scale, "some impact" from the increase in ambient noise.

Residences to the west of the route would receive noise impacts similarly reduced, with some additional reduction for intervening rows of houses.

Reduction of Highway Noise by Design. The construction of roadside acoustic barriers is one of the most practical methods of highway noise abatement. To be effective, barriers must substantially break the line-of-sight between the truck traffic and the observer and must be long enough along the roadway to shield the observer not only from the nearby traffic, but also from traffic further down the roadway.

Depressing the roadway below grade can also provide significant noise reduction, for the earth walls on either side of the road act as barriers in reducing the noise, as shown above.

The addition of trees and planting along a roadway will offer little noise reduction unless it is done on a very large scale (100-ft depth or more), and is not generally recommended as an effective method.

Substitution of a quieter road surface material will bring little benefit, because the noise level (L_{10}) near the roadway is controlled mainly by truck engine and stack noise.

Noise reduction at interchanges near residential areas is desirable. The design of acoustic barriers at interchanges is complex, for it depends upon the exact interchange design, including ramp gradients and the elevations of all components of the interchange. It is sometimes possible for an off-ramp to shield the affected residences from on-ramp noise if it is constructed on fill rather than on piers. Other local shielding may be provided by the interchange design itself, due to the necessary grade separations involved, and may even eliminate the need for separate acoustic barriers. The necessary acoustic diagnosis must be left to the detailed design stage. In general, the noise reductions required are amenable to solution through barrier design, consistent with nonacoustic constraints such as cost, esthetics, and proper driver visibility.

In cases where large buildings are exposed to impact noise levels, it is possible to obtain some relief by closing the windows and installing forced ventilation or air conditioning systems in these buildings.

REFERENCES

1. Parkin, P.H., "On the Accuracy of Simple Weighting Networks for Loudness Estimates of Some Urban Noises," J. Sound Vib., 2(1):86-88 (1964).

2. Hillquist, R.K., "Objective and Subjective Measurement of Truck Noise," Sound Vib., 1(4):8-13 (1967).

3. Callaway, W.J., W.E. Clark, and J.S. Kerrick, "Urban Highway Noise: Measurement, Simulation, and Mixed Reactions," National Cooperative Highway Research Program, Rept. 78 (1969).

4. Botsford, J.H., "Using Sound Levels to Gauge Human Response to Noise," Sound," Sound Vib., 3(10):16-28 (1969).

5. Kittelson, K.E., and C. Poulsen, "Statistical Analysis of Sound Levels," Bruel & Kjaer Technical Review #1 3-23 (1964).

6. Griffiths, I.D., and F.J. Langdon, "Subjective Response to Road Traffic Noise," J. Sound Vib., 8(1):16-32 (1968).

7. Olson, N., "Statistical Study of Traffic Noise," Rept. #APS476, N.R.C. 11270, National Research Council of Canada, Ottawa (1970).

8. Scholes, W.E., "Traffic Noise Criteria," Appl. Acoust., 3(1):1-21 (1970).

9. Gordon, C.G., W.J. Gallaway, B.A. Kugler, and D.L. Nelson, "Highway Noise - A Design Guide for Highway Engineers," NCHRP Rept. 117 (1971).

10. Federal Highway Administration Policy and Procedure Memorandum (PPM) 90-2: Proposed Noise Standards and Procedures for Implementing Section 109(1) of Title 23, United States Code, Federal Register, 37:114, Tuesday, June 13, 1972.

11. Stevens, K.N., W.A. Roseblith, and R.H. Bolt, "A Community's Reaction to Noise: Can It Be Forecast?" Noise Control, 1:63 (Jan. 1955).

12. Beranek, L.L., Acoustics, McGraw-Hill, New York (1954).

13. Thiessen, G.J. and N. Olson, "Community Noise-Surface Transportation," Sound Vib., 2(4):10-16 (1968).

14. See Ref. 9, page 13.

15. See Ref. 9, page 18.

16. Maekawa, Z.E., "Noise Reduction by Screens," Appl. Acoust., 1:157-173 (1968).

17. Bolt Beranek and Newman Inc., Rept. 1709, "A Comprehensive Survey of the Noise in Communities Around Boeing Field, Seattle," (Jan. 1969).

18. Bolt Beranek and Newman Inc., "Noise Environment of Urban and Suburban Areas," U.S. Department of Urban Development (Jan. 1967).

19. See Ref. 9, page 18.

20. Wiener, F.M., D.H. Keast, "Experimental Study of the Propagation of Sound Over Ground," J. Acoust. Soc. Amer., 31:724-733 (1959).

21. Aylor, D., "Noise Reduction by Vegetation and Ground," J. Acoust. Soc. Amer., 51:197-205 (1972).

22. See Ref. 9, pages 57 and 72.

b. Air Quality

Introduction

The level of air pollution in the vicinity of any highway depends upon:

1. The quantity of pollutants emitted per vehicle. This in turns depends upon the age of the vehicles, fuel employed, engine characteristics, and the operational mode (steady speed, changing speed, idle).
2. Traffic: the number of vehicles emitting and the general traffic conditions.
3. Dispersion patterns which in turn depend upon the combination of meteorologic conditions and the topography which together determine the local movements of air.

Formulae have been developed to calculate pollutant levels at various distances from a highway when unit emissions, traffic volume and atmospheric and topographic conditions are known.

The Triborough Bridge and Tunnel Authority has been involved in a continuing research program to determine actual pollution levels as opposed to theoretical projections in the vicinity of its vehicular bridges and tunnels. In connection with the Authority's program, Scott Research Laboratories computed pollution levels under various operating conditions. Scott is also the source of information in this section not otherwise cited.

The Scott estimates employ the most recent engine emission data developed by the U.S. Environmental Protection Agency. These reflect the impact of current Federal emission regulations, and the gradual phaseout of older more pollutive engines through 1990. They also reflect daily and peak hour traffic volumes through 1995 developed by Madigan-Praeger. Most significantly, the Scott work recognizing the limitations of theoretical models of the dispersion effect, has taken into account actual field measurement of pollution by the Triborough Bridge

& Tunnel Authority, at toll plaza sections as well as at highway sections.

To test the accuracy of the ability to predict pollution levels under specific atmospheric and traffic conditions,predictions were made by Scott of the CO levels that would be found at the Bronx-Whitestone Bridge at a point 150 ft. from the curb of the toll plaza during peak traffic, heavily congested periods and at periods of average traffic flow. The predicted levels were found to be high during certain periods and low at others tending to demonstrate the inaccuracy of the predictory statistical models at points quite close to the source. Based on actual measurements, the CO levels did not exceed the Federal one-hour standard of 35 ppm at this point 150 ft. from the toll plaza with severely congested traffic.

With the order of magnitude accuracy of the predicting model confirmed and recognizing the fact that the accuracy is greater at greater distances from the source, predictions were made by Scott of pollution levels at a point 100 meters from an expressway or expressway toll plaza operating at the traffic levels anticipated on the Long Island Sound Crossing in 1977, 1980 and 1985. In order to compare air pollution forecasts with National Air Quality Standards, the available meteorological data was examined to determine the frequency of adverse meteorological conditions that would coincide with peak one-hour and peak three-hour traffic conditions. 1 mph and 3 mph respectively were thus estimated as being representative of adverse conditions, which when combined with peak traffic, would produce pollution levels which can be compared with the National Air Quality Standards. These are "working assumptions" subject to modification when more complete meteorological information becomes available.

The objective of the present work as well as of the continuing environmental design for air pollution as the project is refined in subsequent stages, is to assure that the national and state air quality standards will be maintained everywhere outside of the project right-of-way. The final right-of-way configuration will be designed to assure this.

In computing air pollution for new highways herein, the estimates have been limited to a horizontal plane at the level of the highway. The actual levels experienced by locations above or below this plane will be less than shown. Final estimates will depend upon the final approach configuration, and upon additional field work.

There are two conditions which must be examined. One of these is the case of dispersion from a highway section with vehicles operating at the design speed of 50 to 60 miles per hour. To be conservative, the speed of 45 miles per hour has been utilized. The other is the case of dispersion from a "Toll Plaza Region" within which vehicles decelerate, stop and idle as the toll is paid, and accelerate again to cruising conditions. Clearly, the latter case will give rise to higher emissions, and hence have a higher impact upon local air quality.

In both cases, Scott Laboratories have combined theoretical considerations with actual field data at the Whitestone Bridge in order to arrive at the most accurate results possible at this time.

Types of Impact

Several impacts are recognized, not all of which are negative.

1. The impact of the highway upon the air quality outside the right-of-way, including the case of toll booths. Major emphasis in this report is given to this impact; as indicated in the introduction.
2. The positive impacts that results from:
    a. Shorter vehicle trips for those with cross-Sound trip ends, with consequent reductions in total regional emissions.
    b. Relief of congestion on the Throgs Neck and Bronx-Whitestone Bridges resulting in major improvements of air quality at those locations.
    c. The displacement effect for that portion of emissions presently impacting land areas that will be shifted out to Long Island Sound.

3. The quality of air that will prevail within the right-of-way itself, particularly within the toll plazas. Here the air quality is primarily related to traffic conditions within the toll plaza. By designing for minimum queue length and providing, if required, a forced ventilation system in the toll booth region, the occupational hazard to workers can be minimized, and the impact of short term exposure of vehicle passengers to higher pollution levels will be negligible. The Triborough Bridge and Tunnel Authority has conducted detailed toll plaza studies at several facilities and the knowledge gained will be applied to the final design of the toll booths.

In this impact statement, quantitative estimates will be presented for the first two impact types discussed above, with emphasis placed upon meeting Federal Standards.

Present Air Quality In The Long Island Sound Area
Status of Measurements [a]

1. Particulates. Exhibit E-3 illustrates the average annual distribution of suspended particulates in the Long Island Sound area as represented by the data obtained by New York City, New York State and the State of Connecticut for the year 1968. (Ref. 14, 15, 16) Where continued measurements have been made, the trend has been downward in almost all locations (Ref. 17.)

It can be observed that pollution levels generally decrease as one goes east on the Island. Also of note are the increased values obtained along the northern shore in the vicinity of Glen Cove and Bayville. This can be partly explained by peculiar wind features of the Island rather than by a larger amount of pollution in the area, and will be discussed more fully later.

2. Carbon Monoxide, Hydrocarbons. Because continuous monitoring of other pollutants has been quite limited, only an estimate of what it might be in this

(a) Source: Creighton-Hamburg Report.

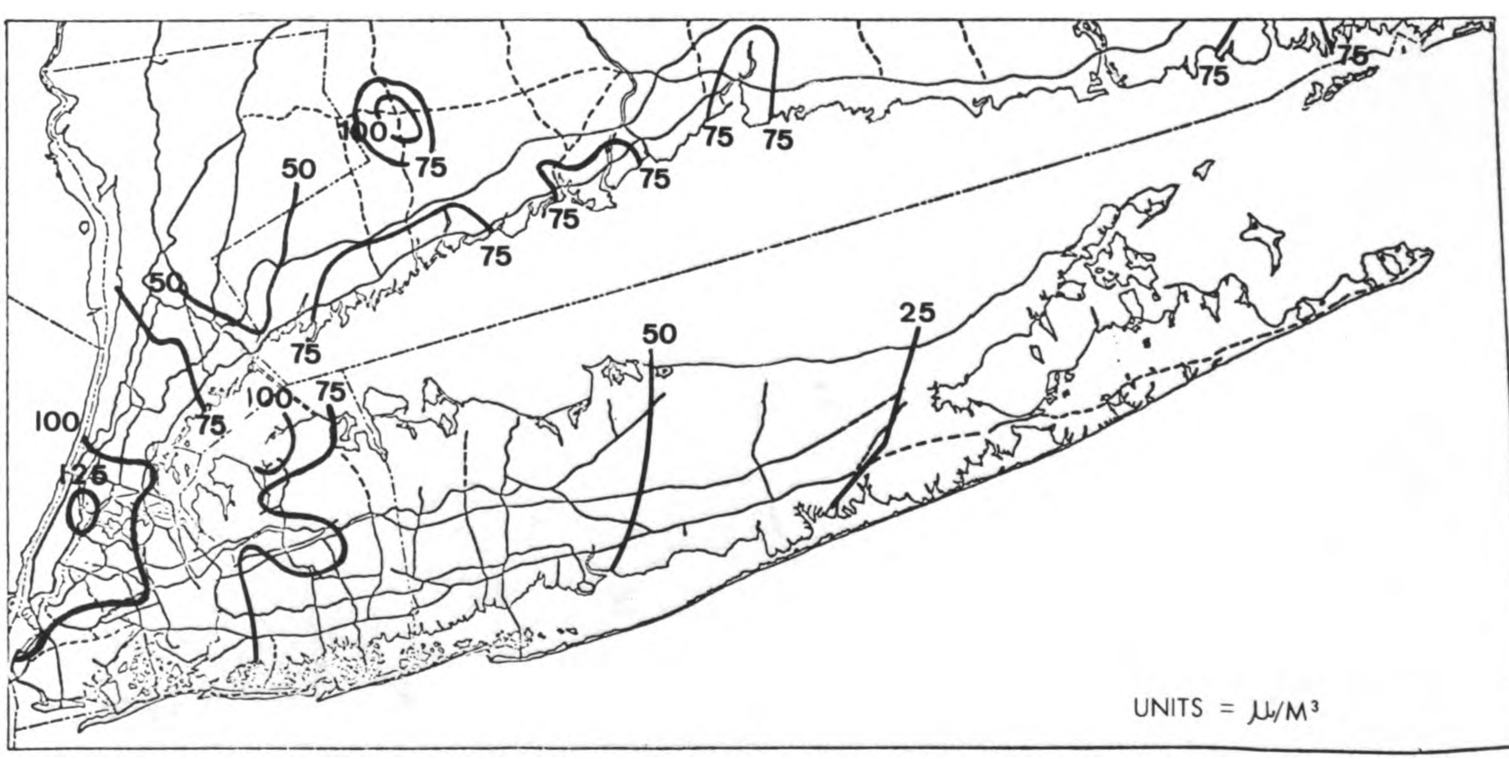
area can be made. Total hydrocarbons average about 1 ppm (parts per million); carbon monoxide about 4 ppm for Westchester and Nassau counties, with somewhat lower values for Suffolk County. No plots are given as the data are inadequate. Data are insufficient to relate levels to all state or national standards.

Air Quality Zones and Standards

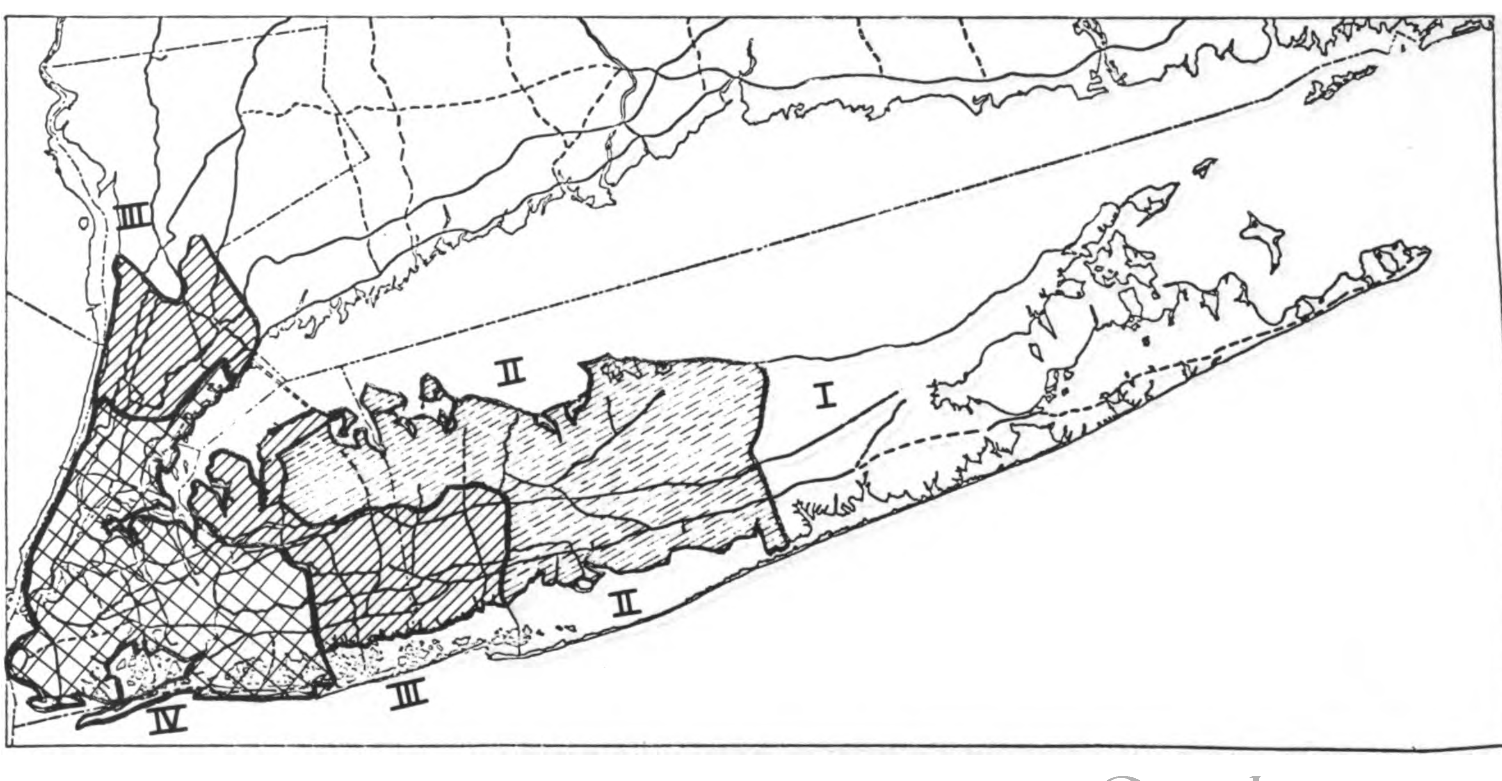
1. New York State has established five grades of ambient air quality classifications and standards. Only four are applicable here. These have been classified in Chapter IV of Title 10 (Health) of the Official Compilation of Codes, Rules and Regulations of the State of New York. Various areas of the state have been classified according to these grades. As far as we know, Connecticut has not yet established a similar classification, although one is under study. Exhibit E-4 shows the air quality zones for the Long Island Sound area with respect to desired maximum levels of suspended particulates. The corresponding ranges are given in Table E-5.

2. Exhibit E-5 shows those areas in New York part of the Long Island Sound region where suspended particulates exceeded the Air Quality Standards on the average in 1968. Of special note is the fact they exceeded the standards along the northern shore of Long Island opposite Westchester county.

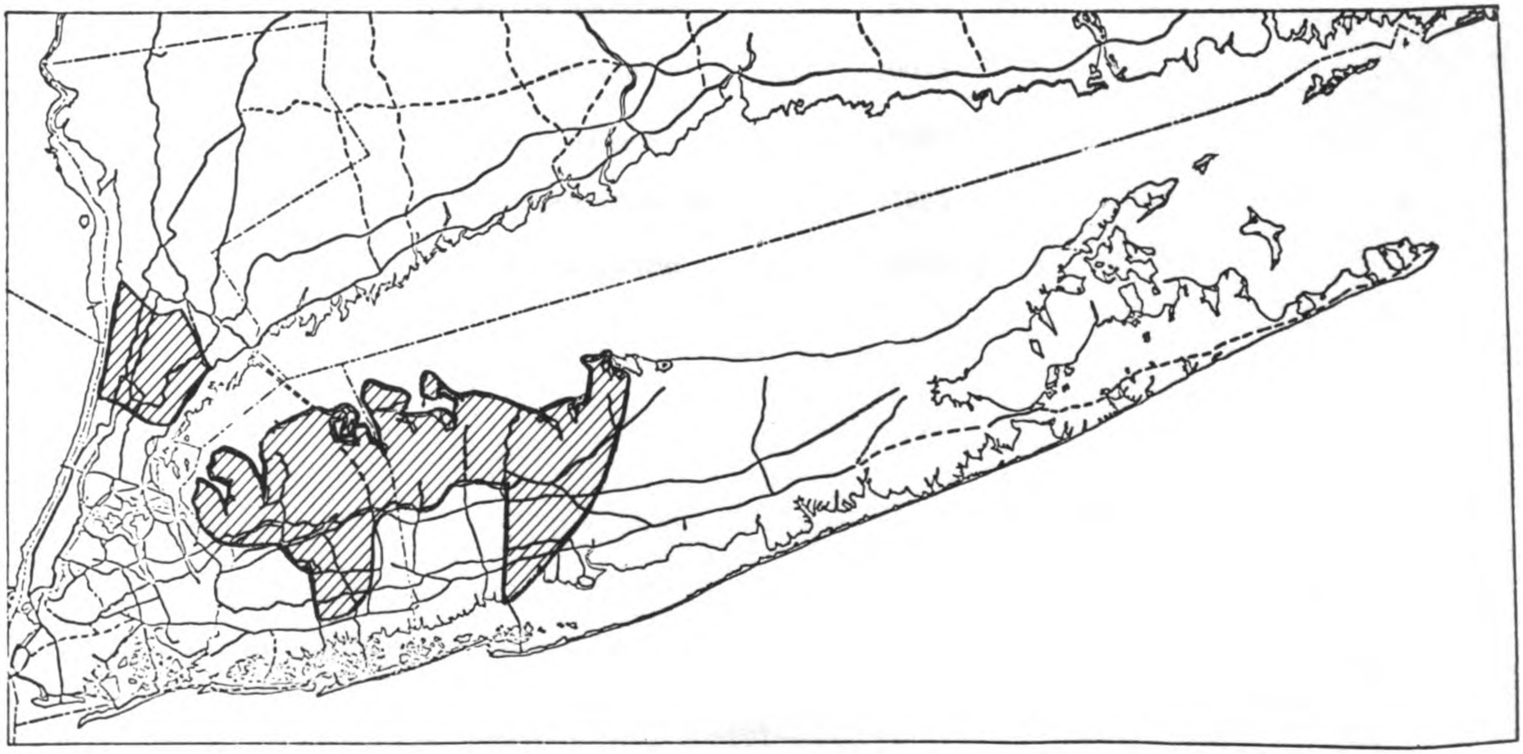
3. Table E-4 lists the National Air Quality Standards. Table E-5 presents additional standards for New York State. The primary standards define levels judged adequate to protect the public health. The secondary standards define levels judged adequate to protect the public welfare from any known or anticipated adverse effects of a pollutant.



AVERAGE ANNUAL DISTRIBUTION OF SUSPENDED PARTICULATES - 1968.



AIR QUALITY ZONES - NEW YORK STATE.



AREAS EXCEEDING AIR QUALITY - 1968 SUSPENDED PARTICULATES.

TABLE E-4

NATIONAL AIR QUALITY STANDARDS

Pollutant	Basis	Primary Standard	Secondary Standard
Particulate Matter	Annual mean	75 $\mu g/m^3$	60 $\mu g/m^3$
	1 day av. once/year	260 $\mu g/m^3$	150 $\mu g/m^3$
Carbon Monoxide	8 hr. av. once/yr.	10 mg/m^3	10 mg/m^3
	1 hr. av. once/yr.	40 mg/m^3	40 mg/m^3
Photo-oxidants	1 hr. av. once/yr.	160 $\mu g/m^3$	160 $\mu g/m^3$
Hydrocarbons (non-methane)	3 hr. av. once/yr.	160 $\mu g/m^3$	160 $\mu g/m^3$
Nitrogen Dioxide	Annual mean	100 $\mu g/m^3$	100 $\mu g/m^3$
Sulfur Dioxide	Annual mean	80 $\mu g/m^3$	60 $\mu g/m^3$
	1 day av./ once/year	365 $\mu g/m^3$	260 $\mu g/m^3$

Source: Federal Register, Vol. 36, No. 84 Apr. 30, 1971, pp. 1502-1513.

to convert $\mu g/m^3$ and mg/m^3 to ppm multiply by:

Carbon Monoxide	.87
Hydrocarbons	.0015
Photo-oxidants	.0005
Nitrogen Dioxide	.0005
Sulfur Dioxide	.000375

TABLE E-5

APPLICABLE NEW YORK STATE AMBIENT AIR QUALITY STANDARDS

	Zone I	Zone II	Zone III	Zone IV
Suspended Particulates (g/m^3)				
Sampling period - 24 hours				
50% of values less than	45	55	65	80
84% of values less than	70	85	100	120
Settleable Particulates (mg/cm^2)				
Sampling period - 30 days				
50% of values less than	0.30	0.30	0.40	0.60
84% of values less than	0.45	0.45	0.60	0.90
Beryllium (g/m^3)				
Monthly averages to be less than	0.01	0.01	0.01	0.01
Total Fluorides (ppm)				
Dry weight basis (as F) in and on forage for consumption by grazing ruminants				
Average concentrations over growing season (not to exceed 6 consecutive months) to be less than	40	40	40	40
Average concentrations over 2 consecutive months to be less than	60	60	60	60
Average concentrations for any month to be less than	80	80	80	80
Sulfuric Acid Mist (mg/m^3)				
24 hour averages to be less than	0.10	0.10	0.10	0.10
Sulfur Dioxide (ppm)				
24 hour averages	0.10	0.10	0.10	0.10
1 hour averages	0.25	0.25	0.25	0.25
(To be less than given values 99% of the time on an annual basis)				
Hydrogen Sulfide (ppm)				
1 hour averages to be less than	0.10	0.10	0.10	0.10

Meteorology of the Area

The purpose of examining meteorology is to determine the frequency of types of weather conditions which affect the amount of pollution that reaches people. Federal and State standards are defined for specified occurrence frequencies. In strong winds pollution is dispersed rapidly. In low winds pollution is dispersed more slowly. The direction of the winds, and the variations in wind direction must be taken into account in relating the theoretical work to reality, and in determining compliance with Federal and State standards.

General Topography. Long Island is characterized by the two glacial terminal moraines extending the length of the island marking the point where the edge of the continental glacier remained long enough so that rock and sand detritus accumulated. The combination of the topography with the variation of water, land, water and land as one proceeds north gives rise to a complicated wind structure which affects the distribution of pollution.

Wind circulation in the vicinity of the proposed bridge sites is affected by the northern terminal moraine and the way it is broken up by the numerous bays along the northern shore of Long Island.

Winds of General Circulation. The prevailing winds in the northeast arise from the passage of general cyclonic disturbances through the region. These result as the air flows counter-clockwise around a low pressure area and clockwise around a high pressure area. These winds favor a westerly direction and have sufficient velocity so that pollution is generally lower than areas such as Los Angeles where air is commonly trapped.

However, these winds do not blow all the time. For instance during the summer the strength of the cyclonic disturbances drops so that little air movement is produced by this general circulation. At night, especially in the fall and early winter, the radiational cooling of the land surface at night will cause inversion conditions where the warmer air aloft will not readily mix with the colder air below. Under such conditions pollution will build up unless there are local winds to move it out.

Local Winds - Sea and Sound Breeze. The local winds are produced by the unequal heating and cooling of the land and water and by topographic channeling of the air. When they are present they produce a motion which carries pollution away from its source and diffuses it.

Most predominant of the local winds is the "sea" or "Sound" breeze which arises from the greater warming of land surfaces compared with water surfaces. Air tends to rise over the warm land, so that air is drawn in from over the water to replace it. There will be a return circulation aloft. A normal sea breeze situation brings air from the ocean as much as 30 miles inland. However, on Long Island the presence of the large water surface of the Sound along the north gives rise to a more complicated structure.

As the land warms up local winds appear along both northern and southern shores of Long Island as well as along the Connecticut shore. The forces driving the sea breeze are stronger than those driving the Sound breeze so that the sea breeze will weaken the effect of the Sound breeze on the northern shore of Long Island and increase the effect on the Connecticut shore. The presence of the terminal moraines on the island will deflect these winds so that a region of stagnation will tend to remain between the two moraines. Precise location of these points is influenced by the irregularity of the moraine structure, being especially cut up by the bays along the northern shore.

Less important than the sea and Sound breeze is the land breeze which develops to a lesser extent at night and is the reverse of the sea and Sound breeze. It is less important because it is weaker than the sea and Sound breeze and it occurs during periods when the rate of pollution production is less.

No study has been made of the diurnal variation of winds in the area. There has been a study of the variation in New York City when the sea breeze was over-ridingly effective but it omitted the Long Island Sound region because of the more complex variations and structure there. However, one can postulate a typical day when the sea and Sound breeze fully develops without the presence of a cyclonic disturbance. We should remember that most days will deviate from this, thus the typical day described below is the average for days of fully developed sea and Sound breezes.

During the night radiational cooling results in an inversion with some tendency for a land breeze to develop, however, since this is not frequent, it will be ignored for our typical day. When the sun rises the land heats up and any local patches of fog either are dissipated or rise into clouds. Along the shore line a breeze develops from the water toward land. This will blow perpendicular to the shore.

As the day progresses this breeze increases in strength and range both inland and out over the water. By noontime the wind structure will have developed to a point where there is competition between the structure developing along Long Island Sound and that developed from the Atlantic Ocean. Stagnation thus remains over the central part of Long Island with a tendency for it to move to the northern part later in the day. Meanwhile, the southeast wind along the Westchester coast changes to a south wind as the sea breeze develops late in the day. This turning appeared as far north as the Westchester County Airport on one of the days covered by the study mentioned above. The Westchester County Airport is 6 miles northwest of Rye.

Estimated Wind Roses. There have been no extended studies made of wind patterns in the immediate vicinity of any of the bridge sites. The closest locations are at La Guardia and at Kennedy Airports. Based on these wind roses, Table E-6 has been prepared giving the percentage occurrence of winds from each of the sixteen points of the compass plus the percent of the time during which stagnation (or zero wind) can be expected to occur. This table is based on our estimate of the presence of the local wind situation in each of the nine types of cases outlined. Measurement can be anticipated to deviate from this, especially if it is made where local topography will modify the air flow near the ground.

Table E-7 shows the expected range of wind velocities in the New York City region. It is worth noting that stagnation occurs only 1.5-2.0 percent of the time and low winds (0-3 mph) occur only four percent of the time. Additional data on the distribution and duration of stagnation periods will have to be collected at the proposed bridge site before the pollution impact of stagnation can be properly assessed. Further discussion of stagnation follows.

TABLE E-6

ESTIMATED FREQUENCY OF WIND FROM VARIOUS DIRECTIONS IN VICINITY OF PROPOSED BRIDGE

	(percent of time)	
Wind Direction	South Shore	North Shore
Stagnation	2.0	1.5
N	5.8	5.1
NNE	5.8	6.1
NE	5.8	5.6
ENE	3.8	4.4
E	2.6	2.6
ESE	2.1	2.8
SE	3.9	5.7
SSE	5.5	6.7
S	6.4	7.5
SSW	5.8	6.2
SW	8.5	7.6
WSW	6.8	6.2
W	5.3	5.2
WNW	9.4	9.9
NW	11.9	11.5
NNW	9.4	6.2

Source: Creighton-Hamburg Report

TABLE E-7

ANNUAL PERCENTAGE FREQUENCY OF WIND
BY SPEED GROUPS IN NEW YORK CITY AREA

Speed Group	Percent Frequency
Stagnation	2
0 - 3 mph	4
4 - 7	16
8 - 12	33
13 - 18	29
19 - 24	11
25 - 31	4
32 - 38	1

Mean Wind Speed - 12.5 mph

Source: Climatography of the United States Series 82; Decennial Census of the United States Climate -- Summary of Hourly Observations, 1951 - 1960 (Table B).

From the data it can be seen that the most prevalent winds are from the northwest with the southwest being the next most prevalent. North or a south wind are also frequent in some localities. Calms are relatively rare in this area, varying from one percent to about four percent of the time.

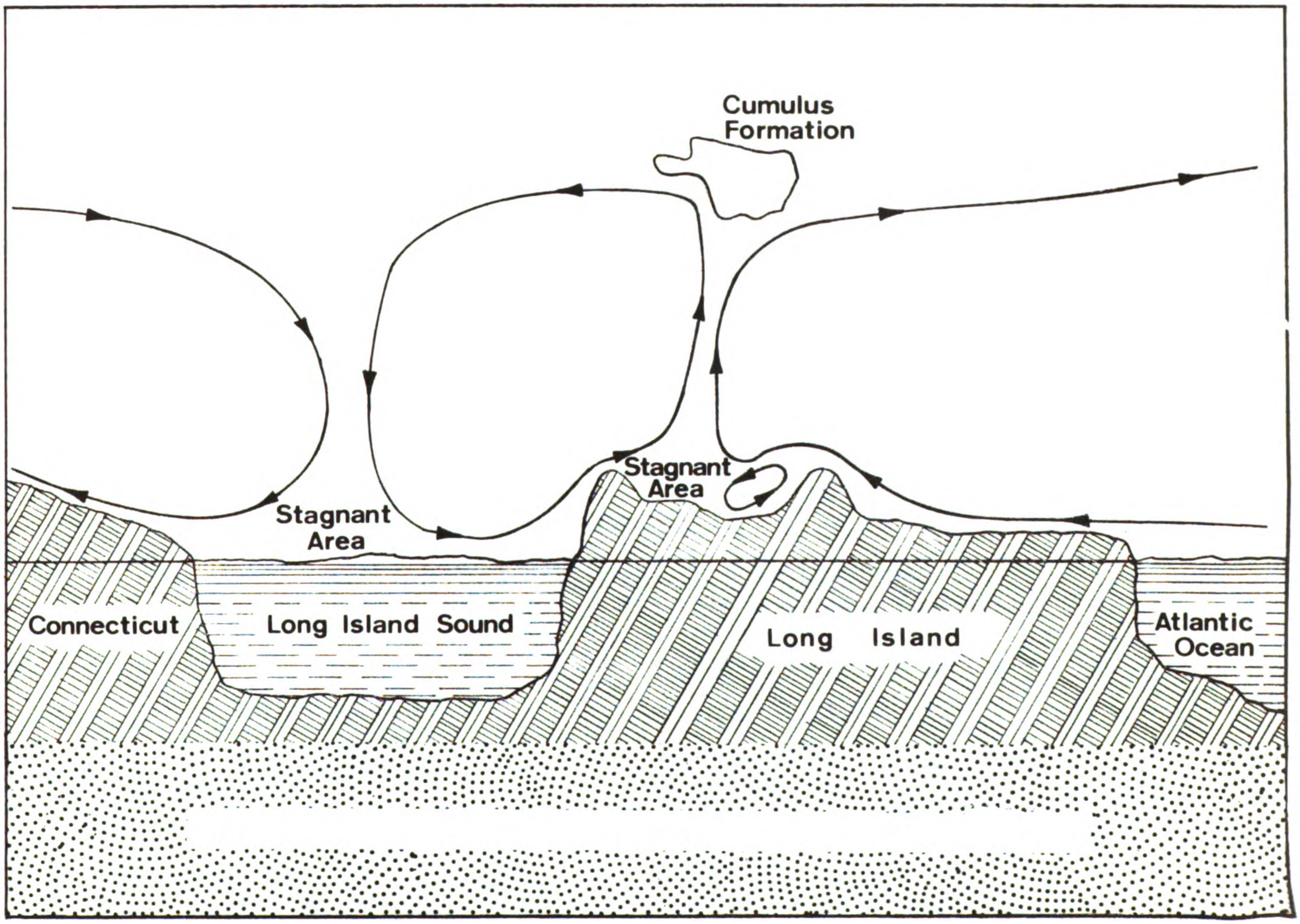
Stagnation Areas. Stagnation and high levels of pollution are nearly synonymous. As previously indicated, long periods of stagnation or relatively low net wind motion, do not occur frequently in the New York City-Long Island area.

The development of sea breezes helps in this respect. However, these breezes do not blow everywhere the same. Figure E-6 illustrates the wind structure that develops along a cross section from the Connecticut Shore across the Sound and Long Island to the Atlantic Ocean. Notice that stagnation occurs on a more local scale - in the middle of Long Island Sound and between the two terminal moraines on the Island. One should also note a secondary effect. The development of cumulus clouds over the Island will cool the land immediately to the North, thus weakening the Sound breeze flowing over the northern shore of the Island. This weakening causes the stagnation point to move further north. This could lead to further weakening of this Sound breeze.

Measurements of suspended particulates in Northern Long Island bear this out, as they show increased levels despite the fact that most major sources are inland. Longer periods of stagnation account for this. In considering the precise locations of toll booths, in the vicinity of which higher unit emissions are expected, it will be important to study in detail the effects of very local topographic and meteorological effects in order to develop a design that minimizes the impact.

Forecast of Pollution Levels and Comparison With Standards

The Environmental Protection Agency, Office of Air Programs (Ref. 22) has recently revised its previous estimates (Ref. 11) of air pollutant emission factors, through 1975. In addition, estimates have been extrapolated through 1985, taking into consideration the progressive impact of federal automotive emissions regulations (Ref. 12). Using these emission estimates, combined with theoretical considerations on dispersion phenomena and the predicted traffic volumes, Scott Laboratories estimated the probable impact for several pollutants in ppm (parts per million). The Scott results assuming a level surface, are presented below. Distances shown are measured from the theoretical center line of traffic:



FULLY DEVELOPED SOUND AND SEA BREEZE CIRCULATION.

TABLE E-8

POLLUTION FORECASTS (ppm), PEAK HOUR CONDITION
(Cross Winds = 1 mph, 100 Meters from Toll Plaza)

	1977	1980	1985
Carbon Monoxide	1.96	1.07	0.41
Hydrocarbons	0.35	0.19	0.12
Nitrogen Oxides	0.06	0.05	0.04

TABLE E-9

POLLUTION FORECASTS (ppm), 24-HOUR CONDITION
(Cross Winds = 1 mph, 100 Meters from Toll Plaza)

	1977	1980	1985
Carbon Monoxide	0.68	0.41	0.17
Hydrocarbons	0.17	0.07	0.05
Nitrogen Oxides	0.02	0.02	0.01

TABLE E-10

POLLUTION FORECASTS (PPM), PEAK HOUR CONDITION
(Cross Wind = 1 mph, 100 Meters From Expressway Centerline)

	1967	1980	1985
Carbon Monoxide	.57	.38	.31
Hydrocarbons	.18	.11	.11
Nitrogen Oxides	.06	.04	.04

TABLE E-11

POLLUTION FORECASTS (PPM), 24-HOUR CONDITION
(Cross Wind = 1 mph, 100 Meters From Expressway Centerline)

	1967	1980	1985
Carbon Monoxide	.20	.15	.13
Hydrocarbons	.05	.05	.04
Nitrogen Oxides	.02	.02	.01

The above tables summarize what is considered "worst probable" pollution events. They assumed a theoretically infinite line of vehicles queuing at the toll plaza, with each car occupying approximately 20 feet of road length, and a simultaneous average crosswind of only 1.0 mph.

Forecasts were also made by Scott Laboratories for other traffic and meteorological conditions. These studies indicated:

1. When the wind is increased to 3 mph the pollution levels in the above tables actually increase slightly (approximately by 4%). The reason this occurs is because atmospheric instability is relatively higher at 1 mph than at 3 mph, offsetting the benefit of the wind increase. At greater wind speeds than 3 mph pollution levels will again decline.
2. When traffic conditions typical of the expressway at 45 mph are represented, the above tables show a large decrease in pollution levels. (Approximately 19.5%).
3. When average daily traffic conditions are represented the values in the above tables decline radically. (Approximately by 65%).

Using the above results to approximate standard conditions in the National Air Quality Standards the following observations are made:

1. Carbon Monoxide: The one-hour average once per year standard is 35 ppm. this compares with an estimated 1.96 ppm in 1977, 100 meters from the center line of traffic at toll plaza conditions under a 1 mph wind. There is thus no apparent excess over the

standard, in 1977 or later years.

The eight-hour average once per year standard is 8.7 ppm. This compares with an estimated 24-hour average of 0.7 ppm 100 meters from the center line of traffic at the toll plaza. There is no apparent exceedance of the standard in 1977 or later years.

2. Hydrocarbons: The 3-hour average once per year standard is 0.24 ppm. The 3-hour average for toll plaza conditions in 1977 at 100 meters from the center line of traffic is just under 0.24 ppm. There is no apparent excess over the standard in 1977 or later.

3. Nitrogen Oxides: The standard requires a 24-hour once per year average of 0.050 ppm for nitrogen dioxide only. This compares with the 24-hour average 100 meters from the center line of the toll plaza for all nitrogen oxides in 1977 of 0.02 ppm. There is thus no apparent excess over standards in 1977 or in later years.

Particulates, sulfur oxides and lead emissions have also been studied. However, the impact of these pollutants upon ambient values proved very minor, compared with those indicated above.

Since there were no apparent excess over standards near the toll plaza (beyond 100 meters from the center line) and considering that the levels of pollution are lower adjacent to the expressway, there will be no apparent excess over standard adjacent to the expressway.

More detailed studies will be required to determine pollution levels within the 100-meter zones and these studies will be made.

Assessment of Improved Air Quality Impacts

The section on "Need for Relief of Congestion" in Chapter C has indicated that in 1977 a total of 220,000 vehicle-miles of travel per day will be saved on the present expressway system on the Long Island side, and an additional 280,000 vehicle-miles per day on the Westchester side. The impact in items of reduced emissions on presently congested arteries is summarized below:

TABLE E-12

REDUCED EMISSIONS ON EXISTING EXPRESS HIGHWAY ROUTES DUE TO SHORTER TRIPS
(pounds/day)

	L.I Side	Westch. Side	Total
carbon monoxide	2880	3640	6520
hydrocarbons	445	560	1005
nitrogen oxides	428	540	968
particulates	10.9	13.7	24.6
sulfur oxides	19.4	24.4	43.8

The above estimates assume an average vehicle speed of 45 mph. This travel occurs principally on the main radial routes leading to Manhattan, and actually many of the stated vehicle-miles presently occur under very congested rush-hour conditions at a lower average speed, and with speed changes that add total emissions. It is thus estimated that the above figures understate the emission savings by 30 to 50%.

In the corridor of the proposed Long Island Sound Crossing and its approach roads, there will be a volume of additional traffic, including both vehicles diverted from existing crossing and generated traffic, but the calculations presented earlier indicate that there will be no apparent excess over acceptable standards for pollutant levels. A considerable portion of those pollutants, moreover, will be emitted over Long Island Sound rather than over land areas.

In addition to the above estimates are reductions in emissions for all traffic in the congested approach highways to the Throgs Neck and Bronx-Whitestone Bridges which will experience improved operating conditions, particularly during the rush hours. While the total reduction cannot be reliably estimated without considerably more detailed study of improved traffic conditions everywhere in the region, an order of magnitude effect may be arrived at by considering the 63,370,152 trips over the Throgs Neck and Whitestone Bridges in 1972 (174,000 vehicles/day). If we conservatively estimate a trip length on these approach highways of only 10 miles per vehicle and an emissions reduction in that 10 miles averaging only 10% (a 5 mph increase from 15 to 20 mph for carbon monoxide results in a 20% reduction from 10 to 15 mph results in 35% reduction), the following estimate of reduced emissions in the East River Bridge regions are observed, using 1977 emissions data.

TABLE E-13

REDUCED EMISSION IN REGIONS NEAR WHITESTONE AND THROGS NECK BRIDGES DUE TO ASSUMED SMALL IMPROVEMENT IN TRAFFIC CONDITIONS
(Pounds/Day)

carbon monoxide	2260
hydrocarbons	348
nitrogen oxides	332
particulates	8.5
sulfur oxides	15.2

In reality the total emission reductions will be much higher than stated because of the "multiplier effect". As bottlenecks at the existing bridges are removed, traffic pressure points are likely to be relieved at other locations as well, resulting in improved flow-through for many more vehicles, including those that do not presently employ the bridges, with consequent and significant reduction in total emissions.

What measurable or predictable improvement in air quality will result from the above estimates of reduced emissions? To precisely assess the improvement would require detailed traffic simulation studies on an hourly basis for the entire regional highway network. Only in this way can the combinations of effects be simultaneously accounted for to include:

- distribution of traffic over time
- reduced trip lengths for some vehicles
- reduced emission rates as average velocity increases and total time is reduced
- the geographic locations of specified levels of improvement

Of particular interest would be the air quality at a number of critical points including toll plazas and major interchanges currently jammed during peak hour operations.

Clearly, the overall impact of the proposed project will include an important reduction in total regional emissions, with significant, but as yet unmeasured improvements in air quality at extensive local areas in the vicinity of major thoroughfares.

REFERENCES CITED

AIR POLLUTION

1. N.Y. State DEC, DAR Statistical Analyses, Suspended Particulates 1967/1968, Report BAQS-11.

2. Data Report - Aerometric Network - Fiscal year 1969-70 - N.Y. City, EPA - Dept. Air Resources.

3. Conn. State Dept. Health - Summary of CASN Results - 4 years, Obtained from G. H. Vance, Conn. State Dept. of Health, Env. Health Services Division.

4. Trends in Concentrations of Suspended Particulates, 1964-1969, NYSDEC.

5. N.Y. State Air Quality Data - Continuous Air Monitoring System - 3rd Quarter (Sept., 1970), NYSDEC, Report BAQS-23.

6. Frizzola and Fisher, A Series of Sea Breeze Observations in the New York City Area, J. App. Meteorol. 2:722-739, Dec., 1963.

7. Alan Watts, Wind and Sailing Boats, Quadrangle Books, 1967.

8. Munn, Descriptive Micrometeorology, Academic Press, 1966.

9. Air Pollution Nassau County, NYSAPCB - Comp. Area Survey #4, 1964.

10. Air Pollution - Suffolk County, NYSDH, 1969 - Comp. Area Survey #8.

11. Compilation of Air Pollutant Emission Factors (Revised) US EPA, Office Of Air Programs, Feb. 1972 (Publication No. AP-42).

12. Federal Register, Vol. 36, No. 158 - Saturday, August 14, 1971.

13. Estimates of Pollutant Levels in the Vicinity of Toll Plazas and Expressway, Scott Research Laboratories Report to TBTA, November, 1972.

OTHER REFERENCES EMPLOYED

14. Air Quality Criteria for Carbon Monoxide, U.S. Dept. HEW, PHS-EHS, NAPCA, Mar., 1970.

15. State Air Sampling Network, Part I, Aug., 1958 - July, 1959, N.Y. State Air Pollution Control Board.

16. Air Pollution in Westchester, N.Y. State Air Pollution Control Board, 1965.

17. N.Y. State Dept. Health DAR-Statistical Analyses, Air Quality Data 1964/1965/1966, Report BAQS-6.

18. Freedom to Breathe - Report of Mayor's Task Force on Air Pollution in the City of New York, June, 1966.

19. New York City - Traffic, Driver Habit, and Vehicle Emissions Study, N.Y. State Dept. Health, Div. Air Resources, 1969, Report No. BARD-4.

20. Characteristics of Particulate Patterns, 1957 - 1966, U.S. Dept. HEW - NAPCA, Publication AP-61.

21. Air Pollution Measurements of the National Air Sampling Network - Analyses of Suspended Particulates, 1957 - 1961, U.S. Pub. Health Service, Publication 978.

22. Interim Report on Motor Vehicle Emissions Estimations, Environmental Protection Agency, EPA-AP-42, Revised October 13, 1972.

c. Water Quality

Long Island Sound is an estuarine ecosystem; an environment of land, water and air, inhabited by plants and animals that have specific relationships to each other. Long Island Sound is the interface between the land, containing the highly urbanized megalopolis, and the ocean. One of the principal actors in this zone is man.

Man is continually altering his surroundings. Man has traditionally drawn from the biosphere all that he needed for survival, growth and development, and has discharged his wastes and unwanted refuse back into this same environment. Pollutants are the residue of the things humans make, use, or throw away and in turn can cause the degradation of man's habitat. As long as population densities were low, and the changes to the environment small, the total effects were not noticed, or were overlooked.

A highway and major water crossing such as the one proposed herein must be carefully studied to insure that there is no undesirable change in the physical, chemical or biological characteristics of the environment. The proposed engineering improvement must be carefully examined to be certain that it will not harm human life or that of other desirable species, or will waste or deteriorate our resources.

With respect to water quality, criteria have been established which attempt to protect this vital resource by minimizing the adverse affects which may be caused by the introduction of human produced materials into the ecosystem. However, since the environment has varying degrees of self purification capacity, the introduction of specific waste materials, even in delimited quantities, may alter the biological, physical or chemical characteristics of the water without necessarily creating adverse affects on the beneficial uses of the environment. Thus with respect to water quality, the basic tenet followed is to establish a water classification in accordance with the usage to which the specific waters are to be, or should be, developed. The beneficial uses made of a specific water resource are the controlling factors in determining water quality levels that are to be maintained which at the same time permit the orderly and rational growth and development of the needed technology to allow the urban area to exist and thrive.

The proposed highway improvement and Sound crossing are in actuality two separate problems. The first concerns itself with the effects on the ground water, surface water and controlled runoff, while the second concerns itself with the direct impact on the water quality of the Sound. The first set of problems are concerned with the actual roadway on the land portions, while the second addresses itself to the overwater crossings and discharge to the Sound.

Ground and Surface Water -- Nassau County. The land portion of the roadway in Nassau County passes through hilly area generally close to the edge of L.I. Sound. The watershed areas for municipal water supply will not be adversely affected by the construction of this roadway. In addition, the proposed profile does not introduce any significant changes to the land form to either deplete surface aquifers or prevent the lateral ground water movement to the Sound. The impact of this proposed highway construction is not anticipated to be any different from that of any other major highway in the area.

Due to the hilly nature of the terrain, as well as the soil material, there is the potential of erosion both during construction as well as after the highway is completed. The erosion will be controlled in the final design through the use of flat slopes blending into the natural terrain and through the use of positive control of storm drainage with protective treatment and landscape development. The storm drainage system will be designed with due regard for slope and alignment of drainways and piping, facilities for surface and ground water interception and recharge to the natural ground water table, protective devices such as deep catch basins, recharge basins, dammed areas, and use of ground covers and planting. Where surface discharges must be made, they will be controlled through culverts with headwalls and the receiving bodies of water will be protected to prevent washouts, or bank undercutting through the use of riprap, gabions, or masonry structures.

During the construction phase extreme care will be exercised to limit and prevent any erosion, silting or alteration of landforms and natural drainage ways. The loss of topsoil and natural vegetative cover is directly related to soil conservation and erosion. Hence all topsoil will be stockpiled and re-used in the final grading and landscaping. In addition, care will be taken during construction that no more than 750,000 square feet of earth may be cleared at one time. If there are any protracted periods of time when these areas will be devoid of natural cover, turf re-establishment procedures will be undertaken to minimize erosion, excessive water run-off and dust development.

In addition, any borrow pits developed for earth embankment, or sand or gravel utilization for the project, will be restored to a natural contour with adequate natural landscaping and ground cover so as not to adversely affect aesthetics or the water recharge and runoff from the area.

Further, all drainage from the roadways themselves will be adequately collected and will be recharged to the ground water table. The total net affect will be the same as from any other highway constructed on the north shore of Nassau County. Particular attention will also be given to prevent the introduction of large volumes of fresh water into salt water embayments so as not to adversely affect the ecological families which exist there. These controls will assure that there will be no adverse effects either to the useful ground water or to the estuarine zone.

