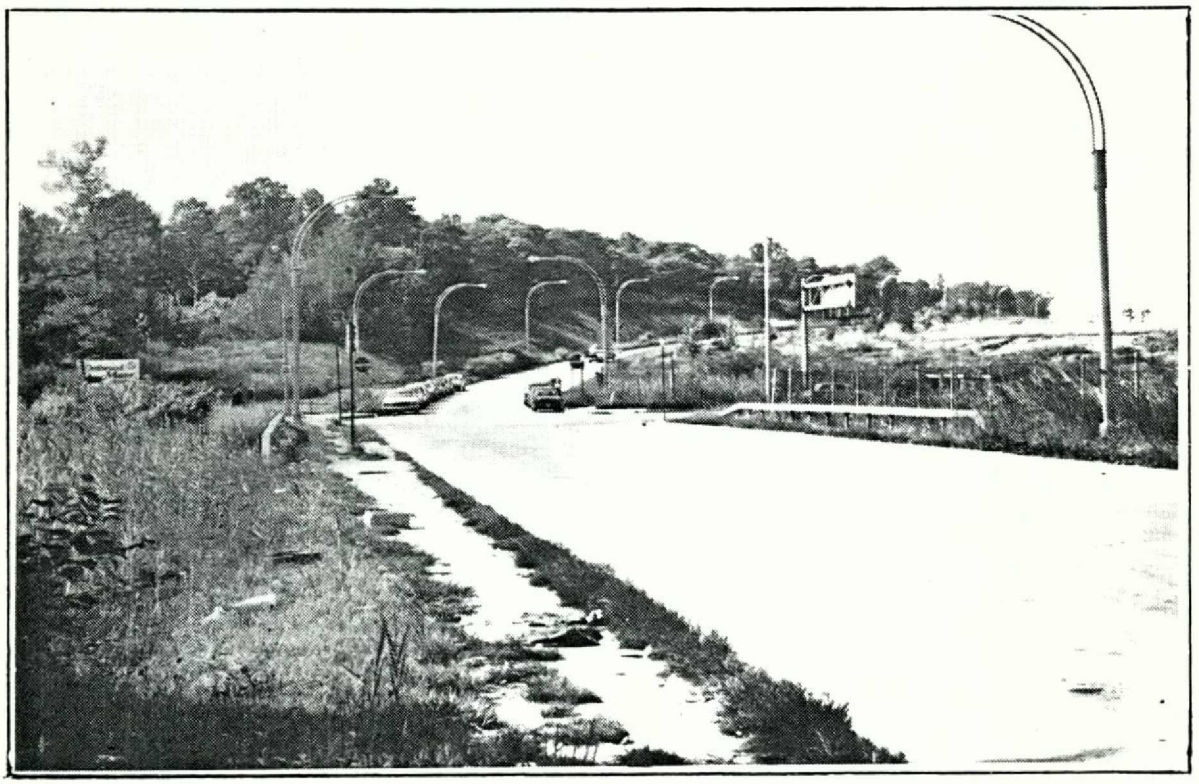
Report of the Stage 1b Archaeological Survey of the Mayflower Avenue Pump Station and Force Main of the Oakwood Beach Water Pollution Control Project, County of Richmond, Staten Island, N.Y.

Capital Project No. WP-136



submitted to
O'Brien & Gere Engineers
New York, New York

submitted by
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Materials Investigation, Inc.
Utica, New York
February, 1985

REPORT OF THE STAGE Ib ARCHAEOLOGICAL SURVEY FOR THE MAYFLOWER AVENUE PUMP STATION AND FORCE MAIN OF THE OAKWOOD BEACH WATER POLLUTION CONTROL PROJECT COUNTY OF RICHMOND, STATEN ISLAND, NEW YORK

CAPITAL PROJECT NO. WP-136

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Report No. MT78A-1-2-85

February 1985

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(Note: Plates 1-13, 15-19, and 24 are by J. Geismar; Plates 14, 20-23 are by C. Perez.)

Abstract

This report presents a Stage 1b archaeological evaluation of the Mayflower Avenue Pump Station and Force Main Project in the County of Richmond, Staten Island, New York (Capital Project No. WP-136). The evaluation, which included the compilation of a project-specific history as well as field testing, indicates that the project area has a long history of prehistoric and historic occupation, but, mainly as a result of relatively recent development, no culturally significant material will be impacted by the construction as currently planned. However, an assessment of the final plans is recommended. It is also recommended that selected samples from borings planned prior to construction be made available for pollen analysis. This would establish the age of a known, deeply buried organic silt level and determine whether there is any possibility of finding underlying deposits related to human activity.

INTRODUCTORY SUMMARY AND RECOMMENDATIONS

Introductory Summary

This report represents an archaeological evaluation of the proposed Mayflower Avenue Pump Station and Force Main in the County of Richmond, Staten Island, New York (Capital Project No. WP-136; see Fig. 1). The evaluation was undertaken by Materials Investigation, Inc., for O'Brien & Gere, the engineers under contract to the Department of Environmental Protection, Bureau of Water Resources of the City of New York, for this phase of the Oakwood Beach Water Pollution Control Project.

