# RULS-AD-1980-400

October 1980

- [redacted]
- Article titled, "Bedminster Regional Center" used as Defendants's Exhibit

– Article + title pg + TOC – 62 pgs
– Appendices – 34 pgs.

# Bedminster Regional Center

**A Planning Study for Development of a Regional Mall in Bedminster Township, New Jersey**

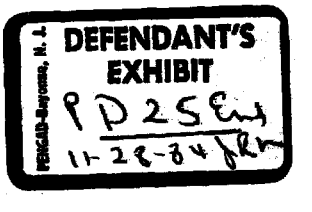
prepared by:

Wallace, Roberts and Todd

with

Gorove/Slade
S.I.T.E. Engineers
Keller & Kirkpatrick

October 1980



# BEDMINSTER REGIONAL CENTER

**A Planning Study for Development of a Regional Mall in Bedminster Township, New Jersey**


prepared by:

**Wallace, Roberts and Todd**

with

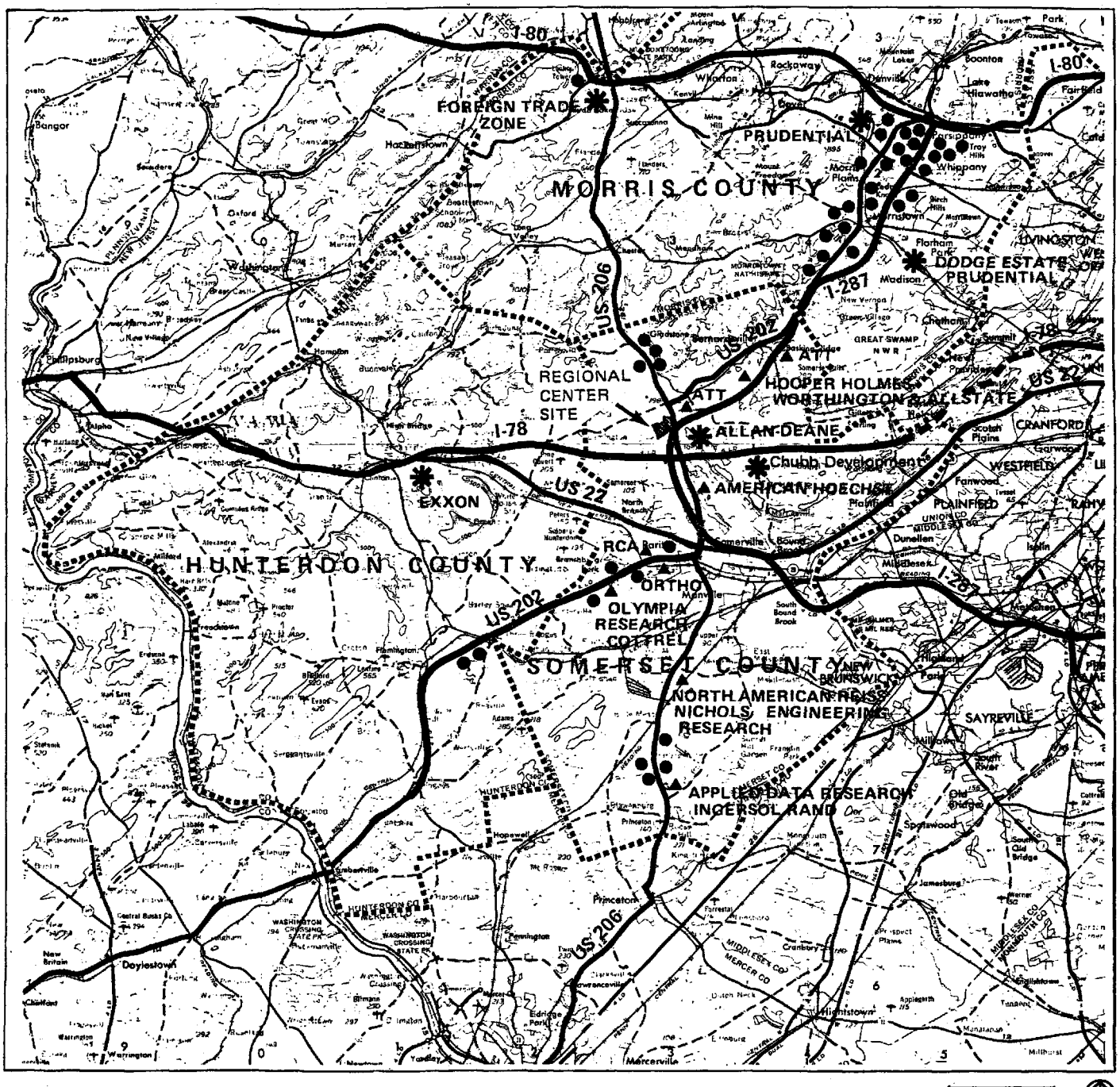
Gorove/Slade
S.I.T.E. Engineers
Keller & Kirkpatrick



October 1980

TABLE OF CONTENTS

LIST OF FIGURES




## REGIONAL GROWTH PATTERN

Source: Economic Development Office - Somerset County, Morris County, Hunterdon County.

▲ MAJOR CORPORATION DEVELOPMENTS 1970 - 1978

● 100,000 SQ. FT. DEVELOPMENT SINCE 1978

✱ MAJOR PROPOSED DEVELOPMENT CONCENTRATIONS BEYOND 1980

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

# 1. SUMMARY

## INTRODUCTION

This Report presents the Concept Plan of the proposed Regional Center in Bedminster Township, Somerset County, New Jersey. The Report is organized in 7 sections. Following this summary, the regional context of the project site is described providing general information on the project area's natural environment, demographics, employment, transportation and utilities, and regional planning policies. The third section illustrates the pattern of growth in the U.S. Route 202/206 corridor and addresses the influence the interchanges of Interstates 287 and 78 have and will have on regional development. The rationale for the proposed Regional Center and its underlying planning and design objectives are presented in Sections 4 and 5. The environmental characteristics of the proposed project site are detailed in Section 6. The final Section describes the Concept Plan and its various elements. This Section also provides a brief assessment of the potential environmental impacts that may result from construction and operation of the proposed project and mitigating actions taken to minimize negative impacts.

## The Project Site

The project site comprises 211 acres located immediately northwest of the intersection of U.S. Route 202/206 and River Road in Bedminster Township. The Concept Plan for this site represents the transformation of environmental constraints -- seasonal high water table, poorly drained soils and ponding -- into project amenities and the minimization of potential negative environmental impacts.

## The Proposed Regional Center

The proposed Regional Center will have 1,200,000 square feet of Gross Leasable Area (GLA) with four department stores and space to accommodate a fifth in the future. The space provided for the stores will total 800,000 GLA. An additional 400,000 square feet will be provided for smaller shops and restaurants in a climate-controlled Mall. The estimated cost of construction in 1980 dollars is $46 million, in addition to site improvement costs.

## The Regional Context

A rapidly growing region has established itself in Northern New Jersey along the links of the Interstate highway system and its major access roads. The project site is located in close proximity to the interchange of Interstates 287 and 78 and of Interstate 287 and U.S. Routes 202/206. The effect of these interchanges on Bedminster Township, which is part of this region, has been improved accessibility to developable lands and increased employment opportunities. This increased pace and new patterns of land development in the region are expected to continue. This trend is recognized in a number of plans for the region, including the Tri-State Regional Planning Commission's and Somerset County Planning Board's.

The emergence of this new growth area has been recognized, as well, by the New Jersey Superior Court. In Allan-Deane Corporation v. Township of Bedminster,[1] the Court held that the Township is a "developing municipality" applying the criteria used in the precedent-setting Mount Laurel Case.[2] As a result of the Mount Laurel decision, the Court found the Township's zoning ordinance invalid because, among other reasons, "it failed to reflect county and regional planning (policies)."

Planning analyses of the regional context of the project indicate that this new growth area has already generated demand to support a regional retail facility of the type proposed. Similar facilities have been successfully established in other locations across New Jersey serving older population centers.

## Major Conclusions

The major conclusions addressed in the body of this Report are:

1. Recent growth in the region, stimulated by the combined influence of the Interstate Highway System and the relocation of many major corporate headquarters, has created a need for a regional retail facility;

2. The growing demand for retail services and facilities, if not met by the kind of centralized development proposed in this Report, will allow the continuation of strip commercial development which the region's Counties are opposed to;

3. The Regional Center proposed in this Report is consistent with regional planning policies promoting the centralization of commercial and industrial development;

4. Rapid growth in the region will generate a need for improved transportation and utility systems in the U.S. Route 202/206 corridor whether the proposed Regional Center is built or not;

5. Improvements can be made to the transportation and utility systems in the general project area to accommodate the expected increase in demand; and

6. The environmental constraints associated with the proposed project site can be mitigated by the proposed Regional Center without significant negative impact. Careful monitoring and control of soil erosion will be carried out during construction.

---

[1] Allan-Dean Corporation v. Township of Bedminster, 121 N.J. Super 228 (App. Div. 1972), remanded, 63 N.J. 951 (1973).

[2] Southern Burlington County N.A.A.C.P. v. Township of Mount Laurel, 67 N.J. 151 (1975).

## 2. THE REGIONAL CONTEXT

### INTRODUCTION

Development of the proposed Regional Center is a response to recent changes in regional accessibility, employment opportunities and land use patterns. The following provides an overview of the region's natural, social, and economic characteristics which in recent years have combined to contribute to the growing need for a Regional Center.

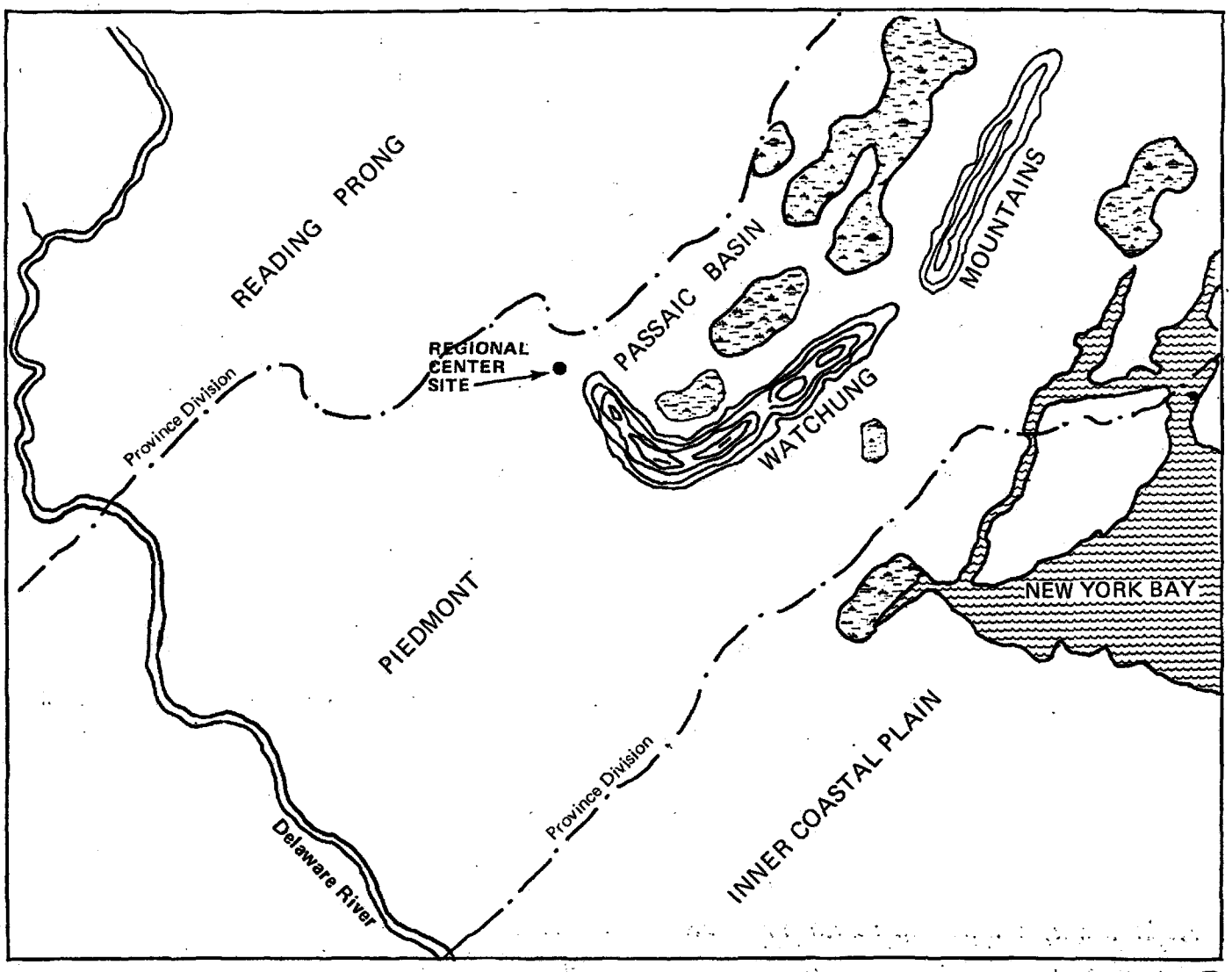
### Environmental Framework

To fully appreciate the evolution of Bedminster Township and its surrounding region, one must review the natural history of the area. It will become clear, for example, that the geology and resulting topography of the area have been a strong influence on its urbanization.

The Regional Center site lies within the physiographic province identified as the Piedmont Plateau. The Piedmont Plateau extends north from the State of Georgia through the Carolinas, Virginia, Maryland, northern Delaware, southern Pennsylvania and central New Jersey to the Hudson River in New York. It comprises one-fifth of the State of New Jersey. Characterized by its gently rolling hills, the province occupies a transitional zone between the flat Atlantic Coastal Plain and the mountainous Appalachian Highlands. The bedrock within New Jersey of this zone consists of two major rock types which have been significant influencing factors in the development of the region.

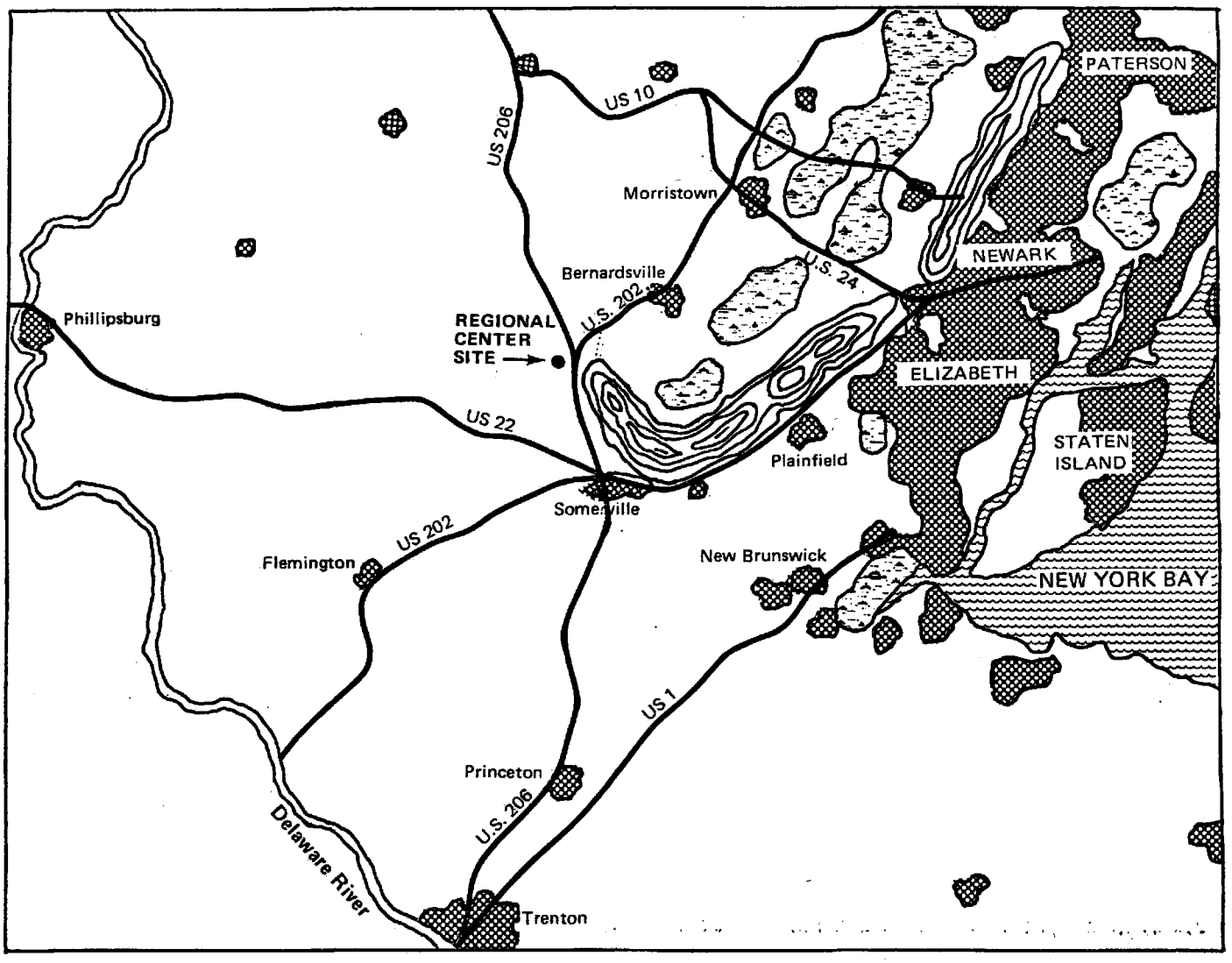
The predominant rock type is composed of sediments deposited during the Triassic period when much of North America was covered by water. Over time, the sediments were folded and uplifted above sea level where they became exposed to weathering. Weathering is the geologic process by which rocks are broken down and decomposed by the action of the wind, rain and other climatic forces. At the same time molton rock intruded, cooled and crystallized to form the second major rock type identified as basalt.

Basalt is harder than the sedimentary rocks. It, therefore, has weathered at a slower rate during the period of continental glaciation that followed the Triassic period.



