APPENDIX A

Englewood: A Quality of Life Study

ENGLEWOOD;

A QUALITY OF LIFE STUDY

by

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submitted in partial
fulfillment of the requirements
for the degree of

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Graduate School of Fine Arts
University of Pennsylvania
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PREFACE

It has been asked why municipalities such as Englewood should want to conduct an environmental inventory...surely there is hardly any left. Those who would ask the question would do well to take a closer look at the downtown area which serves as a periodic reminder that the gods of the flood have not forgotten them.

Certainly these same people would be sobered were they to realize that, though the natural processes often move at the pace of the proverbial tortoise, they are no less determined. Man labors endlessly to hold his own against the same forces which, over tens of millions of years, have humbled into old hills, what were once towering mountains.

Against such forces as these, we would be well-advised to treat them as the friends they are, rather than as the enemies we have made them. The labor we expend to fight them is as singleminded and awe-inspiring as a world war...we fight the enemy with computers, explosives, maps, and huge machines; we take his weapons and materials - the spoils - and use them against him. We steal and murder while we accuse him of doing the same.

The city would do well to consider the suggestions of the authors... that cooperation with the natural processes based on understanding, rather than antagonism based on ignorance, is the answer to many of our most pressing problems.

September 13, 1976

Ian L. MacHarg
Chairman

Department of Landscape Architecture
and Regional Planning
University of Pennsylvania
Philadelphia, Pa.

Introduction

Since the inception of this project many people have asked why we wished to compile an Environmental Resources Inventory when an urben center like Englewood is "all built up and there are no natural resources left".

The fact is that the natural resources, although somewhat altered, are still here. The quality of life in Englewood always has been and still is governed largely by its natural features, especially its location, topography and hydrology, and, though there are only a few large undeveloped tracts of land left, small scale development and redevelopment decisions are being made all the time. Some of Englewood's worst environmental problems stem from bad small-scale development decisions made in the past.

We hope that this Study will provide Englewood's government and residents with an environmental overview which will prove useful in whatever decision-making takes place, and, because we view this publication as merely a first step, the process of continuous updating will remain an important part of the work of the Englewood Environmental Commission. Most of the information in this Inventory existed in one corner or another of our city, but this is the first time it has been collected together and presented from an environmental point of view. We have been kept busy updating it, even during the preparation of the manuscript for press, and, therefore, have attempted to design the finished publication in such a way that Appendices can be added with ease.

We are very much indebted to Charles Edward (Ched) Bradley, Jr. and Jay Steven Sanders for their months of work in preparing the manuscript, and to Professor Ian MacHarg of the University of Pennsylvania for making the resources of his Department available to us.

In addition, we thank the following for lending their expertise: Mr. Peter Brooks, Research; Mr. Steven Diplock, Sites of Historic and Architectural Interest; Ms. Margaret Engelmann, Vegetation; Mr. Thomas Lanzana, Graphics; Dr. Malcolm McKenna, Editorial Advice; Mr. Joseph Murphy, City Planner; Campbell and Ernestine Norsgaard, Wildlife List; Dr. Michael Passow, Hydrology; Mr. Johannes Richter and Dr. Frederick Warburton, Additional Bird List.

We also hereby gratefully acknowledge the valuable contributions of many City Departments and Agencies, in particular Planning, Engineering, Recreation, Community Services and Environmental; of private groups such as the Social Service Federation and the League of Women Voters; and of many individuals, without all of whom this Study could not have been completed.

Lastly, we thank the Englewood City Council and the State of New Jersey Department of Environmental Protection for financing this project.

May 1, 1977 The Environmental Commission of the City of Englewood

Priscilla C. McKenna, Chairwoman
Renee Leiter, Treasurer
Margaret O'Carrol, Recreation
George Roberts, Planning Board
Betty Robinson, Public Schools
Gwynneth Smith, Secretary
Frederick Warburton, Vice-Chairman

ACKNOWLEDGEMENTS

The authors wish to thank the members of their thesis committee; Arthur Johnson, Nicholas Muhlenberg, Ian McHarg, and particularly their principal advisor, Robert Giegengack.

The authors are also grateful for the assistance of Thomas Lanzana, Peter Brooks, and the seemingly tireless enthusiasm of Priscilla McKenna, all of the City of Englewood.

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This is not a study of an area either hoping for, or defending itself against new development rather, it interests us because of:

a. Diverse landforms whose boundaries all meet within the City limits of Englewood.

b. Diverse social groups who live within these varied environments and have to share a finite amount of space.

The area offers us a fine opportunity to study an already developed area and includes the following planning process:

a. Information gathering

b. Idea of the size of the problems faced by urban areas

c. Look at some design alternatives

d. Implementation procedures

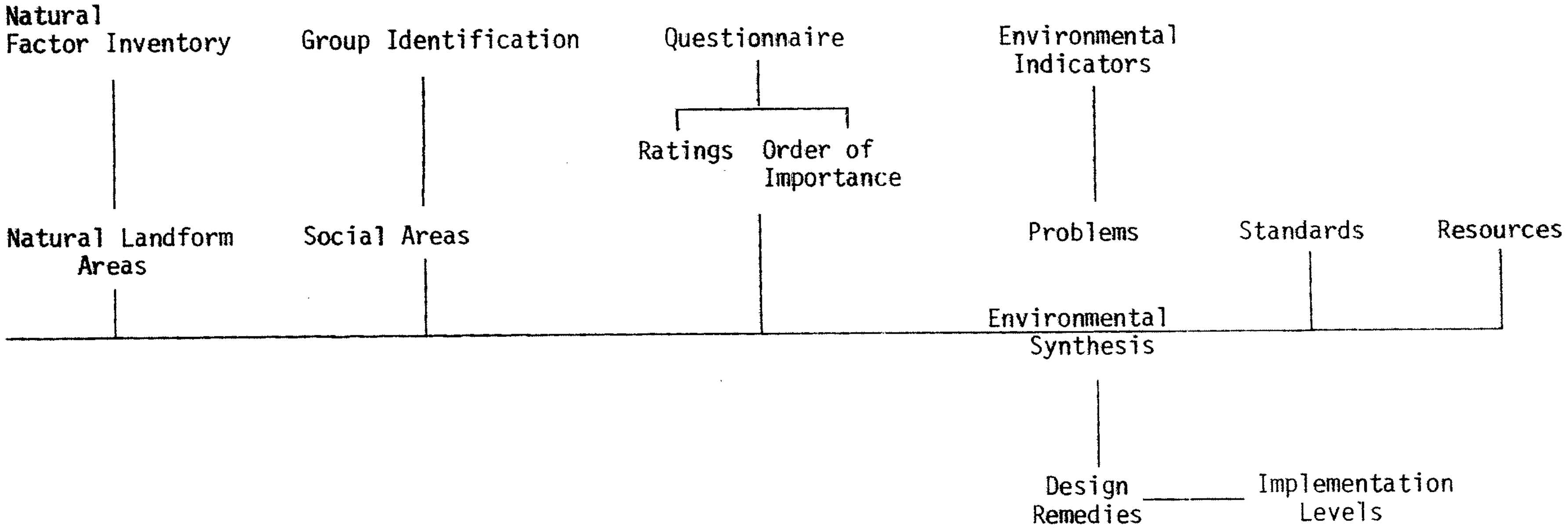
"External effects and the levels of public services can serve simultaneously to determine the state of the environment; the condition of a particular area depends both on the extent of private activities that damage the locality and on the public resources expended to maintain it. More generally, the quality of the environment depends both on individual private decisions and on collective action undertaken through the public sector (that is, on the provision of public services). This is only to be expected because environmental quality, broadly interpreted, is a public good consumed jointly by all members of society."

<u>The Theory of Environmental Policy</u>,

Baumol and Oates

FRAMEWORK FOR ENVIRONMENTAL STUDY

OF ENGLEWOOD, N.J.



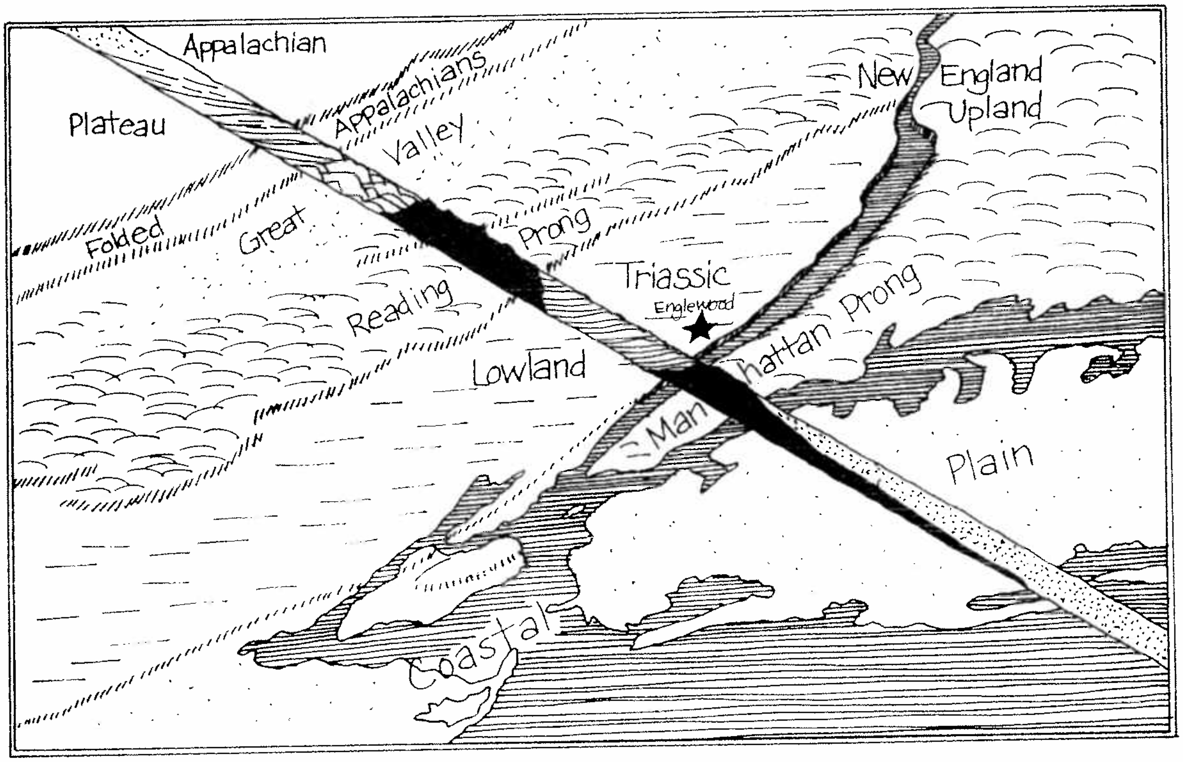
INTRODUCTION

THE NATURAL FEATURES OF ENGLEWOOD

The City of Englewood, New Jersey, is located (40^{o} 53' North latitude, 73^{o} 58' West longitude) on the eastern edge of the Triassic lowlands, between the Reading and Manhattan Prongs (see fig. 1). It is located at the extreme northern end of the Hackensack Meadowlands, and was once more a part of them than it is today, owing to the construction of tide gates at the south end of the city (on Overpeck Creek) which prevent the diurnal flooding of the stream with the ebb and flow of the tides in the Meadowlands. Early maps of the city showed the area on which most of the third and fourth voting wards is now built, as "impassable swamp" (see fig. 2). There are Phragmites (common reed) marshes still in existence in the southwestern lowland areas in the fourth ward.

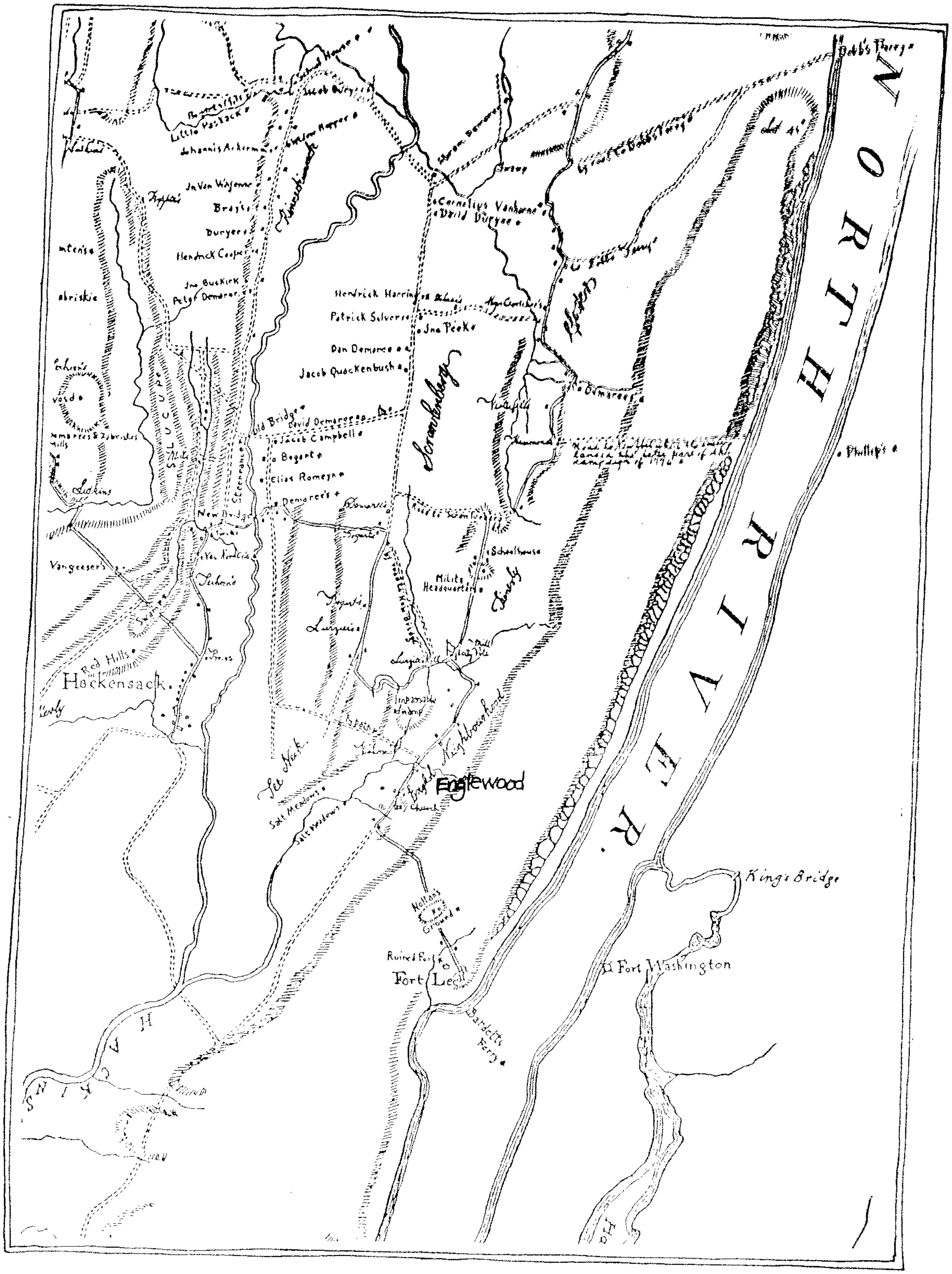
After the Triassic Lowlands were formed and they had been washed and scoured by the streams and glaciers, morainal dams backed up the waters from the glacial outwash - the dam was eventually breached and the lake drained, leaving a great marsh. The diabase uplands, stripped of their vegetation by the moving ice, were revegetated with northern hardwoods such as Beech, Black Oak, White Oak, Red Maple, and Hickory (6, p. 177). These hardwood forests were clearcut in the mid- and late-nineteenth century (20, Chptr. IX) and occasional specimens of these forests can still be seen - huge White Oaks, Black Oaks, and Beeches - two to three hundred years old, among a much younger forest of the same trees. In addition, there are abundant pioneer species such as Sweetgum, Ailanthus, Sassafras, and Tulip trees.

fig. 1



The physiographic provinces of the New York region.
After A.K. Lobeck (25)

fig. 2


NORTH RIVER.
Dobb's Ferry
Little Paskack
Jacob Duryee
Johannis Ackerman
Jn Van Wagenne
Brasts
Duryees
Hendrick Cooper
Jno Buskirk
Peter Demarest
Cornelius Vanhorne
David Duryee
Hendrick Harring
Patrick Silvers
Jno Peek
Dan Demarest
Jacob Quackenbush
Schraalenburg
Old Bridge
David Demarest
Jacob Campbell
Bogert
Elias Romeyn
Demarest's
New Bridge
Vangeeser's
Demarest's & Zabriskie's Mills
Zabriskie
Liskins
SLUCUP
Steenrapie
Swamp
Red Hills
Hackensack
Bogert's
Schoolhouse
Militia Headquarters
Impassable Swamp
English Neighbourhood
Englewood
Salt Meadows
Salt Meadows
Church
Hollan's Ground
Ruined Fort
Fort Lee
Bardett's Ferry
King's Bridge
Fort Washington
Phillip's
Demarest
HACKINS

Deer, bear, fox, squirrels, skunks, rabbits, chpimunks and many varieties of birds inhabited these forests. The deer and bear have gone, (the last deer was seen in 1975) but an occasional fox has been seen, and many of the birds remain. Those species of animals well adapted to urban living such as rats, raccoons, squirrels, and mice remain also.

The climate of the northern New Jersey area which includes Englewood is typical of that found in the Eastern Maritime rainfall region (21, p. 205). Average annual rainfall in Bergen County is 48.6 inches (22, p. 14). Over 25 years, the average annual temperature in January is -15°C (31°F) and in July is 7°C (70°F) (22). The Englewood area is primarily influenced by the amount of insolation (sunlight received) resulting from its latitudinal position, the distribution of the high and low pressure cells, and the alternating influences of the cells; the relative position of the land area with respect to the Atlantic Ocean, and the surrounding topography. The overall climatic conditions of the Englewood region are moderate and well suited for human habitation, as land values in the area will testify.

CHAPTER I

GEOLOGY

There are four identificable lithologic formations in the City of Englewood. One can only guess as the lithology and structure of the pre-Triassic basin, but from exposures adjacent to the Triassic troughs, Schuberth (38, p. 156) has concluded that the Manhattan Schist Formation of the New York City group underlies the Triassic.

LITHOLOGIES

The Triassic Sediments

Englewood is underlain by 12,000 feet of Triassic terrestrial sediments and interdigitated intrusive rocks, covered with a discontinuous and highly variable veneer of Quaternary sediments. The distribution of Triassic units within the city of Englewood can be studied on the geologic map (map 1-1) and the accompanying cross-section (fig. 1-2); a brief lithologic description of each formation follows.

The Stockton Sandstone Formation

The Stockton Formation crops out in Englewood on the west side of the Palisades Diabase Sill, and in Englewood Cliffs, on the east side of the sill paralleling the Hudson River. The Palisades Sill was injected into this formation, baking the local shales into hornfels and dividing the formation into two units.

The Stockton consists of mostly coarse arkose, containing mica, quartz,and feldspar fragments. The finer-grained rocks contain animal tracks. The shales are reddish brown, while the sandstones and arkoses are light brown to reddish brown.

The arkoses sandstones and shales of the Stockton overlie the

Ordovician and post-Ordovician schists and serpentinites in east Jersey City and Hoboken. To the southeast, the Stockton is overlain unconformably by the Cretaceous Raritan Formation, and to the northeast, conformably by the Triassic Brunswick. The formation ranges from 2,300 to 3,100 feet in thickness.

The Brunswick Shale Formation

The Brunswick Shale Formation ranges in thickness from 6,000 to 8,000 feet and is reddish brown, argillaceous shale, easily broken into thin sheets or sharp chunks. There are many ripple marks and mud cracks filled with calcite. The bulk of the rock is comprised of illite, chlorite, limonite, and hematite. The hematite gives the rock its characteristic red color.

The Brunswick Formation overlies and is interbedded with the Lockatong, and conformably overlies the Stockton.

The Triassic (Early Jurassic) Igneous Rocks

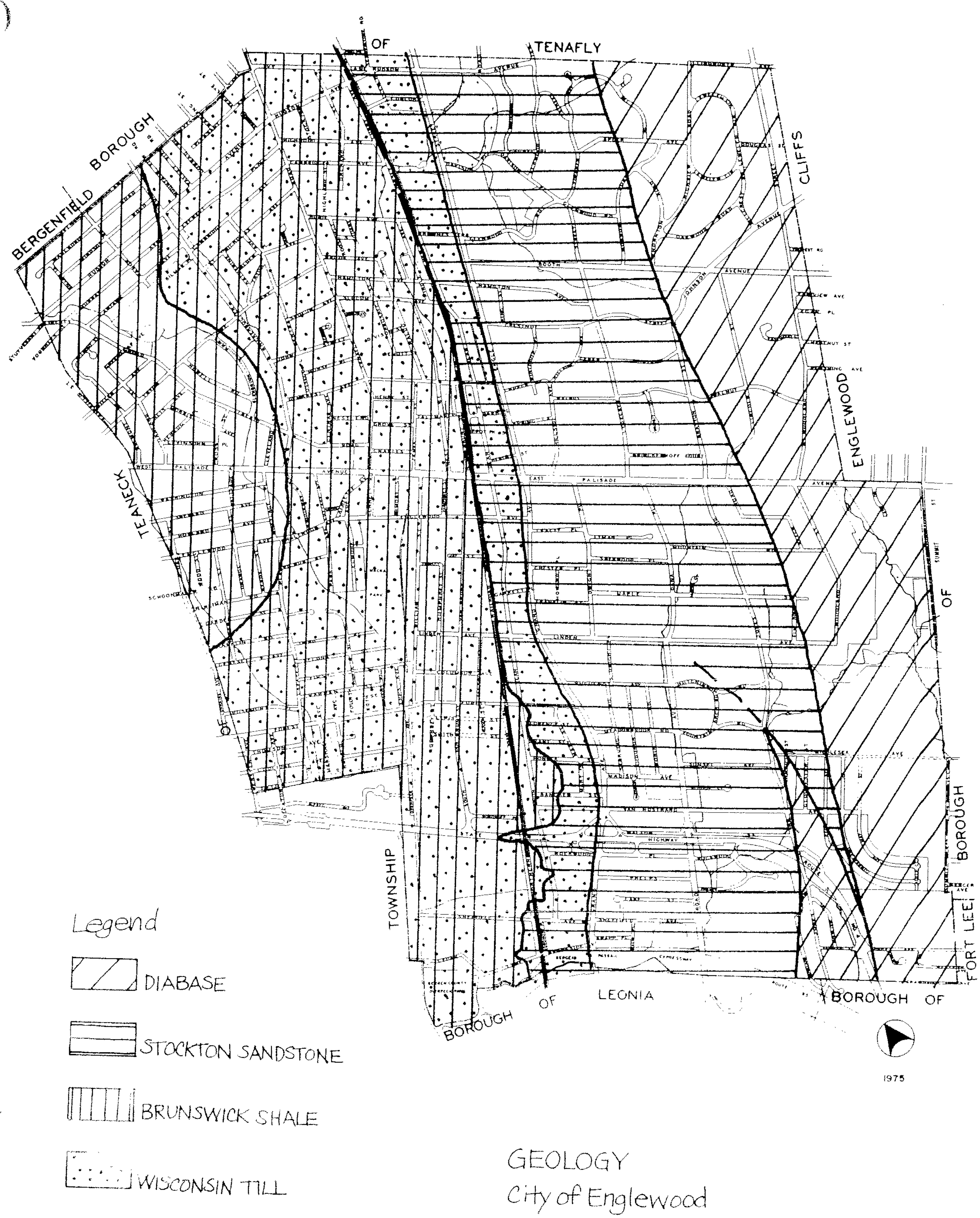
The Palisades Diabase Sill

The Palisades Diabase Sill was injected between layers of the Stockton Sandstone Formation. Prominent columnar jointing, from which the sill derives its name, can be seen from the Hudson River (see fig. 1-3). The sill forms a high ridge along the Hudson for miles from Bergen Point, New Jersey,to Haverstraw, New York.

The Diabase varies in color from near white to dark gray. Two samples of the Palisades Diabase taken and analyzed by Dallmeyer (10) show, ". . . minor amounts of olivine and pyroxene microphenocrysts set in an extremely fine grained groundmass (0.02 to 0.05 mm) of pyroxene, plagioclase, and minor opaques." (10, p. 245).

(It might be mentioned here that in his study, Dallmeyer has

Map 1-1



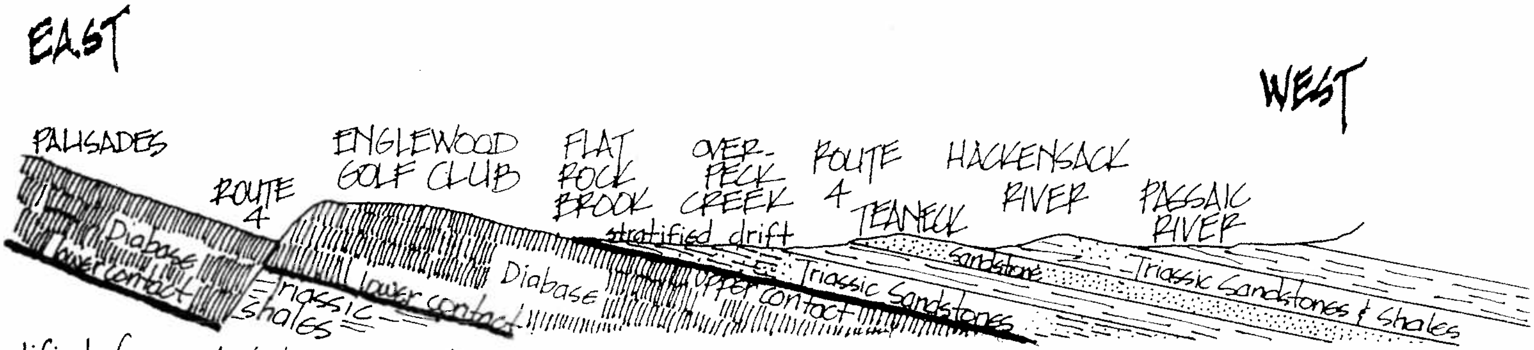
GEOLOGY

City of Englewood

Source: U.S.G.S.

fig. 1-2

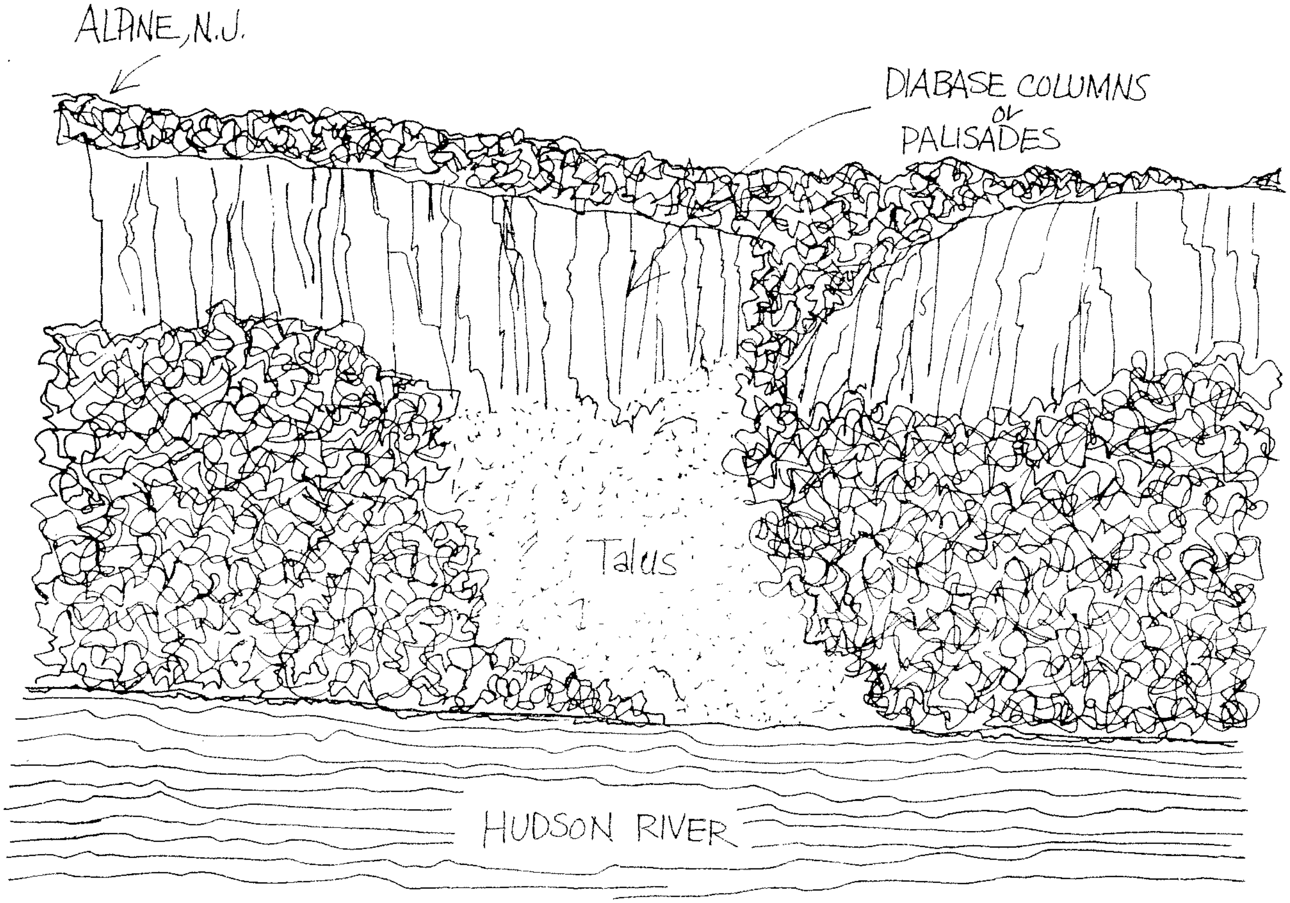
Geologic Cross-Section of the Englewood Area



modified from A.K. Lobeck (25)

fig. 1-3

Columnar Jointing of the Palisades Diabase Sill



modified from A.K. Lobeck (25)

found that the age of the sill is probably earliest Jurassic rather than Triassic. He dates the emplacement of the sill at about 190 million years ago (p.244). The analysis was done by $^{40}Ar/^{39}Ar$ spectrography.)

Walker, in his study of the sill in Englewood Cliffs, reports the mineralogy to be, "plagioclase, monoclinic pyroxenes, orthopyroxenes, and olivines. Micropegmatite, hornblende, and opaque iron minerals are important constitutents in the top third of the intrusion. The Fe-Ti minerals occur throughout, however, and with biotite and quartz, are the major accessory minerals; others are apatite, zircon, chalcopyrite and sphene" (47).

Walker has divided the sill into several horizontal layers, showing that the differentiation became progressively more acidic as altitude increased and the early-crystallizing minerals, chiefly olivines, fell to the bottom under the influence of gravity (see fig. 1-4).

The thickness of the sill varies from 364 feet in Jersey City to 875 feet at Fort Lee, the measurements being made by well borings. Kummel (22, p. 105) estimated that the sill's maximum thickness probably exceeds 1,000 feet.

FRACTIONATION OF PALISADES DIABASE

FIGURE 1-4

SPECIMEN	HEIGHT ABOVE BASE (IN FEET)	FRACTIONATION STAGE	FRACTIONATION RANGE (IN FEET)	ROCK NAME
1, 2	1,900		0-20	chilled dolerite
3	30	1	20-37	early dolerite
4	70	2	52-80	hyalosiderite dolerite
5	90	3	85-100	bronzite dolerite
6	215	4	175-310	hypersthene dolerite
7	365	5	310-	early pidgeonite dolerite
8	560	5	-640	late pidgeonite dolerite
9	685	6	640-740	ferrohypersthene dolerite
10, 11	990-980	7		fyalite granophyre
12	790	7	790-800	granophyric dolerite fyalite granophyre
13,14	805-830	8	800-850	ferrodolerite

THE QUATERNARY PERIOD

Wisconsin Stratified Till

The Hackensack Valley, of which Englewood is a part, was invaded by glacier ice, sometime between 50,000 and 60,000 years ago (22, p. 169). Evidence of this glacial epoch can be found in both the highlands and the lower portions of the city. Glacial striations on the surface of the diabase in the abandoned quarry in the southeast section of town and in the Flat Rock Brook section of Allison Park indicate that the glacier flowed to the southeast across the diabase. In the lower elevations, an extensive layer of stratified till (Qsd) runs southwestward in a belt across the city and down into the Hackensack Meadowlands. The till overlies the Brunswick Formation, with the exception of a narrow strip along Overpeck Creek on the western edge of the Stockton.

The southernmost boundary of the ice advance is marked by the terminal moraine which cuts across the State through Perth Amboy, Summit, and Hackettstown (see fig.1-5).

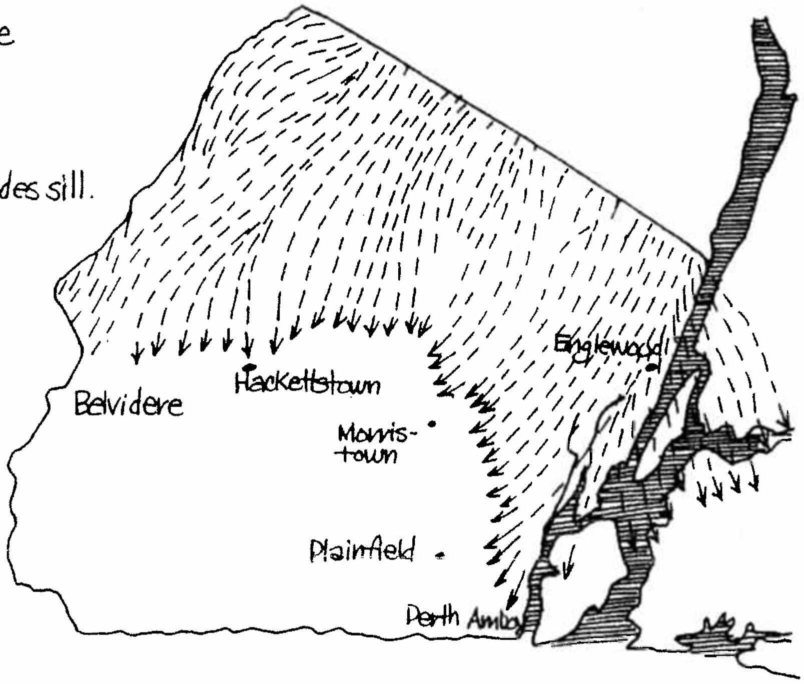
> "The stratified drift or till consists of a claylike rock flour (glacial clay) with which are mingled in variable proportions sand, gravel, rock fragments, and boulders, some of which have a diameter of several feet. Most of the recognizable fragments are like that of the underlying bedrock or that of the areas lying immediately to the northward. Only a small percentage of the material has been transported many miles."
>
> (22, p. 162)

According to the study of the Hackensack Meadows done at the University of Pennsylvania (45, p. 21), the material from which the drift originated was mostly "gneisses and other crystalline rocks of the Paleozoic highlands to the north of the Hackensack Valley, Palisades

fig. 1-5

The Extent of Glacial Flow in the Englewood Area

Map showing direction of ice flow and terminal moraine during Wisconsin Glaciation. Note deflection of ice flow across Palisades sill.



modified from
Widmer Geology of New Jersey, 1964 (48)

Diabase, and Newark Group sandstones and shales".

Despite the estimated 1,200 foot thickness of glacier ice (14, p. 484-5) and the probability that it persisted here for several thousand years (14, p. 560), "the amount of erosion was not great." (22, p. 163). According to Kummel, "It is probable that the actual amount of erosion was somewhat less than 25 feet." (22, p. 163).

As the glacier began to retreat about 18,000 years ago (14, p. 560), the aforementioned terminal moraine served as a dam behind which the glacial meltwater and associated outwash debris accumulated. It was here that ancient Lake Hackensack was located (see fig. 1-6).

In a geological section of the Hackensack Meadowlands constructed by the U.S. Army Corps of Engineers, varved (seasonally deposited) clays are shown to underlie all of the City of Englewood from an average depth of eight feet below mean sea level, to more than 100 feet. "Its (the clay's) composition, texture, and structure show that it was deposited in standing water, and it overlies till of the last glacial stage (the Wisconsin). It was almost certainly laid down in the quiet waters of a now-extinct glacial lake." (45, p. 22).

Subsequent drainage of the lake left the meadowlands much as they are now.

Structure

The structure of the bedrock layers is relatively simple. The diabase was injected between parallel beds of Triassic sandstones and shales (the Stockton and Brunswick Formations) and, within the limits of the city at least, none of these units is folded. The entire sequence of rock is tilted to the northwest at angles from 8 to 10^0.

A fault is evident in the southeast corner of the city at the upper contact of the diabase and Stockton Formation. The altered outcrop pattern is most easily explained as the result of a normal fault on which the southwest side moved up relative to the northeast side. The fault nearly parrallels Jones Road, and extends from Fountain Road southeastward out of the city between Jones Road and Broad Avenue.

Geologic History

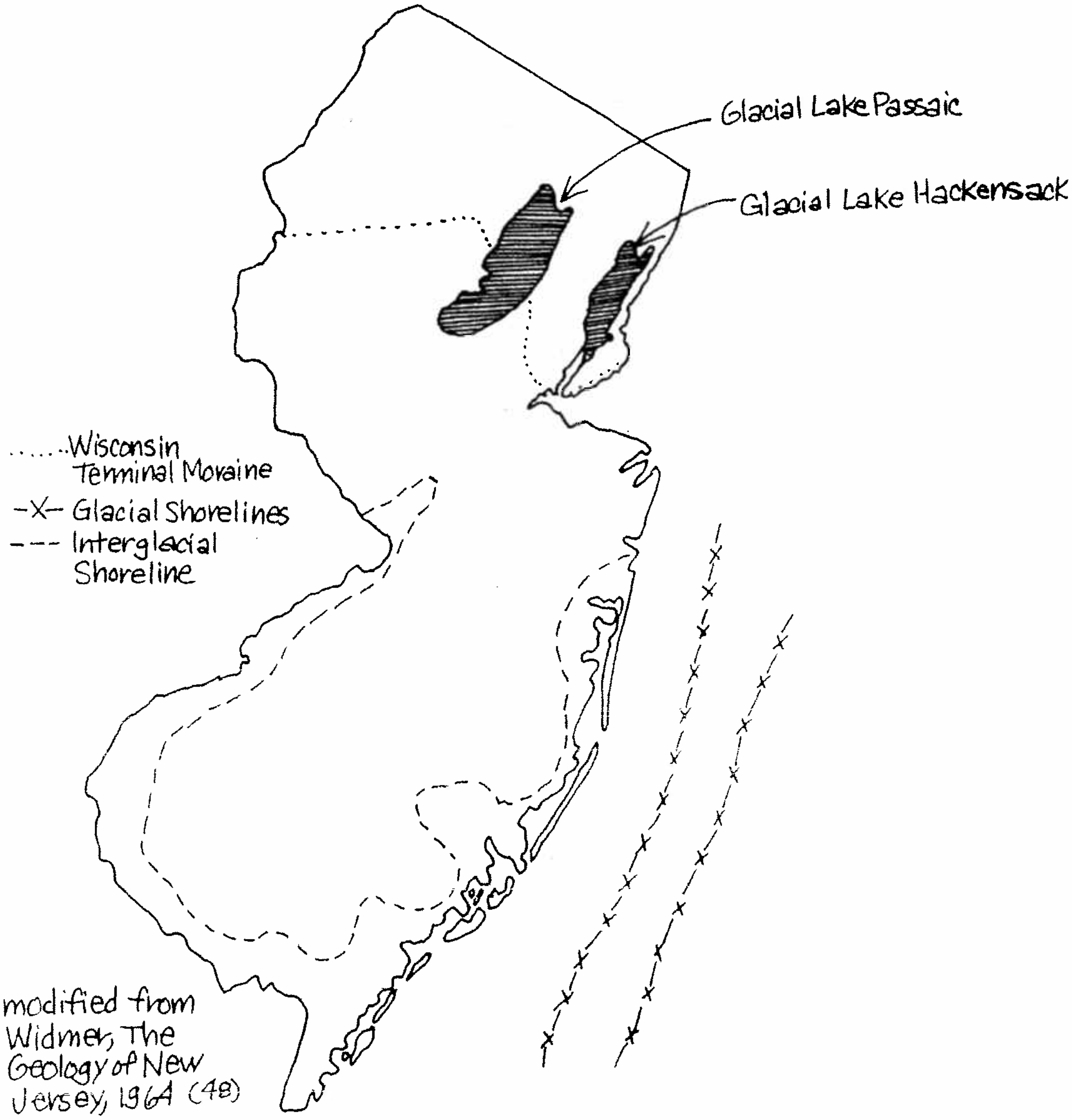
The Classical Theory

Classical explanations of geologic evolution describe the occurence of such dynamic events as mountain building and basin forming, but for the most part neglect to say what caused them. What follows is a classical explanation of the geology of Englewood.

According to Hunt, late Pre-Cambrian and early Paleozoic time found the Atlantic Coast flooded by an interior sea which has been interpreted as an extension of the Gulf of Mexico northward along what is now the site of the Appalachian Province. During this time, some 40,000 feet of sediments accumulated in the geosyncline occupied by this sea. "The sea never was 40,000 feet deep; the geosynclinal trough sank gradually during the Paleozoic, and eight miles of sinking and comparable rise of the mountains to the southeast, from which the sediments were derived, could have averaged only a foot in 10,000 years.: (20, p. 253)

Limestones and shales were deposited in the shallower of the two major zones of the sea, while greywackes, shales, and dolomites formed in the deeper waters. As time passed, the land was repeatedly uplifted and submerged; unconformities now well expressed in the rocks of this province give evidence of this.

fig. 1-6



modified from Widmer, The Geology of New Jersey, 1964 (48)

The classical theory provides no reasonable explanation for the mountain building activity; the existence of these mountains is given as a result of folding and faulting, whose cause is not specified. The resistant rocks that now underlie the highlands region, west of the Hudson River Valley and the Watchungs, were deformed and metamorphosed during an early period of mountain building.

As stated by Dunbar, "During late Ordovician time uplift was progressive farther north along the whole of Appalachia, and a vast coastal lowlands was formed along its western flank, finally pushing the shoreline (of the interior sea) bank into Ohio and southern Ontario. This was the subaerial part of the Queenston Delta. This progressive uplift in Appalachia was to culminate at the end of the period in the Taconian Disturbance." (13, p. 130)

During the Silurian and Devonian periods, the mountains that had formed earlier were eroded and the sediments were carried to lower regions and deposited in new sedimentary layers.

In the middle of the Devonian period, there occurred another mountain building event called the Acadian Orogeny. Appalachia experienced another period of diastrophism, which resulted in a chain of mountains stretching in a gentle "S" curve from the Maritime Provinces of Canada, southward to Cape Hatteras, following the line of the old Appalachians (13, p. 175).

The Silurian and Devonian periods saw extensive erosion of the Appalachians, resulting in new series of sediments carried to lowland areas and redeposited. In some sections of New York and Pennsylvania, these sediments are exposed, and show depths reaching 12,000 to 15,000 feet in places (13, p. 175).

Sedimentary rocks continued to be deposited through the Mississippian and Pennsylvanian Periods, and as much as 8,000 feet of sediments of this age have been reported on the western flanks of the Appalachians.

At the close of the Permian period, the Appalachian Revolution began. Folding and faulting of the older sediments resulted in the formation of yet another chain of mountains along the coastal margin from Newfoundland to Alabama (13, p. 247). Estimates made of the heights of these mountains range up to five miles, based on analysis of the structural folds in Pennsylvania, "...but this is probably too great, since the highest peaks must have suffered rapid erosion as they slowly rose..." (13, p. 248).

Subsequent erosion of the entire rock sequence produced the surface of low relief east of the present Appalachians on which Triassic sedimentary rocks were laid down in isolated, fault-bounded basins. Englewood lies at the eastern margin of one of these basins, the so-called Newark basin. The classical theory simply states that sediments, derived from erosion of adjacent highlands, were deposited in basins that were limited by normal faults. That movement on the faults which occurred during deposition is documented by the progressively steeper dip of deeper units in the conformable sequence. During deposition, igneous rocks of basaltic and diabasic composition were incorporated in the make-up of Triassic rock, both as concordant and disconcordant plutons and as subaerial lava flows.

Plate Tectonics

The problems created by the classical explanation of stratigraphic and tectonic development are in part resolved by the recent acceptance of continental drift. Classical theory had vague, if any, explanations for the origin of the configurations of structural provinces. Collision and rifting of lithospheric plates now explain the formation of mountains and oceans which, heretofore, were explained in terms that raised more questions than they answered.

Paleomagnetic evidence shows that rocks formed on continents and plates throughout the ages have been magnetically aligned in configurations which differ from present day polar continental relationships. Analysis of fauna in Devonian formations in the southern hemisphere "...yield the same peculiar collection of invertebrates in southern South America, the Faulkland Islands, Antarctica, Australia, and South Africa" (40, p. 428).

Similar analyses of Cambrian and Ordovician sediments in eastern North America and western Europe lead to the conclusion that a common seaway existed between the two land masses during these times.

The previously unexplained Taconian Orogeny now seems to have a plausible explanation. According to Bird and Dewey a collision of the two continental margins intensively deformed rock adjacent to the collision zone and produced extensive volcanic activity. Marginal rocks were pushed landward atop other formations. The folding, faulting and volcanism gradually metamorphosed the rocks in a transitional sequence; those nearest the locus of the collision represent higher metamorphic grades than occur in more distant rocks (4, p. 1045).

The Silurian and Devonian Periods

The Silurian and Devonian periods saw the erosion of the mountains built during the Cambrian and Ordovician, depositing the resulting sediments in the lowlands.

A re-collision of the continents appears to have occurred toward the end of the Devonian Period. According to Stokes and Judson, "The close of the Devonian was marked by a localized disturbance, the Acadian Orogeny, which affected the territory in and adjacent to New England and eastern Canada (Acadia). Intense folding and metamorphism of older rocks, the extrusion of lava, and the intrusion of granite accompanied this activity." (40, p. 334).

Subsequent to the Acadian Orogeny, we find the first evidence of rifting of the two continents and the widening of the Atlantic Ocean. Tensional faulting produced horst and graben fault blocks in the Maritime Appalachians. Great thicknesses of sediment accumulated in eastern New Brunswick and the Gulf of St. Lawrence in large basins formed by the rifting (4, p. 1034).

Carboniferous and Permian Periods

Paleomagnetic data for the Carboniferous and Permian, "...would suggest strongly that in the Permian (and Carboniferous) of North America, Europe and Africa were contiguous, or nearly so." (23, p. 34-6)

The apparent close proximity of the continents to each other is further indicated by the extensive mountain-building activity occurring across the North American continent during this period. Stokes and Judson (40, p. 334-7) state that the entire chain of mountain ranges and troughs including the Appalachian Mountains and the Appalachian Geosyncline, as well as depositional and orogenic sequences as far west as Texas and Nevada, were occurring throughout the Carboniferous and Permian Periods (see also 15, p. 484-498)

It is at this point that significant intercontinental breakup makes itself evident in the rocks of Englewood. From Larson and LaFountain:

> "Adequate Triassic data are available from Europe and northern Asia, Africa, and North America, (paleomagnetic pole positions)...rotation of (which) produces a great reduction in scatter of all pole positions. The result is striking and is in agreement with the idea that the ancient supercontinent had not yet, or had only just, begun its breakup in the Triassic." (23, p. 346

Smith, Rose, and Lanning, in discussing the Triassic diabase of Pennsylvania, suggest that the emplacement of the Triassic diabase sills and dikes along the east coast of North America, coincided with, and resulted from, the separation of the continents as described by Larson and LaFountain (39, p. 953).

Paleomagnetic evidence from the Cretaceous, some fifty million years later, shows the distance between the two continents had widened considerably. Evidence therefore indicates that the supercontinent began to separate in the Triassic into the various smaller continents evident today and, further, that the extensive network of sills and dikes in eastern North America, of which the Palisades are a part, were emplaced during the early stages of the breakup.

The coastal plain sediments of the North American continental margin were deposited on top of an eroded surface underlain by representatives of all these earlier events; the material of which the coastal plain rocks are composed were derived from the continual erosion of the mountain mass to the west; systematic, relative depression of the Atlantic margin has imparted to this conformable sequence a subtle eastward dip.

In late Cenozoic time, advance of continental glaciers deposited a discontinuous and highly variable veneer of unconsolidated sediment on top of this terrain.

CHAPTER 2

GROUNDWATER HYDROLOGY

While groundwater is not now an important source of water for the City of Englewood, it is most certainly a major potential resource for the city's residents and businesses. According to a study done by the Hackensack Meadowlands Development Commission in 1974, water deliveries to the City in 1970 were 2.66 million gallons per day (mgd), and in 1973 were 2.55 mgd. The loss in water demand might be attributed to the loss in population, experienced by the city over the past several years. These delivery figures represent approximately 102 gallons of water per day per person in the city.