The proposed location of the roadway moving northerly to the Sound will cross Mill Neck Creek and a few private ponds of small size. Particular care will be exercised in these areas to preclude the possibility of siltation. Aside from being unsightly and a nuisance, silt in these areas offers a serious threat to fish and wildlife. Care will need to be taken in these areas to control the accidental spillage of waste materials, construction residues or the discharge of fuels, lubricants, wash down water, or the like into these areas.

Ground and Surface Water - Westchester County. When the proposed roadway reaches to the Westchester County shore, generally the same considerations for the highway apply and will be followed as for the Nassau County area. The prime difference lies in the nature of the terrain and the denser, less permeable soils which will be encountered. Consequently greater care will have to be taken to divert and control surface runoff so as not to permit erosion. The surface runoff will be controlled, conveyed to protected outlets and then carried directly into the Sound so as to mix away from the shore. This will tend to avoid upsetting the shallow, marshy areas adjacent to the roadway. The final analysis of the drainage at this juncture point also will have to consider the manner in which the roads interconnect. All of the developed storm water runoff will have to be contained and removed. There are no areas here which rely on either ground water from the area or the surface waters for water supply, and hence there will be no disruption of any water resources.

Within the project area both in Westchester and Nassau, and with the various alternates examined, none of the proposed road alignments have any adverse or detrimental impacts on either the ground or surface water quality. Further, construction operations in the Sound will not have any effect on the ground or surface water quality of the surrounding land areas.

Effects on Long Island Sound. The main over-water crossing will affect waters which are classed as Tidal Waters, Class SA, within New York State. Class SA has, as its best usage of the water, shellfishing for market purposes.

TABLE E-14

QUALITY STANDARDS FOR CLASS SA WATERS

Items	Specifications
1. Floating solids, settleable solids; oil; sludge deposits.	None attributable to sewage, industrial wastes or other wastes.
2. Garbage, cinders, ashes, oils, sludges or other refuse.	None in any waters of the Marine District as defined by State Conservation Law.
3. Sewage or waste effluents.	None which are not effectively disinfected.
4. Dissolved Oxygen.	Not less than 5.0 parts per million.
5. Toxic wastes, deleterious substances, colored or other wastes orheated liquids.	None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.
6. Organisms of the Coliform Group.	The median MPN value in any series of samples representative of waters in the shellfish growing areas shall not be in excess of 70 per 100 milliliters.

Long Island Sound, and particularly the portion from Rye and Oyster Bay to the west, is a sector of the hydraulically complex tidal water system which interconnects with the New York Harbor area. This total system is composed of a series of intertwined straits and channels which combine the effects of tidal flows, wind currents, and advective river flows. In addition this area receives the runoff from surface storm water, and the sewage and industrial flows from this intensive urban area.

Ongoing investigations by various interested and concerned groups have constructed and studied both physical and mathematical models of this area. Studies have been made of the effect of tidal oscillations which pulsate through the maze of channels comprising the physical features of the New York Harbor complex together with the effects and character of the varying tidal phase relationships. The quantities and direction of outflows of fresh water from the supporting river systems have been gaged. The massive discharges of treated, partially treated and untreated domestic and industrial wastes from the intensely industrialized and densely populated metropolitan regions have been monitored. The direct fallout of dust, soot, flyash, fumes, stack and automotive discharges from the entire area, and the surface flushing and storm water drainage within and around this area, have been under investigation.[a] These research studies, both separately and with respect to each other have been conducted in order to arrive at a basis of understanding of how these additives to the estuarine complex are mixed, dispersed and ultimately disposed of. At present there is no clear, definable, or predictable pattern to the additives or their flows.

In the general area between the Throgs Neck Bridge and a line north from Manhasset to New Rochelle, Long Island Sound is a large mixing bowl. In addition the prevailing winds appear to be from the West and carry a large portion of the urban air with it to this same region, The result is not a clear pattern of flow or of pollutional levels, but rather a jumble of heterogeneous data. Over the long term it is felt that the flow is eastward, carrying with it the pollutants from the metropolitan area, as the waters flow toward the Atlantic Ocean. Gaged values as shown on tidal current charts[b] indicate that in the area of the proposed Long Island Sound crossing tidal currents vary from slack to a maximum of 1.1 knots on flood tide. On the ebb tide, currents vary from slack to 1.3 knots. The average displacement of a floating object during a full tidal cycle might be on the order of 2.5 miles to the west, and then from 2.5 to 4.5 miles to the east. When the oscillation

(a) Ongoing investigations by Nassau County Dept. of Health, New York City Dept. of Water Resources, U.S. Public Health Service, U.S. Corps of Engineers.

(b) U.S. Dept. of Commerce Publication 574 is the same to the west as it is to the east, the material appears to 'hang around' in the area and not be dispersed or diluted. In the case where the displacement is toward the east by some 4.5 miles there is a flushing action taking place.

The Environmental Impact Statement on Waste Water Treatment Facilities Construction Grants for Nassau and Suffolk Counties, New York, produced by EPA Region II, dated July 1972, page 65 reads: "The water quality of Long Island Sound and its bays and harbors varies considerably. The poorest quality is found at Throgs Neck in the western terminus. A slight, gradual improvement in quality can be traced eastward to Hempstead Harbor. From Hempstead Harbor eastward, the waters of the Sound are generally good, with the exception of localized areas." Page 67 of the same report states: "The major contributing factors are the waters entering the Sound from New York Harbor and the Ocean waters entering the eastern Sound. All parameters monitored indicated that the poor water entering at Throgs Neck significantly degrades the Sound water eastward to Hempstead Harbor. From Hempstead Harbor eastward to the area opposite the Connecticut River, the water quality is fairly uniform and of intermediate quality."

These and other studies conducted within Long Island Sound indicate that the presence of man is being felt. Various data [a] have indicated that the dissolved oxygen easterly from the Throgs Neck Bridge is at or below the 5.0 ppm limit. The coliform levels as reported in Table 15 of the above report indicate counts of up to 267 off Manhasset Bay. Earlier studies from EPA have indicated that coliform counts around City Island range up to 600 per 100 ml, while in the vicinity of Steppingstone Beach the counts reach 3000 coliform per 100 ml. In addition there have been numerous reports of oil and floating material on the surface of the Sound. With the increased numbers of pleasure

(a) Reports on the Water Quality of Long Island Sound, Northeast Region, CWT-10-14, CWT-10-29, of U.S.E.P.A., 11/9/69, 3/71.

craft which ply the waves in the same area, there has been a noticeable increase in the amount of floating solids in the water.

Thus the area has felt the degradation which has been the hallmark of man's impact on his environment. What will be the added impacts on the waters of the Sound when the proposed new bridge is constructed and placed in operation. Let us examine each of the possible materials and conditions that could degrade the environment and evaluate the impact of the bridge and its use on each.

Flesh Tainting Substances: These materials consist primarily of organic industrial wastes. Oils and petroleum products can impart a flavor to some varieties of fish. Most of the oil dropping from vehicles adheres to the roadway surface, mixing with roadway dust and remaining there until removed by the mechanical sweepers as part of the regular maintenance procedure of the bridge operations. However, assuming the unlikely situation that all of these oil drippings would find their way directly to the water, what would be the extent of oil pollution? An extreme condition may be assumed when the two-hour slack tide period would coincide with a peak traffic period. During this period, 10,000 vehicles could cross the six-mile section over the water and, dripping 0.1 gram per vehicle-mile, would deposit a total of 6 kg. on the strip of water directly under the bridge, having a volume of 6 miles by 100 feet by an average depth of 30 feet, or about 95 million cubic feet. As a surface film this would be negligible and would be rapidly broken up and absorbed. In terms of dilution this would represent somewhat more than two parts per billion by weight. The assumed average of 30 feet is conservative and the dilution would actually be greater. Moreover the water is not stationary, and each tidal cycle dissipates the particles over a vast area and, with the general movement outward to the ocean as well as opposite direction replacement by ocean water, the dilution is so great as to render the concentration immeasurably small. The dilution factor in the waters of the Sound in the vicinity of the bridge at any given time, therefore, will be of insignificant proportions. It is apparent that the bridge and the cars on it cannot cause a deleterious flesh tainting situation to develop. It must also be realized that the rate of delivery of this pollutant is so slow that it is not realistic to assume that finfish will remain in the area long enough to be able to pick up enough of the food chain to be able to develop tainted flesh.

Decomposable organic Materials: These materials consist generally of plant carbohydrates, animal protein and miscellaneous fats and oils. These decomposable organics are not necessarily detrimental in themselves, but exert a secondary effect on the waters by causing bacterial populations to thrive and thus reduce the dissolved oxygen within the waters. There is no anticipated source of decomposable organic material developed from the bridge span itself. The incidental littering of the water, and the introduction of some decomposable material discarded from a passing vehicle must be considered as inconsequential, or in the same category as the dumping of wastes overboard from pleasure craft in the Sound. The only other possible source of potential organic pollutants would be the oil drippings from the underside of the cars. As previously indicated the dilution factor is so huge that there will be no measureable decrease in the dissolved oxygen content of the waters.

Heavy metals: There are a significant number of heavy metals which can have a deleterious effect on the aquatic environment. These metals are silver, arsenic, cadmium, chromium, copper, mercury, lead, nickel and zinc. Of these metals, only lead would be of concern since lead is presently still being used as the anti-knock ingredient in gasoline fuels. The average lead content of gasoline sold in the United States has been estimated at 2 grams[(a)] of lead per gallon of gasoline. On the average, at normal cruising speeds, some 70 to 80%[(a)]

(a) Accumulations of Lead in Soils for Regions of High and Low Motion Vehicle Traffic Density, Page, A.L. and Ganje, T.J., Environmental Science & Technology, Vol. 4, No. 2, Feb. 1970, p. 140.

of the total lead in the gasoline is exhausted to the atmosphere in particulate form, with a size distribution range from the suboptical to macroscopic chunks. The coarser particles fall under the influence of gravity and tend to settle rapidly. The finer material, which is some 60% of that which is exhausted from the tailpipe, tends to remain suspended to a greater extent in the atmosphere and is wafted about by local breezes and thus travel significant distances.

During an extreme condition, when the peak rush period coincides with an assumed 2-hour nearly stationary period of the tide, 10,000 vehicles could traverse the six-mile over-the-water section of the crossing. Therefore, with 60,000 vehicle-miles and 15 miles to the gallon of gasonline, realizing that 80% of the 2 grams of lead per gallon exhausts into the atmosphere, 40% of which is estimated to settle on the strip of water under the bridge during this 2-hour period. This body of water, some 95 million cubic feet, would provide a dilution of 0.001 mg/liter,or one part per billion by weight or 1/100 of the threshold of toxicity. Moreover the water is not stationary, and each tidal cycle dissipates the particles over a vast area and, with the general movement outward to the ocean as well as opposite direction replacement by ocean water, the dilution is so great as to render the concentration negligible. The lead added to the waters of the Sound is several orders of magnitude lower in concentration than could be measured, or that could have any adverse effect on the environment. It must also be borne in mind that as time goes on the amount of lead in gasoline will be substantially decreased or eliminated altogether. This amount would be spread over the 24-hours of the day in proportion to traffic flow. The lead particles will mix with the tidal flow and gradually move into the ocean by the cyclic movement of the waters. The dilution factor in the waters of the Sound in the vicinity of the bridge at any given time therefore, will be of insignificant proportions. All existing over-water bridges result in the deposition of a certain amount of lead in the water, but conditions toxic to marine life have not resulted.

Inorganic nutrient salts: These materials consist essentially of nitrogen and phosphorous, and de-icing salts. The amount of salt used for snow and ice control on this bridge could not alter the existing salinity of the Sound, and hence has no significance. At the same time it is apparent that neither the bridge span nor the vehicles using it produce or discharge any nutrient salts containing nitrogen or phosphorous. Thus once again this proposed crossing could not upset or add to the burden of deleterious materials within the waters of the Sound.

Pathogenic organisms: These organisms are generally associated with domestic waste water discharges, since they contain disease producing organisms originating in the intestinal tract of warm blooded animals. Since there will be no comfort stations on the over water span, and since horse drawn vehicles will not be permitted on the span, this is not considered a factor for the bridge crossing.

Toxic materials: These materials consist essentially of pesticides, wastes from chemical industries, and the wastes from metal plating industries. These materials include cyanides, sulfides, chromates, and the pesticides. The only way in which these materials could become a problem to the waters of Long Island Sound would be through an accidental spill from a vehicle carrying these materials while crossing over the Sound. The rules and regulations of toll authorities generally regulate the use of their facilities by transporters of dangerous or hazardous materials. The Triborough Bridge and Tunnel Authority, for example, does not permit the use of its bridges or tunnels by vehicles transporting radioactive materials. Explosives are allowed only by special permit requiring an escort vehicle and other precautions. Inflammables, corrosive liquids and compressed gas are controlled. The Triborough Bridge and Tunnel Authority has never experienced a serious flow or spill of other hazardous materials on any of its seven bridges and two tunnels in 36 years of operation.

Heat: Thermal pollution is a major consideration in estuarine management. However, it does not seem that there would be any way in which the structure and its vehicles could alter or affect the thermal balance of the Sound, and therefore this pollutant has not been studied further.

Sedimentation: Sedimentation is the constant build-up of benthic deposits of insoluble, or dense organic materials, that settle to the bottom of the water and cause damage to the environment by smothering bottom feeders, upset aquatic balances, add to the turbidity and color of the water, and consequently reduce the available sunlight for photosynthetic action. The sources of the materials which can cause the associated problems can be released during construction when the foundation structures are being placed and the bottom deposits of the Sound are stirred up. Special precautions will have to be followed to prevent excessive disturbance of bottom silts, and any dredging or earth movement will have to be controlled and contained. After construction is completed there is little or no opportunity for silt, sands or construction debris to be added to the waters. However, traffic passing over the bridge will generate a certain amount of debris such as rubber wear from tires, brake shoe wear, erosion of decking and dropping of under-carriage dirt and debris. Much of this material will be swept up by the bridge cleaning forces, but a portion will somehow eventually be dissipated into the water under and adjacent to the bridge over a fairly broad area, depending on wind conditions and air currents. Considering that the normal dustfall on the land areas of Nassau County[a] ranges from about 0.6 lbs. to 1.25 lbs. per acre per day, the miscellaneous debris reaching the waters from the bridge would be of a similar order of

(a) Data from N.Y.S. Air Quality Network, City College Station.

magnitude. It is thus obvious that there would not be any real sedimentation problem which could cause smothering of benthic feeders, nor cause measurable increases in turbidity or color to the waters of the Sound. However, in the design of the bridge drainage, further study will be given to the advisability of collecting debris and pollutants deposited on the bridge deck.

Thus, for all pollutants considered it is found that the impact of the proposed bridge crossing would not significantly affect the water quality, or the water use, within Long Island Sound.

d. Natural Environment and Ecology

The Creighton, Hamburg report of 1971, included a study of the natural environment in the vicinity of the proposed Long Island Crossing that was conducted by the Marine Science Research Center, State University of New York at Stony Brook, L.I., New York. Included in the study were details and assessments of the impact of the proposed bridge on wetlands, fish, birds and wildlife. That study together with field investigations by Dr. John Lee of City College serve as the source for the following section.

Introduction

In investigations concerning the impact of man upon the natural environment, a guiding precept is that of ecological balance. In the natural world all living organisms (including man) are inseparably interrelated and interact with themselves and their nonliving environment forming a dynamic equilibrium called an ecological system or ecosystem.

Ecosystems maintain their stability through their complexity which produces a buffering effect allowing external influences to be absorbed by the system. Both intensity and duration of stress upon an ecosystem determine the extent and type of change in the system and the success with which adjustments are made to the altered circumstances. Diversity of the kinds and numbers of organisms comprising the biological community of the ecosystem is therefore a critical factor in its maintenance. Damaged ecosystems typically respond by a reduction in diversity of the biological community, and often by a replacement of more desirable organisms by less desirable ones. For example, in instances of severe pollution, biologically productive communities of marine organisms may be replaced by less productive communities such as one composed primarily of blue-green algae. The altered community structure may result in a decrease in the kinds of shelter provided by a diversified flora and fewer kinds of food available.

While the extremes of ecosystem degradation have been observed, the processes by which they occur and the early warning signs of such changes are not well known for most ecosystems. This is particularly true for marine situations where knowledge of the community structure, biological interactions and food chains are only now being investigated. Changes other than dramatic ones, such as the filling of a marsh which results in instantaneous destruction, are not well documented. In part, slow changes through non-catastrophic external effects are difficult to document because of the dynamic nature of marine ecosystems.

For example, in nature, the progressive evolution of marine marshes into terrestrial marshes is matched by their replacement, at another point, by an equivalent marsh as the coastal area extends itself. Man, however, has attempted with considerable success to stabilize the coast, and the terrestrial marshes either naturally or unnaturally evolving are not being replaced by marine marshes. Thus, by both positive actions resulting in loss of ecosystems by direct interference, or by indirect activities which have interfered with the natural evolutionary processes, man has created a major impact upon the number of ecosystems, their stability, and the ability of the planet to adjust to these changes.

Any use or activity requiring physical modifications of the shoreline, marshes, bottom of an estuarine system or water circulation pattern, such as solid waste disposal, dredging, or construction of bridges or jetties which have a permanent impact, requires careful analysis. Unfortunately, many estuarine values cannot be expressed quantitatively. While damages to the shellfish industry might be quantified as a monetary loss, the intangible values of aesthetics, recreation and natural habitat are difficult to measure. The important estuarine marsh and wetland habitats are particularly difficult to have economic values assigned. Decisions regarding utilization of wetlands, because we are dealing with many unknowns, involve risk. Weighing heavily in the calculation of risk is the chance of recovery in the event of loss. Wetlands were centuries in the making. To what extent they can be recovered, once destroyed, is unknown.

These intangibles and limitations of knowledge make it most difficult to resolve competitive use conflicts, and suggest caution in dealing with the irreplaceable natural environment.

Man cannot exist without extracting natural resources from the environment and returning them to the environment in vastly altered form. Man cannot exist without changing the topography of the environment. The challenge is to learn how these benefits can be gained without producing selfdefeating losses.

The proposed locations of the Long Island Sound Crossing traverse some areas of Rye and Oyster Bay which comprise wetlands, shoreline, inland waters and wooded land. Studies have been made to minimize encroaching upon and damaging to these resources. The resulting material and recommendations have been taken into consideration and have greatly influenced the planning and location of possible routes throughout the development of this project. In particular, the routing along the west side of Oyster Bay has been moved inland since previous studies to avoid encroachment upon the Bay shoreline.

Wetlands

Description. Wetlands are natural ecosystems comprising a dynamic environment of land, water and life. They have a special soil-water relationship and are covered with shallow water either permanently or for sufficient periods to support moist soil vegetation. Wetlands are generally classified as salt, brackish, or fresh-water types and include areas known as marshes, bogs, mudflats, wooded swamps and flooded plains, and in broader terms, may even include tidal shorelines, estuaries and waterways.

Importance. A fundamental importance of wetlands is their ability to convert solar energy into forms useful to animal life and to man. The green plants, which inhabit the bottom, banks and water of the wetlands, contain chlorophyll and thus are capable of transforming solar energy into glucose, the basic food of life, by means of photosynthesis. Since animals are unable to perform this process, they must depend upon plant life for food. The decomposition of plants further provides food rich in proteins, minerals, carbohydrates and vitamins for shellfish and other fishes which inhabit the wetlands; they, in turn, are food for larger fishes, birds, mammals...and also for man. This food web, or system of interacting food chains, develops from the wetlands as a starting point, and is evidence of the importance of such areas to ecological balance.

The vegetation of the wetlands in an area depends on the elevation and frequency of flooding. Their productivity can be enormous, and may even surpass the most fertile farmlands. Although man does not profit directly from the productivity of the wetlands, he is able to benefit from the secondary products in such forms as shell-and finfish and waterfowl.

The wetlands along Long Island Sound and elsewhere also function as nurseries and shelters for fish, birds and wildlife. Commercially and recreationally valuable fish grow and develop in the protective wetland areas, and birds breed and develop there. Many shore birds summer in the wetland areas, some waterfowl winter there, and other vertebrates live there throughout the year.

Salt-marshes also act as natural barriers to the effects of storms. The vegetation, such as resilient stalks of cordgrass, dissipates wind and wave energy significantly helping to limit or prevent erosion.

The wetlands also serve to some extent to purify the water of waste contaminants such as those found in sewage. Waste inorganic phosphate and nitrogen compounds are oxidized to phosphates and nitrates, which are then used for consumption by higher organisms. Animals that are filter feeders circulate large amounts of marsh water through their food tracts removing particle contaminants, and other organisms such as snails, consume sediment materials.

Finally, the wetlands are of educational and recreational value as natural museums and laboratories. In these areas, biological processes can be observed and studied under relatively natural conditions.

Due to residential and industrial development of Long Island over the years, large portions of wetlands have been indiscriminately destroyed. The New York State Conservation Department estimates that approximately one-third of its north and south shore's coastal and marine wetlands have been lost since World War II. For their future protection and maintenance, wetland in Nassau and Suffolk Counties are presently being reviewed and classified under a coastal zone management program.

Wetland Areas Within the Oyster Bay-Rye Vicinity. The wetland areas in the Oyster Bay vicinity are one of a limited number of wetland complexes remaining on the north shore of Long Island. This area, totalling approximately 6,500 acres, is comprised of Cold Spring Harbor, Oyster Bay Harbor and Mill Neck Creek and adjacent marshes. These are all contiguous water areas along Long Island's north shore. The greatest portion of this area consists of open water, with the marshes generally being small and scattered and limited to the heads of bays where there is fresh water inflow or to tidal flats protected from the open water by barrier beaches.

Relatively few waterfowl use this area during the breeding season, but it is used as a wintering ground. Various water conditions, which might be critical to waterfowl breeding areas during the summer, here combine to produce a generally favorable habitat for wintering birds. Currents, wave action and tidal fluctuations tend to keep the are ice-free, and in recent years only the brackish and shallow sections have frozen to any extent. Shooting of waterfowl also occurs in this area.

The amount of fresh water entering the area is insignificant when compared to the tremendous interchange of salt water. However, these fresh streams and the many springs in the "flats" at low tide apparently have created ideal conditions for a large variety and abundance of aquatic life, and are used by waterfowl in this area as feeding grounds. Many of the most abundant invertebrates are those known to be excellent duck food.

As with most other north shore bays, the greatest amount of aquatic vegetation consists of succulent forms of marine algae, while among the marsh species smooth cordgrass and reed grass are predominant.

The following descriptions of the areas of wetland in the Rye-Oyster Bay vicinity are based upon recent inspections and marine biota examinations. The areas are located on the map presented in Section I.

Manursing Island-Playland Lake.

This area contains a recreational lake fringed by relatively well preserved deciduous woods. There is some dumping and litter. Salt marshes are confined to the vicinity of Bloomer Island with the marsh vegetation primarily *Spartina alterniflora*, with some *S. pectinata* patches and fringed by *Phragmites communis*. The water is brackish (14% salinity) and clear and large patches of *Enteromorpha intestinalis* are found on the inshore rocks near Bloomer Island.

Recent observations did not reveal any shellfish or other filter feeders in this location. The vegetation in woods surrounding the lake is quite varied. Prominant among the trees and ground cover are: dwarf and smooth sumac (Rhus copallina and R. glabra); quaking and large tooth aspen, seaside alder; pin and black oak; hackberry, varieties of haw and crab apple, sassafras, dogwood, red maple, and few striped maple. Virginia creeper, Rhus radicans and bittersweet entangle many trees. Roses (probably "garden escapes") golden rod, and butter-and-eggs were found along the paths in the woods. Numerous pellets suggested a fair sized rabbit population on Manursing Island and a flock of mallard ducks and a few Canada geese were observed.

Pond located north of the causeway to Manursing Island:

Woodlands on the southeastern border are a continuation of those around Playland Lake. This small pond is fringed on the west by an unspoiled Spartina marsh. At the south end, on and near the rocks which were used to build the causeway are a fairly diverse algal bed containing Ascophyllum nodosum, Bangia fusopurpurea, Polysiphonia sp and Ceramium rubrum. Enteromorpha sp and bank mussels (Modiolus demissus) are growing among the roots of the Spartina. There are burrows in the bank suggesting that fiddler crabs (Uca pugilator or U. pugnax) might be living there. Judging from experience in other marshes, other crabs, Callinectes sapidus or Carcinus meanas might also be found there. A flock of mallard ducks and some sea gulls were noted.

Kirby Pond and tidal mud flats bordered by Kirby Pond Road and North Manursing Island (the eastern area, 4-½ acres known as North Manursing Wildlife Sanctuary):

The area is largely a mud flat which has been dredged in several areas around the marinas. Along the southern and eastern borders a fringe of Spartina salt marsh has built up along the edges of the causeway built to connect the island with the mainland. A small meadow is adjacent to part of the northeastern section of the marsh. The Spartina-dominated marsh is similar to that found in the area described previously. In addition to Enteromorpha both Fucus vesiculosis (rock weed) and Ulva lactuca (sea lettuce) are found. Barnacles are found growing on the shells of some of the bank mussels. Neanthes sp are abundant. Empty shells of Nassarius obsoletus (mud snail) and a fragment of a crab shell, probably Panopeus or Eurypanopeus, were found, suggesting the presence of these animals in the marsh. A flock of mallard ducks and swans were observed dabbling in the western part of the pond.

In laboratory analyses some coliform bacteria (MPN 30/L) were recovered from the Kirby Pond sample. None were found in the other samples. Based on colonial morphology alone on sea water, A 1 and M N, agar plates, a variety of bacteria were found in all 3 ponds. More colonies grew on the marine nutrient agar plates inoculated with samples from north of Bloomer Island and western Kirby pond, indicating that these areas are more eutrophic than the others tested. The other samples were dominated by colonies presumed to be pseudomonads, flexobacteria, Aeromonas, and Flavobacterium. No foraminifera were collected in any sample. Approximately 1,000 diatoms were counted in 3 samples from the 3 ponds. In each sample 50 species (46, 52, 56) were recognized. Dominant were Achnanthes haukiana (23% including varieties), Amphora proteus (12%), Amphora acutiuscula (11%), Opephora martyi (9%), Navicula pygmaca (6%), Navicula spp (6%), and Nitzschia spp (including N. frustrulum, N. hungarcia, N. apiculata, 5%).

None of the preceding areas observed in Westchester could be described as prime, undisturbed marshland. All 3 areas could be described, however, as well preserved. The marsh itself is moderately productive, as evidenced by the large number of filter feeding mollusks. The diversity of the diatom flora, the absence of chenopodiaceae, and low numbers of coliforms indicated to me that not too much eutrophication has taken place in the marsh. The presence of fairly large populations of dabbling ducks, swans and geese, indicates that these ponds and lakes are stops on the Atlantic flyway for migrating water fowl.

Oyster Bay Harbor:

The shoreline area along West Shore Road is dominated by large populations of the algae Chondrus crispus and Prasiola stipata. Only a small fringe of marsh grasses is found along the road. Some Modiulus demissus "ribbed mussel" and some common mussels are also found here. Some shells of Mya (soft shell clam), Mercenaria (quahog), and Encis (razor clam) are found along the shore. Many Crepidula and barnacles are found on the rocks as are a few Littorina littorea.

Along the northern shore of the harbor near Bayville Bridge is a land filled area and a tidal marsh and mud flat. The tidal mud flat is more extensive than is indicated on the current (1967) Bayville, N.Y. 7.5 minute quadrangle (AMS 6265 I NE series V 821). On the mud flat large beds of algae can be observed including Ectocarpus spp or Pylaiella, Polysiphonia, Chaetomorpha, Cladophera, Fucua (some Isthmoplea sphaerophora on the Fucus), Ulva lactuca and Agardhiella tenera. Quite a variety of animals are found here also, including Littorina sp (possible L. irrorata), Nassarius obsoletus, bank mussels, barnacles, and sponges. Some bryophyte incrustations exist on submerged logs. These logs also are riddled by ship worm boring. At the fringe of the mud flat are mixed Spartina and Salicornia ("glass wort") stands. Beyond the Spartina and higher in the marsh and filled area are a diverse flora. Seaside golden rod, sea pinks, Sabatia stellaris, purple thistle, Distichlis spacata, Geradia martima, other species of Salicornia (Virginica, Europaea), *Salsola kali*, and other members of the Chenopodiaceae are found. Small patches of "rushes", mostly phragmites and a *Juncus* species, are found near the road.

Mill Neck Creek - Bayville Bridge to Perry Avenue:

The mud flats and fringe of marsh in this area are similar to those east of Bayville Bridge. Not much of biological interest is found on the boating and beach stretch from Mountain Avenue along Creek Road to Perry Road.

Oak Neck Creek, bounded by Perry Avenue and Creek Road, Bayville Road, Factory Pond Road, Feeks Land, and Mill Neck Road:

In spite of the heavy population built up around this marsh and the dumping of refuse at the ends of some of the dead end streets at the northern borders of the marsh, the marsh is productive and populated by wildlife. The marsh is posted as a U.S. wildlife sanctuary. From the foot of Perry Street west along Oak Neck Creek and south to Feeks Lane Road is a wide expanse of *Spartina alternaflora* which extends almost to the boundaries of the marsh. Most of the "high marsh" has been filled in and built upon. Some willows, rushes, and scrub oak are found at some points along the periphery. Some filling in is presently underway near the intersection of Bayville Road and Bayville Avenue. Below the banks of the creek and drainage ditches is a very shallow mud flat. Some *Zostera* may be growing out in the center. Large numbers of *Modiolus*, *Nassarius*, *Littorina*, *Melampus*, *Neanthes*, and *Capitella* are found on the mud flats and in the stands of *Spartina*. Some burrows, probably of the crab *Uca* are found in the banks of Oak Neck Creek and the drainage ditches. Flocks of ducks and geese were swimming and dabbling in the wildlife sanctuary. These included American brants and mallard ducks. Some small flocks of Canada geese can also be seen.

Beaver Lake and Mill Pond:

Both of these bodies of water are somewhat artificially modified by the roads and railroad. Both are maintained as recreational lakes. Large flocks of ducks and swans are found there. Both ponds are landscaped and surrounded by trees.

In laboratory analyses no coliforms were recovered in 3 samples (Oyster Bay Harbor, Oak Neck Creek, Mill Neck Creek). Based on coloidal morphology alone on sea water, A 1 and M N, agar, this area is much more eutrophic than is the Rye area studied. Large numbers of a single species of bacterium, possibly Pseudomonas or Aeromonas overgrew all the plates at a 10^{-5} dilution (the highest dilution used in this analysis). No foraminifera were collected in any samples. A large variety of nematodes was found. Approximately 10,000 diatoms were counted in one sample each from the 3 areas examined in detail; Oak Neck Creek, Mill Neck Creek, and Oyster Bay Harbor (North). The diversity of the diatom flora was less than in Rye, and very similar to the flora found in Jamaica Bay and Plum Beach in the autumn. Dominant among the flora was Rhopalodia sp (22%), Fragillaria construens (21%), Navicula halophila (15%), Nitzschia acicularis (12%), Achnanthes wellsiae (8%), Cocconeis scutellum (8%), and Navicula spp (6%). Large numbers of Nannochloris sp were also observed.

None of the bodies of water in the vicinity of the Long Island approach can be described as "prime" or undisturbed. Oyster Bay Harbor and Mill Neck are probably the most degraded. Even though no coliform bacteria were recovered in the one sample from Oyster Bay, the other media indicated some eutrophic changes in the harbor and creek. The large diversity of animals and algae indicate that the harbor is still a productive marine environment. The presence of active filter feeders such as the bank mussels indicate that there is reasonable phytoplankton production to support them. The presence of 3 species of clam shells suggest that they are growing somewhere in the harbor. Since no foraminifera are found in the Oak Neck Creek marsh it cannot be considered prime, undisturbed marsh.

Impact of Bridge Approach Roads on the Wetlands. The proposed location approaches the Oyster Bay area on a northerly course several hundred feet west of Mill Pond and just west of Shore Road, thus entirely skirting the Pond and the wooded wetlands southwest of it. Along the west side of Shore Road and north to the Mill Neck Creek vicinity the proposed route location generally traverses terrain that has a succession of small hills, a few small ponds, and is moderately wooded with extremely low density development. These and other wooded areas along the route contain typical mixes of northeastern trees and shrubs. The wooded areas, which are often interspersed with cultivated open space, are a very small portion of the total area traversed.

In the Mill Neck Creek Area, location alternative N-1 crosses the Creek approximately 3,500 feet west of the Bayville Bridge near the south end of Mountain Avenue. Alternate N-2 is about 1,000 feet east of that crossing. For both the N-1 and N-2 alternates only narrow widths of marsh and beach are traversed on the shores of Mill Neck Creek. Alternative N-3 swings just east of the Bayville Bridge and crosses a section of rocky beach on the west shore of Oyster Bay and a width of about 150 feet of marsh on the north shore of the Bay. As the three alternative crossings are generally on elevated 100 foot spans, the only permanent physical intrusion will be the support foundations under the water.

Through Bayville, alternate N-1 follows the wooded, generally undeveloped area west of Mountain Avenue and passes through some residential areas. N-2 also crosses residential and open areas while N-3 crosses a narrower band of somewhat denser residential usage.

On the Westchester side of the Sound alternates W-1, W-2, and W-3 cross the high,wooded southeast corner of Manursing Island. From this point alternate W-1 traverses about 1,000 feet of the northern portion of Playland Lake and about 400 feet of brush-covered low land. W-2 crosses a more extensive mile-long length of woodland in the south-central portion of Manursing Island and passes across a tidal inlet about 200 feet north of the Manursing Drive causeway. This segment of this alternate extends for about 200 feet across the inlet and 200 feet across tidal, reed-covered marsh.

Alternate W-3 traverses the western, also wooded portion of Manursing Island and then is aligned northwards across about a 700 foot width of the tidal inlet, the strip of land on which Kirby Lane runs, a roughly 600 foot wide section of the entrance to Kirby Pond, and the generally wooded peninsula to the northeast of the Pond.

Inland bodies of water crossed by these proposed alternates therefore include the small ponds near the southeast corner of Oyster Bay and the Mill Neck Creek on Long Island, and Playland Lake and nearby ponds and tidal inlets to the north and behind Manursing Island.

Alternate W-4 crosses somewhat over 1,000 feet of a low-density residential area and sections of woodlands. No wetlands are traversed.

Limited amounts of marshland, well under one-half acre, are traversed. These occur along sections of the shores of Mill Neck Creek and the north shore of Oyster Bay and adjacent to the tidal inlets behind Manursing Island. The amount of marshland affected by the proposed alternates is only a very small portion of the total. For example, there are 1,240 acres of tidal marsh in Oyster Bay, according to recent study of the Nassau-Suffolk Regional Planning Board.

The extent of wetlands susceptible to possible damage as a result of construction or other impacts is limited.

As details of design are developed, further studies are to be made to quantify the extent of any such impacts and to investigate methods to minimize them.

Mitigating Measures. To keep siltation and related impacts on wetlands, shorelines, and inland waters in the areas noted above to a minimum, structures spanning Mill Neck Creek and other inland bodies of water will be constructed with the least possible number of supports. Also to reduce siltation, jet-driven piling will be avoided. Drainage patterns and tidal flows will be carefully studied as will be means of catching or minimizing traffic-generated wastes. The existing drainage patterns and flows will be maintained.

Fish (Fin and Shell)

Description of Finfish. According to statistics compiled by the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service, the following sixteen finfish species of importance to commercial and sport fishing maintain populations in Long Island Sound Waters:

bluefish	scup	swellfish
butterfish	sea bass	tautog
blackback flounders	sea trout	sturgeons
fluke	grayfish sharks	kingfish
mackeral	striped bass	sea robins
menhaden		

It is very difficult to numerically rank these species by order of their importance, because great fluctuations occur from year to year (see Table E-15). Fluctuations in population size are due to natural conditions such as temperature effects on reproduction success or migration patterns, and complex predator-prey interrelationships. The total commercial catch of fish caught in Long Island Sound only makes up from one to five percent of the total New York State catch (see Table E-16); this may be due in part to various restrictions placed on commercial fishing in Long Island Sound. As far as sport fish catches are concerned, relatively significant catches for certain species are known to be landed each year.

In order to approximately evaluate the data of Table E-16, the value per pound of New York State fish landings was roughly estimated at $0.10/lb. for a recent six-month period. Applying this unit value to the 1969 Long Island Sound catch (the last year for which appropriate information was readily available) the value of the 1,766,095 lbs. caught would be in the range of from $150,000 to $200,000.

All of the 16 species of finfish considered by this report to be of major importance to commercial and sport fishing are not unique to the Long Island Sound region, but are found over large ranges of the North American Atlantic coast. Several species are found along other coasts and world-wide as well.

Tautog and blackback flounder are the only species known to be in the Sound all year. For the most part, all of the other species are summer migrants coming into the Sound some time in May and usually leaving around October before the onset of winter and lower water temperature.

TABLE E-15

LONG ISLAND SOUND FINFISH CATCH FOR NEW YORK
(Thousands of Pounds)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Bluefish						55.8	45.2	24.1	67.2	167.9
Butterfish		20.5	11.7	24.3	12.7	18.2	29.2	40.9	64.1	51.7
Blackback Flounder		46.0	50.6	52.5	19.8	64.5	140.6	106.7	74.6	65.0
Fluke		96.0	93.7	64.9	75.2	97.2	116.5	32.5	45.9	13.0
Mackerel							2.4	17.7	20.7	67.1
Menhaden							51.5	135.6	58.0	207.2
Scup or Porgy	179.5	244.4	289.0	323.3	232.8	340.1	288.3	89.1	153.6	100.3
Sea Bass	11.8	16.5	48.2	24.8	27.7	44.2	25.4	1.6	0.3	3.4
Sea Trout		3.0	6.4	8.9	7.5	12.1	7.6	9.8	11.9	12.4
Grayfish Shark					9.7		11.1	25.7	10.6	11.9
Striped Bass			3.2			12.6	59.3	104.6	81.3	114.0

TABLE E-15

LONG ISLAND SOUND FINFISH CATCH FOR NEW YORK - Cont.

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Swellfish or Puffer								28.0	12.8	27.5
Tautog							23.2	23.0	12.1	6.7
Sturgeon		1.9	5.7		2.7	2.4	10.4	4.0	0.4	1.4
Kingfish				19.0		2.5		3.0		1.8
Sea Robin							4.3	4.6	4.4	3.0

NOTE: More recent statistics for Long Island Sound are not available as after 1969 Fisheries statistics reports presented catches for all New York Landings by counties only.

Source: New York Landings

U.S. Department of Commerce
National Oceanic and Atmospheric Administration,
National Marine Fisheries Service
Washington 20230
in cooperation with
New York Conservation Department
Bureau of Marine Fisheries
Ronkonkoma, New York 11779

Table E-16

TOTAL L.I.S. CATCH COMPARED

WITH N.Y.S. TOTAL CATCH

	L.I.S. Total Catch Pounds	N.Y.S. Total Catch Pounds	Percent of N.Y.S. Total Catch
1960	2,039,740	126,232,531	1.61
1961	3,158,610	123,615,884	2.55
1962	3,554,216	140,260,855	2.53
1963	3,184,360	128,648,059	2.47
1964	1,902,367	79,157,617	2.40
1965	1,891,280	69,048,578	2.73
1966	2,080,499	63,895,378	3.25
1967	1,899,007	37,348,075	5.08
1968	1,549,556	59,343,064	2.61
1969	1,766,095	40,844,434	4.32

Source: New York Landings

U.S. Department of Commerce
National Oceanic and Atmospheric Administration,
National Marine Fisheries Service
Washington 20230
in cooperation with
New York Conservation Department
Bureau of Marine Fisheries
Ronkonkoma, New York 11779

Most of the 16 species appear to spawn in the Long Island Sound region during some period of the year (Table E-17). The eggs of these species are pelagic except for those of two species, which are demersal and sink to the bottom. After hatching and developing to sufficient enough size, the young of many of these species such as striped bass, bluefish, flounder, sea trout, swellfish and menhaden seek tidal marshes where they spend their formative periods. During this time the young of these species are crucially dependent on the marshes where they find abundant food and protection from larger fish that prey upon them. For this reason the growth and development of many commercial and sport fishes depend on the existence and maintenance of wetland areas.

Description of Shellfish. Shellfish are present in Long Island Sound in considerable quantities (Table E-18) and species of commercial and recreational importance include:

northern lobsters	eastern oyster
hard clam	mussels
soft clam	Atlantic bay scallop

All of the principal shellfish species of importance in Long Island Sound inhabit a broad range of coastline in North America and, like the area's finfish, are not unique to the Sound region.

In the vicinity of Long Island Sound, hard clams are found extensively along most of the Sound's shore areas. Oysters, with the exception of Oyster Bay, New York, are found mainly on the Connecticut coast, and bay scallops only occur at the eastern-most end of the Sound around Mystic, Connecticut. Soft clams are less numerous being found only in thinly scattered small patches. Mussels inhabit all

TABLE E-17

FINFISH SPAWNING AND MIGRATIONS

INTO LONG ISLAND SOUND

Spawning

Species	Inside Sound	Outside Sound	Spawning Period	Type of Eggs	Time of Year Found in Sound
Bluefish		X	April-July	pelagic	May-October
Butterfish		X	June-August	pelagic	May-October
Blackback Flounder	X		January-May	demersal	All year
Fluke		X	November-April	pelagic	May-October
Mackerel	X		May-June	pelagic	May-October
Menhaden	X		June-August	pelagic	May-October
Scup or Porgy	X		May-August	pelagic	May-October
Sea Bass	X		May-June	pelagic	May-October
Sea Trout or Weakfish	X		May-October	pelagic	May-October
Grayfish Shark*					May-November
Striped Bass	X		April-May	pelagic	May-October (Possibly all year)
Swellfish or Puffer	X		May-August	demersal	May-October
Tautog	X		May-August	pelagic	All year
Sturgeon	X		May-July	pelagic	May-October (Possibly all year)
Kingfish	X		June-August	pelagic	May-October
Sea Robin	X		June-September	pelagic	May-October

*Grayfish sharks are viviparous.

Source: Bigelow, H. B. and W. C. Schroeder. Fishes of the Gulf of Maine. Washington, 1953; State of New York Conservation Department. A Biological Survey of the Salt Waters of Long Island 1938, Part II. Albany, 1939.

TABLE E-18

SHELLFISH CATCH FOR NEW YORK STATE
(Thousands of Pounds)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Northern Lobster	31.7	27.5	21.3	13.6	43.6	66.7	151.1	180.9	236.3	266.9
Hard Clam Meats	1,360.0	2,199.9	2,650.4	2,550.8	1,311,9	845.7	925.9	887.3	454.0	431.9
Soft Clam Meats	5.6	12.0	10.4	8.8	12.0	14.4	14.7		2.3	15.2
Sea Mussel Meats	1.0	18.0	18.6	8.8		208.7	40.6	17.0	26.1	97.2
Oyster Meats	306.8	408.8	261.0	43.9	84.3	67.7	81.6	74.9	99.1	17.7

NOTE: More recent statistics for Long Island Sound are not available as after 1969 Fisheries statistics reports presented catches for all New York Landings by counties only.

Source: New York Landings

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington 20230
New York Conservation Department
Bureau of Marine Fisheries
Ronkonkoma, New York 11779

of the shore areas and lobsters are found over most of the Sound, occurring in deeper waters as well as along the shores. In the portion of the Sound west of Northport, areas exist which are leased for shellfish harvesting. New York State and the Townships of Oyster Bay, Huntington and Northport have such leases.

Lobsters can inhabit many types of bottoms including rocky, sandy, and muddy types. Being able to crawl and swim, they have good mobility and can move from one region to another. Lobster populations appear to be gradually shifting to the south along the Atlantic coast due to increasingly cooler water temperature to the north, around Maine. Because of this southerly shift, the Long Island Sound commercial northern lobster catch has increased significantly.

Unlike the lobster, bivalve shellfish are for the most part non-migratory except for the Atlantic bay scallop which is a free swimming species and capable of short-range migrations. Eastern oysters inhabit brackish estuarine areas and grow on hard substrate surfaces such as rocky, sandy or dead-oyster-shell bottoms. Hard and soft clams, on the other hand, bury themselves in silty or sandy bottoms along the shore. Mussels are very common in quiet, shallow waters attached to rocks and pilings, often being seen in crowded colonies along the intertidal zone. Bay scallops usually occur in shallow bays or inlets where they are found in eel-grass.

Impact of the Bridge on Fish--Short-Term Effects. Any short-term effects on the fish populations in Long Island Sound would most likely result from increased sediment concentrations in the water due to bridge construction. As far as finfish are concerned, however, current research indicates that increased silt concentrations similar to those that probably would be produced by the construction of a bridge would have a minimal impact. The impact on pelagic fish eggs and larvae also appears to be minimal. On the other hand, demersal fish eggs are susceptible to silt conditions, for if these eggs are buried under sediment and deprived of oxygen, they will die. The area over which silt conditions could occur is a very small portion of the Long Island Sound, however

For the more mobile species of shellfish such as lobsters, and to a much lesser extent scallops, the maintenance of favorable habitat conditions in a given area is not so important since they can migrate out of areas where adverse conditions exist. However, the relatively sessile species such as hard clams, soft clams, mussels, and oysters are much more susceptible to adverse conditions and depend on the maintenance of favorable habitat conditions in the same area over their entire life cycles of reproduction and growth. Adverse local conditions (natural or man-caused) cannot be avoided by out-migration, nor can low levels in abundance of a species in a certain region be offset by immigration from other regional populations. Generally, this tends to enhance the possibility of large fluctuations of sessile shellfish populations at a given location and also increases the potential for local extinction of a particular species.

Impact on shellfish occurs during the construction period when considerable modification of the bottom in shallow areas may be caused by barges, tugs and other construction equipment. Damage to most benthic organisms is temporary, extending only a few hundred feet on either side of the site. Shellfish beds (particularly oyster), however, may be irreversibly modified by damage to the bottom and sedimentation within the area. The sinking of pilings for the bridge also causes increased siltation in the immediate area which can affect shellfish.

Studies have shown that oysters can survive fairly successfully in waters where increased silting occurs. During the winter months, however, oysters are relatively inactive; since they cannot adequately remove silt as it builds up, they are often suffocated by a layer of accumulated silt in the spring when they revive.

Any impact to shellfish beds resulting from the building of the bridge and its approaches will occur in the Mill Neck Creek region in the immediate area of of construction. In parts of Mill Neck Creek and in Oyster Bay which is east of the proposed routes, commercial oyster companies have at various times planted large quantities of oysters.

As these oyster beds are man-made to some extent and part of the operations of commercial enterprises, compensation for temporary loss and the relocation or replacement of beds will be considered. In such operations, before being planted in the bays, oyster larva are artificially cultured in glass-roofed greenhouses where temperature, salinity and food are carefully controlled. Under these favorable conditions, the larva is raised to seeding size, when it is then large enough to be most successfully planted in beds in the harbor. During construction the use of some beds may be temporarily discontinued. However, following construction, cultivation can continue with no adverse effects from the bridge.

Impact of the Bridge on Fish--Long-Term Effects. One long-term positive effect of the bridge on finfish may be that its offshore pilings will develop, in effect, into artificial reefs and serve to attract fish. Structures such as sunken ships and automobiles and artificial reefs of rubber tires and cement rubble have been known to draw and concentrate fish, and are often popular fishing areas.

Destruction of any wetlands could affect shellfish and the young of many species of finfish by decreasing the area in which they grow and develop. The alternates of the proposed bridge and its approaches, however, avoid major wetland areas. For perspective, the area of fish-supporting wetlands to be affected by the highway will amount to under one half acre out of the 6500 acres of existting wetlands in the vicinity of the bridge approaches. With respect to shellfish, the only beds which will be disturbed are those in Mill Neck Creek within the immediate area of the pile-driving. However, oysters are established in essentially man-made beds and farmed commercially. As long as suitable bottoms and other natural conditions prevail in neighboring areas, the effect of losing a portion of one bed will not be of major importance.

It should be noted that no species of fin or shellfish appears to be threatened by extinction due to construction of the bridge.

The impact of the bridge pollutants, oil, asbestos and rubber on finfish populations is not known, since adequate research has not been done on the effects of these pollutants on marine birds.

Mitigating Measures. Shellfish areas in which bridge construction is to be done will be carefully surveyed, noting the locations and types of shellfish beds and the kind of substrate on which they exist. This information will be utilized and appropriate construction techniques adopted to minimize both the short-term and long-term impact on shellfish. Overwater stretches will be constructed on the least number of piers practical to lessen the impact on shellfish beds.

Birds and Other Wildlife

Birds. Thousands of migrating waterfowl frequent the coastal wetland areas of Long Island Sound each winter, of which the principal species include:

Mute Swans	Baldpate	Redhead
Canadian Geese	Wood Ducks	Mallards
Brant	Canvasback	Scaup
Black Ducks	Bufflehead	Scoters
Pintail	Oldsquaw	Goldeneye
Green-Winged Teal	Ruddy Ducks	Merganzers
Blue-Winged Teal		

The birds arrive in the South region by way of the Atlantic flyway and its associated migration routes, the main one being along the eastern end of the Continent leading directly down the coast. All of these birds have tremendous ranges on the North American continent, some of them migrating as far as two or three thousand miles.

Some of the migrating birds use the Sound area only for food and rest before continuing south, while others remain for the winter. Table E-19 shows the approximate numbers of waterfowl that wintered in various regions on Long Island Sound in 1971. Great fluctuation in counts occur from area to area and from year to year. These waterfowl are found in either fresh or salt-water habitats and eat mostly plant materials, small invertebrates and some fish.

Very little breeding of migrating birds occurs in the Long Island Sound area today. For the most part waterfowl breeding grounds are found in the northern regions of the United States or Canada.

Many species of shorebirds are found in the Long Island Sound area and the most common types include sandpipers, turnstones, plover, rails, sea gulls and terns. These inhabit marsh areas as well as many of the small offshore island and sandpits found in bays and along the coast. They breed in the Long Island Sound region during the summer months and then before winter sets in some of them migrate south while others remain in the area.

Over 72 species of song birds frequent the uplands along Long Island Sound in the summer. There they breed and raise their young before migrating south for the winter.

Wildlife. The main species of wildlife that occur around the Sound area are probably deer, muskrats, racoons, foxes and some mink. These are primarily associated with existing wetland areas.

Impact. The impact of a bridge across Long Island Sound on the bird populations in the area will not be large. Probably the largest impact will occur from the bridge spans and towers which are hazardous to migrating birds. Tall, lighted structures such as T.V. towers, skyscrapers and lighthouses are known to have

TABLE E-19

TOTAL WINTERING WATERFOWL COUNTS FOR NEW YORK STATE AREAS

Area	1971	Area	1971
Westchester-Conn. Line	9,970	Northport Bay	4,954
To Little Neck Bay	125	Duck Island Harbor	34
Little Neck Bay	1,625	To Nissequoque River	1,596
City Island	1,375	Nissequoque River	116
Manhasset Bay	1,435	Stony Brook Harbor	510
To Hempstead Bay	133	To Port Jefferson Harb.	655
Hempstead Bay	2,810	Port Jefferson Harbor	976
To Mill Neck Bay	3,172	To Mt. Sinai Harbor	0
Mill Neck Bay	3,172	Mt. Sinai Harbor	4
Oyster Bay	1,041	To Wildwood State Park	275
Cold Spring Harbor	2,115	To Mattituck Inlet	9
Lloyds Harbor	2,165	To Hashamomuck Pond	230
Huntington Bay	869	To Orient Point	4

Data obtained from N.Y. State Dept. of Conservation Water Fowl Survey

Appropriate Data for Connecticut Waterfowl is not available caused mortalities to night-migrating birds at times. These structures, however, are not known to cause significant mortalities during the day. At night the principal hazard is thought to arise from the glaring lights on structures that attract the migrating birds since few migrating birds collide with unlighted tall structures. Most of the casualties are small land birds, and only about one percent is composed of waterfowl such as ducks, geese and shorebirds. These losses when compared to the total population of a species appear to be insignificant. In addition, there will only be two towers in over a six-mile distance which will further serve to result in an insignificant impact.