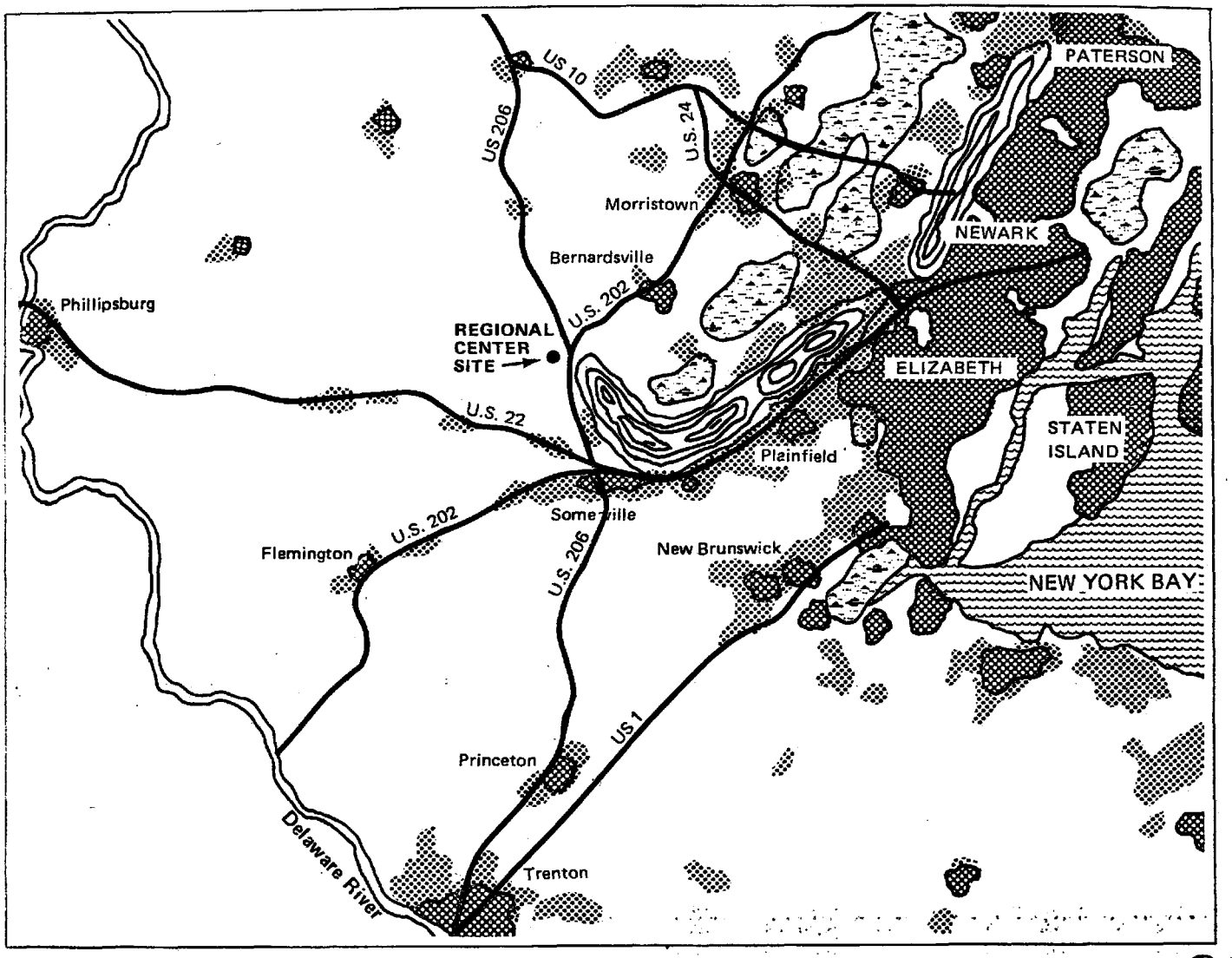

ENVIRONMENTAL FRAMEWORK

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD



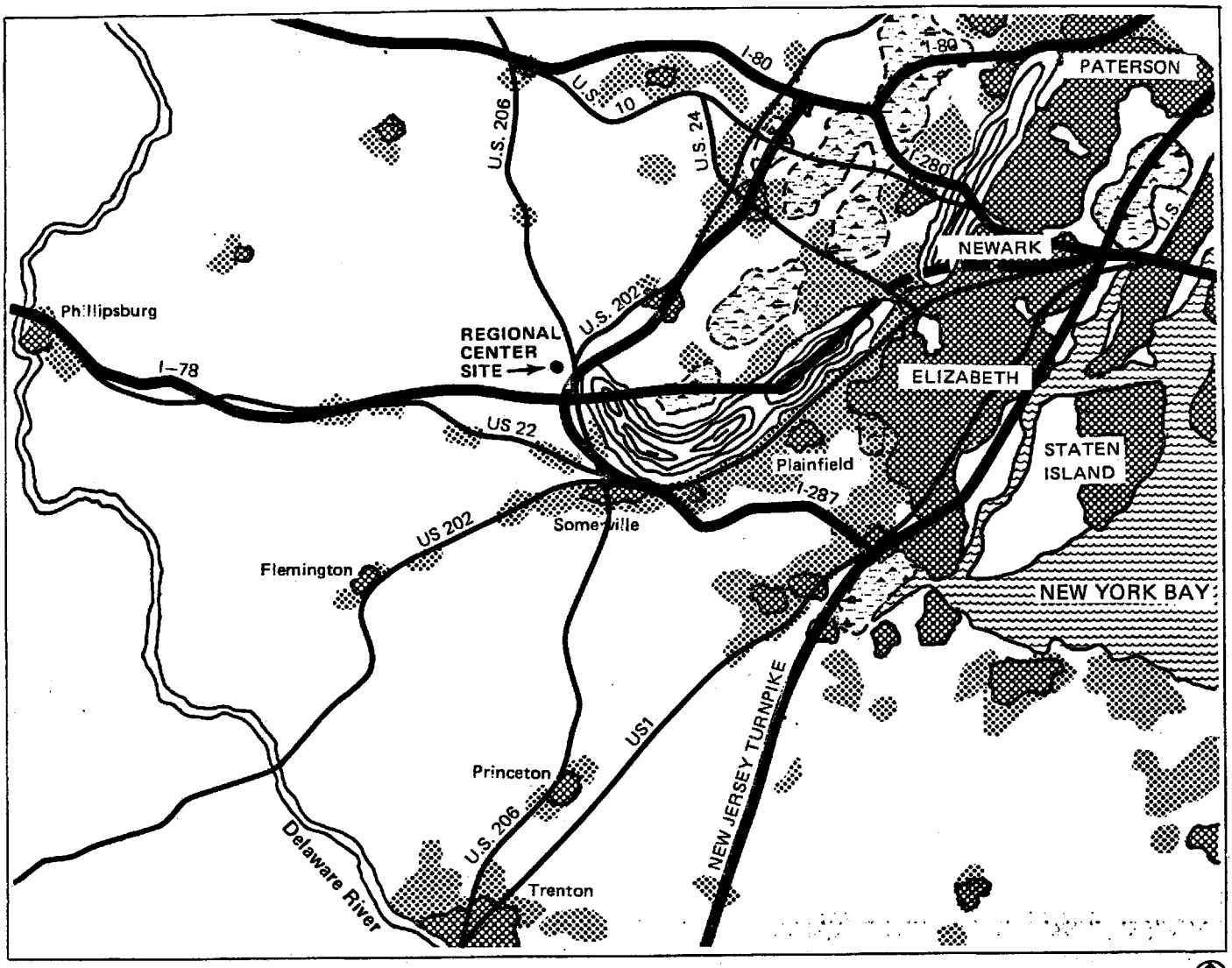

GROWTH BEFORE WORLD WAR II

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD



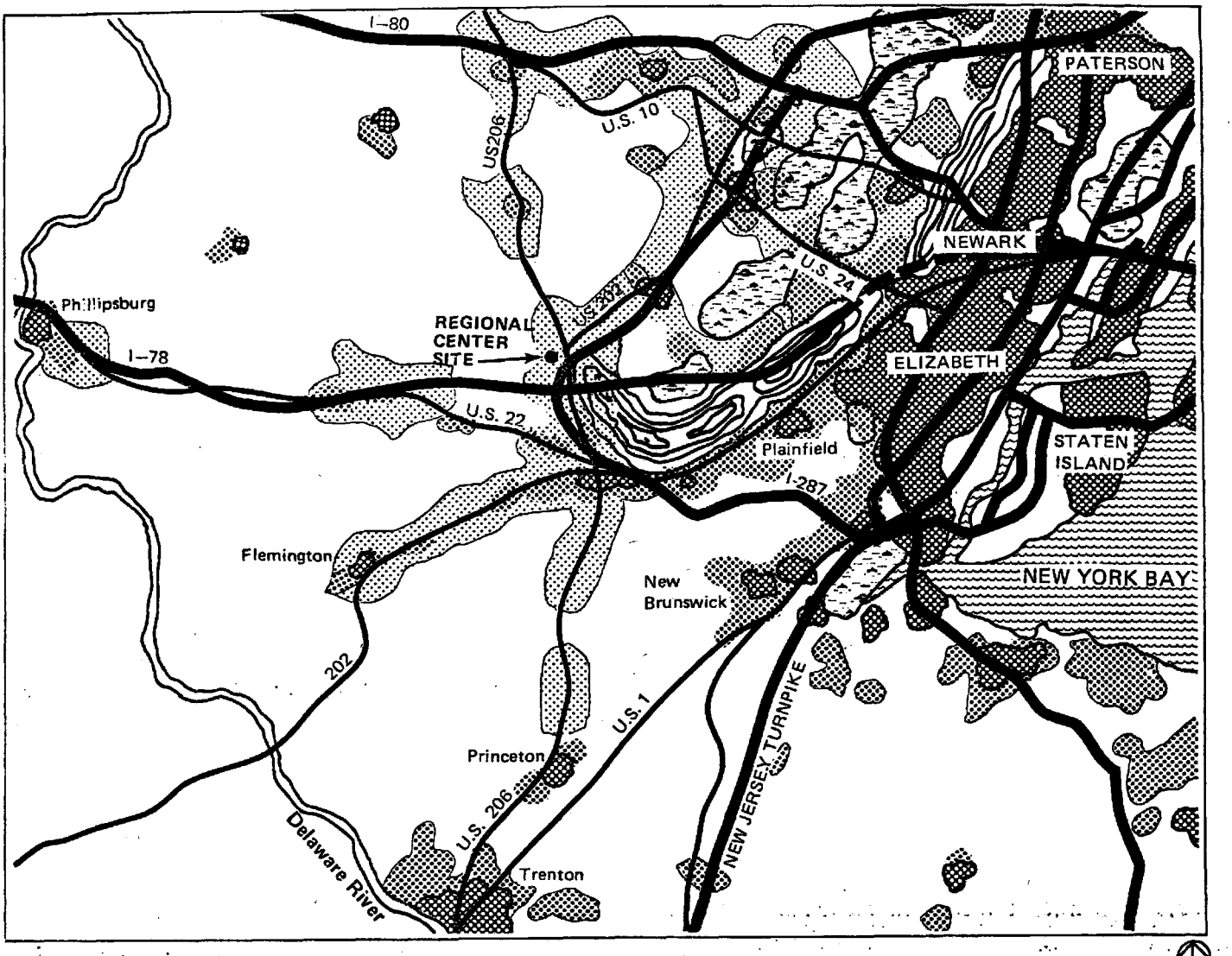

GROWTH BETWEEN 1950 AND 1975

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD




THE INTERSTATE HIGHWAY SYSTEM IN THE REGION

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD




FORCES OF PRESENT AND FUTURE GROWTH

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

During glaciation, the weathering process was greatly accelerated. The land form was transformed by the action of the glaciers. Behind were left the hills and mountains of basalt in a broad rolling plateau of Triassic shales and sandstones. The topography and soils of the project site directly reflect this geologic history.

The pattern of development in the region, encompassing Somerset, Morris, Middlesex and Hunterdon Counties, as well, strongly reflects the effect of this geologic history. One feature in particular, the Watchung Mountains, the result of ancient basalt flows, has had a major influence on the evolution of settlement patterns in this four-county region. Other natural features which influenced the expansion of settlements are the Delaware and Raritan Rivers and the now-called New Jersey Meadowlands.

As the population around New York City increased, with improved mobility, development began to radiate from the old urban centers. This suburban expansion is illustrated by the previous set of five maps. Of particular interest is the influence that the Watchung Mountains have had in stemming rapid expansion westward thus forcing it to move north and southwest along its base until construction of the interstate highways.

Within the last 15 years urban growth, drawn by the Interstate Highway System, has engulfed the Watchung Mountains. New development has spilled into areas near Bedminster Township that prior to 1970 had been able to fend off urbanization. Clearly, this growth will continue. The Watchung Mountains and other natural features will no longer deflect development from northern Somerset County.

Population and Employment

Two factors have combined in recent years to cause the acceleration of growth in the three-county area, encompassing Hunterdon, Morris and Somerset (where the project site is located):

1. The construction of the Interstate Highway System and improvements to its major access roadways greatly increased access to the suburban ring; and

2. The decision of a growing number of major corporations to move their headquarters from older urban areas to the more attractive suburban ring.

Taking advantage of the new context, county economic development organizations have intensified their efforts to lure corporate headquarters to the region. Morris County, for example, now proudly claims fifty of the Nation's "FORTUNE 500", including Allied Chemical, Crum and Forster, and Nabisco. Somerset County boasts the recent development of major office centers of AT&T, RCA and Beneficial Management. Although not all of the municipalities affected support this new growth trend, the improved accessibility has created an opportunity for growth that is difficult to resist. The region's employment profiles have changed considerably in recent years and will continue to change in the immediate future. Housing and services will inevitably follow.

In 1970, the population of Somerset County was 198,372. The population of the 5-county area of Somerset, Morris, Middlesex, Hunterdon and Union was 1,780,100. By 1980, the population of Somerset County had increased to 201,771.

Projections to the year 2000 show population growth in these counties ranging from a modest increase of 12,200 in Union County to nearly 100,000 in Morris and Somerset. By the year 2000 the five-county area could expect 2.5 million residents.

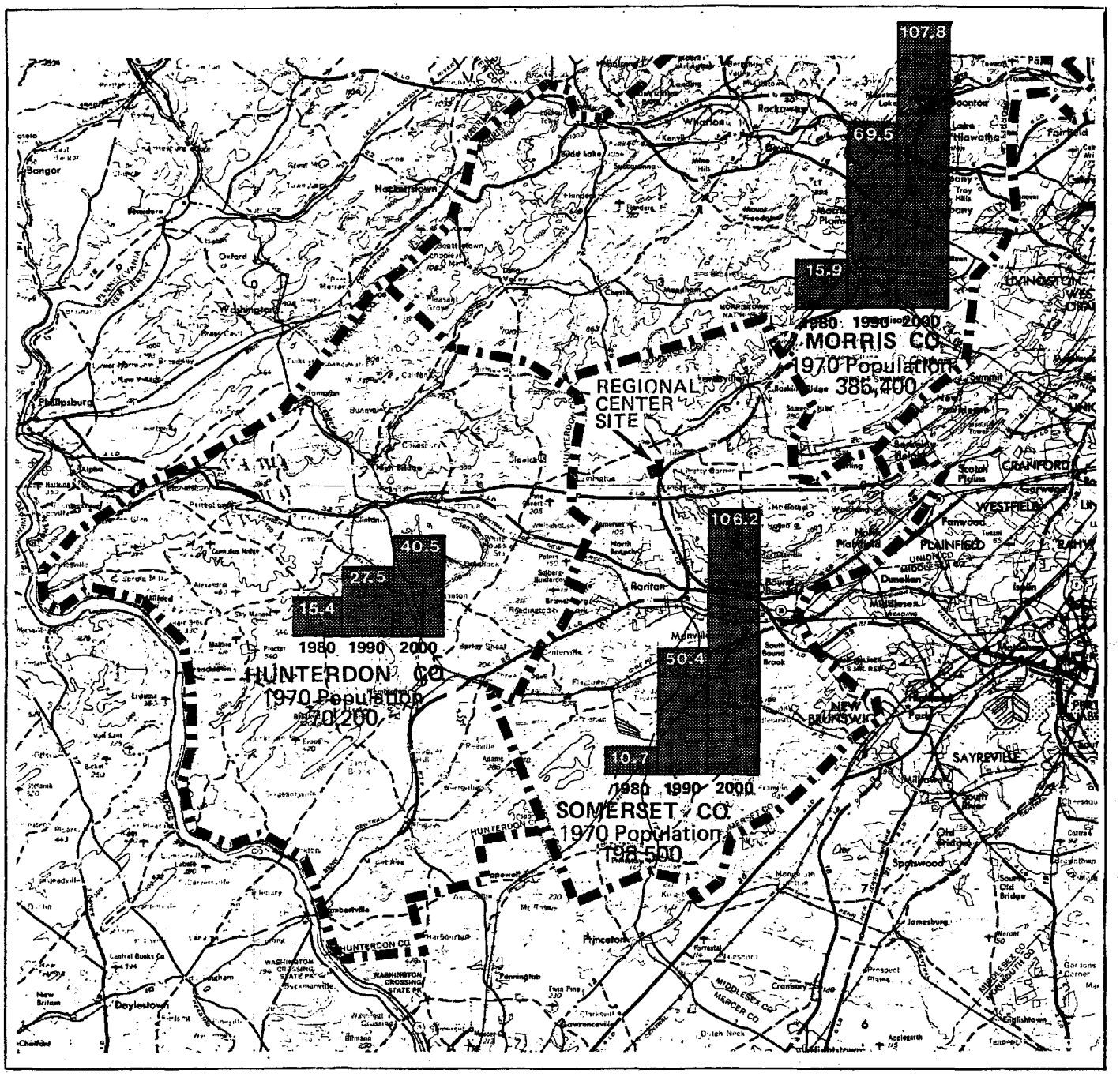
State forecasts for the next 20 years show Somerset County increasing by 72,000, and Hunterdon County by 25,000. The actual growth of Somerset County between 1970 and 1980 (201,771) was less than the State forecast of 209,200. However, the Somerset County Planning Board estimates a lower rate of growth between 1980 and 2000 than projected by the State Department of Labor and Industry (35% vs. 46%).* The State's population forecasts are shown on the following table, followed by 1980 census counts:

**Table 1: Population Projections for the Region**

| | 1970 | 1980 | 1990 | 2000 | 1980-2000 | % Change | Census 1980 |
|---|---|---|---|---|---|---|---|
| Hunterdon | 70,200 | 85,000 | 97,700 | 110,700 | 25,700 | 30% | 87,093 |
| Somerset | 198,500 | 209,200 | 248,900 | 304,700 | 95,500 | 46% | 201,771 |
| | | | | | 72,000* | 35%* | |
| Mercer | 305,100 | 323,500 | 354,000 | 386,000 | 62,500 | 19.3% | 305,596 |
| Morris | 384,400 | 400,300 | 453,900 | 492,200 | 91,900 | 23% | 407,707 |
| Essex | 930,700 | 881,600 | 786,700 | 818,400 | – 63,200 | – 7% | 848,969 |
| Union | 542,300 | 500,500 | 505,400 | 512,700 | 12,200 | 2.4% | 502,464 |
| Middlesex | 584,700 | 592,400 | 654,500 | 735,100 | 142,700 | 24% | 594,984 |

Source: New Jersey Department of Labor and Industry (1978).

*Somerset County Planning Board.




**POPULATION PROJECTIONS** (Growth in Thousands)

Source: Comparison of New Jersey Dept. of Labor & Industry projections to actual 1979 data., 1970 United States Census

**REGIONAL CENTER**
**BEDMINSTER TOWNSHIP, N.J.**
**WALLACE, ROBERTS & TODD**

In the past ten years, Somerset County has experienced trends in household size similar to those witnessed across the rest of the nation. The 1979 estimate of average family size for the country was 3.18, down from the 1970 size of 3.40. The 1975 per capita income for Somerset County was estimated at $6,300. This represents $10,600 in 1980 dollars. By comparison, the 1975 per capita income estimate for Hunterdon County was $5,750, Morris County $6,400, and Mercer County $5,618.

Reflecting the "white collar" character of the work force employed by the relocated corporate headquarters, Somerset County's new population will probably have higher incomes than most of the Northern New Jersey counties. The median household income in 1975 for Somerset County was $19,814.[1] Today this would represent an income of $30,000 per year. In 1975, Somerset County, alone, had a total effective buying power estimated at $1,341,567,000 for its 64,071 households.[2]

## Transportation and Utilities

Transportation and utilities systems are generally recognized as two of the principal determinants of land development. A thorough knowledge of the Interstate Highway System, for example, yields a deeper understanding of present demand for commercial and industrial land in the study region. The availability and capacity of sewer and water systems, solid waste disposal facilities and electrical services has greatly influenced the form and density development may take. The following discussion addresses transportation and utilities systems at the regional scale. The principal conclusion is drawn that system improvements will be needed as the region's inevitable population growth occurs. This is true regardless of whether the proposed Regional Center is built or not.

## Transportation

The site of the proposed Regional Center is ideally suited for a major regional retail facility because it is located near the major links of the regional road network.

Accessibility was the principal quality that attracted other development to the area. One example in Bedminster Township would be the AT&T Long Lines facility which is located immediately northeast of the project site across U.S. Routes 202/206.

The project site lies in close proximity to Interstate 287 and 78. U.S. Route 202/206 on which the site is located, will provide access from a large market area via these interstate highways. At the same time, the site if sufficiently removed from the Interstate interchanges to allow for safe traffic movement between the interchange ramps and the site access points.

The principal roadways that will provide access include Interstates 287 and 78 and U.S. Routes 202 and 206.

Interstate 287 is a regional highway which forms part of a limited-access beltway ringing the Newark/New York Metropolitan Area.

Interstate 287 has an interchange with Routes 202/206 one-half mile south of the project site. Ultimately, the Interstate will connect to the New Jersey Turnpike and Staten Island via I-95. In the northerly direction, Interstate 287 serves the Morristown area providing a connection with Interstate 80. Presently Interstate 287 ends five miles north of I-80. The long-range plan is to connect it to Interstate 87 and the New York Thruway. The interchange of I-287 with U.S. 202/206 has ramps for six of the eight movements found in a complete cloverleaf interchange. The two missing ramps are: the one accommodating the movement from northbound 202/206 to southbound I-287 and the one accommodating southbound I-287 to southbound 202/206. Motorists use a jughandle intersection at River Road to accomplish these two movements.

Interstate 78 is an east-west regional limited access highway extending east from the Pennsylvania border to its present terminus approximately 25 miles east of the interchange with I-287. The interchange of I-78 with I-287 is approximately one and one-half miles south of the proposed Regional Center. Recently, there have been discussions between major developers in the region and the New Jersey Department of Transportation regarding the possibility of a new interchange with Interstate 78 a few miles east of U.S. Routes 202/206 and improvements to other roads in the regional system.

The completion of Interstates 287 and 78 means Somerset County will be located "in the heart of megalopolis" according to a publication of the County's Office of Economic Development. The interchange of I-78 with I-287, by the County's estimation, will be a 45 minute drive from New York and Philadelphia. The regional advantages to new corporations, writes the Office, are described as follows:

> "The business markets, the international airports, the deepwater ports and all the cultural features of New York and Philadelphia can be reached in a matter of minutes. It is estimated that the spot where Interstate Routes 287 and 78 intersect, north of Somerville, will be 45 minutes from both cities when these federal highways are completed. Highways now in service already provide rapid truck service to all industrial centers."[3]

The proposed project site is adjacent to U.S. Route 202/206. U.S. Route 202 crosses the State of New Jersey in a general northwest-southeast direction. U.S. Route 206 is a north-south route also crossing the State. These two routes combine south of Somerville approximately six miles south of the site and separate immediately north of the site. The State proposes to dualize U.S. Route 206 from Princeton north to the Somerville Circle. The Environmental Impact Statement is currently being prepared for this improvement. The State's program is to complete construction by 1985. The section of U.S. Routes 202/206 bordering the Regional Center site was upgraded to a four-lane divided highway by AT&T in connection with the construction of their long lines facility. In addition to widening the road, the alignment was moved to the east to facilitate the construction of an underpass for traffic exiting to the south from the AT&T facility. The old 202/206 alignment to the east of this new roadway now serves as a one-way southbound frontage road. It borders a portion of the Regional Center site.

River Road is the local road providing access to the site. A jughandle intersection is provided with Routes 202/206 at River Road for both northbound and southbound traffic on U.S. 202/206. The easterly jughandle completes the ramp system for the Interstate 287 and U.S. Route 202/206 interchange. The westerly jughandle accommodates the movement for southbound traffic on U.S. Route 202/206 to reach the AT&T facility which is northeast of the project site via a U-turn.

## Utilities

A preliminary engineering investigation was conducted by SITE engineers and by Keller and Kirkpatrick of area utilities including public water supply, sanitary and storm sewers, and gas and electricity service. The aim of the investigation was to establish current capacities and project hook-up needs.

The Commonwealth Water Company of Short Hills, New Jersey has a sixteen inch watermain that runs past the project site along U.S. Route 202/206. Water is acquired from Elizabethtown Water Company. A meeting with a Commonwealth representative determined that adequate service can be provided to accommodate the proposed Regional Center.

Wastewater collection and treatment in the general vicinity of the project site can be achieved through the construction of a tertiary treatment level package plant. Site soil and water table conditions are such that on-site treatment for low density development would be difficult, probably prohibitively expensive to most developments, and potentially add to pollution in the North Branch of the Raritan River.

A new Bedminster Township sewage treatment plant was built by AT&T for their Long Lines facility and donated to the municipality. The plant has a capacity of only 200,000 G.P.D. and affords a limited number of additional hook-ups. The Allan-Deane Corporation has recently received approval to construct a package plant for their development. The system's capacity is not known at this time but its effluent is reported to be at the level of ambient water quality of the Raritan River into which it will flow.

The design and construction of storm sewers in Somerset County is governed by the County's Handbook for Storm Water Management. Preliminary engineering investigations indicate that the County's standards can be met without negative environmental impact.

The results of the engineering investigations of utilities are reported in Section Seven where the proposed utilities element of the Concept Plan is presented.

Regional Planning Policy

Planning policy that affects the process of land development in the 3-county area surrounding the project site is formulated and implemented at three geopolitical levels -- Township; County; and Regional. The township level consists of the planning policies of Bedminster Township as set forth in its Municipal Master Plan and Land Development Ordinance (zoning). The county-level studies focused on the policies articulated by the Somerset County Planning Board and the Somerset County Office of Economic Development. Regional planning policy studied included those of the Tri-State Regional Planning Commission, and the State of New Jersey.

Changes in regional planning policies which were the result of actions taken by the New Jersey Courts were also studied. Primary attention was given to planning policy that addresses land development in the area of I-287 and I-78 interchange and the U.S. Route 202/206 corridor.

Construction of the Interstate Highway System, beginning in the early 1950's, greatly modified the region's development pattern. Land development, as discussed previously, had historically been guided by the natural environment. Development had followed the base of the Watchung Mountains. Until completion of Interstate Highways 80, 287 and 78 communities had been able to retain a distinctive rural character. Interstate 80, however, produced a new corridor of growth that penetrated the Watchung Mountains on the north. Interstate 78 is performing a similar function through the center of the Watchung Mountains. Interstate 287 has already fostered growth which extends along its two parallel access roads, U.S. Routes 202 and 206.

The Somerset County Planning Board has recognized that these development pressures demand their attention. Their Master Plan of 1971 states that:

> "In Somerset County, probably the greatest challenge to State transportation planners and local land use planners is the evolution of U.S. Route 206 between the Route 92 Freeway in southern Montgomery north to, and including, the Somerville Circle. There is ample opportunity to introduce design features and land use controls along this route which will prevent at least the worst features of U.S. Route 22. Unless there is more coherent advance planning on both levels, this would seem to be the inevitable goal toward which U.S. Route 206 is descending". [4]

Since 1971, an overriding objective of planning efforts in Somerset County has been to ensure that Route 202/206 does not develop as a commercial strip of the kind found along U.S. Routes 1, 22 and 17. Planning authorities sought to promote centralized development to facilitate the protection of sensitive areas.

The Tri-State Regional Planning Commission classifies the Bedminster Township portion of the U.S. 202/206 corridor, which includes the subject project site, as "urban land".[5]

In addition, the Plan recognizes the integral relationship between the establishment of an interstate highway interchange and the density of adjacent development. Somerset County's Master Plan for Land Use, in contrast, classifies the 500-acres in the Route 202/206 corridor around the Interstate 287 and 78 interchange as "Village Neighborhood".[6] While this classification allows a higher density of development than is permitted in the less accessible locations of the County, it does not reflect the effect new growth is expected to have on land development in the U.S. Route 202/206 corridor.

The State of New Jersey through its Department of Community Affairs has also greatly influenced regional planning policy. The State's Municipal Land Use Law dictates how local governments shall regulate land use. The New Jersey Courts have also, though only very recently, entered the land use planning arena.

In the Allan-Deane decision,[8] the New Jersey Superior Court held that Bedminster Township, in the meaning of the Mount Laurel decision,[9] was a "developing municipality" of which the U.S. Route 202/206 corridor was a part. However, the court ruled that the Township would only be required to amend its zoning ordinance for the area east of U.S. Route 202/206 to accomodate higher density residential development. It is not clear how the Court reasoned that the lands west of U.S. Route 202/206 north of I-287 were not part of the corridor and could remain as presently zoned, R-3%. It would appear logical that both sides of the corridor should be zoned to enable higher density development as the need arises in the region, particularly since both sides of U.S. Route 202/206 were rezoned south of its intersection with I-287.

---

[1]New Jersey Department of Labor and Industry (1978).

[2]Somerset County Planning Board (March 1978).

[3]Somerset County Office of Economic Development, Public Information Flyer (Somerville, New Jersey, n.d.).

[4]Somerset County Planning Board, Master Plan for Land Use (1971) 35.