Hackensack Water Company has records for twenty-three wells within the city limits, all of which are commercial. Three of these are reported to be artesian. (Map 2-1)

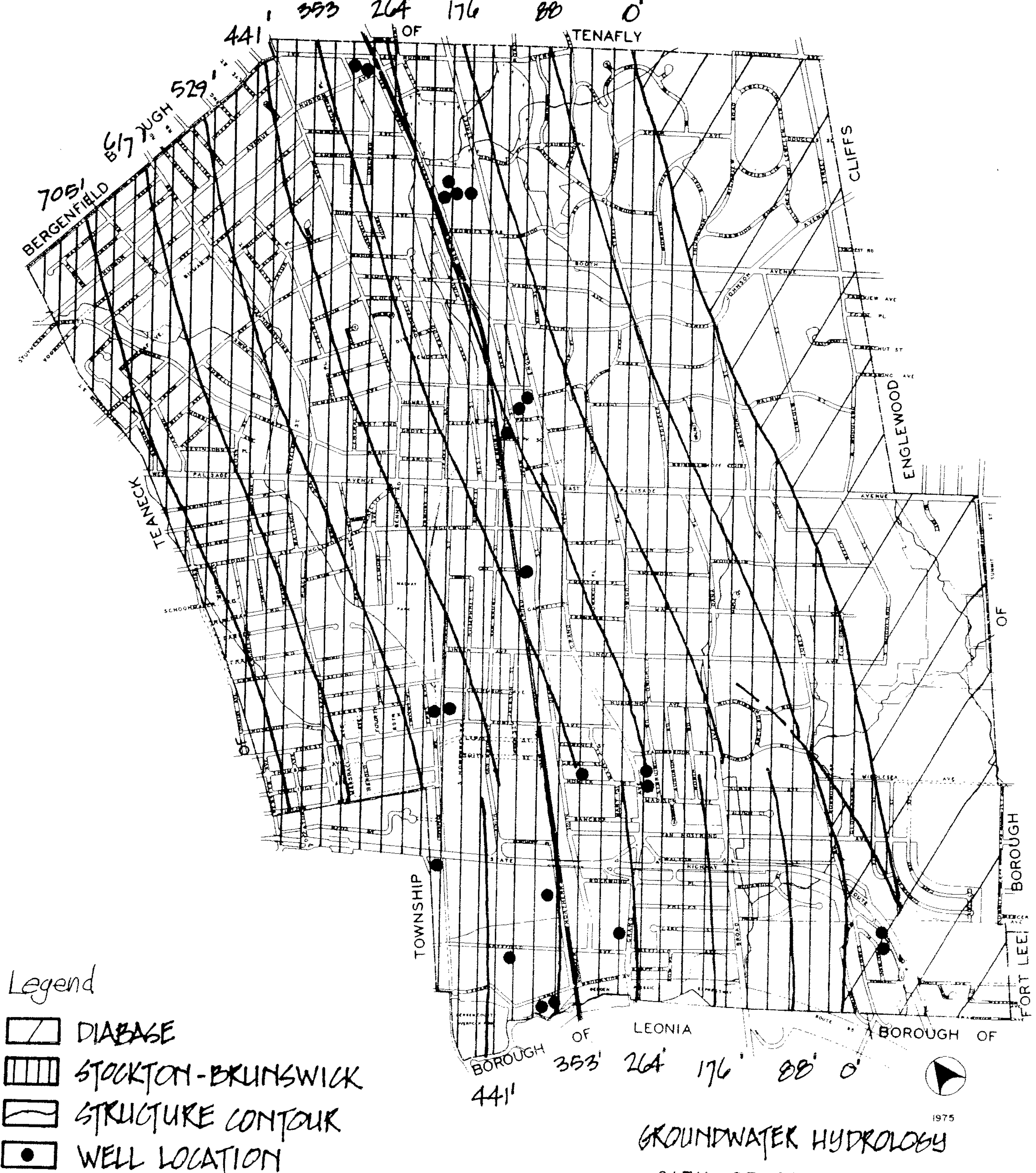
Artesian Wells

Artesian wells are wells which produce water at the ground surface under their own pressure. In order for the well to behave this way, it must be drilled into a rock unit bearing water (an aquifer) under sufficient hydrostatic head to lift water in the well to the ground surface (see fig. 2-2). Wells flowing at the surface can be of two types; the first is drilled into the side of a hill where the water in the interstitial spaces of the soil or rock flows out of the well by gravity. The second must be drilled through a confining layer of rock into a waterbearing unit. This latter type is called an Artesian well; the former type is called a spring.

Semi-Artesian Wells

A semi-artesian well is one in which the water rises partially up the height on the well under hydrostatic pressure, but does not flow at the surface. A third type of well is the water table well. This well intersects

Map 2-1



Legend

▨ DIABASE

▥ STOCKTON-BRUNSWICK

∼ STRUCTURE CONTOUR

● WELL LOCATION

176' DEPTH TO DIABASE

1975

GROUNDWATER HYDROLOGY

CITY OF ENGLEWOOD

SOURCE:

the water table and the water stands in the well at the height of the water table. The water table is the height or upper surface of the water in the ground, or zone of saturation (24). The remaining wells in the city are of either the semi-artesian or water table type (see fig. 2-2).

Groundwater information for the city is poor in general. The limit of the information is the well logs in Trenton and the Hackensack Water Company, which indicate yields ranging from 25 to 250 gallons per minute (gpm). The accuracy of these figures is questionable, however, as pump tests are frequently too short to be indicative of yields over a long period. However, for the sake of discussion, we will assume that the data are reasonably accurate.

Major Aquifers

The aquifers of major importance in the city are the Stockton and Brunswick Formations. They appear to be roughly equal in yields, although indications from other municipalities are that the Stockton has a somewhat higher yield. (Aquifer characteristics vary considerably over short distances, however, and assumptions of the characteristics of the aquifers in Englewood based on those of other areas are not advisable.) Average yield for wells indicated to be in the Stockton Formation is 98 gpm. Average yield for those indicated to be in the Brunswick Formation is 102 gpm.

Specific capacities of the wells are a more significant figure. Specific capacity is the yield of the well in gpm per foot of drawdown. Drawdown is the effect that pumping has on the water table (see fig. 2-2). As the water is pumped, the well produces a "cone of depression" around the pumping area, lowering the water table adjacent to the well in a cone shape. If the water is pumped too fast, the well will temporarily go dry until the water has had time to flow through the pore spaces of the rock back into the well. The rate at which this cone is formed is called drawdown.

Consequently, if a well record indicates that a well yields 100 gpm, it is important to know how long it will sustain this rate and this can only be determined by a pump test usually lasting 24 hours...

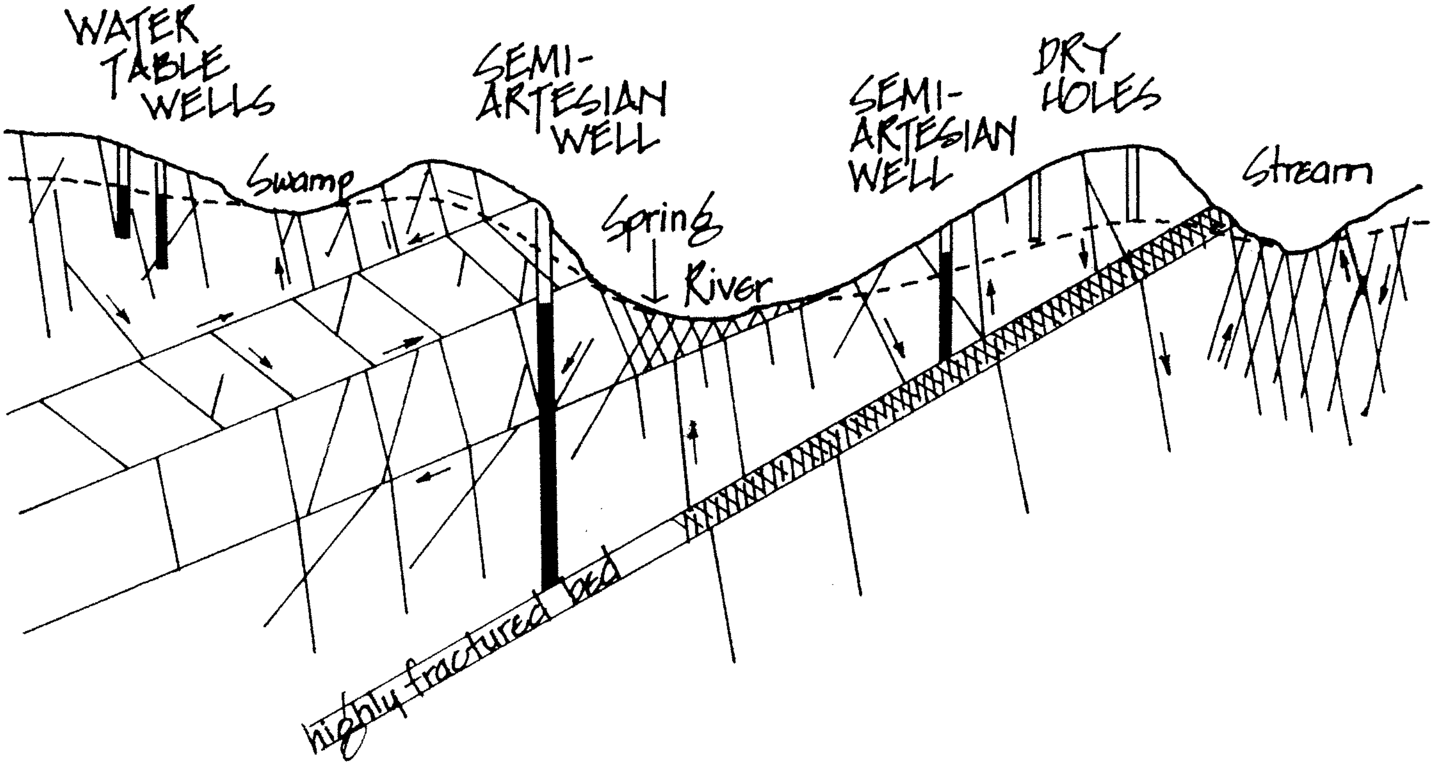
The aquifer in the city which is likely to have the highest yield is the Wisconsin Till. The till is what is called a unconfined aquifer; that is, there is no overlying rock formation to inhibit recharge (the influx of new water into the unit) from above. This enables the formation to be relatively easily recharged.

The only other formation in the city not discussed so far is the Palisades Diabase. As the diabase is crystalline rock, it does not carry and yield water easily. There are no pore spaces between crystals through which the water can move. This is not to say that the diabase contains no water; it does contain some. The formation is highly fractured and jointed in places and water will collect and move through these joints. The problems posed to well drillers are essentially two; first, the diabase is dense and tough-- drilling through it can be an expensive and arduous task. Second, there is no guarantee that a well drilled into the diabase will tap a fracture or joint, and if it does not, there will be no yield.

> "This rock is such a poor aquifer and so hard that some drillers will only accept contracts by the hour rather than the foot and some drillers will not even drill in traprock (diabase) as they feel that a poor well will reflect upon their reputation.
>
> Needless to say, industrial wells are not found in the traprocks. Only one high capacity well was attempted in the traprock of Hunterdon County. This well was drilled at Lambertville to 1,005 feet, and the reported yield was zero." (21, p. 36)

Englewood Country Club has the only well listed in the diabase in the fig. 2/2

Idealized Ground Water Section



Idealized section showing semi-artesian and water table conditions in fractured, non-porous rocks and possible directions of ground water movement.

---- Water table

⟶ Groundwater flow

from Hunterdon Co. Planning Board, Master Plan Report 4, 1967. (21)

city and this well has a reported yield of 25 gpm.

Locations of the wells can be seen on the Groundwater Hydrology Map (Map 2-1).

CHAPTER 3

SURFICIAL HYDROLOGY** AND SURFICIAL DEPOSITS

In an area such as Englewood the surficial geology is of utmost importance in understanding the hydrological and soil systems. The surficial consequences of the Wisconsin glacial event both overwhelm and magnify the preceding geologic epochs. Their importance in understanding the geologic and climatic history is immeasurable, as well as their important effects on present soils, vegetation, etc.

The presence of surficial deposits, or materials transported by varying agencies from another location, is dependent on the geologic and climatic processes operating in the region over time. Some of the most important characteristics of surficial deposits are:

1. Age--how long the sediment, once deposited, has been exposed to the weathering process.
2. Maturity--extent to which chemical weathering of the materials has evolved.
3. Lithology--the size and sorting of particles which is dependent on the transporting agent.

The presence of glacial deposits explains further the history of this area of the Piedmont Physiographic Province. We have discussed the deposition of shales and sandstones (Triassic) and the later periods of volcanic activity and subsequent faulting and tilting, resulting in the erosion-resistant diabase ridge, the Palisades. The shales and sandstones have been deeply eroded but the igneous rock resisted erosion and remained as elevated ridges while the area between the Palisades and Watchung Mountains was excavated into a broad valley part of which is below the modern sea level.

**Hydrology information supplied in part by Dr. Michael Passow, 1975.

STAGES IN SEDIMENTATION OF LAKE BASINS

1. Glacial retreat (see fig. 3-1)
2. Glacial meltwater
3. Dam of drift of other deposits across a valley fed by meltwater (see fig. 3-2)
4. Accumulations of sand, silt, and clay on lake floor
5. Breaching of outwash fill by erosion (see fig. 3-3)
6. Draining of lake
7. River erosion of clays, silts and sand which replaced glacial lakes.

Stages in Sedimentation of Lake Basins

fig. 3-1

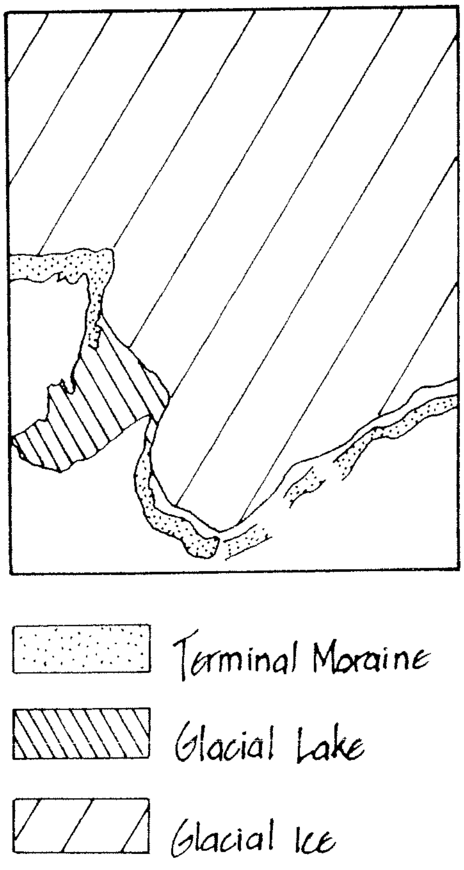


fig. 3-2

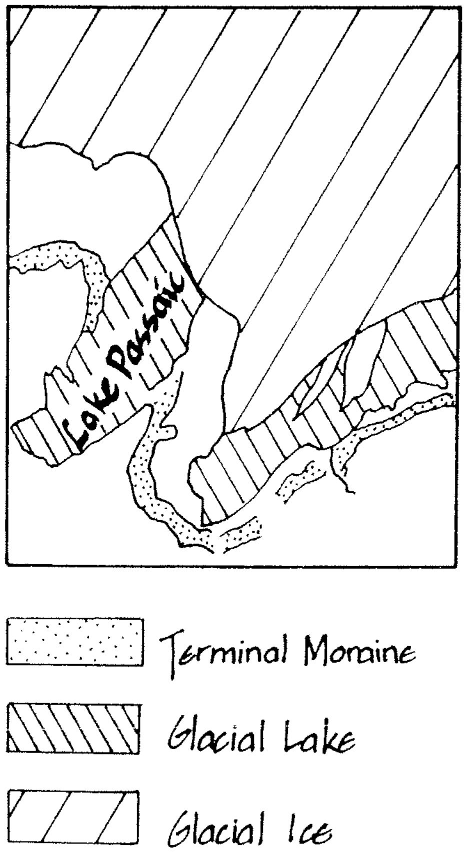
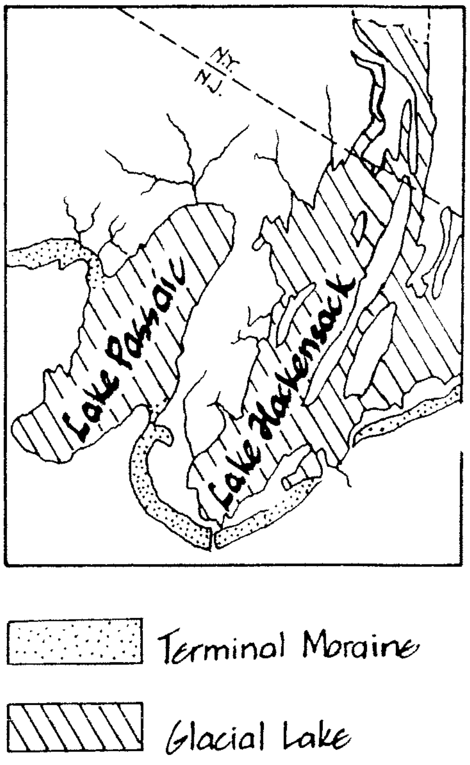


fig. 3-3



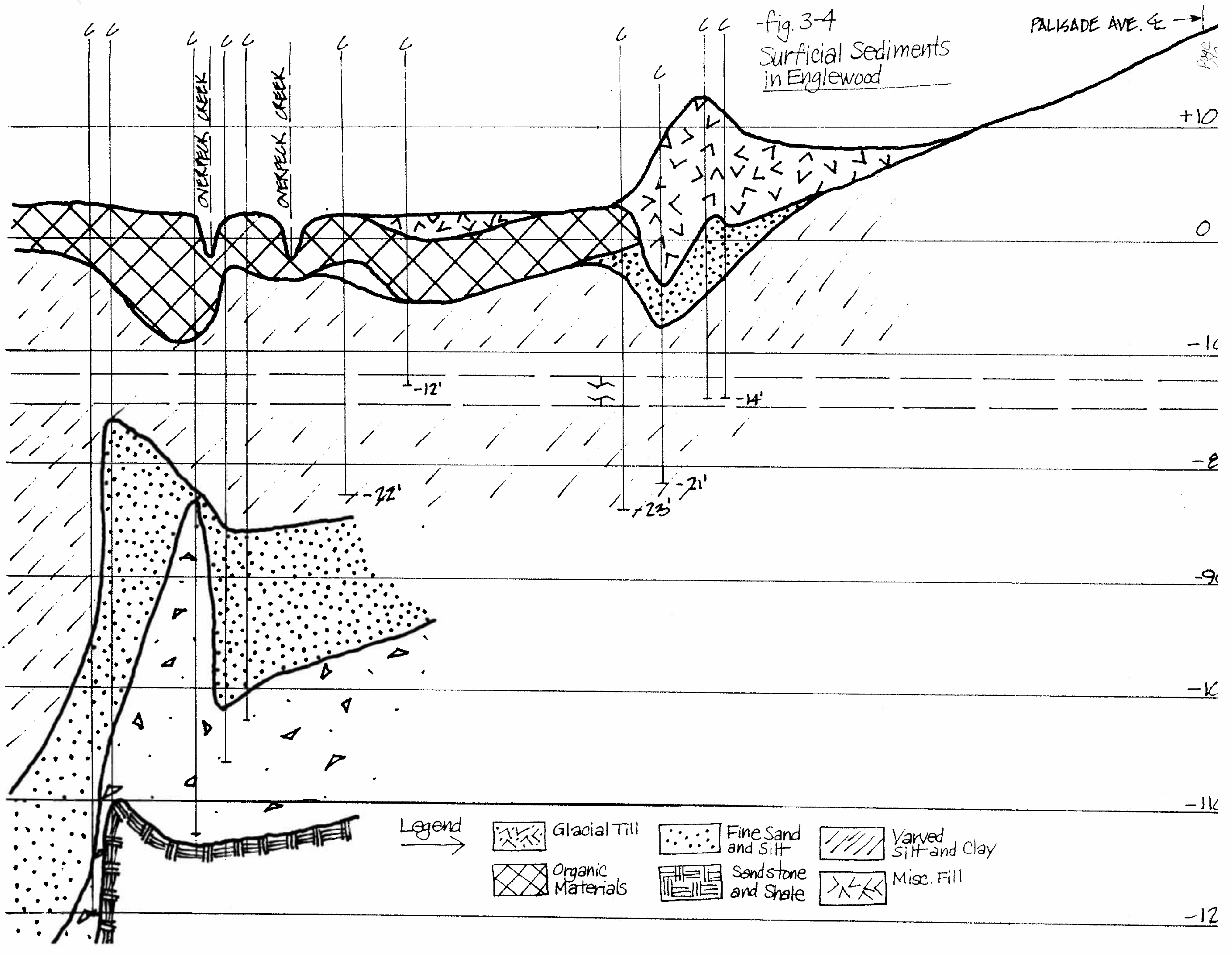


fig. 3-4
Surficial Sediments in Englewood

"As the ice sheet began to melt about 15,000 years ago, it shrank back from the high ridge of till, or terminal moraine, which had been pushed up in front of the ice. Apparently the moraine formed a dam across the outlets of Newark Bay and impounded the drainage from the melting glacier. As water accumulated between this natural dam and the glacier front, Glacial Lake Hackensack was formed... At maximum, the lake was approximately 15 miles wide near the present location of the city of Hackensack."

(31)

Each varve "is composed of two thin layers of sediment that are believed to represent seasonal deposits during a single year. The light colored sand grains and coarser silt particles were kept in suspension by waves and ripples generated by the wind. Thus, a coarse-textured section of a varve was deposited each summer. As the lake surface froze each winter, the water became less turbulent. As a result, silt and clay particles settled out of suspension and formed a darker-colored, finer-grained section of the annual varve."

(31)

These materials settled to the bottom of the lake and formed a deposit of varved clay that lies over the glacial till (see fig. 3-4).

About 10,000 years ago the terminal moraine which held back the waters of Glacial Lake Hackensack was breached and, though the exact mechanism is in question, the resulting overflow eroded the channel through the unconsolidated material and drained the lake into what is now Newark Bay.

> "As the ice sheet melted, the glacier slowly retreated northward and the enormous load it imposed on the earth's crust was reduced. In response, the crust gradually rose until it returned approximately to its pre-glacial elevation. This crustal rebound increased the gradients and velocities of the local streams. The rejuvenated streams were able to carry much coarser materials, and this period now is evidenced by deposits of gravel, sand, and coarse silt that rest on the older varved clay bottoms of Glacial Lakes Hackensack, Passaic and Hudson. As the ice sheets melted, water flowed back to the oceans and sea level began to rise. In the lower Hackensack Valley, the sea rose rapidly enough to overtake the contemporary rise in land surface caused by crustal rebound... The valley now is under tidal influence to a point 22 channel miles inland from the head of Newark Bay."

(48)

Thus, the changes of the Pleistocene era left a salt-water marsh, which reached into Englewood. The boundaries of this marsh were, roughly Palisade Ave. (north), Grand Ave. (east), with the whole southern part of the city considered to be an impassable swamp. (See Vermeule map 18, and City of Englewood, Water and Sewage map, 1877).

Man-made changes have led to the present status of Overpeck Creek, with the water flow condition of:

1. Stream channelization
2. Bridge and culvert openings
3. Functioning of tidal dam
4. Tidal conditions of the Hackensack River

The topograpical conditions of Englewood (see Chapter 6 "ELEVATION AND TOPOGRAPHY") led, in 1952, to the erection of tidal flood gates at the point where the Overpeck flows into the Hackensack River.

1. Before tidegates:

   Estimated extreme high water
   Elev. + 6.0 ft. above mean sea level

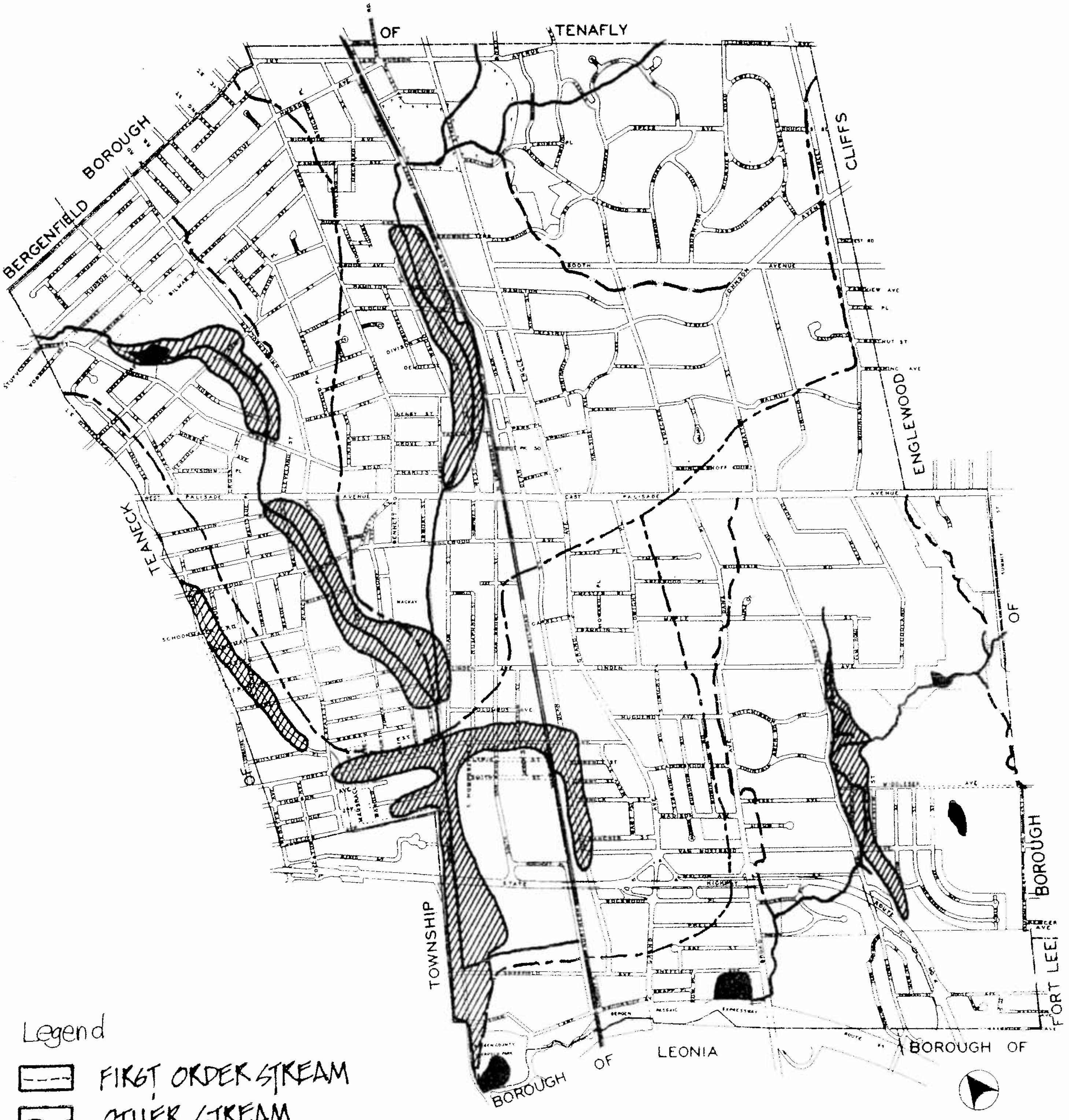
   Spring tide
   Elev. + 4.3 ft. " " " "

   Mean high tide
   Elev. + 3.7 ft. " " " "

The 1952 tide gates changed Overpeck Creek from an estuary to a freshwater lake which serves as a retention reservoir for flood flows from the Overpeck Creek area. Flood waters are stored during high tide and released during low tide. The gates are opened (during flood conditions) when the floodwaters stored in the estuary rise to an elevation 6 inches higher than the tide downstream (18). During normal flow the water level is maintained at -1.0 ft.

The Surficial Hydrology Map (Map 3-5) shows the 3.5 mile Overpeck Creek, its tributaries as well as those areas in the city subject to flood hazards. Overpeck Creek originates on the diabase ridge and flows in a southerly course

Map 3-5



Legend

- ▭ FIRST ORDER STREAM
- ▭ OTHER STREAM
- ▭ WATERSHED BOUNDARIES
- ▨ FLOOD-PRONE AREAS
- ▶ PONDS, LAKES, RESERVOIRS

SURFICIAL HYDROLOGY

CITY OF ENGLEWOOD

ONE HALF MILE

SOURCE: Michael Passow

through downtown Englewood, making its way through the less resistant stratified drift. The slope of the Creek is steep at its origin but begins to moderate fairly quickly. "The steep slope of the headwater sections... makes it hard for floodwater to escape. This situation is further aggravated by tidal conditions in the Hackensack River." (18)

THE OVERPECK CREEK DRAINAGE BASIN (see fig. 3-6)

1. Geographical boundaries--

   east--Palisades ridge

   south--tidal estuary

   west--elevated areas west of Englewood

   north--parts of Tenafly

2. Drainage area--Overpeck Creek

   a. Overpeck Creek--drainage area (in sq. miles)
      First Street--3.10
      Flat Rock Brook Junction--10.54

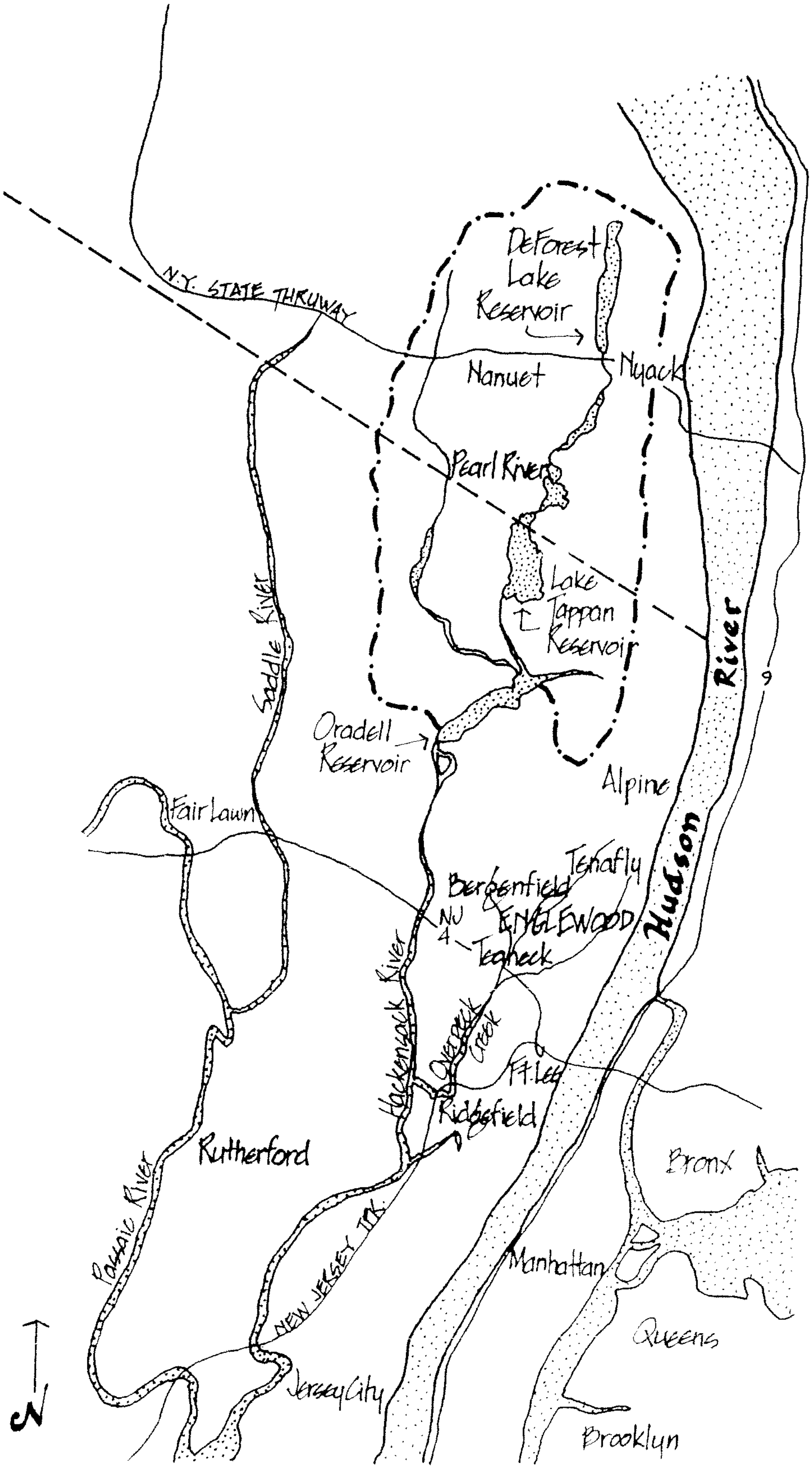
   b. Metzler's Brook
      First Street

   c. Flat Rock Brook
      Overpeck Creek Junction

   d. Tributary #4
      Overpeck Creek Junction

fig. 3-6

Overpeck Creek Drainage Basin



SURFICIAL DEPOSITS

Each group of surficial deposits represents a distinct and individual response to; material transported, weather conditions over time, and amount of erosion and breakdown to which the area was subjected. This in turn has led to a specific group of characteristics, such as drainage capabilities, support, texture, etc. for each group in the Englewood area. There has not been a soil survey done for Englewood so we have not been able to classify soils down to the area size needed for detailed analysis, however we were able to use a soil survey initiated for highway engineering purposes. This allowed us to categorize surficial deposits in a general way, and to translate those engineering characteristics into categories useful in environmental analysis. This information is condensed on the following pages for each group and then three particular engineering characteristics are listed with each soil's capabilities.

In general the surficial deposits in Englewood can be differentiated by their stratification. Those deposits found on the diabase ridge are typically unstratified, non-residual material which is thinly deposited, intermixed particles from clay size to boulders. Their steep, stony slopes lead to imperfect drainage conditions.

The soils occurring in central Englewood on the Stockton and Brunswick shales and sandstones are non-residual materials usually sorted by glaciofluvial action with silts appearing closer to the surface and underlain by gravels and clays. Their stratification leads to good drainage conditions in the north, but where the water table is close to the surface together with a lack of relief the drainage conditions are poor to very poor. The Wisconsin glaciation left well-preserved surficial deposits of two kinds:

a. Unsorted, unstratified till deposited directly beneath or on top of the ice sheet.

b. Stratified and sorted glaciofluvial deposits, dropped in contact with melting stagnant ice or by meltwater streams beyond the glacial margin (outwash). (see fig. 3-7).

These deposits are represented on the following chart with their respective formations and the soil series normally associated with the specific physiographic area (see Chart 3-8). The Surficial Deposits Map (Map 3-9) differentiates the surficial deposits of Englewood on the basis of transport mechanism and subsequent stratification (fig. 3-10). The Drainage Characteristics Map (Map 3-11) further classifies these deposits based on their engineering characteristics.

SURFICIAL DEPOSITS

Method of transport (see fig. 3-10)

1. Alluvium	Running water
2. Dunes	Wind
3. Till or Glacial Drift	Glacial ice or meltwater
4. Colluvium	Gravity

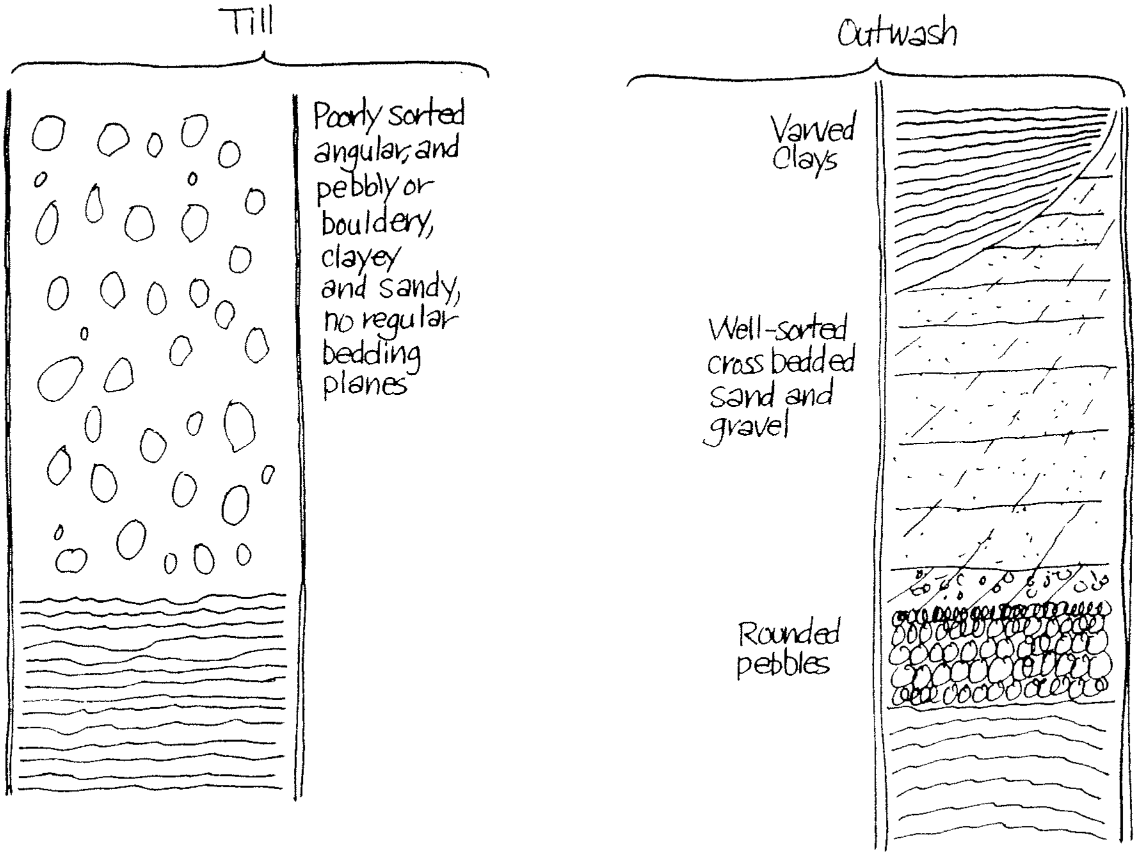
(20, p. 121)

fig. 3-7

Glacial Deposits

till - mixed, poorly sorted accumulation of material left behind by melting ice.

outwash - sorted, stratified deposit of water-transported drift.

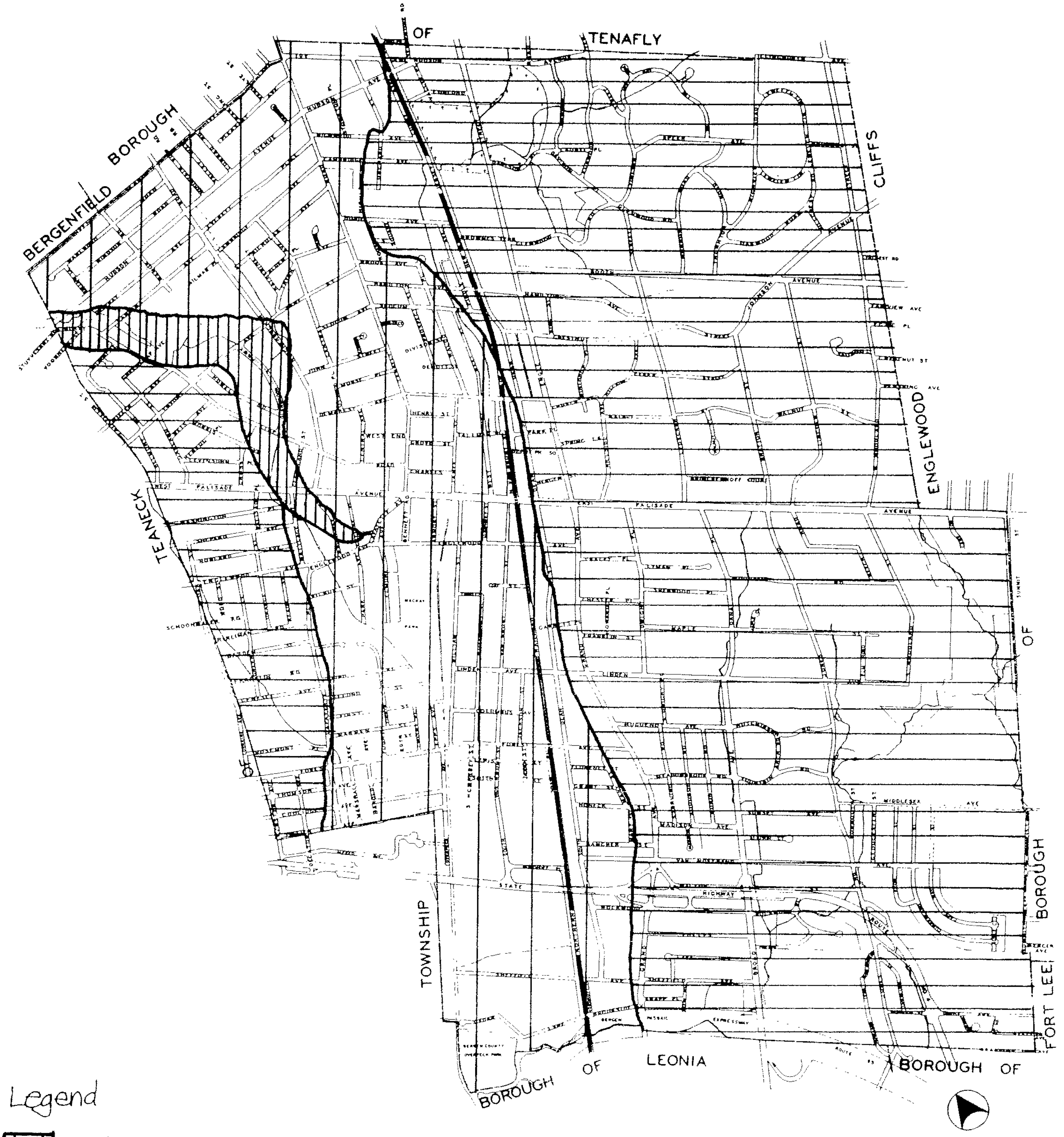


(35, p. 381)

Chart 3-8

<table>
<tr><th colspan="4">GEOLOGIC PERIODS AND THEIR REPRESENTATIVE FORMATIONS</th><th rowspan="2">SOIL SERIES</th><th rowspan="2">PHYSIOGRAPHIC AREAS</th></tr>
<tr><th colspan="3">Triassic</th><th>Quaternary</th></tr>
<tr><td rowspan="4">BRUNSWICK</td><td rowspan="3">STOCKTON</td><td rowspan="2">DIABASE</td><td>GLACIAL TILL
ALLUVIUM</td><td>WETHERSFIELD</td><td>UPLAND, LOWLAND</td></tr>
<tr><td></td><td>HOLYOKE</td><td>RIDGE</td></tr>
<tr><td colspan="2"></td><td>WETHERSFIELD</td><td>LOWLAND, UPLAND</td></tr>
<tr><td colspan="3"></td><td>WETHERSFIELD</td><td>LOWLAND, UPLAND</td></tr>
</table>

Map 3-9



Legend

▭ GROUND MORAINE

▤ STRATIFIED DRIFT

▥ RECENT ALLUVIUM

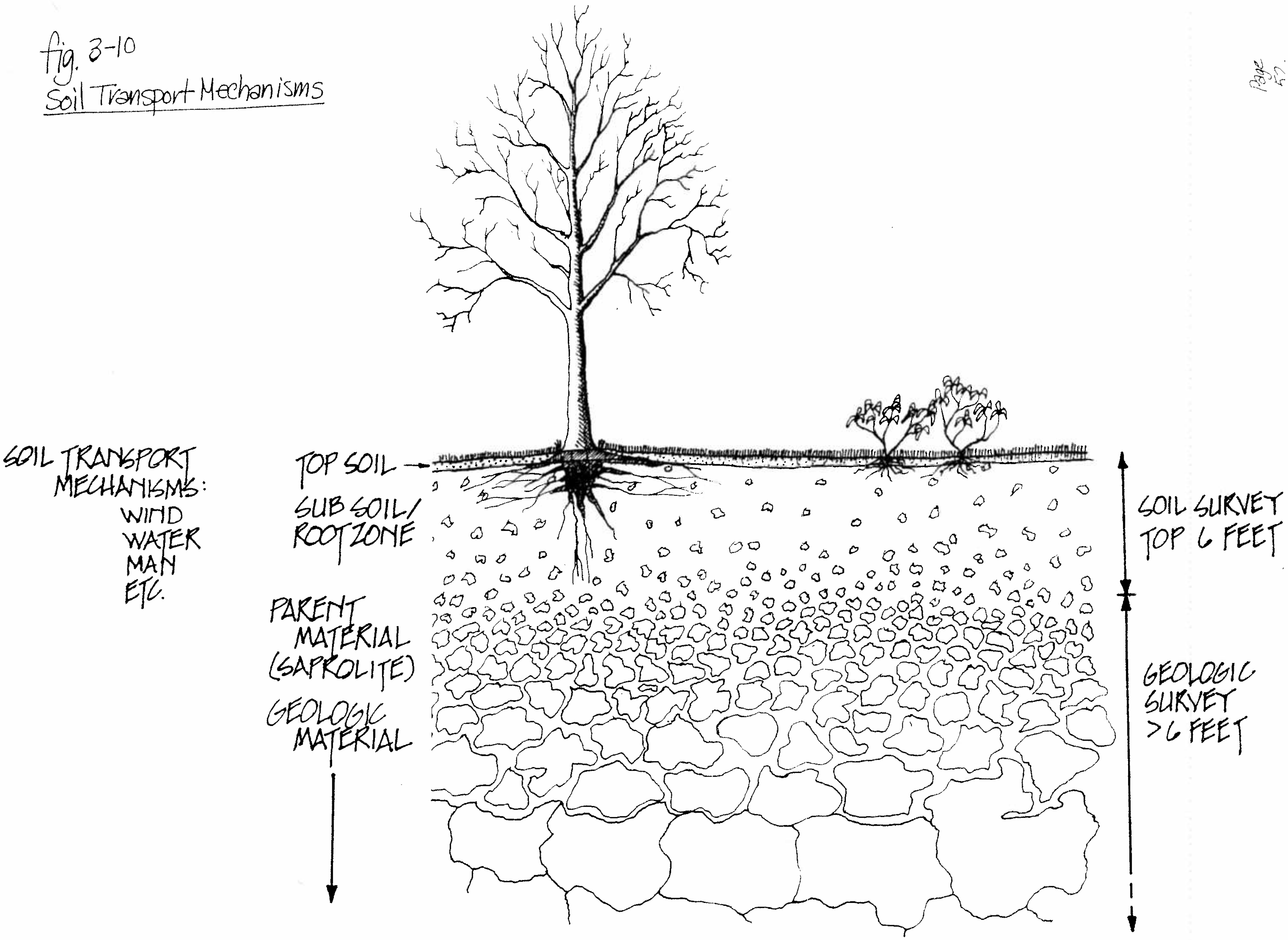
SURFICIAL DEPOSITS

CITY OF ENGLEWOOD

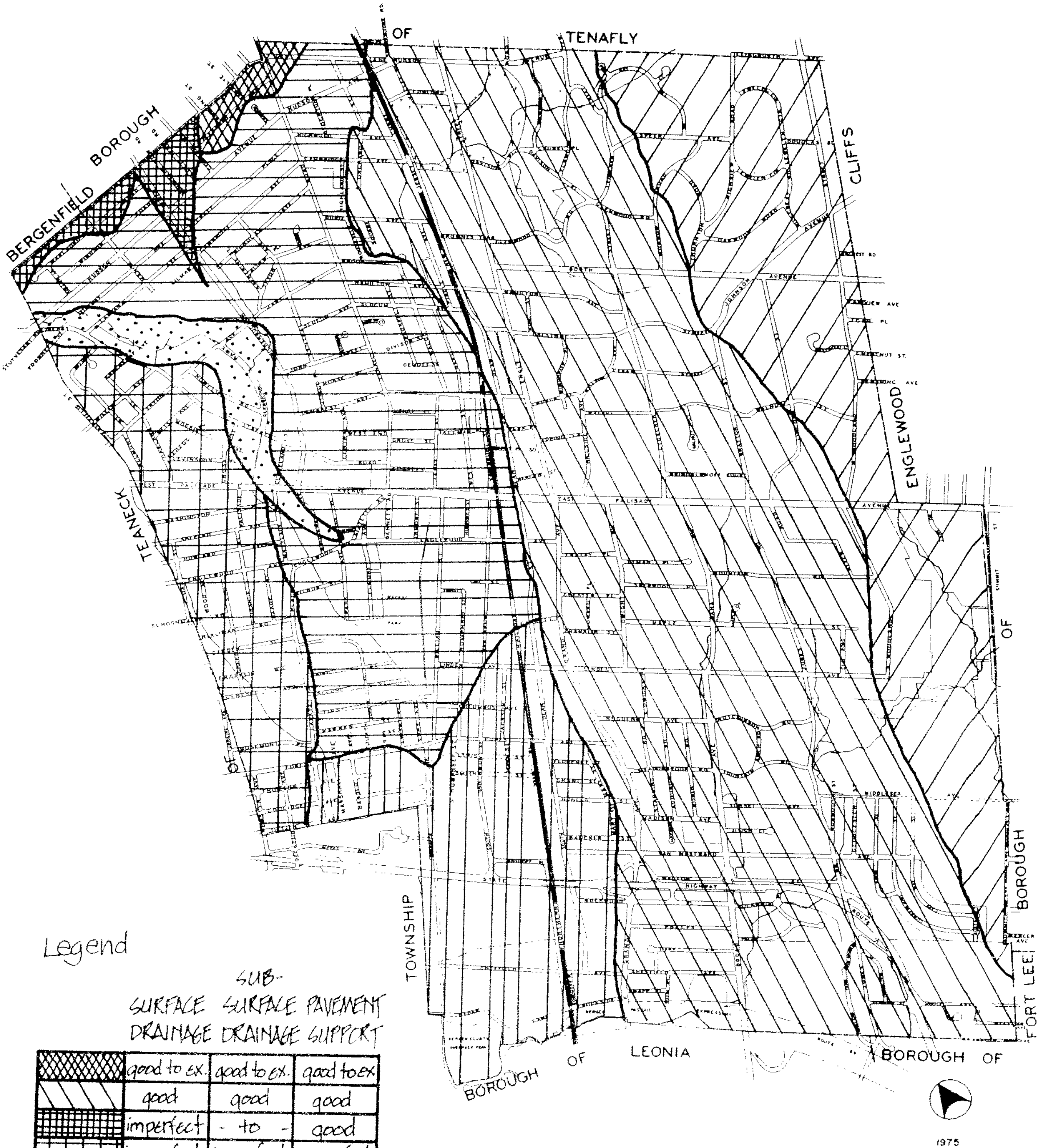
0 400 800 1200 1600 2000 2400 2800 3200 3600 4000 4400 4800 FEET
ONE HALF MILE

SOURCE: Environmental

fig. 3-10
Soil Transport Mechanisms



Map 3-11



Legend

	SURFACE DRAINAGE	SUB-SURFACE DRAINAGE	PAVEMENT SUPPORT
▩	good to ex.	good to ex.	good to ex
▧	good	good	good
▦	imperfect	- to -	good
⊞	imperfect	imperfect	imperfect
▨	poor	poor	poor
▥	very poor	very poor	very poor
⁘	poor	poor	poor
▤	good to ex.	good to ex.	good to ex.