Elimination of a small portion of wetlands at a particular site may affect waterfowl since this can decrease the attractiveness of the prime habitat area in the Atlantic flyway where migrating birds rest and feed on their way south or winter over. However, it appears that the existence of a bridge at one site will not make a significant impact on the overall waterfowl populations in Long Island Sound. Waterfowl enjoy a large range of habitats; if one is made unsuitable, they will simply move to another.

The main impact on terrestrial wildlife species in the Long Island Sound area will result from destruction of wetland areas (see Section on Wetlands). As indicated, however, these areas constitute an almost negligible portion of the amount of existing wetlands in the vicinity, and the effect on birds and wildlife will be insignificant. There are no known species of birds or wildlife threatened by extinction as a result of construction of the bridge.

<u>Mitigating Measures</u>. To alleviate the hazard of collisions by birds attracted to lights, lighting on the two towers will be studied with the view toward avoiding excessive glare to birds. During migration seasons illumination directed downward and minimized intensity will lessen accidents to birds.

2. Transportation Impacts of the Proposed Crossing

The proposed crossing is seen as a link in a balanced transportation network for the New York Metropolitan Region, in keeping with the goals and objectives formulated by the responsible regional planning agencies.

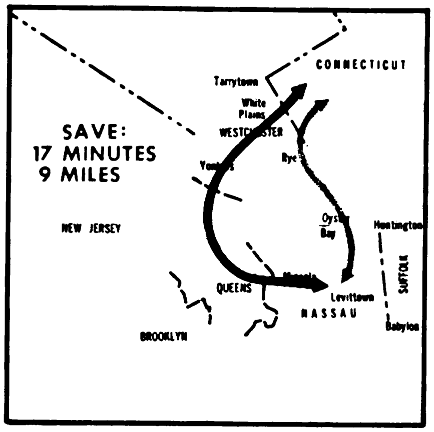
The transportation benefits of the proposed bridge will accrue most directly to its users, but travelers on many portions of the regional transportation system will also benefit by the reduction in congestion brought about by diversion of traffic to the new route.

a. User Benefits

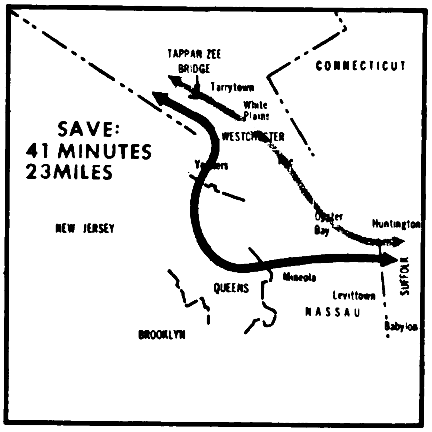
To the potential bridge user, some rather dramatic travel benefits will be available in the form of time and distance savings. A number of these are illustrated in Exhibit E-7. For example, on trips between the North Shore of Long Island, east of the bridge, and northern Westchester or New England, motorists will be able to save 25 to 30 miles of travel and from 45 min. (average) to over 60 at congested times. Drivers moving between central Suffolk or the South Shore of Long Island and White Plains, upstate New York or Connecticut will be able to enjoy savings of from 15 to 23 miles and 30 minutes to an hour of time. Trips to eastern Nassau County will benefit by similar savings, and some time advantages will also accrue on trips as far west as Mineola, where the distance via the new crossing and the Throgs Neck Bridge will be about equal. The avoidance of some of the most congested portions of the metropolitan transportation system and more pleasant driving conditions will no doubt encourage some drivers from western Nassau and even New York City to take advantage of the less crowded route, even when the travel distance and out-of-pocket costs are somewhat higher. However, the Rye-Oyster Bay Bridge will not be an advantageous bypass route for motorists traveling between New England and points south or west of New York City.

It is difficult to quantify the value of time and distance savings, since each driver perceives such savings in different terms. A driver will evaluate the unit worth of his own time entirely differently while en route to work or on a business trip than he will while taking the family on a Sunday recreational outing. However, there is universal agreement that time savings are important and can be assigned monetary value. The time of the travelers is a resource which is affected by delays, congestion and detours. Savings in vehicle operating costs can be determined somewhat more precisely, particularly those relating to costs that vary with mileage, such as gas, oil and tires. These costs average at least five cents per mile for most cars, so the typical bridge user who saves 20 miles in distance will avoid $1.00 of direct operating expense, without even considering the value of the time saved. Existing passenger car tolls via the present route are 50 cents on the East River bridges used by all cars, plus 25 cents on either the New England Thruway or Hutchinson River Parkway for trips destined north of the southern part of Westchester County. Therefore the average user of the Long Island Sound Crossing will avoid an out-of-pocket expenditure of $1.50 to $2.00 per trip incurred on existing routes. This amount will be offset against the toll charge of the Rye-Oyster Bay crossing.

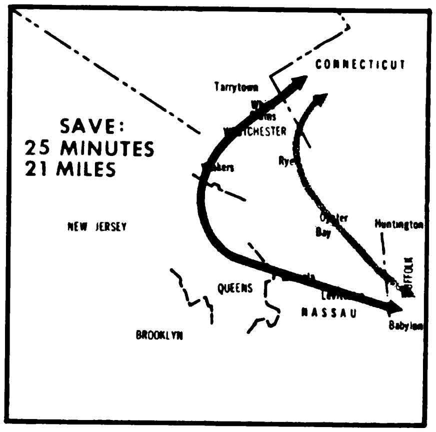
For commercial vehicles the cost saving will be much more definite as well as substantially greater in magnitude. Truck operators are far more conscious of their true operating costs than passenger car drivers. Such costs include drivers' wages, insurance, maintenance, garaging, license fees and taxes in addition to fuel, oil and tires. The productivity of the vehicle making deliveries and pick-ups is an important factor for earnings. The more time saved, the greater number of deliveries that can be made within a working day. Therefore the savings of 20 to 30 miles that will be made possible by the



MITCHEL FIELD AREA - CONNECTICUT



HUNTINGTON - TAPPAN ZEE BRIDGE AND BEYOND



BABYLON - CONNECTICUT

ADVANTAGES VIA PROPOSED BRIDGE

← BETWEEN →		MINEOLA	MITCHEL FIELD AREA	LEVITTOWN	HUNTINGTON	BABYLON	RIVERHEAD
NORTHERN WESTCHESTER & BEYOND	MINUTES	15	21	32	46	29	32
	MILES	2	6	17	25	17	17
TAPPAN ZEE BRIDGE & BEYOND	MINUTES	10	16	27	41	24	27
	MILES	0	4	15	23	15	15
CONNECTICUT	MINUTES	11	17	28	42	25	28
	MILES	5	9	21	29	21	21
RYE - PORT CHESTER	MINUTES	15	21	32	46	29	32
	MILES	7	11	23	31	23	23
WHITE PLAINS	MINUTES	11	17	28	42	25	28
	MILES	1	5	17	25	17	17
YONKERS	MINUTES	-6	0	11	25	8	11
	MILES	-10	-6	6	14	6	6

DRIVING TIME AND DISTANCE ADVANTAGES
VIA PROPOSED RYE-OYSTER BAY BRIDGE AS COMPARED WITH EXISTING ROUTES

Rye-Oyster Bay Bridge could mean cost economies substantially in excess of the bridge tolls. Based on the usual ratio of truck tolls to passenger car tolls, the charges for commercial vehicles will probably average about $3.00 per trip for small trucks and approximately $5.15 per trip for larger commercial vehicles.

b. Effect on Congestion

In Section C the need for relief of congestion on the metropolitan highway system was discussed and the extent of the relief to be afforded by the Long Island Sound crossing was presented. It was shown that traffic levels on the Throgs Neck and Bronx-Whitestone Bridges are approaching capacity, which will lead to chronically congested conditions if corrective measures are not taken.

On the basis of the detailed traffic surveys and studies cited in Section D-5, it has been estimated that an average of 21,000 vehicles per day or about 11 percent of the volume using the upper East River bridges will be diverted to a Rye-Oyster Bay crossing during its first year of operation. This reduction plus the improvements to approach roads and toll plazas that are now going forward will afford relief for a number of years.

Further long range relief will be largely dependent on the ability of the integrated transportation system to induce many peak hour travelers to the central business districts and metropolitan sub-centers to use mass transit instead of private cars. In order to achieve the goal of a balanced transportation system, both mass transit improvements and highway improvements must be coordinated to reduce the demands on the major arterial roads leading to the centers of employment.

As indicated in Section C, substantial relief will be provided by the new crossing for the principal express highways leading into New York City, since most of the diverted traffic now uses these roads to reach the East River bridges. The 21,000 vehicles expected to be diverted to the Rye-Oyster Bay crossing on an average day will travel some 222,000 vehicle-miles less on the principal highways of Long Island. On the Westchester side, a corresponding net reduction of about 280,000 vehicle-miles of travel on the main radial highways is expected on the average day in the first year of operation. As traffic volumes grow in future years, the diverted travel will increase.

Due to the shortening of trips which the bridge will make possible, the overall travel volume on the highways is expected to be reduced even when the longer length of the over-water crossing and the new traffic generated by the bridge are taken into account. During the first year of operation of the bridge, the overall reduction in total travel by diverted trips is estimated at 450,000 vehicle-miles per day. Generated trips will add about 225,000 vehicle-miles per day, on the average, including travel over the bridge itself. Therefore a net reduction of some 225,000 vehicle-miles of travel on the regional highway system is anticipated.

c. Nassau County Connecting Roads

On the Nassau side, the bridge approaches will connect with the Seaford-Oyster Bay Expressway, which will be extended from its present northern terminus at Jericho Turnpike. The traffic situation on this route is not as great a matter of concern as on the Westchester side as this expressway in its present incomplete state is moderately used. A substantial portion of the Sound bridge traffic will use this arterial, but with the volumes anticipated (see Section D-5), total traffic on the expressway, as well as on the direct bridge approach road, will be well within capacity at the design year.

By virtue of the diversion to the Sound crossing and the consequent reductions in travel on existing arterials, several present key trouble spots should enjoy substantial relief. One outstanding example is the intersection of the Long Island Expressway with Northern State Parkway at Guinea Woods Road; the merging of vehicles into the Cross Island Parkway at both Long Island Expressway and Northern Boulevard should also be relieved.

d. Westchester County Connecting Roads

In Westchester County, the bridge will have a direct connection with I-287, the Cross Westchester Expressway. This is a major east-west facility, connecting I-95 (the New England Thruway) on the east, with I-87 (the New York State Thruway) on the west. It interchanges with several major highways along its length.

There has been concern on the local level about the ability of this expressway to handle additional traffic.

Presently, the Cross Westchester Expressway carries average daily traffic volumes of 43,000 to 50,000 vehicles east of the Hutchinson River Parkway and 58,000 to 72,000 vehicles west of the Hutchinson River Parkway. These are annual average daily traffic (AADT) figures.[a] Observed daily volumes are lower in the winter and higher in the summer. During peak hours there are some ramp locations which experience delays due to the inability of the local street system to absorb the peak volumes. Also the Cross Westchester Expressway from the Sprain Brook Parkway to the New York State Thruway experiences operational difficulties on some Friday evenings due primarily to heavy weaving movements and merging with the Thruway traffic westbound. However, the overall effect on the capacity of the Cross Westchester Expressway mainline is minimal.

In addition to traffic volumes, there are two important criteria that describe how a highway functions. They are average operating speeds and the safety record.

(a) All traffic data is this section were furnished by New York State Department of Transportation.

Operating speeds on the Expressway mainline during peak travel periods were determined in the month of August, 1972. August is the peak travel month for this facility.(b) East of the Hutchinson River Parkway, the average overall travel speeds were 57 to 64 mph, and west of the Parkway they were 56 to 59 mph. These speeds are considered to represent a very good level of service, with considerable additional capacity available for future growth.(c) It is recognized, however, that when breakdowns or other interferences occur there may be delays.

The safety record for the Expressway is also favorable. This highway has a somewhat lower accident rate than the average of similar facilities elsewhere in New York State.(d)

It is recognized, however, that even though the main line functions well, there is congestion at some of the off ramps and at the western end of the Expressway. The New York State Department of Transportation has addressed itself to this situation, and has committed itself to a continuing program for upgrading the Cross Westchester corridor.

This is caused by the limited ability of the local streets and service roads to quickly absorb the traffic headed for local destinations. This will be improved by the following actions: One proposed measure is to connect the eastbound exit ramp leading to I-684 with the eastbound service road of I-287 (Westchester Avenue). This measure has recently been approved by the FHWA and will be implemented shortly. It will help relieve the present congestion at the eastbound off ramp near the General Foods office complex. Other measures are under active study and will be carried out as approvals are received and funds are available. These improvements will deal with ramp widenings, extra lanes on the parallel service roads (Westchester Avenue) and on connecting

(b) August is approximately 25% higher than the yearly average. Week-end volumes are generally lower than weekdays.

(c) This level of service is higher than would be indicated by the Highway Capacity Manual. However, this represents actual driver characteristics for the New York metropolitan area.

(d) The Cross Westchester Expressway accident rate is 1.71 per million vehicle miles, compared to 1.82 for similar expressways in New York State.

local bridges, etc. For example, the current White Plains TOPICS Study includes proposals to improve traffic service on portions of Westchester Avenue adjacent to the expressway. Last year a contract was completed on the Cross Westchester Expressway main line to install devices to maintain its favorable safety record.

Operational problems at the west end will be eased by completion of the Sprain Brook Parkway and construction of the north to east (and return) ramps at the Cross Westchester Expressway. Access to the Thruway westbound from the Expressway is under review. An operational improvement already implemented by the Thruway Authority is the discontinuance of toll collection for westerly traffic on the Tappan Zee Bridge.

The proposed Rye-Oyster Bay crossing will, of course, add an additional surcharge of traffic to existing volumes on the Cross Westchester Expressway. It is estimated that these volumes will initially be 10,000 vehicles per day east of the Hutchinson River Parkway and 7,000 vehicles per day west of that Parkway. These volumes are well within the ability of the Cross Westchester Expressway main line to absorb them, and still allow for growth.

The off ramp-crossroad-service road problem, however, will need attention. This problem could be alleviated by a combination of wise land use controls in the corridor and improvements to the local collector road system. Also, operational problems at the westerly end of the Cross Westchester Expressway can be resolved.

In summary, it appears that the mainline will be adequate for the foreseeable future, whereas the local collector-distribution system will need a continuation of the program of progressive improvement that has already been initiated. Even if the improvements are made, however, the Cross Westchester Expressway ultimately may be subject to more frequent delays as the traffic builds up. This condition is similar to that of other arterial routes in the area. The extent to which these conditions occur will depend in large measure on the degree of local development as well as on normal traffic growth. The Long Island Sound crossing can be considered as merely an additional factor contributing to increased traffic volumes.

It is not realistic to consider a new major east-west route for additional traffic capacity in this area of Westchester County. Thus as much service as possible will have to be obtained from the existing expressway corridor by making progressive improvements to it. The program underway will provide the needed improvements for satisfactory traffic service on the Expressway for the foreseeable future.

The New England Thruway (I-95), which also connects with the bridge route at the intersection with Cross Westchester Expressway, will be relieved of that portion of its traffic that now travels via the East River Bridges to reach upper Westchester and New England. This will also help reduce turning improvements at the interchange and make for smoother traffic flow.

e. Safety Benefits

Since the average user of the Long Island Sound Crossing will travel roughly 20 miles less than he would have traveled between the same points via existing routes, there will be a substantial reduction in vehicle-miles of highway use for these particular trips. As estimated in the previous section, even after considering generated traffic there will be a daily reduction of perhaps 225,000 vehicle-miles of travel on the highway system in the bridge's first year of operation.

Assuming that most of these trips, whether made by the old routes or the new one, are being made mostly on limited access highways, the same accident rates can be applied in both cases. In New York State the fatality rate per 100,000,000 vehicle-miles on controlled access express highways has been about 2.5. Applying this to the estimated reduction of 82,000,000 vehicle-miles of travel, an average saving of about two lives per year results. In addition, using the statistical record of 182 accidents per 100,000,000 vehicle-miles, some 150 accidents per year might be prevented. Actually the new route built to modern, up-to-date standards should have a lower accident rate than the older, more congested arteries, but available statistical averages do not distinguish between highways of similar type but differing traffic loads and design characteristics.

f. National Defense

By providing an additional connection between Long Island and the mainland, greater mobility will be provided for persons and equipment in times of national emergency or disaster. An additional major route will be provided, separated by

13 miles from the nearest existing crossing. Travel times and distances for many trips will be reduced substantially by the construction of the Rye-Oyster Bay Bridge. Clearances, both vertically and horizontally, for shipping will be at least equal to the minimum provided on the East River and thus the bridge will not affect present limitations on the movements of the larger naval craft. All roadway clearances on the bridge and the approaches constructed in conjunction with it will be built to meet Interstate Highway standards.

3. Socio-Economic Impacts of the Proposed Crossing

In evaluating any major project, all significant impacts, positive as well as negative, which the proposed facilities may have on the lives of the people must be considered, especially when these impacts affect their social and economic activities. This section deals with many of the elements of concern that have been expressed about the Long Island Sound crossing project.

a. Economic Benefits

The general economic trends of the New York Region were discussed in Section C, and the relationship between economic growth and the transportation system was briefly examined. It was seen that population continues to increase in the suburban areas, with some of the largest increases in the section most directly served by the Long Island Sound crossing. New York City itself has nearly stabilized in population, but the region as a whole is expected to rise from 19,032,000 persons in 1970 to approximately 25,900,000 persons by the year 2000.

Economic patterns are in a state of change, with the long dominant manufacturing sector declining in relative importance even though it will still show a small increase in number of employees by the end of the century. Services, wholesale and retail trade, and government employment will rise rapidly, while the pace in some other fields will slow down or even decline.

These shifts in the composition of the economy coupled with the anticipated population increase mean that many new businesses will be established and some older ones will be expanded. New enterprises thrive best when they have access to as broad a clientele as possible. With so many specialized activities in the New York region, and more to come, viability will often depend on the ability to render services throughout a wide area. Therefore access and good transportation are vital to a sound economy.

A major impediment to regionwide economic interchange is the concentration of transport routes through the heavily congested area of New York City. Long Island particularly has been locked in by the urban core at one end and by water barriers on all other sides. The Long Island Sound crossing has been proposed as the first direct link between Long Island outside of New York City and the mainland. The economic impacts of the bridge will be most important for Long Island but will also have major significance for the areas on the northern side of Long Island Sound as well. Key economic factors are mentioned below:

1. A wider regional market will be available to business enterprises on both sides of the Sound, thereby creating more favorable conditions for establishment of new businesses and expansion of older ones. This applies particularly to specialized enterprises serving areas broader than individual localities.

2. Employment opportunities will be broader for residents on both sides of the Sound. Persons with special skills will have a wider field in which to locate, and there will be more opportunity to match skills with jobs. As a result, income levels will often rise as people will be more able to utilize their maximum abilities. The need to relocate families in order to gain better access to employment will be diminished.

3. Because the bridge will contribute to a healthy economic development of the region, it will have a favorable general effect on property values. These favorable impacts have been the experience of many transportation improvements. The Verrazano-Narrows Bridge and the Tappan Zee Bridge are outstanding recent examples in the New York region. The specific impacts on the property within the right-of-way and in the neighborhoods immediately adjacent will be discussed in the next section.

4. Construction of a major project of the magnitude of the proposed bridge and its approach highways will provide a substantial number of jobs during the period it is under construction. Approximately 55 per cent of

the total cost of construction will be for labor, of which the major element will be on site. It is estimated that approximately 6,400 man-years of work will be required, spaced over a three-year period. This means an average of about 2,100 men working on the project, with a peak force of perhaps 3,000. In addition to the labor employed directly on contract work, both on-site and off-site, there will also be employment created in the furnishing of materials, supplies and services required for the project. In addition to the direct requirements of the project, there will be secondary economic benefits resulting from expenditures by workers employed on the project, both in the vicinity of the bridge site and elsewhere in the region. All of this economic activity will produce substantial additional income for the region, most of it without requiring additional needs for permanent community services.

The Creighton, Hamburg study[a] included estimates indicating that 52,300 permanent jobs will be created in the region by the year 2000 as a result of the construction of the bridge project or an added increment of 2.4 per cent. Increased property values of nearly $1.8 billion are foreseen, or about 4% of the total anticipated full valuations. These figures are merely indications of the potential economic benefits that could accrue. The important point is that a healthy economic growth requires a full transportation system to support it. In order for the estimate to be realized, expansion of economic activities will be required in many fields. For these activities to prosper, access must be available to broad markets throughout the region; and in some cases national markets are involved. Without such access, business expansion on Long Island will tend to be limited to the provision of services required by Long Island residents. Those types of activities needing broader coverage will be retarded by transportation barriers. Likewise enterprises on the north side of the Sound will not have the benefit of the Long Island market.

With the increasing specialization of industry and services, it is beneficial and even necessary for many business activities to serve as broad a territory as possible. The prosperity of all is aided when markets are broadened and the region functions as an economic unit. As the largest metropolitan region in the

(a) Economic Studies, Chapter 5 of Creighton, Hamburg study prepared by Economic Consultants Organization, Inc., December 1971.

nation, the New York area has the capabilities to support its expanding population if it takes full advantage of its resources. A most important ingredient for success in achieving this goal is a transportation system able to provide efficient interchange for goods and people throughout the region. The Long Island Sound crossing is a link designed to overcome one of the most serious existing deficiencies in this system.

The high unemployment rates in Nassau and Suffolk Counties cited in Section C reflect the lack of resiliency in the Long Island economy, with its narrow concentration of industries in a few fields. When these industries suffer economic reverses, there are not sufficient alternatives to take up the slack. In order to broaden the base of economic activities, access must be provided to other parts of the metropolitan region. The Long Island Sound crossing is the key link in providing this access.

Freight Rates. Originally, higher freight rates to Long Island were based on the fact that rail freight had to be hauled across New York Harbor by boat before being delivered to its final destination on the island. When the trucking industry came under the jurisdiction of the Interstate Commerce Commission, the same basic rate structure was adopted, reflecting the difficulties of driving through congested areas of New York City. For example, the actual mileage from Raleigh, North Carolina, to Montauk on Long Island is 629 miles, but shippers are charged for 825 miles, nearly 24 per cent more. Thus it only stands to reason that the daily necessities of life will cost more.

Construction of the Long Island Sound crossing could result in a reduction of motor freight rates for Long Island shippers and receivers, thus enhancing Long Island's presently poor locational rating for manufacturing and distribution operations that require heavy use of motor freight carriers. Such a reduction could have a favorable impact upon the cost of living if the reduction were passed on to the consumer.

b. Neighborhood Impacts - General

In general socio-economic impacts of a project of this magnitude are felt in all three stages of the project's life: planning, construction and operation.

During the planning stage, there are several socio-economic impacts that can be identified. Perhaps the most noticeable is the coalition of forces mobilized against the proposed project. This has been the case for many major transportation projects. Project opposition groups have often made positive contributions to final decisions regarding project alternatives.

The economic impacts during the planning stage are largely due to uncertainty about whether or not the project will be constructed and if so, uncertainty as to its exact impacts. For instance, owners of property adjacent to the right-of-way may experience a lowering of the value of the property if it is offered for sale because prospective buyers are not sure about the impact of the planned project, and because they anticipate negative impacts during the construction period. The salability of these immediately adjacent properties may go down in this temporary period. As soon as uncertainties are settled, previous experience indicates that values of immediately adjacent properties usually rise.

Although sometimes these increased property values are associated with a change in land use, or in the intensity of its use, there is considerable evidence that property values of land in single family residential use increase after the highway opens to traffic.

In areas not directly adjacent to the project, the early impacts on property values are either neutral or positive. Areas zoned for commercial and industrial usage are subject to increased values due to the anticipated improvement to the transportation system. However, this is unlikely to affect the tax base of the community during the planning and construction period.

Impacts on neighboring activities during the construction process may be severe as men and materials must sometimes use local streets for access. In addition, the construction imposes temporary visual disruption. Modern technology can minimize unavoidable noise and air emissions. As indicated in Section J modern construction technology can be employed to minimize these impacts.

A conservative estimate places bridge construction time at three years, involving approximately 6,400 man-years of work. During this time contractors, construction crews and equipment will need access to the two bridgeheads, as well as a base of operation on each side. A description of these construction impacts and of the steps that can be taken to minimize short term effects of construction is found in Section J.

Socio-economic impacts on neighboring communities of the bridge after it is in operation are of two main types. One is the impact on day to day activities of a major transportation facility passing through the area. The other is the impact on growth and development of the area caused by the facility, either through its presence alone or by its function of increasing access to areas not yet fully developed.

The day to day activities of communities through which the bridge approach roads pass could be affected if the community is divided by the road or if the road passes between the community and a major activity center, such as between a residential area and a beach. Specific instances of this are discussed below. In cases where the road does divide a community, great care will be exercised to insure that existing access between areas will be maintained and practical steps to avoid division of neighborhoods will be incorporated into the final design. Residents will be able to keep the same communications in the neighborhood as at present. People will continue to have public access to the same schools, churches and other facilities as at present.

The impacts on growth, development and life styles are harder to predict. One of the key factors affecting these changes is the development policy of each local community. When a major new facility is constructed, some communities view such an event as a positive opportunity, while others do not.

Experience with operation of other New York area bridges, such as the Tappan Zee between Rockland and Westchester, and the Verrazano-Narrows Bridge between Brooklyn and Staten Island and the Newburgh-Beacon Bridge over the Hudson River have shown continued increases in property values in the communities served. These higher values are eventually reflected in an increased tax base.

Through control of zoning regulations affected communities can maintain present land use patterns or can take advantage of the increased access brought about by the bridge to permit controlled expansion. Although the proposed bridge will increase the pressures for changes, the decision as to what development changes are allowed to take place is the province of each community's planning and zoning agency.

In many cases, the planning for major public facilities stimulates area-wide recognition of the need for careful planning of activities surrounding the project and for the implementation of development controls that will ensure realization of desirable planning goals and objectives.

As noted in Section C, Evaluation of Need for Proposed Long Island Crossing, plans for the two counties most affected by the proposed bridge indicate a desire to bring about concentrations of future development in the regional centers strategically located within Westchester and Nassau Counties. The bridge construction between the two counties will be an instrument capable of serving this concept.

In New York State, however, zoning is a local, not a county-wide function and plans for such concentrations of economic activities may not be implemented unless each local jurisdiction can be encouraged to make land use control policies and decisions that support this county-wide objective.

Impact on Immediate Community - Rye Area

The proposed bridge would have its major impact on the City of Rye during the construction years, most particularly during the construction of the connection between the bridge structure and Interstate Routes 95 and 287. At this time the impacts will be kept at a minimum through careful phasing of construction segments and stringent controls on routes, weights and timing of construction truck movements. These procedures can mitigate the most annoying of these impacts such as noise, dust and traffic interference. Protective measures to minimize construction impacts are discussed in details in Section J.

Additional impacts which will be even more local in character are the taking of between 10 and 20 residences (depending on location, possible passage of the approach roads through or at the edge of an undeveloped regional recreational area, Playland Park (three of the four alternatives), and the taking of approximately 100 feet of shoreline.

Relocation requirements for each alternative route and described in greater detail in the succeeding portion of this section. Further discussion of the effect of the bridge on public lands including plans for mitigating adverse impacts, is found in Section I, Statement of Impact on 4(f) Lands.

After construction of the bridge is completed and the facility is open to traffic, the nature of impacts on the immediately adjacent area will change.

As discussed in parts 1.a and 1.b of this section, impacts of vehicular noise and emissions have been estimated. It is not anticipated that these impacts will necessitate any changes in present or future land uses or activities in the City of Rye. Most of the traffic using the bridge will have origins or destinations at points beyond Rye, and there are to be no interchanges or ramps presently planned between the shoreline and the junction with I-95 and I-287. Therefore, the impacts of development resulting from increase mobility between Long Island and Westchester will largely accrue at points further along I-95 and I-287, rather than within Rye. The City of Rye's stated objective of keeping Rye as a predominantly residential community will not be threatened.

Because the alternatives are located in the easterly edge of Rye, severing of neighborhoods is minimized. Care has been taken also in the location studies to preserve the unity of the Manursing Island community.

Impact on Immediate Community - Nassau County

At the Bayville end of the proposed bridge, there is no existing limited access highway immediately near the bridgehead. The project therefore includes an approach highway through the Villages of Bayville and Mill Neck and thence to Oyster Bay Village where it crosses State Route 106. At the Route 106 interchange the bridge approach joins the last extension of the Seaford-Oyster Bay Expressway which is part of the planned State highway program and is included as to environmental impacts on this statement. The completion of this extension between Route 106 and State Route 25 (Jericho Turnpike) will tie the bridge project with Long Island's express highway system. (See map in Exhibit D-1).

The total length of the bridge approach from water's edge to the Oyster Bay interchange will be four miles. At Bayville Avenue there will be ramps for local trend on the approach road but no bridge access. The Seaford-Oyster Bay Expressway connection to the Jericho Turnpike will be 5 miles long and will have a full interchange both at the North Hempstead Turnpike junction (Route 25A) and at the junction with the Jericho Turnpike. (Route 25). Thus the necessary road construction between the bridge and the regional express highway network is, at the Nassau end, not only much longer than in Westchester, but it provides several points of access to the local road system, whereas the Westchester connection does not.

With this in mind it can be understood that there will be considerably greater local neighborhood impact on the Long Island side of the crossing than in Westchester County. This section will discuss these impacts first for the bridge approach portion of the access to Route 106 and then for the Seaford-Oyster Bay Expressway extension.

The bridge's potential impact on Bayville, Mill Neck and Oyster Bay is greater than on Rye not only because the area of potential impact is larger but also because more undeveloped lands exist and there will be more opportunities for change as a result of greater access. The degree to which change will actually occur will depend in great measure on the actions and control measures carried out by the communities themselves. Through their powers to plan and zone the uses of land, local governmental units can determine the future of their development. If such controls are exercised in accordance with a comprehensive development plan which has general support in the community, any changes in the plan following in the wake of the bridge will be of a type desired by the majority. In the absence of such controls, it is likely that some land owners will be receptive to offers of land developers or business representatives who may institute development ideas not in accord with the wishes of the community.

That pressures for change already exist without a bridge has been seen by the recent subdivision of the former Williams estate in Bayville for residential purposes. The decision to permit this development was a local one, and the type of development was controlled by local regulations. Construction of the bridge may increase the opportunities to utilize land more intensively, but the extent and type of utilization is subject to local discussions in accordance with established plans and policies.

Although all of the three proposed alignments on the Nassau side pass through Bayville and Mill Neck, it appears that alignment N-1 would have the least effect on the community life. The route would go in a cut through the wooded and less populated area of Bayville, just to the west of Oak Neck Point and it would similarly avoid built-up sections of Mill Neck and Mill Neck Estates. Further, it would leave West Shore Drive unaffected, to continue as the local north-south route.

Alternate N-3, while avoiding the principal residential areas of Bayville and instead affecting somewhat the commercial section, would not only isolate several houses on the Oyster Bay shorefront, but would also require the taking of several residences fronting on the Bay in Mill Neck Estates. Further, because the shoreline curves in a southeasterly direction from Oak Neck Point, the bridge structure would have to parallel the shoreline for about one mile in order to stay on a direct routing toward Rye. This off-shore parallel section of the structure would create a much greater visual impact than a bridge going straight away from the shore line.

Alternate N-2 is similar at its southern end to N-3 but would cross Mill Neck Creek at its widest point and then proceed diagonally across Bayville roughly parallel to Arlington Lane. Although this alternate was originally chosen because it would require less relocation by use of the former Williams estate, the recent subdivision of this property has made the impact of this particular alternate on residential displacements much more severe.

Specifics of each of these routings in terms of relocation requirements and immediate impacts is given in parts 4 and 5 below.

The designation of the interchange at Bayville as a partial interchange will relieve Bayville of some of the increased traffic that it might get were there full access on and off the bridge at this point. Particularly significant is the fact that travelers coming across the bridge will not be able to get off at Bayville. Thus people coming across the bridge will be discouraged from using the Bayville beaches. However, this interchange will make these areas more accessible to travelers from the south, besides serving local residents.

It is also likely that Bayville Avenue, Oyster Bay Road and Route 106 will experience some increased traffic due to their function as local routes to the bridgehead. These increases should not be major since these roads serve principally residents of the local areas. Bridge users from more distant points will find the limited access bridge approach roads to their advantage.

The impact of the Seaford-Oyster Bay Expressway extension will not of itself have as great an impact as the bridge approach road. This is both because parts of the area are already considerably developed and because it does not significantly open up an area previously inaccessible. The main impacts will be displacement of some residents for the right-of-way, but much of the property needed has already been acquired. There will also be the usual inconveniences caused during the construction period. There may also be vehicle noise experienced by residents adjacent to the highway when it is opened to traffic. (See Part 1a of this Section).

Since the interchange with the Jericho Turnpike has already been built, development in that area has already started. There will certainly be the usual interchange developments where the Expressway crosses North Hempstead Turnpike (25a) and there may be some development at the Oyster Bay interchange (Route 106) as well. There may be increased pressure for land development in Oyster Bay and Oyster Bay Cove with resulting higher property values and increased employment opportunities.

The chief impact of this section of the highway, however, will come as a result of the service provided by the bridge. That is the strengthening of the regional centers in the area as concentrations of employment and economic activity. The presence of interchanges with the Jericho Turnpike, the Long Island Expressway and the Northern State Parkway will make this section of the Seaford-Oyster Bay Expressway a major regional interchange point, accessible not only to Long Island but also Westchester and New England.

Impact on Regional Recreational Facilities

Perhaps one of the most characteristic features of highway routes in Westchester County and Long Island has been the dominance of New York City as a destination. There has been a continuing scarcity of major routes transverse to the radial transportation structure. Even now access between Westchester and Nassau Counties is unavailable except by passing through New York City.

The opening up of a limited access mixed-use arterial between Rye and Cross-Westchester Expressway and Seaford-Oyster Bay Expressway will complete an outer loop from the south shore of Long Island to Suffern. It will be a "two-way street", opening up opportunities for Long Island residents to travel to parklands, mountains, employment centers and shopping areas never before accessible, and at the same time allowing for a similar broad variety of uses by mainland residents who will now gain a convenient means of traveling to Long Island's many miles of beaches and other recreational attractions.

c. Effect on Boating in Long Island Sound

Long Island Sound stretches some 98 miles from the upper end of the East River at Throgs Neck in New York City to The Race which is the waterway between Orient Point at the eastern tip of Long Island and Fishers Island near the Rhode Island shore. At its widest point, the Sound is 21 miles across. It is one of the busiest recreational waterways in the world, famous for yacht racing. It is also used for a substantial volume of commercial shipping. Because of this importance of boating on the Sound, a major portion of this environmental impact statement discusses the effect of the bridge on this activity.

The impacts of the construction of a bridge across the presently unobstructed waters of the Sound, therefore, require careful evaluation. In this section these impacts are identified and the types and numbers of boats that will be affected are analyzed.

The Effects of a Bridge

While each person may evaluate the various effects of the bridge on boating in a different way, there are two general categories that can be defined. Certain effects cause physical changes in present activities while others are more subjective and affect the well-being and general outlook of people.

Intrusion in Open Area. In the subjective category, a structure put in an area that was previously open may be considered an intrusion. The Tappan Zee Bridge across the Hudson River, when proposed, was opposed by many on these grounds. Other crossings such as the San Francisco Oakland Bay Bridge or the Verrazano-Narrows Bridge could be also used as examples. Since its construction, the Tappan Zee Bridge has largely been accepted as a part of the physical environment and many feel it contributes to the visual beauty of the Hudson. Since it is now an existing fact of life, the feeling that it is an intrusion has generally disappeared. For some, however, this feeling will remain.

Apparent Restriction. An additional effect on those using the Sound in the area of the proposed bridge is the feeling that it will be a restriction on their activities. This feeling can exist even if the person never intends to transit the bridge area or is in a small boat which can pass under the structure at any point. The bridge can cause changes in the boating habits of some as they would tend to avoid the immediate area of the structure which is viewed as an obstruction or a deterrent to unrestricted travel. The bridge, in this case, is similar to the shorelines or shoal areas even though these users can, in fact, pass under it.

Physical effects include limitations by changes in the movement of some boats and alterations in wind and water flows.

Limitation of Navigation. By constructing a facility with finite distances between bridge piers and between the water surface and the roadway span limitations are created for users of the Sound. These limitations, which are described in detail, in a later part of this section, cause two principal impacts: 1) they establish navigational limits for some vessels which may require them to deviate from their present routings; and 2) they increase the need for more careful steering and handling in the immediate area of the bridge in order to pass safely through the navigation opening.

The added limitations created by the bridge are similar to those encountered in many bodies of water. Vessels continually pass under bridge structures in San Francisco Bay, the Upper East River, The Connecticut River and numerous other locations. Because the bridge piers are readily apparent, the hazards are much less than in other nearby areas of the Sound, such as at Scotch Caps, outside Rye Harbor or other areas where submerged rocks must be avoided. The horizontal restrictions created by the bridge piers can be navigated with considerably more ease than the entrance of Mamaroneck Harbor, as an example, where all boats going in and out must pass through the same 100' wide channel. Thus, while additional limitations are imposed by the bridge, they are not unusual and, in fact, create lesser hazards than the users of the Sound deal with continually on any trip.

Effects on Wind and Water Currents. The bridge structure will affect the wind movements in the immediate area to some degree. This effect, is slight in the location of the main and adjacent flanking spans where the roadway is high above the water. It would be noticed principally adjacent to the piers of the approach spans. While the bridge will create a new area where wind will be affected by an obstruction, this effect will be considerably less than that now experienced by sailing craft near the shore lines or in the way of other vessels. It may be noted that one of the busiest sailing areas in the Boston area is in the Charles River. The area is bordered by buildings along the shore lines and is limited by low bridges on the upstream and downstream ends.

Changes in water flow under the bridge will be slight because of the total size of the cross section of the Sound and the relatively slow tidal current in the area (See Section D-2). The effect will be noticeable only near the bridge piers. Even in this area the increased water velocity will be considerably less than the currents encountered by vessels now going in and out of such harbors as Rye, Port Chester and Glen Cove.

Boats Affected

The vessels that will feel the effect of the impacts noted are described in the following paragraphs. For the purpose of this statement the effects on commercial vessels will be discussed separately from the effects on recreationsl craft. In the latter category of pleasure boats discussion of the effects will be further sub-divided into the effects on power craft, sailboats and small unregistered boats.

Commercial Vessels. According to the Creighton-Hamburg, Inc. Report commercial vessels make approximately 100,000 trips a year in and out of ports and harbors along the entire length of the Sound and transported more than 34,000,000 tons of commerce. It is estimated that during the calendar year 1971, of the total Sound commerce, almost 20,000,000 tons were carried in more than 30,100 vessel trips which passed the site of the proposed Oyster Bay-Rye Bridge. Approximately 1,650 of these trips were made by deep-draft oceangoing dry-cargo freighters and tankers and the balance of 28,450 trips were made by coastwise and harbor-type shallow draft vessels including dry cargo and tanker type barges, tugs, and small self-propelled tank barges. An approximate breakdown of the vessel trips of all commercial vessels passing the bridge site by the various types of vessels in 1971 is as follows:

Type of Vessel	Number of Trips
Dry Cargo Vessels	2,023*
Tanker	3,550*
Tow Boat	9,870
Dry Cargo Barge	9,505
Tank Barge	5,160
Total	30,108

* Analysis of these trips show 1,650 were by oceangoing vessels and 3,923 were by coastwise and harbor type vessels.

Most commercial vessels that pass the proposed bridge site are either departing from or destined to New York Harbor and beyond and as a consequence are confined at the extreme western end of the Sound to the 1,000 ft. wide channel in the East River under the Throgs Neck Bridge. Eastward of the Throgs Neck Bridge there are no physical restrictions and thus no defined channel through the broad waters of the Sound where the depths are generally adequate for most vessels navigating these waters. Hence navigation is generally unrestricted, except for the deep-draft oceangoing vessels. Observations confirm that most commercial deep-draft vessels presently pass the proposed bridge site in prevailing deep water about one and one half to two miles off the Long Island shore. This course is employed as these vessels navigating east of the bridge site stay to the south side of two shoal areas along the axis of the Sound and pass south of Execution Rocks to the west of the bridge crossing site. The location of the main navigation openings of the bridge is thus defined by the usage patterns of the deep-draft vessels traversing the Sound. In a location about two miles off the Long Island shore and with a contemplated main span having a minimum vertical clearance of 135 ft. above mean high water for a horizontal width of 1,200 ft., the structure should present only a minor effect on deep-draft commercial navigation. The precise location of the main navigation openings and its principal dimensions will, of course, be subject to the approval of the United States Coast Guard.

As indicated previously, existing natural phenomena define the location of the main navigation opening for deep-draft vessels. On the other hand, navigation by tow boats, barges and self-propelled barge tankers is not mandated by physical conditions but is selected on the basis of the destination or departure point along the shore and by the navigator's judgment in utilizing waters close to shore for safety in navigation. Shallow-draft vessels to or from shore points on Long Island are satisfactorily accommodated by the main navigation opening and its flanking spans on the Long Island side. Barges and self-propelled tanker barges destined to points along the Connecticut shore tend to navigate along the north side of the Sound to obtain the sheltering protection of the shore from the winds and rough waters, particularly during adverse weather conditions. Forcing these vessels to utilize the main opening on the Long Island side, particularly those destined for shore points in close proximity to the bridge site, may create an inconvenient change of course.

Consequently, for these reasons and to accommodate certain recreational crafts as discussed later, a secondary navigation opening is contemplated on the Westchester side of the Sound. This navigation opening having a least vertical clearance of 55 ft. above mean high water for a horizontal width of 200 ft. will be located close to the Westchester shore.

A number of possible alternatives in siting the shore ends of the bridge were considered to determine the most desirable route of the crossing. One of the alternates considered (Westchester approach alternative W-4) would extend from the present intersection of the Cross Westchester Expressway and the New England Thruway in a southeasterly direction into and through Port Chester Harbor at the mouth of Byram River. It provides the shortest land approach for the northern end of the bridge but a longer water crossing. The effect of the route on Port Chester Harbor, however, is substantial. The bridge must pass between the present Federalized channel into Port Chester Harbor and North Manursing Island, a residential community. The southwesterly edge of the channel is less than 500 ft. from the North Manursing shore line and the location will therefore be very close to both the channel and the residential community.

Port Chester Harbor is extensively used by a substantial number of recreational craft and commercial vessels. Some 500,000 tons of material were brought into the harbor during the calendar year 1971 consisting of petroleum and bulk construction materials. This involved 1,316 vessel trips in and out of the harbor by self-propelled tank barges, tow boats, dry cargo barges and tank barges.

The bridge approach in the harbor and as it extends out into Long Island Sound would be roughly parallel and immediately adjacent to the route followed by the commercial vessels entering and leaving the harbor. In addition, those vessels plying between Port Chester Harbor and New York Harbor would be required to make an abrupt turn close to the secondary navigation opening of the bridge. This maneuvering plus running close to a low level fixed bridge could be hazardous. Thus an alignment of the route through Port Chester Harbor would have a decidedly adverse impact on commercial vessel navigation.

With slight exception, there will be no additional or out-of-direct-line travel for commercial vessels caused by the proposed bridge crossing of Long Island Sound. While some additional care will be required in passing through the navigation openings as compared with open water navigation, this constitutes only a relatively minor impact. The effect of physical forces such as variable wind and water current effects caused by a bridge crossing will be of minor significance to the commercial vessels navigating these waters. Thus, the overall impact of a bridge crossing on commercial vessels except as indicated in connection with alternate W-4 is considered to be slight.

Recreational Boating. As part of the larger impact study, a special study was made by the firm of Creighton-Hamburg, Inc. which included a determination of the number, size and type of recreational vessels permanently located on the Sound. The data came from official Connecticut and New York State Boat registrations, U.S. Coast Guard Boat documentations and from a special survey of yacht clubs and marinas along the Sound. As a result of the study it was determined a total of approximately 85,000 recreational craft are berthed in Long Island Sound. Of these, roughly two thirds are power boats and the remainder sailing craft. An additional 50,000 to 70,000 unregistered rowboats, dinghies, canoes, and small sailboats are estimated to be stored at home, dry stored near the water, or carried aboard some of the larger craft and used regularly on the Sound.

The Creighton-Hamburg study further identified geographical distribution of the craft along the shore of the Sound by surveying the yacht clubs and marinas. Based on the data obtained it was found that approximately half of the boats berthed in the Sound, or some 42,000 are moored during the boating season between the Upper East River in New York City and the Norwalk and Huntington harbors to the east. This area covers a length of about 30 miles of Long Island Sound, centered on the proposed Sound crossing between Rye and Oyster Bay.

The effects of the impacts of the bridge on power craft, sailboats of various types and the small unregistered boats are expected to be as follows:

Recreational Power Craft. There are estimated to be about 57,000 registered recreational power craft berthed on the Sound. Virtually all of these will be able to pass under all spans of the bridge. The restrictions will be for the most part limited to the avoidance of the piers. Changes in water currents will be slight and will have practically no effect on power craft. Changes in wind currents, such as created by bridge piers or superstructures do not appreciably affect the handling characteristics of these vessels.

A few of the largest power craft may not be able to pass under the spans having a 25-foot vertical clearance and will have to use the main span, the adjacent high spans flanking the main spans, or the other high spans at the opening on the Westchester side. This "detour" effect is expected to be a fairly infrequent occurrence and limited to the largest power craft. With navigation openings having sufficient clearances on both sides of the Sound, these detours will not cause great inconvenience.

Sailboats and Small Unregistered Boats. The Creighton-Hamburg study obtained data on the distribution of sailboats by length and estimated the mast height for each category. A summary of that information is as follows:

TABLE E-20

SIZE OF SAILBOATS BERTHED THROUGHOUT LONG ISLAND SOUND (1)

Length	Approx. Mast Height	Number of Sailboats With Power	Without Power	Total
Under 16'	Under 23'	550	4,600	5,150
16' to 25'	23' to 36'	5,700	4,050	9,750
26' to 39'	36' to 51'	9,250	1,350	10,600
40' and over	51' and over	2,600	100	2,700
	Totals	18,100	10,100	28,200

(1) Does not include unregistered sailboats such as sailfish, sunfish and sailing dinghies. These unregistered boats, whose numbers may equal or exceed the totals shown in the table, are virtually all under 16' in length and have masts under 23' in height.

Source: Creighton, Hamburg Report.

The contemplated vertical clearances of the bridge were described in detail in Section D-3. The minimum clearance at mean high tide will be 25 feet. Two higher sections are to be provided with the main navigation span on the Long Island side rising to over 135' above the water. The spans on either side of the main span provide slightly lesser horizontal clearances as they slope downward. Because this slope is gradual, at a 3% gradient, the total length of spans with increasingly greater than 25' clearance will be about 1.9 miles. On the Westchester side a 200-foot wide navigation opening with 55 feet vertical clearance is proposed. The total length of spans on the Westchester side with clearance greater than 25 feet will be about one half mile. Of the total crossing length of six to seven miles, about 2.4 miles will have a clearance of greater than 25 feet.

It should be noted that a vessel with a 51' mast will require more than 51' of vertical clearance because of wave action and because of the psychological fear and difficulty of judging heights from the water level. An additional 10' to 15' will provide ample clearance for these vessels, in order to provide a comfortable passage.

Taking into account this additional clearance above the top of the masts, the length of bridge available for passage of boats of various sizes will be as follows, based on the contemplated design.

TABLE E-21

BRIDGE CLEARANCES

Boat Length	Approx. Mast Height	% of Total (Excluding Small Boats)	Minimum Length of Bridge with Sufficient Vertical Clearance
Small boats			All Spans
Under 16'	Under 23'	18%	over two miles
16' - 25'	23' - 36'	35	one and two-thirds miles
26' - 39'	36' - 51'	38	one and one-third miles
40' and over	51' and over	9	over one mile

Only the largest vessels will be limited to the main channel spans. All others will have a choice between the Westchester and main spans. The maximum detour for these boats will be about two miles.

The effect of these clearances and other impacts will be different on the various types of sailing activities, which can be summarized as, a) day sailing, b) cruising, c) day racing, and d) long-distance racing.

Day Sailing. By far the largest group of those sailing on the Sound are day sailors. These are people who are going out for a portion or all of a day simply to enjoy themselves. They may or may not have a specific destination in mind. A great majority of these boats are small and their trip, being of necessity limited by time, is of a relatively short length.

Only the craft moored or docked within a reasonable distance of the bridge, therefore, will be affected by the bridge. It was previously noted that about one-half of all recreational boats are within a 30-mile area in the bridge vicinity. The breakdown by boat size in georgraphical areas is not available. It is assumed that it is reasonably similar in the area of the bridge as on the total Sound, approximately half of the vessels under 25' or some 7,450 sailboats, are located in the area where some time during the year they might pass near the bridge or under it.

For these boats that actually pass through the bridge area, the effect can be varied. Those that are day sailing with no particular destination may change their course with virtually no effect. The smaller boats, under 16' in length may pass through the bridge area throughout the entire length. They will note some change in wind directions and may run into some "dead" spots where the wind is cut off by the bridge piers. This, however, occurs in many bodies of water, and is encountered on daily trips in and out of the Sound harbors due to shoreline obstructions. In addition, these boats may encounter a variation in the currents if they pass near the bridge piers. This effect will be minor since the tidal currents in the area are generally less than one knot. The Metropolitan Transportation Authority is committed to using modern design techniques to avoid massive pier and superstructure elements in order to minimize the effect on wind and water currents as well as to provide a pleasing aesthetic appearance.

The day sailing boats that cannot pass under 25' vertical clearances will have to use the higher spans. As noted, openings extending for a width of more than one mile are available, on the Long Island side for all boats up to 39' in length. On the Westchester side, an additional high opening is available for boats up to about 30' to 35', in length.

Most of these larger sailing craft do have auxiliary power and can use it for extra maneuverability if they so desire.

Cruising Boats. The changes in wind and current will affect these larger boats to a lesser degree than the small craft under 16' in length. Cruising vessels are those boats that are equipped with live-on facilities and are capable of being taken on trips of some distance. These boats are also used for day sailing. They are generally over 25' in length and their masts are over 36' in height. Almost without exception cruising boats have auxiliary power. They are, therefore, included in the 11,850 vessels in that category, together with the larger day sailing group. When on a cruise these boats are making long trips. The presence of the bridge will affect them only slightly as they will pass under the higher spans, and the added travel in detouring from their customary "straight-line" path is negligible.