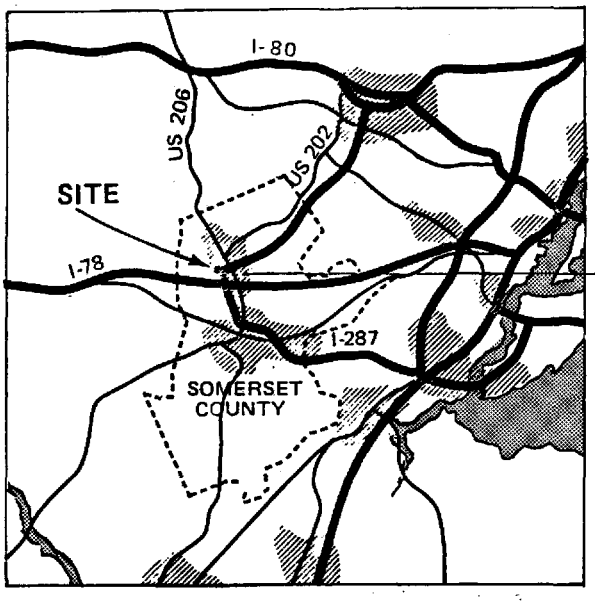
[5]Tri-State Regional Planning Commission, Regional Development Guide 1977-2000 (March 1978).

[6]Somerset County Planning Board, Master Plan for Land Use (September 1971).

[7]New Jersey Municipal Land Use Law, 24 CFR 600, Chapter 291, Law of New Jersey 1975, approved January 14, 1976.

[8]Allan-Deane Corporation v. Township of Bedminster, 121 N.J. Super. 228 (App. Div. 1972), remanded, 63 N.J.

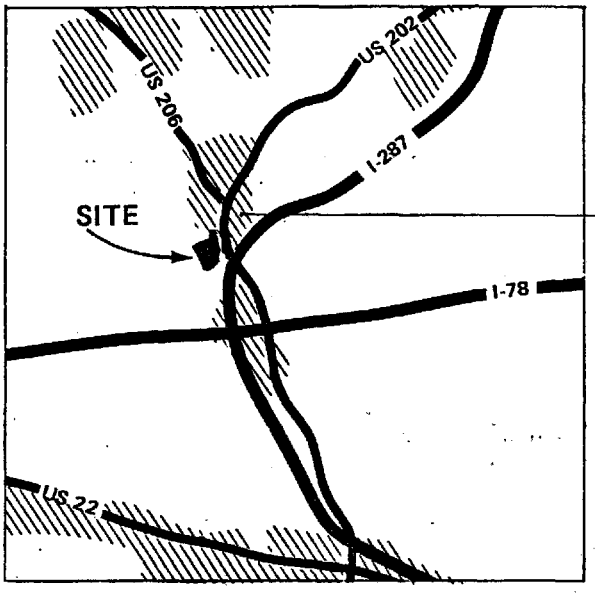
[9]Southern Burlington County N.A.A.C.P. v. Township of Mount Laurel, 67 N.J. 151 (1975).




## REGIONAL POLICY

SOURCE: Tri State Regional Planning Commission

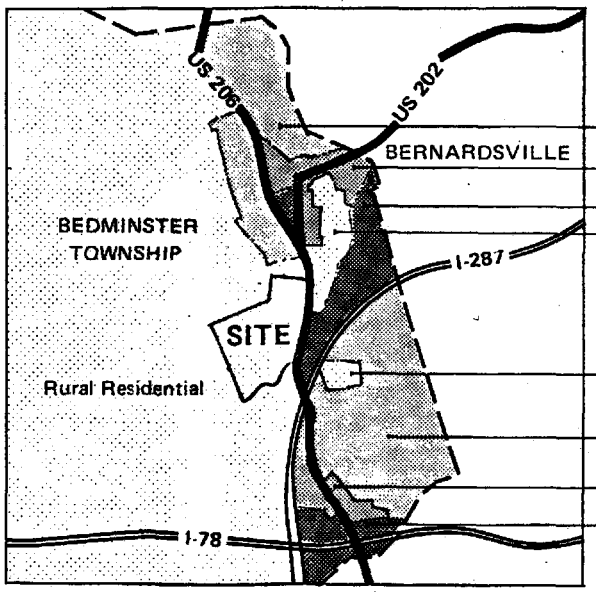
CONVERGENCE




## COUNTY POLICY

SOURCE: Somerset County, Master Plan of Land Use

VILLAGE NEIGHBORHOOD/COMMUNITY DEVELOPMENT




## TOWNSHIP POLICY

SOURCE: Zoning Map, Township of Bedminster

Low/Medium Density Residential
Multi-Family/Village Neighborhood
Office Research
Rural Residential
Rural Residential
Low/Medium Density Residential
Multi-Family/Village Neighborhood
Office Research

REGIONAL PLANNING POLICY

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

## 3. THE U.S. ROUTE 202/206 GROWTH CORRIDOR

The U.S. Route 202/206 corridor in the 3-county area consisting of Somerset, Morris and Hunterdon Counties has been acknowledged by County Economic Development groups as a developing area. Over the past two years, these three counties have all witnessed the construction of over 3 million square feet of office and commercial space EACH YEAR. At this rate of growth, using an average of 4 employees per 1000 square feet of space, 240,000 new employees can be expected to work in the 3-county region by the year 2000. If all of these new employees decide to live in these three counties, the region's population could increase by as much as 720,000, assuming 3 persons per household.

Somerset County's projections for its share of the region's growth, however, indicate a much slower rate of expansion. The County anticipates an increase of only 27,500 new employees in the area between 1980 and 2000. Major new development in the County, however, including the Beneficial Management Headquarters building of 440,000 square feet, clearly demonstrate that the County's growth forecasts will be exceeded.

Added evidence can be found in neighboring Morris County where a proposed Foreign Trade Center will create a major employment center in the U.S. Route 206 corridor. In Hunterdon County in the U.S. Route 202 corridor, Prudential Life Insurance Company has expressed interest in developing a major facility.

### Development Patterns

Reflecting current public attitude against strip commercial development of the type found along U.S. Route 22, part of the corridors of U.S. Routes 202 and 206 were zoned to promote the concentration of special uses. The resulting development has consisted largely of corporate headquarters. For example, in Somerset County, office complexes have been built by such major corporations as Johnson and Johnson, Ortho, RCA, Beneficial and AT&T. Given present zoning regulations, this pattern of development can be expected to persist throughout the County even though a number of communities have more restrictive zoning.

### Influence of the Interstate Interchange

The Interstate Highway System has caused pressure for development in the region, particularly around the interchanges.

This effect has also extended along the major roads which provide access to the Interstate highways.

In the project area, the only arterials providing access to the interchange of Interstate 287 and 78 are U.S. Routes 202/206. The effect has been rapid commercial and industrial growth along U.S. Route 202/206.

Recent Development in the U.S. Route 202/206 and I-287 Corridors

To the south of Bedminster, Bridgewater Township has shown significant industrial and office expansion over the past few years. American Hoechst, a major employer, continues to expand. Major distribution centers for Ortho and Fisher Scientific are located south of the project site as are RCA and American Cyanamid. Hillsborough Township boasts North American Reiss and Nichols Engineering. Montgomery Township, where the largest proportion of the County's new growth has occurred, is the location of Applied Data Research and Ingersoll-Rand.

To the north, over 2 million square feet of commercial development per year has occurred in Morris County. Most of this has occurred in the U.S. Route 287/202 vicinity. For example, Prudential Life Insurance Company will shortly become joint owner of a 400-room hotel-office complex in Parsippany Township with 394,000 square feet of office space. Additional development in this corridor will infill between the AT&T center in Basking Ridge and development at the interchanges on I-287.

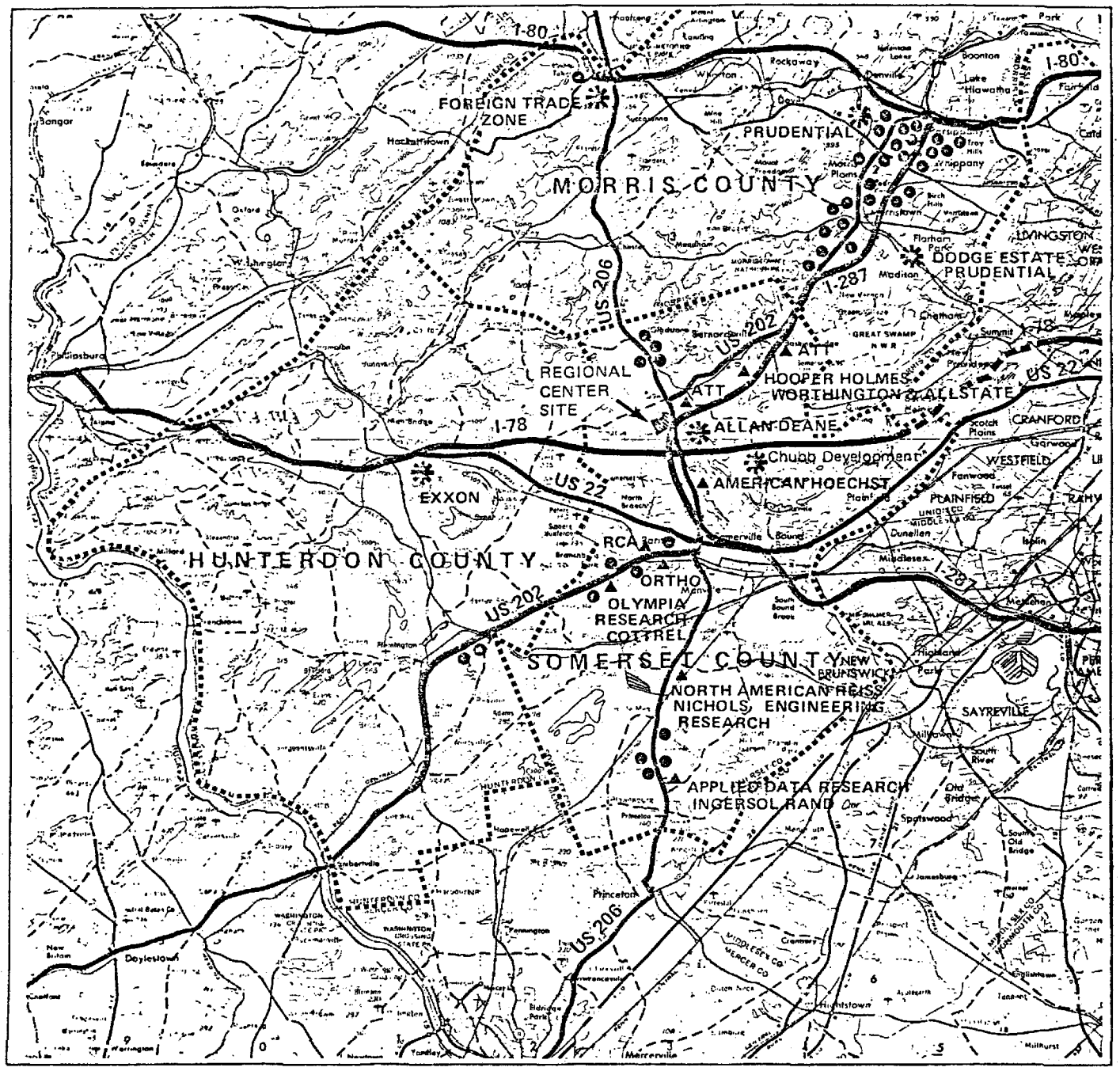
The major development proposed along U.S. Route 206 north of the project site is the Morris County Foreign Trade Zone at the Route 206 and I-80 interchange. Approximately $10,000,000 has already been invested in development of 260-acres on a 467-acre tract. Beneficial Management Corporation has decided to locate a major employment center in Peapack-Gladstone, Somerset County. Many other major developments are being discussed and studied.

In Somerset County alone a total of 478,000 square feet of commercial space was built in 1978. An additional 110,000 square feet was built in 1979. During the first half of 1980 21,459 square feet was built. Industrial expansion and new construction in Somerset County for 1978 totalled 989,166 square feet, in 1979 1,085,112 square feet and in the first half of 1980 460,846 square feet.

As a partial response to anticipated growth, a Regional Center has been proposed immediately outside of Somerville in a location called "The Golden Triangle." The project proposed by the Bridgewater Redevelopment Agency would provide, in addition to retail space, space for office use and a hotel-convention center. Other locations have also been proposed for a Regional Center. The existance of a market for a Regional Center in the Somerville area is recognized by the Somerset County Planning Board, which wrote in its Land Use Plan of 1971:

> "The market availability for a major regional shopping center in this area has existed for some years but there has been a hesitancy upon the part of the retailers to move to the outer fringe of the metropolis. When the consciousness arrives that the market is available there will be a splurge of retail commercial development. Since the retail development will not be confined to a single central business district there is need to try to better integrate the haphazard strip commercialization with more unified traffic circulation system."[1]

[1]Somerset County Planning Board, Plan for Land Use (September 1971) p.41.




REGIONAL GROWTH PATTERN

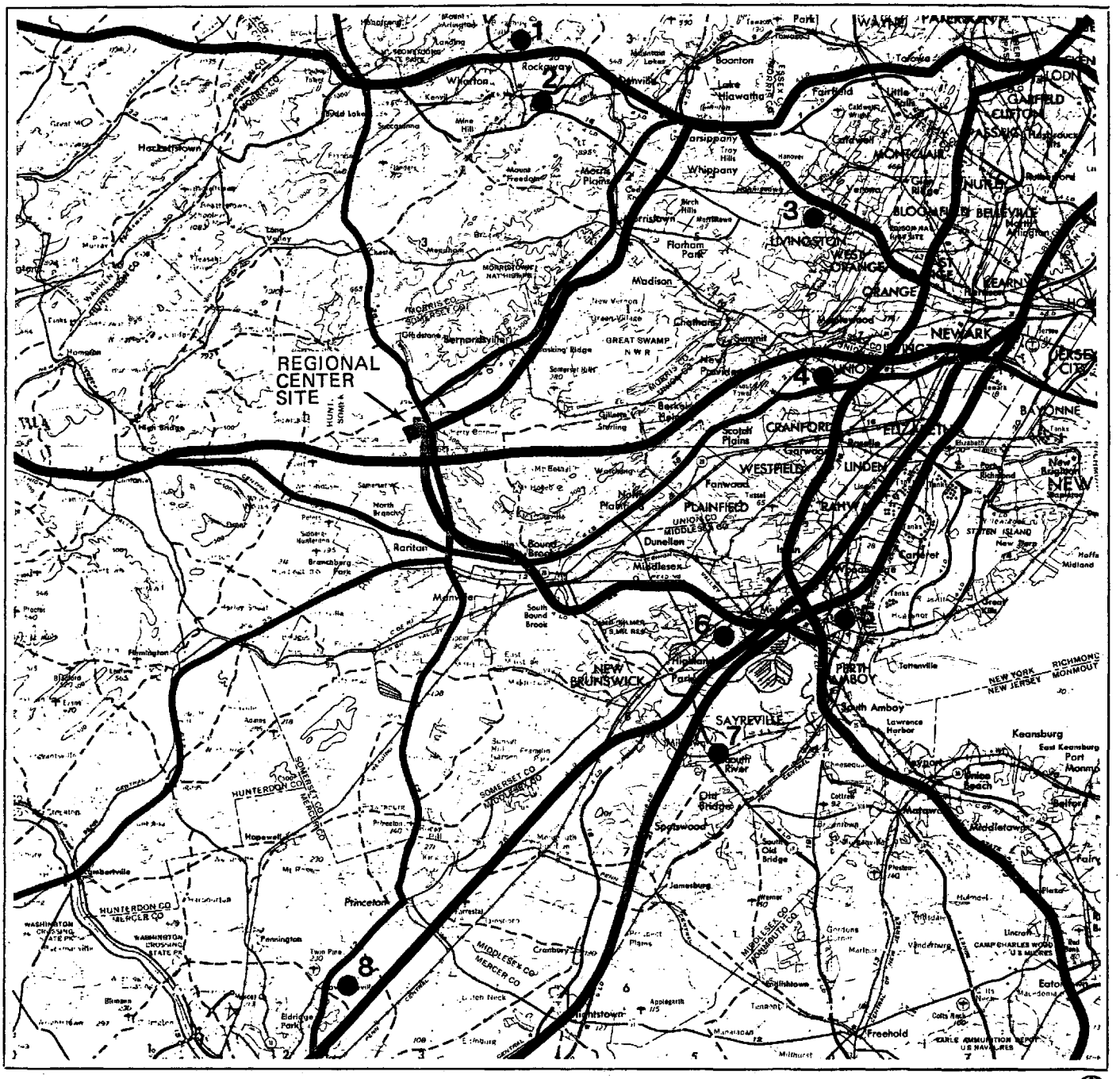
Source: Economic Development Office - Somerset County, Morris County, Hunterdon County.

▲ MAJOR CORPORATION DEVELOPMENTS 1970 - 1978

● 100,000 SQ. FT. DEVELOPMENT SINCE 1978

✱ MAJOR PROPOSED DEVELOPMENT CONCENTRATIONS BEYOND 1980

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD




**REGIONAL RETAIL CENTERS**

1 - ROCKAWAY TOWN SQUARE MALL
2 - DOVER SHOPPING CENTER
3 - LIVINGSTON MALL
4 - MALL OF SHORT HILLS
5 - WOODBRIDGE CENTER
6 - MENLO PARK
7 - BRUNSWICK SQUARE
8 - QUAKERBRIDGE MALL

**REGIONAL CENTER**
**BEDMINSTER TOWNSHIP, N.J.**
**WALLACE, ROBERTS & TODD**

## 4. THE PLANNING RATIONALE FOR THE REGIONAL CENTER

The planning rationale for the Regional Center is built upon four observations.

First, the employment growth that has occurred and is forecast for the 3-county region studied outstrips the availability of housing for individuals who wish to live near their place of work.

Second, the residential population already situated within the general vicinity of the proposed Regional Center is more than sufficient to warrant its development. This, as mentioned previously, was recognized by the Somerset County Planning Board in their 1971 Land Use Plan for the County.

Third, the tax burden on current area residents and businesses to pay the cost of improved public services and facilities to meet the demands of a growing employed and residential population will become increasingly severe unless relieved by additional taxes from service facilities.

When the Allen-Deane development begins in Bedminster Township, the burden of increased public costs for services will become a major consideration to new and old residents alike. School costs, municipal costs and County costs may or may not be positive at the completion of the new development. In the meantime, however, the demand for up to 300 school children, additional police and other municipal costs must be met. Land must be purchased for new school facilities. The tax revenue initially must be met by existing development in the Township. The precise magnitude of the economic impact of the Allen-Deane Corporation's development is presently being studied.

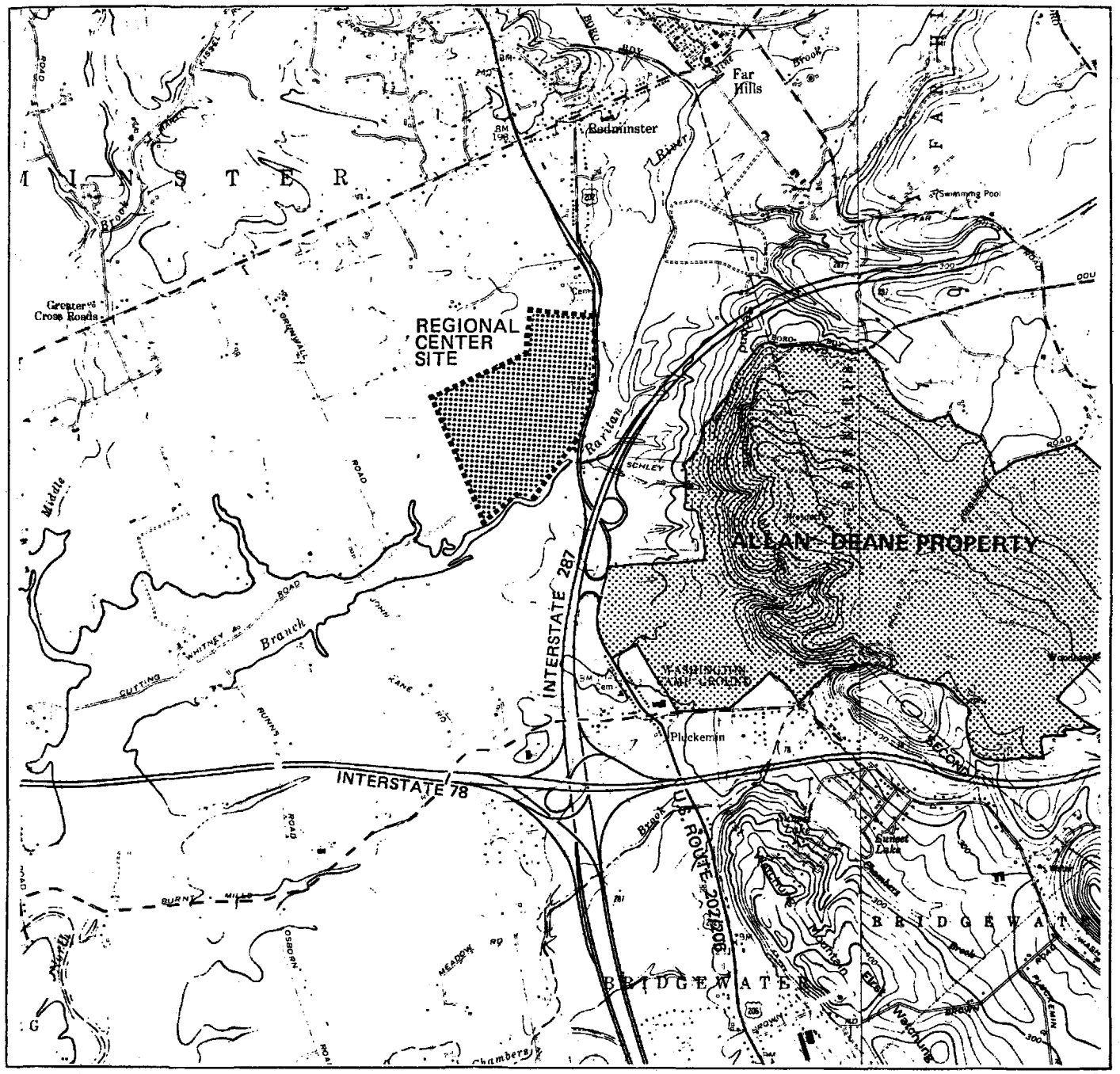
The proposed Regional Center will have four department stores with space reserved for a fifth store in the future. The total square feet for these stores will be 800,000 in addition to the 400,000 square feet of mall stores. An estimate of construction costs shows over $46,000,000 in 1980 dollars plus site improvement costs. Without consideration of land value this construction would yield $640,890 per year in real estate tax for improvements alone. ($46,000,000 @ 83.93% value x $1.66 per $100.)

Other tax benefits are offered by the Center. In full operation, it is reasonable to expect that 3,000 jobs would be created. This would result in an annual earning totalling around $28,000,000.

Fourth, without a Regional Center the current trend of strip commercial development will persist. Problems typically associated with this pattern of land use--visual chaos, traffic congestion, excessive water runoff--will be compounded.

Without the construction of a regional center, the provision of retail services for the growing region will continue to occur in those areas which permit strip commercial development, such as U.S. Route 22.

Proposals for shopping malls have been put forth along U.S. Route 22, including the proposed Bridgewater Commons. The Bridgewater Commons is proposed at the congested interchange of U.S. Routes 22 and 202/206 and will reportedly require major investment in off-site highway access.




**ALLAN-DEANE PROPERTY**

**REGIONAL CENTER**
**BEDMINSTER TOWNSHIP, N.J.**
**WALLACE, ROBERTS & TODD**

## 5. OBJECTIVES FOR THE DESIGN OF THE REGIONAL CENTER

Objectives for the design of the Regional Center on the 211-acre site in Bedminster Township were formulated to guide preparation of the Concept Plan. Each objective was derived from the planning studies and analyses that were conducted to identify site conditions. (Copies of the traffic and soil analyses are included as appendices). These objectives ensure that the Concept Plan fully addresses environmental constraints and site opportunities.

First, the Regional Center should be a major amenity to the local community and the surrounding region. The Center should in addition to providing retail facilities, incorporate other community facilities. Indoor and outdoor spaces should be designed for use of public events such as fairs, art shows and concerts. The design and plan for the Regional Center should be sensitive to site characteristics. It should reflect a commitment to high-quality building and landscape architecture, traffic control and environmental management.

Second, the construction of the Regional Center should help the Region served centralize its commercial and industrial land uses. By meeting regional needs for commercial services and facilities, the Region should be better able to halt strip-commercial development which is both unattractive and resource inefficient.