1975

DRAINAGE CHARACTERISTICS

CITY OF ENGLEWOOD

SOURCE: Bergen County Planning Board

SURFICIAL DEPOSITS

Soils Engineering Tables (26)

Table 3-12

Symbolic Notation: Example - $\frac{\text{GM 46 ig}}{\text{Is}}$

1. Parent material or geologic formation from which the surficial deposits are derived (GM)
2. An indication of texture and consistency (46)
3. An estimate of groundwater conditions (ig)

---

1. Geologic Symbol-- geologic association or character of the underlying material (Is)
2. Soil Texture-- Highway Research Board Classification system
3. Drainage Conditions-- prevalent conditions

SURFICIAL DEPOSITS

1. $\frac{\text{GM 46 ig}}{\text{Is}}$

GM-46

Horizon	A	B	C
Depth, In.	Variable	Variable	Variable
Pass #4, %	85-100	85-100	75-100
Pass #200, %	40-70	50-75	30-75
Silt, %	*	15-40	10-35
Clay, %	*	25-40	15-50
LL, %	25-45	25-40	25-40
PI, %	6-12	7-20	8-15
Max. D., pcf	*	100-110	100-120
Opt. Moist., %	*	16-20	14-20
HRB Class.	A-4, A-5, A-6	A-4, A-6	A-2-4 to A-6
Group Index	0-3	4-10	0-9

Due to the usual depressed position of these areas, the horizon development is not normal, and the test values should be considered as indicative only. The texture of the C horizon often becomes quite granular with increasing depth.

* Values unnecessary or not significant.
NL Non-Liquid. Sample not susceptible to liquid limit test procedure.
NP Non-Plastic. Plasticity index zero or cannot be determined.

Glacial ground moraine is composed of non-residual, unstratified materials deposited during the Wisconsin glaciation. The till is thinly deposited over the high, broad diabase ridge.

a. Unassorted and heterogenous, including intermixed particles from clay to gravel, cobbles and boulders, with silt and sand predominant.

b. Derived from nearby consolidated material.

c. Depth to bedrock variable, usually greater than 10 ft. and sometimes greater than 40 ft. with more shallow depths at ridge-tops and greater depths occurring along the lower ridge slopes.

d. Imperfect surface and internal drainage conditions.

e. Soil mantle very shallow with silt and clay in predominance.

2. $\frac{\text{GM 24 ig}}{\text{Ss}}$

ENGINEERING TEST VALUES

GM-24

Horizon	A	B	C
Depth, In.	6-10	10-25	Variable
Pass #4, %	75-100	80-100	75-100
Pass #200,%	25-55	20-55	20-50
Silt, %	*	10-30	10-30
Clay, %	*	10-20	10-20
LL, %	20-40	NL-30	NL-25
PI, %	NP-8	NP-8	NP-7
Max. D., pcf	*	109-125	115-125
Opt. Moist., %	*	9-16	9-13
HRB Class	A-2-4 to A-4	A-2-4 to A-4	A-2-4 to A-4
Group Index	0-5	0-5	0-3

Glacial ground moraine is composed of non-residual materials deposited during the Wisconsin period (same as above GM soil type).

a. Granular to silty textured soil.

b. Textures light enough to allow for good drainage conditions.

c. Steep surface slopes help to promote rapid runoff.

d. Bedrock, usually sandstone, covered with a thin mantle of unconsolidated glacial materials, with diabase at even greater depths.

3. GS 12ge

ENGINEERING TEST VALUES

GS-12

Horizon	A	B	C
Depth, In.	6-9	12-16	Variable-Deep
Pass #4, %	60-95	40-85	30-55
Pass #200, %	25-40	20-40	5-20
Silt, %	*	*	*
Clay, %	*	*	*
LL, %	30-40	20-30	NL-25
PI, %	5-10	5-9	NP-5
Max. D., pcf	*	*	*
Opt. Moist., %	*	*	*
HRB Class	A-2-4, A-2-5, A-4	A-2-4, A-4	A-1-b, A-1-a, A-2-4
Group Index	0 0 0	0 0	0 0 0

Stratification obscures and complicates profile development in these materials. Accordingly, test values should be considered as only generally indicative.

* Values unnecessary or not significant.
NL Non-liquid. Sample not susceptible to liquid limit test procedure.
NP Non-plastic. Plasticity index zero or cannot be determined.

Glacial stratified drift is composed of non-residual materials, generally sorted by fluvial action and consisting of sand with varying amounts of silt, gravel and clay.

a. Underlying rock usually red sandstone with some diabase close to the surface. Some indications that the stratified drift is underlain by ground moraine at variable depths.

b. Drainage conditions vary considerably depending on texture and position relative to stream courses.

c. Silts, silty sands and gravels predominate with the silts appearing closer to the surface.

4. GS 46vp

GS-4

Horizon	A	B	C	
Depth, In.	8-10	16-24	Variable-Deep	
Pass #4, %	85-100	90-100	60-100	
Pass #200, %	40-60	40-70	15-40	
Silt, %	*	*	*	
Clay, %	*	*	*	Comment as for GS 12
LL%	20-35	20-40	NL-30	
PI%	5-10	1-10	NP-6	
Max. D., pcf	*	*	*	
Opt. Moist., %	*	*	*	
HRB Class.	A-4	A-4	A-2-4, A-4	
Group Index	0-4	2-7	0 0	

* Values unnecessary or not significant.
NL Non-liquid. Sample not susceptible to liquid limit test procedure.
NP Non-Plastic. Plasticity index zero or cannot be determined.

(Same as other GS type deposits.)

Surface drainage is hindered by flat surfaces and lack of relief.

5. GM 24 ig

TABLE 8-1 - GS ENGINEERING TEST VALUES - Cont.

GS-24

Horizon	A	B	C	
Depth, In.	5-10	10-18	Variable-Deep	
Pass #4, %	80-100	80-100	80-100	
Pass #200, %	15-50	20-50	10-35	
Silt, %	*	*	*	
Clay, %	*	*	*	Comment as for GS-12
LL, %	NL-35	NL-30	NL-20	
PI, %	NP-8	NP-8	NP-5	
Max. D., pcf	*	*	*	
Opt. Moist., %	*	*	*	
HRB Class.	A-2-4, A-4	A-2-4, A-4	A-2-4	
Group Index	0 0	0 0	0	

(Same as above GM material)

However, less favorable depth to water-table

6. AR

Decent alluvium composed of stratified, non-residual materials deposited by alluvial action.

a. Sorted by stream action.

b. Ranging in size from silt with clay to silt and fine sand with gravel.

c. Drainage characteristics subject to location adjacent to stream channels.

d. Engineering characteristics are variable due to intermixing of parent material, high water tables near streams, etc.

7. GK 12ge

GE-12, GK-12

Horizon	A	B	C	
Depth, In.	4-12	10-20	Deep	Test values indicate slight profile development which is frequently obscured by the greater contrast of stratification
Pass #4, %	40-75	35-75	35-75	
Pass #200, %	5-30	2-25	0-20	
Silt, %	*	*	*	
Clay, %	*	*	*	
LL, %	NL-40	NL-35	NL-25	
PI, %	NP-10	NP-10	NP-5	
Max. D., pcf	*	110-118	115-125	
Opt. Moist., %	*	10-16	10-15	
HRB Class.	A-1-a, A-1-b A-2-4	A-1-a, A-1-b A-2-4	A-1-a, A-1-b A-2-4	
Group Index	0	0	0	

*Values unnecessary or not significant.
NL Non-liquid. Sample not susceptible to liquid limit test procedure
NP Non-plastic. Plasticity index zero or cannot be determined.

Glacial kame composed of non-residual, stratified materials deposited during the Wisconsin glaciation. Low hills and terraces, with bedrock usually greater than 10 feet.

a. Sand and gravel, usually in well-defined beds and usually sandstone.

b. Underlain by red sandstone and shale.

c. Drainage usually good to excellent with water table at considerable depth.

8. GS 24ig

(Same as above stratified material.)

CHAPTER 4

VEGETATION AND WILDLIFE

Vegetation

History

Adjacent to the lobes of glacial ice which extended through the Bergen County region, were probably tundra associations similar to those which now exist in similar climatic conditions to the north. No vegetation existed under the ice, and that which was there previously was carried away with the advancing glacier. Bog-pollen analysis of areas south of the glacial margin indicates that a Spruce-Fir Boreal forest was the first association to exist after glacial retreat (37).

Braun (6, p. 250) says,

> "The extent to which migration affected established vegetation is another question. In New Jersey, only a short distance beyond the glacial boundary, the fossil record shows that the deciduous forest species persisted, although some northern species entered the area... To the east of the mountain axis (as to the west) oaks entered early, being present in the pine stage, and continued as one of the dominant genera through subsequent stages... An ample source for oak migration in the east existed to the south of the glacial boundary in Eastern Pennsylvania, New Jersey, and on the then emergent continental shelf."

Robichaud and Buell outline four development stages on rock outcroppings stripped of vegetation and soil such as are found on the Palisade ridge. "(1) the lichen and moss invasion, (2) the herbaceous plant invasion, (3) the shrub invasion, and (4) the initial establishment of tree invaders.

Contrary to the popular belief that European settlers found endless expanses of hardwood forest when they arrived in North America, the Indians had been burning and cutting the forest for many years. They did so to drive game for the hunt and to clear ways to get from one place to another." (37, p. 67). Land that was not cut or burned for hunting was cleared for settlements and agriculture.

> "The first reasonably good description of the forest composition in Bergen County was recorded by the early land surveyors between 1760 and 1800. They marked and noted boundary trees when surveying property lines. Hence, a fairly representative sampling of the standing trees is available in the Bergen County deed books. By searching through deed books A to K at the County Courthouse, a total of 169 trees were found mentioned. Six kinds of trees account for three-fourths of all the trees mentioned. In order of decreasing importance, they are: White Oak, Black Oak, Walnut, Chestnut, Maple, and Red Oak. (Walnut is a common name sometimes used for Hickory, so it cannot be certain whether it referred to Juglans, the Black Walnut, or Carya, the Hickory. More than likely, it was Hickory.)... It is significant that the Oaks predominated, and that the White Oak was most common."
>
> (8, p. 20)

As colonization by the newly arrived Europeans proceeded, more and more land was cleared for settlement and agriculture. That portion of the woodlands not cleared was kept as a source of heating and building materials. With the increase of the population in the region, came a concomitant need for more wood.

> "In addition to accomodating the household needs of a growing population, wood was needed in enormous quantities as fuel for the operation of steamboats and locomotives, for the early New Jersey settlers had exhausted a forest of 20,000 acres in about twelve or fifteen years and the works had to be abandoned for lack of wood."
>
> (37, p. 69)

Harvesting of the woodlands in New Jersey slowed considerably with the adoption of coal as an energy source between 1850 and 1900 (37, p. 70). The greatest hazards to the vegetational communities since have been industrial and residential development, and industrial and automotive pollution.

Subsequent to the construction of the tide gates on Overpeck Creek it ceased to be brackish and became entirely fresh in its lower reaches (see Chapter 3, SURFICIAL HYDROLOGY). While the salinity of the creek changed, the vegatational composition probably stayed largely the same.

> "In brackish water some plants more typical of the freshwater marshes join those of the saltwater wetlands. In the mixture, either the salt meadow grass (Spartina patens) or the freshwater reed grass (Phragmites communis) may be the dominant and most abundant plant growing closest to the water. In the brackish Hackensack Meadows, the reed grass is most successful..." (37, p. 122).

Vegetation in Englewood* (see fig. 4-1)

What little Phragmites still exists in Englewood can be found in the southwest corner of the city along the Overpeck in the industrial section. The bulk of the marsh has been filled in during recent years to support light industry, thus displacing an important natural water storage area.

Along with the Phragmites are species of Poplar (Populus sp.) along the edges of the wetlands, and Sycamore (Platanus occidentalis), Sweetgum (Liquidambar styraciflua), Tulip tree (Liriodendron tulipifera), Red Oak (Quercus rubra), and Red Maple (Acer rubrum) in slightly higher elevations (five to ten feet above mean sea level).

Moving eastward in the south section of the city, the vegetational communities begin to change with the change in elevation. Upland communities become more common with the appearances of Red Oak (Quercus rubrua), Sweetgum (L. styraciflua), White Oak (Q. alba), and Beech (Fagus americana). This community begins on the west side of the intersection of Jones Road and Route 4 and gradually becomes the dominant community farther up the ridge slope.

Several early successional communities begin to appear in this area. In the northeastern corner of the Englewood Golf Club near Jones Road, is a

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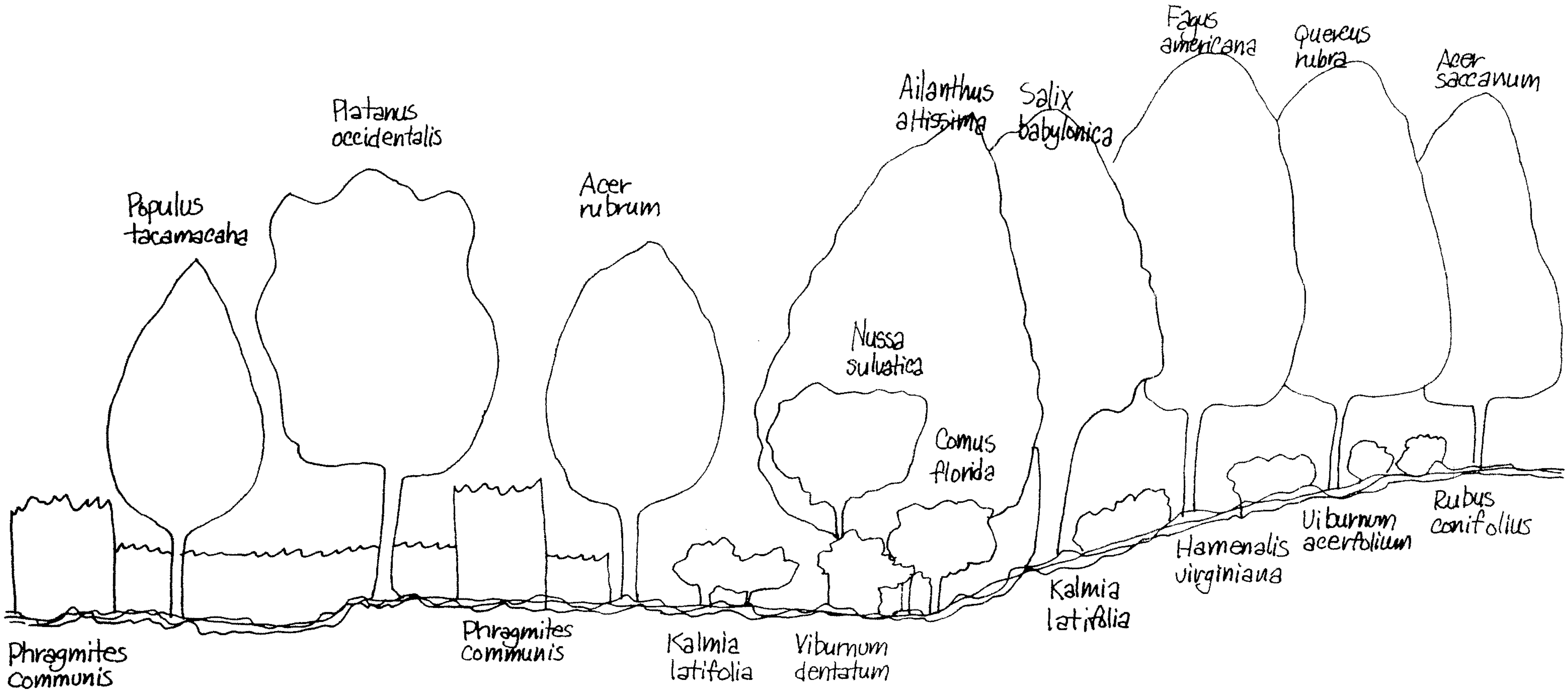
*Vegetational mapping was done by Margaret Engelmann in the Spring of 1975. Information for the existing vegetation in the city is taken from that work.

fig. 4-1


Populus tacamacaha
Platanus occidentalis
Acer rubrum
Ailanthus altissima
Salix babylonica
Fagus americana
Quercus rubra
Acer saccanum
Nussa sulvatica
Comus florida
Phragmites communis
Phragmites communis
Kalmia latifolia
Viburnom dentatum
Kalmia latifolia
Hamenalis virginiana
Viburnum acerfolium
Rubus conifolius

community of briars (Rubus sp.) and seedlings. Diagonally across Route 4 is another early successional community of Red Maple, Wild Cherry (Prunus serotina), Sweetgum, and Beech.

Slightly south of this location, near Myrtle Avenue and Route 4, is a grove of predominantly Beech. This is a typical tree found in the wooded areas on the west side of the Palisade ridge, and, with Oaks, makes up the dominant canopy.

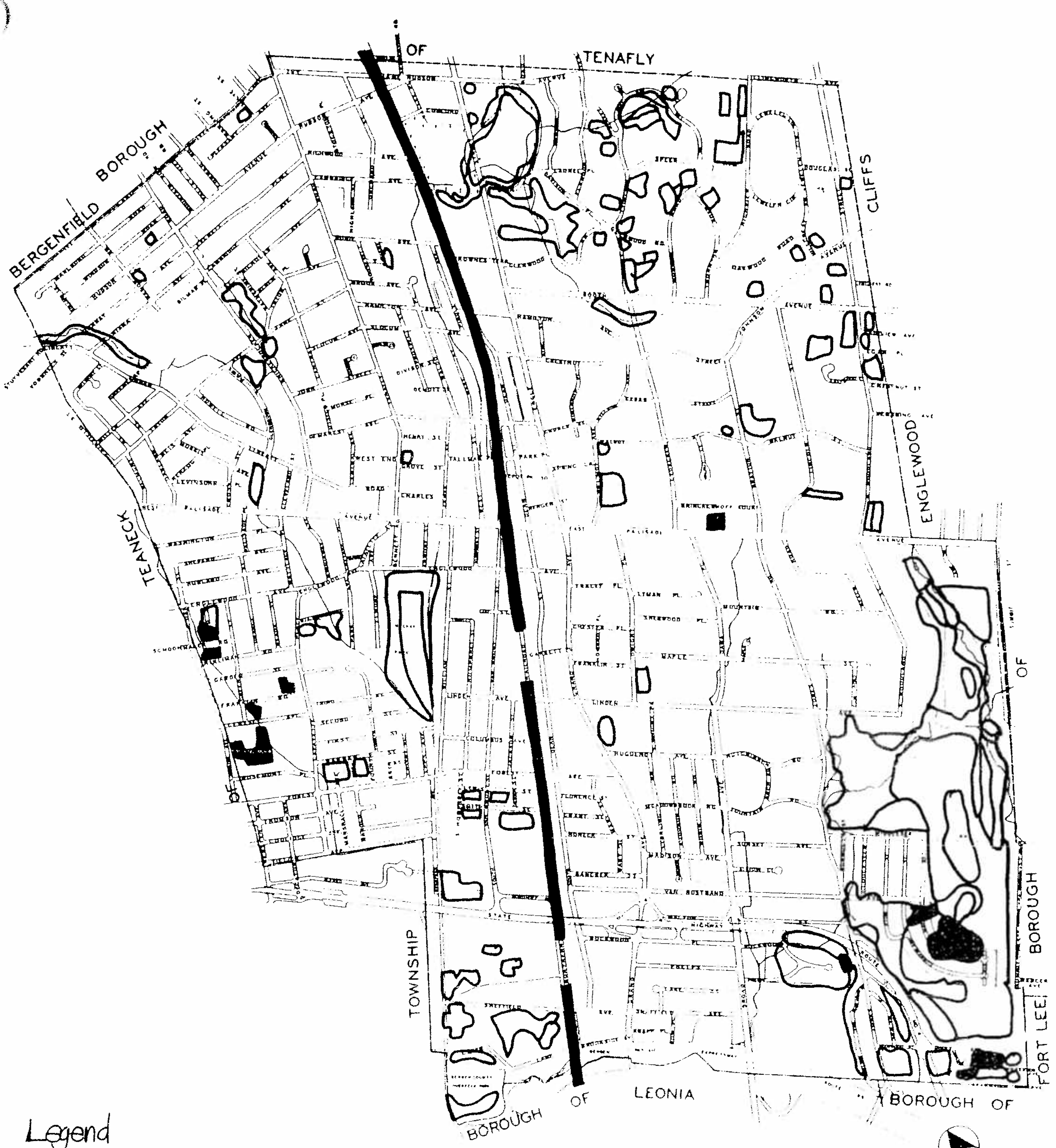
Lowland communities can be found in this area, known as Flat Rock Brook and Allison Park, but they are relatively small. Adjacent to the new pond created in the Flat Rock Brook Nature Center is a Poplar and Phragmites marsh. Farther north, along Flat Rock Brook and surrounding McFadden's Pond are Tulip tree, Sweetgum, Sycamore, and Red Oak communities. This community also follows the lowland ephemeral stream valley along Summit Street running south of the boundary of Allison Park on its North side. In the center of this community are Chestnut Oaks (Q. prinus), and Weeping Willows (Salix babylonica and S. alba).

This area of the city contains the most significant stand of woods in Englewood. It is by far the largest uninterrupted and relatively undisturbed vegetational unit in the city, and as such, it is an important natural resource for the region. While there are no associations on the site which could be called vegetationally unique, the mere existence of a wooded area of this magnitude in an urban setting is unique.

A glance at the Vegetation Map (Map 4-2) will show the vegetational differences between the western and eastern sections of the City. Grand Avenue and Engle Street represent the approximate dividing line between the predominantly lowland species evident in the west, and the predominantly upland species seen in the east.

While the city is green for an urban area, the lack of trees in the

Map 4-2



Legend

☐ UPLAND (DRY)

● LOWLAND (WET)

VEGETATION

CITY OF ENGLEWOOD

67.

downtown business district is obvious when walking through town. Not only is the visual amenity absent, but the lack of shade in the summer is equally noticeable.

VEGETATION SPECIES LIST (continued)

Latin Name	Common Name
Prunus serotina	Black Cherry
Prunus sp.	Planted Cherry
Quercus alba	White Oak
Quercus bicolor	Swamp White Oak
Quercus palustris	Pin Oak
Quercus rubra	Red Oak
Quercus velutina	Black Oak
Robinia pseudoacacia	Black Locust
Salix nigra	Black Willow
Salix sp.	Willow
Tilia americana	Basswood
Tsuga canadensis	Hemlock
Ulmus americana	American Elm

VEGETATION SPECIES LIST

Latin Name	Common Name
Acer campestris	Hedge Maple
Acer negundo	Box Elder
Acer platinoides	Norway Maple
Acer rubrum	Red Maple
Acer saccarinum	Silver Maple
Acer saccarum	Sugar Maple
Aesculus hippocastanum	Horse Chestnut
Ailanthus altissima	Tree of Heaven
Betula alba	White Birch
Betula lenta	Black Birch
Carya sp.	Hickory
Crataegus sp.	Hawthorn
Fagus americana	American Beech
Fagus sylvatica	European Beech
Fraxinus americana	Ash
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Tuliptree
Malus sp.	Apple
Nyassa sylvatica	Black Gum
Picea abies	Norway Spruce
Pinus rubra	Red Pine
Pinus strobus	White Pine
Platanus occidentalis	Sycamore
Populus sp.	Poplar

Wildlife

Definition

For our purposes, the term "wildlife" will refer to those animals which one might ordinarily consider wildlife such as birds, mammals, and fish. We will not consider other forms of wildlife such as the higher and lower forms of insects, single-celled and microscopic multi-celled animals, though they are no less important a consideration than the birds or mammals which eat them The complexity and diversity of these communities make them difficult to deal with--so much so that we will treat them as a single unit within the food chain and go no further.

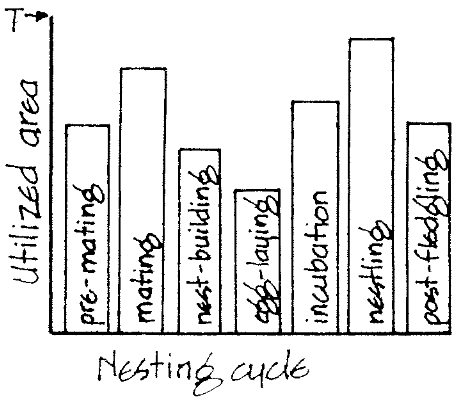
By far the most numerous and obvious representatives of wildlife within the city are the birds. At least 126 species of birds have been sighted in the city and appear on the species list and in Appendix II. No doubt there are many more species which do not appear on the list which have at least visited the city and perhaps reside here during part of the year.

The habitats utilized by these species are for the most part difficult to define, which explains the absence of a map of wildlife habitats in this inventory. (Different species of animals use different areas for different purposes. For instance, a bird which utilizes one corner of a woodlot in the Spring, might utilize an entirely different area of the lot in the summer, depending on the stage of the nesting cycle (see fig. 4-3). Further, many of the bird species are migratory which complicates the concept of habitat. That is, do we consider a migratory bird's habitat to be both Englewood and Caracas, Venezuela, just Englewood, just Caracas, or both of them and all the area in between?

On the other hand, some species of animals are found uniquely in specific areas. For instance, the Great Horned Owl is found for the most part in Hem-

fig. 4-3

Territory of Utilization by Nesting Birds



The utilization of territory by Ovenbirds (Seiurus aurocapillus) at different stages of the nesting cycle. Utilized area is expressed as a fraction of the total area (T) used by the pair during the entire cycle. (From Ricklefs, 1973). (36)

lock hardwood communities and the Two Line Salamander is found exclusively in streams (8).

Significance

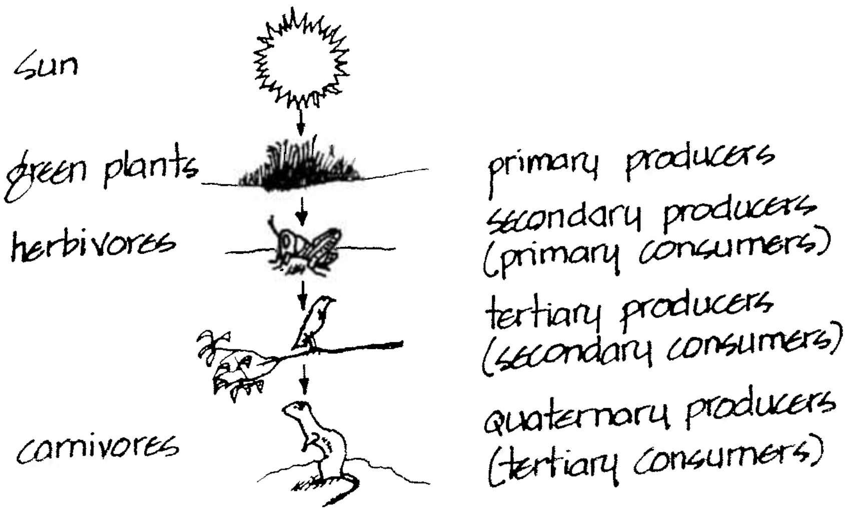
Some might ask why we should be concerned about the wildlife in an area such as Englewood, when the bulk of the community is already urbanized and most of the wildlife is already gone. The value of any part of the natural environment is its ability to accomplish work which would otherwise have to be done by some fossil fuel subsidy. Take for instance the Crow; there seems to be as much hostility toward the Crow among humans, as there is ambivalence. Crows appear often in ghoul movies as companions of the most venal sorts of creatures. Yet Crows occupy an important position in the ecosystem. They are the garbagemen of the natural system. Those creatures which do not make it across the highway wind up in the gullet of the Crow. (Every dead animal he eats on the road is one less that the highway department must burn gasoline to get men and trucks to pick up).

> "While entropy, or degraded energy, in any systems must increase in life systems and the orderings which they accomplish, there is evidence, not of degradation, but upgrading, the counter-tendency which Sears describes. 'Energy impinging on living communities and stored in carbon compounds sustains a variety of forms of life, promoting their individual and group organization, enhancing the capacity of the habitat to sustain life, regulating the economy of water movement and chemical transformations--in short, doing work.' In this, energy is employed with matter through living processes. The energy is temporarily entrapped; it will inevitably be lost to entropy but it will also be replaced. Meanwhile, the living creatures persist, evolve and in their beings and their modifications to the earth, act to raise matter to higher orders. This tendency, which is the sum of all life and all time, and the orderings which these have accomplished, is described as negentropy. Perhaps it can be given the more affirmative and colloquial title of creation-- the world's creativity." (28, p. 53)

The effects and methods employed in this process can be seen graphically in fig. 4-4. Energy from the sun is used by green plants to make biomass (plant

fig. 4-4

Levels in the Food Chain



(After Ricklefs, 1973)(36)

matter) from nutrients in the soil, and, with carbon dioxide, releases oxygen into the atmosphere - the photosynthetic process. These plants are called primary producers, as they are the beginning step in the food chain (36). The herbivores, or plant eaters, are secondary producers, or primary consumers, and are the next step in the chain. Insectivores are the third step in the chain, and are the tertiary producers, or secondary consumers. Last are the quaternary producers or tertiary consumers, the carnivores. The carnivores are the last step in the chain, but while they might not eat green plants (though many do), their reliance on them is considerable. Should green plants cease to exist, the herbivores would also cease to exist, and likewise the insectivores, thereby eliminating the carnivores' source of food.

Edge Effect

Much has been made of the so-called "edge effect" with regard to its influence as a wildlife habitat. It has been argued that the edge of a habitat type, say a forest where it meets an old field, combines the vegetational characteristics of both the forest and the field, thereby enabling species which inhabit one or the other to exist at the edge. As a consequence, the promotion of edge communities as a wildlife management technique has been popular recently. According to Robert Ricklefs, this may not be the case. First, while it may appear as though there is a lot of activity at the edge, this may be due to the edge being the location where wildlife is most easily seen. (Ricklefs, personal communication, 1975). Second, rather than providing a habitat which would accommodate species of both community types, the edge condition, or ecotone, more likely provides a habitat which is utilized by species uniquely adapted to it; "...when man clears forested areas for agriculture and constructs cities and highways, he produces many sharp contrasts between associations--as between field and forest--that form effective community boundaries. The edge between such sharply defined associations consistutes a habitat for many so-called "edge species." (36, p. 596). The consequence of providing an ecotone in the middle of a woodland, then, may be that those species who prefer the woods to the edge will leave the area and those species which are edge-specific may move in; the result being the replacement of one species group by another.

This condition might well exist in the case of deer, each of which according to Maestro (29), needs approximately 640 acres in which to love (see fig. 4-5). Another consideration in the management of wildlife in the city is the degree to which animals are tolerant of human disturbance. Some animals co-exist with humans very well, indeed might even prefer it (rats might be a good example). On the other hand, some will not easily tolerate it. Figure 4-6 shows a continuum of animal sensitivity to human disturbance.

A list of species of birds and animals known to live in the city during some portion of the year, appears at the end of this chapter. Their habitat preferences and food preferences are shown in the last column in order that some understanding can be had of some conditions necessary for their existence. This is not to imply that providing these habitats and food sounces will ensure that these animals will either continue to live in the city or that their populations will increase. However, they will make the existence of the animals easier. The food preferences were deduced from analysis of the contents of the stomach of varying numbers of individuals of each species. The numbers of the individuals, as well as the other methods used in compiling the list can be found in Martin, Zim, and Nelson (30).

fig. 4-5
Home Range Requirements for Some Animals

Mammal	Home Range
Opossum	15-40 acres
Shrew, Least	<1 acre
? Raccoon	<1 mile dia.
Fox, Red	1-2 mi²
Squirrel, E. Gray	2-7 acres
Mouse, House	<1 acre
Mouse, White-footed	½ acre
Rat, Norway	<100 ft. dia.
Rabbit, Cottontail	3-20 acres
Deer, White tail	640 acres

Home range requirements for some mammals (Maestro, 1973)

fig. 4-6
Continum of Animals Sensitive to Human Disturbance

red fox ? raccoon	raptors rabbits	waterbirds opossum	mourning dove squirrels song birds
MOST SENSITIVE			LEAST SENSITIVE

(Maestro in Woodlands, 1973)

WILDLIFE SPECIES LIST (see Appendix II for additional species)

COMMON NAME	LATIN NAME	HABITAT PREFERENCE (FOOD PREFERENCE)
Water Birds		
Common Mallard	*Anas platyrhynchos*	Ponds, lakes, marshes (wild rice, pond wild)
Sandpiper	*Actitis macularia*	Marsh, pond (insects, invertebrates)
Upland Gamebirds		
Mourning Dove	*Zenaidura macroura*	Open, weedy fields and orchards (Bristlegrass, Ragweed)
Songbirds		
Ruby-throated Hummingbird	*Archilochus colabris*	Cultivated flower gardens, woods (flowers, both cultivated and wild; insects)
Yellow-shafted Flicker	*Colaptes auratus*	Lawns, wooded areas, insects (Poison Ivy, Black Gums, Virginia Creeper)
Hairy Woodpecker	*Dendrocopos villosus*	Wooded areas, lawn trees (Insects, Poison Ivy, Dogwood)
Downy Woodpecker	*Dendrocopos pubescens*	Wooded areas, lawns (lawn trees) (Insects, Poison Ivy, Dogwood
Great Crested Flycatcher	*Myiarchus crinitus*	Large trees in either woods or residential areas, (Insects)
Blue Jay	*Cyanocitta cristata*	Wooded areas, yards (Oak, Beech, Blackberry)
Common Crow	*Corvus brachyrhynchos*	Wooded areas, omnivorous (Oak, Cherrym Mulberry, Sumac)
Cardinal	*Richmondena cardinalis*	Wooded areas, residential areas (Grape, Dogwood, Smartweed)

Songbirds (cont.)

Brown Thrasher	*Toxostoma rufum*	Brushy thickets, open residential (Blackberry, Cherry, Dogwood)
Barn Swallow	*Hirundo erythrogaster*	Nests in structures (insects)
Eastern Towhee	*Pipilo erythrophthalmus*	Wooded areas (Ragweed, Oak, Bayberry, Blackberry)
Starling	*Sturnus vulgaris*	Urban and suburban areas (Cherry, wild and cult., sumac)
Chipping Sparrow	*Spizella passerina*	Residential lawn plantings (Crabgrass, Bristlegrass)
Slate-colored Junco	*Junco hyemalis*	Open areas, old fields (Ragweed, Bristlegrass, Crabgrass)
White-breasted Nuthatch	*Sitta carolinensis*	Forests, lawns (Oak, Beech, Hickory, Virginia Creeper)
Purple Finch	*Carpodacus purpureus*	Wooded areas, orchards (Elm, Tuliptrees, Ash, Sycamore, Sweetgum, Ragweed)
Black-capped Chicadee	*Parus atricapillus*	Wooded areas, lawns (Birch, Poison Ivy, Bayberry, Ragweed, Blueberry)
Goldfinch	*Spinus tristis*	Openings (Thistle, Sweetgum)
Evening Grosbeak	*Hesperiphona vespertina*	Wooded areas, lawns (Maple, Dogwood, Cherry, feeding stations)
Redwing Blackbird	*Agelaius phoeniceus*	Openings, lowlands (Ragweed)
Robin	*Turdus migratorius*	Clearings, lawns, orchards (insects, worms)
Scarlet tanager	*Piranga olivacea*	Wooded areas (insects)
Tufted Titmouse	*Parus bicolor*	Wood areas (insects, Blackberry)

Songbirds (cont.)

Cowbird	*Molothrus ater*	Openings, brushy areas (Ragweed, Crabgrass, insects)
Hermit Thrush	*Hylocichla guttata*	Wooded areas (insects, Holly, Sumac)
Mockingbird	*Mimus polyglottos*	Wooded areas, yards (Virginia Creeper, Holly, Blackberry, Sumac, Grape)
Catbird	*Dumetella carolinensis*	Wooded areas, yards (Blackberry, Sumac, Grape)
White-throated Sparrow	*Zonotrichia albicollis*	Bushes, shrubs (Ragweed, Smartweed)
English Sparrow	*Passer domesticus*	Lawns, wooded areas (Ragweed, Elm)
Song Sparrow	*Melospiza melodia*	Brush (grasses, Ragweed)
Golden-Crowned Kinglet	*Regulus satrapa*	Wooded areas (Insects)
Bluebird	*Sialia sialis*	Suburban trees, trees near houses (Dogwood, Sumac, Bayberry)
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Wooded areas (Maple, Beech, Oak, Birch, Hickory, Poplar, Elm, Tuliptree, Cherry)
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Wooded areas, brushy areas (Elderberry, Cherry, Elm, Beech, Hickory)

Raptors

Sparrow Hawk	*Falco sparverius*	Wooded areas (small mammals, birds)

Mammals

Groundhog	*Marmota monax*	Open areas (Clover, grasses, Honeysuckle)

Mammals (cont.)

Opossum	Didelphis virginiana	Lowlands, wooded areas (omnivorous)
Mole	Scalopus aquaticus	Wooded areas, lawns (Insects, Grubs)
Raccoon	Procyon lotor	Open and wooded areas (Oak, Beech, Hickory, Tuliptree)
Chipmunk	Tamias striatus	Wooded areas (Maple, Hickory, Oak, Beech, Basswood, Cherry)
Field Mouse	Microtus sp.	Open areas, houses (Walnut, Maple, Poplar, Oak)
Deer Mouse	Peromyscus sp.	Wooded areas (Oak, Blueberry, Maple, Poplar, Tuliptree, Wild Cherry)
Red Fox	Vulpes fulva	Wooded areas (small mammals, Black Cherry, Apple)
Skunk	Mephitis mephitis	Wooded areas, residential areas (Grape, Blueberry)
Muskrat	Ondatra zibethica	Lowlands, ponds, marshes, streams (Cattail, Bulrush, Oak)
Rabbit	Sylvilagus floridanus	Brushy areas, edges (Crabgrass, Bluegrass, Garden Crops, Clover, Blackberry)
Eastern Gray Squirrel	Sciurus carolinensis	Wooded areas, lawn trees (Oak, Hickory, Beech, Maple, Walnut, Poplar, Black Gum, Dogwood, Sweetgum)

Reptiles

Brown Toad	Bufo americanus	Lowlands (Insects)
Box Turtle	Terrapene carolina	Wooded areas, open areas (fruits, mushrooms, Blackberry, Strawberry)

APPENDIX II

ADDITIONAL WILDLIFE SPECIES

The list below includes all the species of birds seen by two observers, Johannes Richter and Frederick E. Warburton, in the City of Englewood since January 1974. It includes 126 species. Those species seen by only one of the two observers are followed by the initials of that observer. Those seen in the Flat Rock Brook area are marked with an asterisk * (101 species).

One of the observers (F.W.) is preparing an annotated list of the birds of Englewood, describing the relative abundance of each species and its season of occurrence. The list given here does not distinguish rare species from common ones, nor winter residents, breeding species, and migrants from each other.

Great Blue Heron, *Ardea herodias* (JR)*

Green Heron, *Butorides virescens* *

Cattle Egret, *Bubulcus ibis* (JR)*

Black-crowned Night Heron, *Nycticorax nycticorax* (FW)

Canada Goose, *Branta canadensis*

Mallard, *Anas platyrhynchos* *

Black Duck, *Anas rubripes*

American Widgeon (Baldpate), *Mareca americana* (FW)

Wood Duck, *Aix sponsa* (JR)*

Redhead, *Aythya americana* (FW)

Canvasback, *Aythya valisineria* (FW)

Lesser Scaup, *Aythya affinis* (FW)

Sharp-shinned Hawk, *Accipiter striatus* *

Red-tailed Hawk, *Buteo jamaicensis* *

Broad-winged Hawk, *Buteo platypterus* *

Osprey, *Pandion haliaetus* (FW)

American Kestrel (Sparrow Hawk), *Falco sparverius* *

Semipalmated Plover, *Charadrius semipalmatus* (FW)

Killdeer, *Charadrius vociferus*

Spotted Sandpiper, *Actitis macularia* *

Solitary Sandpiper, *Tringa solitaria* *

Greater Yellowlegs, *Totanus melanoleucus* (FW)

Least Sandpiper, *Erolia minutilla*

Great Black-backed Gull, *Larus marinus*

Herring Gull, *Larus argentatus* *

Rock Dove (Feral Pigeon), *Columba livia* *
Mourning Dove, *Zenaidura macroura* *
Monk Parakeet, *Myiopsitta monachus* (FW)
Great Horned Owl, *Bubo virginianus* *
Common Nighthawk, *Chordeiles minor* *
Chimney Swift, *Chaetura pelagica* (FW)
Ruby-throated Hummingbird, *Archilochus colubris* (FW)
Belted Kingfisher, *Megaceryle alcyon* *
Common (Yellow-shafted) Flicker, *Colaptes auratus* *
Pileated Woodpecker, *Dryocopus pileatus* *
Yellow-bellied Sapsucker, *Sphyrapicus varius* *
Hairy Woodpecker, *Dendrocopos villosus* *
Downy Woodpecker, *Dendrocopos pubescens* *
Eastern Kingbird, *Tyrannus tyrannus* *
Great Crested Flycatcher, *Myiarchus crinitus* (FW)*
Eastern Phoebe, *Sayornis phoebe* *
Least Flycatcher, *Empidonax minimus* (FW)
Eastern Wood Peewee, *Contopus virens* *
Tree Swallow, *Iridoproene bicolor* (FW)
Barn Swallow, *Hirundo rustica* *
Purple Martin, *Progne subis* (JR)
Blue Jay, *Cyanocitta cristata* *
Common Crow, *Corvus brachyrhynchos* *
Black-capped Chicadee, *Parus atricapillus* *
Tufted Titmouse, *Parus bicolor* *

White-breasted Nuthatch, *Sitta carolinensis* *

Red-breasted Nuthatch, *Sitta canadensis* *

Brown Creeper, *Certhia familiaris* *

House Wren, *Troglodytes aedon* *

Winter Wren, *Troglodytes troglodytes* *

Carolina Wren, *Thryothorus ludovicianus* *

Mockingbird, *Mimus polyglottos* *

Catbird, *Dumetella carolinensis* *

Brown Thrasher, *Toxostoma rufum* *

American Robin, *Turdus migratorius* *

Wood Thrush, *Hylocichla mustelina* *

Hermit Thrush, *Hylocichla guttata* *

Swainson's Thrush, *Hylocichla ustulata* *

Gray-cheeked Thrush, *Hylocichla minima* (FW)*

Veery, *Hylocichla fuscescens* *

Eastern Bluebird, *Sialia sialis* *

Blue-gray Gnatcatcher, *Polioptila caerulea* *

Golden-crowned Kinglet, *Regulus satrapa* *

Ruby-crowned Kinglet, *Regulus calendula* *

Cedar Waxwing, *Bombycilla cedrorum* *

Starling, *Sturnus vulgaris* *

Red-eyed Vireo, *Vireo olivaceus* *

Black and White Warbler, *Mniotilta varia* *

Worm-eating Warbler, *Helmitheros vermivorus* (FW)

Blue-winged Warbler, *Vermivora pinus* (JR)*

Tennessee Warbler, _Vermivora peregrina_ (FW)
Nashville Warbler, _Vermivora ruficapilla_ (FW)
Parula Warbler, _Parula americana_ *
Yellow Warbler, _Dendroica petechia_ (FW)*
Magnolia Warbler, _Dendroica magnolia_ (FW)*
Cape May Warbler, _Dendroica tigrina_ (FW)*
Black-throated Blue Warbler, _Dendroica caerulescens_ *
Yellow-rumped (Myrtle) Warbler, _Dendroica coronata_ *
Black-throated Green Warbler, _Dendroica virens_ *
Blackburnian Warbler, _Dendroica fusca_ (JR)*
Chestnut-sided Warbler, _Dendroica pensylvanica_ (FW)*
Blackpoll Warbler, _Dendroica striata_ *
Pine Warbler, _Dendroica pinus_ *
Palm Warbler, _Dendroica palmarum_ *
Ovenbird, _Seiurus aurocapillus_ *
Northern Waterthrush, _Seiurus noveboracensis_ *
Louisiana Waterthrush, _Seiurus motacilla_ *
Yellowthroat, _Geothlypis trichas_ *
Hooded Warbler, _Wilsonia citrina_ (JR)*
Wilson's Warbler, _Wilsonia pusilla_ (FW)*
Canada Warbler, _Wilsonia canadensis_ *
American Redstart, _Setophaga ruticilla_ *
House Sparrow, _Passer domesticus_ *
Red-winged Blackbird, _Agelaius phoeniceus_ *
Northern (Baltimore) Oriole, _Icterus galbula_ *

Rusty Blackbird, *Euphagus carolinus* *
Common Grackel, *Quiscalus quiscula* *
Brown-headed Cowbird, *Molothrus ater* *
Scarlet Tanager, *Piranga olivacea* (FW)*
Cardinal, *Richmondena cardinalis* *
Rose-breasted Grosbeak, *Pheucticus ludovicianus* *
Indigo Bunting, *Passerina cyanea* (JR)*
Evening Grosbeak, *Hesperiphona vespertina* *
Purple Finch, *Carpodacus purpureus* *
House Finch, *Carpodacus mexicanus* *
Pine Siskin, *Spinus pinus* (FW)
American Goldfinch, *Spinus tristis* *
Red Crossbill, *Loxia curvirostra* (JR)*
White-winged Crossbill, *Loxia leucoptera* (JR)
Rufous-sided Towhee, *Pipilo erythrophthalmus* *
Dark-eyed (Slate-colored) Junco, *Junco hyemalis* *
Tree Sparrow, *Spizella arborea* *
Field Sparrow, *Spizella pusilla* *
Chipping Sparrow, *Spizella passerina* *
White-throated Sparrow, *Zonotrichia albicollis* *
Fox Sparrow, *Passerella iliaca* *
Swamp Sparrow, *Melospiza georgiana* *
Song Sparrow, *Melospiza melodia* *

American Woodcock, Philohela minor *

Ring-billed Gull, Larus delawarensis

American Bittern, Botaurus lentiginosus *

CHAPTER 5

CLIMATE

Dynamics

As is implicit in the previous chapters, climate is important in controlling the form of the surface of the earth (its physiography). The glaciers which overrode the region of which Englewood is a part, are adequate testimony to this fact. Had the climate of the region not changed, glaciers would not have traversed the area and the region would very likely not have its present form. Not only might it have been different physiographically, but it certainly would have been different pedologically (the soil makeup) and vegetationally.

Atmospheric Composition

The atmosphere over the city is composed of 78% nitrogen, 21% oxygen, and the remaining 1% is mostly argon, with some trace pollutants. In some cases there is as much as 5% water vapor depending on the relative humidity.

The atmosphere extends into space some 50 miles, though the bulk of the atmospheric blanket is in the lower 3½ miles. The weight of all this gas is measured as inches or millimeters of mercury, with the average pressure being 29.52 inches, or 760 mm (approximately one ton per square foot). We are not crushed because the pressure inside our bodies equals the pressure outside.

Solar Effects

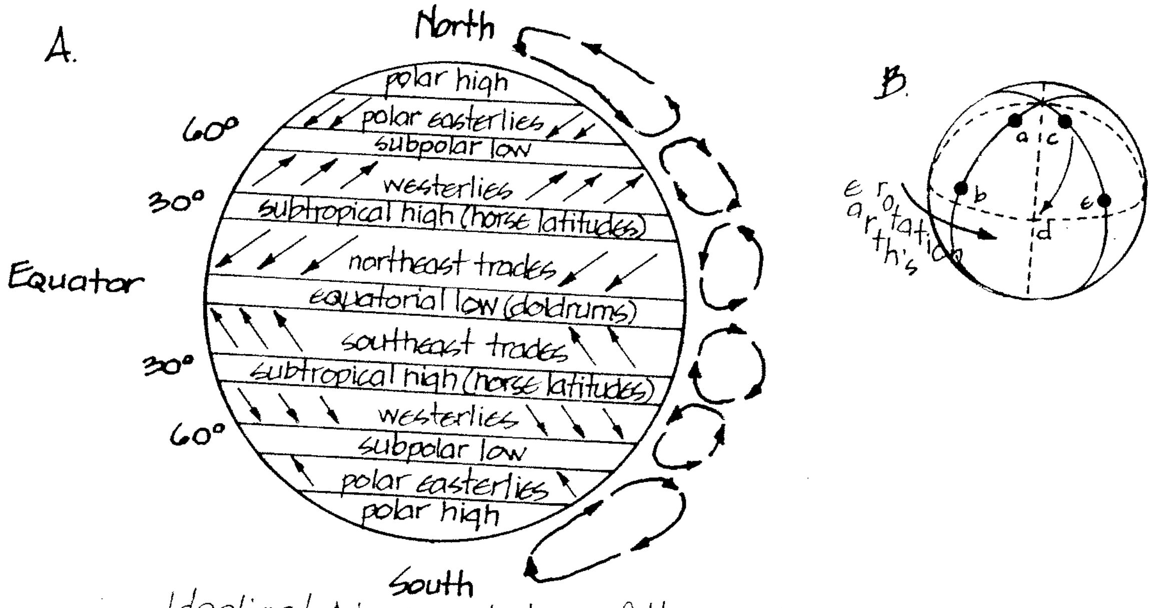
Solar heating of the earth's surface causes air near the surface to rise once heated, and having then risen, it cools and sinks back to the earth's surface again. When near the coast, this effect is modified by the differential heating and cooling of the land and water masses. During the day, the land warms faster than the sea and the winds move landward to displace the air rising over the land. At night, the opposite happens as the land cools faster than the water.

The differential heating and cooling of the earth's surface produces horizontal or meridional circulation in the form of cells (see fig. 5-1). These cells are analogous to those found in a pot of heated or boiling water. The water heated at the bottom rises to the top forcing colder water at the surface down to the bottom where it, in turn, is heated and rises to the top (2, p. 112). The cells at the equator and the poles are directly driven by this thermal machine, while those in between are indirectly driven by the polar and equatorial cells.