Day Sailboat Racing. Long Island Sound is well known for its sailboat racing and probably has more of this activity than any other location on the East Coast of the United States. There are numerous yacht racing associations which hold scheduled sailboat races in the spring, summer and fall. The principal day races in the area of the proposed bridge are the Mid-Sound and Connecticut Area championships held under the auspices of The Yacht Racing Association of Long Island Sound (Y.R.A. of L.I.S.). By far the largest number of sailors race in the Mid-Sound series off the Larchmont-Hempstead Harbor area. The accompanying charts (Exhibit E-8) indicate the marks of the course used in these scheduled sailboat races. These races are confined to one or the other of the two areas shown on the charts. Most of the marks are government buoys and are navigational aids. Some, however, are set out by the Yacht Racing Association specifically for purposes for the Mid-Sound races. The marks closest to the bridge area are "U", a government buoy, and "W", which is set out by the Y.R.A. of L.I.S. specifically for sailboat racing. Mark "U" is about three quarters of a mile from a bridge with its northern approach at W-1, W-2 or W-3, and over one and a half miles from a crossing touching down at W-4. Mark "W" is one-half mile further away. Because of this separation the effect on the wind and water currents due to the bridge will be minimal or non-existent for boats rounding these marks.

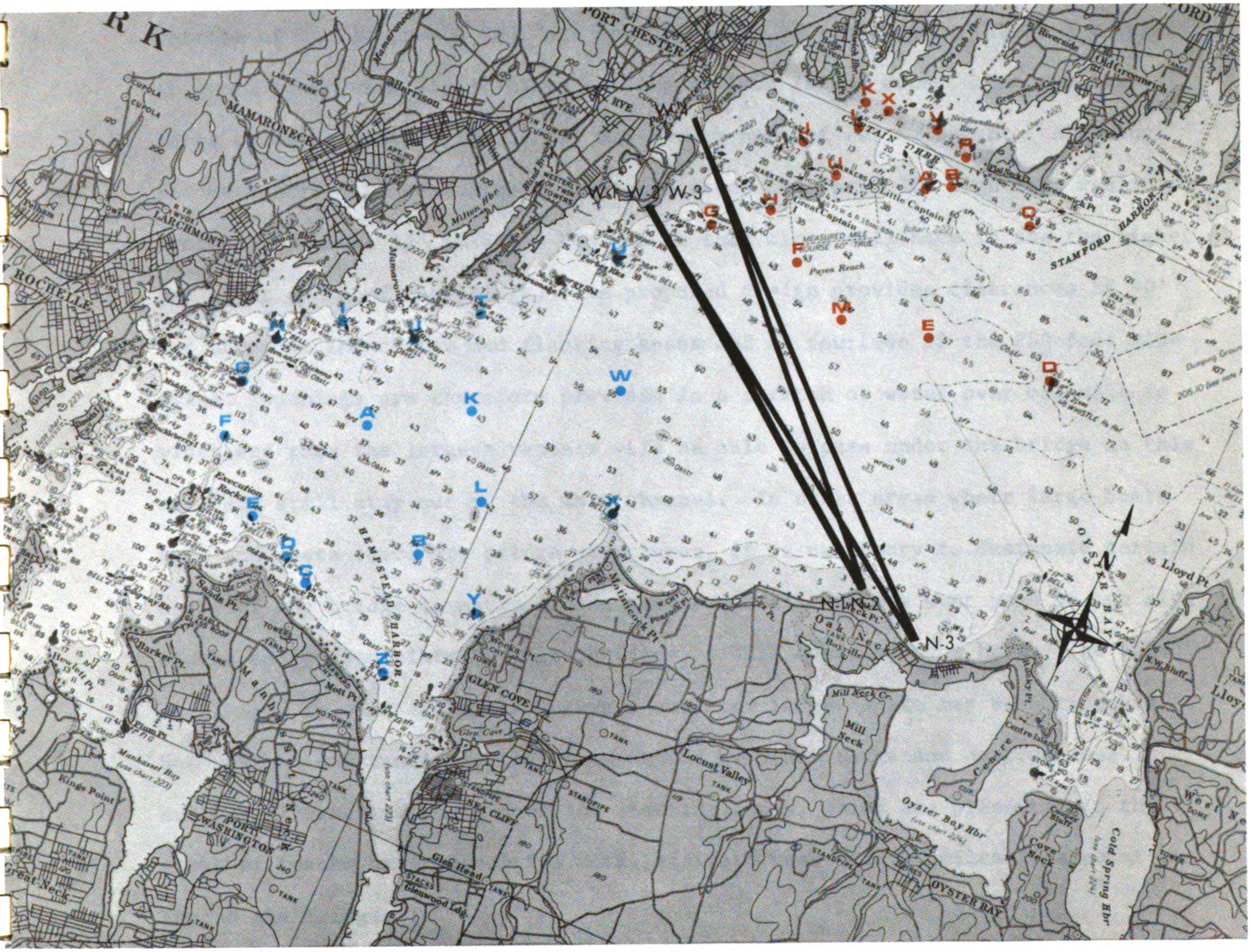
Mark "G" used in Connecticut Area championships is about one half mile east of a bridge with its bridgehead connecting with approach alternatives W-1, W-2 and W-3. If the W-4 alternative approach is used, however, this mark will be west of the structure. The racing in this area therefore would be affected to the extent that this one mark of the course could not be used and, if required, another turning point substituted for it.

It should be noted that all the particular marks discussed are not used constantly but only on certain days when the wind direction dictates a specific racing course. Marks of the course can be changed without undue effect on the racing quality. Mark "W" for instance, in 1972 was located at a point more than 1-1/2 miles from its location in earlier years.

Day racing courses at other nearby locations in the Sound are also confined to areas away from the bridge. The day racing activity in the Oyster Bay area, for instance, is east of Bayville.

Day racing, therefore, will feel little impact due to the bridge project.

Long Distance Sailboat Racing. There is a series of sailboat races that start at the western end of the Sound, west of the proposed bridge location, and continue up the Sound with some going beyond the eastern end. All of these races will be affected to a certain degree by the bridge location and may have to slightly alter their race courses. In 1972 there were about 40 long-distance races listed in the Distance Racing Program of the Y.R.A. of L.I.S. in addition to the Whitmore & Endymion Series, which take place East of the bridge, and the four Larchmont Yacht Club Annual Race Week Day Race Series, which sail in the



LOCATION OF RACING MARKS.

bridge area. Of these long-distance races listed, 17 pass through the bridge area and the remainder are in locations not affected by the crossing.

Participants in these races will be affected by the bridge between Rye and Oyster Bay.

Boats that are involved in these races are of the larger type. They are generally included in the 13,300 boats over 26' in length. However, it is estimated that less than 500 are regularly competitors in long-distance races and generally under 100 are in any one race, although there are more in some. As noted, their mast heights start at 36' and, on the larger vessels, are over 51'. For example, the mast height of the 12-meter class boats, used in the defense of the America's Cup, are approximately 90' in length. There are rarely, if ever, boats with higher masts sailing on Long Island Sound. The typical large cruising boat of 55' or 60' may have a mast of 70' in height. Allowing for wave action, a comfortable clearance necessary for a 70' high mast would probably be about 85' to 90'. Vessels in this class will have to use the higher and wider spans of the bridge. The proposed design provides clearances of 90' and above at the center and flanking spans and at fourteen of the 250-foot side spans. Openings are therefore provided in a stretch of water over one mile in width and thus the largest vessels will be able to pass under the bridge in this area and still stay out of the main channel. In other areas where large boats race and where there are bridge structures, it is customary to designate certain spans of the bridge as marks of the course and all vessels must pass on one side of the designated piers of these bridges. This could be done here. The effect of changes in wind and water currents on these larger boats may be noticeable but will be substantially less than caused by other boats and obstructions. Another alternative is to move the starting lines, which are presently in the areas of Larchmont or Execution Rock, eastward some 5 to 10 miles to a point beyond the bridge.

Small Unregistered Boats. These boats are used to reach moored craft, are carried by larger boats, or are used for fishing, sailing or other recreational uses in close-in areas. Only those immediately adjacent to the bridge will pass under it, and all can do so at all locations because the minimum vertical clearance is ample for them. These few boats may feel slight effects from current or winds, but these impacts will be minimal.

Mill Neck Creek Area

Boating activity in the Mill Neck Creek area is restricted by the shallow water and the movable bridge span connecting West Shore Drive on Mill Neck with Ludlow Avenue in Bayville. Most of the boats kept in the area west of the movable bridge are small motor boats and small sailboats such as sunfish. Larger craft use the area only to reach the marina yard facilities in the northwest corner of the Creek.

Alternatives N-1 and N-2 acrosss Mill Neck Creek will provide minimum clearances sufficient for passage of all boating activity now using the area. Spans with 100' horizontal clearances are planned. Line N-1 provides 60 feet of vertical clearance and Line N-2 provides about 45 feet. Alternative N-3, just to the east of the existing movable bridge will provide 30 feet of vertical clearance and 100 feet horizontal clearance. The only possible limitation due to this bridge will be that the larger sailboats with high masts could not use the marina service facility in the Creek. Only a few do so now. Other yards are available in the area and the effect, therefore, is very small.

Port Chester Harbor

Westchester approach alternative W-4 runs through Port Chester Harbor near the main channel. The large number of recreational boats using the harbor, therefore, will be forced to use extra care in navigating the area.

In addition, boats using the marina located on Manursing Island will have to pass under the bridge structure. They will therefore have to navigate between the piers and will be limited by the vertical clearance which is proposed to be 25' in this area. Vessels that can not pass beneath the bridge will be forced to seek mooring facilities elsewhere.

* * * * * *

The clearances described in the chapter are all subject to approval by the U. S. Coast Guard. This agency will be concerned with all boating on the Sound and how it is affected by the bridge.

4. Direct Impact of Right-of-Way Requirements and of Relocation Program

a. Relocation Assistance

The Federal-aid highway program provides for equitable and considerate treatment for relocations. The original version, contained in the 1962 Federal-aid Highway Act, provided for counseling, while the 1968 Act authorized the basic financial reimbursement provisions in effect today. This act established a uniform set of provisions to assist families, individuals, farmers, businesses, and non-profit organizations to avoid the human and economic shock that can result from involuntary displacement. The act requires that no federal-aid projects be approved unless "decent, safe, and sanitary" housing is available within a reasonable period of time before persons are displaced, such housing is within their financial means, and it is reasonably convenient to public services and centers of employment. Further modifications to the basic relocation assistance provisions were contained in the 1970 Highway Act and the Uniform Relocation Assistance and Land Acquisition Policies Act of 1970. Federal review and approval of State relocation activities is specified in the various legislative provisions.

While some property would be required for the bridgeheads themselves, the larger proportion of property needs would be required for the approach highways. The former is the responsibility of the Metropolitan Transportation Authority; the latter the State Department of Transportation. Department relocation assistance procedures are governed by the Federal requirements and enabling State legislation. This applies even if federal-aid is not being utilized on all or a portion of the project. In recent years, the Department has assisted the Metropolitan Transportation Authority in acquiring property required for transportation purposes. It is anticipated that this type of arrangement would be utilized. Thus, practically all contact will be with Department of Transportation Real Property Division personnel.

Actual work begins at the location stage with the preparation of a Conceptual Stage Relocation Plan. This includes determining for each alternate being considered the approximate number of individuals, families, businesses, farms and non-profit organizations that would be displaced and the probable availability of decent, safe and sanitary replacement housing within financial means of those being displaced. Some of this information has been obtained for the Long Island Bridge Crossing and is included in this statement. The Conceptual Stage Relocation Plan, however, is a separate document which will be made available prior to the corridor public hearing.

During the design stage, the estimates of the number of individuals, families, businesses, firms, and non-profit organizations are refined based upon the inter-agency approval and adoption of one location alternative and the developing detailed information on possible alignments and other design features at this stage, fairly precise estimates on the number and characteristics of dislocatees and the amount and location of the property required are developed.

Upon design approval, relocation activities begin. All potential displacees will be personally interviewed to ascertain family composition and economic status and to determine their needs and preferences in replacement housing. After all displacees are interviewed and the extent of relocation needs are clearly defined, the Metropolitan Transportation Authority and the Department of Transportation will explore the real estate market in order to locate available housing both for rental and purchase, and commercial properties to satisfy needs of all displacees. Liaison is also continued with local government agencies such as the Planning Board and the Urban Renewal Agency, the Chamber of Commerce, local banks, and appropriate Federal Agencies such as the local or regional office of the Department of Housing and Urban Development, the Small Business Administration, and the

Federal National Mortgage Association. Often State or county welfare departments are called upon for assistance and coordination in solving the relocation problems created by the project.

Based upon all of the information gathered during these activities and utilizing the base material contained in the earlier Conceptual Stage Relocation Plan, a Detailed Relocation Plan for the project is developed by the Department of Transportation.

A local relocation office will be established to serve the needs of those being displaced by the project. Consideration is given to the specific requirements of relocatees and the degree of assistance required. Thus in a high income suburban neighborhood where the majority of the residents own more than one car, the need for a relocation field office in the proximity of the proposed project is less than in a low income, downtown area where the residents depend upon public transportation for mobility. When possible, one of the buildings required for the project is used for the local office, but in an many instances the Department must search out and rent suitable space in the project area.

As soon as the Detailed Relocation Plan receives FHWA approval, an elaborate series of activities takes place. At this stage it is necessary for the Department to prepare appraisals on all properties and to make the necessary determinations as to supplemental replacement payments which must be offered.

1. An owner occupant may be eligible for a supplemental housing payment up to $15,000 above the State's offer of fair market value to assist in the purchase of a comparable house, to pay for any increased interest charges on a new mortgage, and to pay the reasonable closing costs on the purchase of a new property, or a payment up to $4,000 if he decides to rent rather than repurchase.

2. A tenant may be eligible for a supplemental housing payment up $4,000 to cover the increased rental or for a downpayment toward the purchase of a replacement dwelling.

3. In addition, Department representatives examine each residential property and determine the amount which may be offered for moving expenses based upon counted rooms.

The residential room count schedule provides for a payment of moving expenses predicated on the number of rooms and quantity of personal items located in the appropriated residence. In addition to the counted rooms, a $200 relocation allowance is also provided to those who permanently reside in the appropriated structure. If the room count schedule is not considered adequate to compensate for all the costs of moving, the eligible occupant may elect to be reimbursed according to the actual reasonable and necessary moving expenses incurred in his relocation up to 50 miles.

The Department's relocation staff will make every effort to provide suitable relocation sites to the commercial occupants to be displaced.

1. In the case of a business, farm operation, or nonprofit organization, the eligible person or his qualified representative may be reimbursed for the actual, reasonable and necessary expenses in searching for a replacement site not to exceed $500. The eligible owner of a displaced advertising sign, may be reimbursed his actual, reasonable expenses in searching for a replacement sign site not to exceed $100. Reimbursement will be limited to the above amounts unless in exceptional cases the commissioner deems otherwise.

2. The eligible commercial occupant will be eligible for actual reasonable and necessary moving expenses incurred in the removal and

reestablishment of the displaced business. There is no monetary limitation on this form of reimbursement.

3. When a business relocatee decides to move or leave some or all of this personal property, he may be reimbursed as follows:

   a. If the business, farm, etc. is reestablished, but the personal property is replaced with a comparable item at the new location, payment shall be the lesser of:

      (i) The replacement cost less the net proceeds of any sale; or

      (ii) the estimated cost of moving the item.

   b. If the business, etc. is discontinued, or the item is not replaced in the reestablished business, payment shall be the lesser of:

      (i) The depreciated value of the item in place less the net proceeds of the sale; or

      (ii) the estimated cost of moving the item.

The eligible business farm or non-profit organization to be displaced is entitled to any one or a combination of moving expenses, searching fee, and payment for taking of property. If, however, the nonresidential relocatee cannot successfully relocate or cannot relocate without a substantial loss of patronage, a special payment "in lieu of moving expenses" may be made. This payment, with a minimum reimbursement of $2,500 and a maximum of $10,000 is computed by averaging the net income of the displaced commercial occupant for the two years prior to the year in which relocation is accomplished.

As the review of appraisals and the review of the various supplemental determinations is completed, the time to initiate negotiations approaches.

After initially meeting with property owners and/or occupants of buildings at time of making a physical inspection of the premises, at which time the acquisition process and the rights of those involved will be explained, contact is renewed with property owners, and/or occupants by personnel of the Department's Regional Agreements Unit and with tenants by personnel of the Property Services Unit. The individual negotiator at the first contact is required not only to discuss and explain the offer for the appropriated property but must also explain the offer for the appropriated property but must also explain all additional payments and services which will be provided. The booklet How Your State Acquires Property for Public Purposes and a written confirmation is given as to the amount of Supplemental Replacement Payment, the amount of moving expenses which can be calculated in advance and a letter giving 90 days notice of the need for the property are delivered. In all instances, the relocatee will have a least three months after that notice before they will be required to move.

Property Services personnel follow-up with repeated contacts depending on the individual needs. Utilizing Department listings of replacement homes and apartments, replacement properties are offered and shown. These properties have been inspected by Department personnel to make certain they are decent, safe and sanitary, of adequate size and conveniently located. In addition, continuing Department contacts with other governmental agencies, lending institutions, real estate brokers, building contractors, etc. make the services offered by each of them readily available to those being displaced by a Department project.

As each individual completes his move, he will be provided with all necessary applications and forms to secure any payments to which he is entitled.

In certain cases it may be feasible to move existing houses to a nearby site. Favorable consideration will be given to such a solution when it is desired by an owner and can be accomplished in a satisfactory manner.

b. Relocation Requirements

The direct impacts of the right-of-way requirements of the various alternates are described in this section, including the land takings, displacements, effects on assessed valuations and on natural and man-made features.

Residential and Commercial Displacement. Studies to date have progressed to the point where feasible alternative routes have been identified. The route adopted will continue to be modified as the studies progress in order to lessen the impact on the areas affected. The use of retaining walls and other measures to minimize takings will be important elements in these continuing studies. The limits of the right-of-way and the exact number of displacements required cannot be accurately defined in this early stage of development. Estimates of displacements included in the following table therefore can only be approximate and represent the best available information. The scope of the project covered in the table is the approach road between the bridge and the Cross Westchester Expressway on the Westchester side and between the bridge and Route 106 on the Nassau side.

TABLE E-22

ESTIMATED PROPERTY REQUIREMENTS

Area	Approximate No. of Displacements (residences and commercial establishments)	Approximate Assessed Valuation of Displacements (000 omitted)
Westchester Approach		
W-1	10-20	$800 to $1,000
W-2	10-20	800 to 1,000
W-3	15-25	1,000 to 1,200
W-4	10-20	600 to 800
Nassau Approach		
N-1	65 to 90	900 to 1,100
N-2	85 to 110	1,200 to 1,400
N-3	75 to 100	700 to 900

In the area of the Seaford-Oyster Bay Expressway extension between Route 106 and Route 25 extension many properties have already been acquired. This is particularly true in the vicinity of the interchange with Jericho Turnpike (Route 25) and at several other locations along the route. An approximate count indicates that the remaining right-of-way required involves about 100 displacements.

The New York State Department of Transportation is in the process of preparing a conceptual stage relocation plan for the bridge project and the remaining parcels in the Seaford-Oyster Bay extension. This plan includes the investigation of individual properties along the right-of-way to determine type of housing presently occupied and the ownership of these properties. Further investigations are under way as part of this relocation plan to determine if safe, sanitary and decent housing is available within the same price range as the homes now occupied. Reasonable estimates of the time required to assemble such replacement housing will be prepared.

Public Facilities. There are no schools, county, town, village or city buildings or properties required for the project. A portion of the underveloped land of St. Gertrude's Church is required for Nassau Approach Route N-1. The Seaford-Oyster Bay Expressway Extension required the taking of the Holy Virgin Protection Russian Orthodox Greek Catholic Church and a portion of the property of the Oyster Bay Jewish Center.

Historic Sites. No generally recognized historic sites or monuments of local, state or national significance are within the right-of-way of any alternative route under consideration.

Parks. A detailed discussion of the effect on Playland Park in Rye is presented in the statement of impact on Section 4 (f) lands in Section I of this document. No other parks are within the right-of-way limits.

Designated Wetlands and Other Lands Used by Public. The wetlands are discussed in the Section 4 (f) statement. Another land area that might be considered as in public use is the section of Ferry Beach in Bayville between Valley Road and Shore Avenue in alternate N-3. This beach is also discussed in the Section 4 (f) statement. Except for those mentioned above, no other known public recreational areas are within the right-of-way.

Archeological or Paleontological Sites. There are no known archeological or paleontological sites within the right-of-way. If during the construction process evidence of such sites is uncovered, it is the policy of the responsible agencies working with the interested State agencies and museums to document and, wherever feasible, preserve and salvage items of importance.

Streams, Brooks and Wetlands. The wetland areas traversed by the Westchester approaches are Playland Lake and surrounding marsh, Kirby Pond and the pond to the north of Manursing Island. Playland Lake is primarily affected by W-1 while W-3 has the most impact on the other two wetlands. It is presently planned that the above bodies of water will be spanned by viaduct structures.

On the Nassau side the approaches N-1 and N-2 cross Mill Neck Creek. N-3 crosses the westerly tip of Oyster Bay to the east of the existing Bayville Bridge. The highway will not encroach on Mill Pond or Oak Neck Creek. Mill Neck Creek and Oyster Bay are a part of the Oyster Bay National Wildlife Refuge and are discussed in detail in Section 4 (f) lands in Section I of this statement.

All streams and other minor waterways crossed will be maintained through the use of culverts and ditches generally in their same location.

5. Impact Upon Adjacent Land Uses

The detailed design studies of the various alternative routes are only in the preliminary stages. Engineering investigation as to alignment, cuts and fills, properties affected, and other features have only progressed to the point where the physical feasibility of the route has been assured. Details of such concerns as horizontal and vertical alignments, gradients, drainage requirements and cross sections at critical points will be further refined as the design progresses. The ongoing investigations will provide the information which will make it possible to properly relate the highway and its users to the surrounding homes and other community features. Specific evaluation of the effects of increased noise and air pollution and other considerations can then be made and at all the critical locations the expected impacts can be compared with the applicable standards.

The preliminary studies completed at the present stage of the development, however, do permit the identification of areas that appear to be particularly sensitive and which must be the subject of the future detailed evaluations.

a. Housing

Housing will be affected to varying degrees by increased levels of noise and air pollution. Final design will assure that these impacts are kept below Federal and State ambient limits. Following is a more detailed discussion of impacts upon housing, with an emphasis on visual design considerations for minimizing adverse effects.

Along the Westchester approach, alternatives W-1 and W-2 are relatively close to the homes on the west side of Kirby Lane and southeast of Drake Smith Lane. The impact of the route will be somewhat minimized because the roadways are in a wooded swale below the elevation of the adjacent homes. Visual impact will be in general limited to the winter months for these homes. Alternative W-3 utilizes a spit of land between a group of homes on

Kirby Lane and North Manursing Island. The effect on the properties facing this route is of major concern. All three of these alternatives also pass close to seven homes which are adjacent to Playland Park and also several homes on Manursing Way. Evaluation of the effects here must be an important part of the ongoing studies.

The impact of alternative W-4 will be felt by almost all residences facing Port Chester Harbor in the City of Rye, particularly on North Manursing Island, in the Village of Port Chester and on Byram Point in Greenwich, Conn. The sensitiveness of these areas must be of great concern to the planners of the project. It is also recognized that the bidge will be visible to all other homes facing the Sound in the general area both on the Westchester and Nassau sides.

To avoid the severe visual impact and the effect on navigation, a bridge-tunnel scheme was considered for the W-4 alignment. Because of the high elevation of the connection with the Cross Westchester Expressway, however, the roadway cannot disappear under the water surface at an acceptable gradient until it is some 1000' off shore. The negative impacts noted, therefore are not avoided.

On the Nassau County side of the Sound there are residential areas on all alternative routes which will be affected by the project. Along alternative N-1 the residential area between the shoreline and Bayville Avenue warrants particular attention as it may be the location of the proposed toll plaza. Continuing studies are being progressed which are concerned with the effects of traffic through existing toll plazas. South of Bayville Avenue near Godfrey Avenue there is a group of homes opposite the village facilities. The route is in a deep cut adjacent to this and the effects will therefore be slight. Vehicular access across the route will be maintained, but pedestrian crossings will be limited as compared with the open field now available. Further south, there are some homes recently constructed near the route. Provisions for maintaining access will be provided. Other effects on these homes must be carefully evaluated. The crossing of Mill Neck Creek will be viewed by residents of homes facing that body of water. Steps to design a structure with a pleasing appearance must therefore be taken, and the responsible agencies are fully aware of this need. Mill Neck alternative N-1 passes in deep cuts through an area of large homes on spacious lots. Although there are not a large number of these, careful consideration will be given to minimize the impact. The placing of the roadways in deep cuts and heavy landscaping treatments are examples of measures that must be fully investigated.

In the southern part of Mill Neck, the N-1 road joins with the other alternatives west of West Shore Road. Between this point and the lower end of Oyster Bay the route passes below several homes which overlook the Bay at higher elevations. In the community of Oyster Bay, the routing passes near some older homes before swinging slightly eastward near several garden apartment houses adjacent to Route 106. Although the visual impact here will be limited to the houses immediately adjacent to the right-of-way, careful study of all impacts is essential in this cohesive community. Across Route 106, on the extension of the Seaford-Oyster Bay Expressway, there is a large group of homes bordering the proposed route that will experience an impact from the route. Detailed evaluations of this impact are essential. Further south to Route 25A, the effects on homes will be relatively slight as there are only a few homes adjacent to the right-of-way. Between Routes 25A and 25, however, there are a substantial number of homes near the right-of-way, and all impacts must be carefully considered here.

The principal variations between alternative N-2 and N-1 alternative, discussed above, are in the area of Bayville and the northern section of Mill Neck. Alternative N-2 passes through the large tract of the former Williams Estate which is now being developed into a residential community. The effect of the route on the homes recently built and those that may be built is significant and will be carefully evaluated. Across Bayville Avenue to the south the community is a mixture of new and old homes fairly closely placed. The visual and noise impacts are of concern here. Further studies of the alignment to minimize impacts are important. Across Mill Neck the route passes through the Mill Neck Estate area which is composed of a group of homes on relatively small plots. The impact of the new route on this small community will be the subject of ongoing studies as the road could create a separation between the homes on either side. The crossing of Mill Neck Creek will be substantially longer than on the N-1 alternative. In addition, more homes are facing the water in this area of the Creek. The visual impact therefore, can be considered greater than alternative N-1.

Alternative N-3 passes through the commercial area of Bayville and therefore has a lesser impact on the houses immediately adjacent to the route. However, the over-water portion on Long Island Sound may be about one third of a mile from the beach and runs parallel to the shore line for a distance of one mile between the N-3 bridgehead and Oak Neck Point. The visual impact on shorefront homes therefore will be substantial.

The principal impact on the area south of Mill Neck Creek from alternative N-3 is in the immediate area adjacent to West Shore Road where there are a few houses along Mill Neck Estates. South of this point, alternative N-3 joins with N-2.

b. <u>Institutional Facilities</u>

Educational facilities that may be affected to some degree by the proposed project are located in Port Chester, Bayville and the Syosset area.

In Westchester the only school near the approach routes is the Horton School, which is located on the northerly side of the New England Thruway in the Village of Port Chester. The increased traffic caused by this project, particularly considering the low percentage of trucks, will not increase noise levels or air pollution significantly. At the present stage of the studies, therefore, the overall impact on the school is assessed to be negligible.

In Nassau alternative N-1 passes to the west of and close to the Bayville Elementary School. The route is depressed in a 30 to 40 ft. cut near the school. The noise and air impacts therefore are predicted to be low. Since there are no entrance or exit ramps in the vicinity of either of the above schools, no additional traffic will be imposed on the local streets and safety at the school will be unaffected by this project. All local streets in the vicinity of the schools will be maintained and therefore no difficulties in access or bus routing will be encountered.

The Seaford-Oyster Bay Expressway extension passes to the west of the Syosset High School and the South Woods Jr. High School. The expressway will be elevated in the area due to a crossing over the Long Island Rail Road which abuts the High School. The noise and air pollution levels at both schools will be affected, but the present indications are that they will be well within standards. The ambient levels at the High School are now affected by the existing railroad along the property line. All local street movements will be maintained; therefore, no difficulties in access nor safety hazards will be created.

The expressway location is also adjacent to the Berry Hill Elementary School. The roadways in this area are in approximately 25 ft. of cut due to crossing under Cold Spring Road in front of the school. The noise level at the school is therefore expected to be within D.O.T. standards although the ambient noise levels will be higher than at present. Air pollution concentrations are expected to be within E.P.A. standards. On and off ramps to the expressway are planned for Syosset-Cold Spring Road; therefore some additional traffic is expected in the area of the school. With the implementation of the appropriate traffic controls the impact on pedestrian and vehicular safety will be minor.

The further details of the specific impacts at all the critical school locations will be refined in the continuing investigations of the relevant factors.

c. Commerce

The local activity of service facilities and commercial establishments on both sides of the Sound serving areas beyond their immediate neighborhoods will not be adversely affected by the project. Local streets will be maintained and the neighborhood facilities, therefore, will be as accessible to the residential areas they presently serve. In the area of the proposed interchanges with the local streets there is a possibility that additional business will be generated for the existing stores.

A commercial establishment serving a large area will have the obvious benefits of better transportation facilities. No severe negative impacts are foreseen for these businesses.

d. Religious Institutions

In the Rye-Port Chester area there are no churches within 2/3 mile of the proposed right-of-way and, therefore, there will be no significant impact on the north side of the Sound. In Bayville, alternative location N-1 runs alongside and utilizes the west edge of the unused church property belonging to St. Gertrude's Church. The extension of the Seaford-Oyster Bay Expressway affects the Oyster Bay Jewish Center. In both locations the noise predictions indicate ictions indicate that there will be a significant increase during peak weekday traffic hours; however, during Sabbath worship the noise level will be well below D.O.T. standards. The visual impact will be minimal at St. Gertrude's because the roadway will be depressed approximately 20 ft. below the ground level near the church. The local streets providing access to the religious institutions will be maintained, so there will be no effect on the Church's operation. The village Church of Bayville is within ½ mile of the right-of-way of alternative location N-2 and St. Mary's Home in Syosset is near the Seaford-Oyster Bay Expressway Extension. Access will not be affected, however, and with suitable design any impact from air pollution, noise or visibility that will result from the project, should be minimal at these locations.

e. Historic Sites and Monuments

The only known, generally recognized, site or monument of local, state or national significance near the proposed location is Council Rock near Mill Pond in the hamlet of Oyster Bay. This site is marked by a plaque on a large boulder within a small fenced-in area. The principal impact on visitors due to the approved route will be increased noise and air pollution levels. The highway will also be visible from this site.

f. Public Health, Safety, and Fire Protection

Hospitals. The only hospital in the area of the proposed project is United Hospital, north of the New England Thruway and the Cross Westchester Expressway interchange in the Village of Port Chester. The effect on this hospital, due to increased traffic levels on the Cross Westchester Expressway, is an increase in ambient noise levels and in air pollution concentrations. The increase in the noise level at the hospital will be minor because the existing level is relatively high due to the proximity of the interchange. Indications at this stage of the studies are that the air pollution resulting from the increased traffic from the bridge is predicted to be small and well within accepted standards.

Public Safety. Local street connections along the bridge approaches are to be maintained as at present. Therefore, there will be no reduction in the accessibility of the community areas to fire and police equipment. Along the Nassau approach route and the extension of the Seaford-Oyster Bay Expressway, accessibility will be improved by the construction of the express highway to carry emergency equipment from one community to another at a much faster rate than can be presently be done on the existing local highway system.

The operating agency responsible for the bridge crossing will maintain its own equipment to handle fire and other emergencies on the bridge.

g. Utilities

All utilities, telephone, gas, electric and water supply together with storm and sanitary sewers will be replaced and relocated as required to provide continuous service during construction and afterwards. Therefore, there will be no adverse effect on utility services.

The provision of a new structure across Long Island Sound will provide the opportunity for utility lines between the mainland and Long Island.

h. Local Highway System

The impact of the project on the local highway system will be directly dependent on location and type of interchanges. On the Westchester side the present proposal calls for no interchange with the local streets. Only a direct connection with the Cross Westchester Expressway and the New England Thruway is proposed. No traffic to and from the bridge, therefore, will be using the local highway system. On the Nassau side, the last complete interchange indicated is in the area of Route 106 at the end of the approved road. The interchange at Bayville Avenue, as presently proposed, serves traffic to and from the south only. This will permit the local Bayville residents to use the approach route to head towards the south or to return from that direction in place of the present West Shore Road.

The extent and configuration of the interchanges with the approaches is subject to modification and will reflect the wishes of the affected communities. If Bayville desires a direct entry and exit from the bridge, this will be provided.

There will be some increases in traffic on Route 106 due to the usage by local motorists who are able to reach the bridge approach faster on Route 106 than on the Seaford-Oyster Bay Expressway. This group, however, is limited because those residing in or going to points somewhat south will find it preferable and quicker to go via the Seaford-Oyster Bay Expressway than to use Route 106. This same situation pertains to residents along the other local roads near the interchange. The extent of use of these local roads, however, will be limited by the distance from the interchange of the origin of the individual trips. The local roads, therefore, will only draw users from the limited area around the interchange. For long distance travelers the main roads such as the Northern State Parkway, the Long Island Expressway and the Seaford-Oyster Bay Expressway will be safer, faster and preferable.

i. Wetlands

The effects of the bridge project on the wetlands is discussed in detail in the section dealing with water quality and in the 4(f) statement related to the wetland areas.

j. Recreational Activities

The principal recreational activities that are affected by the bridge project are water oriented and include sailing, motor boating, fishing, swimming, beach outings, tennis, trap shooting, and to some extent duck hunting.

There are several public and private facilities on both sides of the Sound which provide for these pursuits.

On the Westchester side the primary public facility is Playland Park, which is 4(f) land and is treated in detail in that section of this report. There are two private clubs on Manursing Island, the Manursing Island Club and the Westchester Country Club. Port Chester Harbor contains public and private marina and board yard facilities. The principal effect on the private clubs due to the approach routes will be from a visual standpoint. Alternative W-4 will have a greater adverse visual impact than the other alternatives in that it intrudes on the easterly view down the Sound. The other alternatives affect the westerly view from the clubs which is a lesser impact inasmuch as the clubs face in a easterly direction.

All the alternatives will add to the ambient noise levels and may cause small increases in air pollution levels. Alternatives W-2 and W-4 will have the greatest effect, although in no cases are Federal standards exceeded.

The Port Chester Harbor facilities will be virtually unaffected by alternatives W-1, W-2; however, W-3 will require taking Tide Mill Yacht Basin facility on Kirby Lane. Line W-4 will have the greatest impact on Port Chester Harbor in that it follows the channel from the Sound between Manursing Island and Bryam Point, moving inland near the Rye-Port Chester boundary line. This alternative would create restrictions to marine traffic in and out of the harbor.

Trap shooting at the private clubs will be unaffected by the bridge. Duck hunting in the immediate vicinity of the bridgeheads will be curtailed, although this impact is assessed as minor considering the extent of suitable areas for hunting along both shores.

In Nassau the recreational facilities affected by the bridge project are Ferry Beach in Bayville, Mill Neck Creek, Oyster Bay and the town park in Syosset. The impact of alternatives N-1 and N-2, with bridgeheads on Oak Neck Point, are restricted to an increase in ambient noise level and a visual impact on the northwesterly view. Line N-3 crosses Ferry Beach and will increase the noise level significantly in beach area adjacent to the bridge and will also cast a shadow. The visual impact of this alternate will be significant for the entire extent of the beach, but the beach outing and swimming activities at Ferry Beach will not be seriously curtailed.

Locations N-1, N-2 and N-3 cross Mill Neck Creek which is a 4(f) land discussed in the special 4(f) statement in Section I.

The Seaford-Oyster Bay Expressway extension is adjacent to a Town of Oyster Bay park in Syosset, which is used as a ball field. There will be some increase in ambient noise levels and air pollution, but standards will not be exceeded and there will be no effect on ball playing.

Oyster Bay in the vicinity of the project is used primarily for pleasure boating, fishing and shell fishing. Boating and shell fishing are discussed elsewhere in this report. Fishing will not be affected in that the approaches do not encroach in the Bay and will therefore have no significant impact on fish life.

The public beach at Oyster Bay is across existing West Shore Road from the route and the impact will be limited to slight increase in ambient noise and air pollution levels.

Water pollution stemming from drainage run-off from the bridge and approach roadways will not be significant due to its dilution. Therefore, any water quality changes are considered insignificant and will not affect swimming and other beach use in the vicinity of the bridge heads.

Fishing in Long Island Sound will not be adversely affected by the presence of the bridge in that motor boats will have sufficient vertical clearance to pass under all the spans and will have adequate lateral clearance to accommodate trolling between piers. Experience with similar projects suggests that certain species of fish will be attracted to the bridge because of the marine life that will develop on the piers. The bridge piers may become a preferred spot for bottom fishing. It can therefore be concluded that the net impact of the bridge on fishing in the Sound will be positive.

On the basis of present studies, the overall impact of the bridge project can be summarized as being minor insofar as curtailing beach use is concerned and positive in regard to fishing. Other recreational activity will experience only minor adverse impacts. Continued analyses will be made at all critical recreational locations as the project develops to assure that impacts will be minimized.

6. Visual Impact

Among the effects that the Long Island Sound Crossing project will have on its surroundings, the one that will be evident to the largest number of people is visual impact. This subject will be considered in three parts: The Sound Crossing proper, the Nassau approach road and the Westchester approach connection.

a. Bridge Crossing of the Sound

A bridge across the Sound will have its principal visual impacts on the nearby shore areas. For those in a position to view the bridge from afar, its effects will be largely subjective. Bridges the world over are major attractions on the landscape and are among the most photographed of man's achievements. In the mid 60's the Port of New York Authority installed necklace lighting along the cables of the George Washington Bridge. The Triborough Bridge and Tunnel Authority and the City of New York followed suit and this decorative lighting has become a dominant element in New York City's after-dark skyline. It is generally agreed that the bridge lighting has done more to enhance New York's night scape than any other single factor. A view of the bridges at night has become a very important selling point for New York City apartments. Many will admire the long, slender sweep of the bridge on its 6-1/2 mile path across open water, whereas others who resent any intrusion on the natural state will reject appreciation of the bridge's beauty regardless of the merits of its design. For the millions of persons who will ride over the Bridge each year there will be a rewarding visual experience.

Of more direct concern, however, are the residents of those areas where the bridge will become a conspicuous element of the landscape. The effects will depend on the exact location of a property with respect to the bridge-its angle of vision and relative elevation as well as the distance. Generally, the bridge structure will extend out from the shores at a low level as viaduct construction for a considerable distance before it begins to rise. The supports will be clean and trim, with a slender pier and girder members. Based on present design concepts, the main span will be of cable stayed girder construction. This modern bridge design, while quite popular abroad, has not been widely utilized in this country. As can be seen from Exhibits D-12, D-13, and D-14, alternative visual concepts are being explored. It will, however, change the immediate environment from one of open seascape to a scene including a major man-made structure.

Among the alternative bridgehead locations under consideration, two appear to have considerably more impact than the others. On the Westchester side, route W-4 would place the bridgehead in Port Chester Harbor, on a viaduct approximately 25 feet above the water surface. From the vantage point of the properties along the shore, particularly on Manursing Island, the view would be marred by the proportions of this structure. Manursing Island, now enjoys a beautiful view of the Sound and is occupied by some of the finest homes in Westchester County plus two exclusive beach clubs. The island is flat and its aspect along the shore is one of manicured grooming rather than of a natural state.

The homes are oriented toward the Sound and a viaduct just offshore would obviously become a dominant visual feature. The more graceful main span will be approximately 4 miles away and not of major influence on the Rye Shore. All the other Westchester approach routes would place the bridgehead at the south end of Manursing Island where the viaduct structure would be generally behind the waterfront homes oriented toward the Sound. In this location the viaduct would not intercept the view of the Sound, for the inland homes behind this area are generally on high ground a considerable distance away.

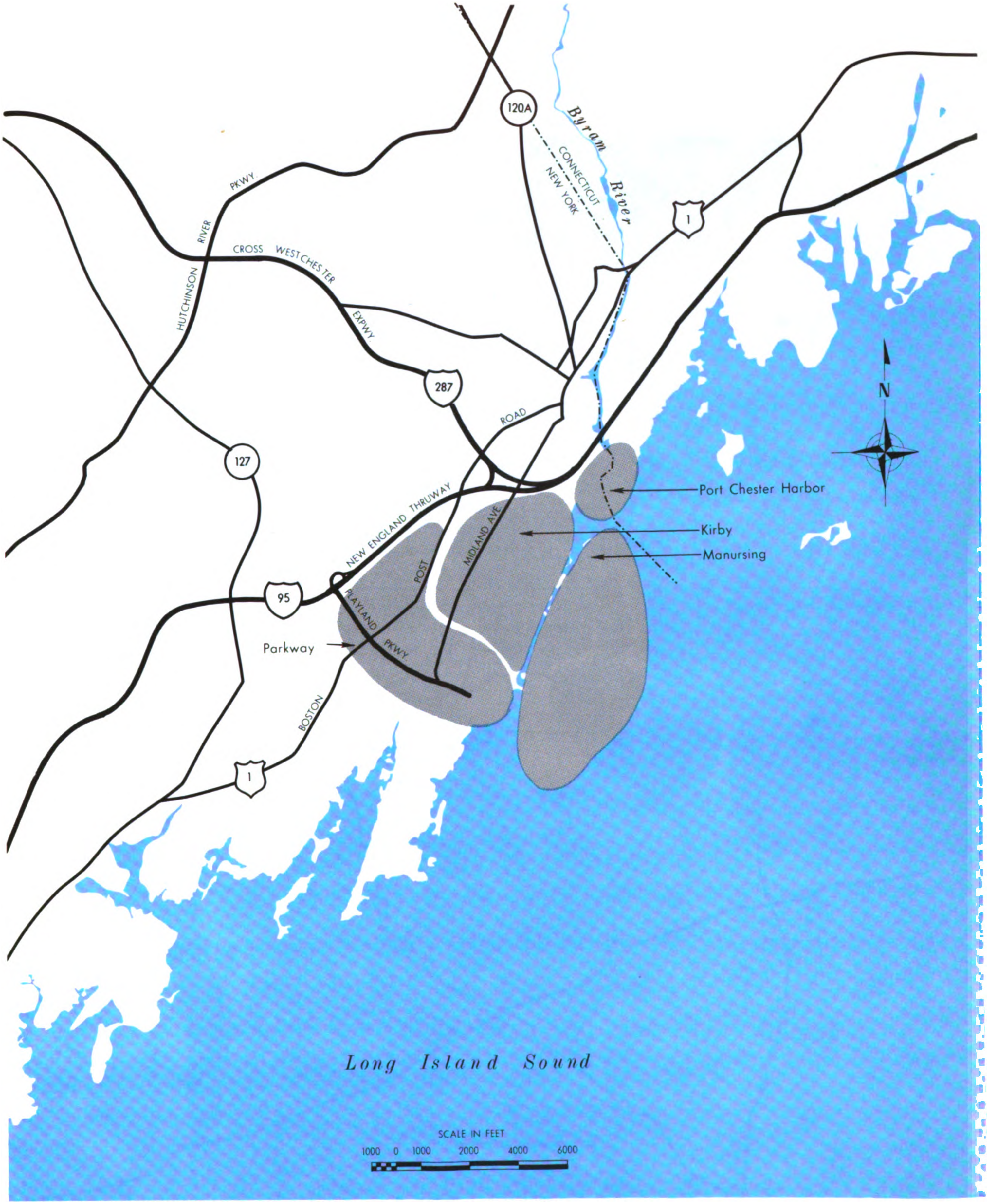
On the Long Island shore, approach route N-3 places the bridgehead on Ferry Beach, approximately one mile east of the alternative locations at N-1 and N-2. This requires an abrupt turn to the northwest in order to reach the Rye bridgehead on the opposite side of the Sound. This means that for a distance of approximately one mile between Ferry Beach and Oak Neck Point the bridge will be running parallel to the shore. Even though the deck level would be kept low, this location would inevitably bring about an impairment of the view for the residents along the cited stretch of the Bayville shorefront.

b. Visual Impact of Approach Highways

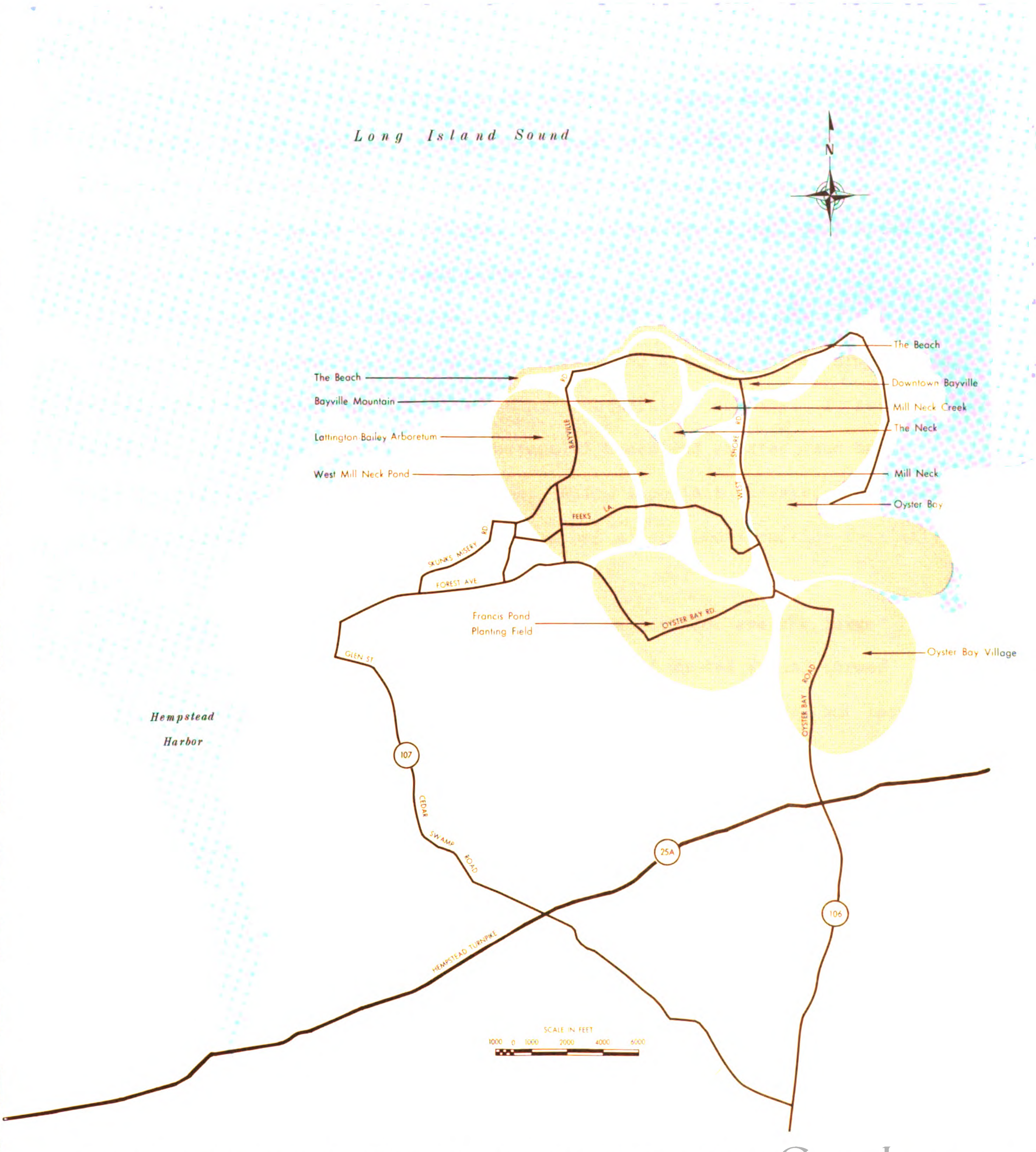
The effect of the approach roads on the surrounding neighborhoods from a visual standpoint will depend in part on the existing conditions, as well as on the manner in which the highways are constructed. A brief description of the visual characteristics of the approach corridors is given below. (Exh. E-9 & E-10).

Long Island Approach. The community immediately adjacent to the Long Island bridgehead is the Village of Bayville. This is a residential area with a preponderance of modest but well-kept homes. It is virtually surrounded by water and its access to beaches and boating encouraged its initial development as a summer and vacation resort, but in recent years most of the homes have been winterized and are now occupied by an all-year-round population. A number of fairly expensive homes have been built in the last few years, but the village retains its independent character as an older shore community a bit off the beaten track. A considerable section of small rental houses still exists in the eastern portion of the village near the N-3 approach location. A very small commercial area is located near the intersection of Bayville Avenue and Ludlam Avenue.

An outstanding characteristic of Bayville is a 100 ft. hill in its midsection, from which the ground slopes gradually in all directions. In this hilly terrain there are large tracts still remaining as undeveloped woodlands.



AREAS WITH DISTINCTIVE VISUAL CHARACTERISTICS - WESTCHESTER APPROACH.



AREAS WITH DISTINCTIVE VISUAL CHARACTERISTICS - NASSAU APPROACH.

To the south of Mill Neck Creek the village of Mill Neck is located on a peninsula with a high spine running north and south through its middle. This area includes numerous large homes situated on wooded estates, many with broad views. A net work of interior roads penetrates large tracts of woodlands interrupted only by well-tended gardens and lawns surrounding the sparsely spaced mansions. Along the eastern edge of Mill Neck is the Oyster Bay waterfront, where the two-lane West Shore Road provides local access. On its west are wetlands areas fringing the inner reaches of Mill Neck Creek and also a fresh water pond called Beaver Lake.

Further south is the unincorporated village of Oyster Bay, one of the earliest settled communities in the area. It is now a mixture of suburban homes and some recently developed garden abutment type multiple housing. It serves as the center of a surrounding area of substantial homes and estates, and has a considerable shopping and commercial area. A few important industrial activities are also located there, including a shipyard and a large construction facilities center. center.

The dominant features of this entire approach corridor are the large bodies of water on its borders and the high spines of wooded ground formed by a glacial moraine. The development is more intensive than rural but less than urban, and the area has retained a visual charm.

Westchester Approach. The Westchester approach routes to the bridge are much shorter than those on Long Island, and affect principally a portion of the City of Rye.

The mainland portion of Rye slopes upward from a rocky shore, providing attractive homesites in a wooded setting. Even the Rye business center is surrounded by wooded terrain, preserving the natural amenities in a prosperous suburban community.

Guidelines for Design of Highway Approaches. Because of the differences in landscape approach areas on the two sides of the Sound, distinctive highway designs will be required to fit the topography and land use patterns. Adaptation of highway design details such as the provision of frontage roads, use of depressed and elevated sections, adjustment to terrain, and the location and spacing of grade separations makes it possible to reinforce the local land use plans and development patterns. The highway will be located to avoid, splitting insofar as possible, the various land use areas as they exist and as they are planned for the future. When the projected plan unavoidably enters an integral land use unit, disruption will be minimized by the use of depressed roadways, crossover bridges to preserve the continuity of existing streets, and the use of walls rather than sloping banks where a narrow right-of-way is desirable.

The objective will be to preserve the present visual aspects of each community, and especially to avoid disruption of continuity and communications. Where desired by local residents or required by a facility such as a school, pedestrian overpasses can be provided.