Finally, the proposed Regional Center should help Bedminster Township meet the costs of supplying additional public services and facilities to new area residents and employees. Full construction of the residential development proposed by the Allan-Deane Corporation would add around 9,000 new residents to the Township. The U.S. Census of 1970 recorded the Township's population at 2,597. In 1977, the Somerset County Planning Board had forecast a population of 5,000 for the Township by 2000. This obviously did not take into account either the Allan-Deane development, or additional growth as above.

## 6. THE SITE CONDITIONS

Preparation of the Concept Plan for the Regional Center required detailed analyses of the natural and physical characteristics of the 211-acre site. Separate studies were undertaken to provide the information and evaluations necessary to develop the land use and transportation elements of the Concept Plan. Copies of these separate studies are included in this Report as appendices.

### Geology

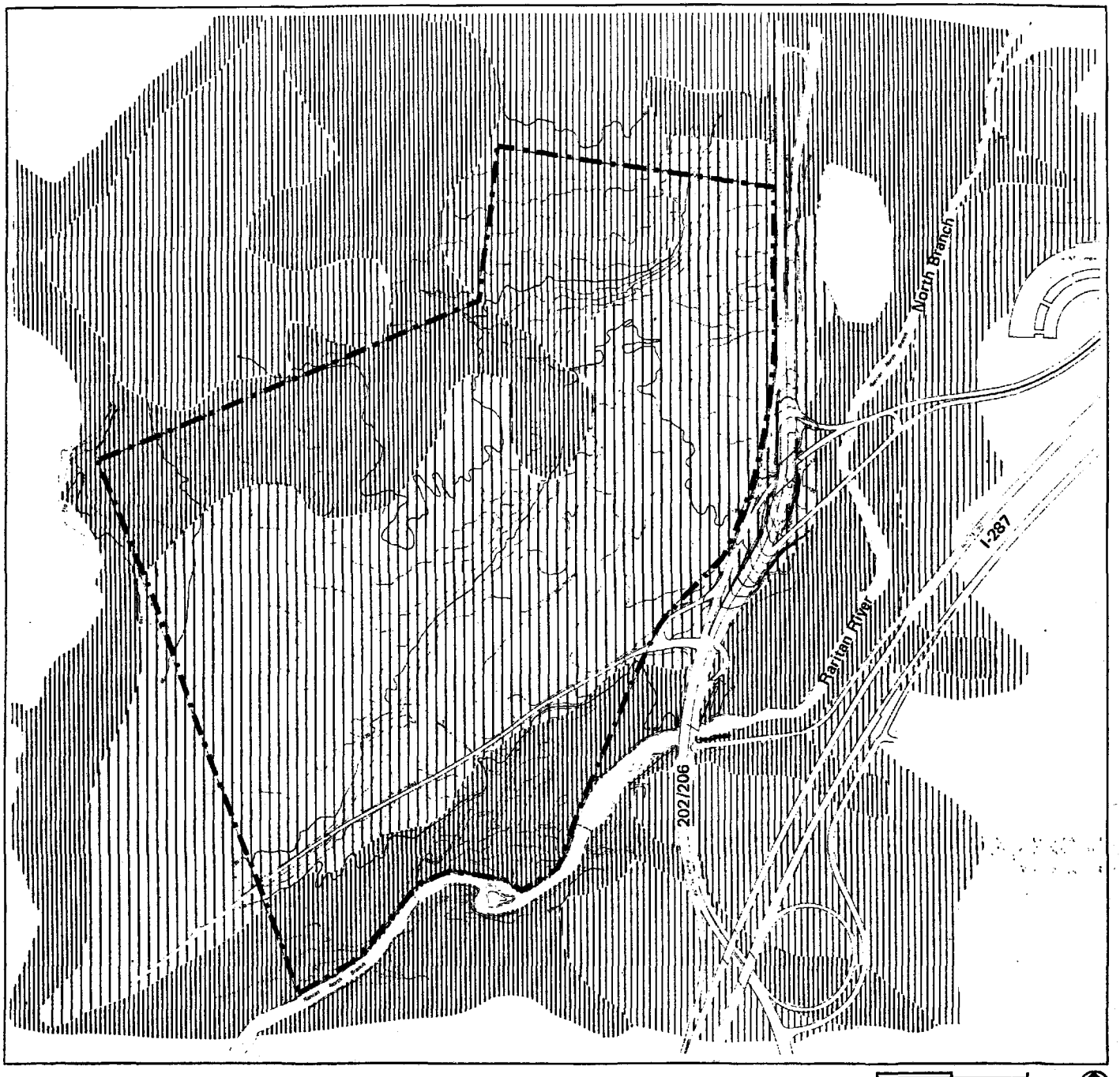
Bedminster Township is underlain predominantly by sediments deposited between 180 to 225 million years ago, during the Triassic Period of geologic history. Today, those sediments exist in the form of soft red shale interspersed with beds of sandstone. Occasionally, the shale is interrupted by harder, much more resistant igneous rocks. This basalt or "trap rock" often occupies higher ground and constitutes much of the bedrock in neighboring townships to the north and east.

The North Branch of the Raritan River forms the southern boundary of the site. The River's older stages have left behind terraces along its present day banks. The Triassic sediments have been overlain by more recent terrace deposits of alluvial sands, gravels and clays. Still more recent sediments consisting of alluvial silt and clay occur in the floodplain.

The site itself is underlain entirely by shale and sandstone of the Brunswick Formation. The bedrock is relatively flat and very near the ground surface. It ranges within three to five feet from ground surface. The shale is relatively impermeable, which contributes to the poor surface drainage conditions of the site.

### Soils

The soil has developed from sediments transported by water and deposited over the shale-sandstone bedrock. Almost 65% of the soils on the site are derived from terrace deposits associated with the North Branch of the Raritan River. Included in this group are the Raritan and Birdsboro silt loams. Formed in old stream sediments and glacial outwash, these deposits occur on terraces adjacent to stream channels and are between 10 and 15 feet above normal stream level.



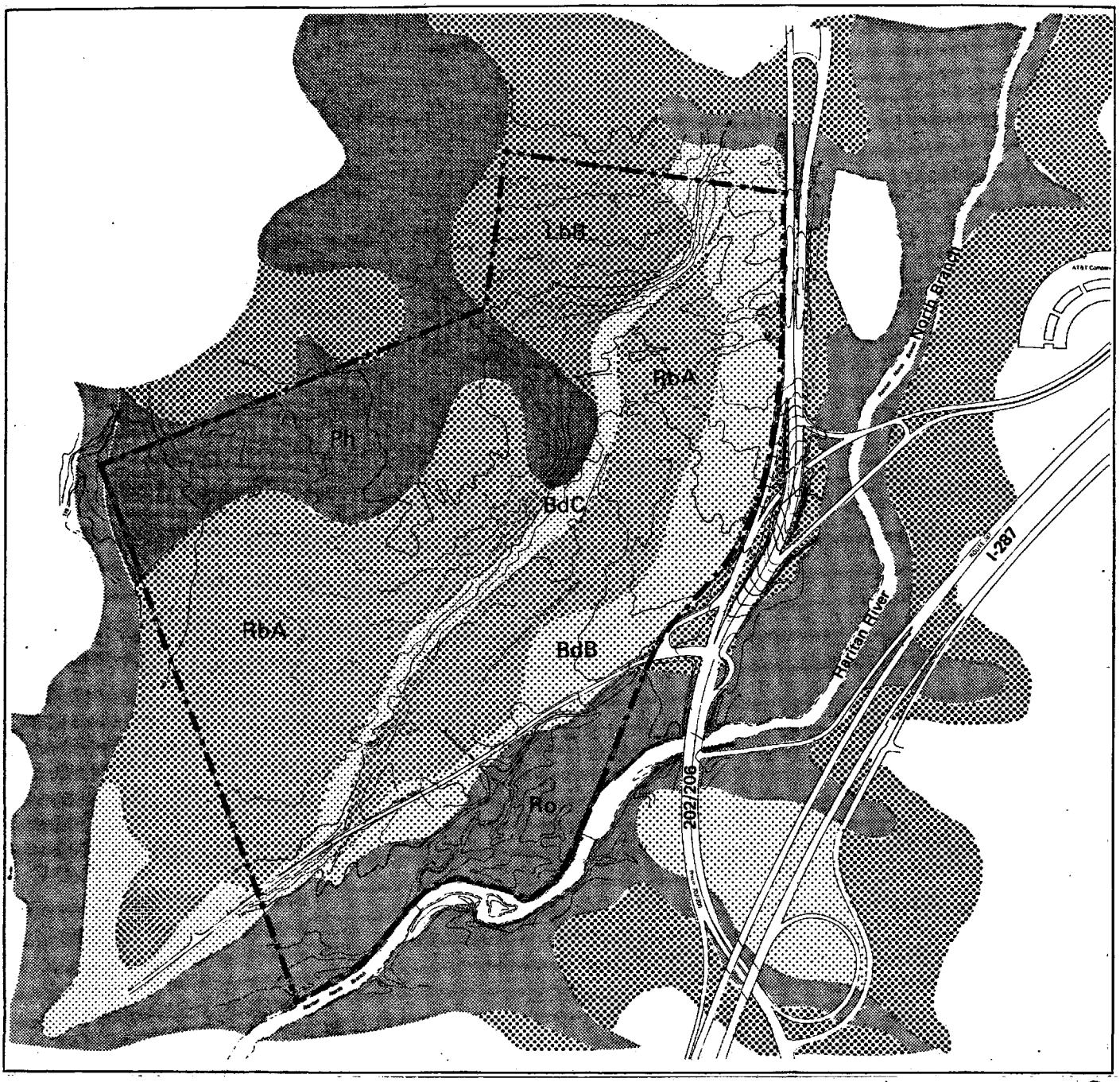

0 400 800 FT.

## SITE CONDITION : GEOLOGY

Source: Soil Resource Map Somerset-Union Soil Conservation District; Soil Conservation Service, U.S. Dept. of Agriculture (Based on the Cooperative Soil Survey)

| Minimum Soil Depth 5′ | Minimum Soil Depth 3½′ | Parent Material | Soil |
|---|---|---|---|
| | | OLD TILL Transported | LbB |
| | | TERRACE DEPOSITS | Rb, Bd |
| | | ALLUVIUM Transported | Ph, Ro |

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD




## SITE CONDITION: SOILS

0 400 800 FT.

Source: Soil Resource Map Somerset-Union Soil Conservation District; Soil Conservation Service, U.S. Dept. of Agriculture (Based on the Cooperative Soil Survey).

**Bedminster Center**
**Bedminster Township, N.J.**

**Wallace, Roberts and Todd**

| Value for Agriculture II | III | LOW | Soils | Building Foundations | Roads and Parking | Lawns and Landscaping | Septic Tank Absorption Fields | Pond Feasibility | Drainage | Water Table | Shrink-Swell/ Frost Heave | Ease of Handling Runoff |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ▒ | | BdC | O | O | O | O | O | + | + | O | + |
| ▒ | | | BdB | + | O | + | + | O | + | + | O | + |
| | | ▒ | Ro | ● | ● | ● | ● | O | ● | ● | + | O |
| ▒ | | | RbA | ● | ● | O | ● | O | ● | ● | O | ● |
| | ▒ | | LbB | ● | ● | O | ● | ● | ● | ● | O | O |
| | ▒ | | Ph | ● | ● | ● | ● | ● | ● | ● | O | O |

SCS Data | WRT Interpretation of SCS Data

Limitations to Development
- ● Severe
- O Moderate
- \+ Slight

Along the floodplain of the Raritan are more recently deposited sediments washed down from upland soils identified as the Rowland silt loam. This transported alluvium is nearly level and subject to frequent stream overflow as it is only 3 to 5 feet above normal stream level. The Rowland series occupies some 14% of the site.

The Parsippany silt loam is another soil type that is subject to frequent stream flooding. Formed in old glacial lake sediments, these deep, poorly drained soils often occur on uplands and comprise about 13% of the site. The remaining 8% of land is derived from transported glacial till identified as Lansdowne silt loam. This soil occurs in the upland of the northwest corner of the site. It was formed in a mantle of old red glacial till that was left on the site during the last period of continental glaciation.

Except for a narrow band with slopes between 3% and 8% that bisects the site, the site is essentially flat. This aspect, combined with low soil permeability and shallow depth to bedrock, renders the site only moderately well to poorly drained. Almost 50% of the site has a perched water table due either to a fragipan in the Raritan silt loam or shallow depth to the bedrock in the Lansdowne silt loam. Agriculture on the site has been limited to pasture and hay crops.

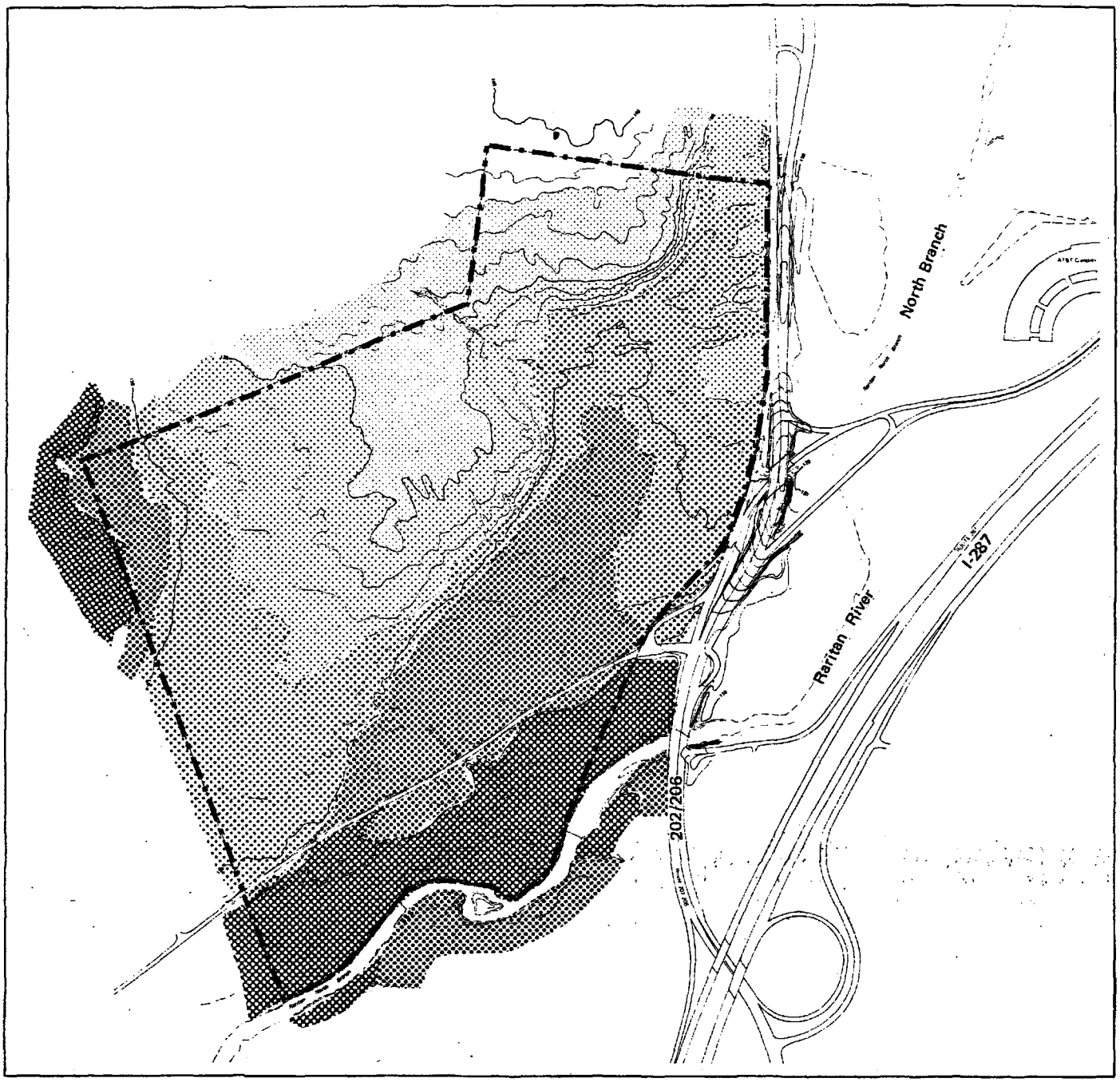
Site soil conditions appear favorable to the kind of development proposed. Field and laboratory data indicate analyzed by the project soil engineers, that proposed structures could be supported on spread footings in firm natural soils. Soil bearing capacities range from 4,000 to 6,000 pounds per square foot.

Topography

The ground surface of the site is characteristic of the gently rolling terrain found in the Piedmont Lowlands. Elevations range between a low of 110' and a high point of 138' above sea level. A 34-foot difference in elevation occurs between the north and south boundaries of the site across 4,500 linear feet along a swale that traverses the site from the northwest to southeast and from northeast to southwest.

Surface Hydrology

Bedminster Township is located within the Upper Watershed of the North Branch of the Raritan River. The majority of runoff, though slow and generally not concentrated in swales, discharges into the Raritan River and its tributaries. The River is a major source of drinking water in



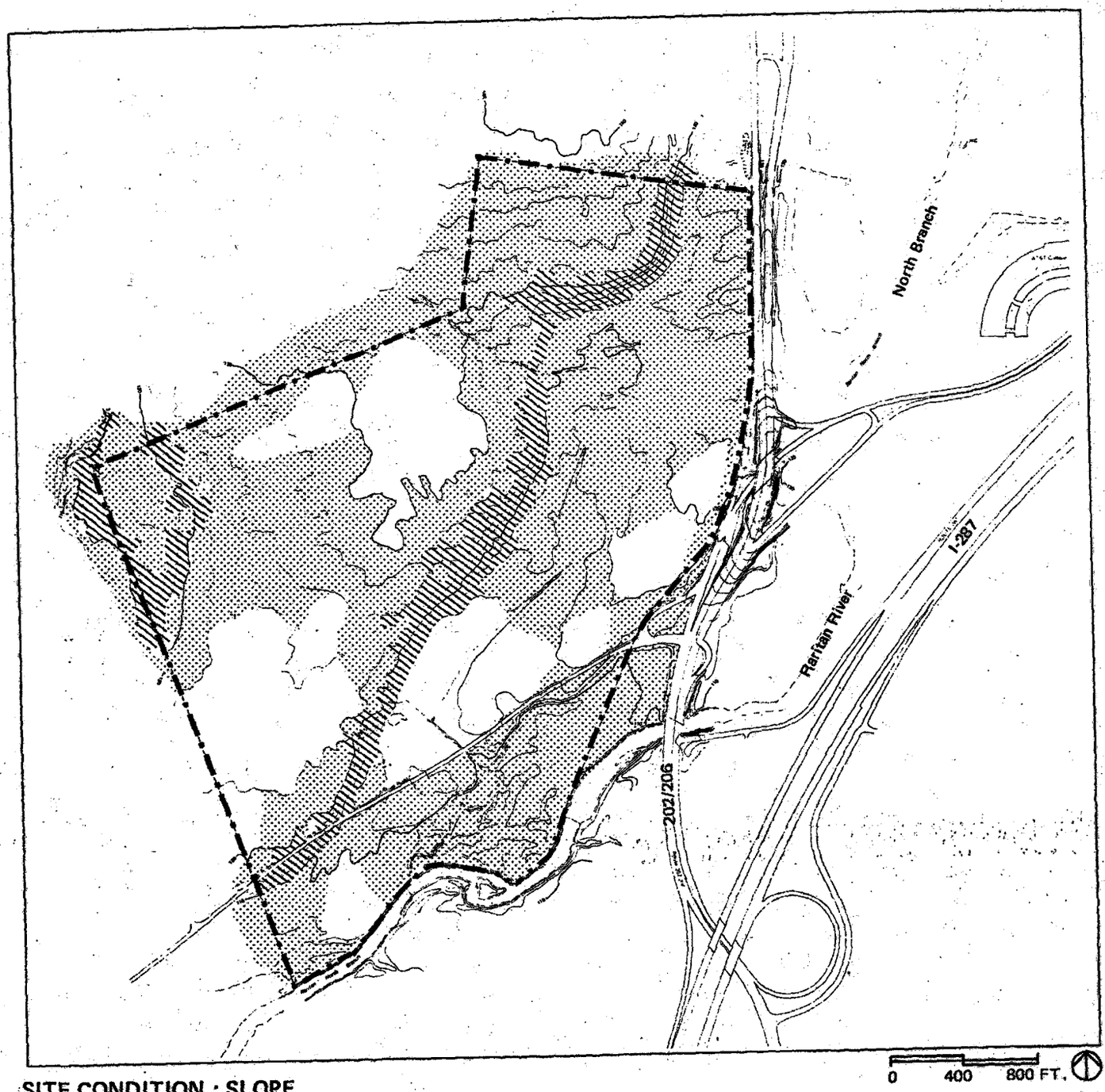

**SITE CONDITION : ELEVATION**

Source: Topographic Data Consultants, Inc.

0 400 800 FT.

- > 136
- 130-136
- 124-130
- 118-124
- 112-118
- < 112

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

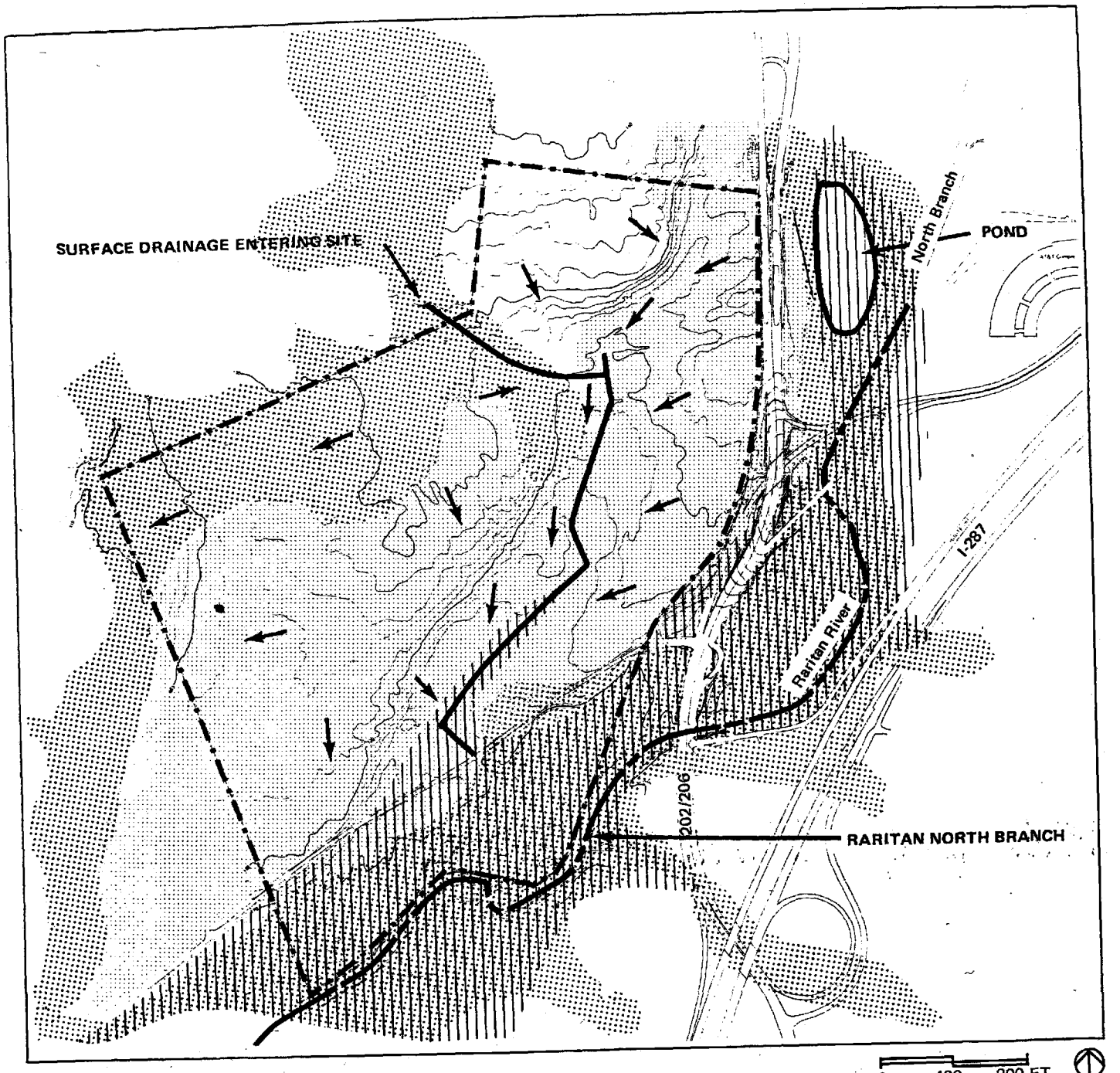



**SITE CONDITION : SLOPE**

Source: Topographic Data Consultants, Inc.