So far, the scheme is relatively straightforward, but is complicated by the fact that the earth rotates. The earth's rotation causes the deflection of these winds to the right in the northern hemisphere, and to the left in the southern hemisphere (see fig. 5-2). This phenomenon is called the Coriolis effect, which forces winds which would ordinarily flow from areas of high pressure to areas of low pressure, to flow around each other. In high pressure cells, the relative motion is clockwise, and in low pressure cells is counterclockwise (see fig. 5-3) (27, p. 216).

Low pressure cells, or cyclones, have winds rotating inward and upward, as well as counterclockwise; high pressure cells have winds rotating outward and downward, as well as clockwise (see fig. 5-3). Consequently, the climatic effects associated with these systems are repetitive and predictable. Low pressure cyclonic cells are so named for the lowering pressure towards the center of the cell as the warm, moist air spirals upward in the center of the cell. As the air rises, it also cools, and the water vapor contained in the air condenses, forming clouds and often rain. High pressure cells, on the other hand, do just the opposite- the air pressure increases toward the center of the cell, as cooler, denser air spirals downward absorbing water as it

fig. 5-1

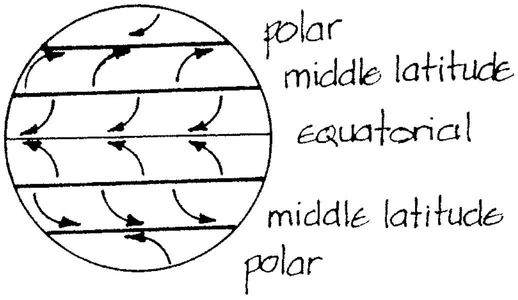


Idealized Air Circulation of the Globe

Fig. 5/1 Idealized air circulation on the globe. Warm air rises at the equatorial and subpolar lows (A); cold air decends at the polar and subtropical highs. In moving southward, the air masses (and ocean currents) tend to turn right in the northern hemisphere and left in the southern hemisphere - the so-called coriolis effect. (B) A mass of air moving south from a toward b has a component of force toward the east because of the earth's rotation. Let this force be represented by the distance of a - c, which equals b-d. But since point b has moved to position e, the air mass has therefore moved to position d - to the west. Likewise, an air mass moving north from b would move right, and masses in the southern hemisphere move left.

(HUNT, 1974)

fig. 5-2
Coriolis Effect



Generalized wind directions at the earth's surface. Winds from the west predominate in middle latitudes. (MacAlester, 1973).

fig. 5-3
Cyclones and Anticyclones

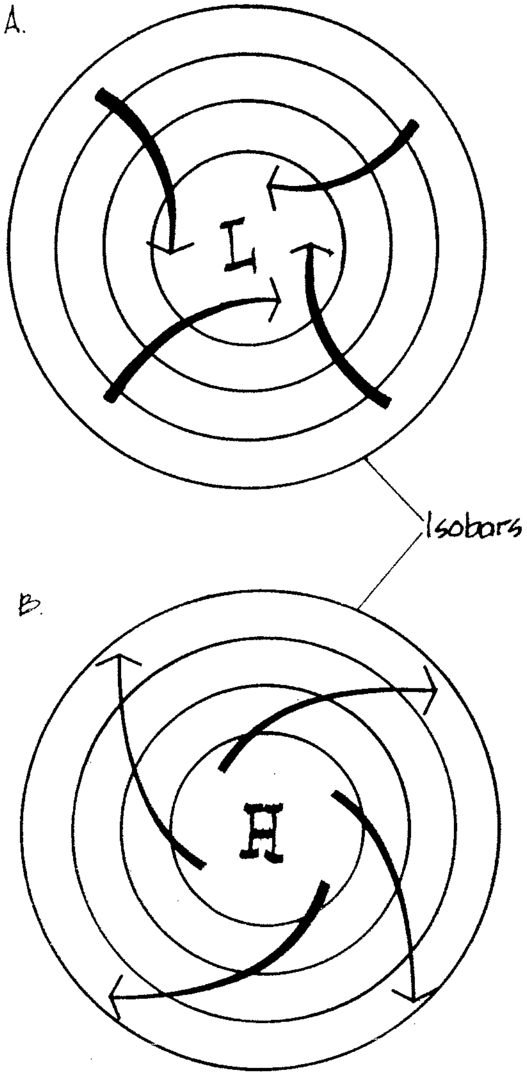


Fig. 1-2 Air motion in cyclones and anticyclones. The inward and upwardly spiraling air of cyclones (a) normally produces clouds and unsettled weather; the downward and outward air spiral of anticyclones (b) usually leads to clear, stable weather. (MacAlester, 1973)

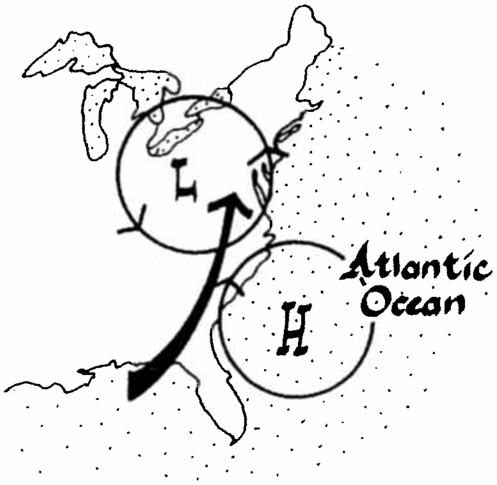
warms, producing relatively dry conditions.

The relative locations of these high and low pressure systems and frequency with which they are found in any one place, determine the type of weather conditions an area will experience over time. For instance, in the summer, the Englewood area comes under the influence of high pressure systems which predominate over the Atlantic Ocean, as well as low pressure cells which predominate over the North American continent. The relative positions of these two cells combine to bring warm, moist air up from the Caribbean (see fig. 5-4). In the winter, the cells are exactly opposite, bringing cold, dry air down from central Canada. Therefore, prevailing winds in the summer are from the southwest, and in the winter are from the northwest. The cause of the change of these high and low pressure cells has been attributed to the sinuosity of the mid-latitude westerlies, characterized by jet streams (see fig. 5-5) (27, p. 216).

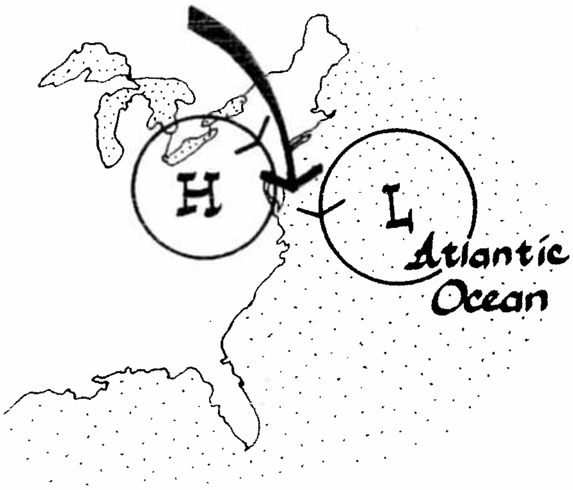
The climate of northern New Jersey has been characterized as continental (37, p. 55). While one might expect the region to be maritime, since it is so near the Atlantic Ocean, the prevailing westerly winds bring the continental climate to the area. Maritime climates are distinguished from continental climates by the extremes of temperature common to both climatic types. Maritime climates are modified substantially by the proximity to the oceans, which do not change temperature as readily as does the land surface. The result, in maritime climates, is that the water cools the air in the summer and warms it in the winter. Such is the case in San Francisco where the difference between the normal average January and July temperatures is about 20°F. By contrast, the difference between the normal average temperatures in Englewood is about 43°F (46, p. 138).

fig. 5-4

Idealized Summer and Winter Patterns

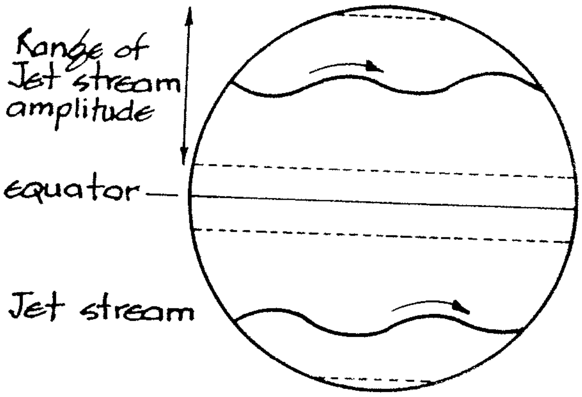


Idealized relative positions of summer high and low pressure cells. Tropical air is brought northward along the coast as prevailing winds are from the south.



Idealized relative positions of winter high and low pressure cells. Polar air is brought southward with prevailing north-westerly winds.

fig. 5-5
Jet Stream Amplitudes



High-velocity midlatitude westerlies, or jet streams are responsible for most of the changing weather of the earth's middle latitudes. Flowing west to east, the amplitude of the waves varies greatly, ranging from near zero to several thousand miles - the distance from Hudson Bay to Cuba.
(MacAlester, 1973)

Both radiation and advection fogs occur in Englewood. Radiation fog occurs when moist air is heated during the day by the Sun, and at night is cooled when the land surface cools. The air temperature is cooled below the saturation temperature and the water vapor condenses in the form of fog. Advection fog occurs when winds bring warm, moist air over cooler land or water surfaces, and the water vapor condenses when the air temperature drops below the saturation point.

The annual temperature in New Jersey averages about 52°F (37). Normal average winter temperature is about 30°F, and the normal summer temperature is about 71°F (46). The maximum normal temperature for January is 38°F and the minimum normal temperature is 20°F (46). The normal maximum temperature for July is 85°F, and the normal minimum for July is 68°F (46).

Rainfall for the region (in this case the county) averages 48.6 inches per year (3). Records over a 25-year period show an annual high of 5 inches of rainfall in the month of August and an annual low of 2.9 inches in January (3). Average snowfall over the same period was 28.8 inches, and "(t)he months of December, January, and February produce approximately 90% of the annual snowfall...In general, the snowfalls occur in small amounts and stay on the ground for extended periods. Snowstorms producing four inches or more of snow occur twice a year; however, one snowfall of 26 inches in 24 hours was recorded." (3, p. 14).

Meteorological data from Newark Airport in 1972 (Lat. 40° 42'N; Long. 74° 10'W; Elevation 7' above mean sea level), show relative humidities highest at 7:00 am, and lowest at 1:00 pm. The highest average was 71.8% in 1972, and the lowest average, 54% in the same year. The average wind speed from January to June was 11 mph., predominantly from the northwest; the average wind speed from July to December was 9.5 mph., predominantly from the southwest.

The terrain of the city has some effect on the weather in the vicinity. Winds from the west must rise as much as four hundred feet upon reaching the Palisades ridge. Ambient temperatures decrease approximately 3½ degrees per thousand feet of elevation increase;thus, all other things being equal, the temperature in the northeast section of the city should be 1.4^{o}F cooler than in the southwest corner of the city. Winds crossing this ridge are subject to the same decrease in temperature as they rise over it. This effect is called adiabatic cooling; (if the air were falling the converse is adiabatic warming). As previously mentioned, if air carrying water vapor is cooled past the saturation point, the water vapor condenses, and either clouds form or rain falls, or both. If measured, this effect would likely be evident on either side of the ridge. Rainfall should be greater both on, and to the east of, the ridge as a result of this phenomenon (27).

CHAPTER 6

ELEVATION AND TOPOGRAPHY

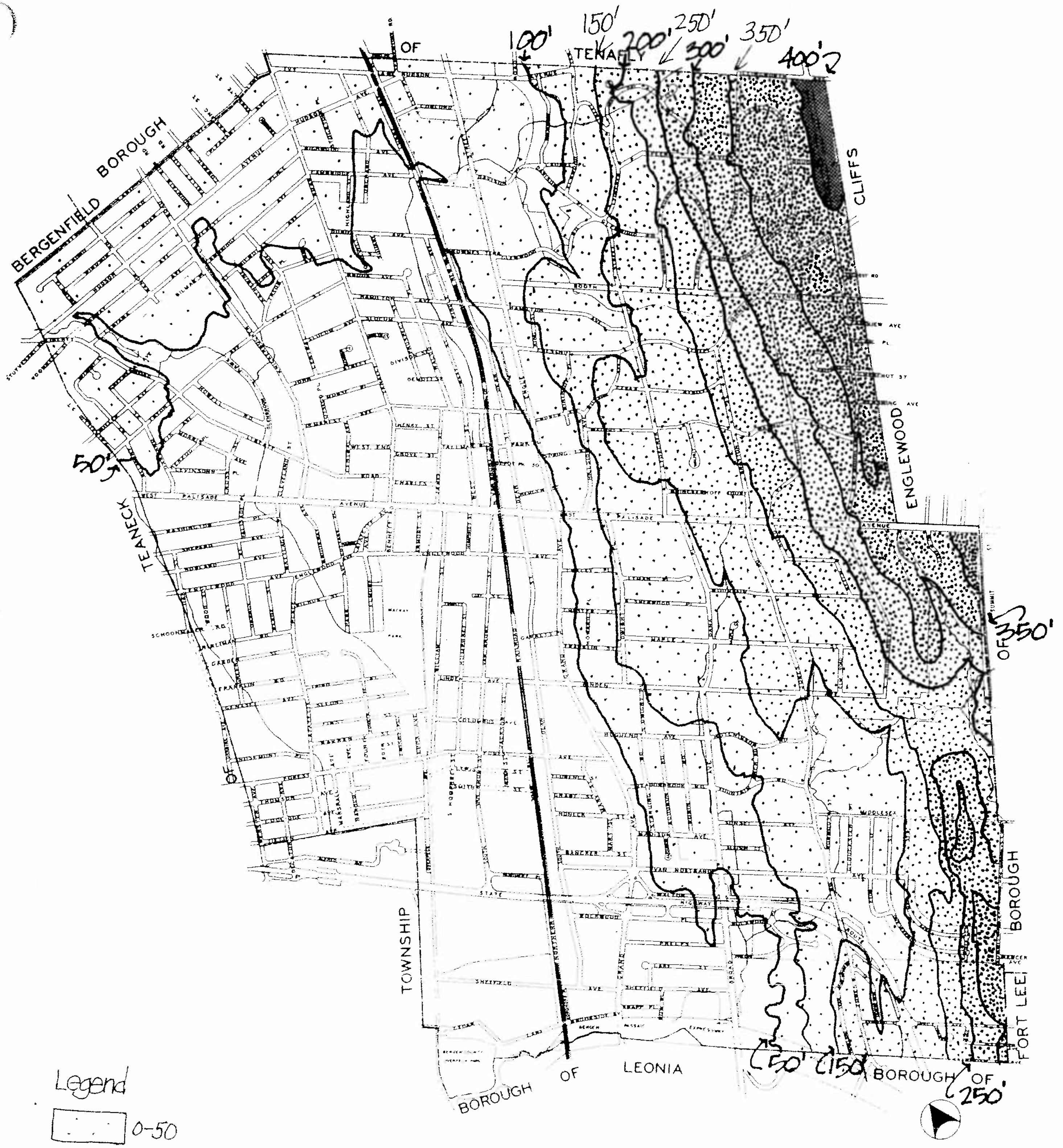
Englewood is built in the extreme northern portion of the Newark Basin where it contacts the Palisades Diabase Sill and the somewhat higher portions of the Triassic lowlands in their northern section. These three characteristics can be thought of as three physiographic regions each of which shows up on the Elevation Map (Map 6-1) and are interpretively shown on the Landforms Map (Map 6-2).

Physiographic Subregions

The two most obvious subregions are the diabase uplands and the lowlands of the stratified till. The lowlands, as mentioned in the Geology section, are a part of the Triassic lowlands between the Reading and Manhattan Prongs. Prior to the construction of the tide gates at the mouth of Overpeck Creek, the waters of the Creek backed up into Englewood as the tide rose in the Hackensack Meadowlands. The elevation in this area, technically once part of the Meadowlands, is all under fifty feet, and much of the southwestern quadrant (the fourth ward) is between five and twenty feet above mean sea level. The northeast and southeast quadrants (the first and second wards) on the other hand, constitute the other major physiographic feature, the Palisades uplands. These were created as the less resistant sandstones and shales of the Stockton and Brunswick Formations were eroded by fluvial and glacial action, leaving the more resistant diabase to protrude over four hundred feet above sea level in the far northeast corner of the city, and over three hundred in parts of the southeast section.

The third and least obvious of the provinces, is the upland section in the northeast and northwest quadrants (the first and third wards), whose elevation ranges from fifty to near 100 feet. For the most part, this subregion is situated on the till over the Brunswick Shale, but the eastern

Map 6-1



1975

ELEVATION

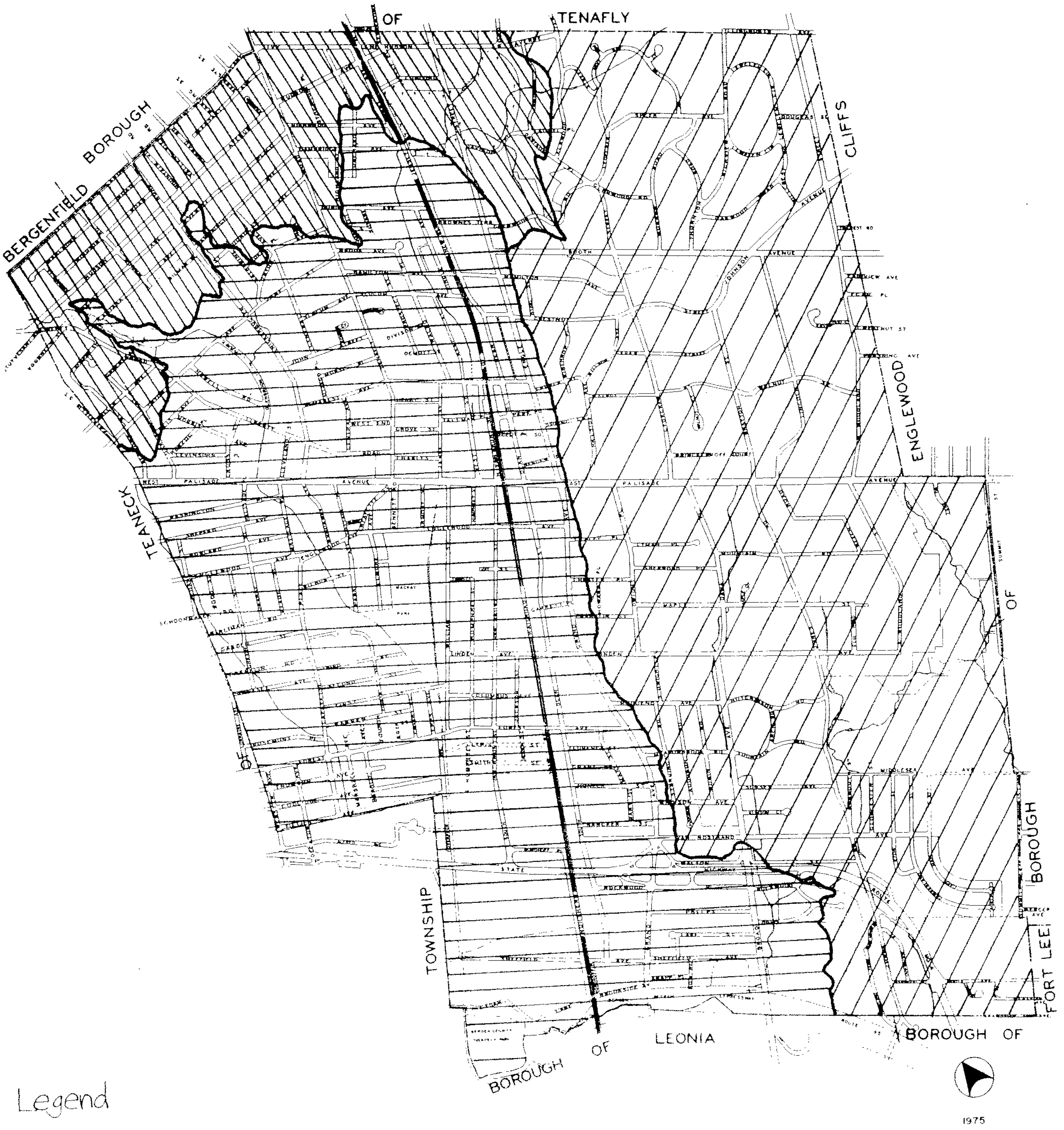
CITY OF ENGLEWOOD

Legend

- ☐ 0-50
- ▨ 50-100
- ▨ 100-200
- ▨ 200-300
- ▨ 300-400

SOURCE: U.S.G.S.

Map 6-2



Legend

▱ RIDGE

▤ LOWLAND

▧ UPLAND

LANDFORMS

CITY OF ENGLEWOOD

portion is on the Stockton sandstone and the western portion is off the till but still on the shale. Portions of the lowlands interfinger with the uplands here, delineating radial ridgelines with their hub at the center of the city.

Significant changes in local relief are evident only in the Diabase uplands, where the elevations range from fifty to over four hundred feet. Views that one might expect to accompany such changes in relief are obviated by the vegetation, which, though it is all second growth, is for the most part mature and for a semi-urban environment, relatively dense.

Slope

Slope categories for this study were defined as 0 - 3%, 3 - 8%, 8 - 15%, and over 15%. Fifteen percent is significant for the area, as it is at this point that engineering difficulties occur involving slope stabilization during construction activities.

For purposes of clarity, a slope of 100% is an angle of 45^0. The percentage of slope is expressed as the amount of rise over the "run" or the horizontal distance covered as one climbs a grade. For instance, if, in climbing a small hill one foot in height, you have gone forward ten feet, the slope of the hill is one over ten, or ten percent.

The steepest hills in the city are, for the most part, in the eastern half. The gentlest slopes are in the west. The steep slopes appear to follow two narrow bands; one paralleling Grand Avenue approximately to Booth Avenue where it bends northeastward, and joins the other. The other band begins in Allison Park running roughly parallel to the other, along Jones Road.

These slopes were gouged into the diabase by the advance and retreat of the glacier, and are an expression of the topographic phenomenon known locally as the "seven sisters", a series of stairstep hills on the west slope of the Palisades ridge, giving a roller-coaster effect which is most pronounced travelling up and down Palisade Avenue.

There are several other locations of slopes over 15% in both the east and west portions of the city. In the third ward, there are steep slopes on Hamilton Avenue, Dean Street between Demarest Avenue and Hamilton, and on Brown Terrace near the hospital.

CHAPTER 7

AIR QUALITY

Introduction

That there is some correlation between high levels of air pollutants and weather conditions, is probably evident to anyone who has spent time in urban areas. There has been some work done on this correlation, and some definitive conclusions have been reached, even to the point of being able to predict, to some degree, when periods of high pollutant concentrations will occur (11). Some general situations are definable for Englewood; however, the lack of data from the immediate area makes specific statements difficult. One definitive statement can be made which should surprise no one, which is that levels of suspended particulates in urban areas are significantly higher than in rural areas--on the average, ten times greater according to Landsberg (34) with corroberative studies by Horbath (34). Another is that the presence of pollutants is a function of wind speed. Further, the pollutant levels decrease an average of twenty percent on weekends due to less industrial activity. Wind direction may be another important factor, particularly in Englewood where there is considerable heavy industrial pollution not far south of the city.

The studies by Davis and Newstein, "...indicate that the general weather patterns associated with high air pollution levels in Philadelphia develop as follows. A continental polar high pressure center moves from central Canada across the Great Lakes and off the east coast. This high becomes stationary, or very slow moving, at or near the coast, and the Philadelphia area is influenced by very light winds between west and south for several days, with southwest flow heavily predominant. Wind speeds are generally less than eight miles per hour for periods of many hours." (11, p. 560). The data for this study were gathered and analysed in order that the principles and theories put forth in Davis and Newstein could be tested for their applicability to the City of Englewood.

Their work appeared to have particular significance to the city since the present authors felt that the heavy industry in and around the Newark region may contribute to the pollution problems to the north when the wind is out of the south. As it turned out, though not conclusively, the major pollution constituent appears to emanate from automobile exhausts. However, the data gathered does support the Davis and Newstein theory--that is, that high pollution levels are associated with the presence of polar continental highs and south to southwest winds.

Dynamics

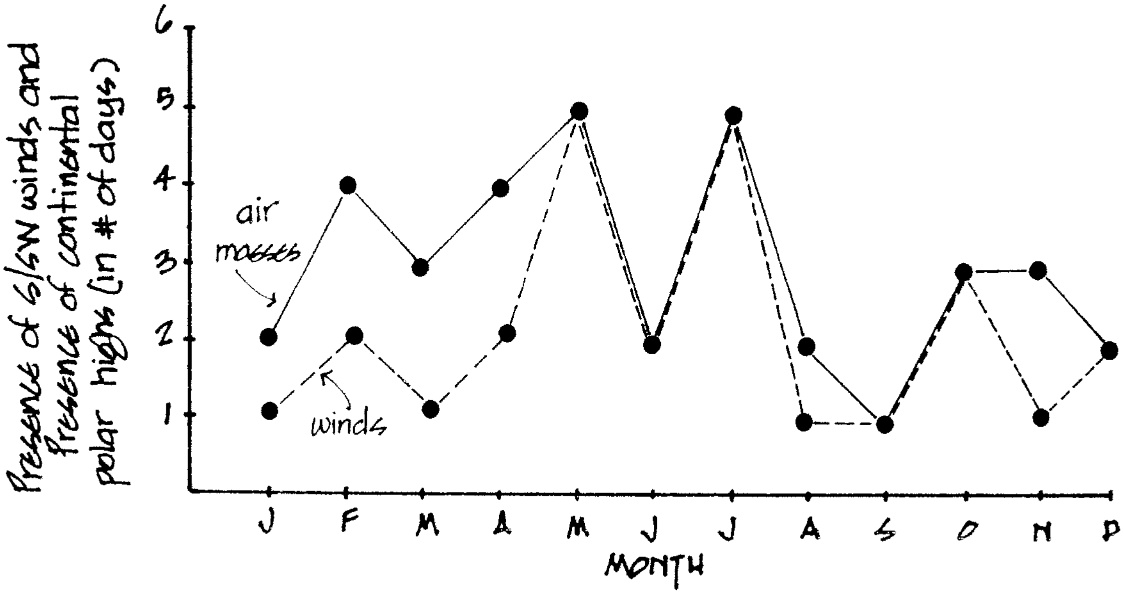
Davis and Newstein cite two episodes of high concentrations of suspended particulates in the Philadelphia area, one in 1966 and the other in 1967. The high pollution levels were present across the entire northeast and mideast coasts. The first episode involved a stagnant high pressure area centered over New York. Drifting eastward slowly after remaining stationary for a short time, the air mass covered the east from Maine to North Carolina. It then drifted slowly southward to Alabama and Georgia taking several more days. During the entire period, the winds averaged less than eight knots.

The second episode was similar to the first, where a continental polar high stagnated over New York for a short period, and drifted southward remaining stationary off the Carolina coast for five days. The wind speeds ranged from less than five knots to a high of eight knots for four days (see fig. 7-1).

Comparison data was gathered from the New Jersey State Bureau of Air Pollution Control, and from the Berry's Creek Draft Environmental Statement, (42) as well as from the daily weather map and accompanying data from the U.S. Weather Service. Figures 7-2a & b show the concentration of suspended particulates at Fort Lee, New Jersey--about one mile from Englewood. Concentrations are

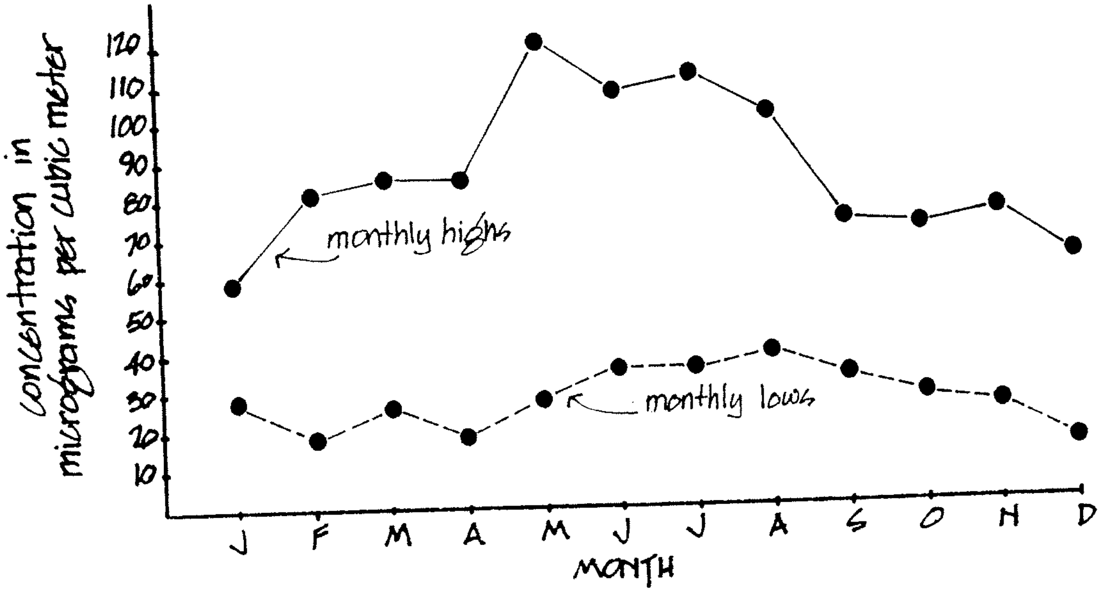
fig. 7-1

Frequency of Stagnated Highs Over Englewood Area



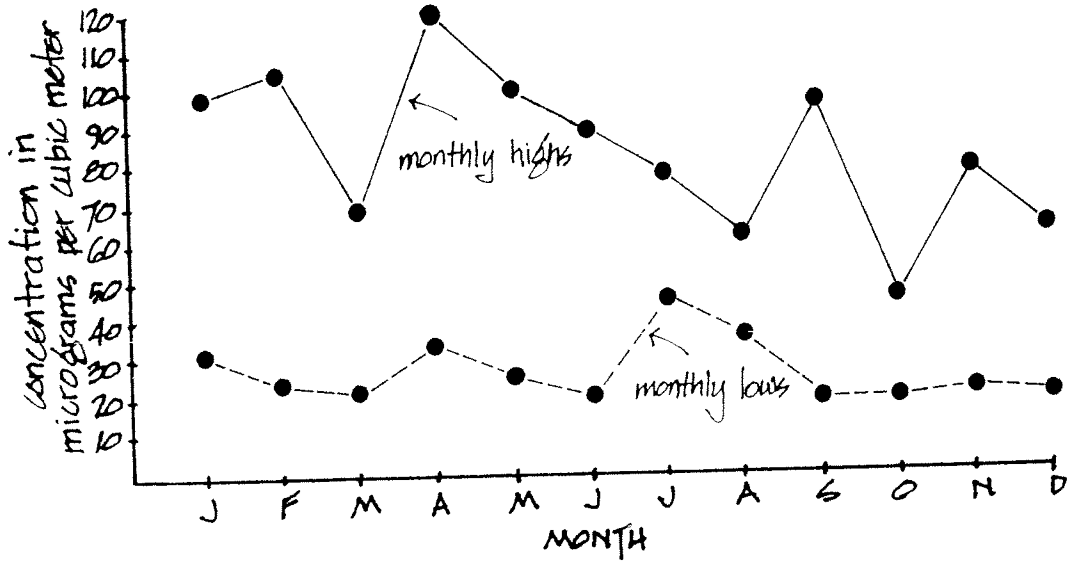
Presence of Continental Polar Highs with coincident South/Southwest Winds (in no. of days) by Month, 1972

fig. 7-2A Suspended Particulets Over Englewood Area



Suspended particulates at Fort Lee, N.J. during 1973.
(ugrams/m^3 of air)

fig. 7-2B



Suspended particulates at Fort Lee, N.J. during 1974.
(ugrams/m^3 of air)

expressed in micrograms per cubic meter of air. Monthly high concentrations are shown on the upper graph, and monthly low concentrations on the lower graph. Concentrations are noticeably higher in the summer months than in winter, both in the highs and lows. In 1973, the off-summer months' highs averaged 74.6 /ugrams/meter^3, while the summer months averaged 110.25/ugrams/meter^3. Less significant differences were recorded for 1974. The average for the highs during the summer months was 82.5/ ugrams/meter^3. Off-summer months averaged slightly higher at 83.8/ugrams/meter^3. However, without performing least-squares regression analysis, the general shapes of the curves are similar.

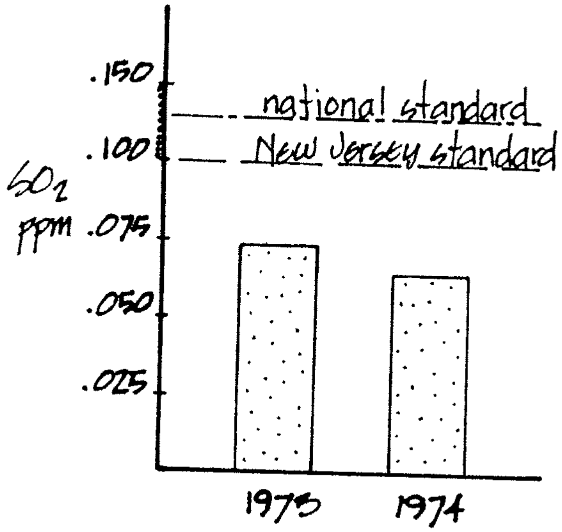
The next step in the anlysis was to calculate the number of continental polar high pressure systems occurring in each month of the only year for which we had complete data, 1972. The summer months averaged 3.5 per month, while the off-summer months averaged 2.75 per month. Coincidence of winds from the south to southwest was similar with summer averages of 3.25 and off-summer averages of 1.62.

The continental polar high pressure systems shown in the data were stalled off the northeast coast for periods of at least one and in some cases for more than one day. The winds associated with these air masses were all less than ten miles per hour in intensity. There are, therefore, strong indications that the method outlined by Davis and Newstein is operant in the northern New Jersey region. Periods of increased air pollution should, therefore, be to some extent predictable.

The extent to which the data were analyzed would indicate that there might indeed be some correlation between the climatological conditions and the incidence of high concentrations of air pollutants. Further, that the direction of the wind being predominantly from the southwest during the summer months might serve to aggravate the pollution from automobile exhausts by spreading industrial pollutants from the south.

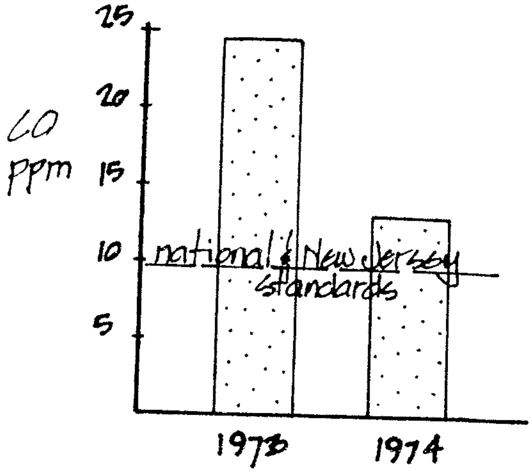
The nearest area for which specific pollution constituent data was available was in Hackensack, from compilations by the Environmental Protection Agency. Daily measurements were taken for carbon monoxide, and sulfur dioxide. Concentration of these pollutants in the Hackensack area can be seen in figures 8-3 and 8-4 with comparisons to the national and state standards. The sulfur dioxide concentration levels were well below the standards in both 1973 and 1974 (see fig. 7-3). However, the levels of concentration of carbon monoxide were two-and-a-half times the standard in 1973 and, while down considerably in 1974, still exceeded the standards by 50% (see fig. 7-4). The number of times per year the eight-hour average was exceeded in both years can be seen in figure 7-5.

fig. 7-3



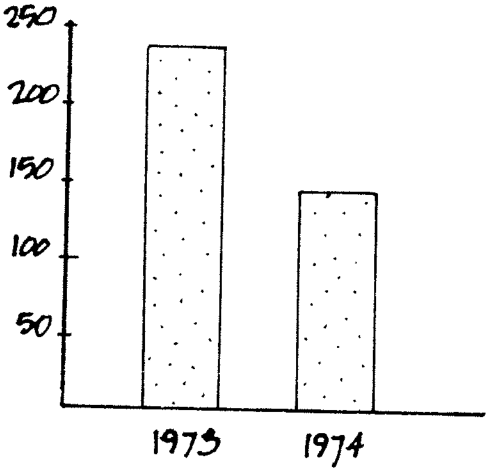
Sulfur dioxide concentration levels in Hackensack, N.J. (in ppm) Maximum 24 hr. average.

fig. 7-4



Carbon Monoxide Concentration levels in Hackensack, N.J. (in ppm) Maximum 8 hr. avg.

fig. 7-5



Number of times 8 hr. average was exceeded in 1973 and 1974. (For CO)

CHAPTER 8

SURFACE WATER QUALITY

Introduction

Data for surface water quality was not scientifically gathered but was scientifically analyzed, making the findings of this chapter indicative and not conclusive. The initial work was done by Michael Condon (9) (St. Peter's College, Bergen County) and the follow-up work by Condon and the authors.

The analysis of the water samples was done at the laboratory of the Hackensack Water Company in the cases of the follow-up work, and the original analysis was done by Condon.

The purpose of the work is not to draw final conclusions regarding the state of the surface water in the city, but rather to determine whether or not further analysis is needed and if so, why and where the problems might be.

Surface Water Quality

The water samples taken for use in this part of the study were taken from four locations; site one was Overpeck Creek near the dog pound, site three was Metzler's Brook near Dwight Morrow High School, site four was Overpeck Creek near Englewood Hospital, and site two was in Flat Rock Brook adjacent to Jones Road. Were the analysis to be done in order that definitive statements could be made concerning the quality of the streams in the city, the sampling procedure would have to have been considerably more involved. For our purposes it was enough to take four samples at each of four locations, with thirteen tests done on the four samples. The samples were analyzed for temperature, dissolved constituents, and microbiological content, as well as chemical properties such as pH and hardness.

The quantity of dissolved constituents shown in the data is expressed in parts per million (ppm). The metric equivalent is in grams per milliliter (g/ml) the conversion is direct; that is, ppm = 1 g/ml (if the density of the water used is 1 g/ml - if it is not, multiply ppm by the density).

The arrangement of the graphs is such as to show the flow of water from upstream (sites two, three and four) to downstream (site one), left to right. Presumably then, site one on the Overpeck should show the aggregate effects of the streams which empty into it (sites one and two), and the difference between Overpeck before the intersection of Flat Rock and Metzler's Brooks and the Overpeck after the intersection is shown between sites three and one.

The New Jersey Department of Environmental Protection (DEP) has classified the surface waters of the State into eight different categories. Englewood falls entirely within the FW-3 class, which the DEP defines as:

> Fresh surface waters suitable for the maintenance, migration, and propagation of the natural and established biota; and for primary contact recreation; industrial and agricultural water supply and any other reasonable uses. (32)

The pH for the streams was determined both on the sampling date in July and on the sampling date in April. Only one of the sites visited in April was the same as any of the ones sampled in July - site one. The water at site one was circumneutral (6.9) in April, and in July the pH had risen to 8.2, slightly basic. Water quality criteria from the state government specify the pH level for class FW-3 waters should be between 6.5 and 8.5. Site three slightly exceeded these limits in July with a level of 8.8. If this level was a natural stream condition, however, it meets the state criteria. Low pH water, water that is to some degree acidic, is corrosive. The graph for the July data is in fig. 8-1.

Nitrates, graphed in fig. 8-2, were sampled both in July and April. In April, site one stood at 6.8 and by July the level had fallen to 2.4. There are no specified tolerance levels for nitrates in the New Jersey codes, but they do specify that there be no deleterious substances in the water harmful to humans, biota, or the uses for which the area is designated. The range of nitrate concentrations in the July sampling were a low 9.22 at site four to a high of 2,8 at site three. According to <u>Standard Methods for the Examination of Water and Wastewater</u>, (1) nitrates are the most highly oxidized phase in the nitrogen cycle, and reach the highest concentrations in the last stages of biologic oxidation. "In excessive amounts they contribute to infant methemoglobinemia." There is therefore a limit of 45 mg/1 placed on nitrates in drinking water by the American Public Health Association.

Nitrites are an intermediate stage in the cycle, and "may occur in water as a result of the biological decomposition of proteinacious materials...and with other nitrogen forms, may indicate organic pollution" (1). The nitrite levels in the July sample (there were none done in April) ranged from zero at site four, to 0.05 ppm at site three. They were 0.0275 ppm at site one. According to <u>Standard Methods</u> .....(1), "nitrites are a corrosion inhibitor in some industrial process, and rarely exceed 9.1 mg/1 in drinking water." (see fig. 8-3).

Hardness, associated with the ability of water to produce soap suds, was likewise only measured in July. Hardness is a chemical characteristic of water representing the concentration of calcium and magnesium

fig. 8-1

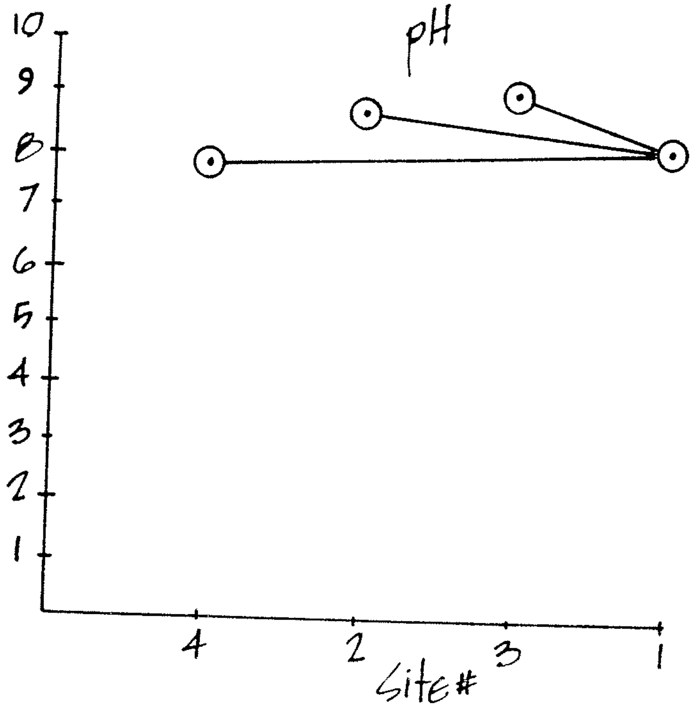

pH
10
9
8
7
6
5
4
3
2
1
4
2
3
1
Site #

fig. 8-2

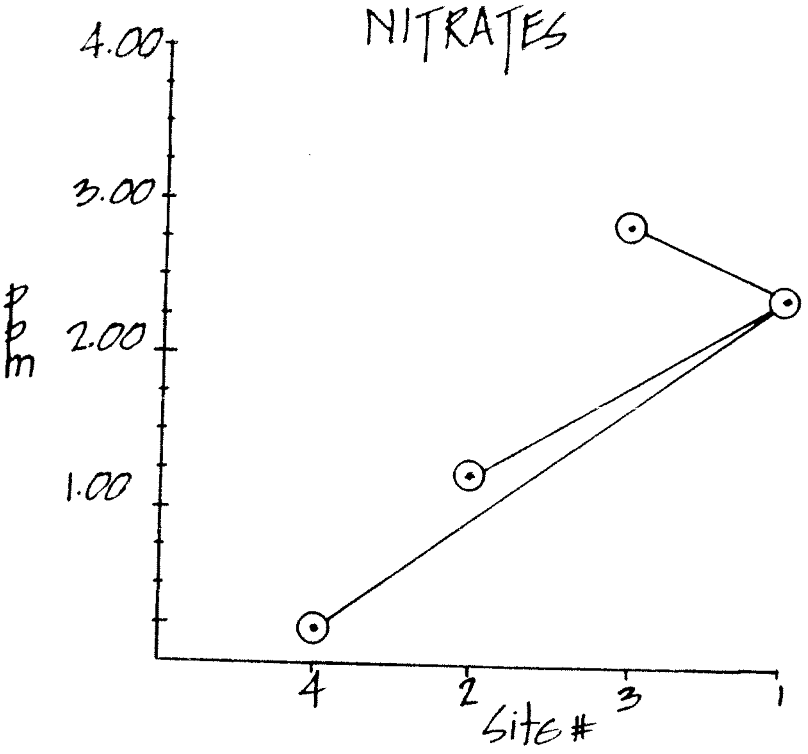
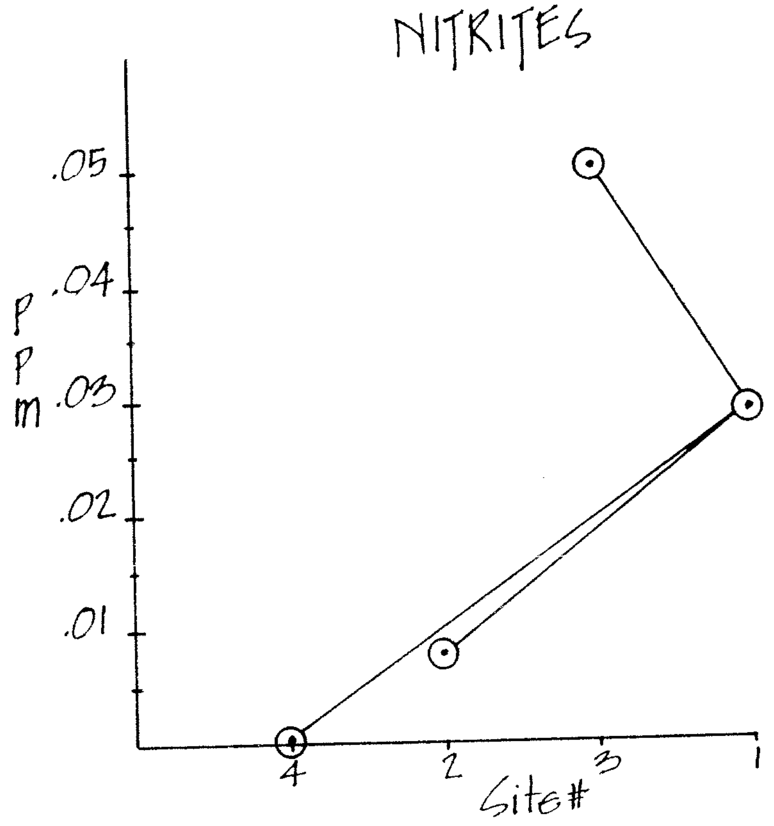

NITRATES
4.00
3.00
2.00
1.00
ppm
4
2
3
1
Site #

fig. 8-3



ions present in the water. The hardness range for the four sites went from a low of 108 ppm at site four, to 152 ppm at site one. Hardness criteria are not dealt with in the state FW-3 standards (see fig. 8-4).

"Phosphorus occurs in natural waters...almost solely in the form of phosphates. These forms are commonly classified into orthophosphates and condensed phosphates (pyro-, meta-, and poly-) as well as organically bound phosphates." (1). Phosphates are introduced into the stream system by domestic laundering wastewater, fertilizers from residential and agricultural applications, and treatment. According to Standard Methods... phosphorus is essential to the growth of organisms, and the amount of phosphorus present in the water body can limit the amount of biota which the water can support. The phosphorus is found primarily in sediments and sludges in the stream beds. Orthophosphate levels in the four sites ranged from a low of 0.137 at site two, to a high of 0.30 at site one (see fig. 8-5).

Polyphosphates ranged from a low of zero at site three, to a high of 0.22 at site four (see fig. 8-6).