Impact of the roadway on residents in the affected areas is the most serious consideration. Land taking should not mutilate or isolate remaining properties. Roadway sections, structures and furnishings will be so designed as to foster "good neighbor" relations. One of the most difficult features of vast road networks is their large scale in comparison to the local streets, but aesthetic design can minimize these effects. Some examples of possible roadway treatment to protect surrounding properties are shown in Exhibit D-30.

Sensitive roadway location, with proper vertical or horizontal adjustment of the centerline, will often substantially reduce the resultant cuts and fills and the destruction of natural cover. The use of appropriate right-of-way planting is important as a means of screening the highway from its surroundings.

Such planting also serves for dust control, windbreaks and the prevention of headlight glare, and is also of limited assistance for noise abatement. Aesthetic value will have high priority in all roadway structures. Their appearance from the highway and from its sides, their obstruction or enframement of views; their bulk and mass; their architectural character; their sculptural profile-all are important to those who will view them in place. To achieve a harmony of structure with the setting, it is often best to disturb the setting as little as possible. When the interplay of forces is most simply resolved and most directly expressed the result is most satisfying.

Aesthetic judgements pertaining to each community's own physical and topographical features, and their relationship to the roadway alignment will be individually evaluated. Aesthetic beauty is subjective in meaning. Those individuals directly affected by the roadway will have the opportunity to react to design proposals and to make suggestions. The extent to which the final alignment will be a visual asset to the community will depend upon a successful integration of visual design with community perceptions. The following statements attempt to indicate a direction for the final alignment and design.

1. The design solution will maintain as much as possible the status quo of each affected community.

2. The roadway alignment will take into account aesthetic characteristics along the entire route and will create the least destruction to existing structures and surrounding terrain.

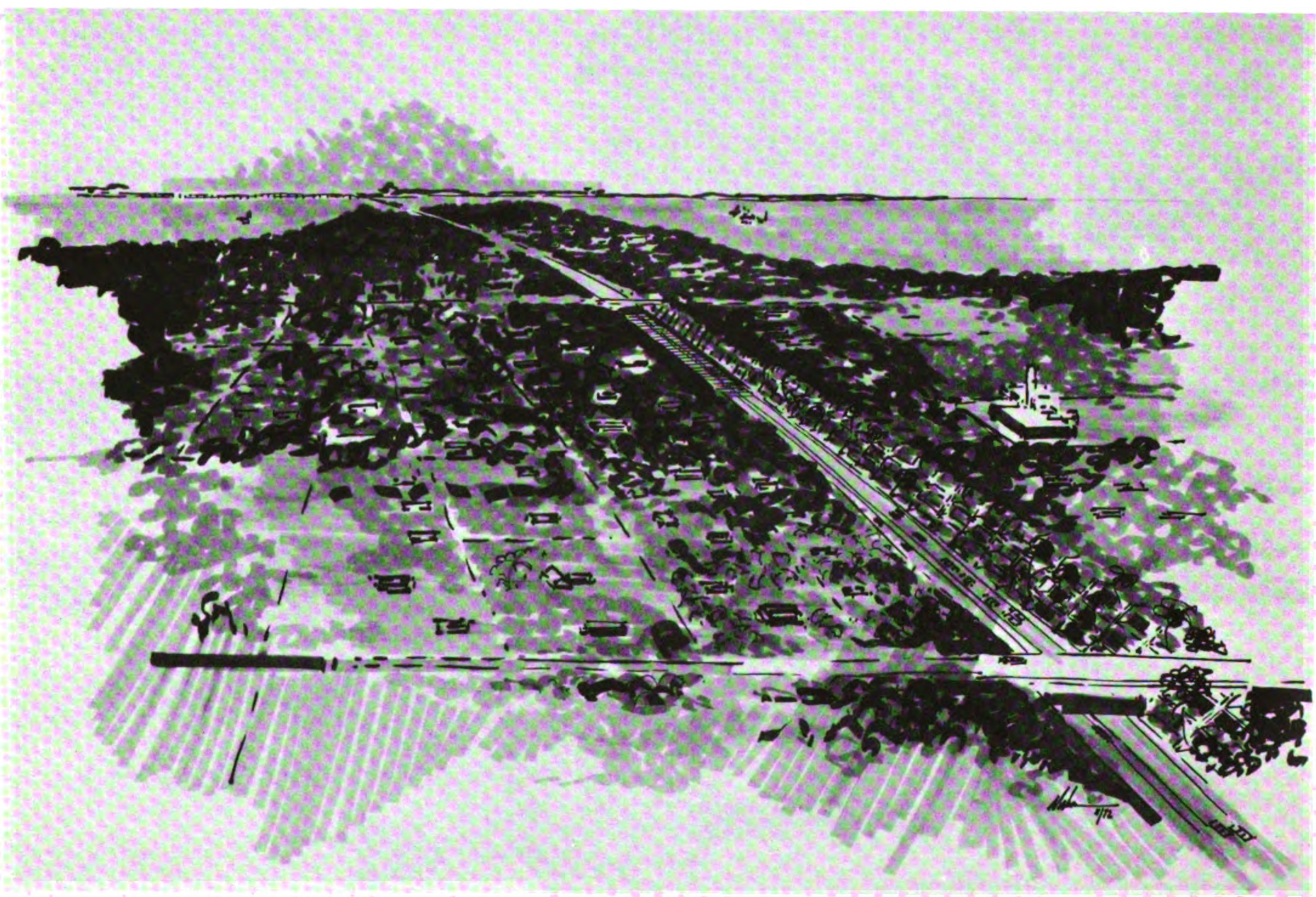
3. Where appropriate, a depressed roadway with adequate overpasses will be utilized to minimize the disrupting affects on the neighborhood. In conjunction with this technique, earth berms will be constructed from cut fill when the roadway remains at grade.

4. The right-of-way will attempt to act as a park and buffer between the transportation system, and the community. This "green belt" could include bicycle, walking trails, and other amenities if desired by local residents.

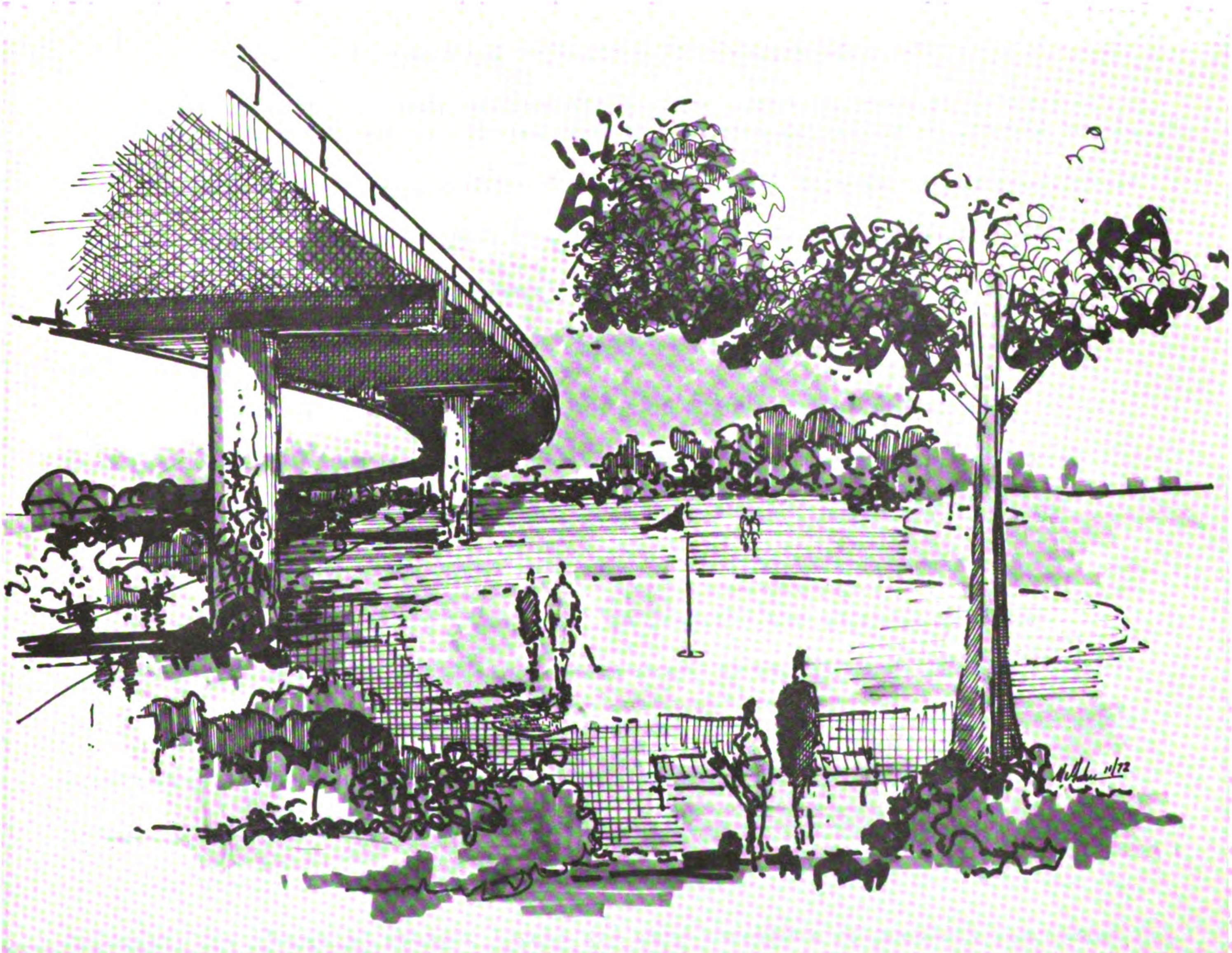
5. Disruption of internal circulation within the community will be kept to a minimum, and consequently minimize or eliminate isolation of neighbor to neighbor.

6. **Protection of the unimpeded view along the shorefronts in Bayville and Rye will be a direct concern in locating the bridge and its approaches.**

Typical study sketches of possible treatment along the route are shown on Exhibits E-11 and E-12.



ROADSIDE DEVELOPMENT STUDY SKETCH 1.



ROADSIDE DEVELOPMENT STUDY SKETCH 2.

F. UNAVOIDABLE ADVERSE EFFECTS OF PROJECT

A distinction is made between effects generic to any highway project, and those that are uniquely associated with a proposed project. For example, all highways, existing and proposed, do utilize land, and the vehicles using them do generate a degree of noise and are a source of gasious emissions which, depending upon their amount and characteristics, can affect adjacent areas. A special highway proposal may also impact public lands, disrupt ecological balance, or have distinct local impacts on adjacent neighborhoods. Given present and foreseeable technology, the generic effects cannot be entirely eliminated; only the point of impact can be shifted to affect less houses and fewer people or to avoid a particular area. Distinct effects can sometimes be entirely eliminated through proper environmental design, and can usually be reduced to a practical minimum.

PPM 90-1 provides a working definition of "adverse effects":

> "Adverse effects should include those which cannot be reduced in severity, and those which can be reduced (but not eliminated) to an acceptable level..."

In Section E, a comprehensive description of all impacts is provided. This Chapter presents a concise summary of those impacts discussed Chapter E which the project sponsors consider both unavoidable and adverse.

1. Noise

Based solely upon the general theory of highway noise propagation (see Section E-1-a) and without considering specific topographic and cultural features or details of highway design, peak hour ambient noise levels could conceptually increase up to 15dBA in a zone up to 1200 feet from the right-of way by 1995. This is the worst case; in practice the increase would be considerably less. This would place these areas in the category of "Some Impact", based on the Highway Design Guide. It does not appear likely that any area would experience a long-term increase in excess of 15dBA, or fall into the "Great Impact" category, although the possibility is not excluded on the basis of work done so far.

In practically all cases FHWA noise standards (see Table E-2) will not be exceeded; the change in ambient levels are more important to people's reactions than the absloute criteria proposed in PPM 90-2.

During the design process, the impact on each building will be studied individually. The project sponsors are committed to the reduction of noise impact to the lowest practical level through careful highway design as well as the application of acoustical design principles where further reductions are necessary. It is expected that the state of the art of acoustical treatment will, in most cases, result in a noise impact well below the current guidelines established by PPM 90-2 at that rise in ambient noise will be well below that considered objectionable.

2. Air Quality

Based upon general theory of air pollution without considering important local topographic and meteorological effects in a quantitative manner, it appears that Federal ambient standards for carbon monoxide,hydrocarbon,nitrogen oxides, particulates and sulfur oxides are easily met under "worst condition" assumptions, everywhere outside a zone 100 meters from the center of traffic.

Based upon approximate theoretical considerations, it appears that the air pollution impact of the proposed project will not be in excess of Federal ambient standards for a significant distance within the zone. The final definition of the zone outside of which all Federal standards will be met can only be made during the final design process, and must be supported by additional field survey work at existing facilities, and accurate wind data at a number of specific right-of-way locations.

3. Water Quality

The impact of the proposed project upon surface water quality of Long Island Sound will result from a small but continuing quantity of solid and liquid particles emitted by vehicles that fall directly into the Sound, or drop to the road surface and are washed into the Sound by surface drainage.

During the winter, de-icing salts and sand may be deposited on the roadway by maintenance crews and ultimately washed overboard. The impact of these substances upon water quality in the Sound would appear to be negligible. For example, oil emissions would not result in more than 0.067 parts per million concentration. This is well below any concentration that could cause a perceptible adverse effect, as fish ingestion at this concentration would not alter health or flavor.

Lead emissions were estimated to result in a concentration of 0.0074 parts per million or 0.004 mg/liter, well below the 0.100 mg/liter considered harmful to marine life. Even this small amount will probably be reduced as the use of leaded gasolines declines.

Other effects noted include the negligible contribution of silting sediments and the risk of spill of oils or hazardous materials resulting from an accident on the bridge. From experience on the facilities operated by the Triborough Bridge and Tunnel Authority, these risks are very small.

The Triborough Bridge and Tunnel Authority knows of no major accidental spill of oil or hazardous materials reaching the waterways at any of its facilities, since their openings. (This represents a history of approximately 242 facility-years taking into account all seven bridges and two tunnels over the last 36 years). Present practice calls for the removal of minor oil spills by applying sand and collecting the mixture for disposal at approved disposal sites.

4. Natural Environment

The proposed right-of-way will traverse a number of wetland areas as described in Section E. On the Long Island side, preliminary design considerations call for viaduct type construction through the very few wetland areas encountered. While this assures a virtually negligible decrease in total productive wetland acres (to accommodate occasional foundation piles) the highway may have a number of other effects. These include the reduction in sunlight hours over the traversed portions. In general, as the height of the deck is increased, the area that experiences shadow is increased. However, the degree of sunlight removed from these areas will diminish with increased structure height. The effect of shadow upon wetland production is presently unknown. This issue will be considered in more detail as part of the final design process at the time vertical clearances are to be established in wetland areas. It does not appear at this time that such wetlands will suffer any significant loss in productivity.

On the Westchester side, the approaches traverse considerably more wetland areas, but still quite small in total extent and depending upon the choice of final approach location from the alternatives considered. The major segment is associated with alternative W-2, where 200 feet of salt marsh is traversed. The ultimate impact upon these wetlands will depend upon the final design decisions, including such factors as the route alternative chosen, viaduct spans and foundations, and height of viaduct structure.

Other unavoidable adverse impacts upon the natural environment, including the impacts upon various species of fish, birds, woodland animals and other wildlife, appear to be negligible in the long term, and subject to minimizing controls during the short term construction process.

5. Communities

The major effects will be related to temporary disturbances due to the construction process, and to the relocation of homes. Such effects need not alter the basic fabric of the impacted communities, nor impede their continuing pursuit of preferred life styles.

Ultimately, regardless of all measures taken to minimize adverse effects, or to compensate affected parties, it must be stated that the building of any bridge or highway will be considered by some to be an adverse effect which can be avoided only in the event of "do-nothing". This has come to be the case in virtually any urban or suburban region where public planners attempt to implement transportation projects.

Thus, the major impact upon the community is really perceptual. Some people in the community may "feel" impacted regardless of quantifiable facts or measures taken to alleviate the effects. These feelings must be taken into account, and may be considered in a sense to be unavoidable.

The project sponsors therefore are committed to minimizing the impact upon communities in every way reasonably possible. Through community participation in the location and design decisions, including the visual aspects of the highway, feasible and prudent means of accommodating local preferences will be reflected in the project plans.

The short-term effect on the tax base of the City of Rye is to decrease the amount of assessed valuation on the tax rolls by between $600,000 and $1,200,000, depending upon the alternative selected. The short-term effect on the tax bases of the communities in Nassau County is to reduce the amount of assessed valuation on the tax rolls by between $700,000 and $1,100,000 depending upon the alternative selected between Route 106 and the shore. Some additional reductions will occur along the Seaford-Oyster Bay Expressway extension. A more detailed analysis of the effect of these losses on the total tax base will be included in the final environmental impact statement following the responses of the communities to this draft statement. These losses should be offset in the long run, however, by an increase in many property values due to the highway project.

6. Navigation

The principal effects will be upon recreational boating, mainly upon sailing vessels with lengths exceeding 16 feet. Some of these will have to make detours of up to a few miles in order to cruise their preferred locations.

This group of boats includes day sailers, cruising boats and racing boats totaling some 20,350 at all Sound locations. Not all of these boats will be equally affected, depending upon berth locations, and some portion will not experience detours.

There is a minor effect upon day racing, since one buoy presently used will have to be abandoned if the W-4 approach is utlimately chosen. This buoy is used only under certain wind conditions, and affects only one leg of the race. Other buoys can be used.

Long distance racing will be affected for those races starting west of the bridge. Either the boats will have to sail under the higher spans as is done in many racing areas, or the starting line will be moved some miles to the east.

Of course, the existence of the bridge affects all navigation in its area as it constrains ships and boats to navigate in a manner that avoids collision with the bridge and its supports. However, the bridge will not constitute an unusual or difficult navigational obstacle and a full set of navigational aids will be provided to afford daylight and night protection, and to guard against the contingencies of bad weather and poor visibility.

Alternate W-4 in Westchester presents a serious navigational obstacle to commercial traffic to Port Chester Harbor and would seal off a local marina to all but the smallest of the sailboats now berthed there.

There will be a minor effect upon boating in the Mill Neck portion of Oyster Bay Natural Wildlife Refuge. Presently the presence of a drawbridge (Bayville Bridge) and low water depth (5-6 feet at low tide) virtually limits sailboat usage to very small craft. The most restrictive alternative, N-3, with 30 feet of vertical clearance, therefore, will affect only the few large sailboats which are presently stored for the winter in a Mill Neck Creek boatyard.

These boats will either have to relocate or unstep masts in the event of inadequate clearance.

7. Visual Impacts

The bridge will present a visual impact which to some observers will be considered adverse, but experience has shown that many consider an attractive bridge to be a visual asset. This is a subjective matter and some adverse reaction is unavoidable. However, as indicated in Section E, approach highway and bridge designing will be accomplished with a conscientious effort to provide an aesthetically pleasing overall structure utilizing special architectural consultants dedicated to this end. In addition, as indicated in paragraph 5 above, community participation will be solicited in decisions regarding visual design details, including toll plazas, landscaping, slope treatment, appearance of acoustical barriers, etc.

8. Effect on Section 4(f) Lands

The lands covered by Section 4(f) provisions of the National Transportation Act of 1966 include small portions of the Oyster Bay National Wildlife Refuge, Ferry Beach in Bayville and the Rye Playland area. (See Section 4(f) Statement included in this volume under heading I.) The following table lists the 4(f) lands affected by the project and shows both the areas physically occupied by the project and the areas traversed by the project in relation to the total areas of these lands.

In all cases the nature of the occupancy of 4(f) lands does not eliminate or significantly alter the use of these areas for conservation or recreation. The highway in these areas will be carried on elevated structures and only the supporting piers and their foundations will actually occupy ground or water space. However, the overhead structure will have a visual impact and also cast shadows which in some cases may influence the productivity of wetlands underneath. The table, therefore, shows both the occupied areas and the areas traversed.

The enjoyment of Ferry Beach will be affected by shadows and also by an increase in ambient noise level due to the highway.

In Playland, several bridge piers will be required along the right-of-way as the bridge viaduct descends to grade. The elevation of the viaduct will be designed with a view to minimizing its effect, and neither the present use of the land nor its proposed future development should be seriously impaired.

TABLE F-1

SECTION 4(f) LANDS OCCUPIED AND TRAVERSED (APPROX.)

	Acres Occupied			Acres Traversed			Total Acres of 4(f) Lands
	N-1	N-2	N-3	N-1	N-2	N-3	
Oyster Bay Wildlife Refuge	0.3	0.5	0.2	1.5	3.0	1.0	3,000.
Ferry Beach	--	--	--	--	--	0.1	5.
	W-1	W-2	W-3	W-1	W-2	W-3	
Rye Playland	0.9	0.4	0.6	5.0	3.0	4.0	273.

(1) Area occupied includes space take by supports and 10-foot strip across entire width of structure at these supports.

Routes W-2 and W-3 avoid Playland Lake, but W-1 will eliminate the use of some shoreline and will take some of the surface of the lake. With the bridge at W-1, W-2 or W-3, future recreation in the presently undeveloped Playland area near the structure will take place in an ambient of higher noise than at present, although noise levels would appear to remain within the standards for this type of land use.

G. STEPS TAKEN TO MINIMIZE ADVERSE EFFECTS AND PROMOTE ENVIRONMENTAL ENHANCEMENT

1. Noise

The entire design of the highway will be undertaken with a view to minimizing noise impacts by appropriate placement of cuts and fills and, where possible, noise barriers. Careful design of roadway sections and interchanges will reduce noise through local shielding. Placement of the toll plaza will be studied carefully to minimize noise impacts. With regard to schools, churches and residences, more extensive quantitative analyses will be undertaken during design to provide responsive solutions to alleviate potential noise impact. Appropriate noise control specifications will be included in construction contracts to minimize short-term effects. The state Department of Environmental Conservation is presently promulgating rules for the control of environmental noise which will apply to construction activities.

2. Air Quality

The highway design will be conducted with special concern for minimizing the impact of air pollution along the highway approaches and bridge, and in particular in the area of the toll plaza. The Triborough Bridge and Tunnel Authority has pioneered research in the field of air pollution in tunnels, on bridges, and at toll plazas, as part of its efforts to protect the health of its employees. This work is presently being expanded to permit more accurate forecasts of air quality impact on areas outside the highway right-of-way. Such research will be applied with particular meteorological conditions so that design may reduce air pollution impact to such sensitive areas.

3. Water Quality

For land areas, during construction, extreme care will be exercised to limit and prevent erosion, silting, or alteration of land forms and natural drainage ways. Particular attention will be given to limit the introduction of fresh water into salt water embayments, so as not to adversely affect ecological families which exist there. For the over-water crossings, during construction, special precautions will be made to prevent excessive disturbance of bottom silt; any dredging or earth movements will be carefully controlled and contained. In the design of the bridge, further study will consider the advisability of collecting runoff from the bridge deck in settling basins.

The rules and regulations of toll authorities generally regulate the use of their facilities by transporters of dangerous or hazardous materials. The Triborough Bridge and Tunnel Authority, for example, does not permit the use of its bridges or tunnels by vehicles transporting radioactive materials. Explosives are allowed only by special permit requiring an escort vehicle and other precautions. Inflammables, corrosive liquids and compressed gas are controlled. The Triborough Bridge and Tunnel Authority has never experienced a serious flow or spill of hazardous materials on any of its seven bridges and two tunnels in 36 years of operation.

4. Natural Environment

The routings of the recommended bridge approach locations have been selected in order to avoid particular high-value conservation and wetland areas in the Oyster Bay corridor, such as the Mill Neck Creek Conservation areas, Frost Creek Conservation area, Bailey Arboretum and the North Shore Bird and Game Sanctuary in Nassau. Further study will be given to adjusting the locations that presently traverse wetlands to provide minimum impact to these wetlands. Any structure spanning Mill Neck Creek and other inland bodies of water will be constructed with the least practical number of supports to minimize impact to these bodies of water.

Shellfish areas in which bridge construction is to be done will be carefully surveyed, noting locations and types of shellfish beds, and kinds of substrate on which they exist. Information will then be used to adopt appropriate construction techniques, minimizing both the short-term and long-term impact to shellfish.

Recognizing that the problem of collisions of birds with lighting towers is considered minor, a study of lighting techniques will be undertaken as part of the final design.

5. Socio-Economic Impacts

Great care will be exercised to insure that existing access will be maintained and that practical steps to avoid division of neighborhoods will be incorporated into the final design of the project. For all residents, existing or equivalent neighborhood communications will be maintained. The same public access as presently exists to schools, churches and other facilities will be adequately maintained. There will be a careful phasing of construction segments, and stringent controls will be placed on routes, weights and timing of construction truck movements in order to minimize the impact during the construction period. By designing the highway approaches to include no major intersections in the Bayville area and in Rye, severe impacts on land use changes will be avoided in these communities.

For water related activities, the exact location of the main span will be designed to allow navigation to proceed with a minimum of disturbance. Navigational aids will be incorporated in the final design of the bridge to aid navigation. Vertical and horizontal clearances for spans other than the main spans will be designed to allow maximum feasible accessibility and maneuvering for recreational vessels, and a special span is planned at a distance from the main span to minimize inconvenience for tall-masted vessels.

6. Direct Impact of Right-of-Way

The New York State Department of Transportation and the Metropolitan Transportation Authority are committed to State and Federal programs providing equitable treatment for persons subjected to relocation because of construction projects. These programs establish a uniform set of provisions to assist families, individuals, farmers, businesses, and non-profit organizations to avoid the human and economic shock that can result from involuntary displacement. Accordingly, enough "decent, safe, and sanitary" housing will be available within a reasonable period of time before persons are displaced, such housing will be within their financial means and reasonably convenient to public services and centers of employment.

The development of all locations has attempted to minimize the number of structures and amount of properties taken; a number of retaining walls have been incorporated into the design for this specific purpose. Special effort has been taken in these locations studies to avoid schools, churches, or county, town, village or City buildings or properties.

Final design details will be developed for impact minimization to local adjacent lands; comments and suggestions for final design of landscaping and other treatment from those affected on adjacent lands will be fully considered.

7. Visual

Highway design details will be adapted to reinforce land use plans and guide urban patterns. The use of naturally shaped or architectural embankments for screening or enframement will be fully considered in design. The use of appropriate right-of-way planting will screen the roadway from nearby residences, as well as enhance the attractiveness of the roadway. Wherever possible, original plant cover will be preserved and volunteer growth of vegetation encouraged. Consideration will be given to the color coding and standardization of signals. New materials that enhance aesthetic possibilities will be used whevever possible. Special consideration will be given to the adaptation of the design of the approaches to the local communities.

8. Short Term Uses

This project will comply with the provisions of New York State in the construction process; these provisions, as included in the standard highway contract, will help prevent air pollution and abate water pollution resulting from soil erosion, as well as to control water pollution during the construction process. Where appropriate, construction will use the most modern equipment, which is provided with a new generation of noise silencers. Specifications and construction contracts will be written with an outline of specific steps to be taken to control and preserve the environment during the construction process. Limitations can be placed on the use and management of any operation within or outside the right-of-way.

9. Section 4(f) Lands

For the Oyster Bay Natural Wildlife Refuge, compensation for all land taken will be provided. All possibilities for multiple use of Section 4(f) lands will be considered, with the intention to retain as much land below mean high water as possible for usage equivalent to that at present. The viaduct crossing Mill Neck Creek will have sufficiently high vertical clearances to allow most vessels presently using the channel to pass beneath it. Piers will be spaced at 100 feet apart to allow maneuvering for sail and motor boats. Pier spacing will be designed to avoid placement on beach lands. During construction, care will be taken to permit transition to new usage. In terms of minimizing harm to this wetland, the most important part of the project is that the design of the Mill Neck Creek crossing will be a viaduct roadway.

For Ferry Beach, provisions will be made to compensate for any lands taken. Construction procedures will minimize impact on adjacent beaches. Studies will be made to minimize the impact of noise and air pollution.

For Rye Playland, care will be taken to study and minimize air, noise and visual impacts. Special attention will be taken in the construction process to control and divert runoff to protected outlets, and to avoid upsetting marshy areas adjacent to the roadway. Consideration will be given to the joint development of presently undeveloped lands in Playland to become a part of the active recreation in the park, financed by the bridge project as indicated below.

10. Enhancement for Joint Development Opportunities

Approximately one-half of Rye Playland is presently undeveloped, fenced off, and more or less inaccessible to the public. Consultants to Playland have recommended the construction of two 18-hole, par-3 golf courses around the lake, connecting the islands and shore with a series of footbridges. Bridge approaches W-1, W-2 and W-3 traverse the lake and/or surrounding land. Since the bridge structure of W-1 is an elevated viaduct through Playland, with a few adjustments to the layout of the proposed golf courses, the bridge could be built without interfering with the use of the area for golf. Such development need not be limited to golf, but could include a beach on the lake, a new boat house, tennis or other recreation facilities in accordance with the desires of the Westchester County Park Commission. The Playland Commission owns the land, but lacks the necessary appropriations for development; the bridge project could be a device to provide funds for such recreational facilities in exchange for easements for the project.

Experience has shown that off-shore bridge piers and pilings tend to be an attraction for fish. Under consideration is a bridge walkway extending from both shores for about 1/2 mile out into the Sound, providing fisherman with new opportunities as well as being a pleasant walkway for general recreation.

Along the line of the Bayville approaches there will be an excess of sand excavated from highway cuts. This material could be made available for distribution on local beaches where there is need for sand replenishment.

H. ALTERNATIVES CONSIDERED

Before describing the various alternatives that have been considered, it is important to review the basic objectives of the project sponsors in proposing a Long Island Sound crossing.

--Increasing the accessibility of Long Island to the mainland.

This benefits Long Island residents who will travel to the mainland for work, business, social, and recreational needs. It also benefits those living elsewhere in the metropolitan area and upstate New York and New England who will travel to and from Long Island. In Chapter C, the economic importance to the regional community, and the critical needs of Long Island, in particular, were indicated.

--Reducing the congestion presently on the East River bridges and along existing expressway and parkway routes through New York City, Nassau and Westchester Counties.

By providing an alternative, more direct way of linking the mainland with Nassau and Suffolk Counties, large trip volumes can be diverted from highways that are presently functioning poorly, particularly in peak hours. In Sections C and E the critical present conditions were indicated.

--Reducing the delays and costs associated with truck freight between Long Island and the mainland.

In broadest terms, the objective is to reduce truck costs and keep them from increasing, as they inevitably will, if new facilities are not provided to reduce the excessive physical and time resources presently being spent in goods movement. This will have important consequences for the Long Island economic community by promoting a more competitive position for new industrial and commercial activities needed to diversify the economic base. This was discussed in Section C.

In addition, there are many secondary effects of a social, economic and environmental improvement nature. The objectives of the project include maximizing the positive effects, while minimizing unavoidable adverse effects.

In weighing alternatives, each is first evaluated with respect to the above objectives. Those alternatives that do not effectively serve all of the objectives are not considered to be satisfactory alternatives. Among those alternatives that appear to effectively serve the objectives, some will appear clearly preferable to others because of the degree to which the objectives are served. These must be considered within a very different framework, oriented toward the secondary objectives. There is no simple way to compare the net effects in social, economic and environmental terms of these competing alternatives. Ultimately a choice emerges as a result of considerations by many people, including public policy makers and planners, professional specialists in the social, economic and environmental sciences and concerned representatives of the communities, in an attempt to maximize the benefits to all and to minimize the adverse effects.

Long term continuation of the existing character of the physical and human environment along both shores of Long Island Sound is of importance. However, it is essential to realize that we live in a complex society that often provides competing objectives. The provision of adequate transportation facilities and services to the region is a valid and necessary objective, which, while in conflict with the legitimate desires of some to maintain their status quo, leads to the long-term well-being and betterment of the larger community.

The cited objectives require the provision of sufficient capacity on our transportation systems, and an adequate level of traffic service, to provide for user safety. Also to be considered in the weighing of alternatives are the capital costs of new facilities at levels that represent reasonable and effective use of taxpayer money. If government is unable to respond to these needs, the results will be decreasing accessibility and significantly poorer traffic service in many parts of the metropolitan area including Long Island.

1. "Do Nothing" Alternative

One alternative is simply "do nothing", that is, not to implement the proposed Rye-Oyster Bay Bridge or any other major capital improvements which would serve travel to and from Long Island.

The basic point to be recognized is that doing nothing does not maintain the status quo. Changes are continually occurring and the conditions that exist this year will be different five years from now. The basic forces at work, such as population growth and increases in vehicular travel, continue on. In fact, doing nothing usually results in present problem conditions becoming worse, and new problems appearing.

While there may be those who believe that a growth condition is undesirable and should not occur, every study by the responsible agencies concerned with long-term growth considerations have clearly indicated that growth will continue in the region and particularly within the area served by the Rye-Oyster Bay Bridge.

By its very nature, the "do nothing" alternative can do little to meet the objectives stated above. Without any improvement in facilities and/or services, there can be no increase in accessibility between Long Island and the mainland. In fact, just the opposite can happen. The data presented in Section C clearly indicates the effect that the proposed Rye-Oyster Bay crossing will have on the relief of present congestion on the existing bridges over the upper East River and on the principal highways leading to New York City from Long Island and Westchester County. Without such relief, the situation on the Throgs Neck and Bronx-Whitestone bridges will become even worse than at present. Extended delays are already frequent, and they will aggravate as time goes on. The improvements to toll plazas and approaches now in progress will ease the situation temporarily, but their ultimate effect is limited by the capacities of the bridge roadways and approaches. Thus travel to and from Long Island under a "do nothing" alternative can only become increasingly more difficult, time consuming and costly since the demands for such travel inevitably increase.

Similarly, there would be an increase in the congestion being experienced on the Long Island Expressway and other main arteries leading to New York City on both sides of the Sound. Without relief, these routes will continue to be burdened with growing traffic traveling into the City only for the purpose of crossing to the other side of the Long Island Sound water barrier. Under such conditions, the cost of freight movement will undoubtedly continue to increase, reflecting the decreasing productivity of truck-drivers and equipment engaged in hauling to and from Long Island. Increasing congestion has other side effects---higher levels of noise and air pollution generated from increasing traffic volumes and poorer "stop-and-go" type operating conditions being examples of adverse environmental effects resulting from traffic congestion.

Perhaps the greatest impact of the "do nothing" alternative is that it would contribute nothing toward the solution of the indicated economic problems of Long Island, let alone encourage the types of diverse and dynamic growth in the various economic sectors needed for Long Island's future well-being. Presently Long Island's industrial base is quite highly specialized and narrow; its unemployment rate has for some period of time been markedly higher than that of the New York Metropolitan Region as a whole. A Sound crossing can act as a much needed catalyst to trigger a broadening and diversification of industrial and business activities. Without transportation relief, economic growth will be distinctly constrained as population increases. Lack of such growth ultimately affects the living standard. To the prospective industrialist, or business entrepreneur, there is little incentive to invest in an area where the transportation infrastructure has major deficiences -- there is a need to improve the competitive posture if diversified economic activity is to be attracted.

In summary, the "do nothing" alternative is not responsive to the basic objectives; in fact, it encourages the opposite result. The consequences of doing nothing are simple --- at the East River bridges, congestion would spread across the prime hours of the day, involuntary suppression of travel would occur, increased resources and time would be spent in travel, and the cost of moving goods would increase. As a result, the diversity of economic growth desired for the region will be constrained. It is well to remember that the Sound is a major water barrier to ground travel and that there are no existing parallel facilities which can substitute for a new vehicular crossing. The present access problem cannot be circumvented by simply ignoring it or hoping it will go away. A Long Island Sound crossing has long been included in the Tri-State Regional Planning Commission highway plan for the metropolitan area for essentially the reasons stated herein. The "do nothing" alternative is, thus, not considered a prudent and feasible alternative.

2. <u>Mass Transportation Alternative</u>

Various proposals have been made from time to time for improving transit in lieu of a Sound crossing. Most of these have centered around the purchase of new rolling stock and roadbed and station modernization of existing radial commuter rail routes oriented to Manhattan, with the feeling being expressed that this is of far greater importance and priority than a Sound crossing. Other suggestions have been made including greater coordination between rail and local bus services; the provision of more express bus service; construction of a circumferential rail transit connection via a Sound bridge; and even promotion of better freight service by rail to and from Long Island, particularly for piggyback service. This discussion will focus primarily on improvements to present commuter rail facilities and services, since on the face of it, this appears to be an alternative to a Sound crossing.

The general concept of diverting capital resources to improving mass rail transit facilities and services in lieu of constructing a Sound crossing is popular and appealing, given the great needs that exist today. However, when one considers that the origins and destinations of travel between Long Island and the mainland are extremely dispersed, and the purposes so diverse, the feasibility of significant substitution by circumferential transit appears less credible. Radial transit services and circumferential travel by highway, reflect complementary, not competitive, travel demands. They are also not competitive in terms of funding. The capital cost of a Sound crossing would be amortized through toll revenues (the approaches would be built, in part, by the State with Federal aid from the Highway Trust Fund) whereas commuter railroad and rail transit improvements are largely financed locally with the aid of Urban Mass Transportation Administration grants. In both cases, however, matching funds (at roughly a 2:1 federal/state or local rate) are required. It should be noted, also, that the capital funds available for a Sound crossing cannot be diverted to mass transit, since they will be derived from the sale of revenue bonds supported by the tolls of the bridge itself.

This alternative does relatively little to meet the stated objectives. While accessibility will be somewhat improved (newer, faster rolling stock riding over improved roadbeds, thus reducing present commuter railroad running times), this increased accessibility is restricted largely to travel to and from Manhattan, primarily for journey to work purposes. This is an entirely different travel market than that which would be served by a Long Island Sound crossing. Thus, overall accessibility of Long Island to the mainland wouldn't change much; as in the "do nothing" alternative, travel to and from Long Island other than from Manhattan would continue to become increasingly more difficult, time consuming, and costly if this alternative alone were to be implemented.

It is anticipated that attractive, modern, high speed transit services could somewhat reduce present and anticipated congestion on radial routes leading to and from New York City if the quality of the service offered is sufficient to induce some present automobile users to transfer to rail or bus routes. Travel on the Long Island Expressway is a composite of widely diverse origin-destination movements. Regardless of the quality of service offered, many of these trips cannot be made by mass transit without circuitous routings and several transfers. Radial trips, particularly for journey-to-work, are now made predominately by transit. The remaining radial journeys made by car, together with the diverse movements between many different origins and destinations, continue to cause highway congestion.

A mass transit alternative does not improve the facilities for goods movements, and thus would not contribute to a more diverse economic base for Long Island. No additional incentives would be offered for the establishment of new enterprises, plant expansion, office building complexes, and other sources of employment.

The first need of rail mass transit is to upgrade the existing rail lines to make them fast, attractive and economical in cost for commuter travel both to and from Manhattan and also between intermediate points within their respective corridors. This condition must be met before even considering the establishment of new rail lines crossing the region. Any attempt to do so would only direct needed funds from modernization programs currently under way.

Since present rail lines are all oriented toward the urban core, the only way that trips between opposite sides of Long Island Sound can presently be made by mass transportation is to travel into Manhattan on one line and then out again on another. This is both too time consuming and costly to serve any significant number of such commuters. There appears to be no practical way in which radial mass-transit services could be improved to make them satisfactorily serve the diverse trips that would benefit from a Sound crossing.

The only form of mass transit that presently functions effectively in areas of diverse origins and destinations is a bus system. Developments in the transportation field may result in other feasible forms of transit for these areas, but they are not available with the present state of the art. The present highway system is capable of handling bus service, and regular bus service is established between Queens and The Bronx via the East River bridges. For cross-Sound movements, such a service is not practical at the present time because these buses would be forced to make circuitous trips via the overcrowded radial routes.

The Rye-Oyster Bay Bridge will provide the capability of establishing an express bus transit system across the Sound between Nassau and Westchester counties. With the growth of regional sub-centers on both sides of Long Island Sound, it is entirely possible that the provision of express bus service will be a feasible and practical way of carrying passengers between points on Long Island and Westchester County. Such services depend, however, upon providing a Long Island Sound crossing to expedite circumferential travel between regional centers located at such points as White Plains and Mineola.

There is perhaps one advantage to both the "do nothing" and mass transportation alternatives. They avoid the short-term localized impacts that are inevitable during the construction period of major highway projects. These effects are overwhelmingly offset by greater travel demands placed upon the existing parts of the system and the resulting degradation in terms of increasing congestion, safety, air and noise pollution as well as a general reduction of economic health and environmental quality in the areas experiencing such unsought travel intrusion. Mass transit, peripherally or radially, is not considered a prudent and feasible alternative to the project.

3. <u>Easterly Crossings of Long Island Sound</u>

The Creighton-Hamburg study considered five different crossings of Long Island

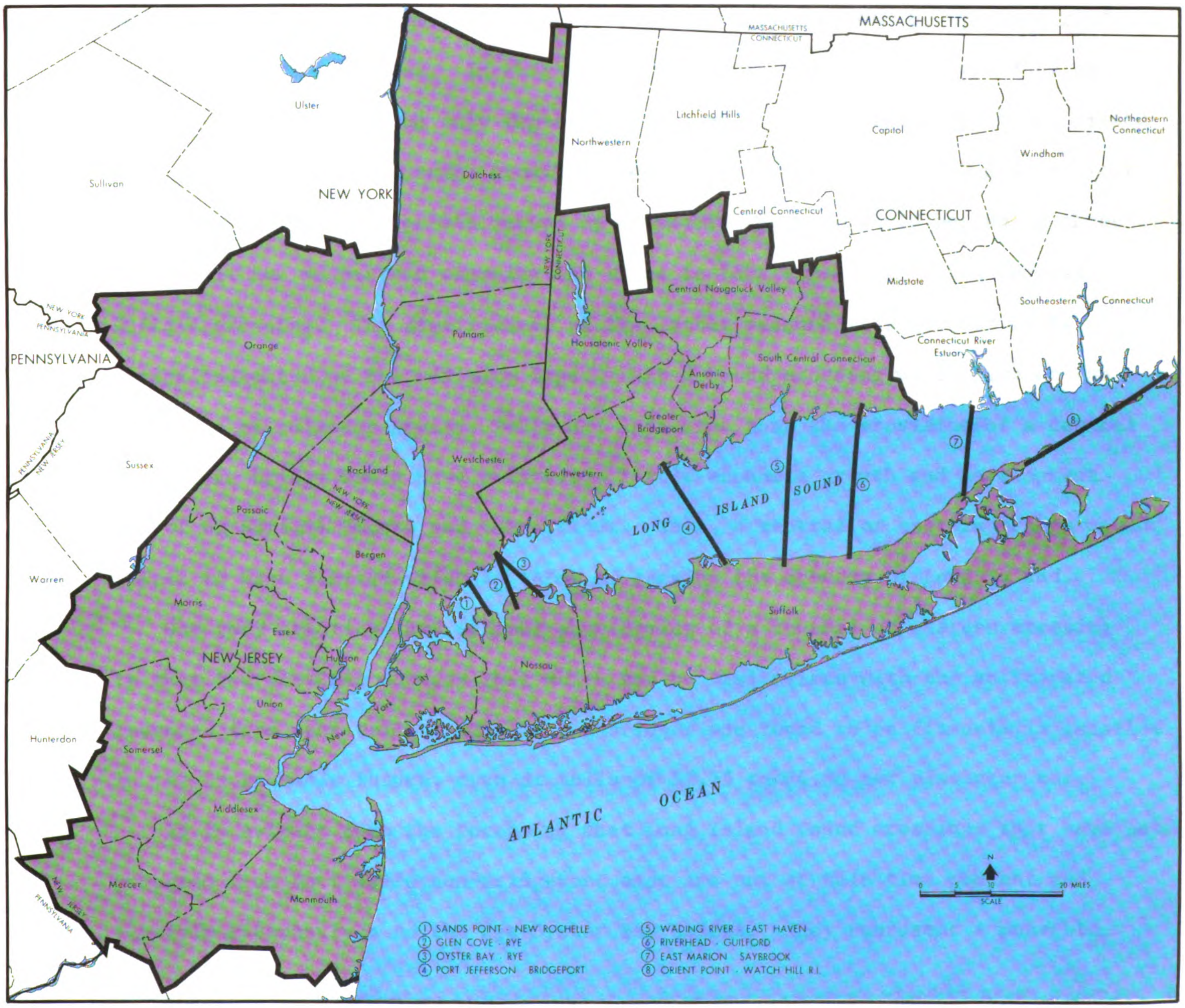
Sound to the east of the proposed Rye-Oyster Bay Bridge. These were all located between Suffolk County on the Long Island side and either Connecticut or Rhode Island. These crossing represent locations which had been suggested or studied from an engineering point of view at one time or another and represented the most promising sites. Other crossing sites are possible, although they would have severely higher costs and similar social, economic and environmental effects. This section focuses on the concept of an easterly crossing rather than a comprehensive consideration of all such possible crossings. (Exhibit H-1)

The various crossings included in the Creighton-Hamburg study are listed from west to east order below together with the approximate bridge lengths and costs:

Southern Bridgehead	Northern Bridgehead	Overwater Length	Estimated Project Cost*
Port Jefferson	Bridgeport, Conn.	14.6	$368,300,000
Wading River	East Haven, Conn.	19.3	564,700,000
Riverhead	Guilford, Conn.	19.2	494,500,000
East Marion	Old Saybrook, Conn.	9.8	335,800,000
Orient Point	Watch Hill, R.I.	24.6	634,800,000

*Exclusive of bonding requirements.

Examination of these crossings indicates that they are all outside the heavily developed portion of the New York region. They do not serve the heavy volumes of traffic between Nassau County and the northern shore of the Sound. The estimates in the Creighton-Hamburg study show that they will divert only about 25 to 40% as many vehicles as the Rye-Oyster Bay crossing. The other 60 to 75% are not served by these easterly crossings. Therefore, they cannot provide significant relief of the congestion on the present East River bridges or on the crowded major arteries leading to them. While they do somewhat improve accessibility to and from Long Island, they serve movements primarily between Long Island and New England rather than the heavier traffic movements to the metropolitan and upstate areas of New York State and adjacent territories.



LOCATIONS STUDIED FOR LONG ISLAND SOUND CROSSINGS.

The Creighton-Hamburg study estimated the impact that western, central and eastern crossings would have on Westchester, Long Island and Connecticut population, housing units, employment and real property valuation. Their findings were that a western crossing, such as the Rye-Oyster Bay Bridge, would produce more growth in the economies of the areas joined than a central or eastern crossing. This difference is indicated in the attached Table H-1 from the Summary volume,[a] which shows that the projected total growth served by a western bridge is roughly three times that of a central bridge and five times that of an eastern bridge. Even when considered as a percentage of total projected growth by the year 2000, a similar picture emerges. In this case, the proportional growth served by an eastern crossing would be only two-thirds that of a western crossing. When viewed as a percentage of the normal growth projected to occur between 1970 and the year 2000, the proportional growth served by a western crossing would be two to three times that for an eastern crossing and three to four times that for a central Suffolk crossing. The significance of the latter measure lies in that it is a direct indicator of the additive impact that a Sound crossing would have on the economics of adjacent areas. Table H-1 indicates that the provision of a central or eastern bridge would have relatively little economic growth and development impact on Suffolk County and Connecticut. Thus, a central or eastern bridge would appear to have limited value in terms of serving the economy of Long Island.

One very practical and serious shortcoming of a central or eastern crossing is that the cost far exceeds that which can be capitalized with the anticipated revenues from user tolls. None of the bridges was found to be financially feasible in the foreseeable future, even at tolls of \$2.75 to \$4.00 per passenger car.

It is evident from the foregoing that Long Island Sound crossings that have been proposed from Port Jefferson-Bridgeport east are not at this time prudent and feasible alternatives to the Rye-Oyster Bay Bridge. They represent a possible

(a) A Comprehensive Study of Proposed Bridge Crossings of Long Island Sound - summary, New York State Department of Transportation, January 1972.

TABLE H-1

COMPARISON BETWEEN NORMAL GROWTH AND ADDITIONAL GROWTH GENERATED BY PROPOSED LONG ISLAND SOUND CROSSING, 1970-2000

Bridge and Measures of Growth for Affected Counties	Unit of Measure	Estimated 1970	Normal Growth	Added Growth	Generated Growth as a % of Year 2000 Projected Growth	Generated Growth as a % of Normal Growth
Western Bridges (1-3)[a]						
Population	people	3,883,000	1,706,000	130,100	2.3	7.6
Occupied Housing	units	1,117,000	404,000	37,600	2.5	9.3
Employment by Place of Residence	workers	1,444,000	711,000	52,300	2.4	7.3
Employment by Place of Work	workers	1,248,000	714,000	43,500	2.2	6.1
Full Valuation	$ millions	24,352	19,994	1,780.8	4.0	8.9
Central Bridges (4-6)[b]						
Population	people	2,634,000	2,241,000	39,800	0.8	1.8
Occupied Housing	units	769,000	585,000	11,300	0.8	1.9
Employment by Place of Residence	workers	984,000	864,000	13,900	0.8	1.6
Employment by Place of Work	workers	882,000	788,000	13,900	0.8	1.8
Full Valuation	$ millions	15,014	20,504	615.8	1.7	3.0
Eastern Bridges (7&8)[c]						
Population	people	658,000	1,092,000	27,000	1.5	2.5
Occupied Housing	units	204,000	304,000	8,200	1.6	2.7
Employment by Place of Residence	workers	242,000	404,000	10,100	1.6	2.5
Employment by Place of Work	workers	219,000	344,000	11,000	2.0	3.2
Full Valuation	$ millions	2,942	6,965	211.3	2.1	3.0

a. Bridges: 1) Sands Point-New Rochelle, 2) Glen Cove-Rye and 3) Rye-Oyster Bay
Counties affected: Westchester, Fairfield, Nassau, Western Suffolk

b. Bridges: 4) Port Jefferson-Bridgeport, 5) Wading River-East Haven and 6) Riverhead-Guilford
Counties affected: Fairfield, New Haven, Suffolk

c. Bridges: 7) East Marion-Old Saybrook and 8) Orient Point-Watch Hill
Counties affected: Middlesex, New London, central and eastern Suffolk

future second crossing of the Sound that should be considered at some date when population densities in the tributary areas are considerably greater than they are now.

4. Tunnel and Ferry Alternatives

In addition to providing a bridge crossing, there are also other potential ways of transporting people and goods across a body of water. These alternatives must be considered and compared with a bridge as to service provided, effect on the environment, and feasibility.

a. Tunnel Crossing of The Sound

A tunnel would increase the accessibility between Long Island and the mainland in the same fashion as a bridge. It would help reduce the congestion presently experienced. In addition, a tunnel offers aesthetic advantages over a bridge through the absence of a structure above the water and would eliminate most vertical and horizontal clearance restrictions affecting boating. On the other hand, a tunnel would incur significantly greater construction and operating costs and would create major negative environmental effects.

While the obvious visual impact across the Sound caused by a bridge is eliminated, a vehicular tunnel, unlike subway and railroad tunnels, requires extensive ventilation facilities which must rise above the water surface. Motorists driving through existing tunnels may not be aware that extensive space is provided below the roadway and above the ceiling for the flow of air required for ventilation. In a conventional vehicular tunnel, the ventilating equipment and air shafts to the surface are located at intervals of about one mile. If this conventional pattern were to be used for a Sound crossing, four to six of these structures would be needed, depending upon the length of the crossing at the tunnel location. Each of the structures would be about 80 feet by 80 feet and be some four stories high above the water surface. If this number is to be reduced, the number of fans and the total air space must be increased substantially, and a larger tunnel must be built to keep the air required for ventilation at acceptable velocities. With ventilating structures spaced two miles apart, the size of each structure would increase as each must be capable of supplying double the amount of air required for ventilating structures spaced one mile apart. The visual impact of a tunnel, therefore, is not negligible and, in fact, may be more severe to some than that caused by a bridge.