- 0-1½%
- 1½-3%
- 3-8%

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD




## SITE CONDITION : SURFACE HYDROLOGY

Source: Aerial survey and site investigation

- 100 Year Floodplain
- Stream Channel
- No Ponding
- Seldom to Occasional Ponding
- Frequent to Very Frequent Ponding
- Direction of Overland Flow

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

the region. It is classified by the Division of Water Resources of the New Jersey Department of Environmental Protection as a Class FW2, "suitable for the maintenance, migration, and propogation of the natural and established wildlife, and for primary contact recreation, industrial and agricultural water supply and any other reasonable uses."

Most of the runoff generated on the site collects into an intermittent stream, identified on the previous figure. The intermittent stream originates on an adjacent property to the northwest. It flows across the site, under River Road and into the Raritan River's North Branch.

Groundwater Hydrology

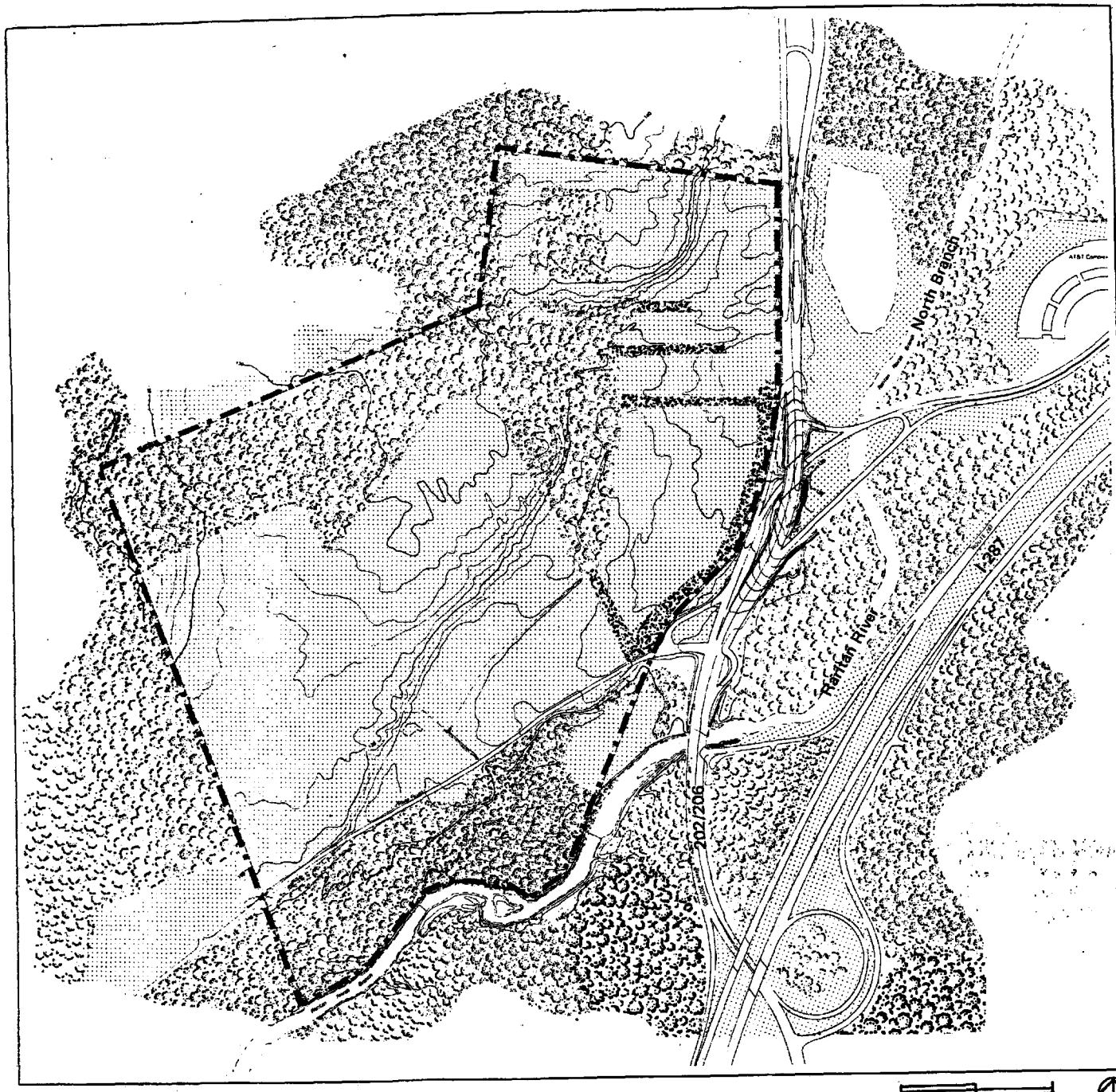
The Brunswick shale that underlies the site has little effective porosity. The surface granular soils are relatively free-draining, however, the underlying clays are impermeable. The water table is, therefore, perched with a seasonal high of 3' below the surface of the ground. Borings taken for the site soils analysis yielded readings that ranged between 3-1/2' to 8' below the surface of the ground.

Vegetation

Site vegetation exists in the form of woodlots, farm land and abandoned pastures. The woodlots are of the oak-hickory association that is indigenous to the uplands of central New Jersey. Representative species in mixed hardwood consist of pine and red oaks, ash, birch, maples, and hickories. The farmland is suited primarily for commonly grown hays and pasture grasses. In the lowland along the Raritan North Branch, abandoned fields exist with abundant red cedar, ash, tulip poplars and associated grasses and woody shrubs.

Zoning and Land Use

The Land Development Ordinance (zoning) of Bedminster Township is presently being amended under court order. A draft ordinance was examined which is still subject to final review by the New Jersey Superior Court and to open discussion at a public hearing scheduled for October 31. The site is presently unimproved and zoned for R-3%, 3-acre residential. The figure on page 39 shows the proposed zoning for the area surrounding the site and present land use.

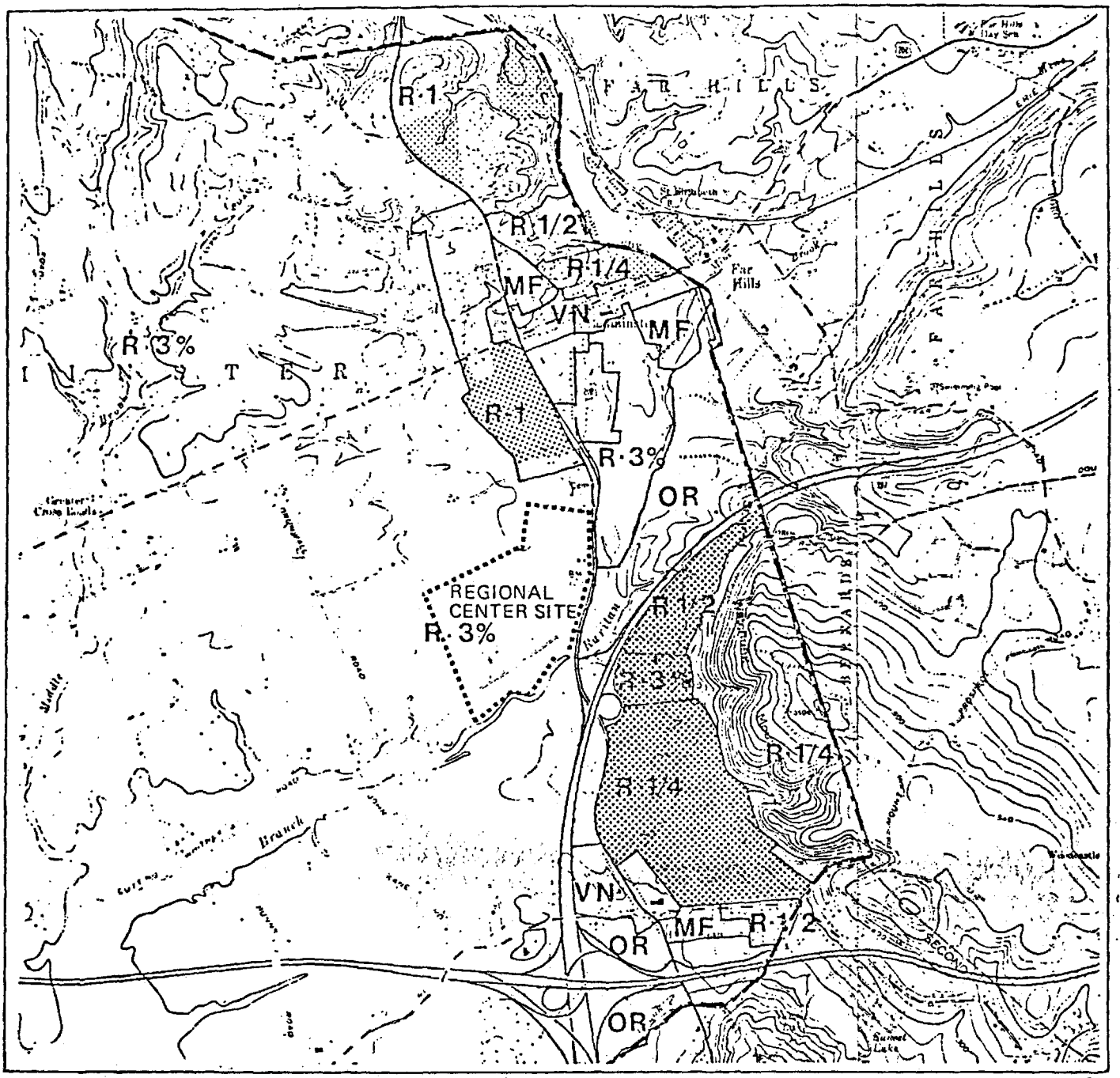



## SITE CONDITION : VEGETATION

Source: Aerial survey and site investigation

- Decidious Wooded
- Coniferous Wooded
- Open Field (Cropland, Pasture, Highway Planting, Abandoned Field)
- Hedgerow

**REGIONAL CENTER**
**BEDMINSTER TOWNSHIP, N.J.**
**WALLACE, ROBERTS & TODD**




SITE CONDITION : ZONING

Source: Zoning Map, Township of Bedminster

ZONING DISTRICTS

R-3% Rural Residential
R-1 Low Density Residential
R-1/2 Medium Density Residential
R-1/4 Medium Density Residential
MF High Multiple Family Residential
VN Village Neighborhood
OR Office Research

OPTIONAL DEVELOPMENT ALTERNATIVES

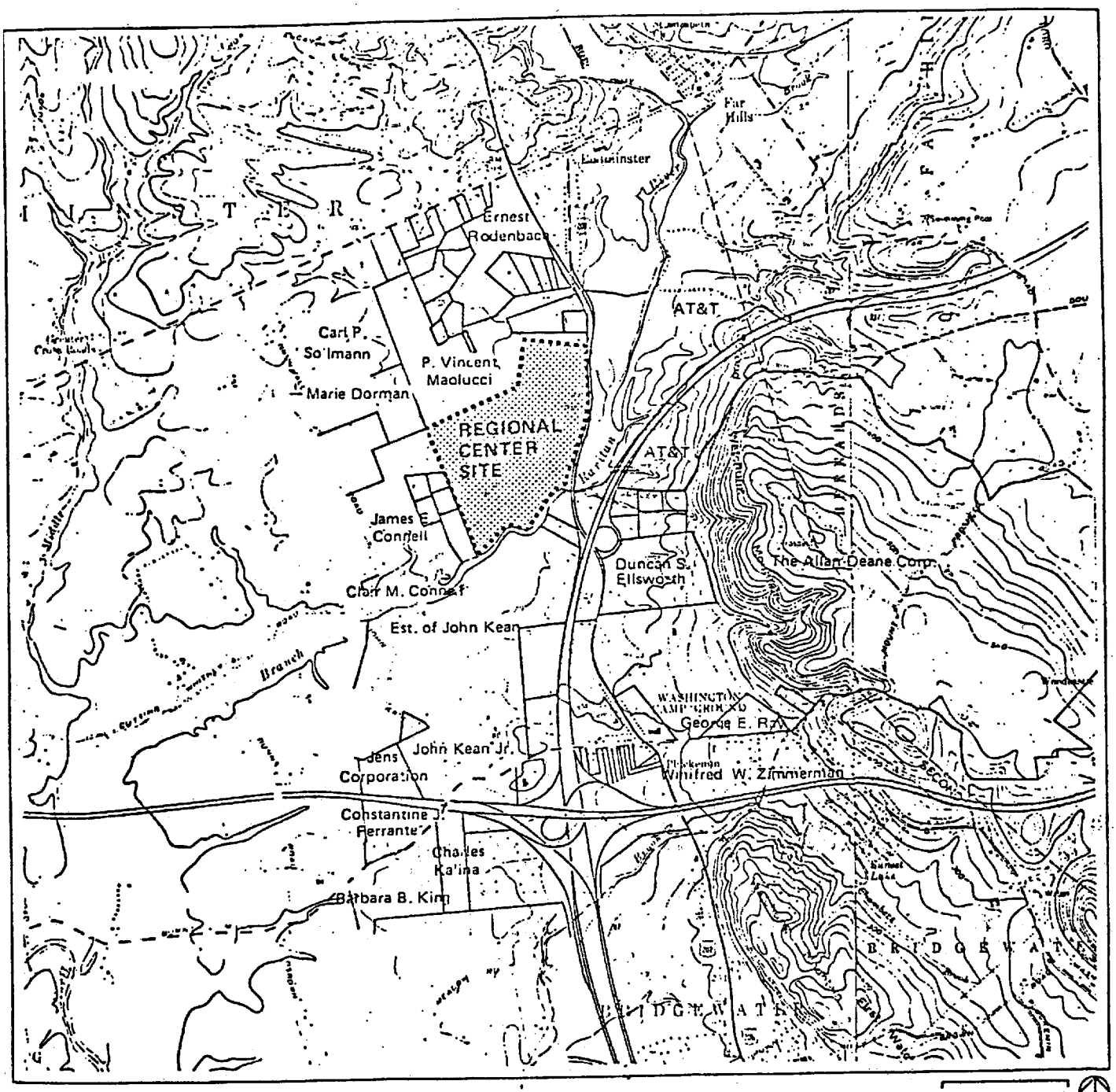
R-1/2& R-1/4 Residential Cluster

Planned Residential Developments–6 DU/Ac

Planned Residential Developments–8 DU/Ac

Planned Unit Developments–10 DU/Ac

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD




SITE CONDITION : SURROUNDING LAND USES

Source: Tax Map, The Township of Bedminster

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

## 7. THE CONCEPT PLAN FOR THE 211-ACRE SITE

The Concept Plan for the site proposed for a Regional Center is presented here in its four major elements: Circulation; Land Use; Utility; and Amenity Network. The brief descriptions of circulation and land use are accompanied by site plans showing proposed elements of the Concept Plan. These elements describe a comprehensive development scheme for the 211-acre site. All development plans for site grading, landscaping and building location will follow the design guidelines listed in the Concept Plan.

### Transportation Element

Following an analysis of possible site access systems, a transportation network for the Regional Center was designed. Principal assumptions that were made as the basis for generating the quantities of traffic on the roadways in the vicinity of the site, which was a major consideration are:

1. The principal mode of travel to and from the retail component of the proposed Regional Center will be private automobile;

2. During the evening peak commuting hour approximately 30 percent of the traffic destined for the retail center will be "intercepted" traffic. This is the traffic generated by commuters using roads passing the Center as opposed to people making a special trip to the Center; and

3. Measures needed to increase the capacity of the Interstate 287 and U.S. Route 202/206 interchange will be taken by public agencies. These will be supplemented by such voluntary actions as car-pooling, staggered work hours, and vanpooling.

The site access system provides a grade-separated flyover ramp providing direct access to the Regional Center to accommodate the major movement from northbound U.S. 202/206 into the site. One of the objectives of developing this access route is to reduce use of the River Road jughandle. This minimizes traffic impact on River Road. All of the site-generated traffic approaching from northbound U.S. 202/206 would use the proposed flyover ramp. The ramp would provide the fastest and the highest capacity access to the site, and take care of 80% of the overall traffic to the Center.

The resultant total traffic volumes estimated to use this access system appear in the traffic analysis Gorove/ Slade's Report.

Capacity analyses were made, and it was determined that the access points serving the Center and the intersections of these access points with the public road system will operate at a Level of Service "C" or better (see Gorove/Slade for definition of Level of Service). The River Road jughandle and Route 202/206 will operate at Level of Service "D" during the PM peak hour. This is approximately the current Level of Service at peak hour.

Site access features are:

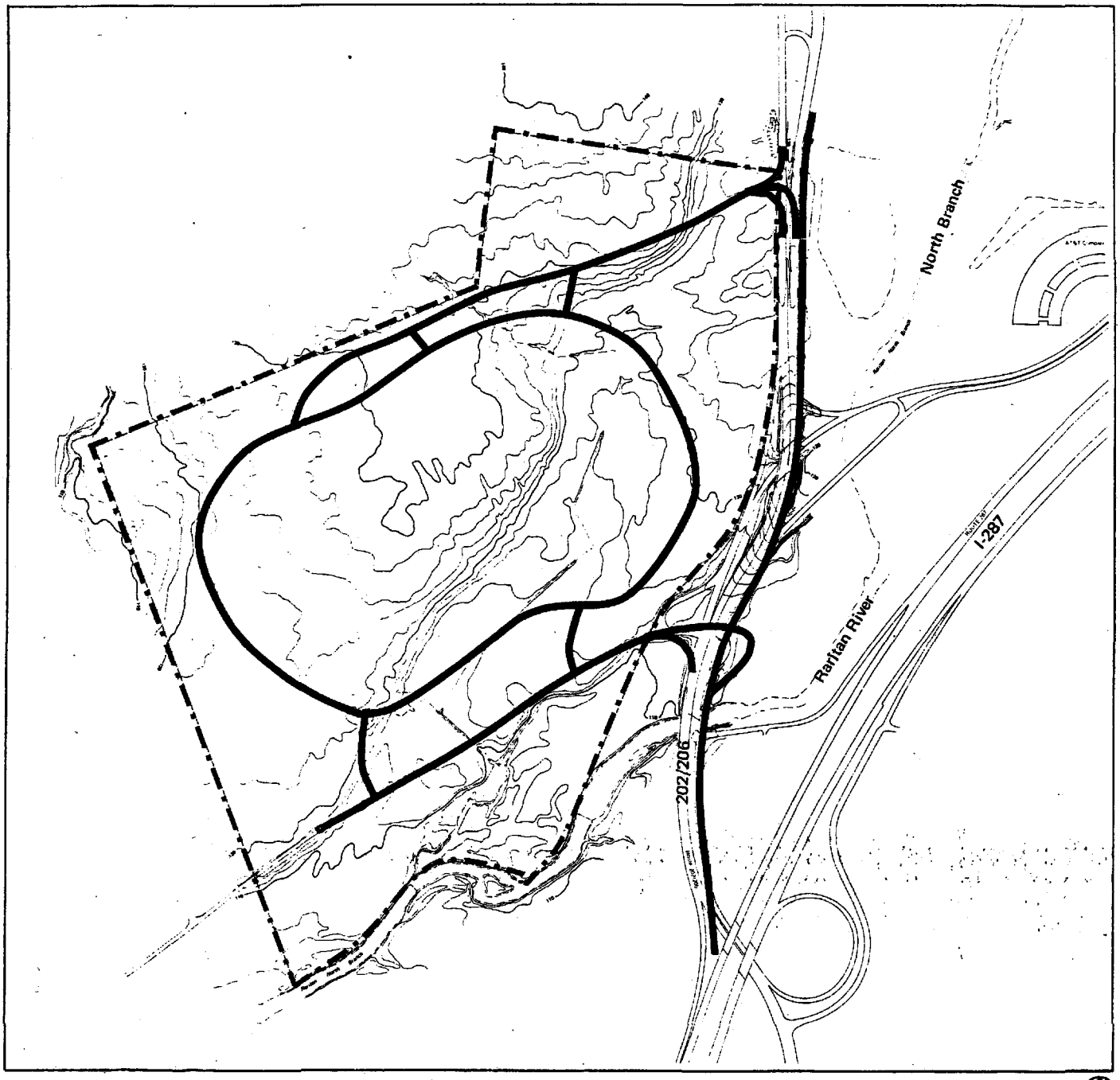
1. Northbound U.S. Route 202/206 will be widened from three to four lanes immediately north of the Raritan River. This additional lane extends to the flyover access ramp to the Regional Center. The additional northbound through-lane to be provided on the south approach of the intersection of U.S. 202/206, River Road, and the jughandle, will provide additional capacity needed to maintain an acceptable Level of Service at this intersection.

2. A traffic signal is proposed at the intersection of the southbound I-287 off-ramp to Route 202/206.

3. The radius of the jughandle turning lane for northbound U.S. 202/206 traffic is increased to lengthen the jughandle to approximately 600 feet and the intersection of this ramp with U.S. 202/206 is widened to three lanes.

4. The flyover ramp providing access to the Regional Center is two lanes in width. The roadway provided along the northerly side of the Center is five lanes in width. This roadway provides access to the north side of the Regional Center. At the location of the flyover, free-flow right turn lanes for both inbound and outbound traffic are provided.

5. River Road is widened to two lanes in the eastbound direction and three lanes in the westbound direction from its intersection with U.S. 202/206 to the westerly Center access point. Beyond this point, the cross section returns to two lanes in width.




PROPOSED TRANSPORTATION ELEMENT

0 400 800 FT.

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

6. Five access points are provided to the Regional Center ring road. Three of these access points would be from the northerly roadway and two of these access points would be from the northerly roadway and two of these access points would be from River Road. These roadways and the ring road will be private roads.