The iron content of the streams ranged from a low of 0.12 at site four to a high of 1.31 at site one. The other sites, two and three, had 0.29 and 0.31 respectively. The iron content of tap water, as opposed to stream water is important because of the stains it can put in laundry and porcelain and the astringent taste if the water is used for drinking (if the levels are above 1 or 2 mg/1). Iron is sometimes visible in natural water when it hydrolizes, becoming insoluble hydrated ferric oxide. This is the thin, oily-looking film sometimes seen on top of the water. State criteria for iron content of surface waters in Englewood says that there shall be none "...in such concentrations as to affect

fig. 8-4

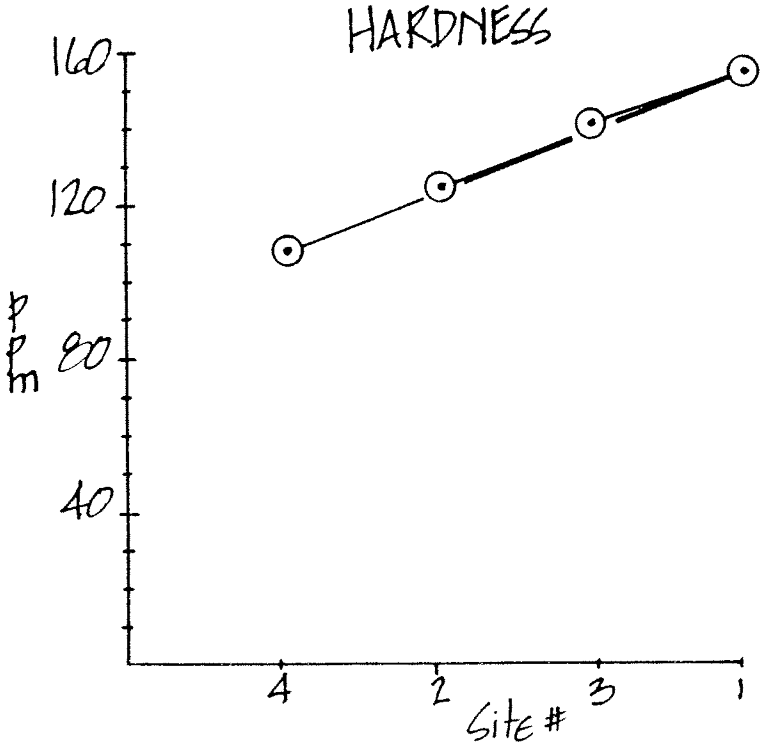

HARDNESS
160
120
80
40
ppm
4
2
3
1
Site #

fig. 8-5

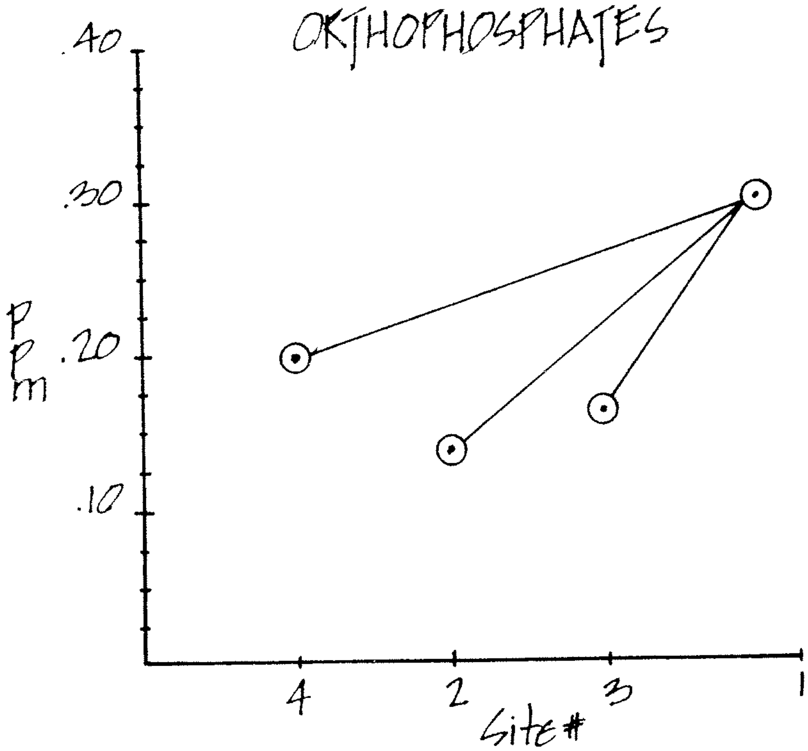
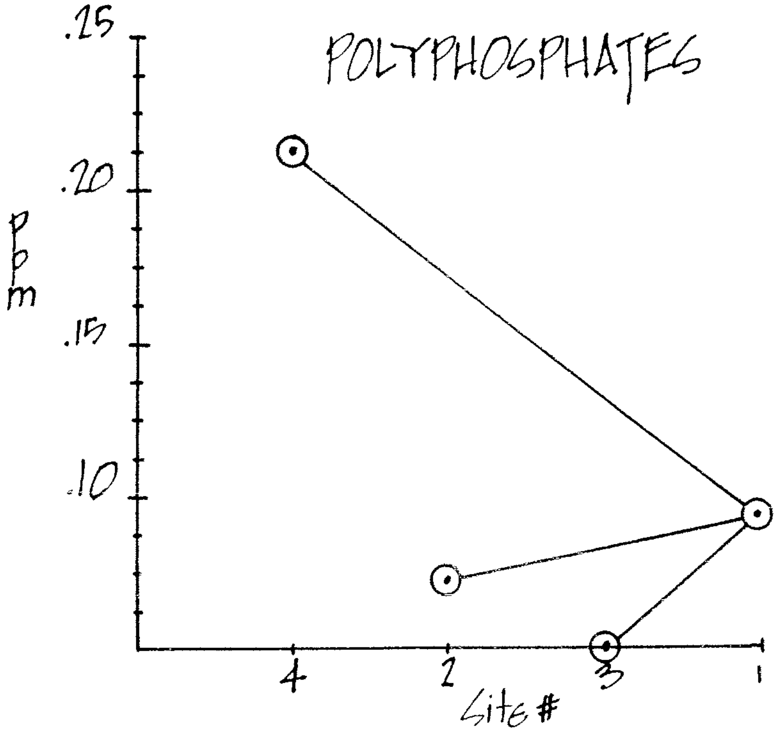

ORTHOPHOSPHATES
.40
.30
.20
.10
ppm
4
2
3
1
Site #

fig. 8-6



humans or be detrimental to the natural aquatic biota...or render the waters unsuitable for the designated purposes."

(32, p. 12) (see fig. 8-7).

The same regulation applies to manganese, which in the city surface waters ranges from a low of 0.0005 ppm in the water at site four, to a high of 0.212 at site one. Both iron and manganese content increase dramatically from site four in the upper end of the city, to site one at the lower end, indicating that passage through the city is significantly increasing heavy metal content of the stream water (see fig. 8-8).

Color in natural waters could be due to the presence of metallic ions, vegetational detritus such as humus and peat, natural biota, or wastes from agriculture or industry. It is directly related to pH, and the color of water will deepen as pH increases. The color of the four locations in the city ranges from a low of eighteen color units at site four, to fifty at site three. This increase corresponds to the changes in pH from sites four and three to site one, but not from site two to site one. Here the color increases but the pH falls. The state criteria for color are essentially the same as those for heavy metals- that "there should be none noticeable in the water...in quantities detrimental to the natural biota...which would render the water unsuitable for the designated uses." (see fig. 8-9).

The alkalinity of the streams (see fig. 8-10) ranges from a low of 72 ppm at site four, to a high of 112 at sites one and three.

MPN is a test for content of coliform bacteria, and was done in April and July. The measurements are in number of organisms per 100 milliliters. In April site one was 75/100 ml, and in July, the same site showed slightly over 6/100 ml. Sites three and four showed 24/100 ml each. The state standards for class FW-3 waters are such that "Fecal coliform levels shall not exceed a geometric average

fig. 8-7

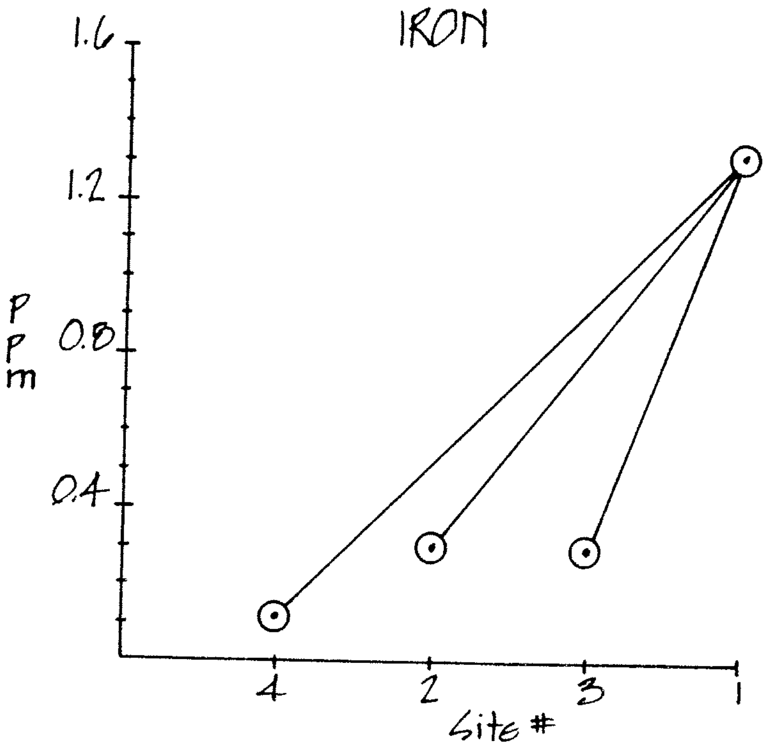

IRON
1.6
1.2
0.8
0.4
ppm
4
2
3
1
Site #

fig. 8-8

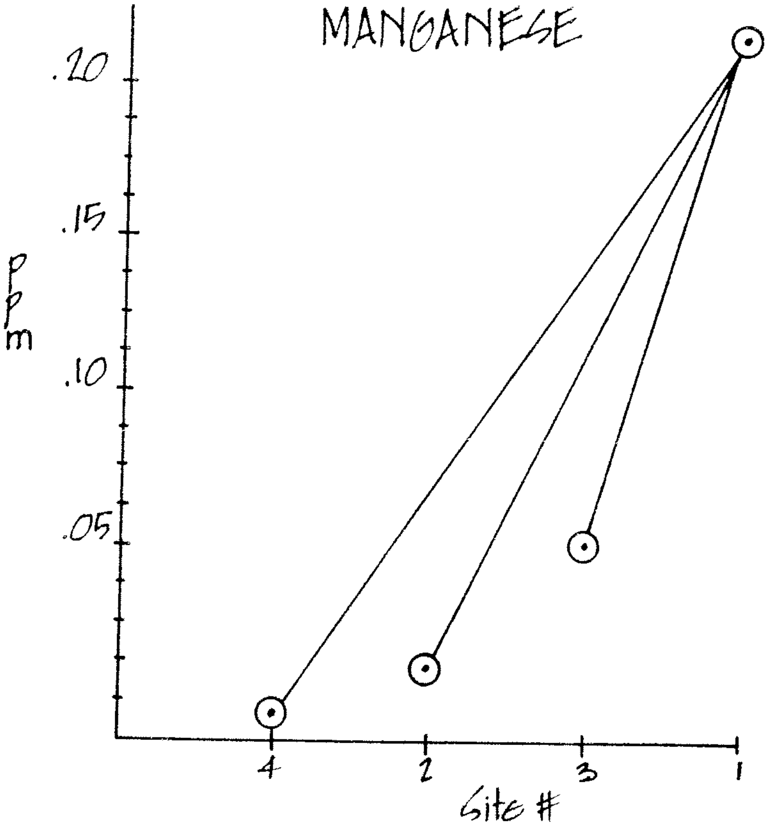

MANGANESE
.20
.15
.10
.05
ppm
4
2
3
1
Site #

fig. 8-9

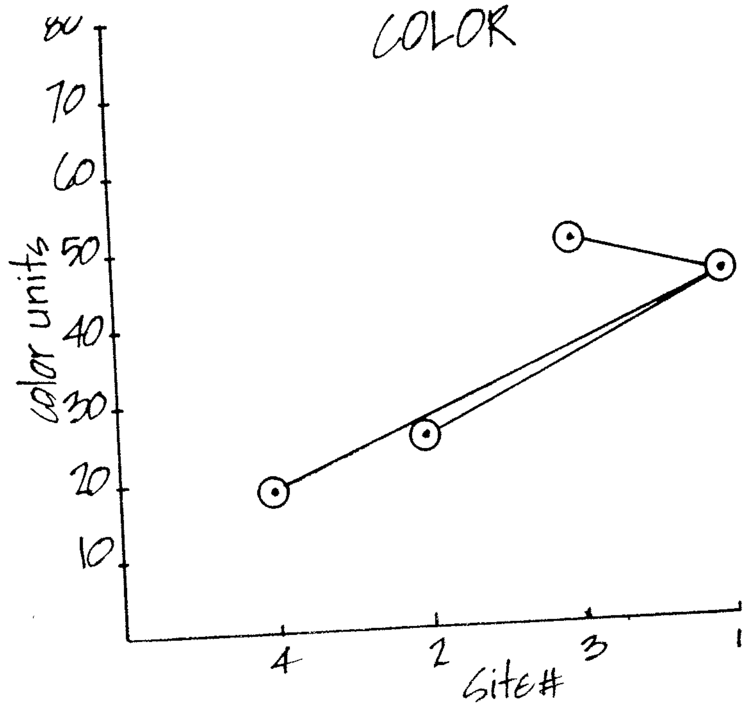
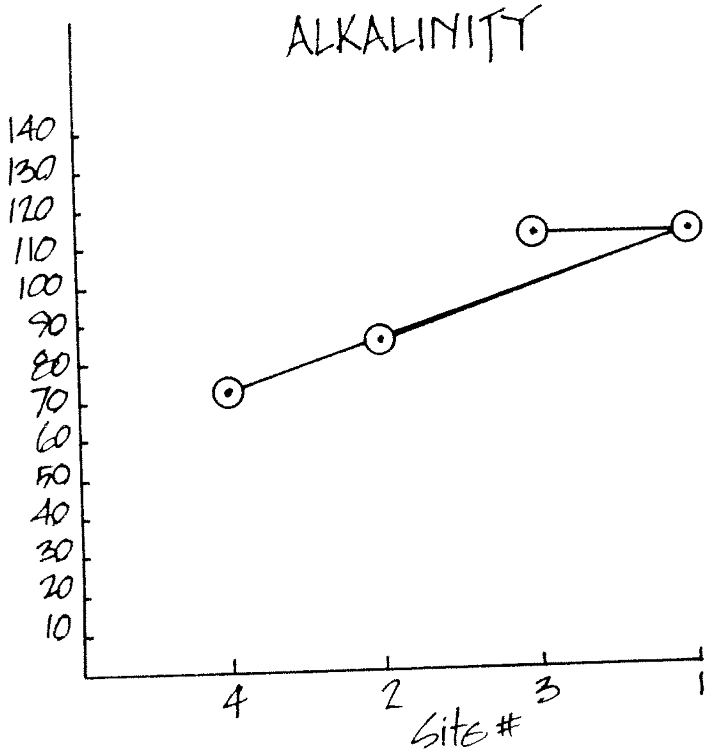


fig. 8-10



of 200/100 ml." Indications are that the city's streams are well below the maximum (see fig. 8-11).

Chlorides are a major anion in surface waters and sewage, and according to Standard Methods..., "Some waters containing as few as 250 mg/1 may have a detectable salty taste." (1). Problems attendant upon water with a high salt content are: increased rate of oxidation of metallic pipes and structures, and harmful effects to plants (reverse osmosis). Chloride levels for the city's streams appear to be average--the low, 21 ppm at site three, and the high, 48 ppm at site one (see fig. 8-12).

Synthetic detergents which pollute streams are evidenced by froth in the turbulent areas. Biodegradable detergents, called linear alkylate sulfonates have replaced alkyl benzene sulfonates which were in predominant use before the mid-1960's. This test (see fig. 8-13) indicates the presence of linear alkylate sulfonates, and ranges from zero at sites three and four to 0.03 at sites one and two. In April, the level at site one was 0.29. The levels appear to be low.

Nitrites and phosphates appear a bit high, and pH might indicate the presence of some algae in the water. Hardness is moderate, and all other parameters appear low to normal. (Barry Schwartz, of the Hackensack Water Company, personal comm. Oct. 8, 1975).

fig. 8-11

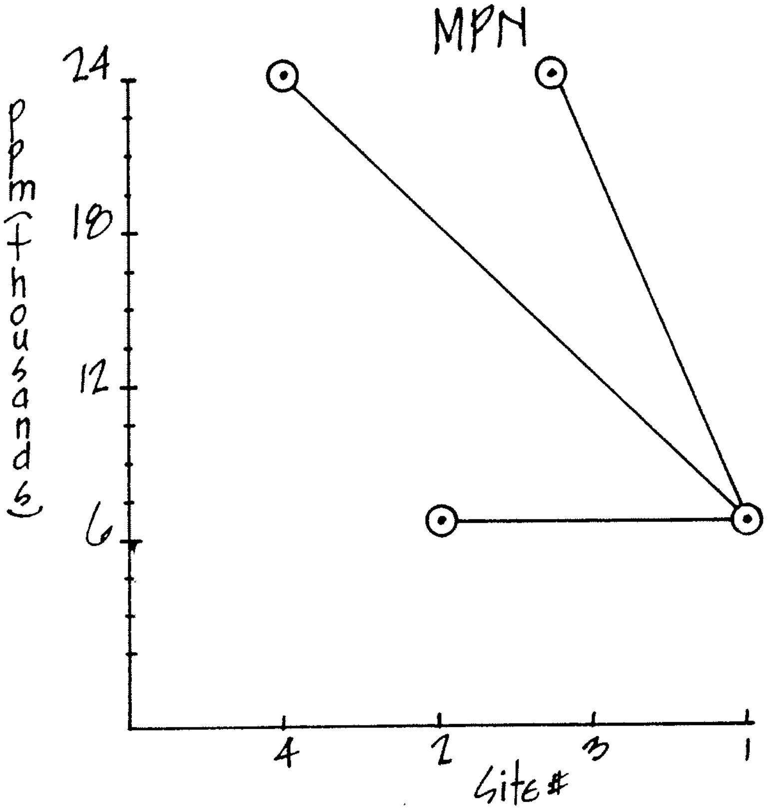


fig. 8-12

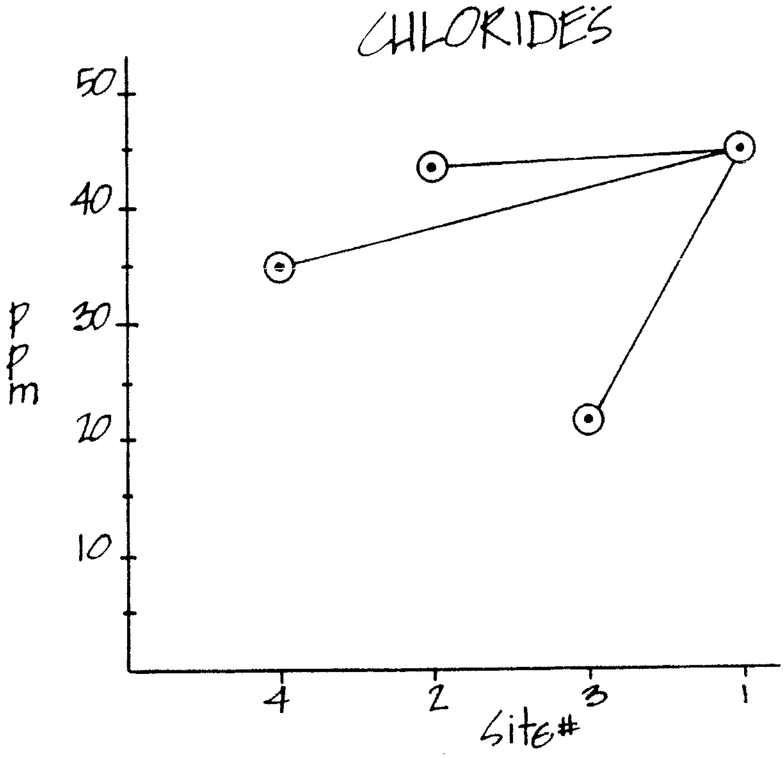
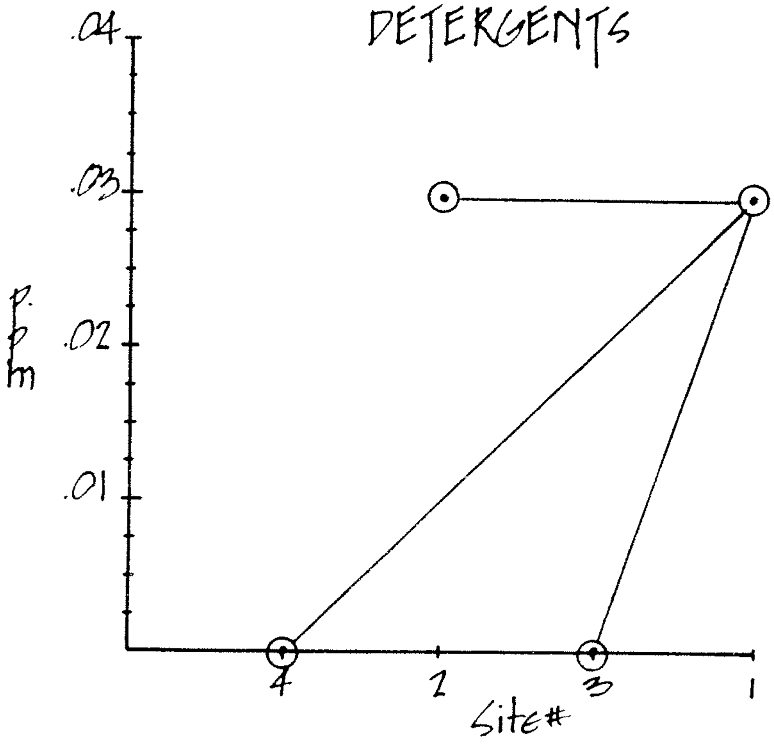


fig. 8-13



CHAPTER 9

NOISE

The importance of the noise environment in Englewood, as well as elsewhere, is underlined by the increasing amount of complaints received by health officials relating to instances of local noise problems. Furthermore, the Clean Air Amendments of 1970 established the Office of Noise Abatement in the Environmental Protection Agency showing governmental interest in the research and legislation of noise levels.

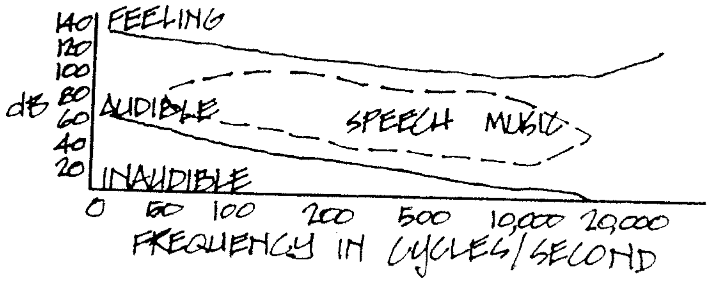
An understanding of noise as a phenomenon is needed to interpret the conflicting data and sources of noise levels. The common expression for the magnitude of level of noise is the decibel. The human ear does not respond directly to energy, but instead to sound pressure, and the limits of the human ear in acoustical energy terms is between 2 and 20,000 hertz (HZ).[1] "Using the smallest sound pressure that normal ears can hear, 0.00002 microbars, decibel levels were developed with this level being the reference level of 1.0 decibel. Because the ear does not respond to all frequencies equally, scales were devised to relate to the different sensitivity levels. To obtain a basis to measure the middle frequencies which the human ear best responds to, a weighted scale was developed reducing the effects of low and high frequencies. The sound level is said to be A-weighted. Thus, most common measurements of noise are done in units of A-weighted decibels (dBA) when concerned with the effects on people". (see fig. 9-1)

Ambient sound is the background level or accumulation of all the natural and man-made sounds. It changes with different atmospheric conditions, topography, land use and point-source activity. Table 9-2 gives some idea of the various activities which contribute to the urban noise environment. The effect these sources have on humans is dependent on the path the noise takes, as well as on the receiver who hears it.

1. Hertz - a measure of frequency of a radio wave where $V = \frac{1}{T}$. V = the number of ocillations per unit of time. T = the period of harmonic motion. (16a, p. 224).

fig 9-1

Sound Frequencies



(ROBINETTE, 1972) (37a)

TABLE 9-2

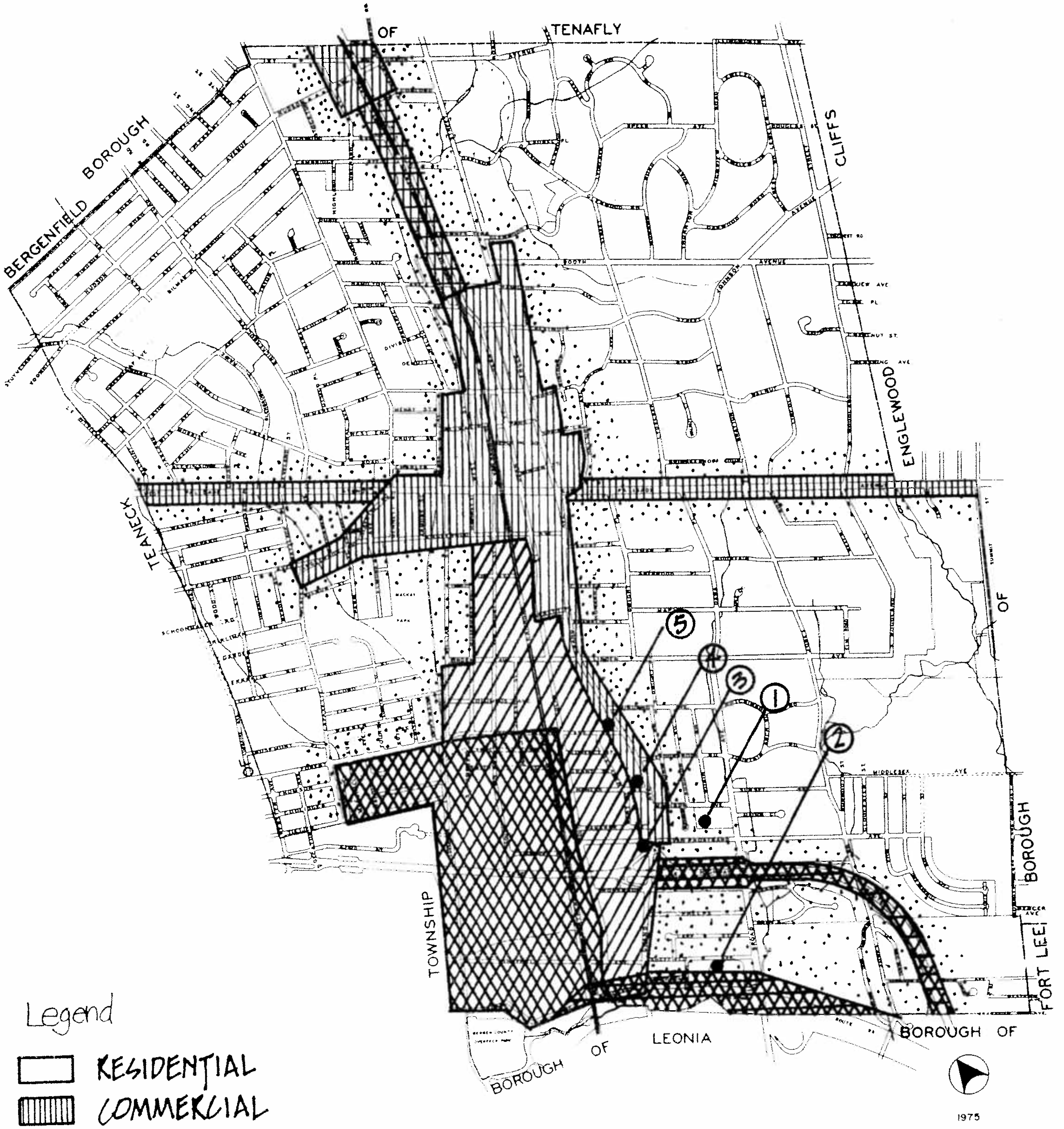
SOURCES OF DIFFERENTIAL POLLUTION (NOISE)

Industrial	Noise Levels dBA
blowers	80
pneumatic chippers	122
oxygen torch	126
textile loom	122
bench lathe	95
milling machine	90
Construction	
compacters	75
front loaders	85
backhoes	93
tractors	95
graders	93
pavers	88
generators	82
pneumatic wrenches	89
trucks	93
concrete mixers	88
cranes	88
jack hammers	98
impact pile drivers	106
pavement breakers	115
Vehicles (Mobile)	
sports car	90
standard car	73-80
medium trucks	88
motorcycles	88-95
utility, maintenance vehicles	88
highway buses	86
city and school buses	85
light trucks	86
freight and passenger trains	94
rapid transit	86
trolley cars	68-80
subway trains	100
Domestic Sources	
alarm clock	85
clothes washer	82
vacuum	72
toilet flush	65
food blender	100
lawn mower	90

In order to establish a methodology for measuring the existence of a noise occurrence, as well as setting up design recommendations, the authors accompanied a representative of the Englewood Health Department to a series of locations (see Map 9-3, Ambient Noise Quality) in order to gather data relating to the noise quality of the area. This data was collected on June 16, 1975 at approximately 3:00 pm, using a Columbia Sound Level Meter. (class 2, model SPL 204). The area around Grand - Van Nostrand Aves., was chosen because of the increasing number of complaints received from the residents of that neighborhood and the great mix of land uses, some conflicting, represented by different groups and interests (see figs. 9-4, 4a, b, c, d, e).

In our analysis, the comparison of different environments in different areas of the city calls for the differentiation of noise levels for different types of land uses, as well as a breakdown of noise sources (see Tables 9-5, 6). It should be noted that middle- and low-income respondents to the Environmental Questionnaire rate Englewood's noise quality as bad (see Chapter 13, THE QUESTIONNAIRE) and, therefore, the authors recommend that the City take measures to reduce noise levels as much as possible. For criteria and suggested means, see figs. 9-7,8,9,10.

Map 9-3



Legend

☐ RESIDENTIAL

▥ COMMERCIAL

▨ LIGHT INDUSTRIAL (I-A)

▩ LIGHT INDUSTRIAL (I-B)

▩ LIMITED-ACCESS HIGHWAY

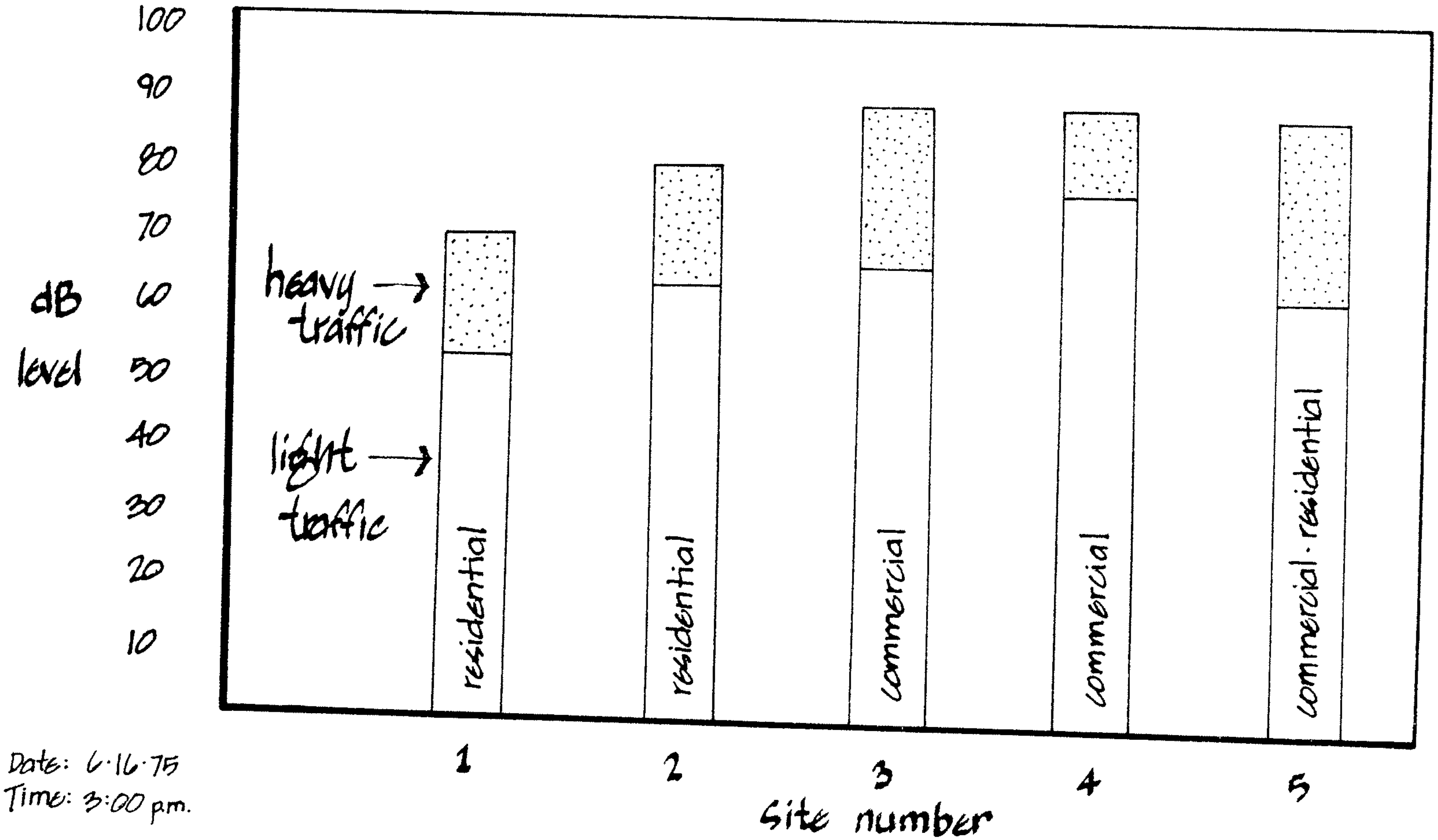
② NOISE MEASUREMENT SITES

NOISE

CITY OF ENGLEWOOD

fig. 9-4

AREA·SPECIFIC SOUND PRESSURE LEVELS



Date: 6·16·75
Time: 3:00 p.m.

fig. 9-4A

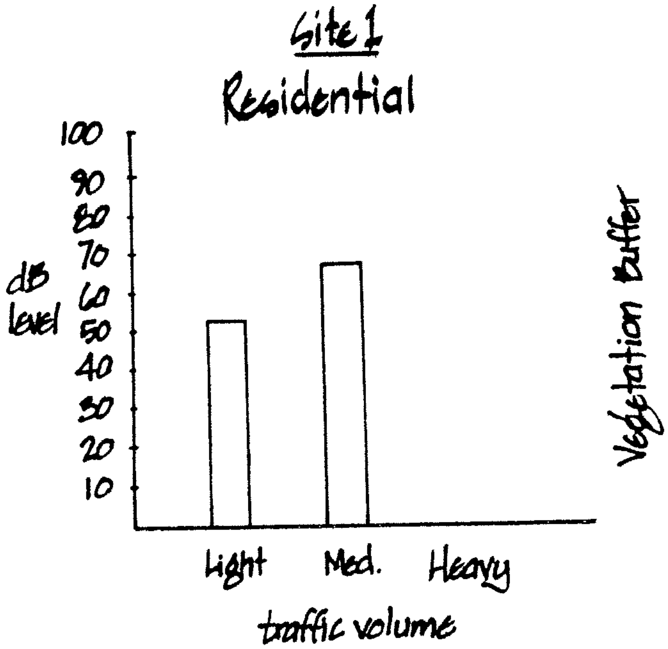


fig. 9-4B

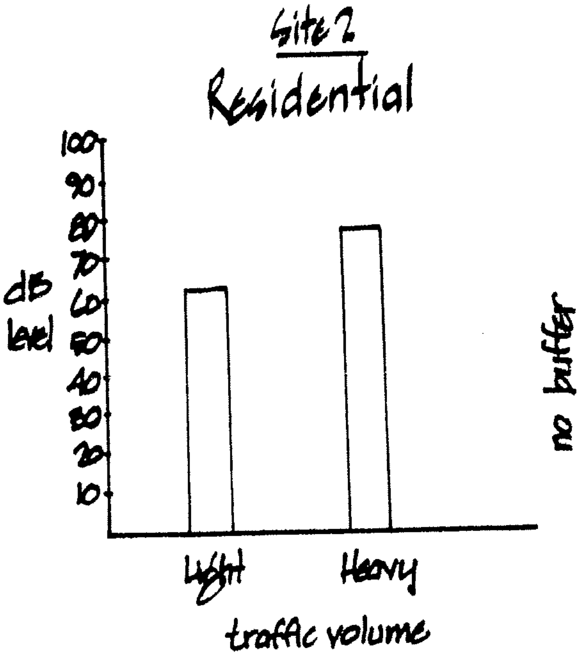


fig 9-4C

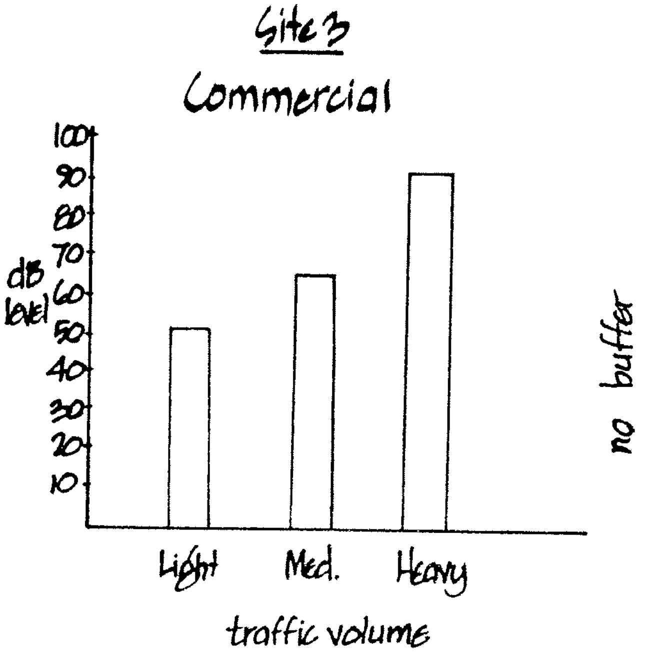
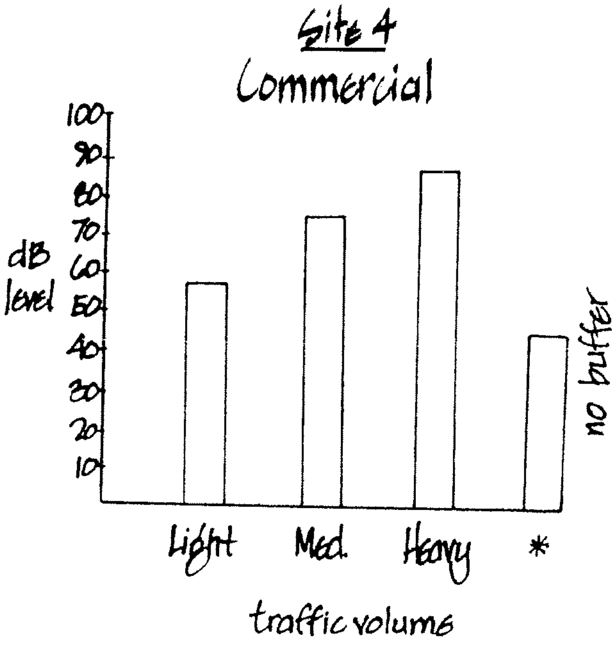


fig 9-4D



* see text

fig 9-4E

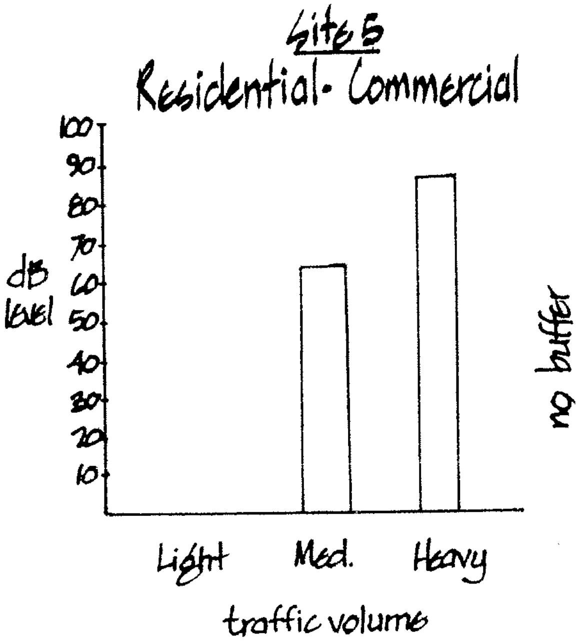

Site 5
Residential- Commercial
100
90
80
70
60
50
40
30
20
10
dB level
no buffer
Light
Med.
Heavy
traffic volume

TABLE 9-5

AVERAGE NOISE LEVELS

Factors influencing noise levels:

- activity
- intensity
- quantity per unit time

Types of communities

	dBA Daytime	dBA Nighttime
City	73.0	65.5
Detached housing/Suburban	50.9	44.2
Wilderness and Rural areas	16 - 35	
Central city	56 - 75	

TABLE 9-6

A listing of the concentration and combination of noises sources includes the following:

Central City
- residential
- commercial
- industrial
- traffic
- construction

TABLE 9-7

NOISE MONITORING RECOMMENDATIONS

Data Acquisition

1. Designation of sound measurement scale.
2. Designation of legal limits.
3. Designation of time frame within which certain activities can occur. (See fig. 9-8)
4. Relation of legal limits to point source. (Land use and human activity). (See fig. 9-9)
5. The relation of buffer zones to the legal limits and particular land uses. (See fig. 9-10)

Spatial Representation

1. Designation of land use activities within the City. This includes: zoning, traffic patterns.
2. Enumeration of City's legal powers concerning the regulation of those particular land uses.
3. Designation of those land uses within the City whose activities include the necessity of noise to function.
4. Designation of those groups residing in the activity areas in which high noise levels can be expected.

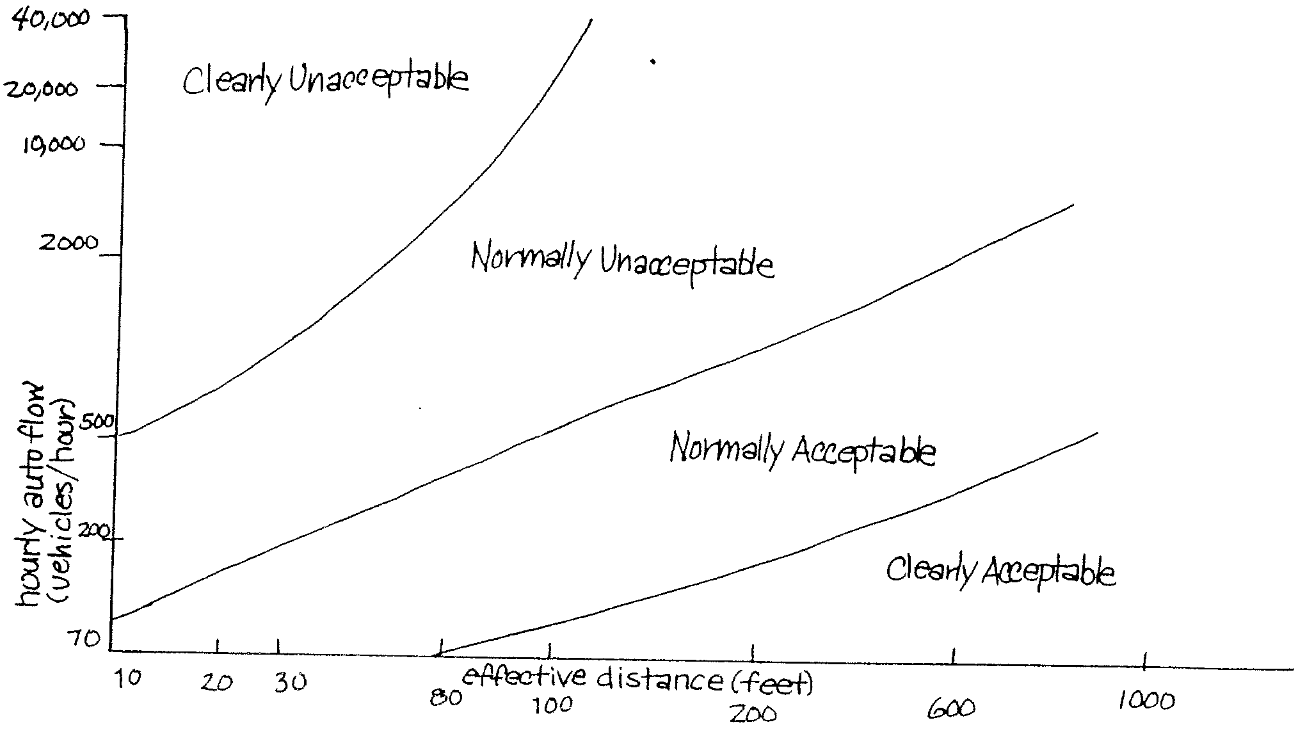


fig. 9-8

Acceptability Criteria for Sites Near Major Roadways (Automobile Traffic)

> "To establish the effect of noise from traffic on residences located at a distance of 100 ft. from the roadway, the chart...was used. The chart provides guidelines for assessing the acceptability of a site for residential use. It shows four levels of acceptability based on automobile noise (at a speed of 60 mph). These levels are Clearly Acceptable (CA), Normally Acceptable (NA), Clearly Unacceptable (CU), Normally Unacceptable (NU)...The 100-ft. distance was chosen because this is the closest that residential buildings may be located to a roadway in this area...Fifty-five miles per hour was chosen as the speed at which the prediction of noise level would be made. This is because most of the roads in the area can handle design volumes of traffic at this speed (and higher), and the legal maximum speed is 55 miles per hour.

(42, p. 76)

fig. 9-9

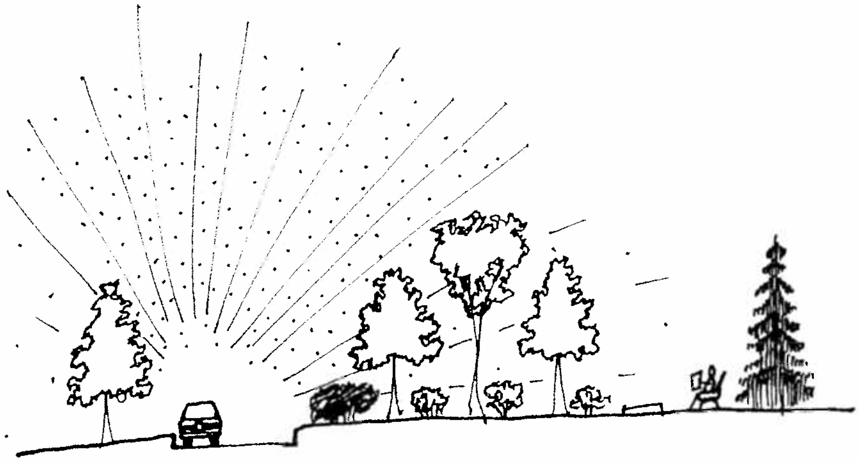
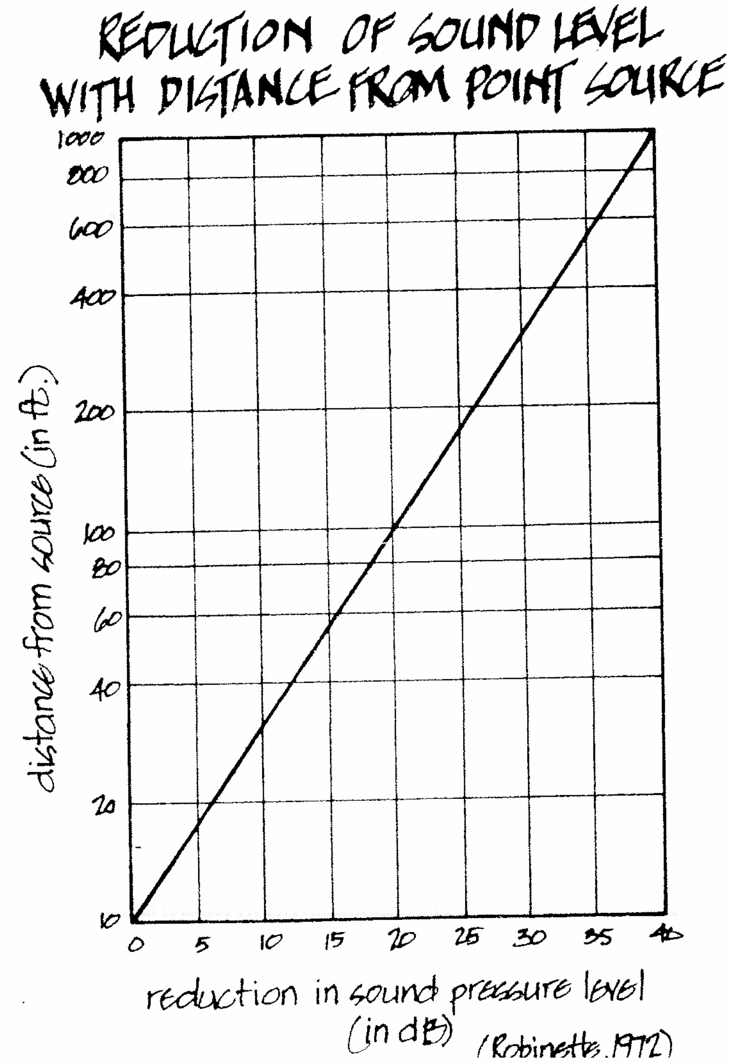


Fig. Noise suppression potential of vegetation along a roadside. (Robinette, 1972)

fig. 9-10



REDUCTION OF SOUND LEVEL WITH DISTANCE FROM POINT SOURCE

(Robinette, 1972)

CHAPTER 10

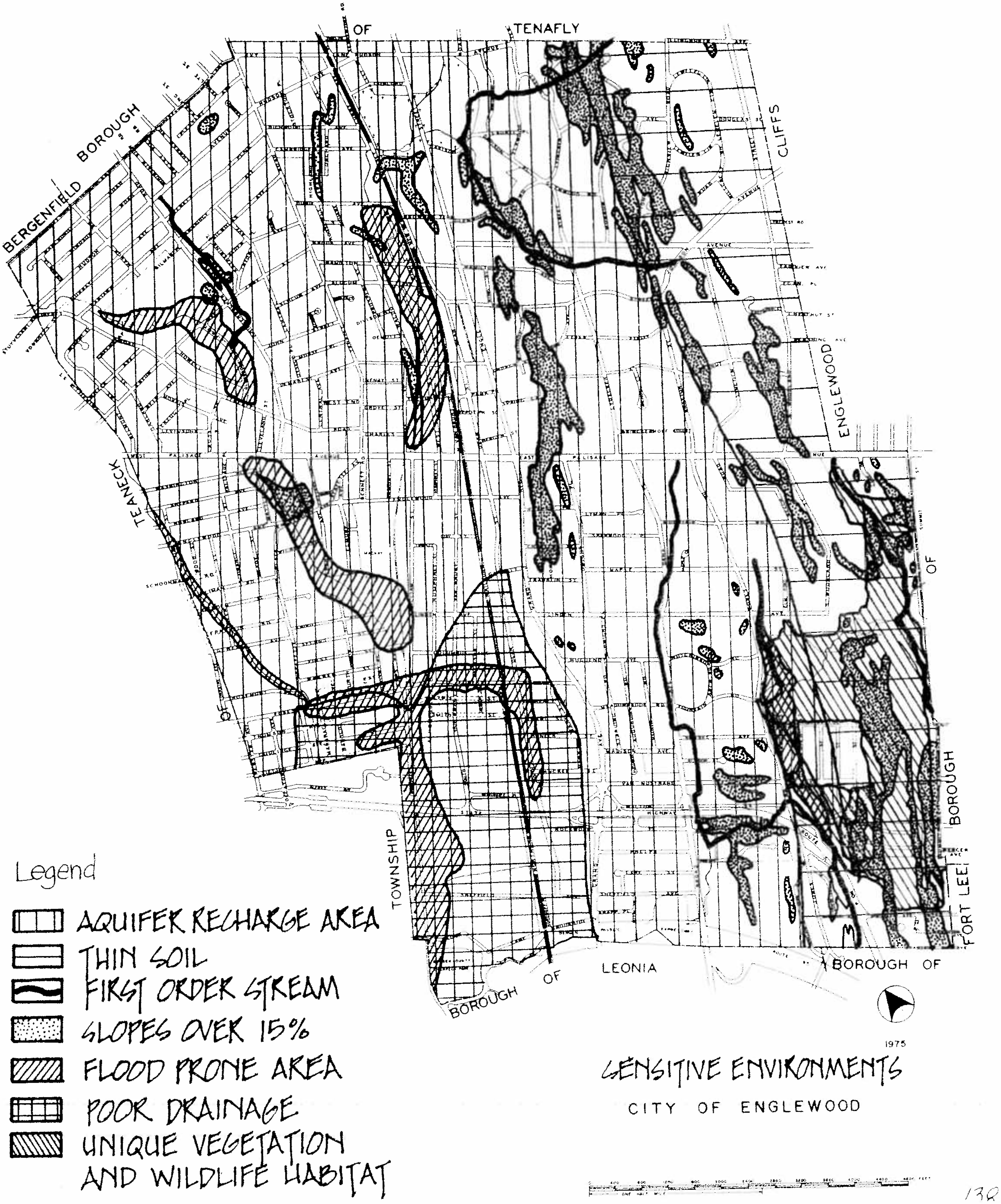
SENSITIVE ENVIRONMENTAL AREAS

The map of Sensitive Environmental Areas is what is termed a "synthesis" map. That is, it is a composite of map units from other "factor" maps (e.g., Slope, Groundwater, etc.) showing those areas which should, in the estimation of the authors, be treated with some care when making planning decisions in the City. The map units in question come from Groundwater Hydrology, Drainage Characteristics of Surficial Deposits, Slope, Vegetation, and Surficial Hydrology. The map units were divided into two basic categories; water related, and vegetation/wildlife related, with factors chosen as follows: slopes over 15%, poorly drained soils, flood-prone areas, first order streams, major aquifers, unique vegetation, and thin soils. (see Map 10-1).