Because there is no rock near the Sound's bottom for the majority of the distance across, a bored tunnel is not practical. The most feasible engineering method for constructing the tunnel is the placement of precast tunnel sections in a trench along the bottom. To handle the required volume of air and provide four lanes for traffic, these sections would have to be 55 or 60 feet wide and approximately the same height. Digging a trench to bury them across the Sound will obviously have a major environmental impact on the Sound bottom and adjacent waters. If this were to be done in an area where the Sound is six miles wide, some five million cubic yards of material would have to be displaced from the bottom. The impact of this excavation is substantially greater than caused by the driving of piles required for a bridge.[a]

Aside from the environmental effects, the cost of a tunnel across the entire stretch of the Sound, considering both initial investment and annual operating expenditures, have an overwhelming negative impact on the financial feasibility of the project. Preliminary estimates indicate that the complete tunnel will cost more than $200 million per mile and that the annual operating expenses will be at least ten million dollars higher than for a bridge crossing at the same location. These cost figures are based on the experience of the Triborough Bridge and Tunnel Authority which presently operates two tunnels under the East River. The projected volumes of traffic, considering any feasible toll rates, will not produce revenues sufficient to amortize these additional costs

(a) A cable anchored submerged buoyant tunnel is not a feasible concept given the draft of ocean-going shipping using the Sound of the depth of the Sound in the area.

and, therefore, a tunnel project could not be financed through the public sale of revenue bonds.

For these compelling reasons, the tunnel scheme is not considered a feasible alternative to an above-water bridge structure.

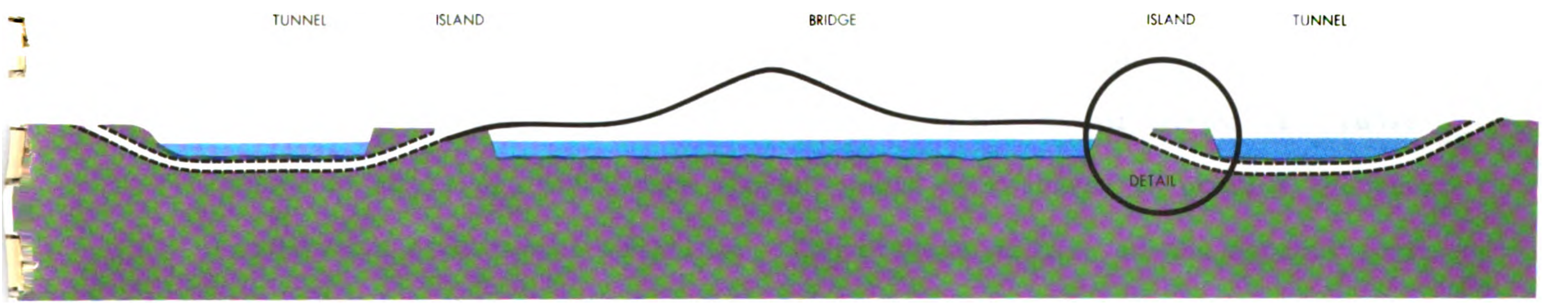
b. Bridge-Tunnel Combination

The alternative of a combination bridge-tunnel provides a visually free shore line at a somewhat lower cost than a complete tunnel going from shore to shore. It would similarly increase the accessibility between Long Island and the mainland and would help in reducing congestion on existing radial routes and the East River Bridges.

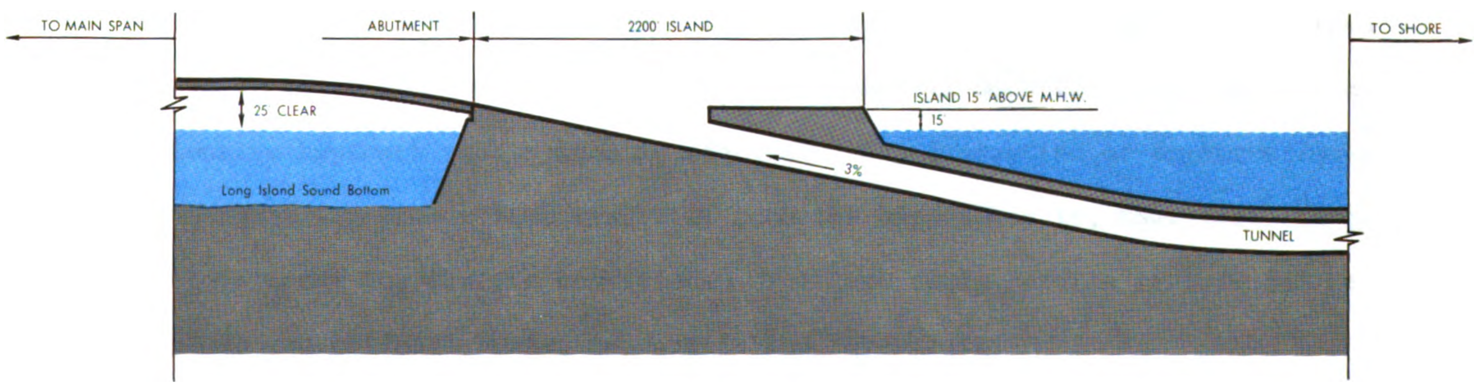
This alternative would consist of a tunnel section for some distance from each shore and then a transition to a bridge across the greater part of the Sound. The initial cost and the annual operating cost for this scheme, although slightly lower than that for a tunnel, are still beyond the range that can be financially supported by the anticipated tolls. Two ventilation buildings would still be required. The negative environmental effect for the stretch of the bottom would be similar to that noted for the tunnel. An additional effect, however, would be caused by the transition area where the structure changes from a tunnel to a bridge.

In other locations where bridge-tunnel solutions have been used, this transition area has been constructed by the placement of material creating an artificial island.

The length of the island must be sufficient to allow the roadway to rise at a 3% grade, while ensuring that the top of the tunnel will be at least 15 feet below the water surface and also that the bridge structure will provide at least 15 feet of clearance at the water's edge. This requires a distance of 2,200 feet for each of two islands (See Exhibit H-2), which would obstruct



SECTION



DETAIL

NOT TO SCALE

OFF-SHORE TRANSITION ISLAND FOR BRIDGE-TUNNEL ALTERNATIVE.

navigation as well as water currents for a total distance of more than 3/4 of a mile.

The effect on navigation by creating two islands in the Sound would be much more severe than that caused by a bridge. On the Long Island side, the island would be directly in the path now used by most commercial vessels. Shipping would, therefore, be forced to change the present pattern of navigation.

Water currents would also be affected to a much greater degree by the bridge-tunnel islands than by a bridge, since a substantial reduction would be made in the effective width of the Sound at this point. To create two artificial islands required by this scheme, a minimum of one million cubic yards of material, using rock slopes, would be required to provide the transition area from tunnel to bridge. The effects of this on the natural environment would be significant.

A bridge-tunnel alternative likewise is not a feasible solution.

c. Ferry

Ferry service sometimes is a viable solution in areas where traffic volumes are low, the water span wide, and the cost of bridging high. To a minor extent, ferry service does increase the accessibility between two areas connected. The advantages over a bridge or tunnel are that no physical structure is required above or below the water, the initial investment is much less, and usually no extensive approach road system is required. Any disruption or negative impact on neighboring communities resulting from the approaches is, therefore, largely avoided under low traffic conditions. The term ferry service is intended to include conventional boats, hydrofoils and hovercraft.

On the negative side, however, are the facts that: 1) the capacity is extremely limited; 2) on the basis of the traffic volume carried, both the initial cost and annual operating expenses are very high; and 3) compared with a bridge or a tunnel, the service is relatively slow and involves waiting, loading and unloading time.

Nationwide experience has shown that virtually all major ferry installations are not able to meet operating costs from the tolls charged. Subsidies of some type are, therefore, required. There has also been a long-term trend towards replacing ferry service with bridges as traffic volumes have increased.

The time savings afforded by a ferry service would possibly accrue only to the few travelers who are going between points near the ferry terminals on each side, and who otherwise are required to make a long round-about trip. In other cases the savings disappear. For example, the existing Bridgeport-Port Jefferson ferry may serve the limited number of travelers between these two points who plan their trips to match the ferry sailing schedule. For others, however, the travel time is faster on the routes into and then out of New York City. Conventional ferry service between Rye and Oyster Bay, as another example, would not offer any savings over the present Throgs Neck route if there were any appreciable waiting time for the boats.

More important, however, is the fact that the demand in the New York Metropolitan area greatly exceeds the practical capacity by ferry service. Peak service presently provided by ferries, such as those which are operated as links on the main highway routes of Denmark, can handle only a maximum of some 800 vehicles in one direction per hour. The demand in the Rye-Oyster area is estimated at about 3,000 vehicles per hour by 1990.

While it may be argued that it is desirable to limit the number of vehicles handled in order to minimize travel and the associated effects, this is not consistent with the planning goals of the region as outlined in Section C. The needs of the large number of residents in the area will not be met, the flow of goods would be aided only to a minor degree, and the relief to the congested East River bridges and East-West arteries would be minimal.

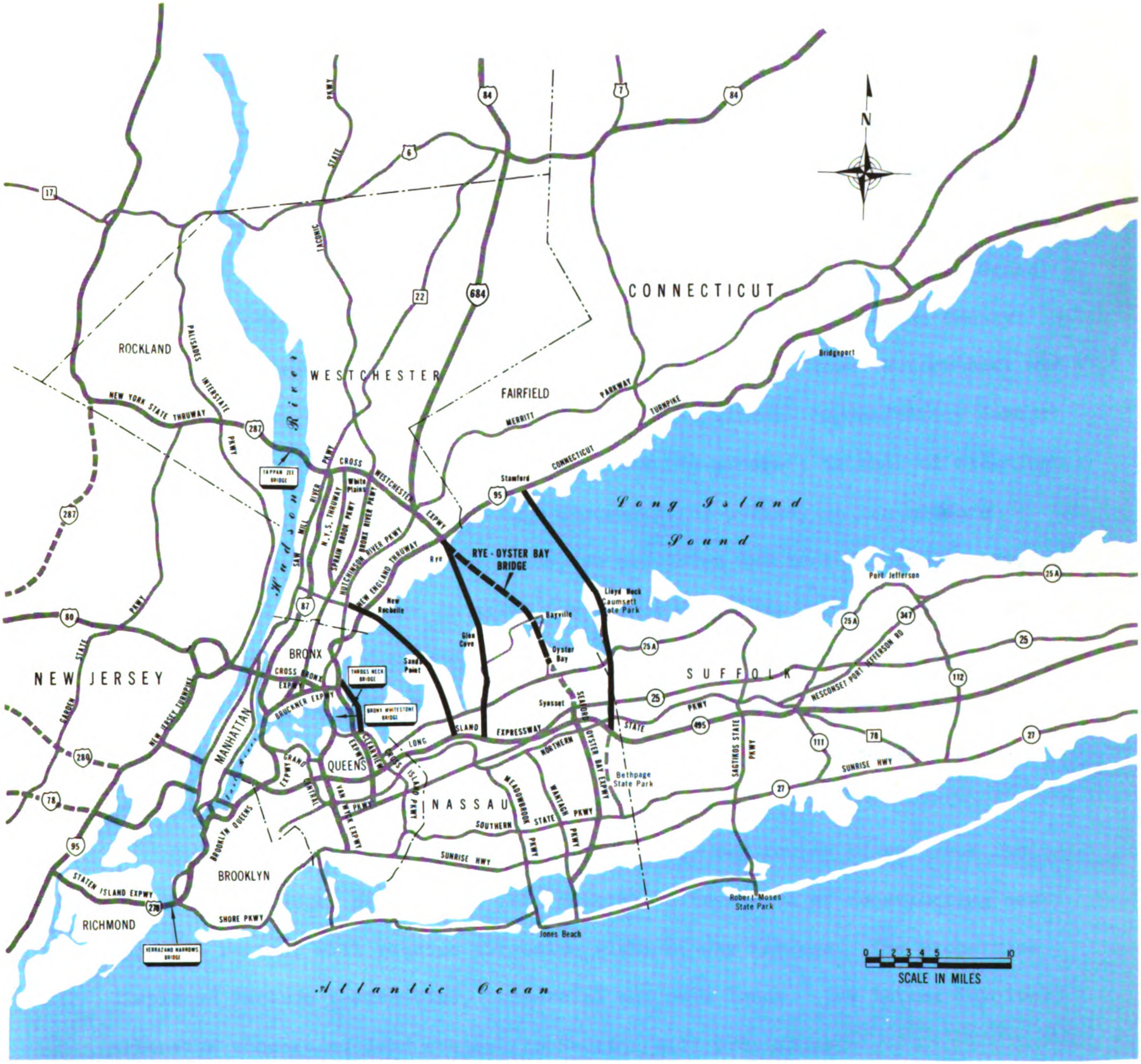
Even if only 800 vehicles per hour were handled, the local streets adjacent to the shore on either side of the Sound leading to possible ferry slip locations would be severely taxed. New routes would probably be required. The effect on the community, therefore, would begin to approach the effect caused by bridge access routes, and the advantages of the ferry service would disappear. If the required relief were provided, approaches similar to those required for a bridge would be needed. The relief, however, is not provided, and this and the other disadvantages clearly indicate that this alternative is not a viable one.

5. Alternative Sound Bridges

Over-all investigations were completed for a number of alternative corridor locations in the western part of the Sound. (Exhibit H-3) These studies, which covered four alternative crossings for the bridge and its approaches, have been made at somewhat different levels of detail, depending upon a judgement as to whether the particular corridor appeared to have a reasonable chance of being feasible. Other western crossing corridor alternatives appear to have an even less likelihood of being feasible and/or prudent. Thus the four alternatives discussed in this section, taken together as a family, represent the general alternative of a western bridge crossing other than the proposed Rye-Oyster Bay bridge. Alternatives within this area are all considered as being potentially capable of fulfilling basic regional transportation and economic objectives summarized at the beginning of this chapter. In addition to the Rye-Oyster Bay bridge, a new crossing parallel and in close proximity to the present Throgs Neck Bridge between Queens and The Bronx, and alternative western Sound crossings between Sands Point and New Rochelle, Glen Cove and Rye and Lloyd Neck and Stamford were carefully studied to ascertain if a bridge in any of these corridors could be successfully integrated into the regional transportation network and to assess their general impact on the community were they to be built. These studies of individual alternative corridors were carried to the point where it became apparent that the particular alternative under study, if constructed, would result in natural and human environmental impacts which were considerably more severe than those which would be caused by the Rye-Oyster Bay location.

a. A New Bridge Paralleling the Throgs Neck Bridge

A maximum traffic relief to the existing Throgs Neck and Bronx-Whitestone Bridges between Queens and The Bronx could in theory be provided by constructing a parallel bridge. Clearly, such a facility is in an ideal geographic position



ALTERNATIVE LOCATIONS FOR WESTERN SOUND CROSSING.

to serve the traffic presently using the existing crossings. A parallel bridge could be either a totally separate facility providing for two-way travel, or might be a structure designed for one-way travel with the existing Throgs Neck Bridge being converted to serve traffic traveling in the opposite direction.

In order to function properly, however, a combination of constructing new approaches or reconstructing the existing approaches to the Throgs Neck Bridge would be required in order to effectively utilize the added capacity. In The Bronx and Westchester County, the primary routes affected are the Throgs Neck Expressway and the New England Thruway. In Queens and Nassau County, the primary route affected is the Long Island Expressway. Also affected to a lesser extent are the Bruckner and Cross-Bronx Expressways and Hutchinson River Parkway in The Bronx, the Clearview Expressway and the Cross Island and Grand Central Parkways in Queens, and the Northern State Parkway in Nassau County. Given the present intensive development in New York City, lower Westchester and Nassau Counties, a new route would appear to be a virtual impossibility except in the vicinity of the parallel bridge. Thus the prospect is that of widening 20 to 30 miles of generally six-lane expressway or parkway to ten or more lanes. In practically every instance, no provision was included in the original design of these facilities to allow for future widening; hence total reconstruction of the structures over or under the routes would probably be necessary as well as acquisition of frontage properties on one or both sides of the present right-of-way. Such reconstruction is expensive in terms of capital cost and maintenance of traffic service during construction.

Community Impact. The expansion of the approach routes to and from the Throgs Neck Bridge, or the even less feasible alternative of constructing new approach routes, will require extensive right-of-way takings. The properties displaced include residential, commercial and park lands. The latter involves extensive amounts of land subject to Section 4(f) provisions.

Expansion of the Clearview Expressway would take many new adjacent homes in Bayside that border the service roads. Also potentially affected would be Cunningham Park and Clearview Park and Golf Course. If the Cross Island Parkway were to be widened, there would be a severe impact on the shore line of Little Neck Bay and adjacent park lands, particularly Alley Pond Park. Expansion of the Long Island Expressway would have the same effect in Bayside and Douglaston and in Nassau communities such as Roslyn Heights and Jericho. If Northern State Parkway is to be expanded to provide the necessary additional traffic capacity, residential property takings would be required in Searington, Albertson, East Williston, Carle Place, Westbury and Hicksville. In The Bronx, the widening of the Throgs Neck Expressway and Bruckner Expressway would extend the service roads into an area now occupied by private homes and apartments, besides taking land from Ferry Point Park and Pelham Bay Park. The same is true for the required expansion of the New England Thruway and Hutchinson River Parkway through The Bronx and into Westchester. Both of these routes pass through Pelham Bay Park for nearly a mile in The Bronx. Further expansion of the Thruway and of the Hutchinson River Parkway into Westchester will adversely affect the park land along these roads.

In Nassau County, expansion of the Long Island Expressway and Northern State Parkway would require takings from Deepdale Golf Club and Fresh Meadow Country Club as well as a major reduction, and in some cases elimination of the green areas along these routes.

Transportation System Considerations. The effects on the transportation system of this alternative are both positive and negative. On the positive side, the parallel route would provide an alternative for the over 65,000,000 annual users of the Throgs Neck and Bronx-Whitestone Bridges, and relief to the overcrowded conditions is thereby provided. This, as noted earlier, can only occur if an expansion of the capacity of the approach roads is completed. If these approach roads are not constructed through The Bronx into Westchester County and through Queens into Nassau County, no relief will be provided for the congested arteries on both sides of the Sound; thus one of the prime objectives of the project would not be achieved. In fact, the opposite would be true. Additional traffic would be forced to use these arteries in order to reach the parallel bridge. Since these existing expressways and parkways are already at or near capacity during most of the prime travel hours of the day, the added capacity of the new bridge could not be effectively utilized, and the project could not function as planned. The expansion of the approach roads are, therefore, considered as an integral part of this alternative.

While a parallel crossing can obviously continue to serve all those travelers now using the Throgs Neck Bridge, the potential distance savings to many that are offered by a Rye-Oyster Bay crossing will not accrue if these drivers must continue to travel into the City, as they do now, before they can reach a crossing, and then travel out again. Some time savings are conceivable as a result of relief of congestion on the existing roads and East River bridges. Vehicle-miles of travel will not be reduced.

Because the time and distance savings will be substantially less than with the Rye-Oyster Bay crossing, the effect on the economic conditions of the area will also be substantially less. The increase in jobs and market opportunities described for the Rye-Oyster Bay Crossing therefore, will not accrue to that degree with an alternative route parallel to the Throgs Neck Bridge.

<u>Assessment of Physical Impact</u>. Noise studies along high volume expressways and parkways have in general shown that generated noise increases proportionally with traffic volumes and that the total area impacted by objectionable noise levels increases. In the case of existing heavily travelled facilities, the noise generated by a major increase in traffic usually is not appreciably noticeable to nearby residents since the change is only in the order of 3 to 5

decibels and generally occurs quite gradually through time. In intensely populated areas, such as exists along the periphery of much of the identified expressways and parkways, and where noise levels are already at or exceed noise standards for new facilities, this effect can raise noise levels to above "standards" for major new groups of residences spread out linearly along both sides of the facilities affected. On the other hand, a totally new facility usually does lead to increased ambient noise levels in immediately adjacent areas since the ambient noise levels are relatively low. However, with proper design and acoustical treatment, these noise levels can usually be kept within prescribed "standards". The precise impact, of course, depends upon the number of people affected and the relative change in ambient noise levels. It appears that the increased traffic volumes on reconstructed approach highways leading to a parallel bridge would increase the noise levels experienced by far greater numbers of people than by constructing a new route which bypasses heavily developed portions of the metropolitan area. While the net effect of noise created by a bridge facility paralleling the Throgs Neck Bridge is totally different than that for the Rye-Oyster Bay corridor, it is believed that the overall impact on the region as a whole is greater with a parallel bridge.

The additional traffic on an alternative route paralleling the Throgs Neck Bridge and the approaches on either side will similarly increase the level of air pollution along the entire route. The number of persons affected by these increased levels, based on the population adjacent to these routes, will be greater than the population affected by a Rye-Oyster Bay facility.

Wetland areas on both the Queens side and The Bronx sides are small, although there will be some effect on the shoreline in The Bronx adjacent to the present bridge. The widening of the New England Thruway through The Bronx would likely result in some filling or other disturbance to existing marsh and wetlands in the area of Pelham Park.

Summary. In conclusion, the difficulty of providing new or reconstructed approach routes to a new bridge paralleling the Throgs Neck Bridge on account of the dislocation of people, the taking of extensive parklands in Westchester, The Bronx, Queens and Nassau County, the high cost of providing additional capacity, and the added impacts of noise and air pollution upon adjacent residents make this alternative appear unfeasible.

b. Bridge Between Sands Point and New Rochelle

A bridge in the Sands Point-New Rochelle location, some six miles west of the Oyster Bay crossing, would provide greater traffic relief for the existing East River bridges, than the recommended crossing. The construction of this route, however, would have serious negative impacts as discussed below.

The Route. The location in this corridor runs from the Cross County Parkway through a residential area of North Pelham into New Rochelle passing by the New Rochelle Hospital and crossing the principal east-west arteries near North Avenue. It then proceeds through the main business district, crosses Pelham Road and goes through the residential and park land adjacent to the bridgehead on the Sound. The length of the approach is about three miles.

On the Nassau side, the bridgehead is at Prospect Point, a residential and park area. The route follows the west shoreline of Hempstead Harbor through the U.S. Military Reservation and along the route of West Shore Drive. It passes adjacent to the sand pits and incinerator in Port Washington, under Northern Boulevard and through the residential area of Roslyn Heights. The southern connections are with the Long Island Expressway and the Northern State Parkway where there are commercial and industrial establishments, a shopping center and closely spaced residential homes. From the bridgehead to Northern State Parkway, the route length is approximately 8.3 miles.

Community Impact. The most critical aspect of the Sands Point-New Rochelle alternative is its impact upon the communities.

In New Rochelle and North Pelham, the route runs through single family, apartment and recreational areas. The approximate route is shown superimposed on aerial photographs H-4, H-5 and H-6. Its route bears little relationship to the existing neighborhoods, boundaries or zoning lines. The resulting loss of portions of the central business district, together with a disruption of area institutions runs counter to the City of New Rochelle's goals. It also reduces the total recreational areas available, and this too is the reverse of one of the local goals of the community which is to provide more recreation space. Opposition to the route connecting the New England Thruway and the Cross County Parkway has been widespread, both in New Rochelle and in the Pehlhams. This proposed route has been included in the Tri-State Regional Planning Commission's interim plan for the metropolitan area.

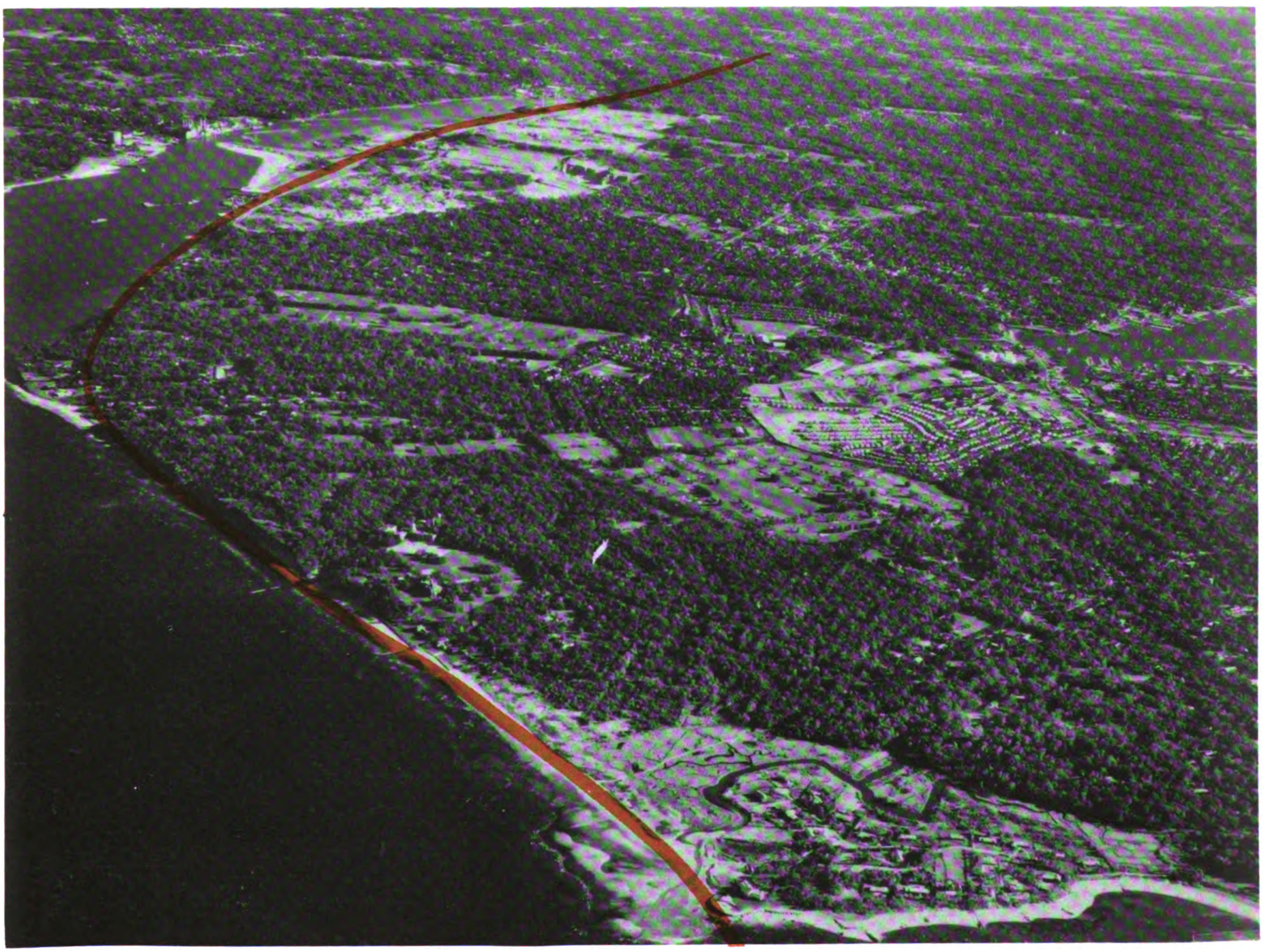
On the Nassau side, the route passes through the communities of Sands Point, Harbor Hill Park, Beacon Hill, Port Washington, Flower Hill, Roslyn and Roslyn Heights. (Exhibits H-7 and H-8) The route takes a portion of a military installation and parklands along the shore of Hempstead Harbor. In the densely built up areas of Roslyn Heights, the impact will be severe and the displacement large in comparison with the total size of the community. The effect on tax ratables, with the loss of numerous residential, and commercial and institutional properties, would be major.

As to the use of the Sound itself, the crossing will be shorter than required between Rye and Oyster Bay, but the effect on recreational boating and particularly on day sailboat racing will be at least as severe. A crossing

ALTERNATIVE APPROACH ROUTE THROUGH NEW ROCHELLE LOOKING NORTHWEST.

ALTERNATIVE APPROACH ROUTE THROUGH NEW ROCHELLE LOOKING NORTHWEST.

ALTERNATIVE APPROACH ROUTE THROUGH NORTH PELHAM AND NEW ROCHELLE LOOKING SOUTHEAST.



ALTERNATIVE APPROACH ROUTE THROUGH SANDS POINT LOOKING SOUTH.

ALTERNATIVE APPROACH ROUTE THROUGH ROSLYN HEIGHTS AND PORT WASHINGTON LOOKING NORTH.

between Sands Point and New Rochelle passes very close to the existing sailboat racing course. It is also in the immediate area of the start of many of the long-distance races.

Direct Effects Along the Right-Of-Way. The dislocation in New Rochelle and North Pelham represents a loss of approximately 250 buildings, including both residential and commercial facilities. Several of the central shopping blocks of the downtown New Rochelle area would be displaced together with some large apartments on the shore. On the Nassau side, another 120 buildings would be displaced in the communities along the route, exclusive of the interchange areas. At the interchange areas, it is estimated that another 30 to 50 homes and at least five commercial properties would be taken, including a portion of a shopping center.

Three schools would be displaced in the New Rochelle-Pelham area and access to two schools would be made more difficult on both sides of the Sound. The route also takes some church properties.

Other facilities affected include the New Rochelle Hospital, the major health facility for the area, a water facility and government offices in North Pelham. If the hospital area is to be avoided, additional park lands would have to be acquired.

There are no known historical sites on either bridge approach.

Parks affected in New Rochelle include the Glenwood Park and part of Davenport Park. Also taken would be a portion of Glenwood Lake.

On the Nassau side, this alternative crosses two public parks, two beaches and the IBM Country Club. Shore frontage on Hempstead Bay both private and public, is also severely affected. Other routings designed to avoid the waterfront would result in even greater displacement of residences and neighborhood disruption.

Transportation System Considerations. The proposed approach on the north end would tie in to the New England Thruway at the North Avenue interchange and would then extend westward to connect with the Cross County Parkway near its interchange with the Hutchinson River Parkway. The two parkway routes are now limited to passenger vehicles. Unless they were opened to mixed traffic, commercial vehicles would not be provided with a cross county artery and would have to proceed on the New England Thruway, either southward to the Cross Bronx Expressway or northward to the Cross Westchester Expressway, or else use local non-express roads.

On the Nassau side, the connection to the Long Island Expressway and Northern State Parkway would provide distribution for traffic along the northern part of the county. Passenger vehicles would reach the southern route by traveling on the Norhern State Parkway to either the Wantagh State Parkway or the Meadowbrook State Parkway. No express highway provision is available at present for commercial vehicles to reach the southern part of the county and they would have to use local roads.

The Sands Point-New Rochelle alternative, therefore, does not provide the link required to achieve a fully integrated regional transportation system. In addition, because of its more westerly location, a bridge between Sands Point-New Rochelle would not provide the relief to the Central Nassau section of the Long Island Expressway and other east-west highways afforded by the Rye-Oyster Bay route. Figures in the Creighton-Hamburg study, in fact, indicate that traffic on these east-west arteries will be increased from 7,000 to 11,000 vehicles per day due to the Sands Point-New Rochelle route.

In addition, this route does not offer the time and distance savings provided by the more easterly crossing for many of its users, since they would still have to travel westerly into the Sands Point area to reach the crossing and then, if headed to New England, central or Northern Westchester or points beyond, travel back from New Rochelle to those areas.

Since this alternative does not provide the same time and distance savings, nor fulfill transportation needs, the economic effect would be less favorable than with the Rye-Oyster Bay crossing. While job opportunities will undoubtedly be increased and regional markets will be widened, the degree of benefit will be less than with the Rye-Oyster Bay Bridge.

Assessment of Physical Impact. The number of homes required for the widening of the approach routes or the construction of new routes would be substantially greater than those required for the Rye-Oyster Bay crossing on both sides of the Sound. The park land removed from use together with other recreational facilities would also be considerably greater than with the Rye-Oyster Bay crossing. These factors, together with increases in levels of noise and air pollution in Queens, the Bronx, Nassau and Westchester afforded by the Rye-Oyster Bay Bridge render this alternative highly undesirable.

While the noise impact is not considered greater than for the Rye-Oyster Bay route, it will affect more people. The effect on air quality in the area of the approaches is estimated to be substantially more severe in the Sands Point-New Rochelle area than in the recommended location. The information in the Creighton-Hamburg report indicated that population in the generalized area affected by air pollution is over twice as high in the vicinity of Sands Point as in the area of Oyster Bay. The report also indicated that the pollution levels would be about one third higher both on the bridge and on the approach routes for the Sands Point-New Rochelle corridor than for the Rye-Oyster Bridge. Based on Scott Research Laboratories' studies cited in Section E-1b, these observations appear to be correct.

The more westerly crossing, because it will handle higher volumes of traffic, will also contribute a slightly larger amount of solid waste to the Sound. The total volume of these pollutants, however, will be small and the overall effect, compared with the water volume of the Sound, is expected to be negligible.

The Sands Point-New Rochelle route affects marshlands, inland waters and shore lines on both sides of the Sound. The areas affected, as noted by the Marine Science Research Center of the State University of New York at Stony Brook,[a] are described below:

	Nassau	Westchester
Marshes	Prospect Point (20,000 sq.ft.)	None
Inland Waters	None	Titus Mill Pond (60,000 sq.ft.)
Shore Lines	Sands Point (5,000,000 sq.ft.)	Hucklebury Island (140,000 sq. ft.)
		Davenport Neck (40,000 sq. ft.)

The impact on wetland areas, as noted in the above tabulation, is very severe for this alternative particularly along the shore of Hempstead Harbor.

Summary. The Creighton-Hamburg study concluded the Sands Point-New Rochelle crossing had the "most severe community impact of any of those bridges". The very severe impacts on the communities on both sides of the Sound, coupled with the inability to integrate such a route with the regional transportation system, the involvement with Section 4(f) lands, and the environmental impacts appear to make this alternative not prudent and feasible.

c. Bridge Between Glen Cove and Rye

A crossing between the Glen Cove area in Nassau County and the Rye area in Westchester has been discussed as an alternative to the Rye-Oyster Bay alternative. The bridgehead on the Nassau side would be approximately 3½ miles to the west of the proposed location in Bayville. On the northern side of the

(a) Creighton Hamburg Report.

Sound, the location of the bridgehead and the resulting impact would be the same as discussed in the earlier section dealing with the impact of the Rye-Oyster Bay crossing. On the Nassau side, however, there would be substantial differences. These are discussed in the following sections.

The Route. The Nassau bridgehead would be located at the tip of Matinecock Point where the route would cross through the residential community on East Island, with excellent homes, and Dosoris Pond. Heading south, the route passes through an area of large homes on large plots and country clubs to the Route 107-Glen Cove Road corridor. The routing continues southward to the connection with Northern Boulevard. To provide the required traffic capacity and distribution system, the approach would have to be extended to the Long Island Expressway and Northern State Parkway through the densely built up area of East Hills and Roslyn Heights. This land approach is slightly over 10 miles in length.

An alternative location to the east was also studied which required the taking of fewer residences but had considerably greater impacts on open space and recreation areas.

Community Impact. Particularly severe impacts will result from this route in the area of Dosoris Island and Locust Valley. (Exhibit H-9) In these areas the alternative results in the severance of established neighborhoods and runs counter to the existing street pattern. Among the established goals of the City of Glen Cove is the creation of more apartment districts. The proposed route would go through some apartment districts resulting in the taking of existing units. In addition, a parochial school and church are affected by this route. A portion of a City park is taken with this route. The impact in the area of Roslyn Heights where the connection is to be made with the Long Island Expressway will be particularly severe as this is a small community of closely spaced homes. A large percentage of these will be removed. (Exhibit H-10)

The effect on recreational boating will be similar to that described for the Rye-Oyster Bay crossing, although the Rye-Glen Cove line is closer to the established day racing courses and may have a slightly greater effect on that activity.

Direct Effects Along the Right-of-Way. In the Glen Cove-Locust Valley area, some 95 residences would have to be displaced. On the route from Glen Cove southward to the connection with the Long Island Expressway, Route 107 and Glen Cove Road would have to be widened and the takings would be severe. To the south the approach route in the Roslyn area also substantial takings. It is estimated that approximately 100 homes would be dislocated in this area.

School and church property is also required for the route.

There are no known historical sites on this alternative line.

A portion of a City park in Glen Cove adjacent to Glen Cove Road would be displaced and the recreational areas at Dosoris Pond would be severely affected, as previously noted. In addition, a portion of the Nassau Country Club, a private facility, would also be taken on this route.

Some adjustment to the local transportation system may also be required in the area of the railroad station.

Variations in the Glen Cove approach route that have been carefully examined create slightly lesser impact in some fields, however, these are balanced by greater impact in others. The tradeoff appears approximately equal and the overall impacts are no less.

Transportation System Considerations. Because of its more westerly location, the span touching down at Glen Cove is expected to carry slightly more traffic than one at Bayville and the relief to the existing East River facilities is, therefore, also expected to be slightly greater. On the negative side, however, the approach in the Glen Cove area will not provide as effective a link in the regional highway system as a tie-in with the Seaford-Oyster Bay

ALTERNATIVE APPROACH ROUTE THROUGH MATINECOCK POINT AND GLEN COVE LOOKING SOUTH.

ALTERNATIVE APPROACH ROUTE THROUGH GLEN COVE AND ROSLYN LOOKING SOUTH.

Expressway. The proposed approach from Glen Cove would proceed only as far south as the Long Island Expressway and the Northern State Parkway. These connections will provide for distribution along the northern side of Nassau County. Passengers cars will have the option of using either the Wantagh or Meadowbrook State Parkways to reach southern east-west arteries. Commercial vehicles, however, presently are banned from using these routes. They would, under present conditions, be forced to travel on the Long Island Expressway either eastward to the Seaford-Oyster Bay Expressway or westward into New York City before they would be able to head southward on arterial highways in that area. The only other alternative would be to use the local north-south roads and streets.

Because of its location, the Glen Cove crossing will not provide the same relief to the congested east-west routes between the Glen Cove area and the eastern edge of Nassau County as the connection to the Seaford-Oyster Bay facility. The Creighton-Hamburg report indicates that traffic between these two locations would not be reduced but would be increased by some 5,000 vehicles per day.

Benefits to the motorist in terms of time and distance savings on the average would be less with the Glen Cove location than for the facility in the Rye-Oyster Bay area because the majority of the traffic will be coming from or going to points near or east of the Seaford-Oyster Bay Expressway.

Because of these lower travel time savings the incentive for increased economic activity will be slightly less and the overall effect on the economy of the area will not be as great as with the Rye-Oyster Bay facility.

<u>Assessment of Physical Impact</u>. The analysis by Bolt, Beranek and Newman of the noise impact for Sands Point-New Rochelle location indicates that in this location the effect will also be greater than in the Rye-Oyster Bay corridor because of the heavier traffic load. The difference, however, in the Glen

Cove area is expected to be more severe than in the Oyster Bay location due to both the higher traffic volume and the more densely populated area traversed. Information contained in the Creighton Hamburg report indicated that the population in the generalized pollution impact zone will be slightly higher and that the pollution created by the traffic would be somewhat higher than for the Rye-Oyster Bay corridor.

The amount of pollutants from vehicles crossing the bridge will be slightly higher on a per mile basis for the Glen Cove-Rye crossing but the total mileage is somewhat less and, therefore, the total amount is insignificantly different from that caused by the Rye-Oyster Bay crossing.

The effects on marshes, inland waters, and shore lines on the Nassau side in the Glen Cove area are expected to be as follows:

Marshlands in the area of Dosoris Pond will be disturbed. (Some 40,000 sq. ft.)

Inland waters traversed by the approaches include some 200,000 sq. ft.

The shore line affected at Matinecock Point contains some 80,000 sq.ft.

The effect of this approach through the Glen Cove area is more severe, therefore than the similar routing through the Bayville-Oyster Bay area.

Summary. The Glen Cove alternative would cause a greater community impact than the Rye-Oyster Bay crossing. As in the case of the Sands Point-New Rochelle crossing, it does not provide a truly integrated transportation system. It too affects valuable park and other natural resources. This routing, therefore, is likewise not considered to be a prudent and feasible alternative.

d. Bridge Between Lloyd Neck and Stamford

A bridge between Lloyd Neck and Stamford would provide transportation service similar to that provided by the Rye-Oyster Bay bridge and would result in fewer dislocations of residences on Long Island. The severe impact on parkland in Suffolk County and the expensive taking required in the Stamford area are factors that overshadow these advantages.

Community Impact. In Nassau and Suffolk Counties, the route would generally follow that proposed as the extension of the Bethpage State Parkway. It would run adjacent to the communities of Syosset, Cold Spring, Cold Spring Harbor and Lloyd Harbor. The impact on the community will be quite similar to that described for the Rye-Oyster Bay crossing in that the southern portion of the route goes through areas of comparable development.

On the Stamford side, the approach goes through the long-established residential community of Shippan Point. Any routing along Shippan Point would have major impacts, since it would divide the area.

Further severe impacts will occur in the vicinity of the connection with the Connecticut Turnpike where displacement of commercial and industrial establishments will result in the loss of jobs and an increase in tax ratables. The characteristics of the area traversed are obvious in the accompanying exhibits.

Perhaps the most severe impact of this alternative is on recreational facilities. To reach the bridgehead at Lloyd Neck, the approach route would have to run directly through Coumsett State Park. This park, 1,426 acres in area, represents the largest remaining undeveloped recreational facility on Long Island having access to the Sound. The routing would divide the park and thus eliminate some of its long-term potential. The users of the park will be affected negatively by the intrusion of a major transportation facility causing noise, air and visual impacts. No replacement facility for this park is available.

The approach route also runs adjacent to Lloyd Harbor Village Park.

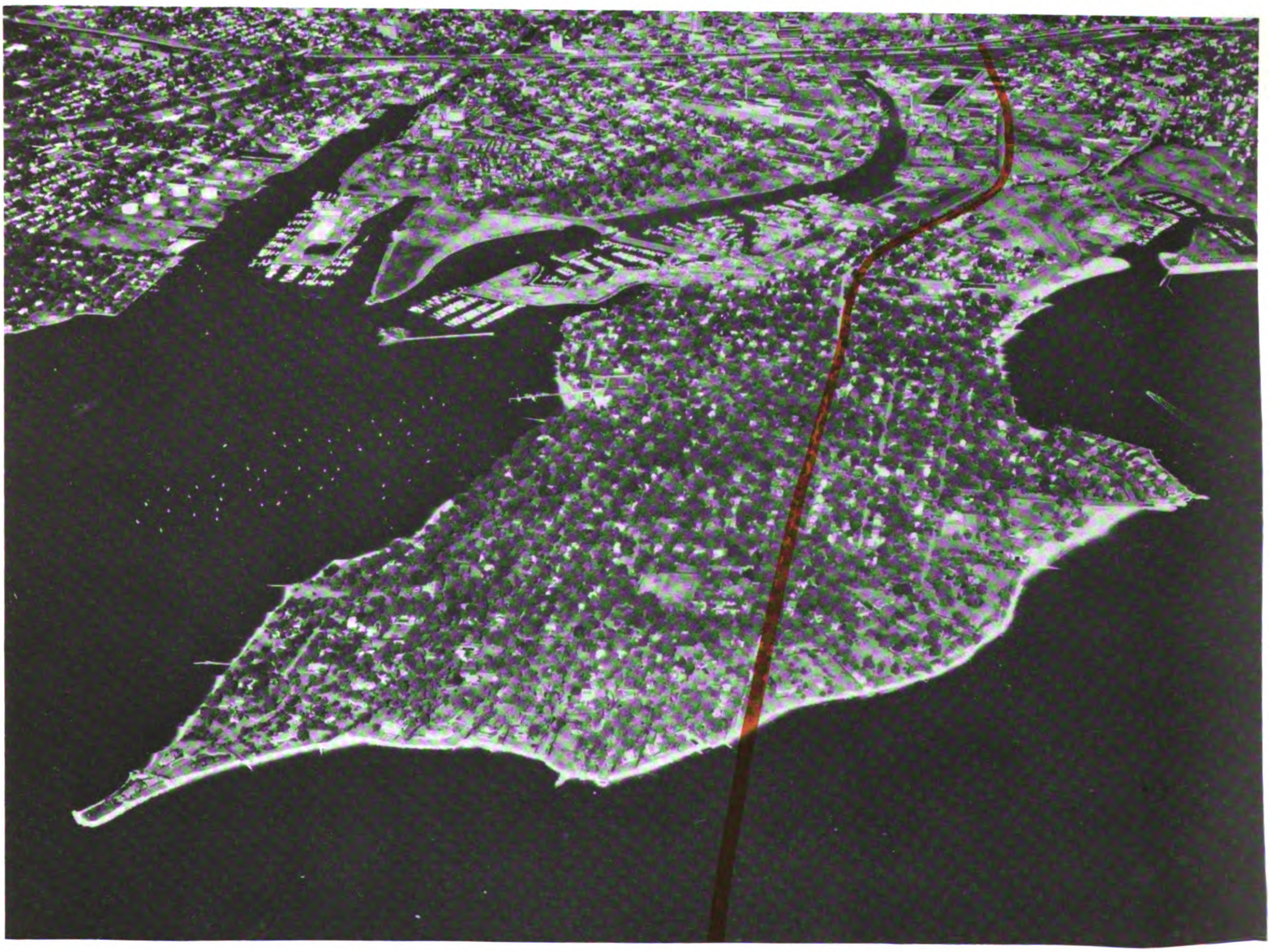
The effects on recreational boating for Lloyd Neck-Stamford route would be of the same magnitude as with the Rye-Oyster Bay bridge.

Direct Effects Along the Right-of-Way. Estimations of takings on both sides of the Sound indicate that up to a hundred homes will be taken on the Nassau side and 50 to 100 homes in Stamford. In addition, commercial facilities near the Connecticut Turnpike would be affected in Stamford. It appears that at least 20 of these commercial establishments would have to be relocated. (See Exhibits H-11 and H-12).

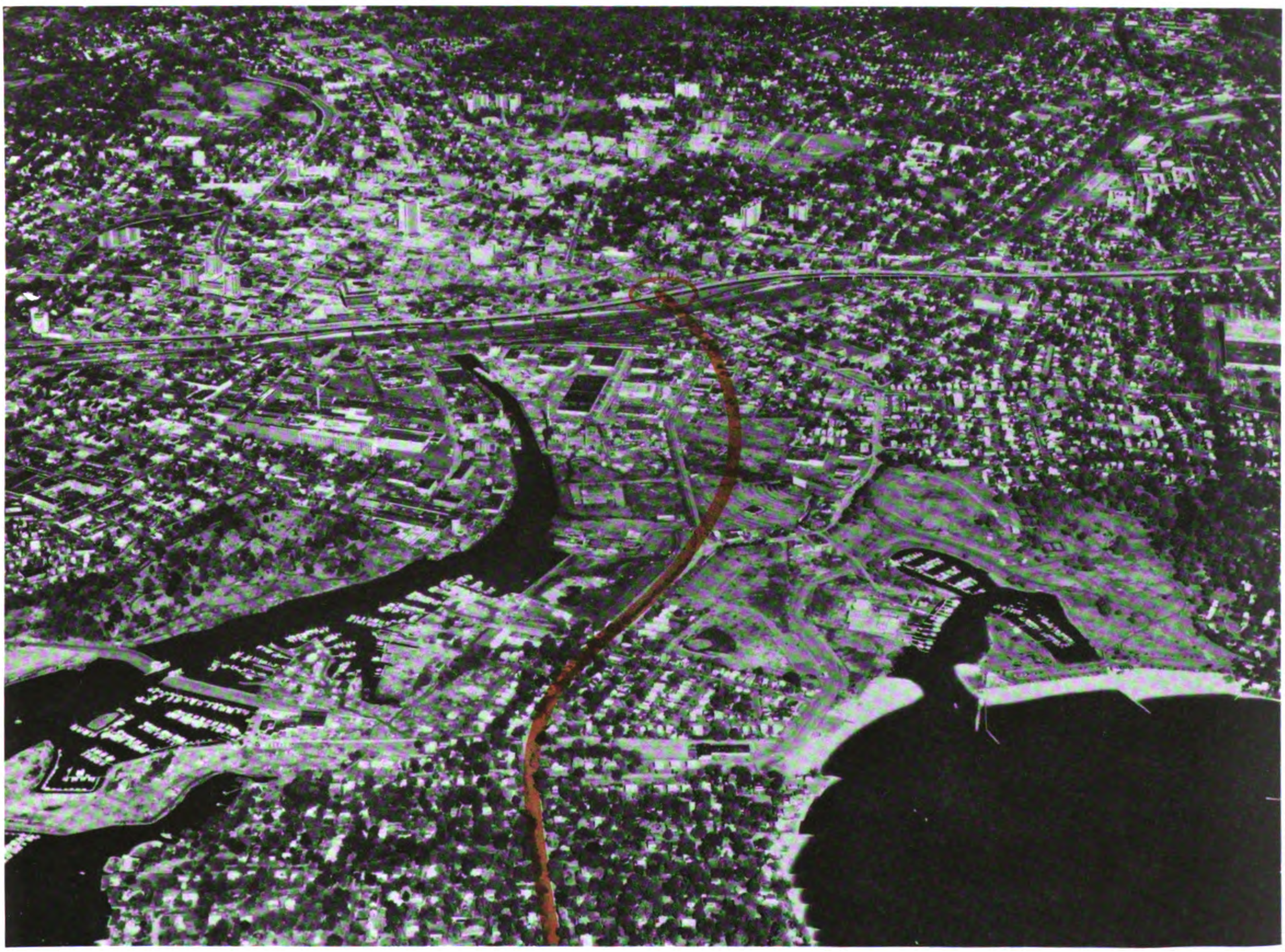
The major park taking in the Caumsett area has already been noted. Approximately 60 acres of land would be required from this park for a bridge approach route.

Transportation System Considerations. On the Connecticut side of the Sound, the approach route will provide a direct interchange with the Connecticut Turnpike, Interstate Route 92. (Exhibits H-11 and H-12) The traffic studies have indicated that the great majority of travelers are travelling to and from points in Westchester County and to the west only about 25 percent would be heading to Connecticut or other New England destinations. Thus, the majority of the travelers would have to turn southwestward and use the Connecticut Turnpike in the Stamford-Greenwith area to reach Westchester County and major routes to the south, west and north. The result would be a greater total travel as compared with the Rye-Oyster Bay route. The time, distance and dollar savings resulting from the Lloyd Neck-Stamford route will, therefore, be less for most of the users than for the Rye-Oyster Bay facility. However, for those users heading for the Connecticut-New England area the advantages are greater.