7. The radius of the right turn from eastbound River Road to southbound U.S. 202/206 is increased to 150 feet.

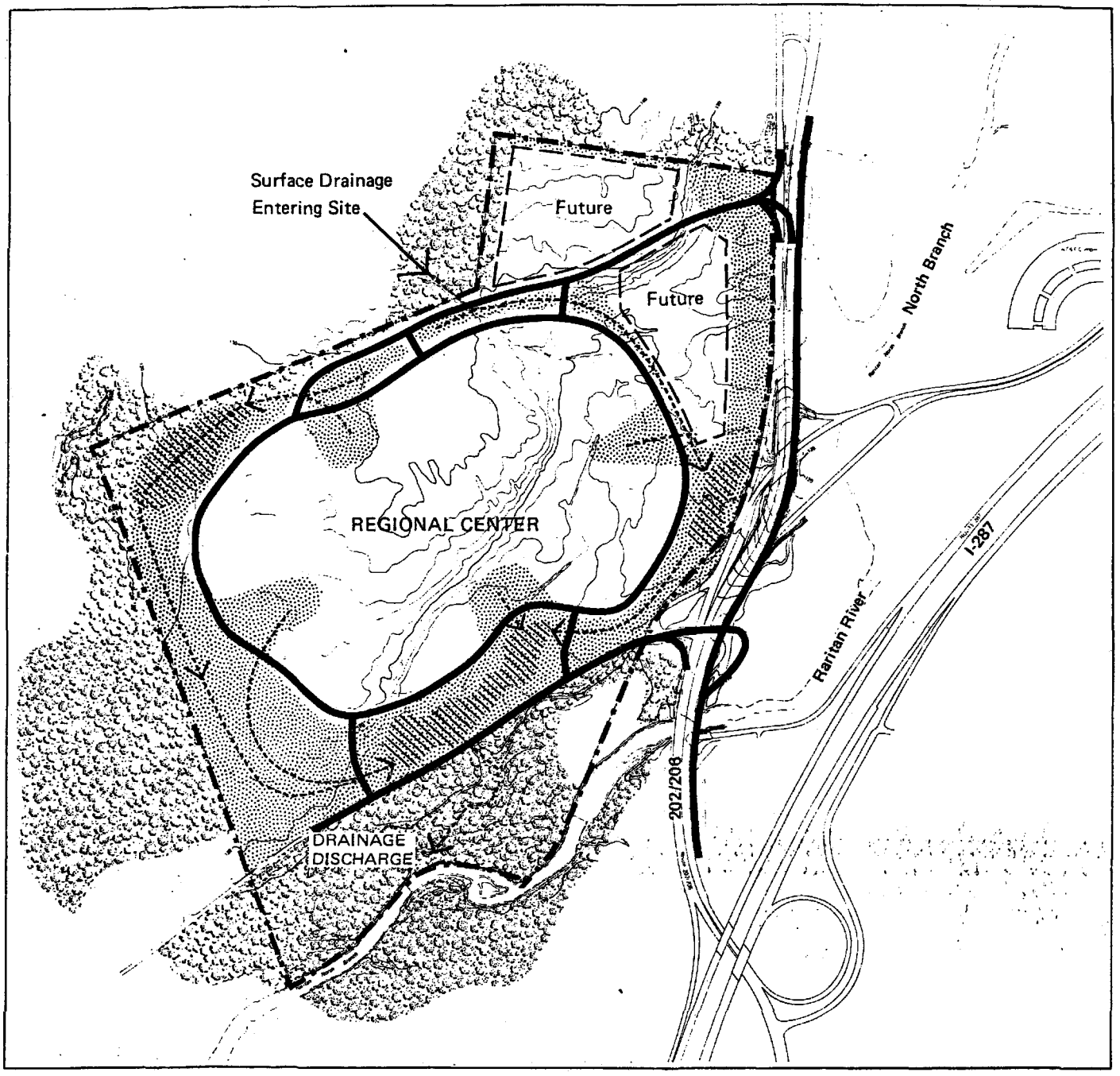
The Land Use Element

The 211-acre site will continue to retain much of the character of the countryside which exists today. Over 50 acres are to be retained for preservation and enhancement of existing vegetation. Another 46 acres will be the focus of a re-vegetation program to screen service docks and parking areas. Only 2% of the future land use area will be devoted to roadways which will be simple and direct but well landscaped and lighted. The five land use categories listed below include the Regional Center and supporting uses. Seventy-eight acres will be covered with impervious surfaces; therefore, surface hydrology must be carefully designed to handle storm runoff. The use of retention ponds and landscaped berm areas will insure good drainage while adding amenity to the site. Approximately 16 acres has been reserved for ponds or lakes. Thirty acres immediately northeast of the Regional Center site are reserved for future development which might be hotel or office development, or possible public use.

The Mall structure itself will occupy fourteen acres with two levels. Extensive interior and exterior landscaping will insure a positive visual impact. Mall and department store entrances will be located on two levels and parking lots will be at each level separated by landscaped berms which become part of the site drainage system.

All land south of River Road will remain undeveloped and special care will be given to preserve natural vegetation in this flood-prone area.

The proposed land uses on the site are summarized below:




**PROPOSED LAND USE ELEMENT**

0 400 800 FT.

- Vegetation Preservation
- Revegetation Programming (Runoff Control Area)
- Water Amenity/Runoff Retention
- Surface Drainage
- Circulation

**REGIONAL CENTER**
**BEDMINSTER TOWNSHIP, N.J.**
**WALLACE, ROBERTS & TODD**

| | | |
|---|---|---|
| Regional Center | | 78 acres |
| Building Footprint | 14 ac. | |
| Parking | 64 ac. | |
| Future Development | | 30 acres |
| Vegetation Preservation | | 50 acres |
| Re-Vegetation Programming | | 46 acres |
| Water Amenity | 16 ac. | |
| Circulation | | 7 acres |
| | | 211 acres |

The Amenity Network

The site planning guidelines discussed later in this Report will outline the principles to be followed in final design of the regional mall and other site uses. One major use area will be the system of open space and public amenities. Located at the base of the Watchung Mountains the site offers good visibility of the wooded slopes to the east. Indoor and outdoor areas for public recreation will be included in the final design of the Regional Center.

Based on its location the theme of the amenity package will be based on the historic rural character of Bedminster Township. The new department stores and mall shops may be contemporary in design but they will be among the highest quality in North New Jersey. The setting and landscaping will focus on the natural plant materials of the Raritan watershed. Types of public amenities which can be provided will include:

- Indoor and outdoor sitting areas
- Sites for community events and fairs
- Children's play areas and adult meeting rooms
- Wooded areas suitable for picnics
- Lake areas suitable for ice skating
- Well maintained meadow areas
- Trail systems linking the site with adjacent communities with bike paths and hiking or equestrian trails
- Sites for public recreation or education

Although the Center will meet a major need for excellent comparison shopping in the region it must also respect the community desire to reflect the character of historic Bedminster Township.

A site entrance similar to that for AT&T headquarters across U.S. 202/206 is proposed at the north entrance to the site.

The character of River Road will be preserved by minimizing Center-generated traffic and preserving its rural character. Use of materials which are often found in Bedminster farmlands will be used in fencing and landscaping treatment. Careful site design will ensure the security of the flood-prone lands against development of any kind, while providing the possibility for a small pond at the River Road entrance with storage capacity for runoff during heavy storms.

Utilities Element

(1) WATER SERVICE

The project site lies within the franchise area of the Commonwealth Water Company which acquires water from the Elizabethtown Water Company. Consultation with a Commonwealth representative established that water service can be provided to the proposed Regional Center. A sixteen-inch water main, owned and operated by the Company, passes to the east of the proposed project along U.S. Route 202/206.

Commonwealth would require two separate connections to this water main. The first connection would provide for "domestic use" and be monitored by use of a meter pit. The second connection would provide for emergency fire flow and would not be metered. The domestic system would be billed on a monthly basis. The fire flow system would be billed on a quarterly basis regardless of actual use.

(2) STORM WATER MANAGEMENT

The entire site has been examined to determine the size, volume and detention storage requirements of the proposed Regional Center development. The calculations have been prepared in accordance with the Somerset County Handbook for Storm Water Management, which governs all detention basins to be constructed in Somerset County.

The site as it presently exists yields a fairly low pre-development discharge rate. This is due to the extended time of concentration because of the nearly flat, undeveloped, wooded and agricultural lands.

The proposed developed state will transform approximately 52% of the site (91.6 acres) into impervious pavement or roof area. This dramatic increase in impervious area has an inverse effect on the time of concentration and almost quadruples the runoff rate in a post-development condition.

The final determination was that the project will generate the need for 36 acre feet of storm water storage during a storm with a frequency of 100 years. This translates to a storage area of a basin seven (7) acres in area and five (5) feet deep. The latest proposed sketch delineates three (3) basins with a total area equal to that which would be needed to fulfill the function. However, the upper basin near Route 202/206 may be better combined with the lower River Road pond due to the difficulty in finding a good and logical discharge point for the upper pond.

(3) WASTEWATER DISPOSAL

The average daily flow from this project will be 225,000± G.P.D. as shown in the Appendix.

Various alternatives have been examined as follows:

a. Connection to Bedminster Township Treatment Plant.

   The Bedminster plant was constructed by AT&T for their Long Lines facility and turned over to the Township. It was designed and constructed at a capacity of 200,000 G.P.D. and is currently operating at about that capacity. Based on information from an engineer who was involved in either the design or operation of the plant it was designed and located (with respect to the flood plan) so that no significant number of additional connections could be made nor could the plant be readily expanded. Apparently the plant was designed to limit future development in the area.

b. Discharge into the proposed Allan-Deane Wastewater Treatment Plant.

   Allan-Deane Corporation has a recent approval for their plant but no construction has taken place to date. It is doubted that they would jeopardize their approval by submitting an amended application for this additional capacity to serve the

Regional Center at this time. It might turn out that there is enough capacity in that plant but their project would have to be built out and the flows measured before that determination could be made. In spite of the fact that the possibility of this alternative becoming a viable solution is rather dim, the Allan-Deane Corporation should be approached for negotiation.

c. Construction of a Wastewater Treatment Plant for this Project.

This is possibly the most viable alternative but also the most expensive. The Bedminster Plant cost approximately one million dollars in 1977 or 1978. Since that plant is about the same size as that which this project would require, the cost adjusted for inflation should be about the same.

A question might be raised as to the advisability of locating a total of three wastewater treatment plants along a one-mile stretch of the North Branch of the Raritan River. If the Wastewater Treatment Plant for this project is designed to produce New Jersey surface water quality level three treatment, as the AT&T plant and the Allan-Deane plant have, it will meet the New Jersey Department of Environmental Protection standards.

d. On-Site Wastewater Disposal.

Extensive soils investigation would have to be performed to properly evaluate this alternative but preliminarily using available general soils data, a percolation rate of 40 minutes per inch can be assumed. Based on a percolation rate of that magnitude a multiple disposal bed system totalling approximately six acres of bed area would be required. In addition, approximately 170,000 gallons of septic tank would be required. For purposes of scale one tank 50' x 50' x 10' deep would be required.

Sludge removal from a tank (or multiple tanks) of this magnitude would be a major problem to be overcome.

(4) EXISTING GAS PIPE ON SITE

There is an existing gas easement (petroleum pipeline) that crosses the site in a north-south direction on the western portion of the site. The easement enters along the River Road Property Line about 100 feet east of the existing culvert. The easement is owned by the Getty Oil Company, Changewater, New Jersey.

Discussions with the Oil Company revealed that there are two 6" diameter petroleum pipelines laid parallel in a fifty foot wide easement. The pipes are very old. The first was constructed in 1897. A second line added in 1914. The lines are thought to be buried at a shallow depth of 1' to 3'. The Oil Company has no recent or accurate as-built type construction maps. Upon request, they will be happy to locate in the field to determine if relocation due to construction excavation would be necessary.

## Design Guidelines

Final design of the various elements of the proposed Regional Center will be guided by a set of design guidelines. Four broad categories of guidelines were identified during preparation of the Concept Plan. Each category reflects one of the special challenges presented by the project site: surface drainage; subsurface conditions; visual considerations; and access and circulation.

### (1) SURFACE DRAINAGE

The nearly level terrain will require extensive site grading to achieve positive surface drainage. Since the soils have little or no recharge capacity, runoff will have to be detained in swales by checkdams. Impounding areas will also have to be provided on the project site to control the rate of discharge into adjacent stream systems.

Preliminary site analysis established that subsurface conditions are generally well-suited to the type of development proposed. Any natural soils that are identified during more detailed site studies as unsuitable will be removed or modified, as judged appropriate. Specific recommendations regarding allowable bearing capacities, foundation elevations, and subsurface drainage procedures will also be put forth at this phase in project design.

### (2) VISIBILITY AND LANDSCAPE

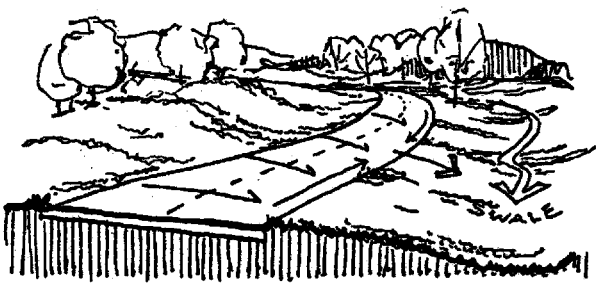
Visibility from adjacent roads is usually a principal consideration in the design of retail facilities. It is recognized that in some settings, such as Bedminster Township, high visibility would detract from the landscape and ultimately reflect poorly upon the intruding development itself. The Regional Center, because it will be a fashion center of high quality, will be designed in a manner so as to enhance rather than disrupt its immediate setting. Imaginative planting and grading to screen service areas and modulate parking lots will be provided.

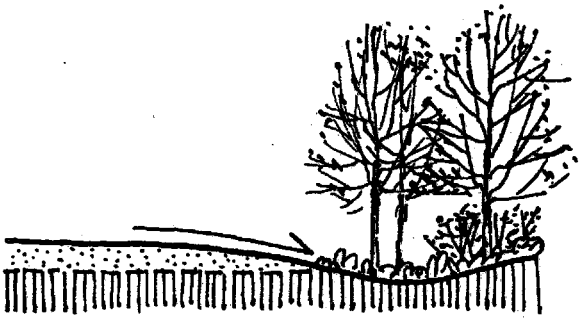
To achieve this design objective, the Regional Center will be well-advertised and the Center will draw patrons who heard about it through advertisements or acquaintances. The stores would not rely heavily upon shoppers who just happened to be passing by and noticed the signs.

(3) CIRCULATION

The internal circulation and site access systems will provide safe and efficient access between all locations in the proposed Center. Special emphasis will be made to achieve a discreet but visually striking main entrance which will function as the gateway to the Center. The internal circulation network will allow swift and convenient access to parking and service areas and to the stores themselves.

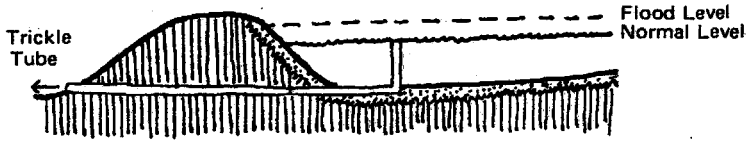
## TYPICAL GUIDELINES; SURFACE RUNOFF



Fill areas to achieve positive drainage and direct runoff to swales.

Checkdams in swales will help detain runoff before it reaches impoundment areas.

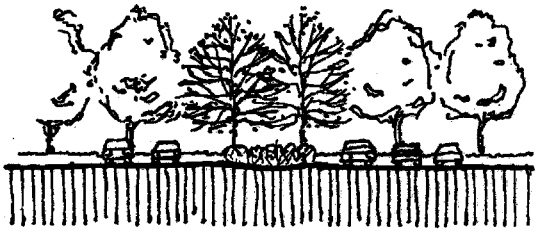



Retention ponds are to be lined with an impermeable layer of clay or plastic.

REGIONAL CENTER
BEDMINSTER TOWNSHIP, N.J.
WALLACE, ROBERTS & TODD

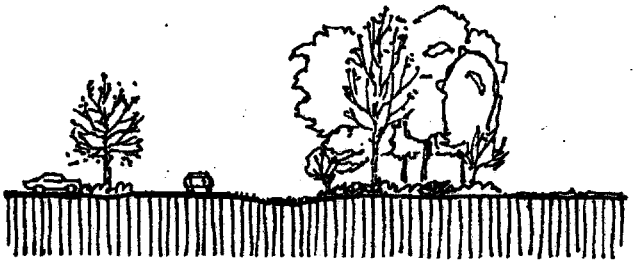
## TYPICAL GUIDELINES; LANDSCAPING

Break up parking with substantial areas of planting. New planting should consist of plants indigenous to the area so that their cultural success and consistency with the surrounding landscape is insured. Non-indigenous species may be used in more architectural settings provided they are analogous to the native flora in their visual character and cultural requirements.



Views into the site from nearby roadways must be selectively screened to hide certain elements such as parking, and expose others such as department store/mall entrances.

The edge of the development site should be screened from adjacent land by a planting area. Where possible, existing trees and understory should be preserved. A 50-foot-wide area is recommended.



## Environmental Assessment

At this stage of project planning it is appropriate to identify and assess the kinds of environmental impacts that may result from implementation of the Concept Plan for the proposed Regional Center. Essentially this is done by re-stating the environmental constraints, identified during an earlier phase in the planning process. It is important to stress that environmental management has been a consideration throughout the preparation of the Concept Plan. The critical impact issues addressed here concern the potential changes in traffic, storm water, geology and soils, site vegetation, the visual setting, and the character of the adjacent community. Each of these issues is addressed very generally since the precise nature and magnitude of environmental impacts will be examined in greater depth during the final design stages of the project.

### (1) GEOLOGY AND SOILS

The major impact to the project site involving its geology and soils would result from the necessity for extensive grading to achieve positive site drainage. Since soils will not be removed from the site the impact will be insignificant.

### (2) HYDROLOGY

A major constraint imposed by the project site is the need to provide for adequate storm water management. Soil conditions, as discussed previously in Section Six, are such that frequent ponding and wetness are common across much of the site. Measures will need to be incorporated into the project design to enhance site drainage and to control storm water runoff. Runoff will be collected and impounded in detention ponds from where it will be discharged into the nearby stream systems at a rate not to exceed pre-development discharge.

Approximately 20% of the project site lies within the 100 year floodplain of the Raritan River, North Branch which is located immediately south of the project site. This area, in the Concept Plan is classified under the vegetation preservation category of the Land Use Element. The hazard of flooding is sufficient to warrant permanent preservation as open space.

The site, in its natural condition, imposes severe limitations for the use of conventional septic tank systems, inferring that whatever development does take place be large enough to support on-site sewerage treatment.

(3) VEGETATION

The major impact to existing vegetation will occur in the development areas of the site as identified in the preceding discussion of the Land Use Element of the Concept Plan. Approximately 45% of the total site area will be maintained as green open space. Existing vegetation will be preserved wherever possible and supplemented with careful landscaping. Vegetation impacts have been kept to a minimum as one of the design objectives was to integrate the natural landscape with the proposed development. The amount of new vegetation planted will approximate that removed.

(4) TRAFFIC

A traffic analysis was undertaken to determine the potential effects of traffic generated by the proposed Regional Center. Because the project site is adjacent to the major residential development proposed by the Allan-Deane Corporation, as well as the AT&T Long Lines office complex, substantial increases in traffic volumes will undoubtedly occur on the roads providing access to the Center. The results of the traffic analysis, including existing and projected traffic counts, and Levels of Service at critical intersections may be found in the traffic analysis which is separate from this Report.

The major conclusion presented is that the proposed improvements to the highway system will accommodate both site-generated traffic and the through-traffic by-passing the site at acceptable levels of service.

(5) COMMUNITY CHARACTER

Bedminster's unique rural character includes the two villages - Bedminster and Pluckemin - actually hamlets, and the surrounding rolling green countryside with white fences and grazing cattle interspersed with large houses and farms. With careful planning as has happened in such other similar countrysides as the Green Spring and Worthington Valley areas of Maryland, inevitable growth has been accepted and guided intelligently. The employment and real estate dynamics reported above are persuasive that growth is inevitable in this portion of Bedminster Township. Indeed this conclusion is reflected by the court's decision in the Allan-Deane case.

Development of the Regional Center must be viewed as only one of the many elements needed to allow the Township to respond to its future growth without losing its identity and unique character. The Center can coexist with very low-density immediately adjacent as it is to the west and northwest. The Township's zoning must take into account the real developing corridor with U.S. Routes 202/206 as its center, not as its edge.

# PRELIMINARY SOIL AND FOUNDATION INVESTIGATION BEDMINSTER REGIONAL SHOPPING CENTER BEDMINSTER, NEW JERSEY

OUR FILE: 4303-01-20/10

SEPTEMBER 23, 1980

for

WALLACE, ROBERTS AND TODD
1737 CHESTNUT STREET
PHILADELPHIA, PA. 19103

by

SITE engineers, inc.

CONSULTING ENGINEERS

One Echelon Plaza
Laurel Road
Voorhees, N.J. 08043

SITE engineers, inc.

September 23, 1980

Wallace, Roberts and Todd
1737 Chestnut Street
Philadelphia, Pa. 19103

Attention: Mr. Richard Huffman, AIA

Re: Preliminary Soil and Foundation Investigation
Bedminster Regional Shopping Center
Bedminster, New Jersey
Our File: 4303-01-20/10

Gentlemen:

As authorized by your Mr. David A. Wallace through his letter dated May 15, 1980, SITE engineers, inc. completed a preliminary soil and foundation investigation for this project. The objectives of this study were to explore site conditions and to make preliminary evaluations regarding foundation treatment and site work.

The recommendations contained herein were presented at a meeting which was held in your office on June 3, 1980 and they were confirmed in our preliminary letter report dated June 9, 1980; a copy of which is enclosed with this report. We trust that this report contains the information that you requested and thank you for this opportunity to assist you with this project.

Very truly yours,

SITE engineers, inc.

Edward Sander
Geotechnical Engineer

Antal Partos, P.E.
Vice President

ES/AP/pt

One Echelon Plaza
Laurel Road
Voorhees, N.J. 08043

September 23, 1980 Our File: 4303-01-20/10

TABLE OF CONTENTS

September 23, 1980 Our File: 4303-01-20/10

# APPENDICES

## APPENDIX A - FIELD DATA

| | |
|---|---|
| Boring Logs | Plates 1 through 12 |
| Boring Location Plan | Drawing 1 |

## APPENDIX B - LABORATORY DATA

| | |
|---|---|
| Summary of Laboratory Test Data | Table L-1 |
| Gradation Curve | Plates L-1 and L-2 |
| Summary of Laboratory Tests | Table LS-1 |
| Laboratory Testing Procedures | |

## APPENDIX C - PREVIOUS CORRESPONDENCE

## APPENDIX D - STANDARD SYMBOLS

September 23, 1980 Our File: 4303-01-20/10

A. LOCATION

The project site is located northwest of the intersection of N.J. State Highway 202/206 and Interstate Highway 287 in Bedminster, New Jersey. The proposed mall and site facilities will cover approximately 114 acres and their approximate locations are shown on the attached Drawing 1.

B. INVESTIGATION

Initially, 15 borings were planned and additionally 12 borings were also proposed by us to study the position of the ground water table.

Eleven test borings were drilled by our drilling division during the period of May 19 to June 27, 1980. The test boring locations were selected and staked out in the field by SITE engineers, inc. Ground surface elevations were planned to be obtained at the as-drilled locations of all borings, including the additionally proposed 12 borings. The conceptional drawings which we received from you contains topographic information at the 12 boring locations which are satisfactory for the purpose of this study. Therefore, we interpolated the ground surface elevations at the test boring locations from "Conceptional Site Plan" by WRT, dated August 13, 1980.

Test boring results, Plates 1 through 12 and a Boring Location Plan, Drawing 1, are presented in Appendix A.

All field work was directed by one of our geotechnical engineers. Water observation pipes (W.O.P.) were installed in Borings B-2, B-9 and B-11 to facilitate long term ground water readings.

All samples were returned to our soils laboratory and visually checked to verify field classifications. Selected samples were tested in our laboratory to determine information regarding the physical properties and volumetric characteristics of the subsoils. Test results and testing procedures are presented in Appendix B.

C. SITE CONDITIONS

1. Surface Features

The ground surface is rolling and irregular with elevations varying from approximately Elev. 110 to Elev. 138 within the areas of the proposed facility. A swale traverses the site in northwest-southeast and northeast-southwest directions. Portions of the site are wooded and the remaining areas are clear and covered with grass and weeds. Several buildings exist on the site.

2. Geology

Available geological data and the data obtained from this investigation indicate that the site lies within the Piedmont Plain physiographic province. The surficial sand, silt and clay soils are stratified deposits of old and recent alluminum transported by surface water and stream flow. The site is underlain by red shales of the Brunswick Formation.

3. Subsurface Conditions

There is an approximately 6 to 12 in. thick layer of topsoil over the site. Based on the field and laboratory data, the subsoils below the topsoil have been separated into 3 principal strata which are briefly described below. Strata numbers are shown on the boring logs.

TABLE 1

PRINCIPAL SOIL STRATA

| Stratum No. | Soil Type | Description |
|---|---|---|
| 1 | SILT | Brown or gray Silt, trace to some fine sand, trace to some clay, trace of roots. |
| 2 | SAND | (2A) Brown silty fine to medium Sand, trace of gravel, trace of clay. |

| Stratum No. | Soil Type | Description |
|---|---|---|
| 2 | SAND | (2B) Reddish brown or brown medium to fine to coarse Sand, some silt, trace to some clay, trace of rock fragments. |
| 3 | CLAY/SILT | Reddish brown clayey Silt or silty Clay, trace of fine to medium sand; reddish brown Silt trace to some clay, trace to some sand & rock fragments. |

Strata 1 and/or 2 are encountered at the site as the surficial deposits underlying the topsoil. These soils are occasionally interbedded with each other and may be encountered in any combination. Penetration resistances indicate that the fine grained soils (silts and clays) are "firm" to "stiff" and the granular soils are "dense" to "very dense".

Stratum 3 was encountered in the basal portions of all borings except B-1. Penetration resistances indicate that these soils are "very hard" and they are considered to be a decomposed shale.