There are three soil-related sensitive areas in the City; thin soils, poorly drained soils, and slopes over 15%. Poorly drained soils are found in the southwest corner of the City, primarily, but not wholly in the industrial section. This condition is characterized by a shallow depth down to the water table, frequently resulting in flooding conditions when the soil cannot absorb any more water. Flood water, in addition to damaging structures and equipment, will carry industrial pollutants into the stream regimen. The former lowland marsh which existed in the area prior to the construction of the tide gates, served as a retention basin into which flood waters flowed and gradually drained off. When the tide gates were constructed and fill dirt replaced the marsh, water, which formerly had occupied the marsh, then had no place to go except into the warehouses and factories.

These soils pose primarily engineering problems to the City, particularly with respect to excavation as, by definition, the depth-to-bedrock is shallow. This condition makes septic tank installation not only difficult and more expensive, but risks polluting what groundwater exists in the joint pattern of

Map 10-1



Legend

- ▥ AQUIFER RECHARGE AREA
- ▤ THIN SOIL
- ▬ FIRST ORDER STREAM
- ░ SLOPES OVER 15%
- ▨ FLOOD PRONE AREA
- ▦ POOR DRAINAGE
- ▧ UNIQUE VEGETATION AND WILDLIFE HABITAT

1975

SENSITIVE ENVIRONMENTS

CITY OF ENGLEWOOD

the diabase. Presumably the Bergen County Sewer Authority has alleviated this worry, but excavation for sewer lines may still be a problem.

The third soil-related issue is slope. Soils become difficult to stabilize during construction activities on slopes over 15% in grade. Degree or percent of slope is actually not the only consideration - the length of the slope is also important (5). As the degree of slope increases the velocity of the water coursing down it likewise increases. "Theoretically, a doubling of the velocity enables water to move particles 64 times larger, allows it to carry 32 times greater." (5, p. 238) The length of the slope is important because the concentration of the water increases as the area of the slope increases. Again Brady, "...research in southwestern Iowa showed that doubling the length of a nine percent slope increased the loss of soil by 2.6 times and the runoff water by 1.8 times. This influence of slope is, of course, greatly modified by the size and general topography of the drainage area." (5, p.239)

First order streams are shown on the map in both the eastern and northwestern portions of the City. First order streams are the least able to absorb pollutants due to their low flow rates. In addition, they are highly productive because the photosynthetic zone reaches to the bottom of the stream channel. Many aquatic organisms live in these streams, and parts of such streams are fish spawning areas.

The Stockton and Brunswick formations are the major aquifers under the City, and as they are potentially a major source of potable water, not only for the City, but also for those communities downdip, they should be treated as a valuable resouce. Englewood has significant responsibility for the correct treatment of the aquifers, as they outcrop, and are thus recharged in the City. With the dramatic increases in population that we are witnessing, there will be a time in the not-too-distant future when these aquifers will be far more important than they are now.

The vegetation community shown on the map was earlier referred to as unique, which in the strict sense of the word is not accurate; that is, it is not one of a kind or rare. It is, however, the only such woodland in the City, and when one considers that it is within fifteen minutes of the most antithetical sort of environment, it is indeed unique. In addition, it provides food and shelter for a valuable wild life community, and the fact that it is open to the public makes it all the more valuable to the residents of Englewood and the region.

Flood prone areas are found in all parts of the City, but for reasons previously outlined, the largest of these is in the southwest corner. But for the fact that there are structures built in them, flood prone areas would be of little concern to most people. In order to prevent the flood waters from inundating them, elaborate mechanical contrivances are built which are not only expensive to the aquatic life but to those who build and maintain them.

CHAPTER 11

EXISTING AND PROPOSED OPEN SPACE

Open space in the City exists primarily in the second, third, and fourth wards. The largest single tract is, of course, the Flat Rock Brook area in the second ward. The second largest in the second ward is the golf course adjacent to Route 4. This brings up a problem inherent in such an analysis - what is open space? There is obviously considerable space in the City not occupied by anything but trees, found primarily in resident's yards, particularly in the first and second wards. Yet this is not shown as open space - why not? The answer is we do not know as we did not gather the data for the map, but we might not have done it any differently if we had. The problem is that there is no precise definition for open space. Attempts to define it have spawned considerable work on the subject, culminating in all sorts of philosophical arguments on how open space is perceived, by whom, and under what conditions. Suffice it to say that the subject is complex and this is not the forum from which to deal with it. So we will continue.

There is considerable open space scattered through the third and fourth wards characterized by Dwight Morrow High School and MacKay Park. There are scattered small parks and other open areas considerably smaller, but many exhibit a common tendency which is that they are located not only in flood-prone areas, but likely in floodplains as well. That brings us to another problem - the flood-prone areas. The City and the Federal Goverment spend considerable time, money, and effort trying to keep Overpeck Creek and Metzler's Brook within some culturally determined boundaries. This attempt is not only expensive for the various governments, but is expensive as well for the hydrologic system. The faunal and floral communities in the streams suffer considerably as a result of the culverting, thus removing them from the food chain. In addition, culverts reduce the amount of water able to flow down the stream corridor, which produces flooding in other areas as well. With the rapidly progressing filling operations taking place in the Hackensack Meadowlands, some consideration should be made as to where all the water will go in the event of a major storm. There are alternatives.

It is no coincidence that parks are often located in floodplains. If the health and safety of a community are threatened by floodwaters, the community should not be located where it is. For the most part, health and safety are not at issue here, however maintenance expenses and ecological considerations are. In addition, it is apparent from residents' attitudes as well as site inspections, that the parks in the third and fourth wards are substandard. There are not enough of them, and the major one, MacKay, is in the redesign stage.

Consequently, we would recommend expansion of the park network in the third and fourth wards to include those areas between the existing open space areas as shown in the map, 11-1. This network is a linear corridor connecting the existing open space with the areas shown on the Surficial Hydrology map as flood prone. Such a network would accomplish several purposes: First, recreation user patterns indicate that those people living in wards Three and Four do not use Flat Rock Brook, but rather Dwight Morrow and MacKay. Presumably this is due to the lack of transportation. Expanding and upgrading the parks would make the park areas in the western half of the City roughly equivalent to those in the eastern half by availability if nothing else. Second, it would make maintaining and upgrading the culverting system considerably cheaper. A lot of money is spent keeping the streams in concrete. Third, considerably

Map II-1

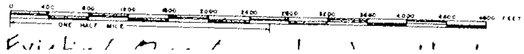
Legend

⁘ EXISTING OPEN SPACE

▨ PROPOSED OPEN SPACE

▦ FLOOD CONTROL AREA

EXISTING & PROPOSED OPEN SPACE
CITY OF ENGLEWOOD



less damage would be done to those houses and businesses now located in flood prone areas. Finally, it should improve the quality of the streams.

Quite obviously, this is not without cost. The City would lose part of its tax base at a time when it could use more. Further, those persons living or working in the areas would be displaced, and some other place would have to be found for them. The problem of the lost revenue would be partially offset by the saving on maintenance of the culverting system and the savings obtained by not having to repair flood damage.

However, we feel the benefits would outweigh the cost. Provided that the park was well maintained, property values adjacent to the parks should be increased, the environmental amenities increased, flood damage decreased, those unable to utilize parks farther away would be provided with a park environment, and the overall value to the town increased. Depending on the nature of the park design, bicycle paths could be constructed the length of the town along both Overpeck Creek and Metzler's Brook.

CURRENT INVENTORY

Englewood's outdoor recreation resources consist of city parks, the facilities on the public school sites and Flat Rock Brook Center (Green Acres). The following itemized table presents the acreage involved.

Outdoor Recreation Areas

City Parks	Area In Acres
1. Route 4 and Walton Street	1.920
2. Route 4 and Rock Creek Apartments	4.200
3. Trumbull Park and Garrity Little League Field	4.373
4. Route 4 and Kenwood Street	1.360
5. Route 4- Dean Street	0.312
6. Depot Park (east of tracks)	2.357
7. Depot Park (west of tracks	2.407
8. Highwood Park (Triangle - Hudson Ave)	0.210
9. Tryon Avenue	4.480
10. Glenbrook	0.930
11. Morris Park	2.450
12. MacKay Park	28.600
13. Unnamed - west of Green Street	9.000
14. Denning Park	5.170
15. Crystal Lake Park	5.800
	73.569 Total
Board of Education Outdoor Recreation Areas	
16. Engle Street School	1.00
17. Liberty School	.50
18. Cleveland School	2.50
19. Lincoln School	0.50
20. Roosevelt School	1.20
21. Quarles School	2.20
22. Middle-Senior High Schools	21.00
23. Winton White Stadium	10.50
24. Durie Avenue Playground	4.24
25. Durie Avenue Little League	3.70
	47.34 Total (school Acres)
Green Acres - Flat Rock Brook Center	
26. North of Allison Park	28.45
27. South of Allison Park	41.84
28. Allison Park - privately owned	75.00
	145.29 Total (Conservation Acres)

PART II

THE SOCIAL FEATURES OF ENGLEWOOD

INTRODUCTION

The importance of the "quality of life" discussion has clearly increased, if judged only by the space accorded it. This discussion has emphasized the different definitions of quality, the different variables to be judged, the psychological vs. physical dimensions inherent in human activity, and the mechanisms of measurement needed to make any conclusions.

The need is now to enter into *human* environments, measure the interactions between those humans and the physical attributes *whatever they may be*, and begin a fruitful discussion of how different environments can affect the human population.

> "Within the cities themselves, at the local scale, there are significant micro-environmental relations. For example, the density-gradient has been shown to be lower in higher-status residential sectors, and Hoyt has pointed out that these high status sectors have sought out zones of superior residential amenities - views, higher ground, slopes, trees--and away from industrial areas and railroad yards (which followed the valleys as they converged on Central Business Districts). Low status groups, on the other hand, have been compelled to follow the industrial axes for dual reasons--they could not compete for superior residential amenities and, by virtue of their lower incomes, they were required to reside closer to their work in the heavy industries that provide most blue collar employment." (51, p. 302)

> "The role of amenities in locational choices is of increasing importance today because generally rising real incomes and improved transportation is breaking down the closeness of the ties to workplace in all but the lowest income groups. Advantages of site and microclimate (Hurd's "pleasurable" features of the use of the land, in distinction to simple nearness) are hence of increasing significance. They are "new resources" in that with increasing demand they are more valued. On the other hand, the oldest and most crowded environments have, in effect, reduced the supply and therefore increased the value of other new resources--in particular, open space, fresh air, and pure water." (51, p. 302)

CHAPTER 12

IDENTIFICATION OF THE GROUPS

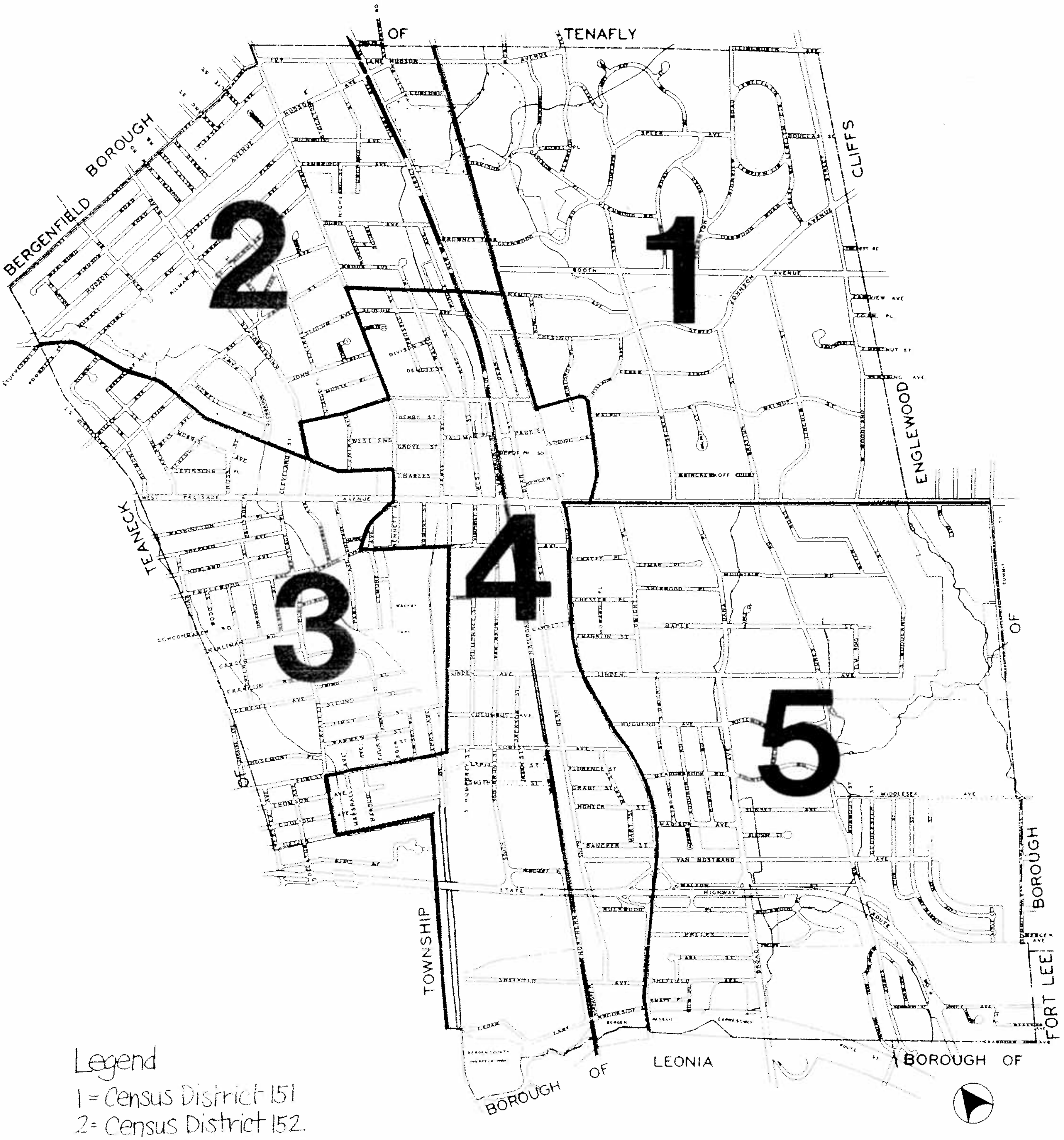
In answering the questions, who??? what??? where???, the environmental planning profession has increasingly turned to cultural anthropology to augment its traditional reliance on the natural sciences. This emphasis on the interaction of social systems with the natural environment necessarily must consider human activity patterns. The basic understanding of human activity underlying this research divides mans' activities into two different levels, each requiring different techniques for collecting and judging the data. Humans functionally operate as individuals and also as members of groups. Each activity is guided by different assumptions, values, and goals which lead in turn to different activity patterns. A person will make different decisions in the same spatial dimension (environment) based on different inputs, depending on the types of activity being considered.

This Study considers two separate human decision processes:

1. Human activity patterns - - day-to-day needs such food, recreation, work, school, and
2. Residential location decision - - based on income, age, race, and lifestyle.

We have used census data to identify the different groups, housing and zoning information to place these groups into their neighborhood environments; and individual questionnaires to elicit person responses, mapped images, and pathways of the people of Englewood. Following are graphic representations of the pertinent census data (Map 12-1, Table 12-2, figs 12-3, 4,5).

Map 12-1



Legend
1 = Census District 151
2 = Census District 152
3 = Census District 153
4 = Census District 154
5 = Census District 155

CENSUS DISTRICTS

CITY OF ENGLEWOOD

Employed Englewood Residents – 16 Years Old or Over

CENSUS DISTRICT	151	152	153	154	155	TOTAL
	1,183	3,005	2,679	2,210	2,120	11,197
Professional	442	754	325	228	703	
Health	151	141	85	57	169	
Teachers	66	168	79	28	111	
Managers & Admin.	261	319	121	113	429	
Sales	165	213	79	107	173	
Clerical	110	674	588	560	363	
Craftsmen	35	335	270	210	130	
Operatives	26	233	457	371	72	
Trnsprt.	15	67	121	75	26	
Laborers	10	69	152	98	32	
Farm	-	4	26	17	4	
Service	14	288	331	225	91	
Private Hshld. Workers	105	49	209	206	97	

Source - U.S. Census: 1970

Table 12-2a

MEANS OF TRANSPORTATION - U.S. CENSUS, 1970

TRACT	151	152	153	154	155
Private Auto					
driver	677	1,876	1,510	1,114	1,264
passenger	127	315	302	145	239
Bus	90	376	556	481	221
RR/Subway	45	149	45	59	121
Walk	49	155	229	312	36
Work at home	165	54	44	30	126
Inside SMSA	606	1,851	1,703	1,511	930
Outside SMSA	497	899	632	408	1,028
All Workers	1,161	2,052	2,709	2,166	2,045

Table 12-2b

fig. 12-3

	Black	White
151	3.9	96.1
152	11.7	88.3
153	89.6	10.4
154	44.5	55.5
155	2.1	97.9

% of Race in each District

fig. 12-4

Age In Each District (Nos of Persons)

	0-19	20-54	55+	
151	861	1144	862	2867
152	2276	2876	1288	6440
153	1765	2568	1256	5589
154	1493	2139	1306	4938
155	1476	2160	1224	4860
	7871	10,887	5,936	24,694

fig. 12-5

% of Annual Income Category In Each District

Districts	Less then $1,000 to $4,000	$4,000 to $12,000	$12000 to $25,000	$25,000 to $50,000	$50,000 and more	# of families
151	48 6.0%	95 11.9%	240 30.0%	260 32.5%	156 19.5%	799
152	78 4.4%	738 41.7%	778 44.0%	170 9.6%	4 0.2%	1,768
153	164 11.1%	692 46.8%	605 40.9%	19 1.3%	—	1,480
154	191 15.5%	656 53.3%	339 27.6%	44 3.6%	—	1,230
155	47 3.3%	322 22.9%	477 33.9%	429 30.5%	132 9.4%	1,407

Map 12-6

1975

CENSUS DISTRICTS and LANDFORMS

CITY OF ENGLEWOOD

In identifying the groups within the natural landform areas, the census data, combined with information gained through key informant interviewing allowed us to categorize individuals into neighborhoods and the neighborhoods into communities. When this information is placed on the street map of Englewood, the patterns of income, ethnic, and racial differentiation which separate the areas of Englewood emerge.

DISTRIBUTION PATTERNS

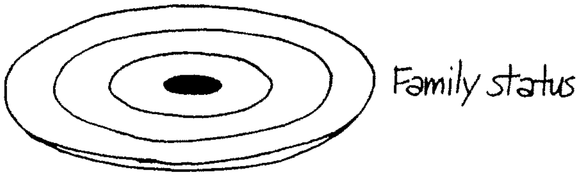
Black groups overwhelmingly live in the Census Districts 154 and 153. Census District 152 is an area in which many groups converge, while Census Districts 155 and 151 consist of mostly white population.

Other variables were mapped which generally follow the same spatial pattern. These include income distribution, with higher levels in Districts 151 and 155; average assessed valuation (obviously tied to income distribution) and housing quality (see Chapter 14, ENVIRONMENTAL INDICATORS).

This process revealed that the areas identified by key informants as being occupied by fairly homogeneous groups generally coincide with the boundaries of the Census Districts and allowed us to use the census information in a uniform manner and to apply it to groups as a whole in the spatial areas in which they live. In short, the Census District boundaries represent, with some qualification, a spatial picture of the makeup of the groups living in Englewood.

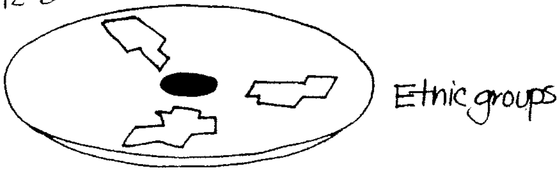
Planning theory has gradually developed concepts about peoples' living patterns as governed by their lifestyles (defined by income, occupation, age, family status, amount and quality of residential space and location of residence in the larger community space). In a theoretical model based on these concepts, various communities are spatially distinct and assume widely differing configurations. (53)

fig. 12-7



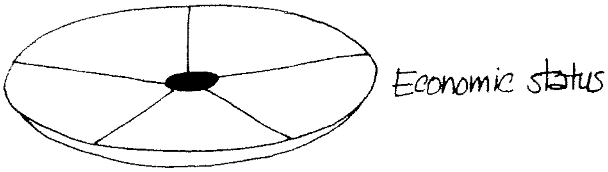
Age groups are distributed around the cities in rings which center on the Central Business District and allow the elderly to contribute to and partake of social interactions without physical difficulty.

fig. 12-8



Racially, groups are viewed as arrayed in clusters which are not connected, have no formal boundaries but are oriented toward the center city.

fig. 12-9



Groups which show different socio-economic status patterns are represented in sectors which emanate from the center city, with lower-income groups close in and higher-income groups occupying the expensive and highly valued suburbs. When overlaid on the physical system these social patterns give us the large and bewildering patterns which represent the modern city.

In comparing Englewood to this theoretical model, we found that the racial and economic groups are arrayed in a pattern which resembles that of the sectors in figs. 12-7 & 8. Each of the groups has access to the Central Business District while at the same time having separate and distinct boundaries. This results in main arteries of pathways converging on the CBD, with increasing population at somewhat of a distance. Because of the evident correlation between racial distribution and income, the income distribution of the population follows a similar pattern. The age distribution is much harder to spatialize and does not seem to correspond to the theoretical paradigm as pictured in fig. 12-9. However, a senior citizens' building has just been completed near Depot Park and the numbers of elderly inhabiting the downtown area will rise dramatically when it is occupied. Thus it will be seen that this Study considers Englewood to be a spatial structure; a three-dimensional space with a behavioral pattern imposed upon its physical patterns.

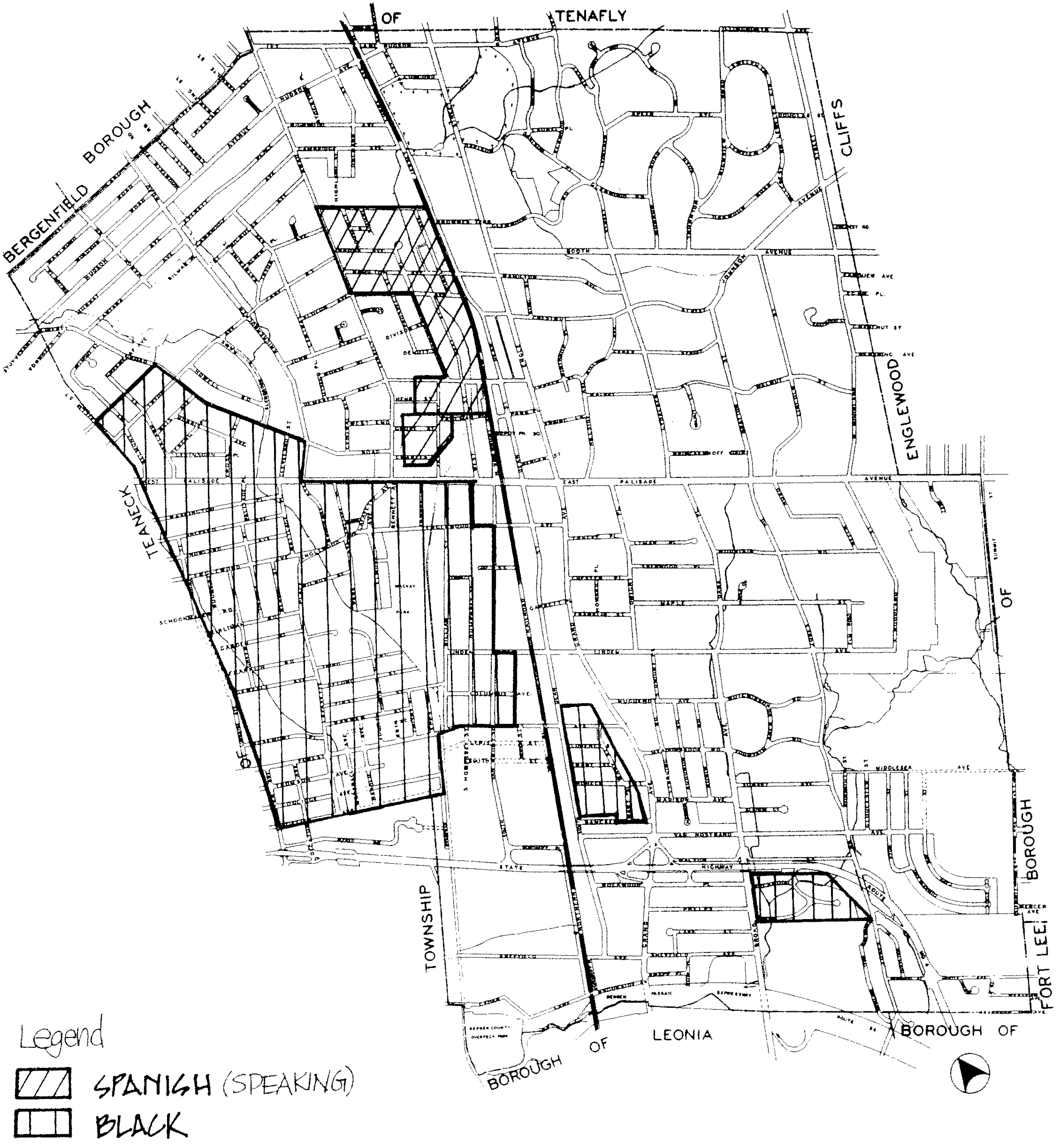
The physical patterns of Englewood have been mapped and are represented in the first part of this report by the Landforms Map (Map 6-2) which shows the coincidence of certain natural factors such as geology, vegetation, topography including slope and elevation, combining them into homogeneous areas where the bio-physical conditions have evolved into a short-term equilibrium. The Vegetation Cross-Section (ch. 4) allows us to see which natural plant associations have evolved over time and arranged themselves in the physical space of Englewood. In a similar manner the social groups of Englewood, through competition and cooperation, have arrayed themselves spatially through time. These arrangements, we argue, are not random but, instead, represent a process of accomodation and conflict, resulting in each group's lifestyle which is reflected by that group's position in the social space of Englewood.

In order to answer the question; "Which of the different physical environments contain which groups and what are the environmental indicators attributed to those environments?" diagrams of each of the social groups were overlaid upon maps of the natural landforms to see if the boundaries of the group residences coincided or were contained within the landforms present (see Chapter 13, THE QUESTIONNAIRE for residents' images of neighborhood boundaries). Clearly, the higher-income families, most of whom are white, occupy the diabase ridge in the eastern half of the City. Here, the highest-valued houses are located, coinciding with the highest quality of the interior and exterior of the houses. Most of the remainder of the higher-income population, again mostly white, resides in the upland area of the northwest, where housing values are moderately high in comparison with the east, reflecting a lower income distribution. By comparison with other towns in northern New Jersey, housing values in the western uplands of Englewood are high, and are here designated as "moderately high" only because of comparison with the extremely high housing values on the east hill.

The majority of the black population shares the lowland area, formerly defined as an impassable marsh, with the CBD and the light industrial area to the southwest.

Thus the relationships between different social groups and different physical patterns in Englewood emerge. Except for one subsidized housing development and the Flat Rock Brook Center, both on the east hill, and Dwight Morrow High School grounds on the west hill, the wide panoramas and residential open spaces of the eastern and western uplands are not available to low-income groups (see Maps 10, 11, 12, 13, 14).

Map 12-10
Residential Concentrations of Minority Groups

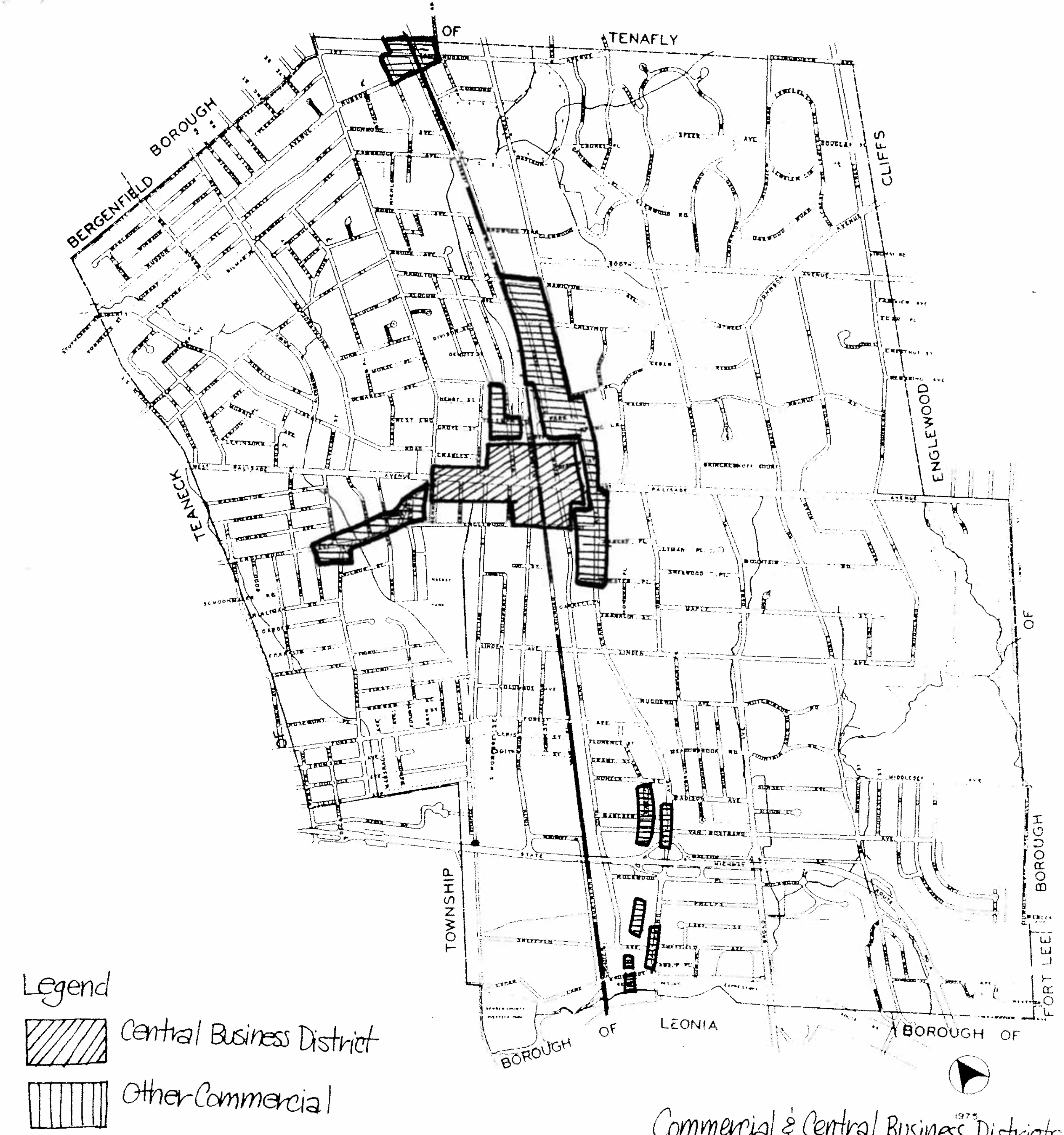


Legend

▨ SPANISH (SPEAKING)

▥ BLACK

Map 12-11



Commercial & Central Business Districts 1975

CITY OF ENGLEWOOD

Map 12-12

1975

INDUSTRIAL LOCATION

CITY OF ENGLEWOOD

Map 12-13

Legend

▭ R1 AA
▨ R1 A
☰ R1 B
▨ R1 C
⁚ R1 D

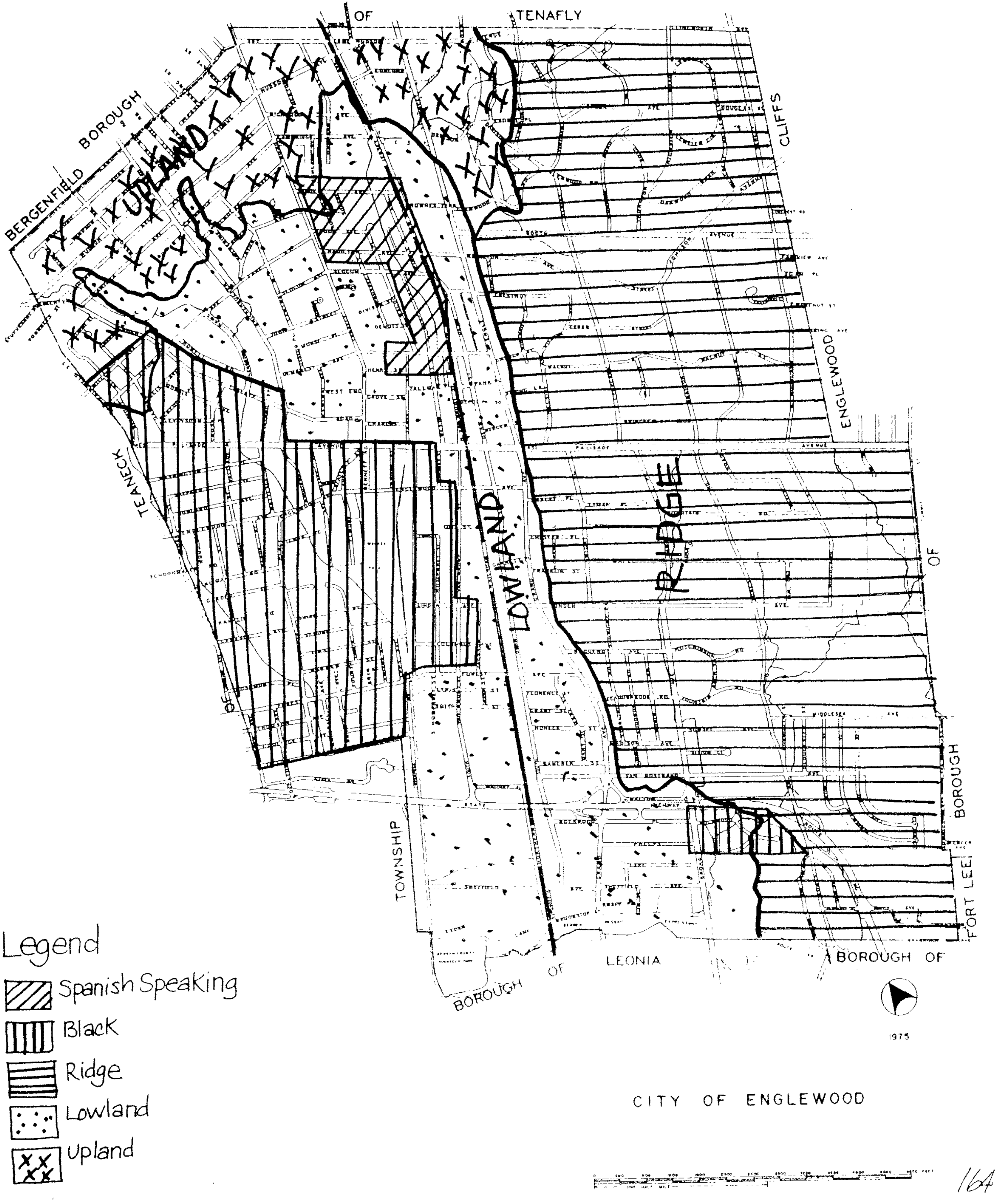
Single family residence

▥ MULTIFAMILY RESIDENTIAL

RESIDENTIAL LOCATION
CITY OF ENGLEWOOD

Map 12-14

Residential Concentrations of Minority Groups (Map 12-10) and Landforms (Map 6-2)



The consequences of these relationships could only be learned through a personal knowledge of the city - - a knowledge possessed by the residents, themselves. To them, we turned our attention.

CHAPTER 13

THE QUESTIONNAIRE

"The relationship between residents' perceptions and independent ratings of neighborhood quality is also reassuring. For most aspects of the environment where both a rating and an attitudinal response were obtained, aggregate estimates of need yielded by the two types of measurement were quite similar". (52)

The environmental planning method, as viewed here, calls for the identification of a human value system best represented by the people living in the area. Therefore, a profile of each census district was established based on the population, racial characteristics, age breakdown, and income stratification. Questionnaires were personally administered to those segments of the population identified by the profile. In this way, groups not usually interviewed were included while maintaining the overall representation of the sample.

Following are the two-page Questionnaire and a breakdown of the survey results (see Table 13-1). The Questionnaire is intended only to elicit information and is not designed to be in any way statistically significant.

Englewood Environmental Questionnaire

1. Name ______________ 2. Address ____________________ 3. Age _____

4. Please place an arrow on the map which will show where your house is located.

5. Were you born in Englewood? ____ If not, what date did you move here? ______

6. Do you own your own home or rent? ________

7. Please circle what you consider to be your neighborhood on the map.

8. With your pencil please write on the map the areas in which you: shop, go to school, go for recreation, go to work.

9. In the area next to the activities explain how you get there, walk, bus, car, etc. and tell if this is satisfactory to you.

	Travel	Satisfactory?
shop		
go to school		
go for recreation		
go to work		

10. The following is a list of things about which we would like to have your opinion. Just put a check in the box which best explains your opinion on the subject.

	good	medium	bad
public transportation			
roads			
traffic			
air			
noise			
drinking water			
climate			
trees			
parks			
housing			
recreation			
schools			
social services			

If you feel there are other important areas write them in on bottom.

11. Please put a number, 1, 2 or 3 next to those items on the above list which shows how important they are to you.

QUESTIONAIRE SURVEY BREAKDOWN

Census District	151	152	153	154	155	Total
Interviews Based on Population	30	65	55	50	50	250
Returned	$\frac{18}{30}$	$\frac{28}{65}$	$\frac{31}{55}$	$\frac{40}{50}$	$\frac{30}{50}$	
Survey Profile Race						
Black	--	10%	90%	45%	5%	
White	100%	90%	10%	55%	95%	
Returned						
Black	--	18%	97%	37%	13%	
White	100%	82%	3%	63%	87%	
Age Returned						
0-19	1	3	20	4	1	
20-54	12	15	4	11	18	
55+	5	9	7	15	11	
Needed %						
0-19	30%	35%	32%	30%	30%	
20-54	40%	45%	46%	43%	44%	
55+	30%	20%	22%	27%	24%	

TABLE 13-1

NEIGHBORHOOD AND ACTIVITY PATTERNS

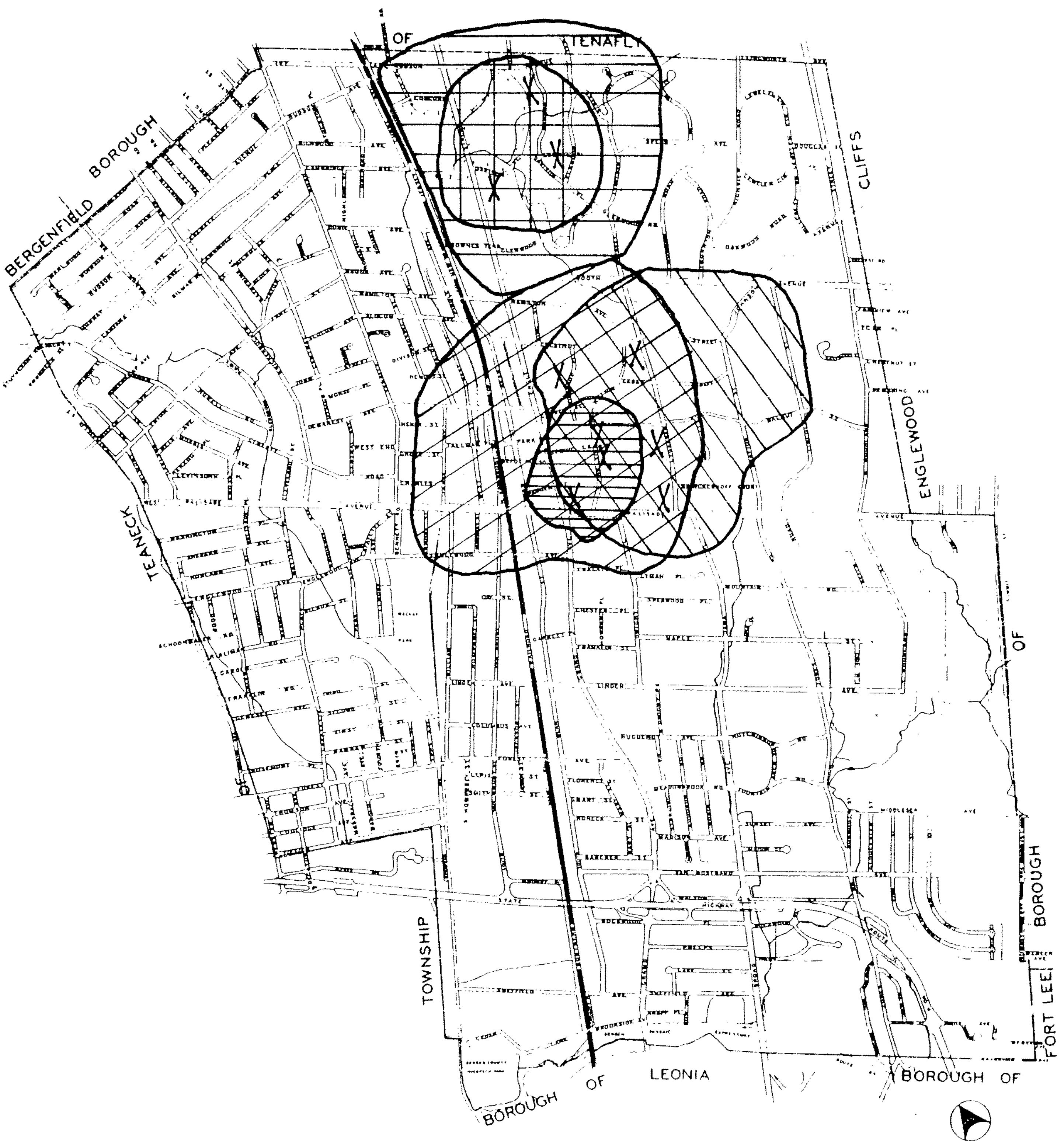
The aim of the Questionnaire is essentially spatial in nature. We wished to know:

1. Do the groups of Englewood view themselves as separate or are there some overlaps? Clearly the respondents consider their neighborhoods to be separate in character with almost no overlapping of neighborhood boundaries (see Maps 13-2, 3, 4, 5, 6, The Neighborhood Patterns of Englewood). This confirms our own designation of group boundaries as it coincides with the same spatial perceptions on the part of the inhabitants. The boundaries of the neighborhoods are separate and distinct.

2. What parts of Englewood are used by which groups, for what purposes, and is there overlapping by user groups during these activities? This human activity analysis was initiated in order to spatialize the movements, activities, and destinations of the people of Englewood as represented by the groups. The group activities are the result of aggregate individual responses to the question "Where do your particular activities occur?"

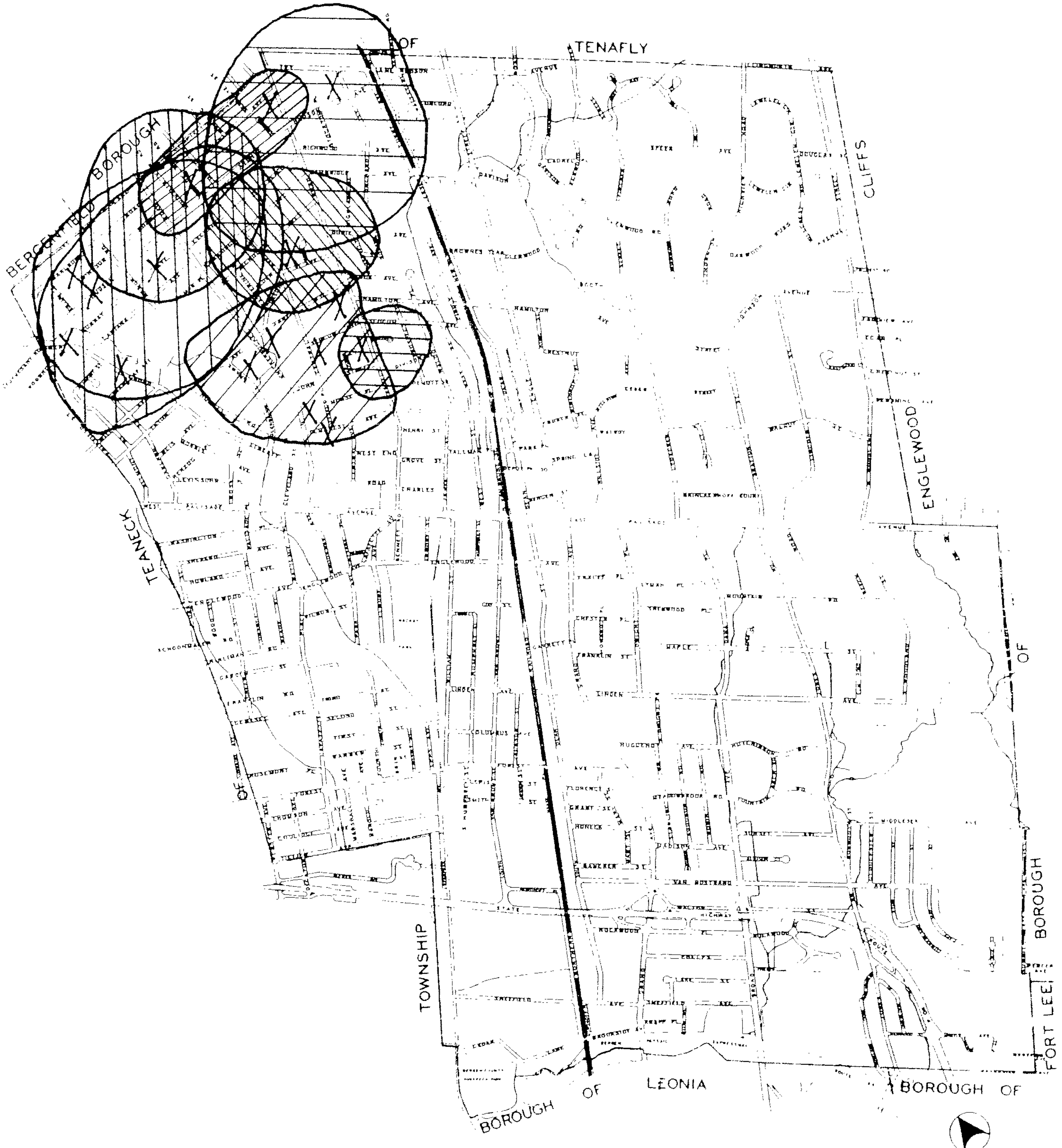
Following are various groups' neighborhood and activity patterns, as diagrammed by Census Districts. (see also Maps 13-7, 8, 9, 10, 11, The Activity Patterns).