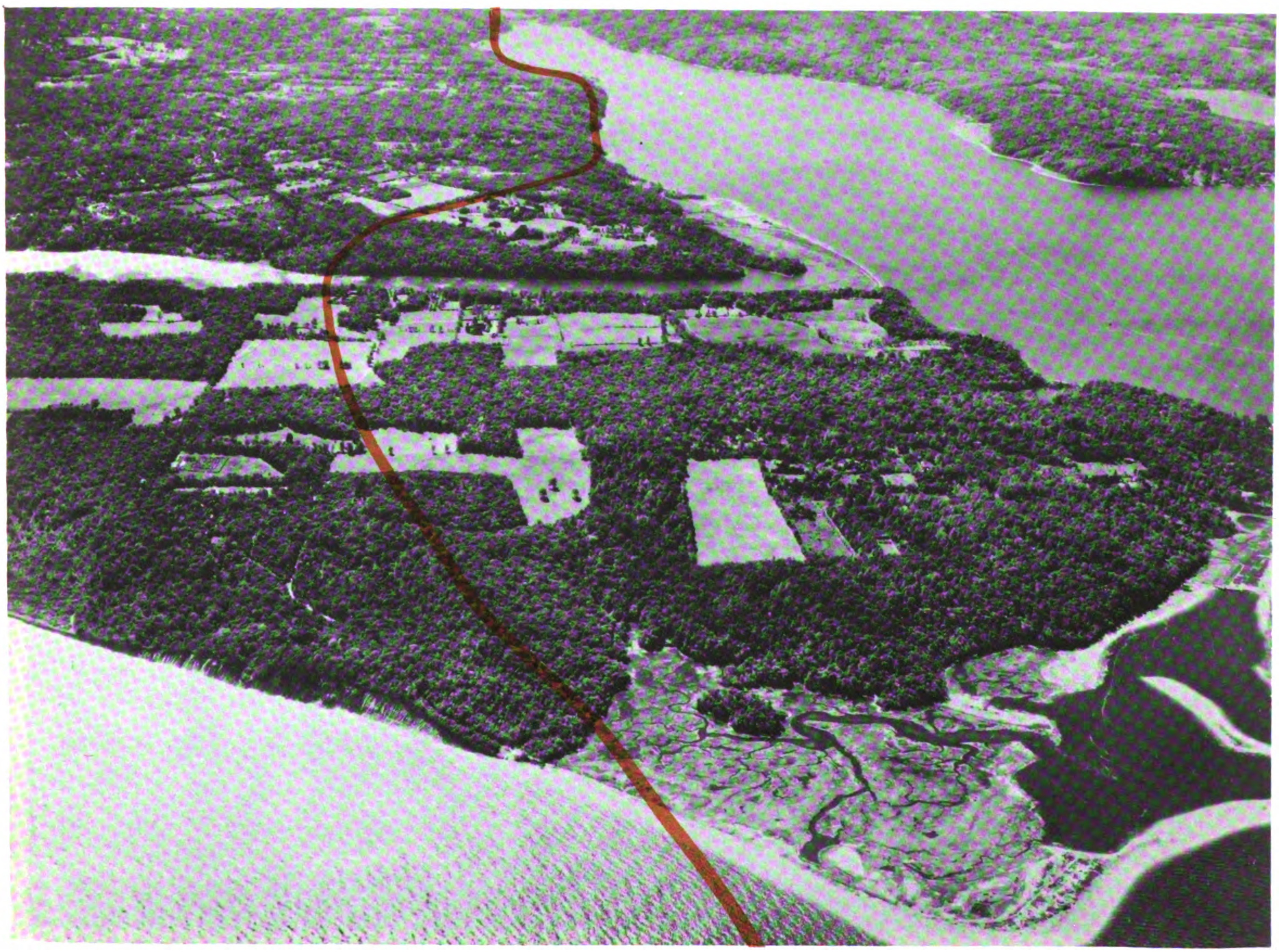
On the Long Island side, the approach highway would be the route of the Bethpage Parkway planned in eastern Nassau and western Suffolk County. At present, this route is proposed as a facility limited to passenger vehicles. Provision could conceivably be made, however, for handling mixed traffic. A connection from the shoreline to the Long Island Expressway would be approximately 9½ miles in length. (Exhibits H-13 and H-14).



ALTERNATIVE APPROACH ROUTE THROUGH SHIPPAN POINT-STAMFORD LOOKING NORTH.



ALTERNATIVE APPROACH ROUTE AT CONNECTICUT TURNPIKE INTERCHANGE-STAMFORD LOOKING NORTH.



ALTERNATIVE APPROACH ROUTE THROUGH LLOYD NECK LOOKING SOUTH.

ALTERNATIVE APPROACH ROUTE THROUGH COLD SPRING HARBOR AND LLOYD NECK LOOKING NORTH.

While impact on the economy of the area is expected to be of equal magnitude as that provided by the Rye-Oyster Bay crossing, the Lloyd Neck route does not offer the same savings to the majority of the users, thus the impact on creating opportunities for economic growth and development on both sides of the sound would be slightly less.

Assessment of Physical Impact. Although the route runs through a slightly less densely populated area than that adjacent to the Nassau approach to the Rye-Oyster Bay bridge, the effects of noise should be of the same order of magnitude. In the Stamford area, the impact will be considerably greater due to the longer approach route and due to the greater number of homes in the immediate area as compared with the approach route at Rye.

The effect on air quality will be similar to that for noise.

Wetlands affected are principally in the area of Lloyd Harbor and Cold Spring Harbor. At Lloyd Harbor 60,000 to 80,000 square feet of shoreline, marshes and inland water, will be disturbed by the alternative. This is an area that is presently actively used for shell fishing. The construction of the approach highway will also have substantial impact along two miles of the shore of Cold Spring Harbor.

Summary. The damage to the irreplaceable park lands at Caumsett State Park, together with the severe negative impact on the Shippan Point community at Stamford, makes this route between Lloyd Neck- Stamford an infeasible alternative. Changes in the routing in the Stamford area, such as going in the Westcott Cove area, could avoid a direct dislocation at Shippan Point. However, this alternative has a major negative impact on both recreational boating, a beach area, and the visual effects on the residential community.

The severe impact on the commercial and industrial area, and therefore, on the tax base could not be avoided. These variations, therefore, appear to be of approximately equal significance in their impact on the community. The overall negative effect suggests that the Lloyd Neck-Stamford alternative is not prudent and feasible.

6. Other Approach Alignments Considered

The alternatives above refer to various possible substitutes for the Rye-Oyster Bay Bridge. In addition, several alternative approach road locations in the Rye-Oyster Bay corridor were studied but were dropped from further consideration because they were found not to be feasible and prudent.

On the Westchester side, detailed studies extended from the area of Milton Harbor in the City of Rye north-eastward through the Village of Port Chester to the Connecticut line at the Byram River. A route along the Playland Parkway route, together with the alternatives W-1 through W-4, received the most intensive study as they showed the most promise. Westward from Playland all routing required extensive takings of residential areas, public beaches and town facilities. Between Playland Parkway and W-1, W-2 and W-3 any line would create extensive damage in the center of the City of Rye. Alternatives between W-1, W-2 and W-3 and the Port Chester Harbor area where W-4 is located, would require the condemnation of some large residential properties and beach clubs on Manursing Island and would damage the local wetlands. Beyond Port Chester Harbor, routings through Greenwich, Conn., together with the required connections to the Connecticut Turnpike, create extensive community disruption in residential areas. The discussion that follows, therefore, is limited to the Playland Parkway route.

The area studied in detail on the Nassau side of the Sound extended from Matinecock Point on the west to Centre Island in Oyster Bay harbor on the east. The routings under active consideration, N-1, N-2 and N-3, were described in detail in Section D-3. Two other routes were also studied extensively but later discarded. These were the Fox Point alternate and the Stehli Beach routing. Other routes within the area were discarded from further study because of the extensive damage caused to either residential communities, parks, wetlands or a combination of these.

a. Westchester

Playland Parkway Route

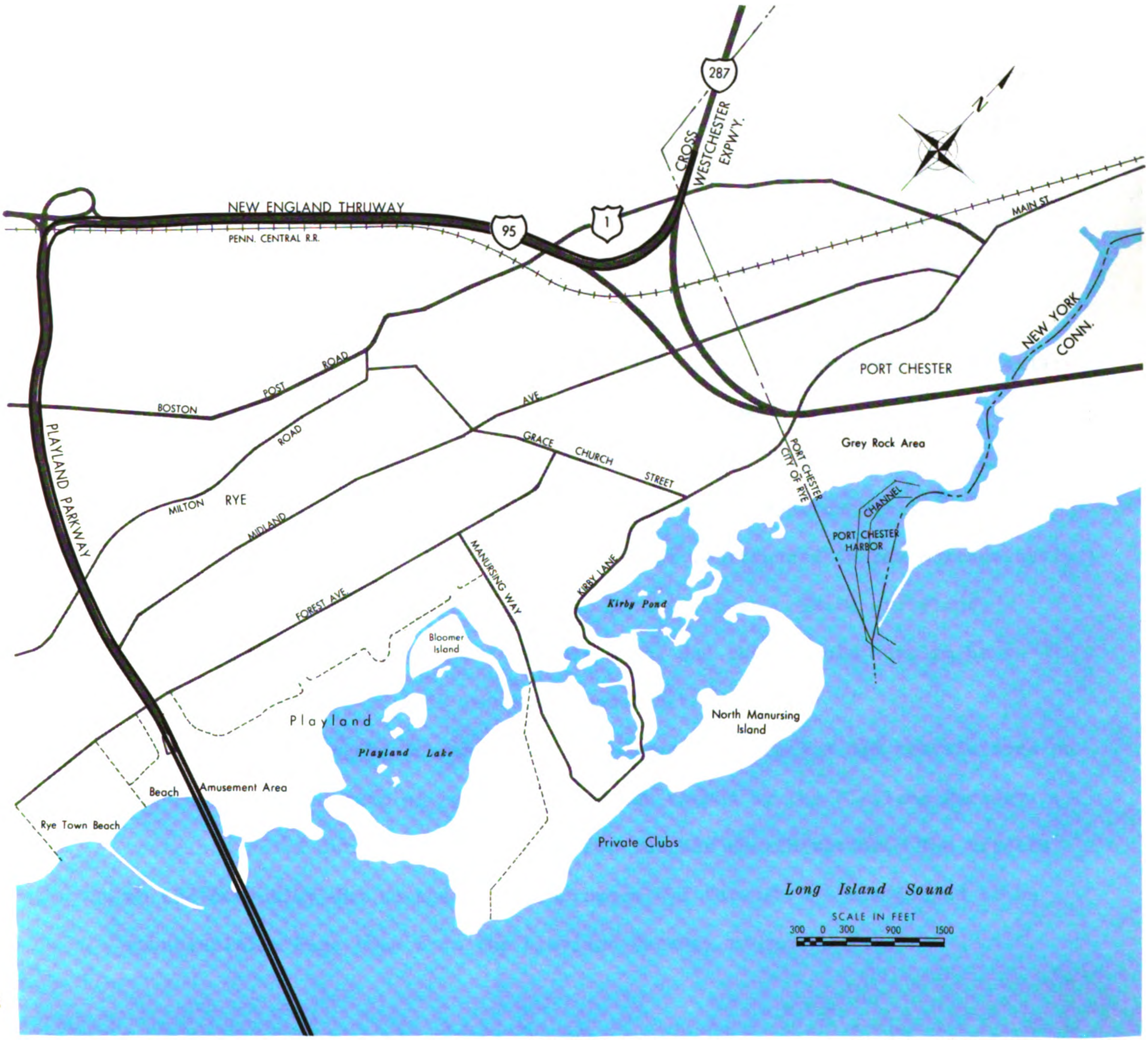
A routing studied in this area utilizes the New England Thruway from its connection with the Cross Westchester Expressway to the existing interchange with the Playland Parkway. The routing then continues south-easterly along Playland Parkway and reaches the shore in the area of the present Playland Park beach and pool.

This alternate requires the widening of the New England Thruway and reconstruction of both the interchange between the Thruway and the Cross Westchester Expressway and between the Thruway and Playland Parkway in order to provide acceptable safe standards for travelers. Playland Parkway itself would have to be widened, grade separations would be required at intersections and the bridge clearances would have to be increased. This would necessitate the taking of residences on both sides of the parkway for some distance as well as the parkland bordering the road. The route is shown on Exhibit H-15 and parklands are shown on Exhibit D-6. In the area of Playland Park this route would require the relocation of the pool and reconstruction of the beach area. The highway would be elevated through the park as it reaches the water.

Adjacent to the present Parkway some 20 residences would be displaced, together with local commercial establishments at the intersection with Milton Road.

Because the Playland Parkway route is longer and runs near to more homes than the recommended alternatives, the impact of noise and air pollution will be felt by more people. There are approximately 80 to 100 residences within 200 feet of the right-of-way along Playland Parkway.

This routing, through use of a "dog-leg" to reach the Cross Westchester Expressway, adds travel time and distance as compared with the recommended line. By causing bridge traffic to mix with New England Thruway traffic, it also does not provide as comfortable or as safe a route as W-1, W-2, W-3 or W-4. The



OTHER ALTERNATIVE CONSIDERED - WESTCHESTER APPROACH.

distance added is about $1\frac{1}{2}$ miles. In 1980, this would cause an additional 30 million vehicle-miles of travel with greater inconvenience to the travelers and air pollution to the community.

Another important consideration is the change that would result in the character of the neighborhood along the route. At present Playland Parkway is a four-lane relatively lightly travelled highway with signal controlled intersections. It is used as a primary artery to reach Milton Road and the other cross streets serving the residential area and also serves seasonally as the main route to Playland Park. The alteration of this route to a limited access expressway carrying mixed traffic with separate service roads for local areas, would affect this established community. This wider expressway, together with the displacement of part of the local neighborhood-oriented commercial establishments, will affect changes on the present characteristics.

The impact on Playland Park of this alternate would be severe. The existing pool and bath house facilities, which have become a landmark in the area, would be demolished and the present beach area would be bisected. These bathing facilities are used by 150,000 to 200,000 persons annually. A new beach area and pool would therefore need to be constructed in the northeasterly part of the Park which is presently not actively used. There are plans, however, for future development of this area, and these would have to be revised and curtailed if this route was constructed.

The effect on the community and the direct dislocation and restrictions on the future development of recreational areas caused by the Playland Parkway route has ruled out this alternative from further consideration. The effects on the community due to the proposed routes W-1 through W-4 are judged to be substantially less than from the Playland Parkway route.

b. Nassau

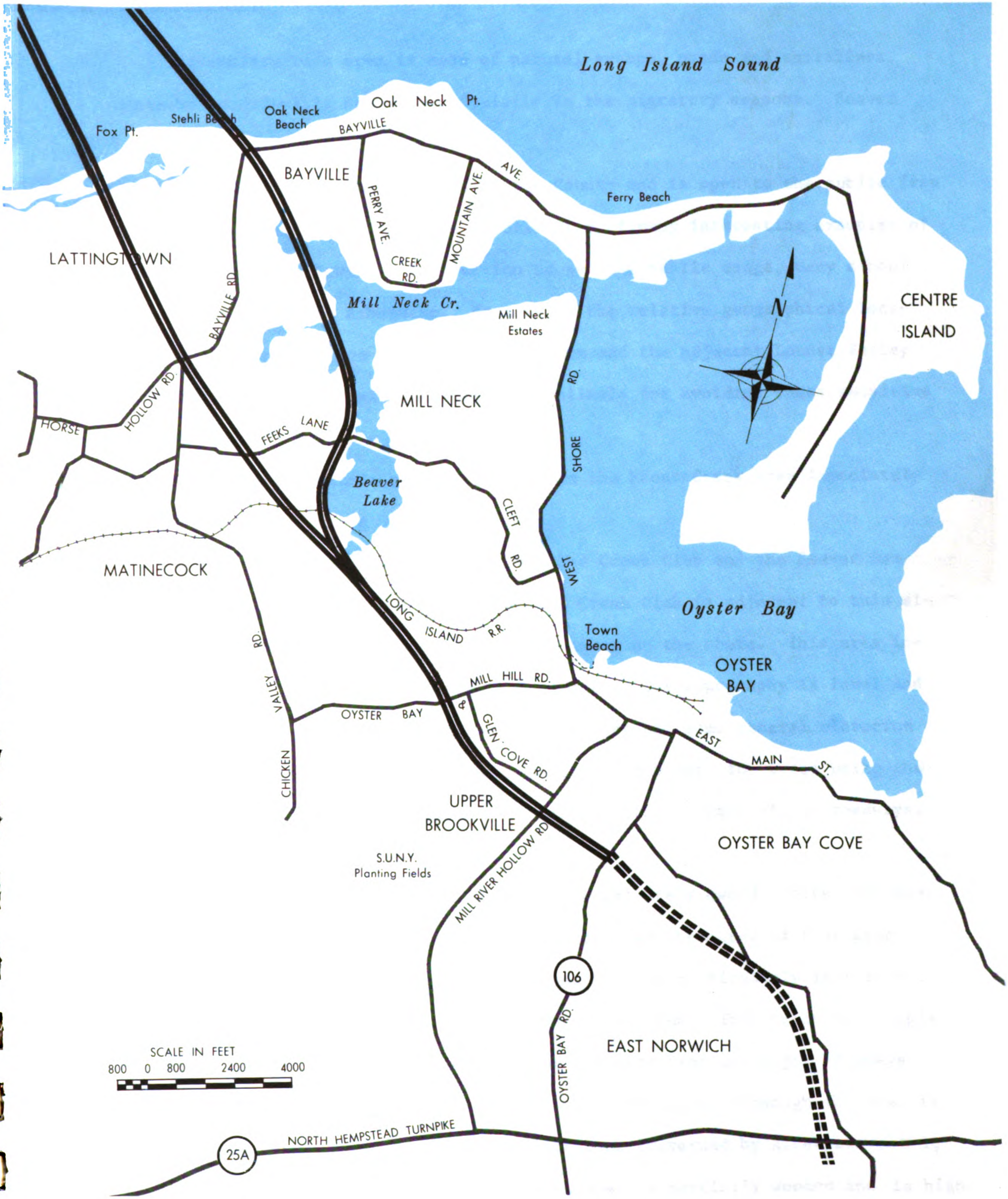
Both the Fox Point and Stehli Beach approach alternatives follow the same Seaford-Oyster Bay Expressway routing and the recommended route from Route 25 to a point just below the crossing of Route 106 in Oyster Bay. From this point northward, however, the alternates are substantially different. Theses alternatives were developed to minimize residential displacements. To do this, however, severe impacts result on conservation, recreation and open lands. The routes are shown on the accompanying exhibits.

Fox Point Route

Route Location. From Route 106 the route runs through the northeast corner or Upper Brookville and into Mill Neck. It then passes south of the Mill Neck Station and Beaver Lake and goes into a corner of the Village of Matinecock, where it crosses the railroad into Lattingtown, passing through the western portion of the Mill Neck Creek Conservation Area. As it turns northward, it cuts through the Bailey Arboretum. The route crosses Bayville Avenue near the Locust Valley School complex and continues northward between Sheep Lane and the Creek Club through a relatively flat area, reaching the Long Island Sound Shore immediately west of Fox Point. This route, shown on Exhibit H-16, is 4.6 miles long between Route 106 and the shore.

Community Impacts. This alternative adversely affects conservation areas, active wetlands, open spaces and community facilities. These areas are shown on Exhibits D-7, D-8 and I-6.

In addition to the Oyster Bay National Wildlife Refuge, this area of Nassau County contains a large tract of conservation area, totaling more than 250 acres, going southward from the Sound shore generally along the western edge of Mill Neck Creek, including Beaver Pond and continuing southward as shown on Exhibit I-6 in the next section. Avoidance of these conservation areas therefore cannot be done without establishing a circuitous routing passing through some densely built-up communities.



OTHER ALTERNATIVES CONSIDERED - NASSAU APPROACH.

The conservation area is made of natural swamps, ponds and shorelines. Usage by waterfowl is heavy, particularly in the migratory seasons. Beaver Lake is a feeding and nesting area.

The Bailey Arboretum is owned by the County and is open to the public from spring through fall. It contains a collection of many interesting examples of trees, shrubs and flowers. In addition to general public usage, many school field trips visit the Arboretum. Because of the relative geographical location of the conservation areas, the Arboretum and the adjacent Locust Valley Cemetery, no practical alternatives are available for avoiding these sensitive and ecologically valuable areas.

Another conservation area is crossed in the Frost Creek area immediately south of the Sound shore line.

Recreational facilities affected are The Creek Club and the Beaver Dam Winter Sports Club. The Golf Course of the Creek Club is adjacent to this alternative and a portion of the property is taken at the shore. This area includes the beach facilities of the Club. Because the topography is level and low, with sparse vegetation, the route will be at the same general elevation as the surrounding land and the roadways will be apparent for those using the adjacent land. If barriers are used to minimize this impact of the roadways, these structures will be evident.

The alternative also passes close to the privately owned Sports Club near Beaver Lake and will change the present undisturbed character of that area.

A major impact on the over-all land use will be particularly felt in the residential area between Sheep Lane and The Creek Club. This tract is occupied by some homes on large plots that are some distance from any major highways. The approach route will therefore affect this condition. Although the area is, in some ways, similar to the Mill Neck locations traversed by Alternative N-1, there are major differences. The Mill Neck area is partially wooded and is high permitting the depression of the highway in a deep cut. This cannot be done along Sheep Lane and impact will therefore be severe.

The Locust Valley school complex in the Bayville Avenue - Ryefield Road - Horse Hollow Road area consists of the 43-acre Junior-Senior High School, an intermediate school and an elementary school. This location is adjacent to a proposed interchange between Bayville Avenue and the approach if it were placed here. Much of the traffic using this interchange would also pass in front of the schools.

Local municipal facilities are also located in this area and will be affected by increased traffic.

Direct Effect Along Right-of-Way. This route, because it passes through conservation areas and other sparsely developed land, requires only about 20 residences. It does, as noted, take a substantial part of the Bailey Arboretum. It laso takes the northeast edge of the State University of New York Planting fields.

Assessment of Physical Impact. Impacts due to increased noise and air pollution levels are estimated not to be materially different from those resulting from alternative routes N-1, N-2 and N-3.

Summary. The Creighton Hamburg study analysis of this route showed that among the impacts are these:

- "creates two neighborhoods where there was one (Lattingtown);"
- "had severe impact on unique centrally located Arboretum, also diminishes other open space areas."
- "cuts through the North Shore Bird and Game Sanctuary, a relatively unaltered natural swamp of unique characteristics which should be avoided if possible."

Because of the severe impact on the conservation and recreation areas, the division of, and negative effect on, established communities, and the safety hazards introduced at the major school complex, the Fox Point Route is considered not prudent and feasible.

Stehli Beach Route

Route Location. From the divergence from the recommended routing near Route 106, the Stehli Beach Route coincides with the Fox Point Route to the Mill Neck railroad station area. At this point, the location swings northward, crossing the railroad just east of the Beaver Lake Dam. It then turns slightly to the northeast and parallels the shore of Mill Neck Creek into the Village of Bayville along the estuary of the Bay through the Mill Neck Creek Conservation Area and across Bayville Avenue to the Sound, proceeding through the middle of Stehli Beach. This routing is 4.6 miles long from Route 106 to the shore. (See Exhibit H-16)

Community Impacts. The principal impacts of this route are on the conservation areas, the recreational facilities and the quality of life of the community. These areas are shown on Exhibits D-7, D-8 and I-6.

By passing along the west shore of Beaver Lake and Mill Neck Creek a substantial impact on the conservation areas will result. These areas are the publicly-owned North Shore Bird and Game Sanctuary and the Mill Neck Conservation Area. The route will also intrude into the water at some locations thereby going into the area of the Oyster Bay National Wildlife Refuge. These areas were noted by the Planning Services Group[a] as "high-value wetlands set aside for preservation by the local communities with the advice and planning of county and state agencies..... Filling in any of these areas would deteriorate the habitat and destroy wildlife values of the area." This alternate will require a longer structure through wetlands with the resultant higher disturbance.

(a) Creighton, Hamburg Report

The principal recreational areas affected are Stehli Beach, Mill Neck Creek and a private club adjacent to Beaver Lake. Stehli and Oak Neck Beaches are Oyster Bay's principal public facilities on Long Island Sound for swimming and other beach activities. The facilities are popular and, on hot summer days, the usage is very high. The alternative approach through the area would take beach property, parking areas and possibly some refreshment facilities.

Along Mill Neck Creek, the usage of the shore lines would be curtailed as access would not be available across the highway from the private properties to the water.

The Beaver Dam Winter Sports Club, Inc. is located at the southwest corner of Beaver Lake. This route would require the taking of the property and the Club House of this private facility.

Residences now facing Mill Neck Creek are able to see an unobstructed stretch of water with natural shore lines on the opposite side. The construction of a highway along one shore will change the appearance of the present pleasant outlook. It is extremely difficult, because of the low level topography, to take measures that will make the route less obtrusive. The impact on the homes in the area therefore will be severe.

No schools, health or municipal facilities are required for this route.

Direct Effects Along the Right-of-way. By running along and in Mill Neck Creek, the takings are minimized and only about 10 residences are required.

In the southern section of this alternative, the route takes a part of the property of the State University of New York Planting Fields.

Assessment of Physical Impact. Impacts due to increased noise and air pollution levels are estimated not to be materially different from those resulting from alternative routes N-1, N-2 and N-3 in the adjacent area.

The impact on wetlands, as noted above, will be severe. At least 25 acres along Mill Neck Creek will be affected. In addition, the shore line at the public beach will be spanned.

Summary. The major impacts on the wetlands, the Oyster Bay National Wildlife Refuge, and the recreational facilities resulting from the Stehli Beach route are considered sufficient to render this alternative as not prudent and feasible.

The effect on the adjacent properties only reinforces this conclusion.

I. STATEMENT OF IMPACT ON SECTION 4(f) LANDS

The Metropolitan Transportation Authority and the State Department of Transportation are requesting approval of a proposed highway and bridge project which provides for a Long Island Sound crossing from Rye to Oyster Bay, connecting the New England Thruway and Cross Westchester Expressway in Westchester with the Seaford-Oyster Bay Expressway on Long Island. This project will pass through several public recreational and natural resource areas. Accordingly, approval of the project is governed by the provisions of Section 4(f) of the Department of Transportation Act and Section 138 of Title 23, U.S.C. which "permits the Secretary of Transportation to approve a program or project . . . only if:

(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 to the Section 4(f) land resulting from such use."

This statement will set forth a determination pursuant to Sections 4(f) of the Department of Transportation Act, as amended, and 138 of Title 23, U.S.C. It is preliminary in the sense that only generalized route locations have been studied to date. Continuing investigations of the impacts that the route alternatives will have on Section 4(f) lands will be undertaken through discussions with public officials and organizations responsible for resource lands with the intent to continually study means for minimizing adverse effects detected during the course of study.

1. Rye Playland

a. Introduction and Description

Three of the four alternatives under consideration in Westchester County must cross through Playland Park in the City of Rye and therefore pass through or over sections of a regional recreational area.

Alternative W-1 crosses the beach on Manursing Island at the most eastern point of Playland's property, continues in a northwesterly direction over the eastern portion of Playland Lake and out of Playland over Manursing Way. Alternative W-2 likewise enters at Playland's most eastern property, then follows closely the boundary of Playland, proceeding just to the west of the boundary until the route crosses out of Playland and over Manursing Way. Alternative W-3 enters, like W-1 add W-2, at the eastern beach property of Playland, proceeds northerly, skirting the main body of Playland Lake, over Manursing Way. For all three alternatives, the roadway is on elevated viaduct structure.

Rye Playland is owned by the County of Westchester and operated by the Westchester County Playland Commission. Of its 273 acres, approximately one half is active recreation, while the rest is Playland Lake and accompanying undeveloped open space, as shown on Exhibit I-1.

The developed portion of Rye Playland is a regionally known and used amusement center, which includes commercial amusement activities, a swimming pool and bathhouse, and a large beach as well as piers for boat docking. Usage of this area is estimated to be 1,400,000 persons per year, of which 43% are Westchester County residents.

Some of the facilities associated with the amusement area, as marked on Exhibit I-1, and their usages are as follows. The pool and beach are used by between 150,000 and 200,000 people annually. About one million rides in Kiddie Land and four million rides on the adult facilities are made each year. The use of the ice skating rink is estimated at 170,000 persons per season. Apart from the amusement area, there are numerous picnic tables, shore fishing, rental boating, horse riding and playing fields at various points in the active recreational portion of Playland.

Playland is the only large-scale amusement center in the region. There are, however, three other open-space tracts of land in the Rye area open to the public.

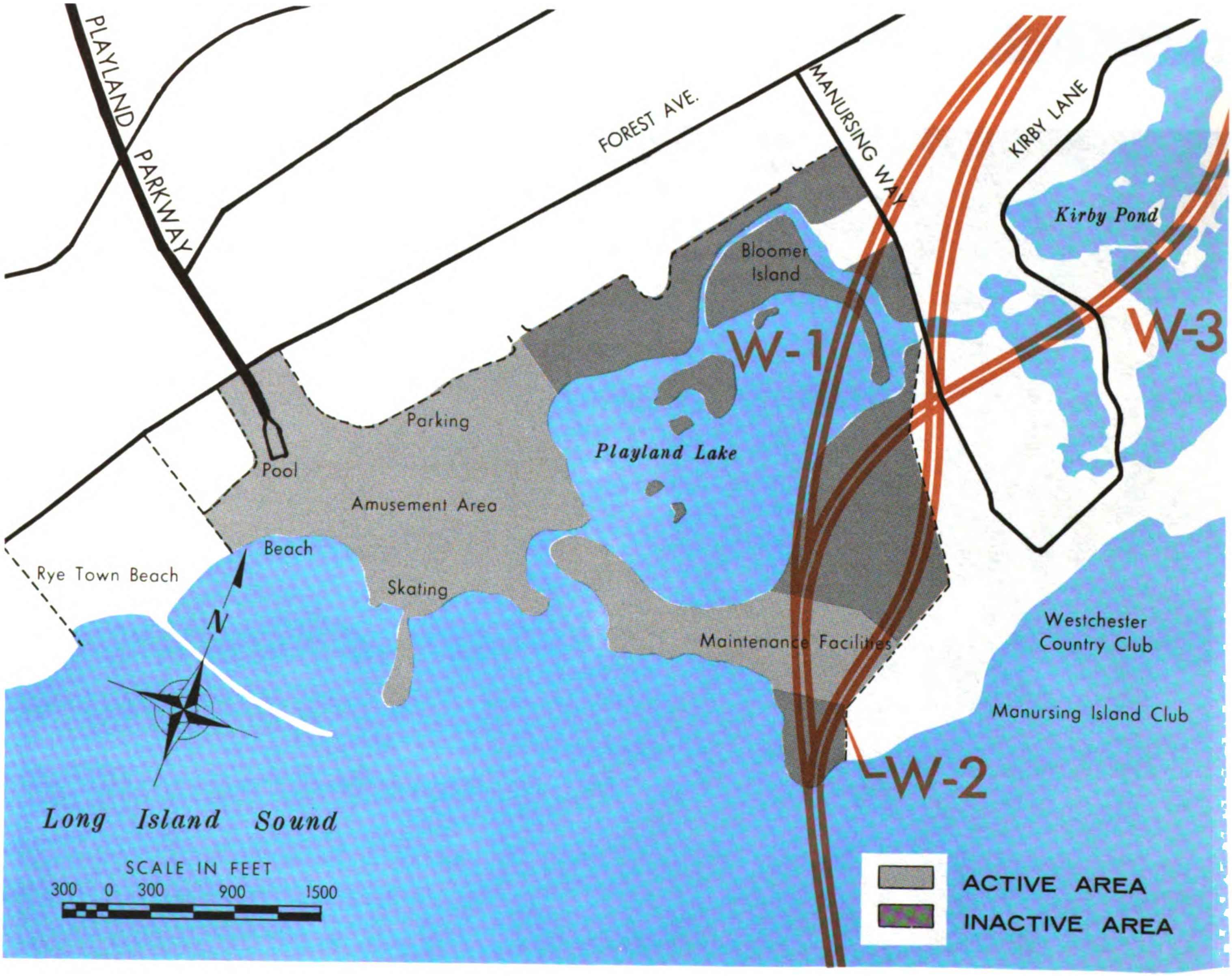
The Playland Parkway serves as access to Rye Playland, connecting to the New England Thruway. Within Playland, internal roads serve to allow movement within the amusement area, although most users park their automobiles in a large parking area near the entrance to Playland. The undeveloped portion has small unpaved roads that serve as access to strollers and to Playland maintenance vehicles.

The natural open-space sections of Playland surround Playland Lake, and are east of the developed area. This land is undeveloped and fenced off, being more or less inaccessible to the general public; thus its usage is extremely small compared to the developed area. While it is occasionally used as a secluded park ground, its primary use appears to be as a dumping ground for Playland's wastes.

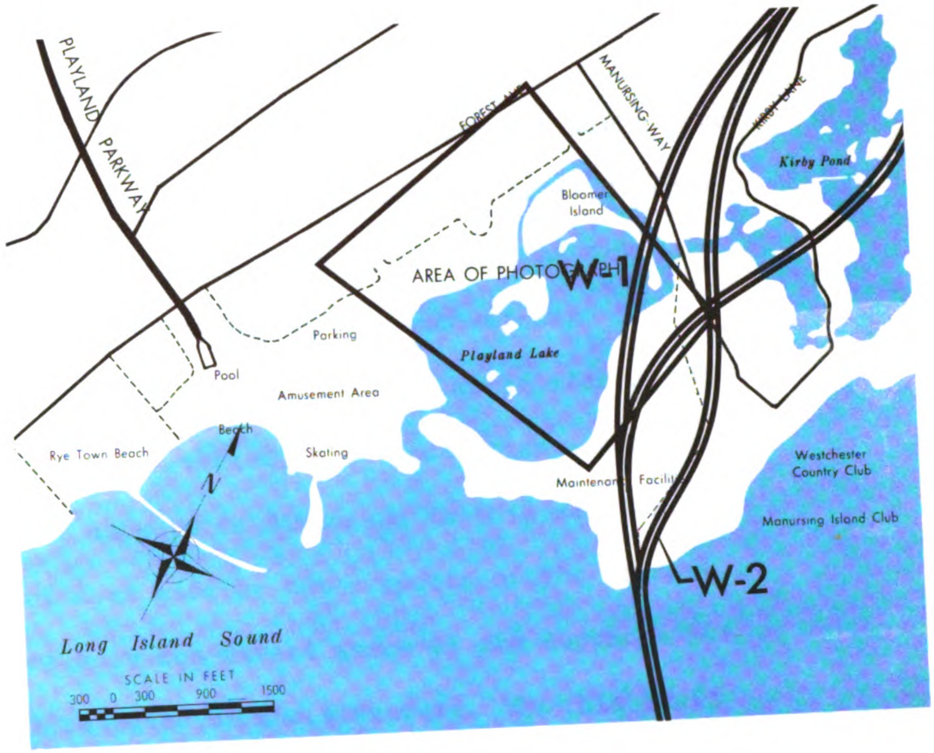
The area affected by the alternative approach routes is shown on the aerial photographs, Exhibits I-2 and I-3.

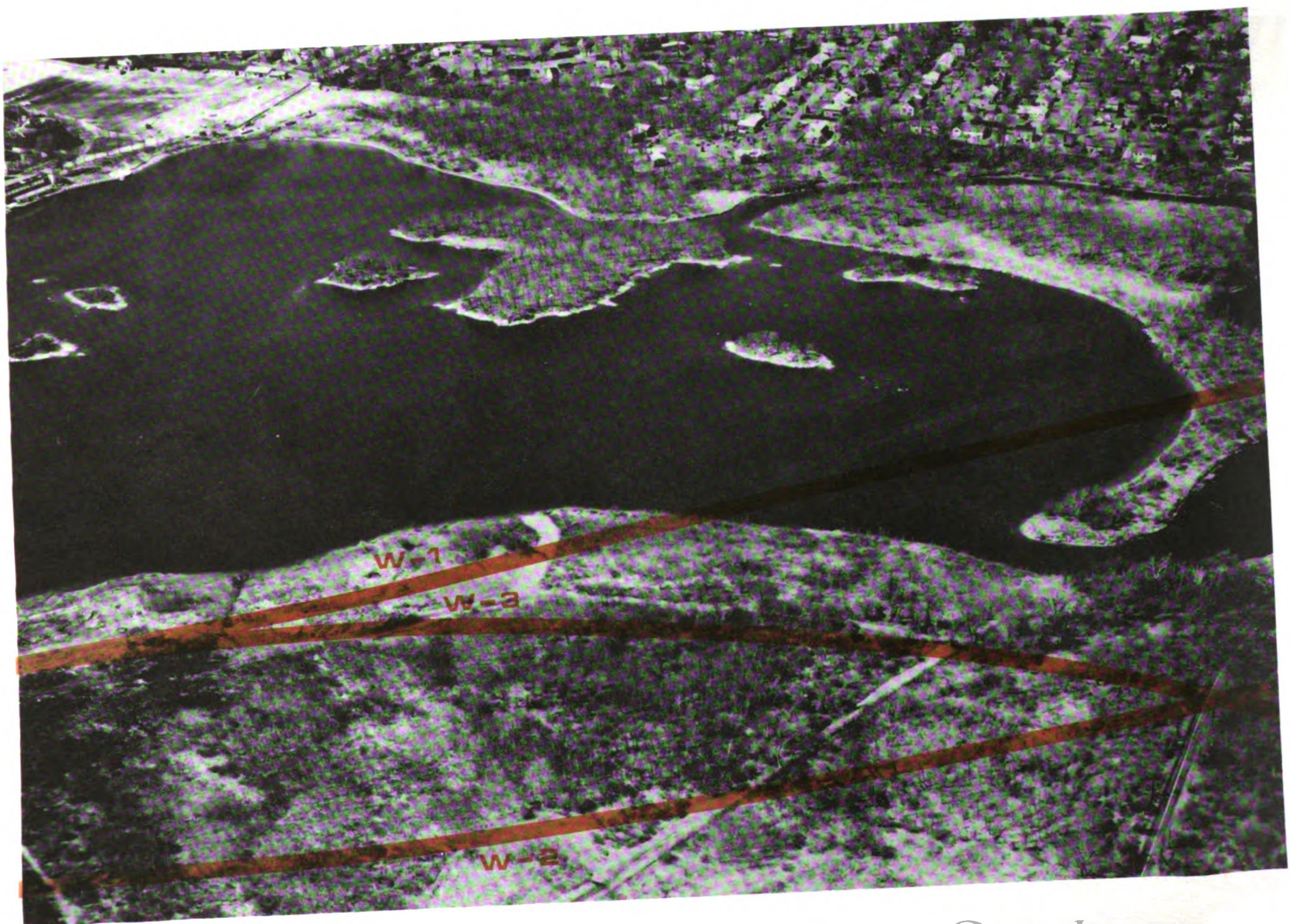
Playland Lake is a recreational lake, fringed by deciduous trees. Salt marshes are confined to the vicinity of Bloomer Island. A variety of marsh vegetation can be found in this brackish water (about 14% salinity). Vegetation around the lake includes: dwarf and smooth sumac; quaking and large tooth aspen; seaside alder; pin and black oak; hackberry; varieties of low and crab apple; sassafras; dogwood; and red and striped maple.

Playland is designated by regional and local plans to remain as a recreation and open-space area.



PLAYLAND PARK-RYE NEW YORK.





VIEW OF WESTCHESTER APPROACH AREA - PLAYLAND PARK 2

b. Effect of the Proposed Highway on Playland

There are several types of impact that the proposed project might have on Rye Playland. One is the immediate effect of the viaduct as it crosses Playland. Another is the impact on the water quality of Playland Lake. A third impact is the effect of auto emissions on the ambient air quality and the fourth is the effect of roadway noise on activities under and adjacent to the bridge. A fifth is vehicular or pedestrian access to the park. Each of these types of impacts is discussed in this section.

Use of Land. The amount of area used by the supports of the viaduct has been calculated by using not only the direct space of the supports but a 10-foot section under the entire width of the structure. On this basis Alternative W-1 uses about 0.9 of an acre, Alternative W-2 about 0.4 of an acre, and Alternative W-3 about 0.6 of an acre. In each case about 1/5 of an acre will be required on land that is designated active recreation. There are no recreational facilities near the viaduct to be disrupted. None of the facilities associated with the active recreational portion of Rye Playland will be disturbed.

Effect on Water Quality. Extending the water quality analysis made in Section E (see Section I-2 on Oyster Bay Natural Wildlife Refuge for details; since the crossings are of similar length and water bodies are of similar depth, the detailed analysis developed for Mill Neck Creek will hold for Playland Lake), it is concluded that there will be no significant adverse effects on water quality caused by the bridge and accompanying roadways. If a more refined analysis reveals potentially adverse effects, designing of the viaduct would incorporate provisions for protecting water quality. No long-term changes in drainage patterns are expected.

Effect on Ambient Air Quality. The analysis of traffic forecasts and present ambient air quality shows that when representative adverse traffic and local air conditions are combined, the area outside 100 meters from the centerline of the roadway will not exceed Federal ambient standards. It also appears that these standards will be met at all locations outside the highway right-of-way. Further study will be needed to demonstrate this (See Section E-1).

Effect of Roadway Noise. For any of the three alternative approach routes, it is anticipated that by 1995, the roadway will, under worst condition (flat terrain) assumptions, could produce 80 dB(A) during peak hours at 85 feet from the roadway to 70 dB(A) at 300 feet (see Section E-1). However, the actual impact zone will be considerably less when the relative elevation of the roadway is considered; the topography lends itself to the possibility of acoustical treatment. It is also possible that by 1995, vehicle design will have resulted in decreased noise generation.

Effect on Vehicular or Pedestrian Access. Since the roadway is to be generally on elevated viaduct with-100 feet spans, no vehicular or pedestrian access will be disturbed.

c. Alternatives to the taking of Section 4(f) lands

Several alternatives to the Rye-Oyster Bay crossing have been considered. (See Section H of Impact Statement) These include non-highway alternatives, crossing at other locations, and alternative routings within the Rye-Oyster Bay corridor.

Non-highway alternatives are the use of mass transit or ferries and the do-nothing alternative. Alternative highway crossings that would meet the purpose of the Rye-Oyster Bay Crossing include a bridge parallel to Throgs Neck Bridge, Sand Point-New Rochelle, Glen Cove-Rye and Lloyd Neck-Stamford. Those that would not meet the purposes of the Rye-Oyster Bay crossing are bridges at Port Jefferson-Bridgeport, Wading River-East Haven, Riverhead-Guilford, East Marion-Old Saybrook and Orient Point-Watch Hill.

Within the given corridor of Oyster Bay-Rye crossing, alternative locations that do not cross Rye Playland are either east of Playland or west of it.

Alternatives Considered West of Rye Playland. An alignment immediately to the west of Playland would cross the Rye Town Park, another Section 4(f) land. An alternative proceeding west of Rye Town Park, continuing on its own roadway to the New England Thruway, would require the taking of a combination of Rye Golf Club, Disbrow Park, the Osborn Memorial Home (a senior citizens facility), a school, and long-established high-density residential areas. This disruption of highly used recreational facilities, and numerous residences make this route neither a feasible nor prudent alternative.

An alternative skirting the recreation areas and connecting to Playland Parkway would require the taking of well-established high-density residential area from the shore to the Parkway and a significant number of residences within the Playland Parkway widening requirements. The Playland Parkway through the use of a "dog-leg" to reach the Cross Westchester Expressway, adds travel time as well as an estimated 30 million vehicle miles per year, with its attendent increases in air and noise pollution. By causing bridge traffic to mix with New England Thruway traffic, it does not provide as convenient or as safe a route as W-1, W-2, W-3, or W-4. The necessary widening of the Parkway together with the displacement of part of the local neighborhood - oriented commercial establishments adjoining the Parkway will make severe changes in the present characteristics of the established neighborhood. This does not represent a feasible or prudent alternative to the use of Rye Playland.

Thus, it is concluded that there are no feasible or prudent alternatives to the taking of Section 4(f) land west of Rye Playland.

Alternatives Considered East of Playland Parkway. Any alternative proceeding to the east of Rye Playland would traverse very valuable private resource areas; the highly used private recreational areas of Manursing Island and the Westchester County Club; or the North Manursing Island Wildlife Refuge; or a major residential development on North Manursing Island.

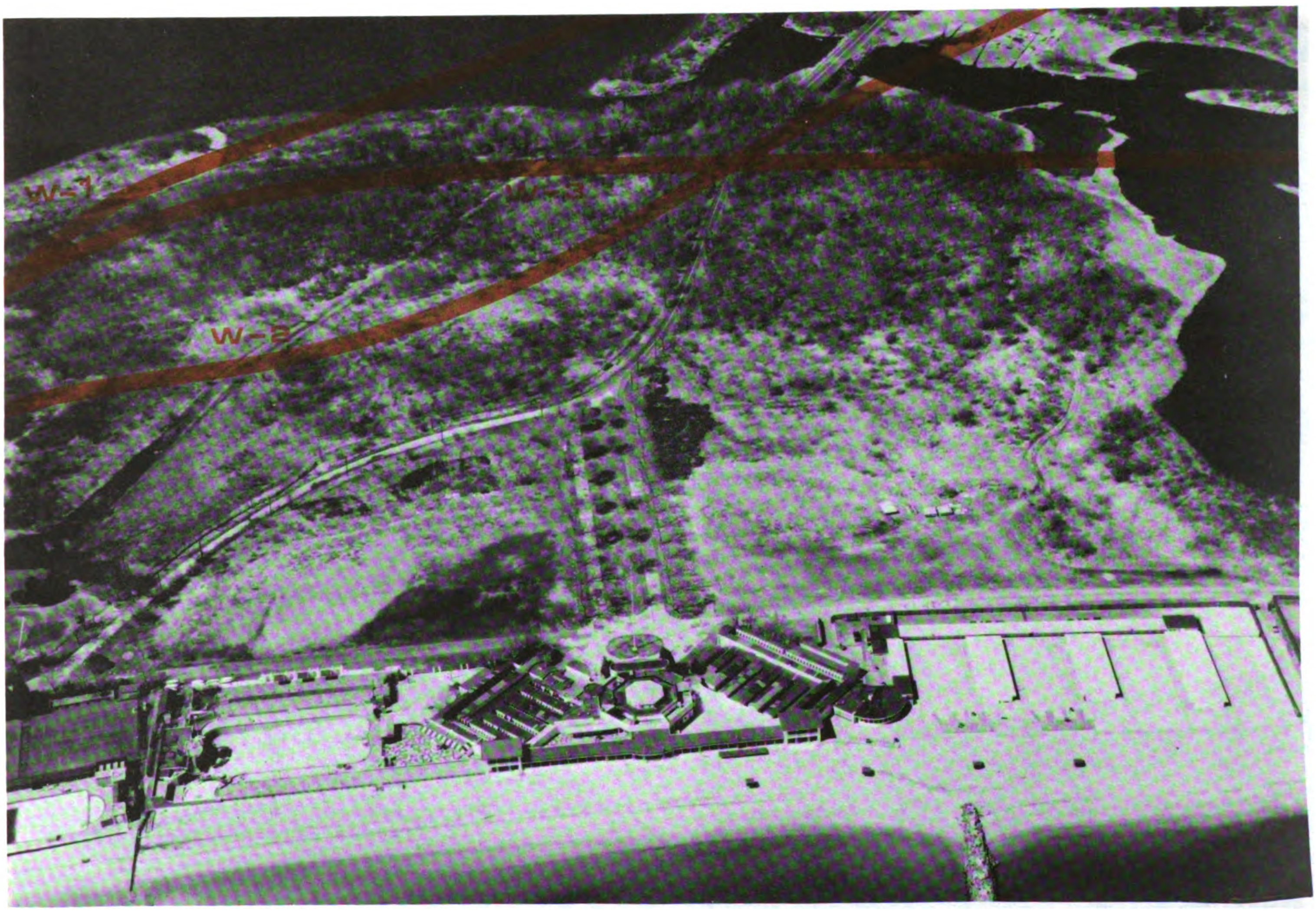
The Beach Club of Westchester Country Club has a large fresh water swimming pool, a wading pool, snack bar facilities, men's and women's lockers, and a series of cabanas on a 1000 foot beach. There are facilities for cooking for banquets as well as an area for dancing. During the winter months, there is trap shooting. A large area is provided for parking automobiles. An aerial view of these facilities is shown on Exhibit I-4.

The adjacent private Manursing Island Club includes a large parking area, a beach with about 600 feet of shoreline and its associated facilities, a swimming pool and tennis courts. (Exhibit I-5) The privately owned North Manursing Island Wildlife Refuge is a tract of about four acres set aside for wildlife as associated with the tidal inlet portions of Port Chester Harbor. It is one of the two private conservation areas on the shore of this body of water.

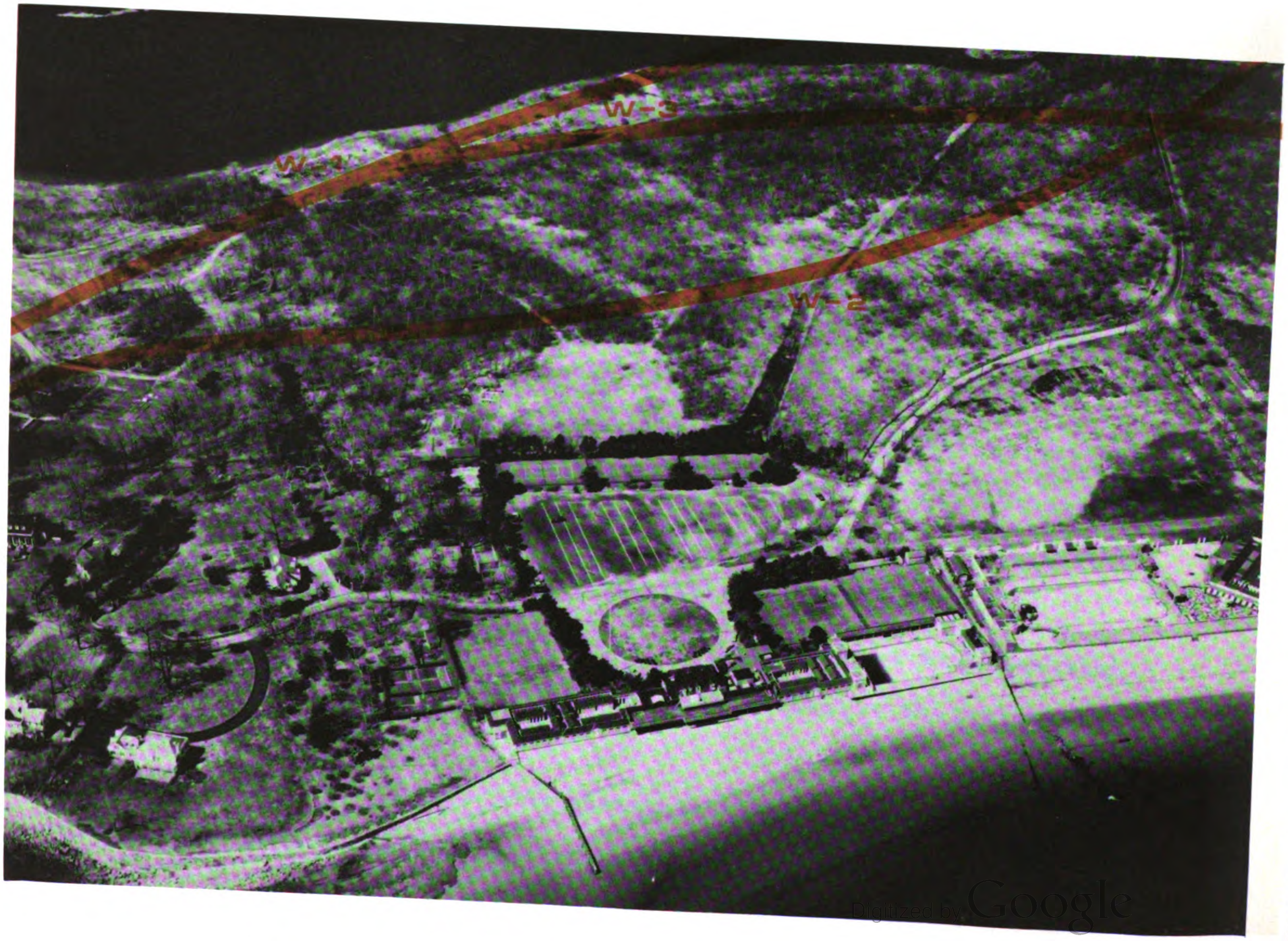
The 39 residential parcels on North Manursing Island constitute a major residential neighborhood. About 30 structures are set on this low-level island, which presently focus on the Sound in the south, and Port Chester Harbor to the north.