4. Ground Water

Ground water readings were obtained in all borings during and/or immediately after completion of their drilling. These short term readings indicate that the water level varies from 3½ to 8 ft below the ground surface (Elev. 111 to Elev. 131). Borings B-6, B-7, B-8 and B-12 were found to be dry.

The observations are for the times noted and may not be indicative of daily or seasonal fluctuations in the ground water level.

D. ENGINEERING EVALUATION

1. Proposed Facility

The proposed construction will consist of a 2-story shopping mall with 5 "anchor" department stores and space for smaller stores. Final grades will be at Elev. 122 (lower level) and Elev. 140

(upper level). Basements are not anticipated. Column loads are not known at this time but are assumed to be relatively light. Detention ponds are anticipated to be located in several areas of the site. Additionally, an Office Park and Hotel/Motel facility in the northeastern portion of the site are being considered.

2. Foundations and Ground Floors

In general, site and subsurface conditions appear favorable for the proposed development. An evaluation of the field and laboratory data and other data available to us indicates that the proposed structures may be supported on spread footings founded in firm natural soils.

Soil bearing capacities on the order of from (4000 to 6000 psf) may be considered in estimating the costs of foundations. When final building locations and grades have been determined, a supplementary soils and foundation investigation should be made to confirm subsurface conditions at the actual building locations and to investigate that no local unsatisfactory conditions exist. The position of the groundwater, an approximate definition of perched water level should also be investigated. The final soils and foundation investigation will give specific recommendations for allowable bearing capacities and founding elevations, etc.

Ground floor slabs may be placed on-grade on natural soils after removal of any unsuitable materials and proofrolling of the subgrade to detect soft areas which should be removed and refilled with compacted soil.

3. Earthwork

To obtain the proposed floor and parking elevations, cuts and fills up to 8 ft and 24 ft, respectively will be required.

Our experience indicates that soils similar to the on-site soils can be used in compacted fills. However, the fine grained soils (silts, clays and fine sands) are moisture sensitive and require careful control of moisture content.

4. Drainage and Ground Water

The surficial granular soils are relatively free draining; the underlying clayey soils generally are impermeable.

The water level readings, visual examination of the soils samples, laboratory test results and available literature indicates that a perched water table could exist. However, excavations approaching the water levels as shown on the boring logs could encounter wet conditions and/or the permanent ground water table. Consideration should be given to providing a subdrain system to keep working areas dry.

E. LIMITATIONS

This preliminary soil and foundation report has been prepared to assist in the evaluation of this site and we trust that the information presented is adequate for your purposes. It is intended for use with regard to the specific project discussed herein and any changes in type of structure, dimensions, locations, proposed use, etc. should be brought to our attention so that we may determine how they may affect our conclusions. The conclusions and recommendations of this report are based on the information revealed by this investigation.

An attempt has been made to provide for normal contingencies but unexpected conditions may be encountered during a final investigation. If this should occur, modifications to this report may be required. We are not responsible for any conclusions drawn from the data included herein other than those specifically stated nor are any parts of this report intended for direct use in preparation of final design drawings and specifications.

APPENDIX A

FIELD DATA

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B - 1
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. [illegible]
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-26-80 COMPLETED 6-26-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| 5'0 | 1630 | 6-26 | 10 MIN. |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 14'2 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 4'6

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | S-1 | 0'0 /2'0 | 1-2-3-5 | 1'0 TOPSOIL | | VERY ~~HARD~~ DRILLING FROM 10'0 |
| | | S-2 | 2'0 /4'0 | 4-5-7-10 | BROWN & GRAY SILT, TRACE OF ROOTS, TRACE OF FINE SAND 3'0 | 1 | |
| 5 | a | S-3 | 4'0 /6'0 | 12-14-18-20 | BROWN SILTY FINE TO MEDIUM SAND, TRACE OF FINE TO MEDIUM GRAVEL, TRACE OF 5'0 CLAY | 2A | |
| | WET | S-4 | 6'0 /8'0 | 25-20-14-10 | | | |
| | WET | S-5 | 8'0 /10'0 | 12-10-10-18 | | | |
| 10 | | | | | REDDISH BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, SOME 7'0 GRAVEL | 2B | |
| | | NR | 14'0 /14'2 | 90/2" | BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, TRACE OF CLAY LUMPS | | |
| 15 | | | | | | | |
| | | | | | REFUSAL ON CASING | @ 14'2 | |
| 20 | | | | | | | |
| 25 | | | | | | | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery

▽ - Ground Water

Drn DM Date 7-1-80
Ckd: ES Date 7-1-80

Plate No. 1

For General Notes See Boring Location Plan

E 27-6 R

E 905

SITE engineers, inc.
Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B - 2
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT REDMINSTER REGIONAL SHOPPING CENTER
LOCATION REDMINSTER, N.J.
GROUND SURFACE ELEV. ±
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-28-80 COMPLETED 5-28-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| 4'3 | 0905 | 5-28 | 10 MIN. |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 30'1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 5'0

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | a | S-1 | 0'0 /2'0 | 1/12"-1-3 | 0'5 TOPSOIL | | INSTALLED 10'0 OF W.O.P. |
| | | S-2 | 2'0 /4'0 | 6-11-9-12 | BROWN SILT, SOME FINE SAND, TRACE OF CLAY 2'6 | 1 | |
| 5 | | S-3 | 4'0 /6'0 | 5-6-5-8 | BROWN SILTY FINE TO 4'0 MEDIUM SAND | 2A | |
| | | S-4 | 6'0 /8'0 | 30-35-28-30 | LIGHT GRAY & BROWN MOTTLED SILT, SOME FINE SAND & CLAY 6'0 | 1 | S-4 & 5 WET |
| | | S-5 | 8'0 /10'0 | 27-39-42-36 | | | |
| 10 | | S-6 | 13'6 /14'6 | 97-143/6" | REDDISH BROWN FINE TO MEDIUM TO COARSE SAND, SOME SILT, SOME CLAY, SOME GRAVEL 11'0 | 2B | S-6 DRY |
| 15 | d | NR | 19'0 /19'3 | 130/3" | | | VERY HARD DRILLING FROM 15'0 TO 30'0 |
| | | | | | REDDISH BROWN SILTY CLAY, TRACE OF FINE SAND | 3 | |
| 20 | | | | | | | |
| | | NR | 25'0 /25'1 | 100/1" | | | |
| 25 | | | | | | | |
| | | NR | 30'0 /30'1 | 100/1" | | | |
| 30 | | | | | END OF BORING | @ 30'1 | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery

▽ - Ground Water

Drn. DM Date 6-23-80
Ckd. ES Date 6-30-80
Plate No. 2

For General Notes See Boring Location Plan
E905

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-3
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. [illegible]
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-28-80 COMPLETED 5-28-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| | | | |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED - IN CASING | 10'0 TO 30'1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 4'6

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | 1'0 TOPSOIL | | |
| | | S-1 | 0'0 /2'0 | 1-1-3-2 | BROWN SILT, SOME CLAY, TRACE TO SOME FINE SAND, TRACE OF ROCK FRAGMENTS 5'0 | 1 | |
| | | S-2 | 2'0 /4'0 | 4-5-5-7 | | | |
| 5 | a | S-3 | 4'0 /6'0 | 3-13-14-20 | | | |
| | | S-4 | 6'0 /8'0 | 23-25-24-33 | REDDISH BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, SOME CLAY, TRACE OF ROCK FRAGMENTS 10'0 | 2B | S-4 & 5 WET |
| | | S-5 | 8'0 /10'0 | 20-29-33-36 | | | |
| 10 | | | | | | | |
| | | S-6 | 13'6 /14'3 | 75-122/3" | | | |
| 15 | | | | | REDDISH BROWN SILTY CLAY, TRACE OF FINE SAND | 3 | VERY HARD DRILLING FROM 12'0 TO 30'0 |
| | d | NR | 20'0 /20'2 | 120/2" | | | |
| 20 | | | | | | | |
| | | NR | 25'0 /25'1 | 100/1" | | | |
| 25 | | | | | | | |
| | | NR | 30'0 /30'1 | 120/1" | | | |
| 30 | | | | | END OF BORING | @ 30'1 | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
▽ - Ground Water

Drn DM Date 6-24-80
Ckd: ES Date 6-30-80
Plate No. 3

For General Notes See Boring Location Plan

E90

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-4
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. 1111.2
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-23-80 COMPLETED 5-28-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| 3' 10 | 1415 | 5-28 | 10 MIN. |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| b | 6" FINGER TYPE CUTTER HEAD | 10'0 TO 30' 1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 5'0

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | S-1 | 0'0 /2'0 | 1-1-1-2 | 10" TOPSOIL | | |
| | | S-2 | 2'0 /4'0 | 4-9-14-22 | LIGHT GRAY & BROWN MOTTLED SILT, TRACE OF FINE SAND, TRACE OF CLAY 3'0 | 1. | S-1, S-4, S-5 |
| 5 | a | S-3 | 4'0 /6'0 | 29-57-40-22 | REDDISH BROWN SILTY MEDIUM TO FINE TO | | WET |
| | | S-4 | 6'0 /8'0 | 17-17-20-21 | COARSE SAND 6'0 | 2A | |
| | | S-5 | 8'0 /10'0 | 24-26-29-29 | | | |
| 10 | | | | | | | |
| | | S-6 | 13'6 /14'6 | 78-110/6" | REDDISH BROWN SILT, SOME CLAY, SOME MEDIUM TO FINE TO COARSE SAND & ROCK FRAGMENTS | 3 | |
| 15 | b | NR | 19'0 /19'1 | 100/1" | | | |
| 20 | | | | | | | |
| | | NR | 25'0 /25'1 | 114/1" | | | |
| 25 | | | | | | | |
| | | NR | 30'0 /30'1 | 120/1" | | | |
| 30 | | | | | END OF BORING | @ 30'1 | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery
▽ - Ground Water

Drn: DM Date 6-23-80
Ckd: ES Date 6-30-80
Plate No. 4

For General Notes See Boring Location Plan

6-22-68

E905

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-5
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER TWP., N.J.
GROUND SURFACE ELEV.
DATUM

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED COMPLETED
DRILLER
HELPER
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| | | | |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| | | TO |
| | | TO |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| 5 | | | | | BORING NOT DRILLED | | |
| 10 | | | | | | | |
| 15 | | | | | | | |
| 20 | | | | | | | |
| 25 | | | | | | | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery

Ground Water

Drn J.H. Date 9-25-90
Ckd E.S. Date 9-23-90
Plate No. 5

For General Notes See Boring Location Plan

8-22-68

E905

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-6
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV.
DATUM SEE DWG. - 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-27-80 COMPLETED 5-27-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| DRY | 1720 | 5-27 | 1/4 |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 25'1 |
| | | - TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT NOT NOTED *

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | S-1 | 0'0 /2'0 | 2-3-3-5 | 0'8 TOPSOIL | | SPOON HEAD @ 25'1 WAS WET |
| | | S-2 | 2'0 /4'0 | 7-13-14-16 | REDDISH BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, TRACE OF CLAY, SOME ROCK FRAGMENTS FROM 5'0 TO 8'0 8'0 | 2B | |
| 5 | a | S-3 | 4'0 /6'0 | 15-18-24-25 | | | |
| | | S-4 | 6'0 /8'0 | 25-30-43-27 | | | |
| | | S-5 | 8'0 /10'0 | 21-24-29-33 | | | |
| 10 | | | | | | | |
| | | S-6 | 13'6 /15'0 | 39-57-83 | REDDISH BROWN CLAYEY SILT, TRACE OF FINE TO MEDIUM SAND | 3 | |
| 15 | d | | | | | | |
| | | S-7 | 19'0 /20'0 | 96-123/6" | | | |
| 20 | | | | | | | |
| | | UR | 25'0 /25'1 | 100/1" | | | |
| 25 | | | | | END OF BORING | @ 25'1 | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery

▽ - Ground Water

Drn DM Date 6-23-80
Ckd: ES Date 6-30-80

Plate No. 6

For General Notes See Boring Location Plan

E905

6-3748

SITE engineers, inc.
Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B - 7
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. 122.3
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-27-80 COMPLETED 5-27-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| DRY | 1540 | 5-27 | 10 MIN. |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 25'1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT NOT NOTED

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | S-1 | 0'0 /2'0 | 1-2-2-5 | 6" TOPSOIL | | |
| | | S-2 | 2'0 /4'0 | 7-15-20-25 | BROWN SILT, TRACE OF CLAY, TRACE OF FINE TO MEDIUM SAND, TRACE OF 1'6 GRAVEL | 1 | |
| 5 | a | S-3 | 4'0 /6'0 | 10-10-12-18 | | | |
| | | S-4 | 6'0 /8'0 | 21-22-35-34 | BROWN FINE TO MEDIUM TO COARSE SAND, SOME SILT, TRACE OF CLAY, TRACE OF 6'0 GRAVEL | 2B | VERY HAR DRILLING FROM 19'0 TO 25'0 |
| | | S-5 | 8'0 /10'0 | 15-20-31-34 | | | |
| 10 | | | | | REDDISH BROWN SILTY CLAY, SOME FINE TO MEDIUM SAND, TRACE 12'0 OF GRAVEL | | |
| | | S-6 | 13'6 /15'0 | 26-44-58 | | | |
| 15 | d | | | | | 3 | |
| | | S-7 | 19'0 /20'0 | 73-104/6" | REDDISH BROWN CLAYEY SILT, TRACE OF FINE TO MEDIUM SAND | | |
| 20 | | | | | | | |
| | | NR | 25'0 /25'1 | 100/1" | | | |
| 25 | | | | | END OF BORING | @ 25'1 | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery

▽ - Ground Water

Drn DM Date 6-23-80
Ckd ES Date 6-30-80
Plate No. 7

For General Notes See Boring Location Plan
E90

SITE engineers, inc.
Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-8
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. 150.0
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-27-80 COMPLETED 5-27-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| DRY | 1410 | 5-27 | 10 MIN. |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 25'2 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 5'6

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | S-1 | 0'0 /2'0 | 2-2-4-6 | 8" TOPSOIL | | S=4 ± 5 |
| | | S-2 | 2'0 /4'0 | 10-16-20-28 | BROWN & GRAY MOTTLED SILT, SOME CLAY, TRACE OF FINE SAND 4'0 | 1 | -5-5 WET |
| 5 | a | S-3 | 4'0 /6'0 | 8-10-14-25 | TAN & GRAY CLAY, TRACE OF FINE SAND 5'6 SEAMS | | |
| | | S-4 | 6'0 /8'0 | 25-32-45-35 | | | |
| | | S-5 | 8'0 /10'0 | 30-36-34-39 | BROWN & GRAY MEDIUM TO FINE TO COARSE SAND, SOME GRAVEL, SOME SILT & CLAY 9'0 | 2B | VERY HARD DRILLING FROM 12'0 TO 25'0 |
| 10 | | | | | | | |
| | | S-6 | 13'0 /14'0 | 105/6" | | | |
| 15 | d | | | | REDDISH BROWN CLAYEY SILT, TRACE OF FINE SAND | 3 | |
| | | S-7 | 19'0 /19'4 | 110/4" | | | |
| 20 | | | | | | | |
| | | NR | 25'0 /25'2 | 100/2" | | | |
| 25 | | | | | END OF BORING @25'2 | | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery
▽ - Ground Water

Drn: DM Date 6-24-80
Ckd: ES Date 6-30-80
Plate No. 8

For General Notes See Boring Location Plan

8-27-68

E90

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-9
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. N.Y.S.
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-20-80 COMPLETED 5-20-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| 7'3 | 1345 | 5-20 | 1/4 |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 25'1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 8'0

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| 0 | a | S-1 | 0'0 /2'0 | 2-4-6-10 | 0'0 TOPSOIL | | INSTALLED 10'0 OF W.O.P. |
| | | S-2 | 2'0 /4'0 | 24-47-68-79 | BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, TRACE OF CLAY, TRACE OF GRAVEL 2'0 | | |
| 5 | | S-3 | 4'0 /6'0 | 53-65-74-95 | BROWN SILTY MEDIUM TO FINE TO COARSE SAND, SOME GRAVEL 4'0 | 2B | |
| | | S-4 | 6'0 /8'0 | 49-83-85-70 | | | |
| | | S-5 | 8'0 /10'0 | 19-10-10-11 | GRAY ROCK FRAGMENTS & MEDIUM TO FINE TO COARSE SAND, SOME RED BROWN SILT 8'0 | | VERY HARD DRILLING FROM 15'0 TO 25'0 |
| 10 | | | | | | | |
| | | S-6 | 13'6 /15'0 | 28-43-54 | REDDISH BROWN & LIGHT GRAY CLAY, TRACE OF FINE SAND 13'0 | | S.#6 & 7 DAMP |
| 15 | d | | | | | | |
| | | S-7 | 18'6 /20'0 | 47-64-87 | REDDISH BROWN SILT, SOME CLAY, TRACE OF FINE SAND | 3 | |
| 20 | | | | | | | |
| | | N.R. | 25'0 /25'1 | 100/1" | | | |
| 25 | | | | | END OF BORING | @25'1 | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N - Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery
▽ - Ground Water

Drn DM Date 6-24-80
Ckd: ES Date 6-30-80
Plate No. 9

For General Notes See Boring Location Plan

E-22-68

E905

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-10
FILE NO. 9303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. +/-?
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-19-80 COMPLETED 5-19-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| 3'10 | 1505 | 5-19 | 10 MIN. |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 25'1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 4'0

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| 0 | a | S-1 | 0'0 /2'0 | 1-2-1-3 | 1'0 TOPSOIL | | |
| | | S-2 | 2'0 /4'0 | 5-9-9-28 | BROWN & LIGHT GRAY SILT, SOME CLAY, TRACE OF FINE SAND 2'6 | 1 | S-1, S-3, S-4, S-5 WET |
| 5 | | S-3 | 4'0 /6'0 | 30-25-20-34 | BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, SOME GRAVEL, TRACE OF CLAY | 2B | |
| | | S-4 | 6'0 /8'0 | 31-40-29-31 | | | |
| | | S-5 | 8'0 /10'0 | 30-38-42-33 | 12'0 | | HARD DRILLING FROM 12'0 TO 25'0 |
| 10 | d | S-6 | 13'6 /14'6 | 78-124 | REDDISH BROWN CLAYEY SILT, TRACE OF FINE SAND | 3 | |
| 15 | | | | | | | |
| 20 | | S-7 | 19'0 /20'0 | 93-131 | | | |
| | | NR | 25'0 /25'1 | 100/1" | | | |
| 25 | | | | | END OF BORING | @ 25'1 | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery

▽ - Ground Water

Drn. DM Date 6-24-80
Ckd. ES Date 6-30-80
Plate No. 10

For General Notes See Boring Location Plan

E905

SITE engineers, inc.
Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-11
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. ---
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-13-80 COMPLETED 5-19-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| 3'5 | 1335 | 5-19 | 114 |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 24'1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 6'0

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | S-1 | 0'0 /2'0 | 5-5-4-4 | 1'0 TOPSOIL | | INSTALLED 10'0 OF W.O.P. |
| | | S-2 | 2'0 /4'0 | 8-14-17-10 | BROWN SILT, SOME FINE TO MEDIUM SAND, TRACE OF GRAVEL 3'0 | 1 | |
| 5 | a | S-3 | 4'0 /6'0 | 45-60-91-98 | BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, SOME GRAVEL, TRACE OF CLAY | 2B | S-4 & S-5 WET |
| | | S-4 | 6'0 /8'0 | 42-47-63-31 | | | |
| | | S-5 | 8'0 /10'0 | 24-23-21-24 | | | |
| 10 | | | | | 13'0 | | VERY HARD DRILLING FROM 15'0 TO 24'0 |
| | | S-6 | 13'6 /15'0 | 38-54-73 | REDDISH BROWN SILT, SOME CLAY, TRACE OF FINE SAND, TRACE OF SHALE FRAGMENTS | 3 | |
| 15 | d | | | | | | |
| | | S-7 | 15'6 /20'0 | 35-42-69 | | | |
| 20 | | NR | 24'0 /24'1 | 100/1" | | | |
| 25 | | | | | END OF BORING | @24'1 | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery
▽ - Ground Water

Drn DM Date 6-24-80
Ckd: ES Date 6-30-80
Plate No. 11

For General Notes See Boring Location Plan

E-905

8-22-68

# SITE engineers, inc.

Philadelphia, Pa. Cherry Hill, N.J.

BORING NO. B-12
FILE NO. 4303-01
SHEET NO. 1 OF 1

PROJECT BEDMINSTER REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
GROUND SURFACE ELEV. [illegible]
DATUM SEE DWG. 1

CLIENT WALLACE, ROBERTS & TODD
DATE STARTED 5-27-80 COMPLETED 5-27-80
DRILLER J.I. YESIN
HELPER J.P. TIERNEY
INSPECTOR

| GROUND WATER DATA | | | |
|---|---|---|---|
| DEPTH | HOUR | DATE | HRS. AFTER COMPLETION |
| DRY | 1150 | 5-27 | 1/4 |
| | | | |
| | | | |

| A - METHOD OF ADVANCING BORING | | DEPTH |
|---|---|---|
| a | CONTINUOUS SAMPLING | 0 TO 10'0 |
| d | DRILLED-IN CASING | 10'0 TO 25'1 |
| | | TO |
| | | TO |

GROUND WATER FIRST ENCOUNTERED AT 7'0

| DEPTH | A | SAMPLE NO. | SAMPLE DEPTH | SAMPLE N | SOIL CLASSIFICATION | STRATUM NO. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | S-1 | 0'0 /2'0 | 2-2-2-6 | 0'3 TOPSOIL | | |
| | | | | | BROWN SILT, SOME FINE SAND | 1 | |
| | | S-2 | 2'0 /4'0 | 12-15-19-21 | | | |
| 5 | a | S-3 | 4'0 /6'0 | 15-28-18-18 | BROWN SILTY FINE TO MEDIUM SAND, TRACE OF SANDSTONE FRAGMENTS | 2A | S#4 WET |
| | | S-4 | 6'0 /8'0 | 16-17-17-23 | | | |
| | | | | | 9'0 | | |
| | | S-5 | 8'0 /10'0 | 19-16-18-21 | | | |
| 10 | | | | | | | |
| | | | | | REDDISH BROWN SILT, SOME CLAY, TRACE OF FINE SAND | | VERY HARD DRILLING FROM 14'0 TO 25'0 |
| | | S-6 | 13'0 /15'0 | 36-49-51 | | 3 | |
| 15 | | | | | | | |
| | d | | | | | | |
| | | S-7 | 18'0 /20'0 | 50-78-102 | | | |
| 20 | | | | | | | |
| | | NR | 25'0 /25'1 | 100/1" | | | |
| 25 | | | | | END OF BORING | @25'1 | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

S - 2" O.D. Split Spoon Sample
U - Undisturbed Sample, 3" Diameter
Core Drilling
N Standard Penetration Resistance per 6" (140 lb. hammer, 30" drop)
N.R. No Recovery

▽ - Ground Water

Drn: DM Date 6-24-80
Ckd: ES Date 6-30-80
Plate No. 12

For General Notes See Boring Location Plan

8-22-68

E-905

## FIELD WORK COMPLETED

| | | | |
|---|---|---|---|
| Test Boring..... | 279 ft 1 in. | Auger Probe..... | ft in. |
| Earth Drilling. | 279 ft 1 in. | Test Pit..... | days |
| Method a ..... | 110 ft 0 in. | Thin walled tube sample | |
| Method d ..... | 149 ft 0 in. | 2 in. O.D. ..... | |
| Method b ..... | 20 ft 1 in. | 3 in. O.D. ..... | |
| Rock Coring.... | ft in. | Denison sample..... | |
| Method ..... | ft in. | Water Observ. Pipe 30 ft 0 in. | |
| Method ..... | ft in. | W.O.P.sealed No. | ft in. |
| | | Percolation Test | days |

## METHODS AND TOOLS FOR ADVANCING BOREHOLES

a. Continuous sampling (split-barrel sampler and/or thin wall tube)
b. Finger type rotary cutter head (4-3/4 in. or 6-3/4 in.)
d. Drilled-in casing (3-3/8 in. X 8 in.)
$e_1$. Drilled casing BX (2-7/8 in. O.D.)
$e_2$. Drilled casing NX (3-1/2 in. O.D.)
f. 4 in. I.D. casing: blows/ft 300# hammer, 18 in. drop
g. 2-1/2 in. I.D. casing; blows/ft 300# hammer, 18 in. drop
h. Drilled ahead of casing, then applied method _____
i. Chopped ahead of casing, then applied method _____
j. Washed ahead of casing, then applied method _____
k. Rotary drag bit: 2-1/8 in.
l. Tricone roller bit: 3-1/8 in. O.D., or 3-5/8 in. O.D.
m. Sawtooth bit: 2 in. O.D.