Map13-2



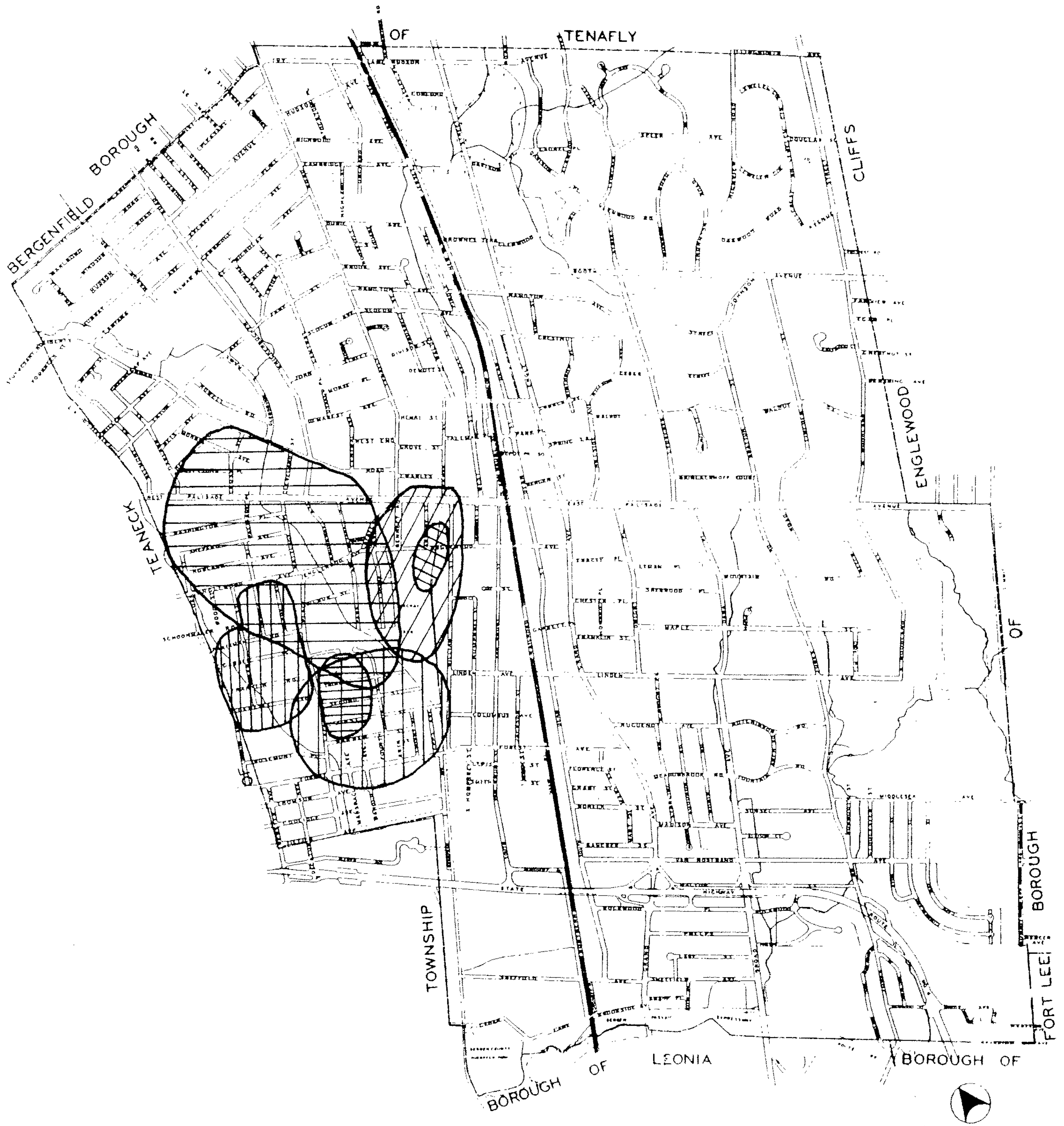
NEIGHBORHOOD PATTERNS 1975
CENSUS DISTRICT 151
CITY OF ENGLEWOOD

Map13-3



NEIGHBORHOOD PATTERNS 1975
CENSUS DISTRICT 152
CITY OF ENGLEWOOD

Map 13-4

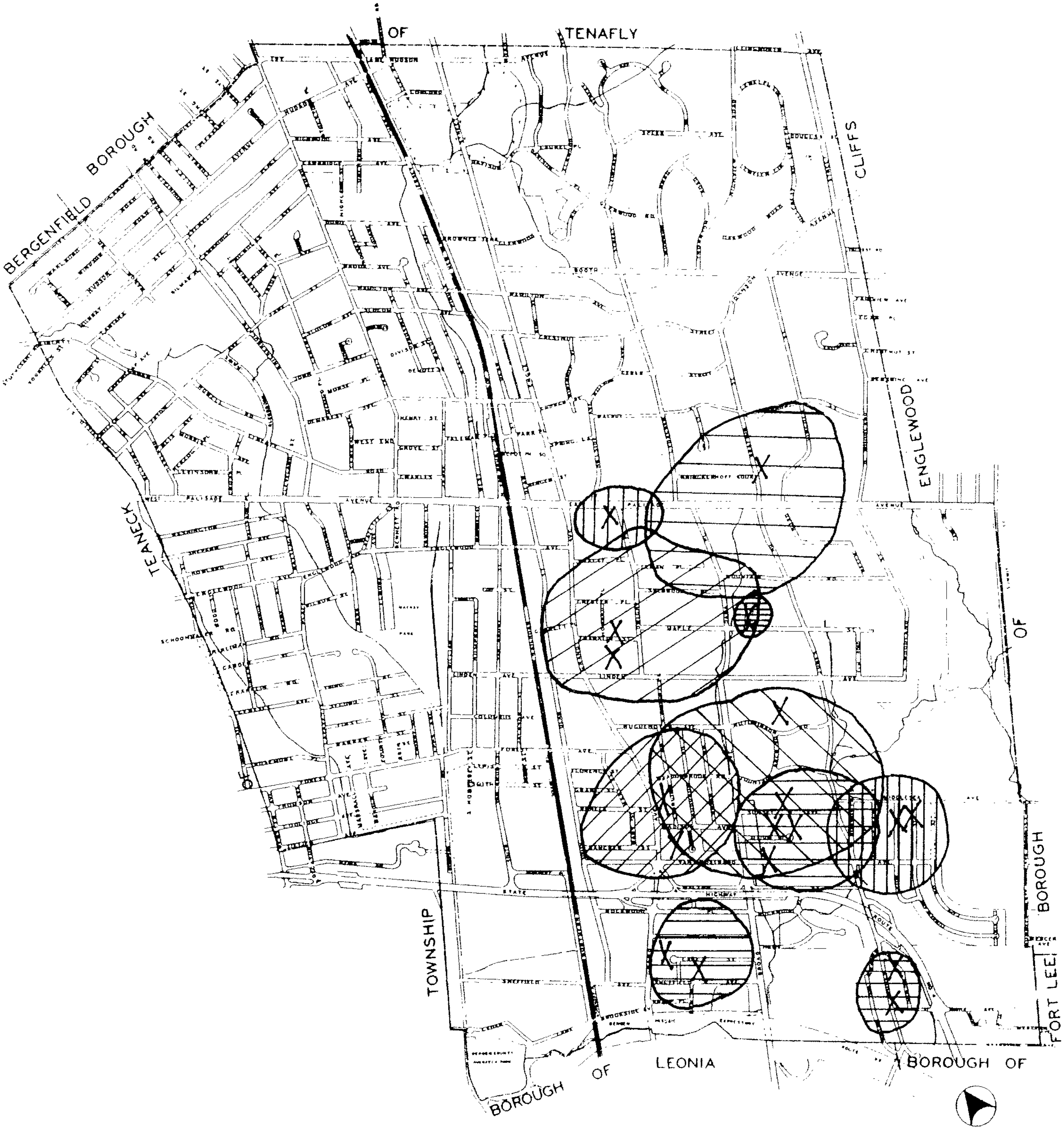


NEIGHBORHOOD PATTERNS 1975
CENSUS DISTRICT 153
CITY OF ENGLEWOOD

Map 13-5

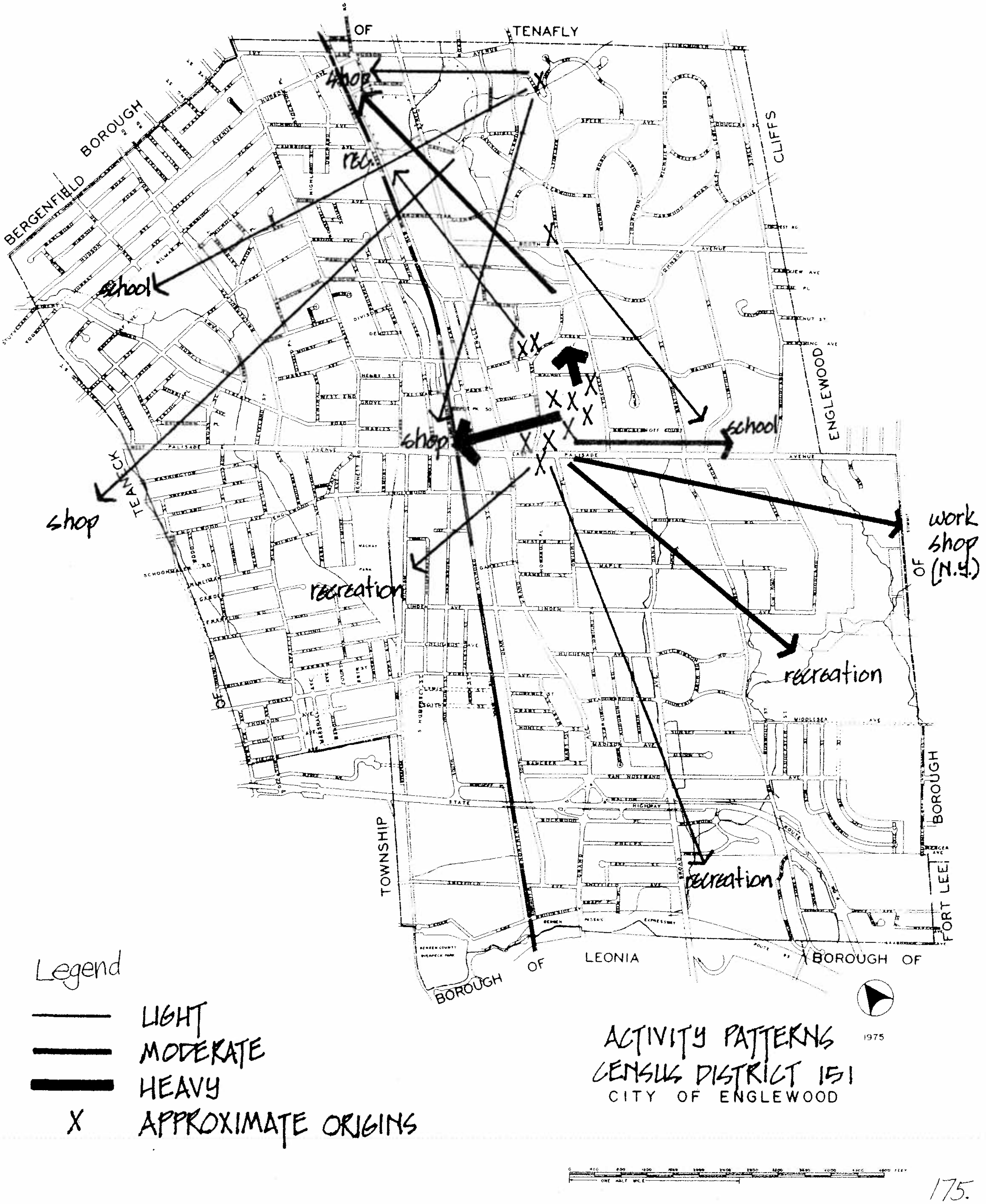
NEIGHBORHOOD PATTERNS 1975
CENSUS DISTRICT 154
CITY OF ENGLEWOOD

Map 13-6



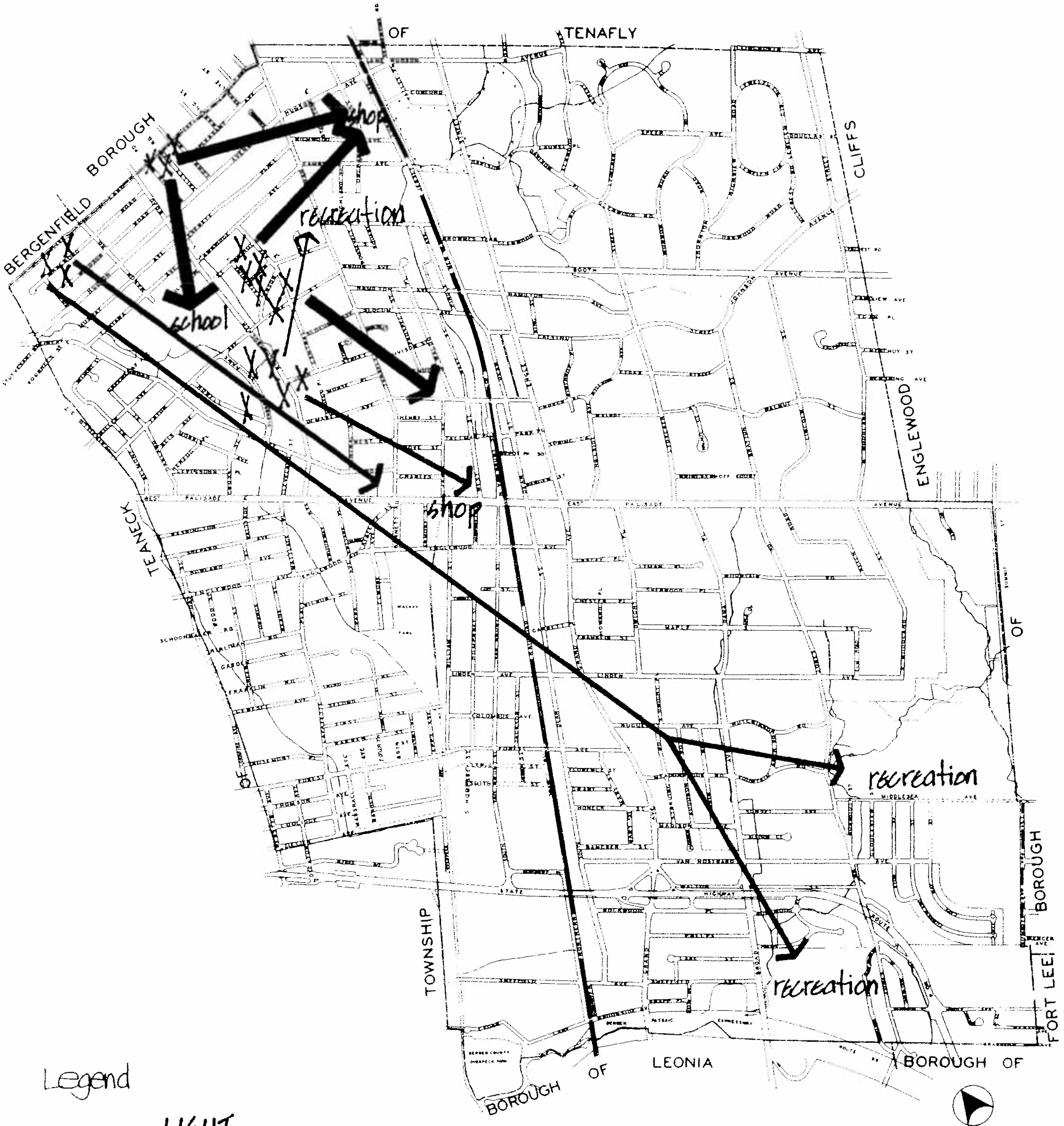
NEIGHBORHOOD PATTERNS 1975
CENSUS DISTRICT 155
CITY OF ENGLEWOOD

Map 13-7



ACTIVITY PATTERNS
CENSUS DISTRICT 151
CITY OF ENGLEWOOD

Map 13-8

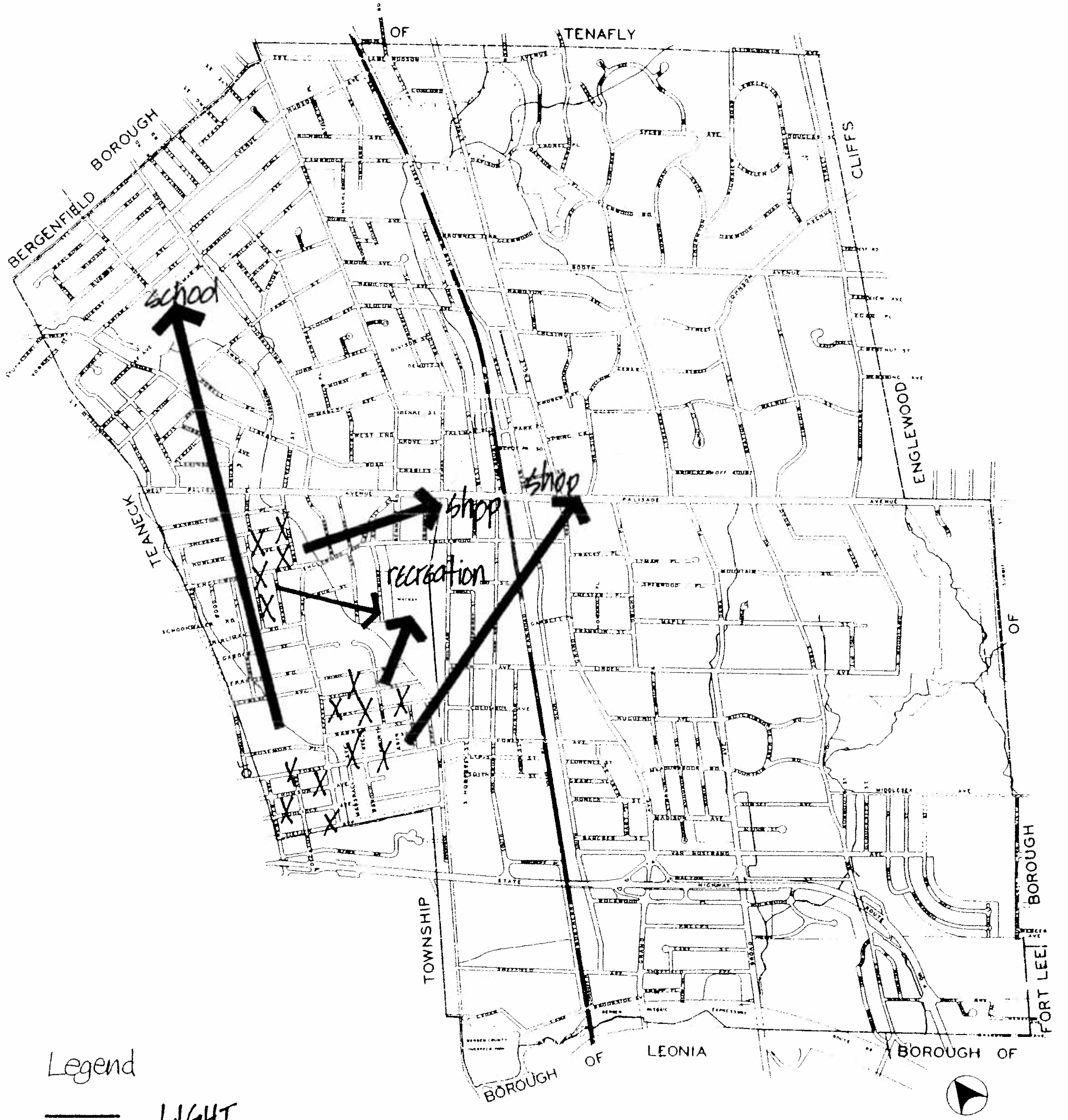


Legend

— LIGHT
— MODERATE
▬ HEAVY
X APPROXIMATE ORIGIN

ACTIVITY PATTERN
CENSUS DISTRICT 152
CITY OF ENGLEWOOD

Map13-9



Legend

— LIGHT

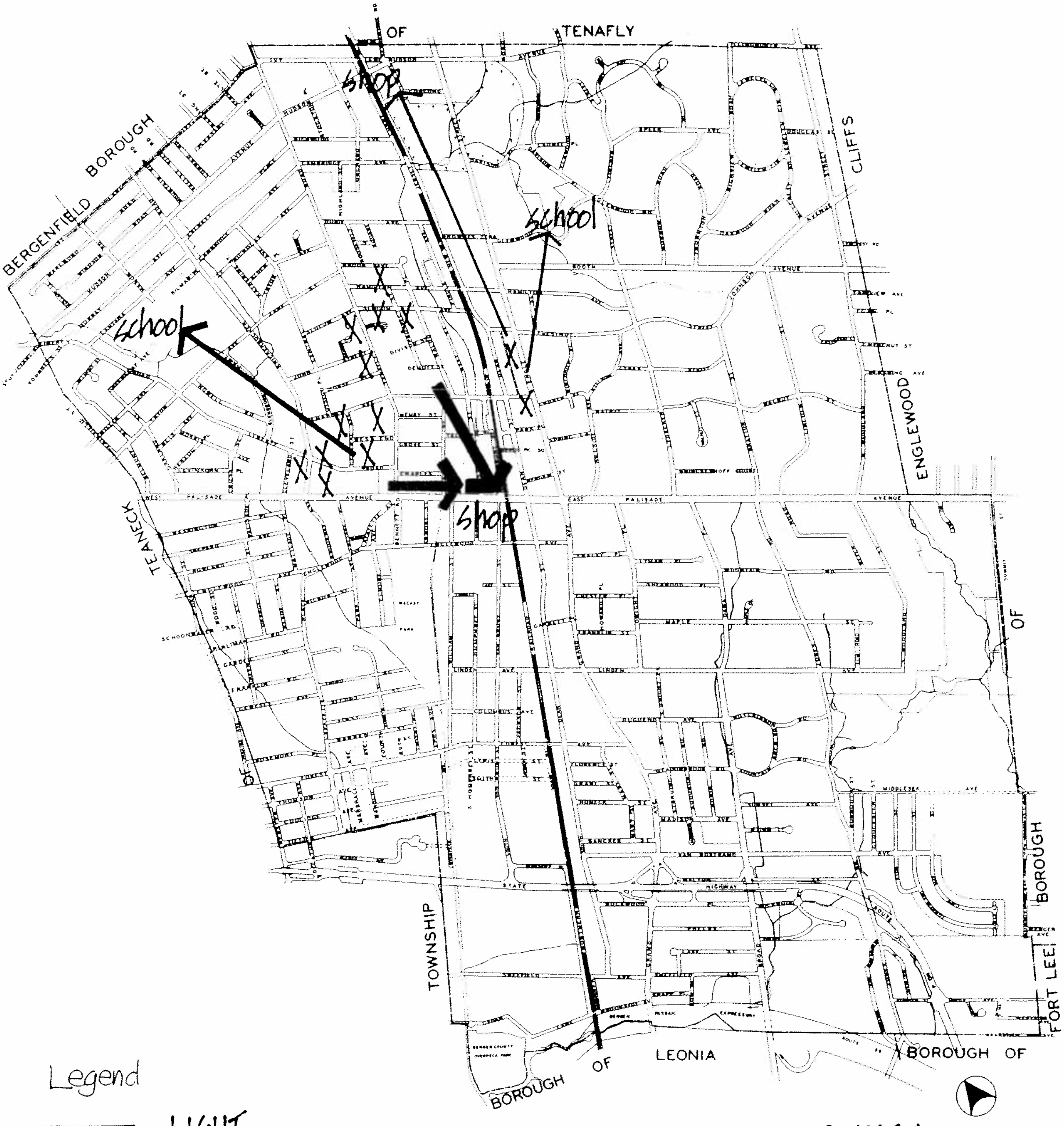
━ MODERATE

▬ HEAVY

X APPROXIMATE ORIGINS

ACTIVITY PATTERN
CENSUS DISTRICT 153
CITY OF ENGLEWOOD

Map 13-10



Legend

— LIGHT

— MODERATE

━ HEAVY

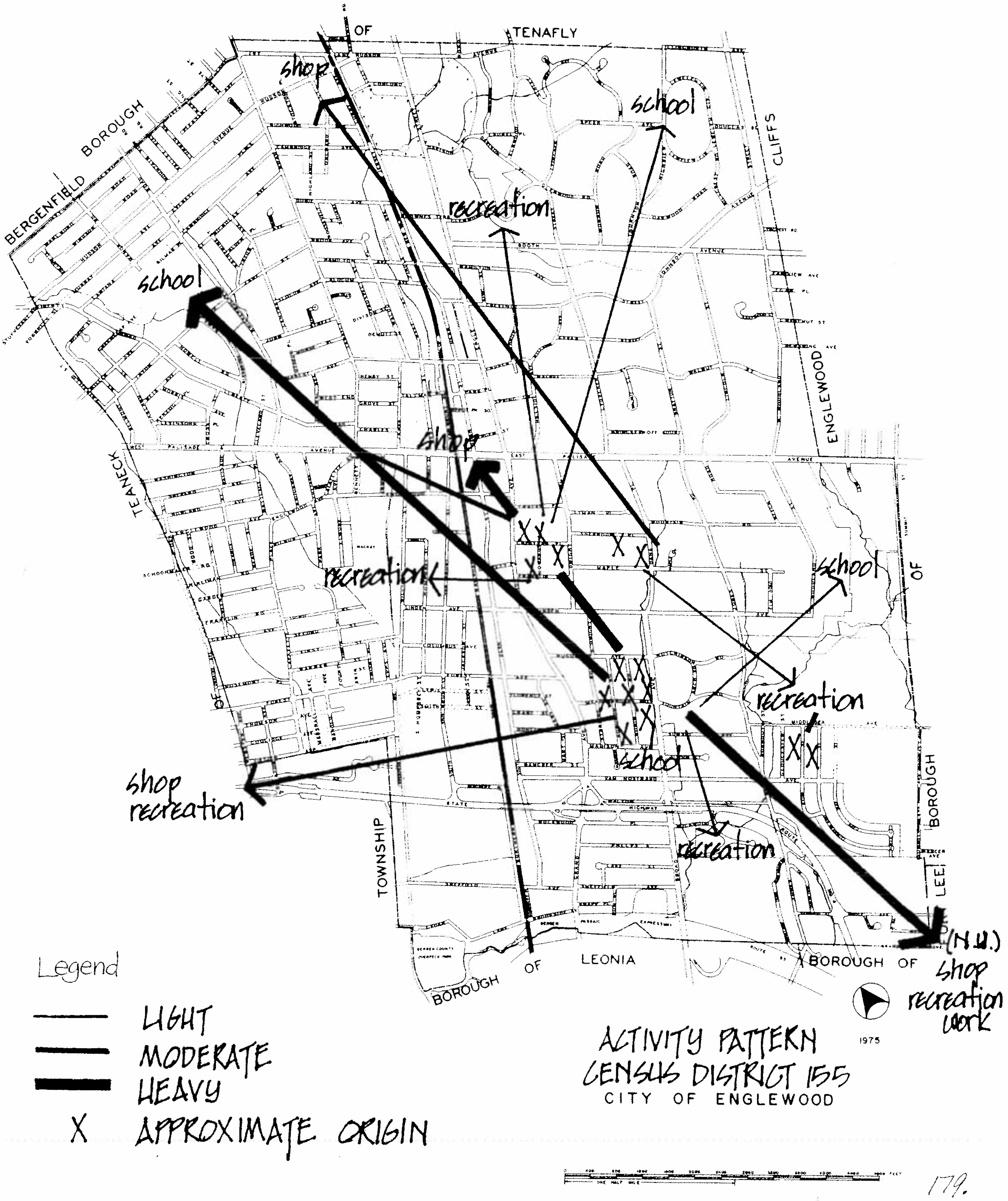
X APPROXIMATE ORIGINS

ACTIVITY PATTERNS
CENSUS DISTRICT 154

CITY OF ENGLEWOOD

1975

Map 13-11



ACTIVITY PATTERN
CENSUS DISTRICT 155
CITY OF ENGLEWOOD

Group Rankings and Ratings

The residents of Englewood were asked to rank and rate those environmental variables considered to be important by the authors and by key informants who were interviewed before the Study was begun. The results were then used by the authors to identify problems within Englewood and also to represent users' views of their own environments.

Rankings of Environmental Factors

The inhabitants of the individual neighborhoods were asked to choose three of the environmental variables most important to them and rank them in order of importance (see Table 13-12).

GROUP RANKINGS OF IMPORTANCE OF ENVIRONMENTAL FACTORS IN ENGLEWOOD

	high income	middle income	low income
public trans.	L,M	L	L
roads	M	L	M
traffic	L,M	L	L,M
air	L,M	L	L
noise	L	M	L,M
drinking water	L	L	L,M
climate	L	L	L
trees	L	L	L,M
parks	M	M	M
housing	L,M	M	H
recreation	L	L	M
schools	H	H	M
social services	L	M	H,M

L	low
M	medium
H	high

TABLE 13-12

Ratings of Environmental Variables

Different groups rated their environments differently, based both on the natural factors found there and the social factors imposed by humans. Those neighborhoods of Englewood which enjoy the natural amenities of open space, panorama, and fresh air were rated good by the inhabitants, while the downtown lowland areas were considered to be sub-par as residential space. Schools and parks, rated poorly by the low-income groups, were seen as good by the high and middle income sectors of the community, a reflection of the distinct and separate living patterns of the Englewood area, and especially a reflection of the existence in Englewood and nearby communities of a wide choice of independent and parochial schools (see Table 13-13).

GROUP RATINGS OF ENVIRONMENTAL FACTORS IN ENGLEWOOD

	high income	middle income	low income
public trans.	M,B	G	G,B
roads	M,B	B	B
traffic	B	B	B
air	G	B	B
noise	G	B	B
drinking water	G	G	B
climate	G	G	G
trees	G	G	G
parks	G	G	B
housing	G	G	B
recreation	G	G	G
schools	M,G	G	B
social services	G	G	G

good	G
medium	M
bad	B

Table 13-13

Obviously, the individual characteristics of each area have a profound effect on those living there, while a group's values influence its members' views of the importance of the individual variables to their way of life. The lower-income groups rank social services and housing as highly important, a reflection of the elderly and blacks' need for emphasis in these fields. High income whites choose schools as the environmental variable most important to them.

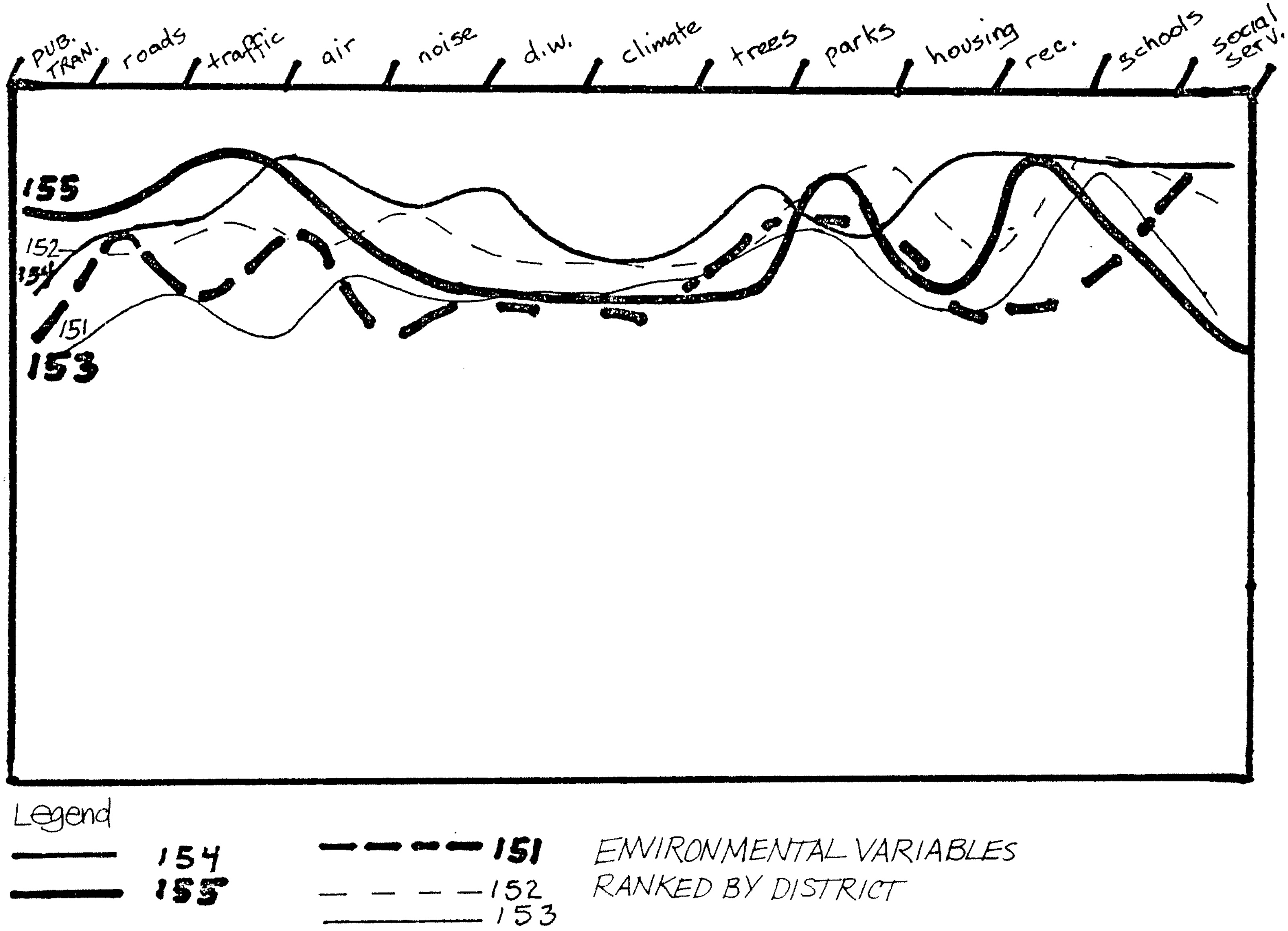
The diagrams of the rankings and ratings are followed by composite graphs which allow the reader to compare these measures and, in effect, to see if Englewood is meeting the environmental needs of its population (Graphs 13-15, 16, 17).

High Income Groups

Census District	Ranked High	Rated High	Low	
151	Schools		✓	
	Transportation		✓	
155	Roads		✓	
	Parks	✓		
	Middle Income Groups			
152	Roads		✓	
	Noise		✓	
	Housing		✓	
	Schools		✓	
	Low Income Groups			
153	Transportation		✓	
	Traffic		✓	
	Housing		✓	
	Social Services		✓	
154	Traffic		✓	
	Noise		✓	
	Parks	✓		
	Housing		✓	
	Social Services	✓		

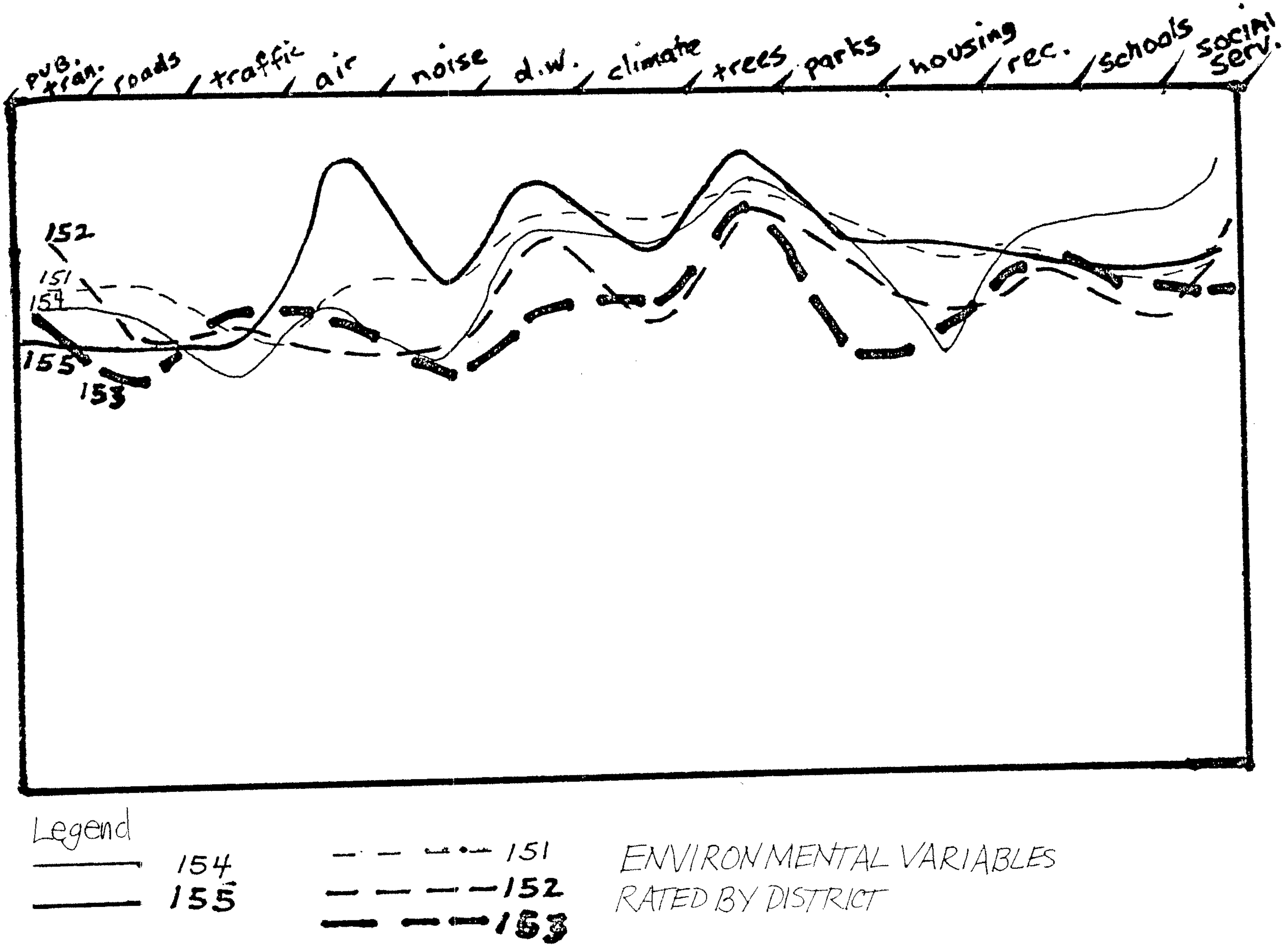
Table 13-14

Graph 13-15



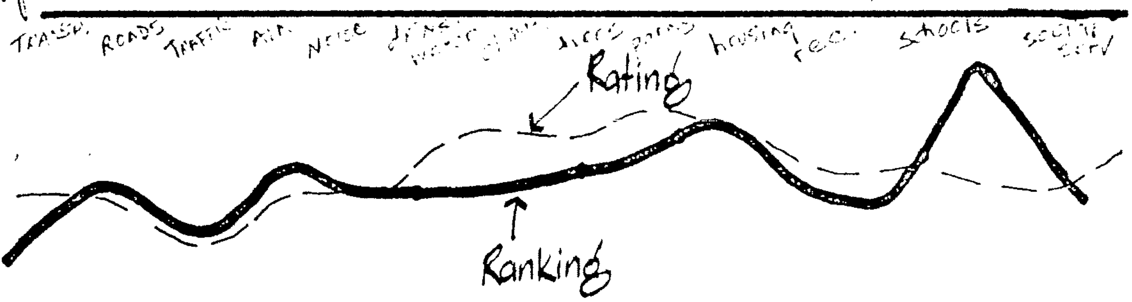
ENVIRONMENTAL VARIABLES RANKED BY DISTRICT

Graph 13-16

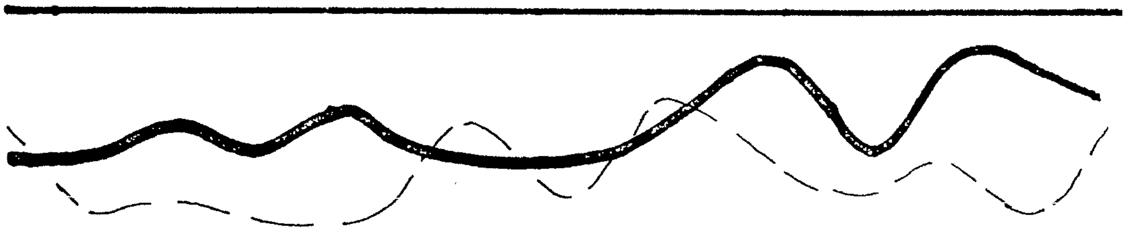


ENVIRONMENTAL VARIABLES RATED BY DISTRICT

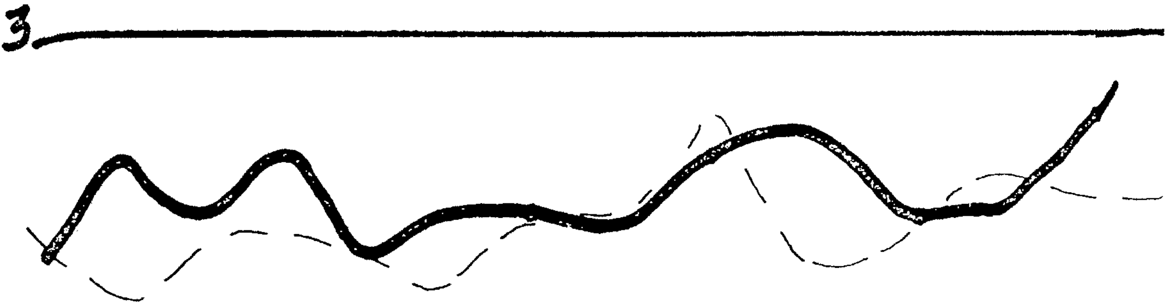
151



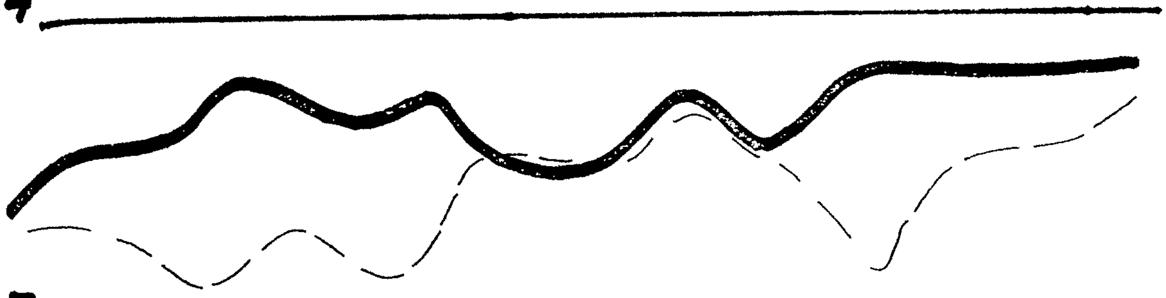
152



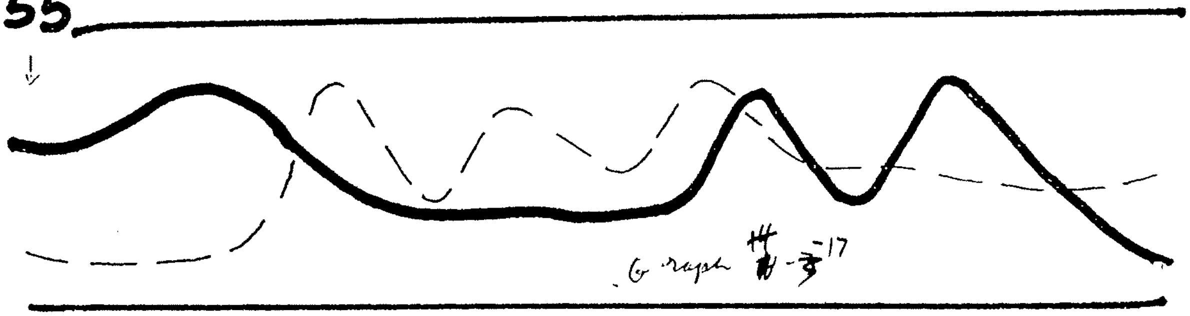
153



154



155



Graph #-17

CHAPTER 14

ENVIRONMENTAL INDICATORS AND PROBLEMS

The responses to the questionnaire gave the authors one measure of the quality of Englewood's environments. Added to these, the authors included a separate measure of environmental quality based on their own observation and data-gathering, as well as on local sources which had already begun the process of evaluation. These additional qualitative areas were housing quality, public transportation, parks and recreation, and social services.

Housing Quality

> "Compared to many other communities the prevalence of housing deprivation in Englewood is relatively low. Since the mid-1960's urban renewal and an active low and moderate housing program have done much to eradicate and alleviate the most severe housing conditions that had beset the city. As Englewood continues resolving its most obvious and debilitating housing problems, the focus of concern is likely to shift from replacing poor housing to reusing the existing supply of servicable housing and enhancing the qualities and public services that sustain neighborhood life.
>
> Nevertheless, for the up to six percent of Englewood's households suffering from poor housing conditions the situation is intolerable and demands immediate attention. In addition to families living in unsatisfactory shelter, another group of households, possibly up to 10% of the City's families, live in neighborhoods exhibiting noticeable housing deficiencies. While the second group of households does not face personal and immediate housing difficulties their dwellings may have some physical defects or deficiencies. Even if their dwellings are not affected the block they live on may have a reasonable number of deficient dwellings or it may be subject to the adverse effects of near-by non-residential areas."
>
> (50, p. 35)

The rating of housing quality gave the authors a qualitative definition of social areas and also a measure by which to compare the ratings of individual neighborhoods given by the questionnaire respondents. The factors included in our assessment of housing quality were: facade observation, rehabilition site ratings, (including other study sites in various parts of the City), zoning regulations and lot size, and areas considered sub-par because of high scores in a rodent survey conducted by the Englewood Board of Health and the New Jersey Department of Health (see Map 14-1), assessed valuations and sales prices (see Table 14-2, Maps 14-3,4).

The housing situation was studied extensively in 1974 (50) and the conclusions of that study have resulted in extensive efforts on the part of the City and the Federal Government toward rehabilitation and subsidized public housing. The low vacancy rate (less than 2% in 1976) results in a lack of available housing for both renters and potential owners, especially in the low and middle income groups.

The Rehabilitation Program designated older, sound housing needing exterior work as sub-par and a point system was set up which rated such items as carpentry, painting and other repairs. This system was applied to well over five hundred structures and the ratings may be found on the Housing Quality Map (Map 14-5).

The ratings of housing quality reveal the spatial differentiation of the housing environment. Housing quality obviously relates to income and is highest in those areas of Census Districts 151 and 155 where large, well-built houses are surrounded by spacious yards. Other areas in 151, 152, and 153 contain structures of equally high quality which are smaller and stand on lots of lesser size

Map 14-1

Legend

③ NUMBER of ACTIVE RAT SIGNS

RODENT SURVEY
CITY OF ENGLEWOOD

VALUE OF OWNER-OCCUPIED HOUSING

Value	151	152	153	154	155	TOTAL
		%	%	%	%	%
0-14,999	--	6 (0.3)	60 (6.4)	50 (14.6)	7 (0.8)	123 (3.16)
15,000-17,499	1 (0.2)	26 (2.2)	66 (7.1)	38 (11.1)	9 (1.1)	140 (3.60)
17,500-19,999	--	55 (4.7)	127 (13.6)	78 (22.8)	16 (1.9)	276 (7.09)
20,000-24,999	3 (0.5)	250 (21.5)	265 (28.3)	95 (27.8)	73 (8.5)	686 (17.63)
25,000-34,999	17 (2.9)	514 (44.1)	323 (34.5)	47 (13.8)	138 (16.1)	1,039 (26.70)
35,000-49,999	66 (11.1)	275 (23.6)	86 (9.2)	24 (7.0)	218 (25.5)	669 (17.19)
50,000+	505 (85.3)	40 (3.4)	8 (0.9)	10 (2.9)	395 (46.1)	958 (24.62)
Total	592	1,166	935	342	856	3,891 (99.99)

Source: U.S. Census: 1970

Table 14-2

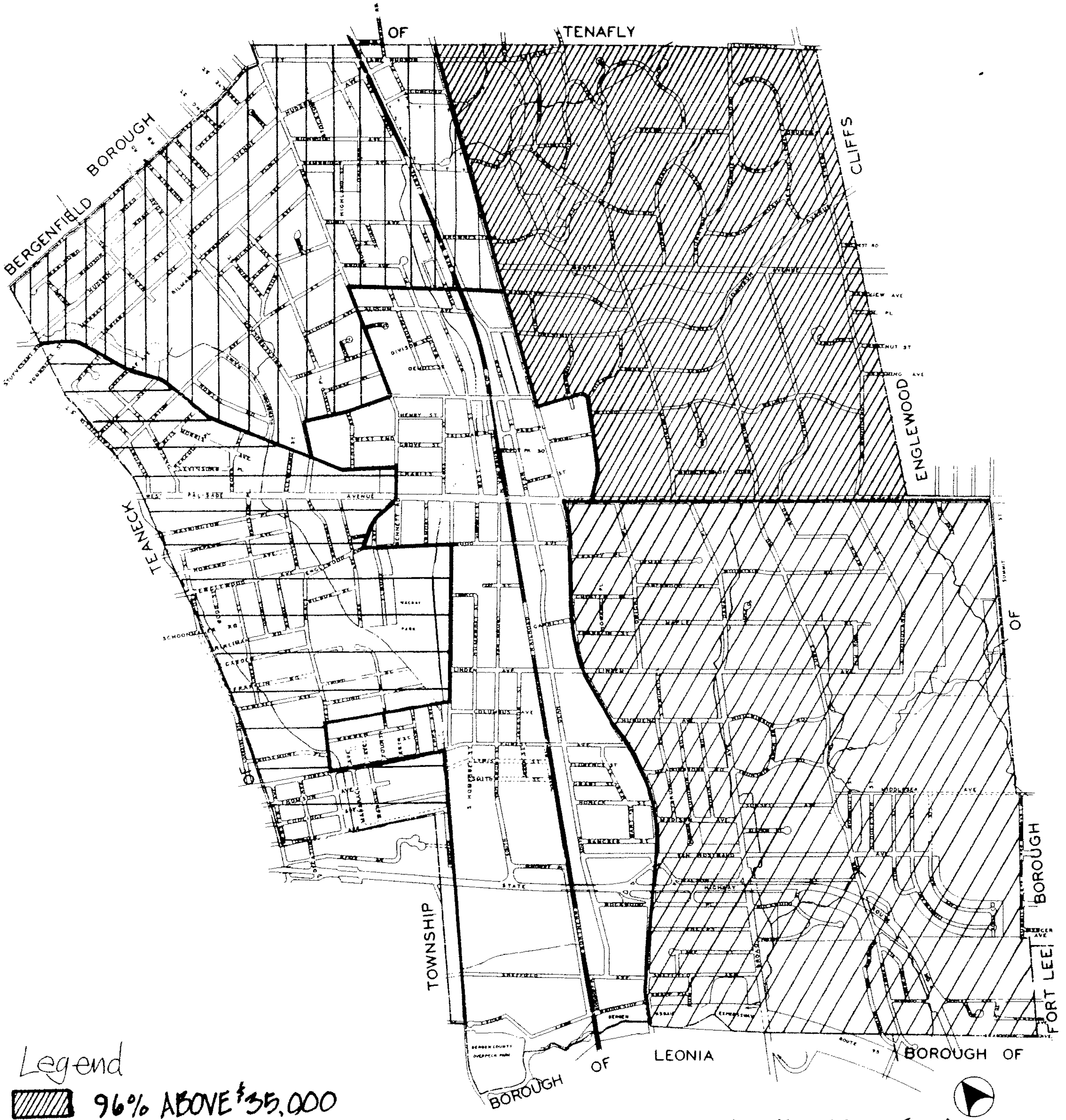
Map 14-3

Legend

▨ $20,000,-30,000
▥ 0 - 20,000
▤ 30,000 - 40,000
▦ OVER 40,000

AVERAGE ASSESSED VALUE
AND SALES PRICE, 1968-72
CITY OF ENGLEWOOD

Map 14-4

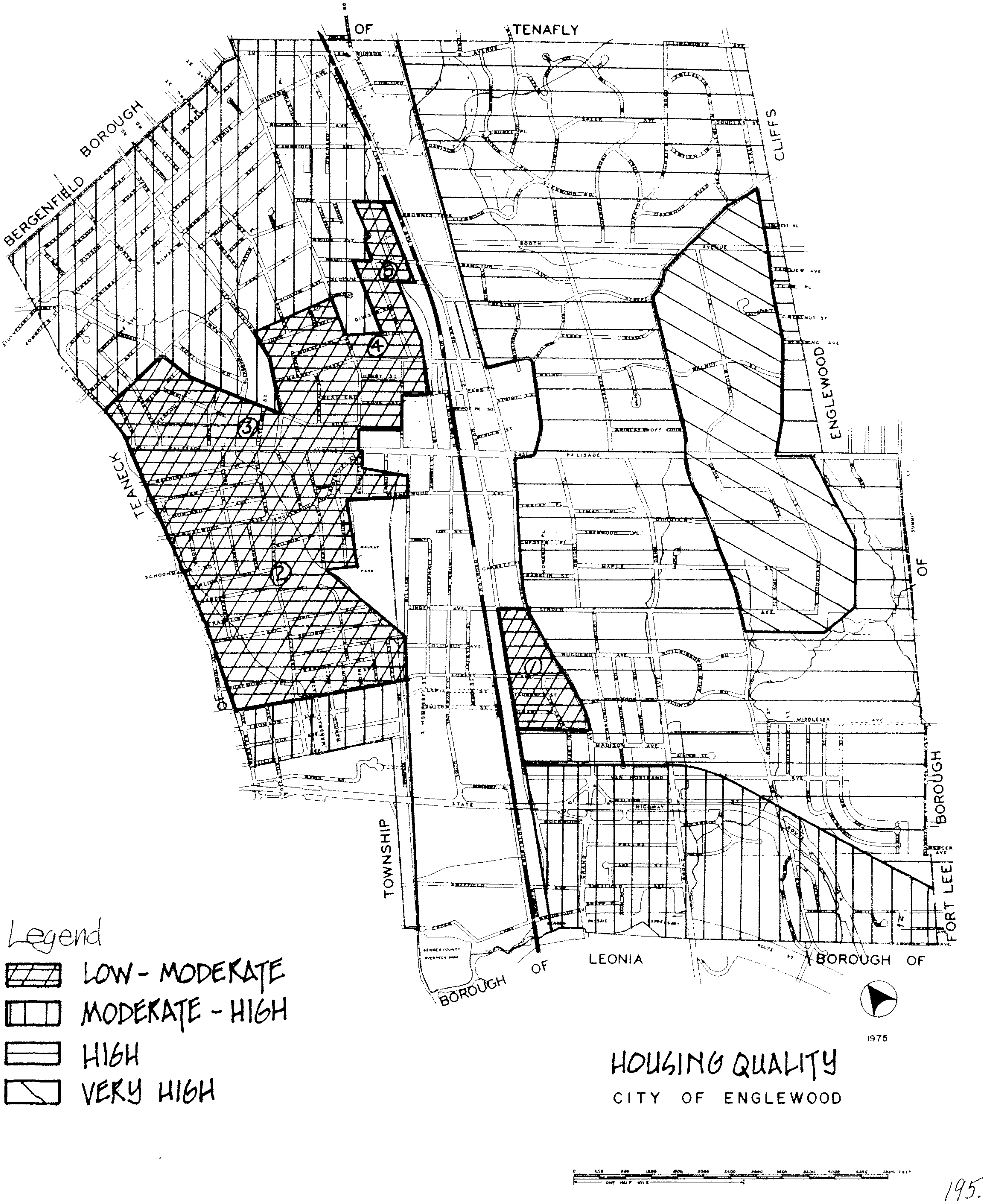


Legend

- ▨ 96% ABOVE $35,000
- ▨ 70% ABOVE $35,000
- ▥ 50% BETWEEN $25,000 and 35,000
- ▤ 50% BELOW $25,000
- ☐ 75% BELOW $25,000

ASSESSED VALUATION
and SALES PRICE
CITY OF ENGLEWOOD

Map 14-5



Legend

▨ LOW-MODERATE

▥ MODERATE-HIGH

▤ HIGH

▧ VERY HIGH

HOUSING QUALITY

CITY OF ENGLEWOOD

195.