Moving the present routing easterly through one of the above areas would expose the roadway visually to a significantly larger portion of residences. Presently Alternatives W-1, W-2 and W-3 are set in a depressed section of land which minimizes the visual as well as noise and air pollution problems.

Thus, by moving the routing to the east of Playland, severe environ-



AERIAL VIEW OF BEACH CLUB OF WESTCHESTER COUNTRY CLUB


W-3
W-1
W-2

mental impacts would be experienced by those who live on North Manursing Island and the surrounding area as well as those who use its facilities.

Alternative W-4. This routing would go from the present intersection of the Cross Westchester Expressway with the New England Thruway directly southeast into Port Chester Harbor. It provides the shortest land approach for the northern end of the bridge, but a longer water crossing. The effect on the Port Chester Harbor, however, is substantial. The bridge must pass between the present channel into Port Chester Harbor and North Manursing Island, a residential community. The southwesterly edge of the channel is less than 500' from the North Manursing shore line and the structure will therefore be very close to both the channel and the residential community.

Port Chester Harbor is used by a substantial number of recreational boats and commercial vessels bringing petroleum products and construction materials to this area. Some 500,000 tons of goods pass through the harbor annually. Because of the shallowness of the area between the bridge at this location and the shore, all vessels using the marina located to the east of the line near the Kirby Pond would have to be able to pass under the structure. The location, therefore, will affect navigation in the harbor area.

The displacement of homes within the Port Chester Harbor area by Route W-4 will be similar to the number required by routes W-1, W-2 and W-3. The impact on noise and air quality for the land portion will also be similar. There will be significant difference, however, due to the over-water bridge portion on Alternative W-4 adjacent to the shore line. The properties on North Manursing Island and Byram Point in the Connecticut will be affected by the proximity of the bridge in the harbor.

This visual impact of this route through Port Chester Harbor will be substantially greater than for the recommended alternative of using the point of land in Playland Park as a bridgehead. The development around the harbor would be facing the bridge. The visual impact would be felt by those in the Grey Rock area of Port Chester, Kirby Lane area of Rye, Byram Point in Connecticut and by the Manursing Island residents. The effect on the latter would be particularly severe since the bridge would be within 200 feet of their shores.

Because of the visual impact and the larger number of persons to be affected by increased air pollution and noise levels, combined with the navigational hazards, this routing is considered to have, on an overall basis, a greater adverse environmental impact than routes that traverse the eastern edge of Rye Playland. Whether this route can be considered feasible depends heavily on local officials and agencies, and the comments received from those interests potentially affected by such a routing. Thus, such a determination can only be made after consideration of the Draft Environmental Impact Statement/Section 4(f) Statement.

d. Minimization of Adverse Effects

Since there is no feasible and prudent alternatives to the taking of 4(f) lands, all possible planning has been undertaken to minimize harm.

The Metropolitan Transportation Authority will be responsible for furnishing the right-of-way for the project through Section 4(f) lands.

During construction, care will be taken to permit transition to new usage. To minimize short term effects, construction will follow New York State and local requirements in accordance with their construction provisions, paying special attention in the area in or near Playland Lake.

Presently, most of the area through which the road is undeveloped and fenced off or otherwise more or less inaccessible to the public. Recommendations have been made to develop this area into two 18-hole, par-3 golf courses around the lake, with numerous foot bridges connecting the islands and the above. In exchange for use of the right-of-way, the Metropolitan Transit

Authority could develop the park in accordance with the desires of the Playland Commission. In addition to golf, as recommended, such development could include a beach on the lake, new boat house, tennis or other facilities for active recreation.

While all these alternatives could be easily developed along with new active recreation, Alternative W-1 has the greatest potential. The structure of Alternative W-1 would be an elevated viaduct through Playland; with a few adjustments to the layout of the proposed golf courses, the bridge could be built without interfering with the use of the area for golf.

Presently, the Westchester County owns the land, but lacks the necessary appropriations for development. The bridge and highway project could be a device to provide the funds for any proposed recreational facilities.

The intent of the planning of this project is to minimize adverse impact to Playland and to compensate for unavoidable effects by environmental enchancement. The design of the approach road was made an elevated viaduct to avoid the effects normally associated with modifying wetlands and open areas. Vertical clearances and spans over land and water in Playland will allow all vehicle and pedestrian access, as well as boating access, for Playland Lake areas.

Studies will be undertaken to determine the appropriate construction techniques and exact foundation placement to minimize the adverse effects of construction.

The project sponsors are committed to a restoration of affected beach areas to a condition equal to or better than existing conditions whereever feasible.

Full consideration will be given to the comments and suggestions of the Westchester County Playland Commission as to further refined measures to minimize harm.

2. Oyster Bay National Wildlife Refuge

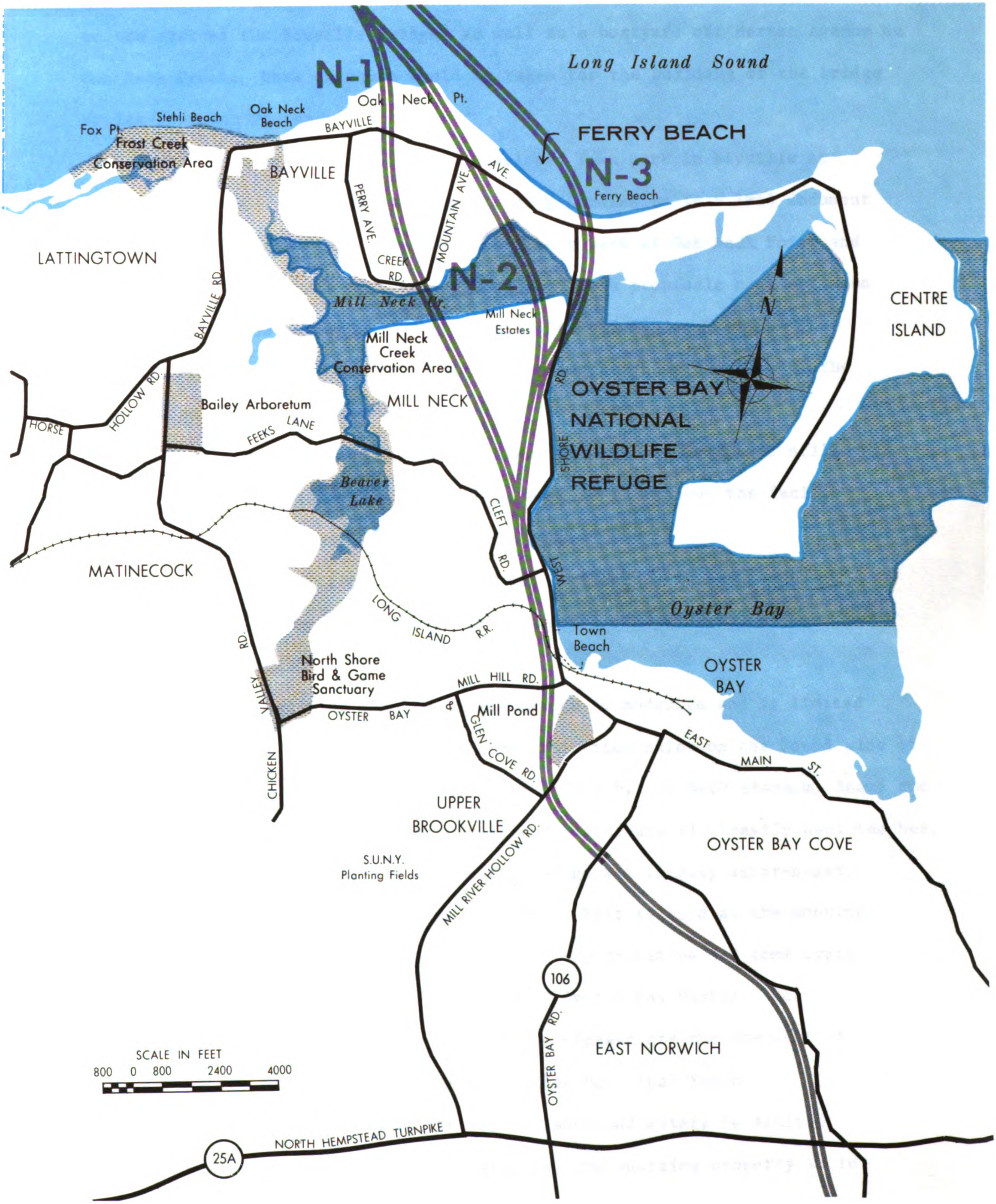
a. Introduction & Description of Refuge

All three bridge approach alternatives under consideration in Nassau County must cross over Mill Neck Creek and, therefore, pass through or over a national wildlife refuge area. This area, of approximately 3,100 acres, was deeded to the United States by the Town of Oyster Bay in June of 1968 as a wildlife and waterfowl refuge. Exhibit I-6 shows the area covered by the refuge, other conservation areas and the location of the alternative routes.

As can be seen from the map, Mill Neck Creek and Oyster Bay Harbor are included as are portions of Cold Spring Harbor. The major portion of the refuge is under water all the time as the deed includes the shore only up to the mean high water mark.

This map shows the areas over the whole refuge, indicating local area affected. The area is used as a migratory stop and as a wintering ground for waterfowl on the Atlantic flyway. These fowl are primarily found in the salt marsh areas of Mill and Oak Neck Creeks and the waters of Beaver Lake and thus are out of the area impacted by the proposed bridge. Some nesting of black ducks, wood ducks, mallards and Canadian geese takes place around Beaver Lake and vicinity. Herring gulls, black-bellied plover, greater yellow legs, black-crown night herons and great blue-herons have been noted, as well as snipe, sandpipers, rails, sea gulls and shore birds. Ruffled grouse, woodcock and mouring dove have been in fringe areas. Mink, weasel and muskrat signs are common along streams.

Although intended primarily as a wildlife refuge, there is a long history of recreational use in the area. There are two public beaches adjacent to the refuge in Bayville (Beekman Beach and West Harbor Road Beach) and two in Oyster Bay (West Shore Road Beach and Roosevelt Memorial Park). In addition, there are boat mooring facilities in Mill Neck Creek just



CONSERVATION AREAS- NASSAU APPROACH.

to the east of the Bayville Bridge, as well as a boatyard off Herman Avenue on Oak Neck Creek. None of these would be taken for the building of the bridge or its approach routes.

In addition, there is a small undeveloped Town park in Bayville at Michael F Street. The Nassau County Planning Commission in a 1964 document "Parks and Recreation" also considered a county park at Oak Neck Point and another just to the east of Bayville Bridge. These proposals have not been implemented and do not appear in the Nassau-Suffolk Regional Plan. The Oak Neck Point proposal was taken out of consideration by the sale of the Williams estate for private development.

It is not known if the site to the east of Bayville Bridge is still being actively considered. Currently, the plan is to improve the facilities at the existing beach on West Harbor Road.

There is, in addition, to these public facilities, at least one commercial oyster company operating in the waters of Oyster Bay Harbor and Mill Neck Creek.

Uses of the existing beaches in the refuge is moderate and is limited to local residents, since more attractive facilities exist on the Sound side of Bayville, which is not in the refuge. Stehli Beach, Oak Neck (Ransom) Beach and North Centre Island Beach on the Long Island Sound, are all heavily used beaches.

Other recreational activities in the refuge are largely water-based; fishing, shell-fishing, crabbing and boating. Bait is sold at the mooring area just west of Bayville Bridge. Crabbing opportunities and some oyster beds are found primarily on the west side of Oyster Bay Harbor. Boat mooring facilities are numerous. Two of the biggest are the one west of Bayville Bridge and the one just east of Creek Municipal Beach.

Public vehicular access to the refuge lands and waters is limited because in all but the above noted instances, the abutting property is in private ownership. Public pedestrian access to the entire refuge is possible by entering at a publicly owned point and walking along the refuge shoreline. It should be noted, however, that at a normal high tide, there would be no refuge land above water, and at low tide, the exposed land under water would be minimal at the beaches, and somewhat wider in the mud flat areas.

The Secretary of the Department of Interior, accepted the refuge area for the U.S. Government in December, 1968 and placed it under the administrative jurisdiction of the Bureau of Sport Fisheries.

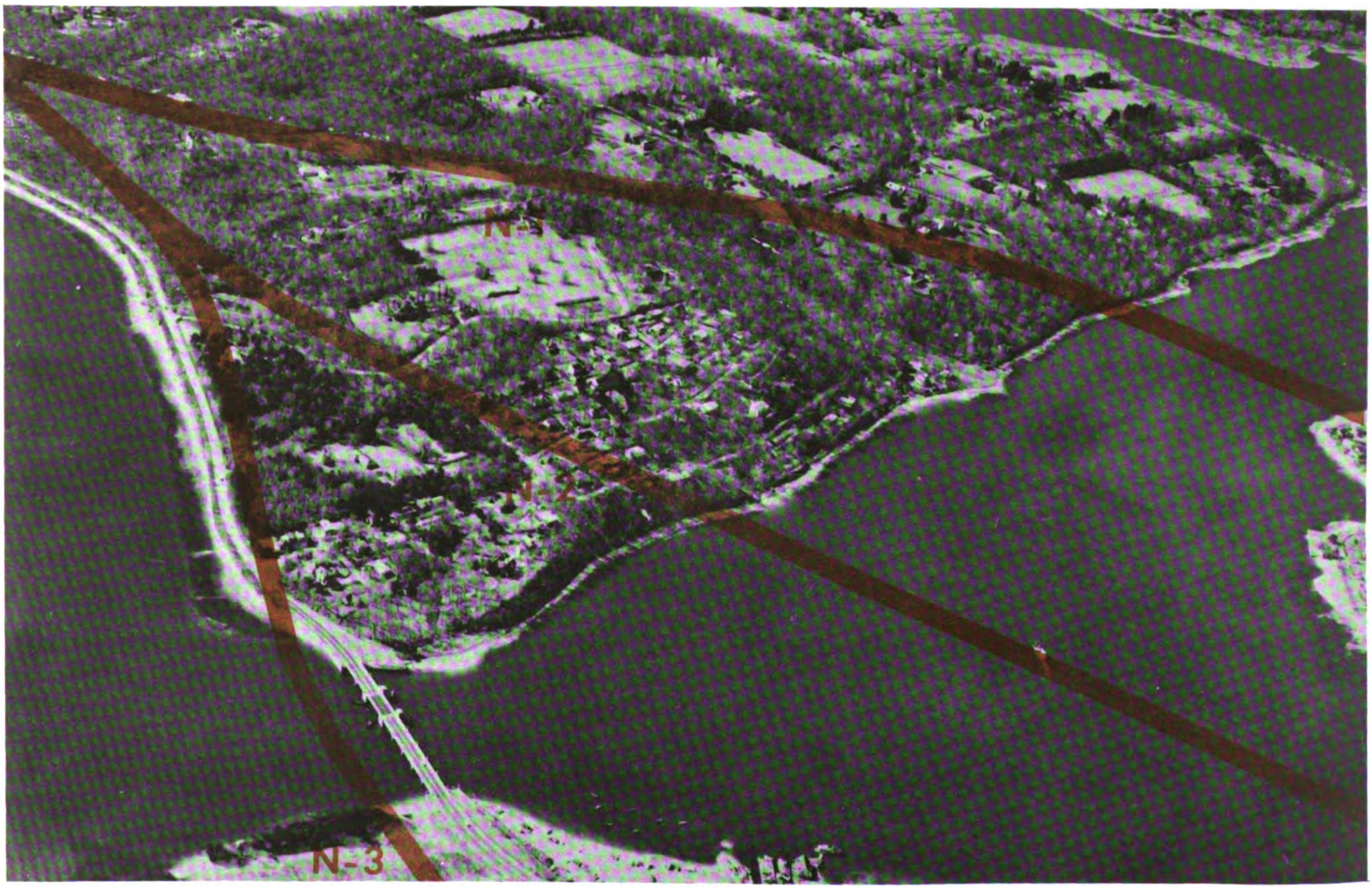
There are no particular unusual conditions of terrain, flooding, or habitation that either reduce or enhance the value of portions of the area.

The location and present use of the refuge is entirely consistent with community goals, objectives and land use planning. All plans made for the Oyster Bay Harbor area indicate a desire to maintain the low density, water-related activities now taking place. Placement of the shoreline in federal ownership does much to reduce pressures for urbanization.

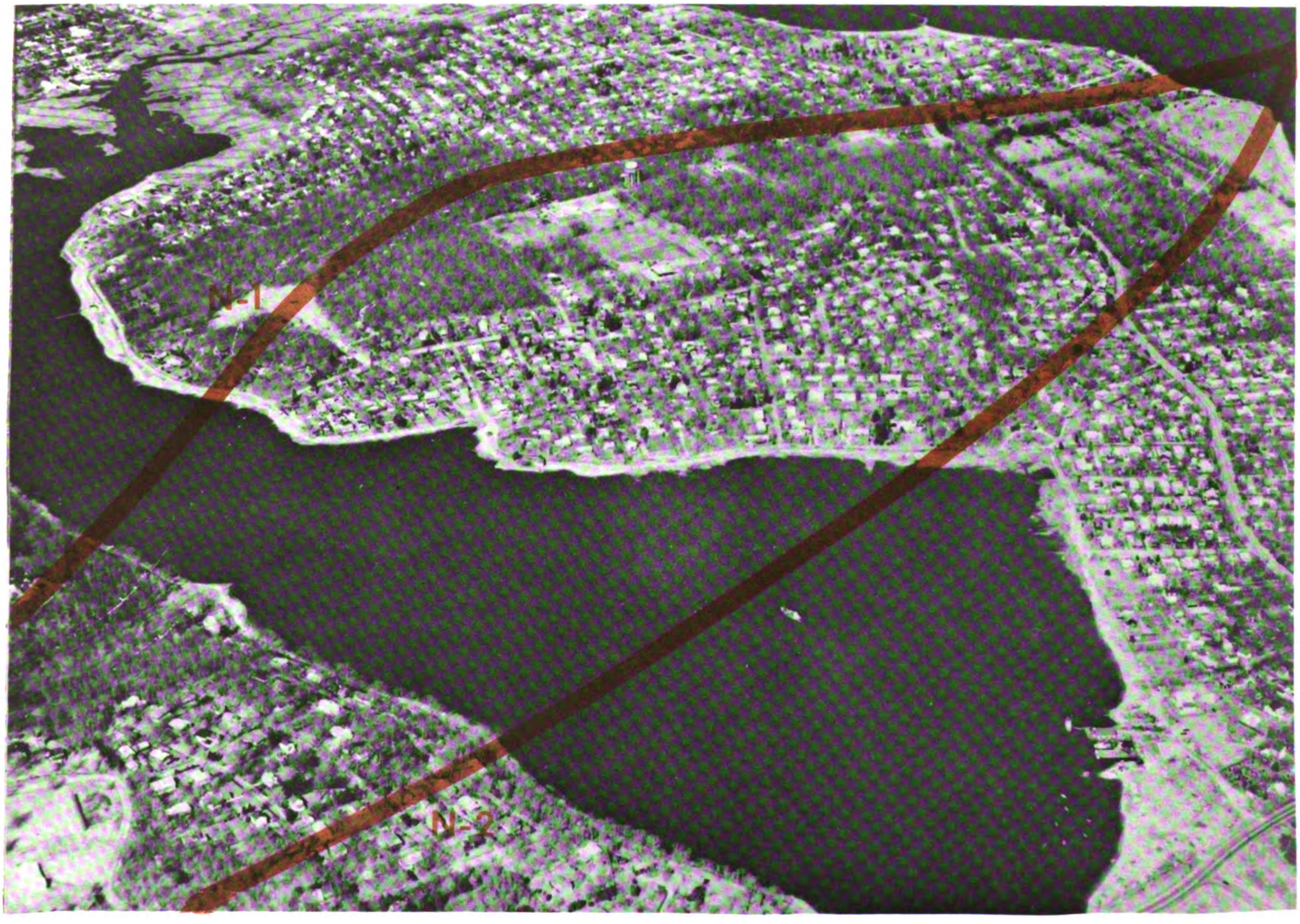
There were no state or federal funds used in the acquisition or development of this refuge. Aerial views of the Mill Neck Creek area of the Refuge, with the alternative routes superimposed, are shown on Exhibits I-7 and I-8.

b. Effect of the Proposed Bridge on the Wildlife Refuge

There are several types of potential impact that the proposed bridge over the Sound might have on the Oyster Bay National Wildlife Refuge. One is the taking of land within the refuge area as the bridge over Mill Neck Creek reaches the shoreline. Another is the effect on boating activities by reason of the bridge roadway or piers. A third possible impact is upon the



AERIAL VIEW OF OYSTER BAY NATIONAL WILDLIFE REFUGE-1



AERIAL VIEW OF OYSTER BAY NATIONAL WILDLIFE REFUGE-2

quality of the water if drainage or tidal patterns are changed or if run-off from the bridge roadway adds pollutants to the water. A fourth is the effect of auto emissions on the ambient air quality and a fifth is the effect of roadway noise on activities under and adjacent to the bridge. Vehicular or pedestrian access to the refuge could be affected by the bridge approaches, and a further consideration is visual impact. Each of these types of impacts is discussed in this section.

Taking of Land.- All three alternatives cross Mill Neck Creek with an elevated viaduct. The immediate vicinity of the foundations for the structure will occupy underwater areas of 0.3 acres for N-1, 0.5 acres for N-2 and 0.2 acres for N-3. None of the alternatives would require the taking of public beach lands, although Alternative N-1 would pass within 1500 feet of the eastern end of Bayville's Creek Municipal Beach.

Effect on Boating in Mill Neck Creek. - Alternative N-1 would pass over the edge of an area presently used for mooring small craft, most of them motorboats. It is possible that boats presently moored where the bridge will pass will have to be moved to the east or west so as not to be affected by modified currents around the bridge piers. Since the roadway in this alternative would be approximately 60 feet above mean high water, it is not anticipated that its height would cause any restriction of activity. In each of the alternatives bridge supports would be spaced about 100 feet apart.

Alternatives N-2 and N-3 are not expected to cause significant changes in present boating activities by reason either of location or height. Alternative N-2 would be approximately 45 feet above mean high water and Alternative N-3 would be approximately 30 feet above water.

The greatest impact on boating activities from the proposed bridge would come while the Mill Neck Creek span is actually being constructed.

At this time it may be necessary to detour boating around primary construction areas so as to prevent possible accidents.

It is possible that the 30 foot height of alternative N-3 would prevent some larger boats from entering Mill Neck Creek. Those with larger sailboats would have to unstep their masts when coming in their boat for winter storage or else use another yard in the area, thus affecting the trade of the boatyard in Oak Neck Creek. It is also possible that Alternative N-3 might temporarily adversely affect oystering operations at the mouth of Mill Neck Creek during construction.

Effect on Quality of Water in Mill Neck Creek. - It is not anticipated that there will be no significant effects on the water quality in Mill Neck Creek. Impacts from each of the possible pollutants is described below.

Oils - Using the same units employed in Section E-1-C"Physical Environment Impacts - Water Quality", with the only change being a conservative assumption of an average depth of water of 5 feet. The amount of oil dripping would, for the 2,000-foot length of structure for Alternative N-2, be about 400 grams. This amount would be reduced by 1/4 to 1/3 for the shorter Alternatives N-1 and N-3. The dilution directly under the structure at the stationary tide period would be about one in 100 million by weight. Even this low concentration will be considerably dissipated by tidal movements.

Lead - Using the same units employed in Section E-1-c "Physical Environment Impacts - Water Quality" with the exception that the water depth is conservatively to be an average of 5 feet, the amount of lead particles would, for the 2000-foot Alternate N-2, total about 160 grams. This would be much less for the shorter Alternatives N-1 and N-3. The dilution directly under the structure at slack tide would be about 6 parts per billion or 0.006 m/g liter. Tidal movements will reduce even this low concentration considerably. It must be borne in mind that the amount of lead in gasoline will, in the future, be substantially decreased or eliminated altogether.

Salts - the amount of salt used for snow and ice control would not appear to alter significantly the salinity of Mill Neck Creek.

Heat - the structure crossing Mill Neck Creek will not alter the thermal balance of the refuge lands.

Sedimentation - traffic passing over the bridge will generate a certain amount of debris such as wear from tires, part of which will be swept up by maintenance forces. A portion will be dissipated into the waters, but the rate of sediment development would be of the same order of magnitude as normal dustfalls in urban areas.

If a more refined analysis reveals potentially adverse effects, designing of the bridge would incorporate provisions for containing the run off.

The alterations of tidal or drainage patterns due to the bridgeheads and supports may occur during the construction period as foundations are put into place from barges. However, actual operation of the bridge is expected only to create some local eddying around each pier during maximum tidal flow.

Effect on Ambient Air Quality. - The analysis of traffic forecasts and present ambient air quality shows that when representative traffic and local air conditions are combined, the area outside 100 meters of the centerline of the roadway will not exceed Federal Standards. It also appears that these standards will be met at all locations outside the highway right-of-way. This will be demonstrated by more detailed study.

Because each of the alternative approach routes is elevated above the water, much of the emissions will be dispersed to a non-pollutant level before they reach the water level or levels used by people. (See Section E-1.)

Effect of Roadway Noise. - For any of the three alternative approach routes it is anticipated that by 1995 the bridge could, under worst conditions assumptions, produce 80 dB(A) during peak hours at 85 feet from the edge of the roadway to 70 dB(A) at 300 feet. (See Section E-1). However, the actual impact zone will be considerably less when the relative elevation of the roadway is considered; the topography lend itself to the possibility of acoustical treatment. It is possible that improvement in vehicle design by 1995, will decrease the amount of noise guaranteed.

Effect on Vehicular or Pedestrian Access. - Vehicular access to the Refuge is limited, as noted above. Since all present roadways will be maintained in the design of the proposed bridge, vehicular access will not be adversely affected. Although the bridge might increase the number of people wanting to visit the refuge for recreational purposes, the limitation of existing local streets and parking facilities may be the controlling factor more than anything else.

Effect of Visual Impact. - A viaduct over Mill Neck Creek will obviously alter the visual characteristics of the area. The design of this structure will incorporate aesthetic design directions in an attempt to blend the bridge into the surrounding areas as well as possible. The bridge will afford users of the Sound Crossing a beautiful view from the roadway.

c. Alternatives to Taking of Section 4(f) Lands

Several alternatives to the Rye-Oyster Bay Crossing have been considered. (See Section H of the Impact Statement.) These include non-highway alternatives, other locations for a highway crossing, and alternative locations within the Rye-Oyster Bay corridor.

Non-highway alternatives would include no bridge, or use of mass transit or ferries. Alternative highway crossings discussed include those that would meet the purposes of the Rye-Oyster Bay Crossing (a new bridge parallel to Throgs Neck, Sands Point-New Rochelle, GlenCove-Rye and Lloyd Neck-Stamford) and those that would not (Port Jefferson-Bridgeport, Wading River-East Haven, Riverhead-Guilford, East Marion-Old Saybrook and Orient Point-Watch Hill).

All alternatives that would meet the purposes of the Rye-Oyster Bay Crossing would also require the use of 4(f) lands. The Oyster Bay National Wildlife Refuge is 5-1/2 miles wide from east to west. Any route avoiding this refuge would have to go east of Centre Island or west of Oak Neck Beach.

The nearest practicable route to the east is the one going through Lloyd's Neck. This also would go through Section 4(f) land, Caumsett State Park.

Two routes to the west of the Refuge have been studied in detail, the Fox Point and Stehli Beach. Exhibit H-16, Section H shows the location of these two routes.

Fox Point Route

This route crosses Route 106 south of alternatives N-1, N-2, N-3, proceeding a short distance into the northeast corner of Upper Brookville into Mill Neck. It then passes south of the Mill Neck Station and Beaver Lake, and then proceeds northeast across the railroad into Lattingtown. The route, then crosses Bayville Avenue near the 43-acre Locust Valley Junior-Senior High School and continues northward between Sheep Land and The Creek Club, reaching the Long Island Sound immediately east of Fox Point. The length of this route is 4.6 miles from Route 106 to the shore line. This route, while successfully avoiding the Oyster Bay National Wildlife Refuge would have severe environmental impact on several other areas.

It would cut through the Bailey Arboretum--a County owned property of 42 acres having examples of many examples of plants, trees and flowers, open to the public in the spring, summer and fall. It is also used by many school field trips.

It would pass through a part of the large conservation tract in the area which is made up of the Mill Neck Conservation area and the North Shore Bird and Game Sanctuary. The total acreage of these wetland areas is over 250 acres. They are under private ownership and are populated with large numbers of waterfowl.

It would pass through the Frost Creek wetlands.

It would impact a small edge of The Creek Club Golf Course between Frost Creek and the Sound, and passes close to the Beaver Dam Winter Sports Club.

It would take a small strip along the northeast edge of the State University of New York Planting Fields in Upper Brookville.

It would be adjacent to The Locust Valley High School and near The Locust Valley Intermediate and primary schools on Ryefield Road. Access routes to and from the Bayville Avenue interchange would bring additional traffic by these schools.

Since several of these properties are in public ownership, this alternative would also require the taking of 4(f) lands. Because of the relative positions of the Conservation Area, The Arboretum, The Sanctuary, The Golf Course and the Locust Valley Cemetery, no feasible alternatives are available in this routing that would avoid these sensitive areas.

The low flat terrain of the Fox Point Alternative makes it difficult to depress or elevate the highway to lessen the noise and visual impact. Therefore, the noise impact of this alternative has been judged by Bolt, Beranek and Newman to be more severe than Alternative N-1, N-2, and N-3.

Based on the number of public facilities impacted by this route, and the difficulty of alignment changes within it, the Fox Point Alternative does not appear to be either feasible or prudent.

Stehli Beach Route

Between Route 106 and the Mill Neck Railroad Station, this route coincides with the Fox Point Route. At this point, the route swings northward, crossing the railroad just east of the Beaver Lake Dam. It then turns slightly to the northeast and parallels the shore of Mill Neck Creek into the Village of Bayville along Oak Neck Creek, through the Mill Neck Creek Conservation Area, across Bayville Avenue and across the middle of Stehli Beach, to the Sound. This routing is 4.6 miles long, from Route 106 to the shoreline. This route also would have significant environmental impacts:

It would bisect Stehli Beach, the Town of Oyster Bay's public beach. This tract of 10 acres has a large bathing beach and refreshment facilities for its users.

It would cut through the Mill Neck Conservation Area (mentioned above in Fox Point Alternative).

It would pass right at the edge of The Oyster Bay Wildlife Refuge, and might, in fact, require filling of some small tidal creeks.

It would cross over Beaver Lake, at present a resting and feeding place for numerous types of waterfowl, and the lands of the North Shore Bird and Game Sanctuary.

Because of the substantial negative impact on the conservation areas, the Stehli Beach route does not appear to be either feasible or prudent.

As these two alignments demonstrate, trying to route the alignment around the Oyster Bay Natural Wildlife Refuge would result in significantly greater environmentally adverse impacts on wetlands, beaches, conservation areas, sanctuaries, and neighboring communities. There is no routing east of the refuge that can avoid such severe impacts, due to the arrangement of the other environmentally important lands. Thus, there are no feasible and prudent alternatives to the taking of the 4(f) lands of the Oyster Bay Natural Wildlife Refuge.

d. Minimizing Adverse Effects

Since there is no feasible and prudent alternative to the taking of 4(f) lands, all possible planning is being undertaken and will be included in the final design of the project to minimize harm to these lands.

The New York State Department of Transportation will furnish the right-of-way for the project; the Department will also provide maintenance upon its completion.

The intent of the planning in this project is to make the lowest possible impact to Refuge lands.

The design of the Mill Neck Creek crossing will be a viaduct type roadway, supported by pile foundations. These will be installed by methods designed to avoid disturbance to the wetlands. Thus, the damages normally associated with modifications of a wetlands area by a bridge, that is solid-fill, changing drainage patterns, cutting off water supply, erosion, will not be a part of this Mill Neck Creek crossing.

Vertical clearance of structures across Mill Neck Creek will be sufficient to allow most vessels presently using the channel to pass beneath it. (60 feet for N-1, 45 feet for N-2, 30 feet for N-3.)

The piers which support the structure will be spaced at 100 feet apart to allow adequate maneuvering for sail and motorboats.

The piers will be spaced with special consideration to allow equivalent use of lands to that at present.

Studies will be undertaken to determine the appropriate construction techniques and exact pier placement to minimize the adverse effects of construction.

This project is committed to a restoration of affected beach areas to a condition equal to or better than at present.

Full consideration will be given to the comments and suggestions of local, State and Federal officials who have jurisdiction over these lands and adjacent lands as to further refined measures to minimize harm.

3. Ferry Beach

a. Introduction

In addition to passing through the Oyster Bay Natural Wildlife Refuge, Alternative N-3 also passes over a small section of beach known as Ferry Beach. The Section 4(f) involvement is thus dependent upon whether Alternative N-3 is ultimately chosen as the location of the Nassau County approach to the Sound crossing; it is worth noting that N-3 requires the shortest over-water crossing in the refuge area.

As shown on a previous exhibit, Alternative N-3 passes through Ferry Beach near Revilo Avenue and along the north shore of Bayville. This beach is presumably owned by the Village of Bayville. Its access is from Revilo and Pine Park Avenues. Since no public parking facilities are provided in the immediate area and since these access streets are marked "private", its usage is largely confined to those who live in proximity to the beach; thus it has mainly local significance. There are no facilities in this area besides the beach proper, which is used primarily for swimming and sunbathing. The three properties affected by Alternative N-3 passes represents less than 5% of the Ferry Beach area, which is used primarily by local residents. Considering the large amount of beach area at Stehli Beach, Oak Neck Beach, West Harbor Beach and the Bayville beach near Centre Island on the Sound, this small section of Ferry Beach impacted represents a very small portion of the total amount of beach areas in the Bayville area. The area of Ferry Beach is shown on Exhibit I-9.

b. Effect of Proposed Project

Alternative N-3 passes over a section of Ferry Beach that has an average width of 20 feet. There will be no foundations for the bridge placed on the beach itself, so no beach land taking is necessary,

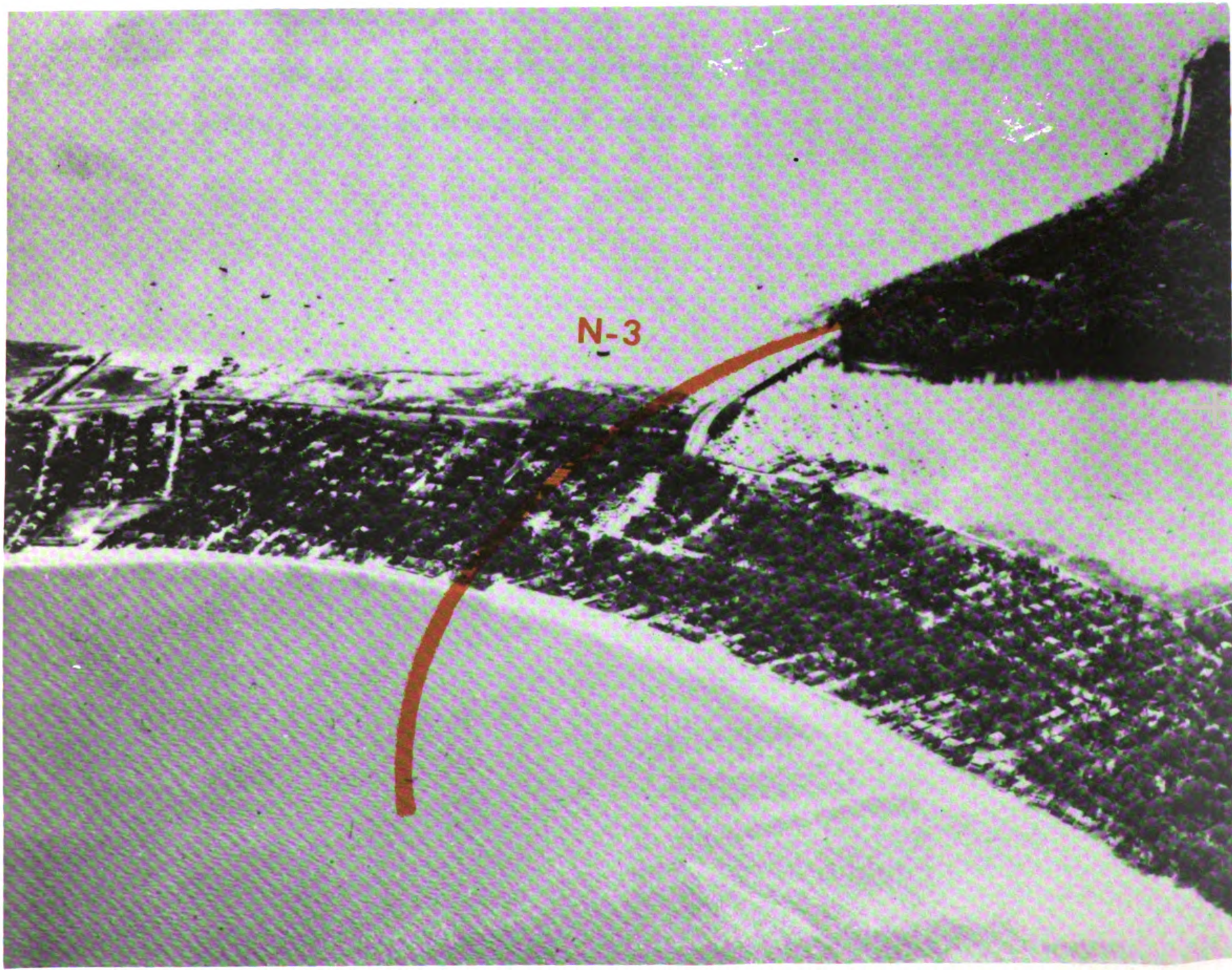
The bridge structure will obviously be a visual intrusion to beach users and will cast a shadow on the area adjacent to the bridge.

No major access will be changed by this alternative, vehicular or pedestrian. The basic the analysis made for the Long Island Sound in Section E is applied below for the Ferry Beach area.

Water Quality. There will be no long-term adverse effect on the water quality at Ferry Beach. During construction, some sedimentation will be expected in the water areas adjacent to the beach, but all measures will be taken to keep this at a minimum for the construction. Also, during construction, usage of the beach area near the bridge site will not be permitted, for the protection of the public.

Air Pollution. Analysis of air pollution under representative adverse conditions indicates that Federal Standards will be met outside a distance of 100 meters from the highway centerline. It also appears that these standards will be met at all locations outside the right-of-way. This will have to be demonstrated by further more detailed study. (See Section E-1.)

Noise. It is anticipated that by 1995 the bridge could, under worst conditions assumptions, produce 80 dB(A) during peak hours, at 85 feet from the edge of the roadway to 70 dB(A) at 300 feet (See Section E-1). However,



AERIAL VIEW OF FERRY BEACH

the actual impact zone will be considerably less when the height of the roadway is considered pending a study of the possibilities of acoustical treatment (See Section E-1).

c. Alternatives to the Taking of Section 4(f) Land

Alternatives N-1 and N-2 represent feasible alternatives to Alternative N-3. It should be noted that the over-water crossings of Mill Neck Creek by N-1 and N-2 are longer than by N-3.

d. Minimizing Adverse Effects

All possible planning will be taken to minimize harm.

The Metropolitan Transportation Authority will furnish the right-of-way and provide maintenance for the bridge.

The design of the bridge structure will place no foundations on the beach proper, requiring no taking of beach land.

J. SHORT TERM USES AND ENHANCEMENT OF LONG TERM PRODUCTIVITY

1. Introduction

Short term effects and uses of the environment generally include the immediate economic and physical aspects of the construction process.

Short term economic effects are largely beneficial. A sizable work force will be employed with virtually all being drawn from surrounding communities and the Metropolitan area. Substantial salary income will thus be generated, as well as local purchases of goods and services stimulated by these wages.

Firms engaged in construction operations and their many suppliers will also contribute significant amounts to business incomes. Not only will local and Metropolitan area companies receive this new business but other firms outside the region selling materials and services to ones directly engaged in the construction will directly benefit from the project. Ultimately, new business and salary income amounting to several times the project's construction cost will be generated.

With regard to the construction operations, they do constitute a temporary disruptive process. It is impossible to build a major new facility such as a bridge without disturbing the immediate neighborhood. The construction period is a period of intense activity as men, material and equipment are marshalled to complete a major project.

A preliminary analysis has been made of the various phases of bridge construction with a view to identifying the environmental impacts and to indicate ways in which these impacts may be kept to a practical minimum. This description can only be made in general terms. The actual local temporary construction impacts will depend to a great extent on local soil conditions, season of the year that the work is progressed, methods, materials and equipment employed by the contractor and the final highway and bridge design. One type of pile foundation, for example, would have a different impact than another. A bridge pier built within a cofferdam would have a different impact than a pier constructed on pipe caissons. It is possible, however, to discuss in general terms the types of disruptions that will probably be experienced at various locations within the project. The approaches and the bridge are treated separately as each will require somewhat different construction techniques.

2. Short Term Uses - Nassau and Westchester Approaches

1. Clearing and grading of the highway right-of-way will involve heavy machinery. The process will result in noise and some dust, and possibly dirt spillage. The specifications will include controls over all three.
2. Foundation work for structures will involve the use of piles. Therefore, pile drivers will be employed. Depending upon foundation conditions it may be possible to use low noise vibrating pile drivers, rather than the conventional impact pile drivers. Some vibration in nearby structures may be experienced. Pile driving generally results in a disturbance time of two to four weeks at any given locality. All three alignment alternatives require a bridge structure over Mill Neck Creek, and thus may require pile driving for the foundations.
3. The towns of Bayville and Rye will be impacted by increased trucking and other construction related traffic.
4. In Westchester, certain sections of right-of-way traverse rock foundation areas. This will require some blasting and the consequent noise disturbance. Blasting may take place for 30 to 60 days during the first year of construction.
5. Also in Westchester, alternates W-1 and W-3 are over inland waters and will require temporary means of access to structure supports. Temporary trestles may

be constructed out to individual pier locations or floating pontoon or barge access may be provided. Each method has different short term effects upon the waterway which will be considered in more detail during final design.

6. The terminus of the project in Westchester is the Cross Westchester-New England Thruway Interchange. Construction of the Bridge connector ramps will involve a major reconstruction of this interchange. The necessary construction detours and delays will have a temporary impact on the traffic flow in the area.

3. Short Term Uses - Long Island Sound

1. Pile driving for piers near shore may cause some noise impact in the vicinity of the bridgeheads.
2. All of the work on the bridge piers across the Sound will be done from floating equipment. All men,materials and supplies will be delivered to these piers. This marine activity will have an impact on navigation. Much of the bridge superstructure construction will similarly impact navigation. All such marine activity will be subject to U. S. Coast Guard regulations.

4. Steps Taken to Minimize Adverse Effects

Typical highway construction has undergone a radical change in the last few years with relation to its regard for the natural environment and man's pollution of the atmosphere. All standard highway contracts within the State of New York presently require new items of work never before included in typical highway contracts. These items were added to help prevent air pollution and to abate water pollution resulting from soil erosion, as well as to control water pollution and air pollution during the construction process. Air pollution has been controlled for some time now through anti-burning regulations incorporated in the contracts. (See New York State Standard Specifications Item INB - Supplemental Clearing and Grubbing and Item 900 - Temporary Work for Prevention, Control and Abatement of Water Pollution Resulting from Soil Erosion (Appendix J-1 contains an excerpt of Item 900).

The most modern construction equipment today is provided with a new generation of noise silencers. Air compressors are as quiet as any other normal piece of equipment. The standard pile driver, however, still makes the hammering noise it always did. There are, however, different hammers in use today, namely vibration type hammers, which are relatively quiet. These are used where it is required to cut down on the noise level in sensitive adjacent areas such as hospitals.

Specific construction contracts will be written with an outline of specific steps to be taken to control and preserve the environment during the construction process. Limitations can be placed on the use and management of any operation within or outside the Right-of-way. Such was the case during construction of the Adirondack Northway.

5. Comparison To The Long Term Productivity

There is no simple way to compare the impact of the construction process and associated short term uses with the resulting long term productivity. In Chapter C the regional benefits of the project in economic and transportation terms were presented. That Chapter represents the basic statement of long term productivity associated with the proposed project. In addition, a number of long term effects, both positive and negative were discussed in Chapter E.

Based upon these considerations, it would appear that the value to the region gained through the proposed project far outweighs the cost of temporary disturbance to the environment by construction and other short term effects.

APPENDIX J-1

NEW YORK STATE STANDARD SPECIFICATIONS (EXCERPT)

ITEM 900 - TEMPORARY WORK FOR PREVENTION, CONTROL AND ABATEMENT OF WATER POLLUTION RESULTING FROM SOIL EROSION.

1. 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 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.

   Work under ITEM 900 will not be used and paid for in situations where permanent contract items in the final position in the contract can be practically installed and can provide for pollution control.

2. 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 to the Regional Director 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 water-courses; 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 either at the time of the preconstruction conference or prior to the starting of any work on these items. No work shall be started until the erosion control schedules and methods of operations have been accepted by the Regional Director.

3. CONSTRUCTION DETAILS. 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.

Temporary control measures that are made necessary by the Contractor's negligence, carelessness or failure to perform the sequence and scheduling of work as part of his schedule as given in the subsection Preconstruction Conference or as later amended and approved shall be ordered by the Engineer to be accomplished and performed by the Contractor at his own expense.

Where erosion is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent 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 prior approval by the Engineer. The same limitation shall apply to each borrow or spoil area and erodible haul road outside the right-of-way.

ITEM 900 - (Cont'd.)

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.

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.

K. IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS

PPM 90-1 of the U.S. Department of Transportation is quoted below (Appendix E, Par. 2f):

"Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. Highways require use of natural resources such as forest or agricultural land, however, these are generally not in sufficient quantity to be significant..."

There are no significant amounts of forest or agricultural lands committed by the proposed project. The major resources committed consist of small takings in areas that are presently used for public recreation or conservation, as well as some areas of ecological importance. These are described below.

1. Public Recreational Areas and Parklands (4(f) lands)

Oyster Bay Natural Wildlife Refuge. The bridge crossing Mill Neck Creek in Oyster Bay will require the placement of supports at a spacing of about 100 feet for lengths ranging from 700 to 2,200 feet depending upon route selected. Thus, approximately from 0.2 to 0.5 acres of Refuge Land will be required for this purpose. The areas underneath the viaduct range from 1 to 3 acres. However, since no long-term adverse effects on this land are expected from this crossing, the placement of piers appears to involve only a small, permanent commitment of the wildlife resource.

Ferry Beach. Alternative N-3 requires the commitment of one-tenth of an acre of beach on the North Shore of Bayville under the viaduct structure. The recreational uses of this limited area will hence be affected as this part of the beach will be covered by the viaduct.

Rye Playland. Alternative highway approaches require the irreversible and irretrievable resource commitments of from 0.4 to 0.9 acres of Playland Park land for pier foundations, depending on the alternative selected. Viaducts will cover from 3 to 5 acres which will be affected by the presence of the structure. While the resource commitments of W-2 and W-3 involve undeveloped wooded areas, W-1 additionally requires an elevated viaduct structure over Playland Lake. These commitments require changes with respect to present land use and character, as well as foreclosing some future land use possibilities. There are potential uses to which the impacted areas can be put, according to plans of the Playland Commission.

2. Areas of Ecological Importance

Nassau County. The only commitments of ecological resources are those wooded areas within the right-of-way of the project. This commitment will involve a minor change of habitat for birds and animals. Since the extent of such commitments will be limited to a width of a few hundred feet, all but the smallest woodland areas will be largely maintained in their existing character.

Westchester County. Alternative W-1 passes through an area that is generally residential and moderately wooded and thus involves the resource commitment of those wooded areas through which the roadway passes. Alternative W-2 crosses similar wooded areas, but in addition, traverses a tidal inlet to Port Chester Harbor. This will require an additional commitment of marshland and its associated life forms. Alternative W-3 crosses wooded areas and the south shore of Kirby Mill Pond, a private recreational and natural wildlife area. The commitment of land and tidal marsh as well as changes of wildlife habitat will be necessary.

While there is only a small commitment with respect to shellfish and bird feeding and nesting grounds, the noise associated with the highway will, in effect, commit the adjacent lands to a change of habitat for its wildlife uses.

3. Special Resource Features

On the Oyster Bay side, there are about four parcels of land comprising some 20 acres that are or have been agriculturally productive lands; the project requires the irreversible and irretrievable commitment of those agricultural resources. In addition, the Oyster Bay approach traverses a sand and gravel pit area, requiring a limited commitment of about 1½ acres of that resource.

There are no known paleontological, archaeological, or historical resources committed by this project.

4. Other Resource Commitment Considerations

PPM 90-1 in defining irreversible and irretrievable commitments of resources includes the following statement:

"The improved access and transportation afforded by a highway may generate other related actions that could reach major proportions and which would be difficult to rescind. An example would be a highway improvement which provides access to a non-accessible area, acting as a catalyst for industrial, commercial or residential development of the area."

Two issues have been considered within the above context. The first, concerning the "catalyst" effect, ultimately depends upon the communities themselves as they exercise their legal and other prerogatives in controlling land use and other activities within their respective jurisdictions.

The second issue pertains to adjacent areas that are presently not developed and whose future development will have to be planned with a view to the physical presence of the highway. For example, the presence of highway noise in certain areas suggest certain future land use as preferable to others. While this does not represent a resource commitment in a strict or total sense, it does suggest constraints upon the desirable future uses of those lands.

The two issues are closely related in that the resource commitment pertains to a wide range of alternative future uses rather than to a present resource commitment. An assessment of such future conditions can only be accomplished within the framework of land planning changes that will evolve in the county subdivisions following a decision to proceed with the project.

Previous Studies on Long Island Sound Crossings

Traffic, Earnings and Feasibility of the Long Island Sound Crossing, Madigan-Hyland, Inc. 1965; updated in 1968.

Feasibility Report: Long Island - New England Bridge and Connecting Highways, Bertram D. Tallamy Associates, 1965; updated in 1968.

Traffic and Revenues, Proposed Suffolk County, New York to Connecticut Crossing, Wilbur Smith and Associates, 1965; updated in 1968.

Long Island - New England Bridge Study, Sverdrup & Parcel, 1965; updated in 1968.

A Comprehensive Transportation Study for Proposed Bridge Crossings, Creighton, Hamburg, Inc., December 1971.

A Comprehensive Study of Proposed Bridge Crossings of Long Island Sound - Summary, New York State Department of Transportation, January 1972.