## METHODS AND TOOLS FOR TESTING AND SAMPLING SOILS AND/OR ROCKS

Penetration test and split-barrel sampling of soils, ASTM D 1586-67. 140 lb. hammer, 30 in. drop, recording number of blows obtained from each 6 in. penetration and generally for a total of 18 in. penetration of the standard 2 in. O.D. and 1-3/8 or 1-1/2 I.D. split-barrel sampler. Penetration resistance (N) is the total number of blows required for the second and third 6 in. penetration.

Thin walled tube sampling, ASTM D 1587-67.
Samples are obtained by pressing thin-walled steel, brass or aluminum tubes into soil.

Standard thin-walled steel tubes:

| O.D. in. | 2 | 3 | 5 |
|---|---|---|---|
| I.D. in. | 1.94 | 2.87 | 4.76 |

Diamond core drilling, ASTM D 2113-62T.
Diamond core drilling is designed for recovering intact samples of rock and some hard soils generally with the use of

$c_1$. 2W single tube core barrel 2 in. O.D., 1-3/8 in. I.D.
$c_2$. 2WM double tube core barrel 2 in. O.D., 1-3/8 in. I.D.
$c_3$. NWM double tube core barrel 2-15/16 in. OD., 2-1/8 in. I.D

Denison type core sampling.
Sampling of hard or very dense soils with the use of a double-core barrel having an inner stationary barrel extending slightly below the outer rotary barrel to protect the samples from erosion by the wash water.

# APPENDIX B

# LABORATORY DATA

# SUMMARY OF LABORATORY TEST DATA

| SAMPLE IDENTIFICATION | | | | | GRAIN SIZE DISTRIBUTION | | | | PLASTICITY | | | | | | VOLUMETRIC ANALYSIS | | | COMPACTION | | | | | | SHEAR STRENGTH | | | CONSOLIDATION | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BORING NUMBER | SAMPLE NUMBER | DEPTH (FT.) | ELEVATION (FT.) | SOIL GROUP (USC SYSTEM) | GRAVEL (%) | SAND (%) | SILT (%) | CLAY & COLLOIDS (%) | LIQUID LIMIT - $W_L$ (%) | PLASTIC LIMIT - $W_P$ (%) | PLASTICITY INDEX - $I_P$ (%) | LIQUIDITY INDEX - $I_L$ | SPECIFIC GRAVITY - G | MOISTURE CONTENT - W (%) | DRY UNIT WEIGHT - $\gamma_d$ (PCF) | VOID RATIO - e | DEGREE OF SATURATION - $S_r$ (%) | MAXIMUM DRY DENSITY (PCF) | OPTIMUM MOISTURE CONTENT (%) | | | | TYPE OF TEST | ANGLE OF INTERNAL FRICTION - $\phi$ (DEGREES) | COHESION - C (TSF) | UNCONFINED COMPRESSIVE STRENGTH - $q_u$ (TSF) | OVERBURDEN STRESS - $p_o$ (TSF) | PRECONSOLIDATION STRESS - $p_c$ (TSF) | COMPRESSION INDEX - $C_c$ | SWELLING INDEX - $C_s$ | STRATUM |
| B-9 | S-5 | 8'-10' | | | | | | | | | | | 2.70 | 15.6 | 116.5 | 0.45 | 95 | | | | | | | | | | | | | | 3 |
| | S-6 | 13'-15' | | | | | | | | | | | 2.70 | 13.6 | 119.9 | 0.35 | 100 | | | | | | | | | | | | | | 3 |
| B-10 | S-2 | 2'-4' | | | 25 | 53 | 22 | | | | | | 2.67 | 13.0 | 116.5 | 0.43 | 81 | | | | | | | | | | | | | | 2B |
| | S-3 | 4'-6' | | | 34 | 48 | 18 | | | | | | 2.67 | 9.6 | 131.4 | 0.27 | 95 | | | | | | | | | | | | | | 2B |
| | S-5 | 8'-10' | | | | | | | | | | | | 8.3 | | | | | | | | | | | | | | | | | 2E |
| | S-6 | 13'-15' | | | | | | | | | | | | 8.4 | | | | | | | | | | | | | | | | | 3 |
| B-11 | S-4 | 6'-8' | | | 45 | 45 | 10 | | | | | | | 10.6 | | | | | | | | | | | | | | | | | 2E |
| | S-6 | 13'-15' | | CL | 59 | | 24 | 17 | 25 | 15 | 10 | -0.3 | 2.70 | 12.4 | 119.3 | 0.41 | 81 | | | | | | | | | | | | | | 3 |

↑ ASSUMED VALUE
* REMOLDED SPECIMEN

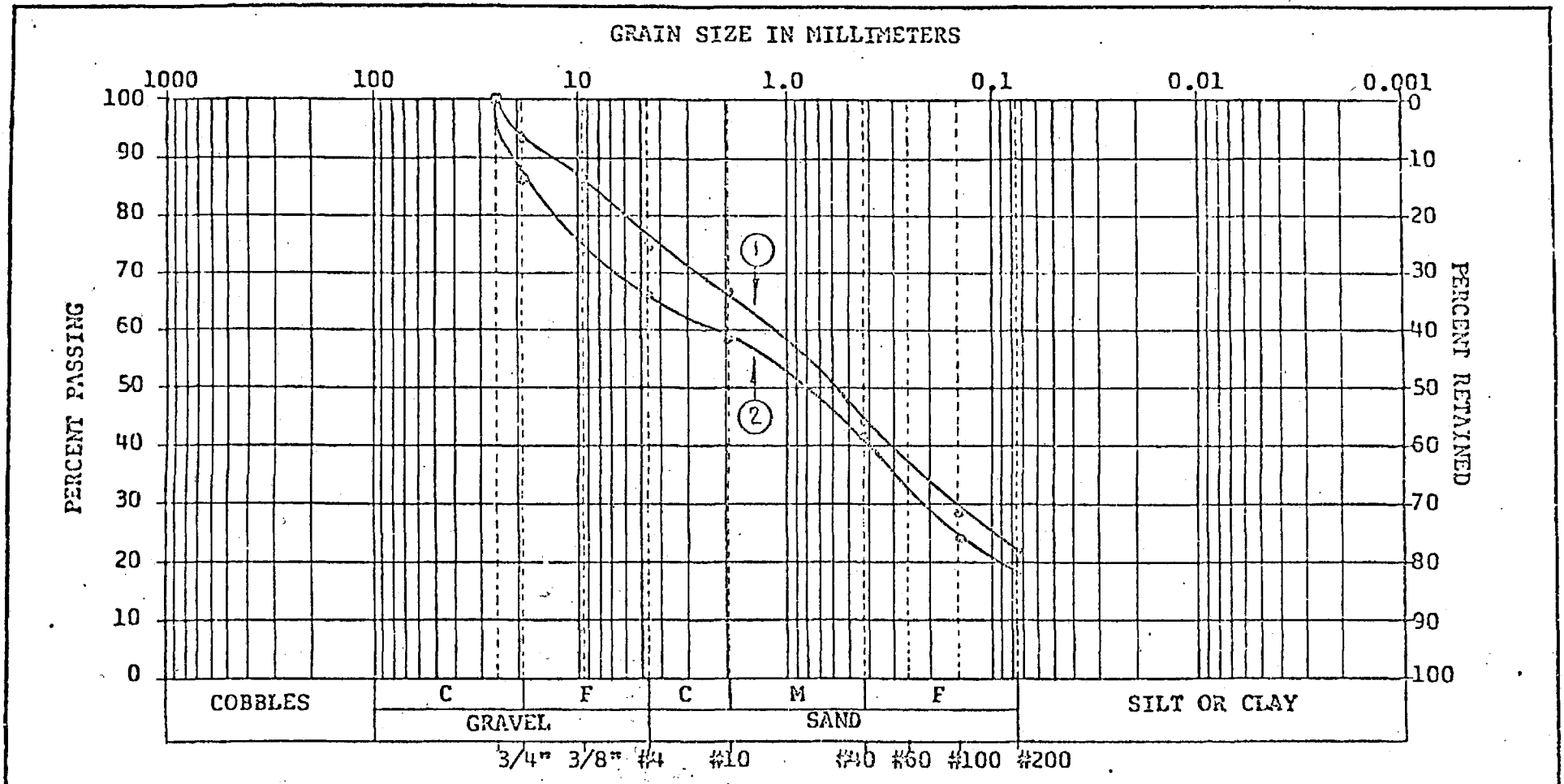
SITE engineers, inc.
Philadelphia, Pa. — Cherry Hill, N.J.

DRAWN: DM DATE: 7-7-80
CHECKED: ES DATE: 7-7-80

REGIONAL SHOPPING CENTER
BEDMINSTER, N.J.

FILE NO. 4303-01
TABLE NO. L-1

E 903

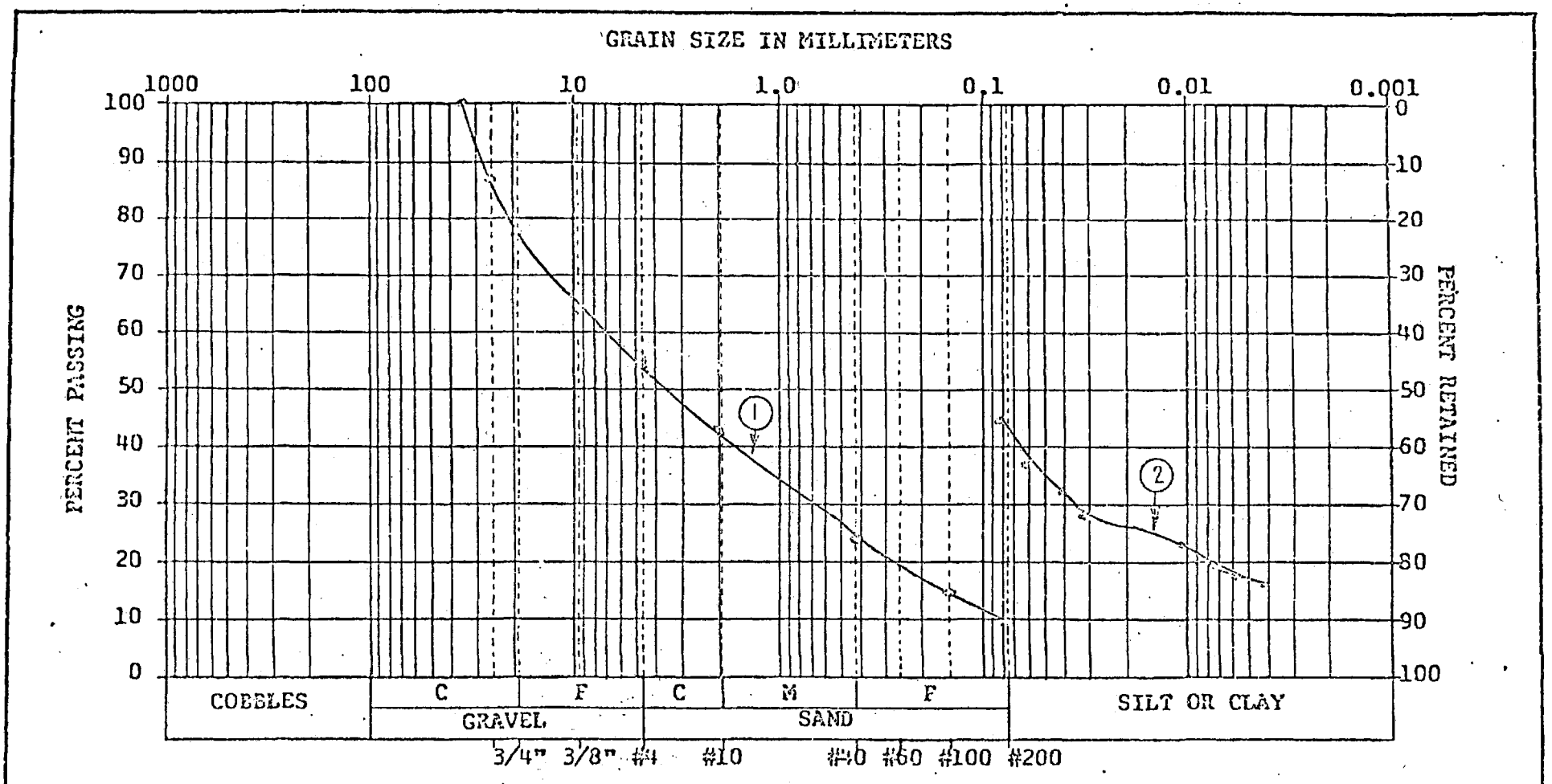



| BORING | SAMPLE | DEPTH | CURVE | CLASSIFICATION | USC | $W_L$ | $I_p$ |
|---|---|---|---|---|---|---|---|
| B-10 | S-2 | 2'-4' | 1 | BROWN FINE TO MEDIUM TO COARSE SAND, SOME GRAVEL, | — | — | — |
| | | | | SOME SILT | | | |
| B-10 | S-3 | 4'-6' | 2 | BROWN GRAVELLY FINE TO MEDIUM TO COARSE SAND, | — | — | — |
| | | | | SOME SILT | | | |

SITE engineers, inc.
Philadelphia, Pa. ◇ Cherry Hill, N.J.

GRADATION CURVES
UNIFIED SOIL CLASSIFICATION

PROJECT REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
FILE NO. 1303-01 DATE 7-7-80 PLATE NO. L-1




U. S. STANDARD SIEVE SIZES

| BORING | SAMPLE | DEPTH | CURVE | CLASSIFICATION | USC | $W_L$ | $I_p$ |
|---|---|---|---|---|---|---|---|
| B-11 | S-4 | 6'-8' | 1 | BROWN MEDIUM TO FINE TO COARSE SAND & GRAVEL, TRACE | — | — | — |
| | | | | OF SILT | | | |
| B-11 | S-6 | 13'-15' | 2 | REDDISH BROWN CLAY, SILT & SAND, SOME GRAVEL | CL | 25 | 10 |
| | | | | | | | |

SITE engineers, inc.,
Philadelphia, Pa. ○ Cherry Hill, N.J.

GRADATION CURVES
UNIFIED SOIL CLASSIFICATION

PROJECT REGIONAL SHOPPING CENTER
LOCATION BEDMINSTER, N.J.
FILE NO. 4303-01 DATE 7-7-80 PLATE NO. L-2

## PHYSICAL CHARACTERISTICS AND IDENTIFICATION OF SOILS

| | TOTAL NO. OF TESTS |
|---|---|
| Description of samples | |
| Classification of samples | |
| Opening thin-walled tubes for identification only. | |
| Moisture content | 3 |
| Liquid and plastic limits | 1 |
| Liquid or plastic limit | |
| Shrinkage factors | |
| Sieve analysis REGULAR | 3 |
| Hydrometer analysis | 1 |
| Specific gravity | |
| Unit weight | 5 |
| Maximum and minimum densities of granular soils (Burmister's method) | |
| Bearing ratio of laboratory compacted soil (CBR) | |
| Standard compaction test 4 in. mold | |
| 6 in. mold | |
| Modified compaction test 4 in. mold | |
| 6 in. mold | |

## PHYSICAL AND STRUCTURAL PROPERTIES OF SOILS

| | Trimmed | Remolded |
|---|---|---|
| Vane shear or penetrometer | | |
| Unconfined compression | | |
| Triaxial compression, per Mohr's circle | | |
| Unconsolidated, undrained | | |
| Same with pore pressure measurements | | |
| Consolidated, undrained | | |
| Same with pore pressure measurements | | |
| Consolidated, drained; cohesive soil | | |
| Consolidated, drained; non-cohesive soil | | |
| Unload-reload cycle | | |
| One-dimensional consolidation (load and final unload cycle) | | |
| Additional unload-reload cycle | | |
| Permeability | | |
| Constant head; cohesive soil | | |
| Constant head; non-cohesive soil | | |
| Variable head; cohesive soil | | |
| Variable head; non-cohesive soil | | |
| Capillary head | | |

## PHYSICO-CHEMICAL PROPERTIES OF SOILS

Organic content
- Ignition
- Modified dichromate oxidation

Hydrogen ion concentration (pH)

Soluble salts

## PHYSICAL CHARACTERISTICS, STRUCTURAL PROPERTIES, AND IDENTIFICATION OF ROCKS

Identification of rock samples

Specific gravity

Unconfined (uniaxial) compression

SITE | REGIONAL SHOPPING CENTER | CHECKED: ES | FILE 4303-01

# LABORATORY TESTING PROCEDURES

All testing is done in accordance with the indicated ASTM Designation or with other standard or generally accepted engineering practice as described hereafter:

1. Visual Identification of Soil Samples

   All soil samples are visually identified and/or classified. The classification system used is shown in Table E-1.

2. Identification of Rock

   Rock core samples are identified by the appearance and character of newly fractured surfaces of unweathered pieces, by core conditions and characteristics, and by the determination of simple physical and chemical properties.

3. Atterberg Limits

   a. Liquid limit of soils, ASTM D 423-66(1972)

   b. Plastic limit and plasticity index of soils, ASTM D 424-59(1971)

   c. Shrinkage factors of soils, ASTM D 427-61(1974)

   (Moisture content is also determined with the Atterberg limits tests, and liquidity index is also computed.)

4. Moisture Content of Soil

   ASTM D 2216-71

5. Grain-Size Analysis of Soils

   ASTM D 421-58(1971), Dry preparation of soil samples
   ASTM D 422-63(1972), Sieve and/or hydrometer analysis
   (Specific gravity is determined with the hydrometer analysis)

6. Specific Gravity of Soils

   ASTM D 854-58(1972)

7. Unit Weight Determination of Soils

   See ASTM D 2166-66(1972) for preparation of specimen except that sample size may differ.
   For moisture content see ASTM D 2216-71.

8. Triaxial Compression Test of Soils

   Sample preparation, apparatus, and testing generally follow the procedures outlined in Soil Testing for Engineers, T.W. Lambe, John Wiley & Sons, Inc., New York 1951 and in The Measurement of Soil Properties in the Triaxial Test, Alan W. Bishop & D.J. Henkel, 2nd Ed., St. Martin's Press, New York, 1962.

9. Unconfined Compressive Strength of Cohesive Soil

   ASTM D 2166-66(1972)

10. Consolidation Test of Soils

    Preparation of samples and testing procedures generally follow the methods described in Lambe, op. cit. In addition, the time of loading may be selected on the basis of:

    a. controlled rate of percent of consolidation
    b. controlled pore pressure gradient
    c. controlled strain

    The method of test is selected to suit the soil type in question and the test is conducted in accordance with generally accepted engineering practice.

11. Compaction Test of Soils

    a. Moisture-density relations of soils using 5.5 lb hammer and 12 in. drop, ASTM D 698-78 (Standard Proctor)

    b. Moisture-density relations of soils using 10 lb hammer and 18 in. drop, ASTM D 1557-78 (Modified Proctor)

12. Maximum and Minimum Densities of Granular Soils

    Testing procedures follow D. M. Burmister, "Suggested Methods of Test for Maximum and Minimum Densities of Granular Soils" cited in Proceedings for Testing Soils, Fourth Edition, ASTM, Philadelphia,, 1964, pp. 175-77.

13. Bearing Ratio of Laboratory-Compacted Soils

    ASTM D 1883-73(1978)

    (Sometimes called California Bearing Ratio or CBR)

14. Organic Content

    A modified dichromate oxidation method using ferrous ammonium sulfate solution is employed in determining the percent of organic matter in the soil.

APPENDIX C

PREVIOUS CORRESPONDENCE

SITE engineers, inc.

June 9, 1980

Wallace, Roberts & Todd
1737 Chestnut Street
Philadelphia, Pennsylvania 19103

Attention: Mr. Richard Huffman, AIA

Re: Regional Shopping Center
Bedminster, New Jersey
Our File: 4303-01-20/10

Gentlemen:

This letter confirms the recommendations we presented at the project meeting held in your office on June 3,1980.

The general site and subsurface conditions are favorable for construction of the proposed development. The structures can be supported on shallow spread footings designed for an allowable net soil bearing capacity on the order of 4000 to 6000 psf.

The ground water level readings and visual examination of the soil samples indicate that a perched water table may exist. Consideration should be given to providing a subdrain system to keep working areas dry.

Our experience indicates that soils similar to the on-site soils can be used in compacted fills. However, the fine-grained soils (fine sands, silts, and clays) are moisture sensitive and require careful control of moisture content.

The surficial granular soils are relatively free draining; the underlying clayey soils generally are impermeable. We recommend that 2 to 3 additional borings with sealed water observation pipes be drilled in order to provide more

One Echelon Plaza
Laurel Road
Voorhees, NJ 08043
(609) 772-1742

70 Park Street
Montclair, NJ 07042
(201) 744-1070

1818 Market Street
Philadelphia, PA 19103
(215) 922-5024

28 Pleasant Street
Darien, CT 06820
(203) 655-9197

detailed information across the site regarding the depth to the impermeable soils and the ground water gradient.

If you have any questions please contact us.

Very truly yours,

SITE engineers, inc.

Edward Sander
Geotechnical Engineer

Antal Partos P.E.
Vice President

ES/AP/jm

One Echelon Plaza
Laurel Road
Voorhees, NJ 08043

# APPENDIX D

## STANDARD SYMBOLS

## STANDARD SYMBOLS

| | |
|---|---|
| $B$ | width of footing |
| $c$ | cohesion |
| $c_v$ | coefficient of consolidation |
| $C_c$ | compression index |
| $C_\alpha$ | coefficient of secondary compression |
| $C_s$ | swelling index |
| $C_u$ | uniformity coefficient = $D_{60}/D_{10}$ |
| CBR | California Bearing Ratio |
| $D_f$ | depth of foundation |
| $D_p$ | diameter of grain corresponding to percentage P on grain size curve |
| $D_{10}$ | effective grain size |
| $E$ | modulus of linear deformation - Young's modulus |
| $e$ | void ratio |
| $F_s$ | factor of safety |
| $G$ | specific gravity of solids |
| $h$ | hydraulic head |
| $H$ | stratum thickness |
| $i$ | hydraulic gradient |
| $I_L$ | liquidity index = $(w_n - w_p)/I_p$ |
| $I_p$ | plasticity index = $w_L - w_p$ |
| $k$ | coefficient of permeability |
| $k_h$ | coefficient of horizontal subgrade reaction |
| $k_s$ | coefficient of vertical subgrade reaction |
| $L$ | length of footing |
| $n$ | porosity |
| $P$ | deviator stress = $\sigma_1 - \sigma_3$ |
| $P_c$ | estimated probable preconsolidation pressure |
| $P_o$ | existing overburden pressure |
| $q_a$ | allowable soil bearing pressure |
| $q_u$ | unconfined compression strength |
| $Q$ | triaxial compression test - unconsolidated and undrained |
| $Q_c$ | triaxial compression test - consolidated and undrained |
| $S$ | triaxial compression test - consolidated and drained |
| $S_r$ | degree of saturation |
| $u$ | pore-water pressure |
| $U$ | degree of consolidation |
| $U_c$ | unconfined compression test |
| $w_f$ | moisture content at end of test |
| $w_L$ | liquid limit |
| $w_n$ | natural moisture content |
| $w_p$ | plastic limit |
| $\gamma$ | unit weight |
| $\gamma_d$ | dry unit weight |
| $\gamma_b$ | submerged unit weight |
| $\epsilon$ | unit liner strain |
| $\epsilon_f$ | unit linear strain at failure |
| $\sigma$ | normal stress |
| $\sigma_1$ | major principal stress |
| $\sigma_3$ | minor principal stress |
| $\tau$ | shear stress |
| $\phi$ | angle of internal friction |
| $K_a$ | coefficient of active pressure |
| $K_p$ | coefficient of passive earth pressure |
| $\delta$ | friction angle |
| $\tan \delta$ | friction factor |