Upon overlaying the Housing Quality Map on the Landforms Map, it becomes obvious that the large majority of sub-par and low quality housing is centered in the lowland area and coincides with older areas near the CBD.

Housing quality patterns, therefore, coincide with previously mentioned racial and racial and income distribution patterns, activity patterns, and perceived neighborhood environments, thus reinforcing the impression that Englewood is divided into several separate environments (see Maps 14-6, 7).

Map 14-6

Legend

▨ 96% ABOVE $35,000

▨ 70% ABOVE $35,000

▥ 50% BETWEEN $25,000 and $35,000

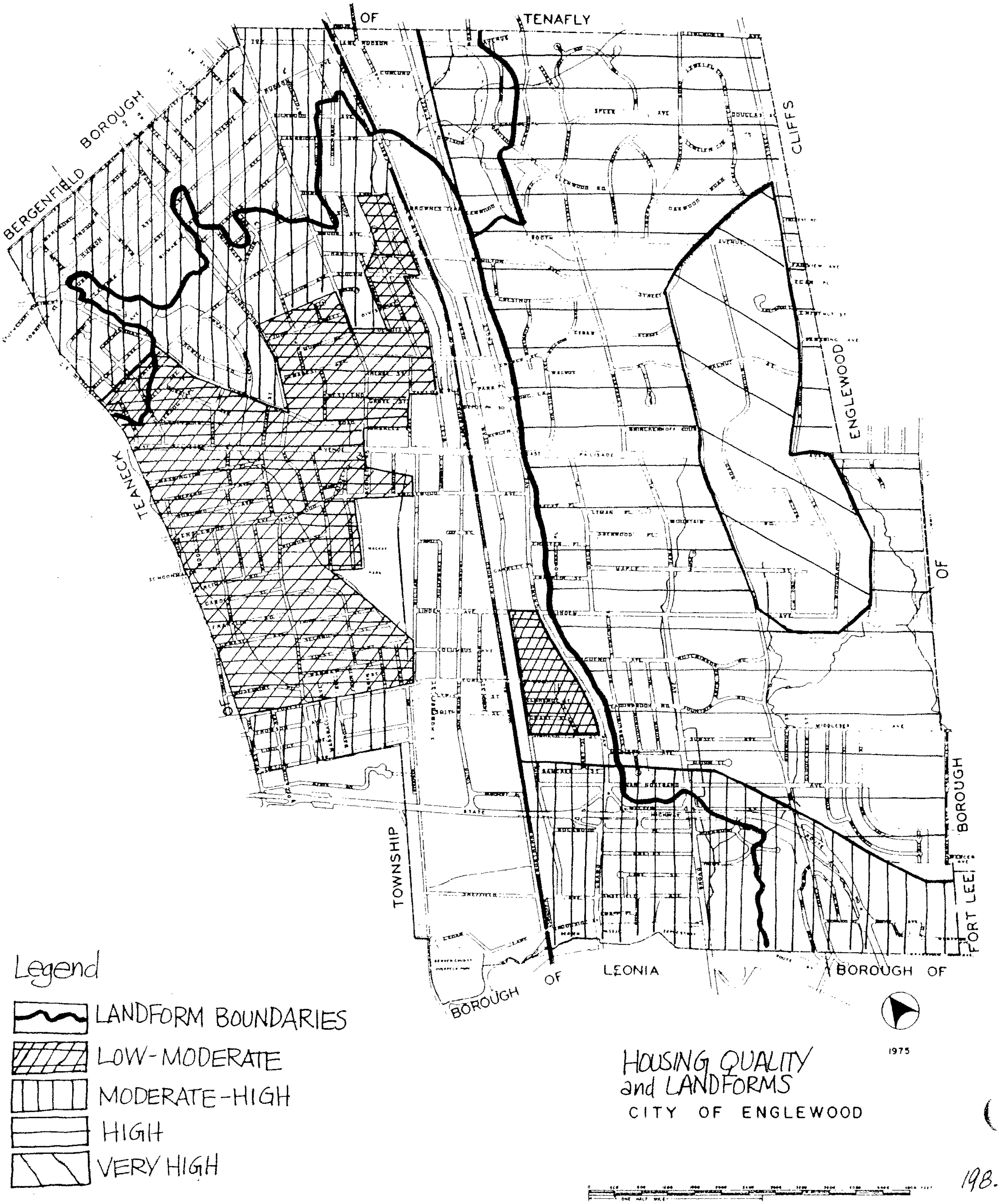
▤ 50% BELOW $25,000

☐ 75% BELOW $25,000

ASSESSED VALUATION
and LANDFORMS
by CENSUS DISTRICT

CITY OF ENGLEWOOD

Map 14-7



HOUSING QUALITY
and LANDFORMS
CITY OF ENGLEWOOD

PART III

CHAPTER 15

SYNTHESIS AND RECOMMENDATIONS

The environmental method of planning as taught at the University of Pennsylvania typically includes: factor inventory (natural); suitability-intrinsic suitability (natural); and the addition of some outside value system whose purpose is to weigh those natural factors deemed useful and important, to both the natural and human world. The authors would like to apply some parts of this analysis to the social data collected in order to better understand the relationship between the environment and identified social groups.

The accumulation of data inevitably leads to a synthesis in which inventory leads to measurement which, in turn, leads to problem identification. In Tables 15-1 thru 6 we have tried to bring together the information about landform areas and the groups within them. The particular group ratings and problems envisaged by residents are included, as well as the authors' own evaluation of the environmental factors of Englewood. Recommendations are included and are envisaged to be used within the framework of Chapter 16, POLICY MEASURES FOR THE ENVIRONMENT . We have tried to build up factor by factor our view of Englewood's environment.

Table 15-1 LAND FORMS

LANDFORM	GEOLOGY	SURF. WATER	SOILS	VEGETATION	ELEVATION	OLD LANDF'M	PHYSIOGR'PHY
Ridge	Diabase sill 10° westward dip.	Small, usually shallow first order streams.	Glacial ground moraine, mostly thin with frequent clay lenses.	Upland Beech-Maple	≥100'	Ridge glacially eroded into small terraces	Ridge - steep east slope, more gradual west
Lowland	Stratified drift over shale and sandstone	Dendritic drainage, 2nd to 4th order flood prone areas culverts.	Stratified drift, poorly drained, clay lenses, varves	Lowland Poplar, Willow Sycamore Black Gum	≤50' (often <10')	Phragmites marsh, glacial outwash	Filled marsh, flat valley
Glacial Upland	Kame terrace stratified drift over shale	Semi-radial drainage, 1st and 3rd order, culverts	Well-drained. stratified outwash sands	Upland mostly lawn trees	>50' <100'	Dissected terrace	Semi-radial ridge and valley of low relief

Table 15-2 Census District 151

LANDFORM	SOCIAL GROUP	ATTITUDES		ENV. QUALITY	MEETS STD?	PERCEIVED PR.	PROBLEMS	RESOURCES	RECOMM.'S
		Rating	Rank						
Ridge	Very high income white Census district 151	hous'g trees drink'g water climate recre. MOD: noise soccer air LOW: trans roads traffic	schools MOD: parks air roads noise	water qual. good air quality fair-good noise-good trans-fair parks/op.sp. good climate-good trees-good recreation fair-poor housing- good	yes yes* *see text yes N-A yes N-A N-A N-A yes	transport. roads traffic	recreation steep slopes minor flood'g thin soils		trans & roads see Alexander Recreation open theater precautions for soil ero- sion on steep slopes

Table 15-3 Census District 152

LANDFORM	SOCIAL GROUP	ATTITUDES		ENV. QUALITY	MEETS STD?	PERCEIVED PR	PROBLEMS	RESOURCES	RECOMM.'S
		Rating	Rank						
Upland	Census district 152 mod-high income Black, White Spanish	High: trees soc.ser. drink'g water parks Mod: trans. hous'g recr. Low: air q. roads noise traffic	High: schools soc.ser. hous'g noise parks Mod: traffic recre. air q. trans	water quality fair-good air quality fair-good noise-good transport. fair parks/op.sp. fair climate good trees-good recre.-fair-poor hous'g-good	yes yes* *see text yes N-A yes N-A N-A N-A yes	air quality roads noise traffic	recreation parks transport. flooding culverting rats		open theater improve & expand park netw'k. Roads & traffic see Alexander Rep. Abandon floodplains and culverts Rats - Health Dept. supervision

Table 15-4 Census District 153

LANDFORM	SOCIAL GROUP	ATTITUDES		ENV. QUALITY	MEETS STD?	PERCEIVED PR.	PROBLEMS	RESOURCES	RECOMM.'S
		Rating	Rank						
Lowland	low-mod. income Black, White Spanish Census District 153	High: soc.ser. recrea. climate Mod: schools Low: roads traffic Low: roads traff parks	High: soc.ser. roads parks Mod: hous'g air q recre. school	Water (surf.) fair air quality fair-good noise-fair trans-fair parks/op.sp. fair-poor climate-good trees fair-good recreation fair-poor hous'g-poor	yes yes* *see text no N-A yes N-A N-A N-A no	roads traffic parks noise housing	flooding surface water parks housing recreation		noise zoning rehab. continuation roads & traff. see Alexander Rep. expand, improve quality of park network. abandon flood plain, take streams out of culvert

Table 15-5 Census District 154

LANDFORM	SOCIAL GROUP	ATTITUDES		ENV. QUALITY	MEETS STD?	PERCEIVED PR	PROBLEMS	RESOURCES	RECOMM.'S
		Rating	Rank						
Lowland	Census dist. 154 Black, White moderate income	High: trees drink. wat. parks soc.ser. trans. Mod: climate recr. schools Low: traffic hous'g	High: soc.ser. recr. drink. water hous'g schools Mod: traffic trees noise air qual.	water quality fair air quality fair-good noise - poor trans. - fair parks & op.sp. fair - poor climate - good trees - poor recreation fair-poor housing fair	yes yes* *see text no N·A yes N·A N·A N·A yes	traffic housing noise	surface wat. flooding trees - CBD parks recreation (housing: some problems) traffic noise rats		·noise zoning ·traffic - see Alexander Report ·housing - continue rehab. prog. ·plant street trees in CBD ·abandon floodplain take streams out of culvert

Table 15-6 Census District 155

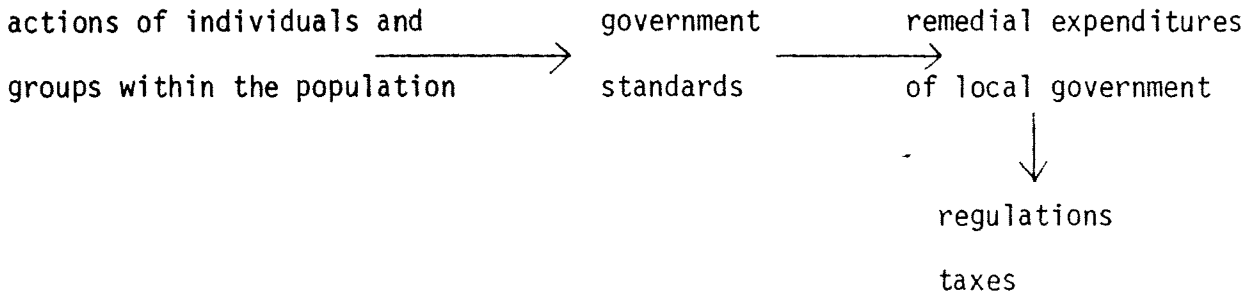
LANDFORM	SOCIAL GROUP	ATTITUDES		ENV. QUALITY	MEETS STD?	PERCEIVED PR	PROBLEMS	RESOURCES	RECOMM.'S
		Rating	Rank						
Ridge	Very high income white Census district 155	High trees parks climate dr'g wt. MOD: air Q. hous'g soc.ser recr. schools LOW: trans roads traffic	High schools MOD: hous'g air Q. traffic roads trans.	water quality good air quality fair-good noise fair transport. fair parks/op.sp. good climate-good trees - good recr. - fair hous'g-good	yes yes* *see text no N-A yes N-A N-A N-A yes	noise transport. roads traffic	steep slopes minor flood'g thin soils first order streams noise transport. recreation		•noise - zon'g veg. buffer •Trans., etc. see Alexander Rep't. •precautions for soil erosion on slopes •protect stream •open theater

CHAPTER 16

POLICY MEASURES FOR THE ENVIRONMENT

In this final Section we have accumulated a group of policy measures which, when problem areas are already identified, give some ideas as to alternative policies which can be followed by citizen groups, elected officials, and the population at large. An overall view of the processes by which environmental degradation and upgrading operate would look something like this:

Environmental Quality - A Working Model



independent variables:

- population
- proximity of population
- level of development
- taxing power and pool

TABLE 16-1

with the actions of individuals and corporations operating in and around governmental standards and being affected by regulations, taxes, and remedial attempts by outside forces.

Any local group whose object is to effect any change in the environment should choose in which part of the process their actions can be most effective.

TABLE 16-2

Policy Measures for the Environment:

Responses to Macroenvironmental Conditions (54)

Adapted by Bradley, Sanders, & McKenna

Elements in the Environment	Attributes of Macroenvironment	Societal-Governmental Approach	Private/Individual Response	
The Natural Environment			Family	Firm
1. The airshed	air quality - smoke, soot, smog, gaseous waste, smells or odors (suspended particulates)	emission or ambient air stds. fuel or combustion equipment stds. tax on emissions	shift outdoor activities indoors ventilation control - air filter and conditioning maintenance relocation	waste reduction waste treatment relocation
2. The watershed	surface water quality ground water quality	water quality standards municipal water treatment plants effluent charges and user fees regional transfers of water protection of aquifers	individual wells	changes in water sources industrial waste treatment plants changes in use patterns - recirculation and reuse relocation

3. Soil	fertility erosion potential drainage characteristics engineering characteristics	erosion & drainage stds Soil Conservation Service education campaigns	conservation methods	conservation methods construction standards
4. Vegetation	needless destruction, robbing community of climate-modifying, air-filtering, esthetically pleasing, noise-controlling amenities siltation & erosion flooding	recognition of importance protection by various means replanting & care of existing vegetation	proper care of soil & veg. replanting	avoidance of needless destruction landscaping
5. Open Space	lack of vegetation overcrowding unrelieved asphalt and concrete	redevelopment plantings change in transport systems transfer of development rights - easements direct acquisition	landscaping guided nature trips relocation to suburbs	landscaping

6. Noise zones	unacceptably high noise levels deleterious effects on human health & lifestyle	zoning regulations muffler stds. for vehicles, construction equipment, planes, small machinery restrictions on air flight patterns green buffer zones nuisance laws pertaining to noise reduced speed limits relocation of traffic	insulation & better construction in housing relocation installation of mufflers on home equipment relocate outdoor activities indoors	insulation & better construction mufflers on equipment green buffer zones
7. Odor zones	deleterious effect on health and lifestyle	ambient air quality stds.	relocate outdoor activities indoors filter air	effluent treatments for masking or removal of odors

8. Microclimate	weather variations	building codes snow removal emergency operations planting of vegetation	household design clothes activities suited to climate planting of vegetation	cropping pattern construction and materials planting of vegetation
9. Exposure	amount of sunshine ability to install either passive or active solar energy collectors	building codes & stds. "solar bill of rights"	window area use of colors relocation	window area & use of glass use of colors
<u>The Spatial Environment</u>				
10. Transportation	traffic congestion lack of mobility	transportation programs - form and structure	individual preferences public transportation carpools	parking facilities staggered work hours carpools

11. Sewerage facilities	pollution diminished supply of usable water	sewerage systems municipal treatment plants standards reclamation & reuse	outhouse or septic tanks self-composting toilets reclamation devices	treatment plants disposal systems reclamation & reuse
12. Health	lack of health care spread of environmentally caused conditions and illnesses	medicare physical fitness programs recreation programs preventive medicine public health education social security social work hospitals & clinics pest control air, water, noise stds.	medical insurance personal care accident prevention preventive medicine	safety programs medical insurance medical staff occupational health & safety stds.

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LIST OF ILLUSTRATIONS

Wildlife Species List

Water Testing Results

CHATPER 17

BUILDINGS AND SITES OF POSSIBLE ARCHITECTURAL SIGNIFICANCE

This is a very basic survey survey of Englewood's extant domestic and civic architecture of the 19th and early 20th centuries, including a few 18th century structures, and some 18th and 19th century historic sites. It is a purely visual survey done from the sidewalk or through the car window, arbitrary at times, and highly subjective. As funds were limited, it was not possible to do special research on the history of any site or structure. No detailed physical examination was done of any structure nor was any resident interviewed regarding his or her home. The survey does not define what is or is not historic or determine what should or should not be preserved, nor does it evaluate the historic or architectural significance of any site or structure. This can be done only after detailed physical examination of the structure and intensive research into the history of the property and that of its owners.

A building was included in or excluded from the survey after a brief evaluation of its probably quality as originally built, its uniqueness, its present overall condition, the extent of exterior alterations, the condition of its grounds, and of any known historical data.

Buildings were listed whose value has not been excessively reduced by ill-conceived exterior alterations. Some have grounds that retain the feeling of the period to which the house belongs. Others, while abused, but retaining a large percentate of the original exterior details, were also listed. In some cases a building was included because it was considered unique or folk architecture, or was an example of a type-specimen, although having little datable detail or "architectural" or "historic value" to speak of. Further research and examination may find some "listees" not all that important - a more detailed survey would possibly eliminate a few structures presently included. Some may have been missed inadvertently, due to error or their being hidden from the street by Englewood's luxuriant flora.

For the purposes of the survey, the City was divided into four sections, each corresponding roughly to one of the four wards. Each section has its own group of survey numbers starting with the number one. In the CBD the buildings were listed generally ignoring the appearance of the ground floor if the upper stories of the facade had anything worth noting or had some degree of integrity. A few structures were listed because they date to the beginning of the downtown area, and should at least be noted. Generally speaking, throughout the City, all structures built before the turn of the century were noted if they met the criteria, as many were built between 1900 and 1920, especially in the western half of the City and the areas immediately to the east of the Grand-Engle corridor.

Preliminary Conclusions

The listing of a structure in this survey does not imply that it should stand for eternity, or even that it is important; but that it certainly bears further looking into, to a greater or lesser degree. Most structures noted here are in good repair, some exceptionally so, almost as they were when built. Ideally they should remain this way -

the owners should be encouraged to preserve the exterior of their homes, for this in turn would help retain the architectural character of the City.

The range of size and quality of the buildings reflects the socio-economic levels that existed in the 19th and early 20th century Englewood. They follow the stylistic trends in vernacular architecture on the national scene, and with a few exceptions, are conservative in feeling, not ostentatious. Most of the structures listed have purely local historic, architectural, or environmental value as components of the Cityscape.

Within the City are areas where there are groups of buildings that retain much of their original architectural integrity. These could form the basis of future historic and/or architectural/neighborhood conservation districts. The historic and physical relationships between the structures within these areas should be established as a prerequisite for such districts to be created by any kind of preservation ordinance.

TERMS USED IN THE SURVEY

c (circa)	As used in this survey the abbreviation of "c" refers to the approximate date of construction. Some dates given will prove to be close, while others will vary five or more years either way.
detail	Refers to decorative shingles, bargeboards, brackets, finials, scrolls, etc., dating from the time the structure was built.
Original Exterior	Little or no alteration on the exterior.
Porch	Porch is original with some details and/or that it has had little or no alteration.
Mansard	Refers to a mansard roof
Grounds	Denotes grounds that are well-kept and/or retain their 19th or early 20th century character. Used mostly with regard to buildings in the western half of the City.
Chimney	The building has chimneys that appear to be original and/or unusual in design.
Site	Various locations around the City are known to have had a building felt to have historic significance, but now gone.
Pond Site	Former location of a man-made pond, used in conjunction with a mill.
Road	Road considered to have historic significance, dating from the 17th through early 19th centuries.
Survey No.	This refers to the numbers on the field copy maps which eventually may be transferred to the final copy.

NOTE: Some listings do not have street numbers. These will have to be taken from the Tax Map.

Survey No. 1

1) 76-78 West Palisade Ave., Frame c 1870, 2½ story frame. Mansard Slate roof.

2) 136-138 West Palisade Ave., Frame, built 1897. (West Side Presbyterian Church).

3) 166 West Palisade Ave., Frame, c 1910, 2 story stone foundation.

4) 200 West Palisade Ave., Frame c 1880, 2 story original exterior with details and shingles, unique.

5) 204 West Palisade Ave., Frame, c 1880, 2 story slate roof.

6) 212 West Palisade Ave., Frame, c 1900, exterior details.

7) West Palisade Ave., between 204-212. Brick, c 1900, 2 story, unique.

8) 230 West Palisade Ave., Frame, c 1880.

9) 244 West Englewood Ave., Cement block, 2 story, c 1910, unique.

10) 116 Reade St., Frame, 2 story, c 1870, mansard roof.

11) Reade St., Frame, 2 story, c 1860, barn in rear.

12) 102 Lafayette Pl., c 1860.

13) a) 70 Lafayette Pl., c 1890, flat roof.
    b) 66 Lafayette Pl., c 1870, 2 story frame, slate mansard roof.

14) 204 Englewood Ave., 1½ story frame Dutch Colonial style, c 1875.

15) Probable site of Revolutionary period mill site (Lozier?) Pond site apparently between Brookway and Mattlage.

16) 8 Cottage Pl., Frame, 2 story, c 1860, barge board, front porch.

17) 10 Cottage Pl., Frame, 1½ story, c 1865.

18) Cottage Pl., Frame, 2 story, c 1865, with mansard roof.

19) 42 Cottage Pl., brick, 1½ story, c 1865, with mansard roof.

20) Cottage Pl., house lost most of exterior architectural value but has finely fitted stone foundation. 2 story frame, c 1870.

21) 48 or 46 Cottage Pl., 2 story frame, c 1880, exterior details.

22) 151 Englewood Ave., 2 story frame, c 1875, with mansard.

23) Washington Pl., 2 story brick, c 1890.

24) 356 Englewood Ave., frame barn, c 1870.

25) 141 Greene St., 2 story frame, c 1860.

26) 133 Greene St., 2 story frame, with mansard roof - cast iron work on roof, c 1870.

26a) Well - period Victorian, c 1870.

27) Rosemont Pl., frame barn with cupola, c 1875.

28) 2nd St., 1½ story frame, c 1865.

29) 2nd St., 1½ story frame, c 1865.

30) 2nd St., 1½ story frame, c 1865.

31) 3rd St., 1½ story frame, c 1865. Moved and/or new foundation.

32) 111 Lafayette Pl., 2 story frame, c 1880.

33) Lafayette Pl., 1½ story frame, c 1900.

34) Park Aven., 2 story frame, c 1910, original exterior.

35) 105 Park Ave., 2 story frame, c 1890, original exterior.

36) 90 Park Ave., 2½story frame, c 1890.

37) c 19th Century mill pond site.

38) c 18th Century mill pond site.

39) 2 East Palisade Ave., 2 story brick, c 1890.

40) 8-12 East Palisade Ave., 2 story, c 1920, one of better terra-cetta buildings.

41) 34 East Palisade Ave., 3 story brick, c 1890-1900.

42) 46 East Palisade Ave., 3 story brick, c 1890, cornice.

43) Englewood Ave., 3 buildings, 2 story frame, c 1880-1910.

44) 52-60 West Palisade Ave., 3 story brick, c 1890.

45) 31 East Linden Ave., 2 story frame, stone foundation, c 1885.

46) 67 Forest Ave., 1½ story frame, c 1865.

47) 180 Grand Ave., 2 story frame, c 1870, stone foundation.

48) 228 Grand Ave., Garret A. Lydecker House, 1½ story stone and frame, c 1800-1806. Frame wing, 1790-1830. HABS "Dutch Colonial"

49) 174 Grand Ave., 2 story frame, c 1870, mansard roof.

50) 166 Grand Ave., Garret J. Lydecker House, 2½ story frame with slate mansard roof. Probable site of Rev. Garret Lydecker home and also of Ryck. Possibly built 1820-35 and altered, c 1870, stone and frame wing in rear.

51) 114 Grand Ave., 2 story frame, c 1875.

52) 106 Grand Ave., 2 story frame, c 1875.

53) 60 Grand Ave., John G. Benson House, c 1800, 1½ story stone and frame. "Dutch Colonial". BCHS marker.

54) 50 Grand Ave., 2 story frame with mansard. c 1870.

55) Van Brunt store site.

56) 370 Grand Ave., T.W. Demarest House. c 1800-1811. 1½ story stone and frame. Altered c 1900. "Dutch Colonial"

57) Lincoln School, brick c 1920.

58) Liberty Pole Tavern site.

59) Gate House, brick, c 1890 (W.W. Phelps)

60) Oprandy House, 2½ story, c 1890.

61) 69 Park Ave., 2½ story frame, c 1885, some exterior details.

62) 73 Park Ave., 2½ story frame, c 1885, some exterior details.

Survey No. 2

1) 104 James St., 2 story frame, c 1865, mansard.

2) 72 Demarest Ave., 2½ story frame, c 1910, original exterior.

3) 78 Demarest Ave., 2 story frame, c 1870.

4) 82 Demarest Ave., 2 story frame, c 1890.

5) 86 Demarest Ave., 2 story frame, c 1880.

6) Corner Tenafly Rd. and Demarest Ave., (Reformed Church) (Mt. Calvary Baptist) built 1875. Stone, slate roof. Steeple has flashing and slate missing.

7) 95 Tenafly Rd., 2 story, mansard roof, frame, c 1875. Porch about 1885 or 1890.

8) 89 Tenafly Rd., 1½ story frame, c 1875 with addition.

9) 77 and 81 Tenafly Rd., Typical c 1910 frame, 2 story, mostly unaltered exteriors.

10) 72 Tenafly Rd., 2 story frame, c 1885, exterior details.

11) Liberty School, Tenafly Rd., 1901-1908 2 story brick.

12) 15 Tenafly Rd., 2½ story frame, porch, c 1890.

13) Charles St., buildings., c 1880-1910, most are extensively altered.

14) 19-21 James St., c 1880, 2 story frame.

15) 82 Grove St., 2 story frame, c 1870, restorable exterior.

16) 86 Grove St., 2 story frame, c 1870.

17) Grove St., 2 story frame, c 1885.

18) 87 Grove St., 2 story frame, c 1870.

19) 88 Henry St., 2 story frame, c 1865.

20) Henry St., 2 story frame, c 1865.

21) 71 Henry St., 2 story frame, front porch, c 1875.

22) 90 James St., 2 story frame, c 1870, restorable.

23) 96 James St., 2 story frame, mansard roof, c 1870.

24) 84 James St., 2 story frame, mansard roof, c 1870.

25) 72 James St., 2 story frame, c 1870-1885, original exterior. Barn in rear, c 1870.

26) 67 James St., 2 story frame, c 1865, mansard roof, (Tallman).

27) Tallman Pl., 2½ story frame, (Tallman?), c 1910.

28) 42 Tallman Pl., 1½ story frame, c 1880, Stone foundation.

29) 3 buildings-Tallman Ct., 1½ story frame, c 1910. Altered cottages with stone foundations.

30) City Hall. Built 1922. 2 story brick. Site of Stagg's Hotel, which became first City Hall.

31) 33 East Palisade Ave., 3 story brick, c 1890.

32) 37 East Palisade Ave., 3 story frame, c 1870.

33) 49 East Palisade Ave., 3 story brick, c 1890.

34) 18-24 Engle St., 3 story brick, c 1910.

35) 38-44 Bergen St., 2 story frame, c 1875.

36) 30 Bergen St., 2 story frame, c 1870.

37) 25 & 29 Bergen St., 2 story frame, c 1870-1880.

38) 17 East Palisade Ave., (Fronts on Dean Street). 2 story frame, c 1870.

39) 31-33 North Dean St., 2 story frame, c 1880.

40) Peoples Trust, cor. North Dean St. and Park Pl., stone faced c 1920, (Palisade Trust & Guaranty Co.)

41) 95 North Dean St., in rear, 1 story frame barn, c 1870.

42) 30 Demarest Ave., 2 story frame, c 1870.

43) 102 Engle St., 2 story frame, c 1865.

44) 96 Engle St., 2 story frame, c 1870.

45) 44 Engle St., 2 story frame, c 1870.

46) Mill site in 1700's. Ice Pond site, filled in 1890's

47) 172 West St., 2½ story frame, c 1900.

48) 192 West St., 2½ story frame, c 1890.

49) 205 Waldo Pl., 2½ story frame, c 1890. Original exterior details, stone foundation.

50) Waldo Pl, 2½ story frame, c 1870. Partially good porch.

51) 202 Waldo Pl., 2½ story frame, c 1905.

52) 166 Waldo Pl., 2½ story frame, c 1865.

53) 160 Waldo Pl., 2½ story frame, c 1865. Good interior, exterior, and porch.

54) 155 Waldo Pl., 2½ story frame, c 1865, porch.

55) 147 Waldo Pl., 2½ story frame, c 1910, original exterior.

56) 162 Prospect St., 2½ story frame, c 1870, porch.

57) 160 Prospect St., 2 story frame, c 1865, (porch gone).

58) Waldo Pl., 2½ story frame, c 1910, exterior and grounds.

59) 205 Prospect St., 2½ story frame, c 1870, slate roof, porch.

60) 202 Prospect St., 2½ story frame, c 1890, fence.

61) 223 Prospect St., 2 story frame, c 1865, porch, interior.

62) 98 Hamilton Ave., 2½ story frame, c 1910, grounds.

63) 100 Hamilton Ave., 1½ story frame bungalow, c 1915.

64) 109 Hamilton Ave., 1½ story brick, c 1870, slate mansard roof, porch, exterior details (parish house)?

65) 85 Hamilton Ave., 1½ story frame, c 1875.

66) 73 Hamilton Ave., 1½ story, brick (stucco), mansard roof.

67) 232 Waldo Pl., 2½ story frame, c 1875.

68) 234 Waldo Pl., 2½ story frame, mansard roof, c 1870.

69) 218 Waldo Pl., 2½ story frame, mansard slate roof, c 1865, exterior.

70) 96 Slocum Ave., 2½ story frame, c 1885, original exterior.

71) Slocum Ave., 1½ story frame, c 1865.

72) 219 Pindle Ave., 1½ story frame, c 1865.

73) 253 Waldo Pl., 2½ story frame, c 1880, porch, shingles.

74) 257 Waldo Pl., 2½ story frame, c 1880, porch, shingles.

75) 64 Brook St., 2½ story frame, c 1895, porch exterior.

76) 69 Brook St., 1½ story frame cottage, c 1860, unique.

77) 72 Brook St., 2½ story frame, c 1870, exterior.

78) 95 Brook St., 2½ story frame, c 1880, exterior details, porch, unique gambrel roof. (Westervelt)

79) Tenafly Rd., 1½ story stone Dutch Colonial, possibly, c 1800. Appears to have been altered about 1865-70, or perhaps actually built then.

80) Tenafly Rd., 2 story frame, c 1830, altered 1870's. Hand split shingles, said to have Pre-Revolutionary kitchen wing.

81) West Palisade Ave., 2½ story brick and frame duplex, slate roof, c 1920.

82) 159 West Palisade Ave., 2½ story brick and frame, c 1920.

83) 37 Knickerbocker Rd., 2½ story brick, c 1920. Green tile roof - unique in this area.

84) 167 Liberty Rd., 2½ story frame, c 1915.

85) Liberty Rd., 2½ story frame, c 1920, porch with columns.

86) 139 Liberty Rd., 2½ story frame, c 1915, porch shutters, exterior.

87) 178 Liberty Rd., 2½ story frame, c 1870.

88) Knickerbocker Rd., 2½ story frame, mansard roof, exterior details, restorable, c 1870. (Mayor Tipping)

89) 63 Knickerbocker Rd., 2½ story frame, c 1900, original exterior.

90) 125 Knickerbocker Rd., 2½ story frame, c 1910, most original exterior details.

91) 190 John St., 2½ story frame, c 1895, original exterior.

92) 186 John St., 2½ story frame, c 1885, good details.

93) 170 John St., 2½ story frame, c 1885, porch.

94) John St., 2½ story frame, c 1890, porch later?

95) 164 John St., 2½ story frame, c 1890.

96) 157 John St., 2½ story frame, c 1890.

97) 183 John St., 2½ story frame, c 1885, exterior, shingles.

98) John St., 2½ story frame, c 1910, exterior, grounds.

99) 162 Jane St., 1½ story frame, c 1880, good exterior, grounds.

100) 156 Jane St., 1½ story frame, 1885, good exterior, grounds.

101) Jane St., 2½ story frame, c 1885, good exterior grounds.

102) Tenafly Rd., 2½ story frame, c 1920, exterior, grounds.

103) 222 Central Ave., 2½ story frame, c 1880, porch, bargeboard, restorable.

104) 183 Demarest Ave., 2½ story frame, c 1910, exterior, grounds.

105) 157 Morse Pl., 2½ story frame, c 1875, chimneys, porch, altered.

106) 48 Tenafly Rd., 2½ story frame, c 1885, exterior details.

106a) 12 Knickerbocker Rd., 2½ story frame and brick, c 1895, stained glass window.

107) 64 Knickerbocker Rd., c 1890, 2½ story frame.

108) 104 Knickerbocker Rd., c 1890, 2½ story frame, porch.

109) 280 Tenafly Rd., c 1865, 2½ story frame, some details.

110) 398 Tenafly Rd., c 1920, 2½ story frame, orig. extension.

111) 405 Tenafly Rd., c 1890, 2½ story frame, some original details, aluminum siding.

112) 473 Tenafly Rd., c 1740-1810-1865, porch 1865, 2½ story stone (Vermilye in 1876, B.C. Atlas) stone wing, barns (frame). Said to date in part to 1802 and small wing earlier c 1740.

113) 486 Tenafly Rd., 1½ story stone (formerly English Neighborhood School, built 1818, rebuilt 1850) BCHS marker.

114) 93 Ivy La., c 1915, 1½ story frame, stone porch.

115) Ivy La., c 1880, shutters, porch, stone foundation.

116) 80 Ivy La., c 1890, 2½ story frame, bell cast roof on tower.

117) Ivy La., 2½ story frame, c 1870, w/alterations.

118) 60 Ivy La., c 1870, 2½ story frame, w/alterations.

119) 52 Ivy La., c 1900, 2½ story frame, exterior detail, porch.

120) 494 Orchard St., c 1870, 2½ story frame, porch altered, 6/6 windows.

121) West Hudson Ave., c 1870, Hudson Avenue Church, 1½ story frame, w/bell in bell tower - disintegrated weathervane.

122) 56 West Hudson Ave., c 1885, 2½ story frame, exterior detail.

123) 19 East Ivy La., c 1895, firehouse, 2 story brick, w/alterations.

124) 34 East Ivy La., c 1885, 2½ story frame, original porch.

125) East Ivy La., c 1870, 2½ story frame, stone foundation on main house and wing, carriage house, both altered.

126) 479 Valley Pl., 2½ story frame, mansard, c 1870.

127) 475 Valley Pl., 2½ story frame, mansard, c 1870.

128) 44 Concord St., 2½ story frame, c 1895.

129) 20 Concord St., 2½ story frame, c 1875, almost original.

130) Barn (on Concord), c 1870, (used as garage).

131) 498 and 492 Engle St., 2½ story frame, c 1910, mostly original exteriors.

132) 476 Engle St., 2½ story frame, c 1915, mostly original exterior.

133) Engle St., 1 story stucco (frame?), mission style w/red tile roof bungalow, c 1915, garage.

134) Brookside Cemetary stone wall (both sides of Engle St.), c 1880?

135) 216 and 220 Engle St., 2½ story frame, c 1900, good exteriors.

136) 162 Engle St., 2½ story frame, c 1880.

137) 128 Engle St., c 1870, 2 story frame, bargeboard in rear.

138) Liberty Rd., c 1900, 2½ story frame, exterior details.

139) 284 Liberty Rd., c 1890, 2½ story frame, c 1890, wing c 1860.

140) 345 Liberty Rd., c 1865, 2½ story frame, slate mansard roof, dressed stone foundation, cast iron "widow's walk".

141) 403 Liberty Rd., 2½ story frame, tile roof, c 1820, (Zabriskie).

142) 480 Liberty Rd., 2½ story frame, c 1900.

143) 501 Liberty Rd., 2½ story frame, c 1865-1870, large brick fireplace, back exposed on wing.

144) 17 Cleveland St., 2½ story frame, c 1910, shutters.

Survey No. 3

1) St. Paul's Church, Engle St., built 1900-1901. Turner, Architect. Stone, windows by Tiffany and LaFarge.

2) 129 Engle St., 2½ story frame, mansard roof, c 1875, extensive alterations on exterior. (Mayor McKenna).

3) 57 Engle St., 2½ story frame, c 1870, porch, exterior details, little alteration.

4) 163 Engle St., frame and brick, c 1895. Justice H. Stone said to have lived here.

5) 199 Engle St., 2½ story frame, c 1870, exterior details, porch, front door, tower.

6) 121 Chestnut St., 2½ story frame, c 1890.

7) 147 Chestnut St., 2½ story frame, c 1865, front porch.

8) 114 Chestnut St., 2½ story frame, mansard roof, c 1865, exterior details, porch, dormer, slate roof.

9) Winthrop Pl., 2½ story frame, c 1870, slate roof, porch, exterior details.

10) 95 Chestnut St., 2½ story frame, c 1870, porch.

11) Chestnut St., 3 story frame, c 1865.

12) 6 Chestnut St., 2 story frame, c 1860, exterior details.

13) Chestnut St., 2 story frame, c 1900, original exterior.

14) 209 King St., 2 story frame, c 1890.

15) 18 King St., 2½ story frame, c 1895.

16) 214 King St., 1½ story frame, c 1910.

17) 218 King St., 2½ story frame, c 1890, exterior shutters.

18) 224 King St., 2 story frame, c 1890, original exterior porch.

19) 69 Hamilton Ave., 2½ story frame, c 1875, porches, slate roof, carriage house or barn.

20) 75 Hamilton Ave., 2½ story frame, c 1900, exterior details, porches, shingle.

21) 81 Hamilton Ave., 2½ story frame, c 1890, exterior details, porch.

22) 118 Hamilton Ave., 2½ story frame, c 1875, porch later.

23) Corner of Chestnut St and Cedar St., 2½ story frame, c 1860, porch, exterior details.

24) Cedar St., 2½ story, mansard roof, exterior details.

25) 151 Hillside Ave., 2½ story frame, c 1860, details.

26) 102 Hillside Ave., 2½ story frame, c 1900.

27) 80 Church St., 2½ story frame, c 1890, porch details.

28) Winthrop Pl., 2½ story frame, c 1885, exterior details, original exterior.

29) 135 Winthrop Pl., 1 story stone mansard, slate roof, c 1865. Apparently Frederick Low Olmstead Jr. lived here and helped the garden along.

30) 164 Winthrop Pl., 2½ story frame, c 1890, shingles.

31) 63 Spring La., 2½ story frame, c 1915, original exterior.

32) 67 Spring La., 2½ story frame, c 1915, original exterior.

33) 71 Spring La., 2½ story frame, c 1905, original exterior, (First Morrow house).

34) 87 Spring La., Munroe-Morse-Dunning House. 2½ story frame, c 1865, original exterior, original porch, slate roof. (Mayor Munroe).

35) 98 Hillside Ave., 2½ story frame, c 1870, original porch.

36) 100 Hillside Ave., 2½ story stone, c 1870, original porch.

37) Lydecker St., 1 story stone, c 1859. Gate house for Jones House.

38) 59 Walnut Ct., 2 story stone, c 1859, original exterior. (F. Wyman Jones).

39) 133 East Palisade Ave., 2½ story frame, c 1870.

40) Stone wall, 133-115 East Palisade Ave. Formerly wall of a 19th century house.

41) 82 East Palisade Ave., 2½ story frame, c 1870, porch c 1880, original exterior.

41a) 97 East Palisade Ave., 2½ story frame, c 1870.

41b) East Palisade Ave., 2½ story frame, c 1870.

42) 21 Hillside Ave., 2½ story frame, c 1885, original exterior. details, porch.

43) Hillside Ave., 6 houses, 2½ story frame, 1875-1895, exterior details.

44) 64 Hillside Ave., 2½ story frame, c 1895, porch, slate roof.

45) First Public Library, 1½ story brick, c 1920. The Dominie Demarest Farm and later the Englewood Hotel were on the northeast corner of E. Palisade Avenue and Engle St.

45a) Probable location Garret Lydecker House (earliest in Eng.) corner Engle & Palisade.

46) Brookside Chapel, (Dwight Memorial) First Church (Presbyterian) erected in Englewood. built 1860, moved in 1877 to present location.

47) Engle St., 2½ story frame, c 1865, slate mansard roof, most shutters, original porch.

48) 255 Walnut St., Bede School, 3 story frame, c 1885-1890, shingle style, chimneys.

49) 80 Brayton St., sandstone, small wing, c 1870.

50) 49 Brayton St., 2½ story frame and stone, c 1900.

51) 52 Brayton St., 2½ story (stone original section, c 1860).

52) 40 Brayton St., 3 story frame, c 1865, porch c 1900, shutters shingles, c 1900.

53) Dwight School, 2½ story frame, c 1915, w/carriage house.

54) 40 Lincoln St., 2½ stone gate house, c 1870, 2½ story, c 1870, (Barber).

55) Lincoln St., 2½ story stone, c 1875.

56) 104 Lincoln St., 1½ story stone, c 1870.

57) 104 North Woodland Ave., 2½ story stucco, c 1920, (Helicon Hall).

58) 76 North Woodland Ave., 3½ story stone frame, c 1885.

59) North Woodland Ave., 2½ story brick, half timber, c 1920.

60) 229, 241, 249 Chestnut St., frame, 2½ story, c 1900.

61) 254, 244 Chestnut St., frame, 2½ story, c 1910.

62) 200 Chestnut St., 1½ story frame, c 1920.

63) 221 Cedar St., 2½ story frame, 1875.

64) Next Day Hill Dwight W. Morrow House, c 1920.

Survey No. 4

1) 1st Presbyterian Church, E. Palisade Ave., stone, slate roof, c 1880.

2) 1st Presbyterian Church Parish House, E. Palisade Ave., c 1880.

3) 170 East Palisade Ave., 2½ story frame, c 1870.

4) 194 Sherman Pl., 2½ story frame, c 1890.

5) 178 Sherman Pl., 2½ story frame, c 1885, original exterior.

6) 170 Sherman Pl., 2½ story frame and stone, c 1885, exterior details, original exterior.

7) 156 Sherman Pl., 2½ story stone, c 1875, original exterior, reroofed.

8) 151 Sherman Pl., 2½ story frame, c 1870. exterior details.

9) 83 Dwight Pl., 2½ story frame, c 1870.

10) 76 Dwight Pl., 2½ story frame, c 1870.

10a) Dwight Pl., c 1860-1890, demolished within last 12 months. (shown on map).

11) 69 Tracy Pl., 2½ story frame, c 1885, details.

12) 5 Chester Pl., 2½ story frame, c 1885, original exterior.

13) Chester Pl., 2½ story frame, c 1885, original exterior.

14) 140 Dwight Pl., 3 story frame, c 1910, original exterior and chimney.

15) Franklin St., 2 story frame, c 1910, original exterior.

16) 74 East Linden Ave., 2½ story frame, c 1915, exterior.

17) 83 East Linden Ave., 2½ story frame, c 1910, exterior, carriage house on site.

18) East Linden Ave., 2½ story frame, c 1875, slate mansard roof, exterior details.

19) East Linden Ave., 2½ story frame, c 1870.

20) 184 Dwight Pl., 2½ story, c 1910, exterior, carriage house.

21) 200 South Dwight Pl., 2½ story frame, c 1900, exterior.

22) Maple St., 2½ story frame, c 1885, slate roof, details.

23) 156 Maple St., 2½ story frame, c 1910 exterior.

24) 164 Maple St., 2½ story frame, c 1890, exterior.

25) 209 Maple St., 2 story frame, c 1890, exterior.

26) 118 Dana Pl., 2½ story frame, c 1885, exterior.

27) 156 East Linden Ave., 2½ story frame, c 1870, exterior, porch.

28) 140 East Linden Ave., 1½ story stone, c 1890, exterior details, chimney.

29) 171 Meadowbrook Rd., 1½ story frame, c 1850.

30) 151 Meadowbrook Rd., 1½ story frame, c 1850. 8" Clapboard. Original 6/6 windows.

31) 285 Grand Ave., DeMott-Westervelt House, c 1808, 1½ story sandstone and frame wing. Dutch-type barn c 1808, frame. Both buildings on The National Register of Historic Places. HABS "Dutch Colonial"

32) 179 Walton Pl., c 1870, 2 story frame, porch, original exterior.

33) 488 Grand Ave., John DeMott House, 1½ story, sandstone, "Dutch Colonial", mostly original exterior, c 1740-1800, presumably Englewood's oldest residence. (small wing)

34) Grand Ave., DeMott House, 2½ story frame, c 1860, barns, out buildings, mostly original exterior.

35) Grand Ave., Englewood Firehouse, c 1900, 2 story brick.

36) 164 Lake St., 2½ story frame, c 1915, original exterior shingled porch.

37) Grand Ave., St. John's Episcopal Church, c 1870, frame.

38) Industrial complex, 2½ story brick, c 1890 (3 buildings).

39) Industrial building, 3 story frame, c 1870.

40) Jones Rd., 2½ story frame, c 1870, most exterior details.

41) 276 East Linden Ave., 2½ story frame, slate roof, c 1875.

42) East Linden Ave., 2½ story frame, c 1870, some details.

43) 376 East Palisade Ave., 2½ story frame, c 1870, original exterior and porch.

44) 36 South Woodland Ave., 1½ story frame, c 1890.

45) East Linden Ave., 2 story stucco, c 1925. (Bernarr McFadden House).

46) Sawmill site, mid 19th century.

47) Mill site, 18th century.