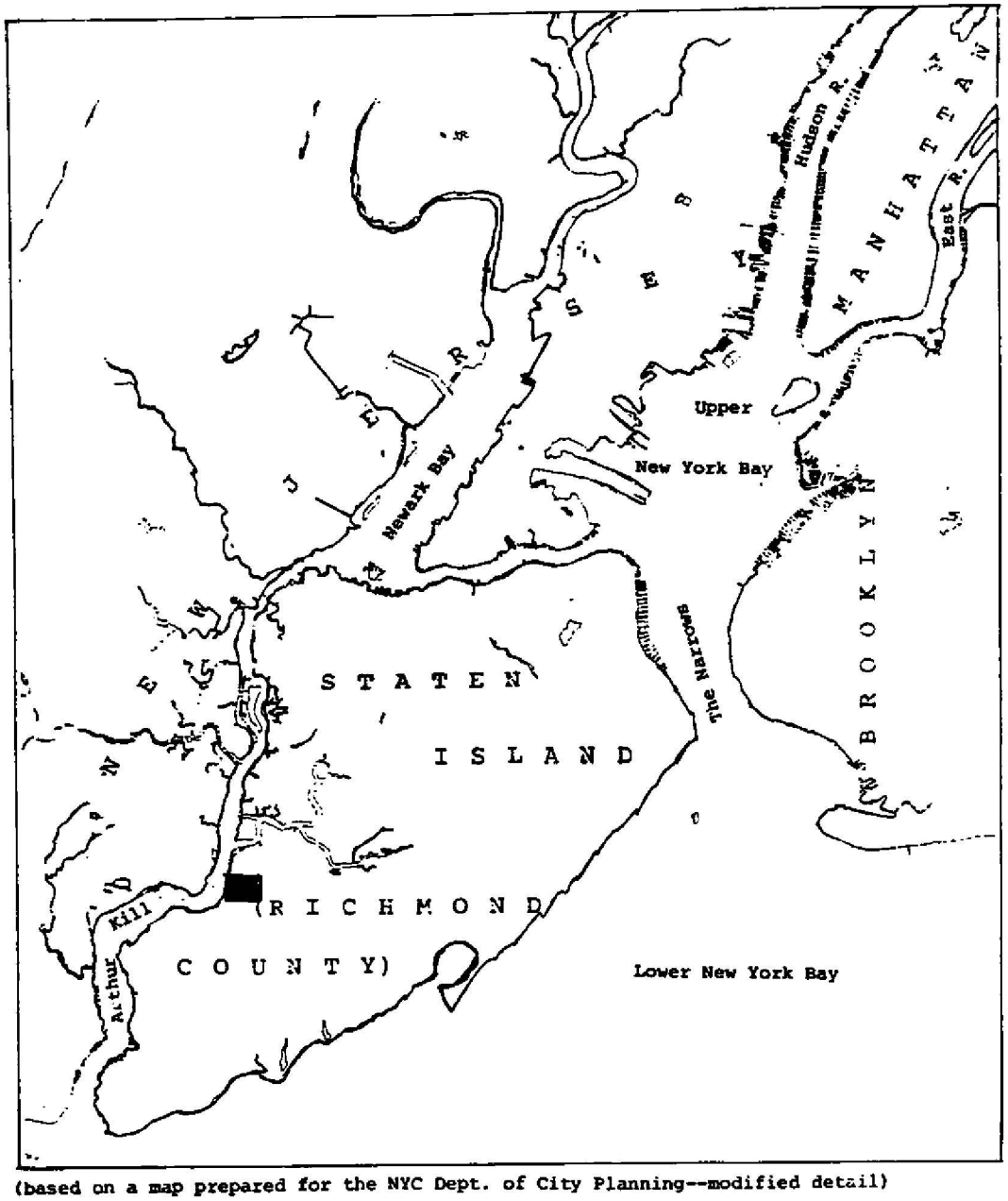
The proposed construction, which will join two existing sewers on Arthur Kill Road (Capital Project Nos. FK-24 and FK-25), includes an interceptor line that crosses the West Shore Expressway and runs along the south side of the East Service Road. The force main sewer route will begin at the Huguenot Avenue intersection and end just west of Arden Avenue. In addition to this route, four alternate pump station sites were considered in the assessment (Fig. 2).

Early in the fall of 1984, five additional locations were under consideration as possible alternate pump station sites; all five (#1-#5) were located on Arthur Kill Road between Rossville and Huguenot Avenues in a section previously tested and considered highly sensitive both historically and archaeologically (Jacobson 1980a; see Fig. 2 and Plates 1-5 this report). In general this is true of the entire project area, but particularly the section northwest of Huguenot Avenue and north of Arthur Kill Road (Pickman 1978). For this and for many other practical reasons, the current evaluation was ultimately limited to four viable pump station sites (#6-#9; see Plates 6-8).

The process of evaluation entailed a literature search to refine the general history previously compiled for the entire Oakwood Beach Water Pollution Control Project (Pickman 1978) as well as field testing to determine if prehistoric or historic deposits might be impacted during construction. Known land alterations, such as road and utility improvements, were also considered to assess the extent of potential disturbance to any cultural deposits that may have accrued over the millenia of possible use by Native Americans and the centuries of settlement by historic populations.

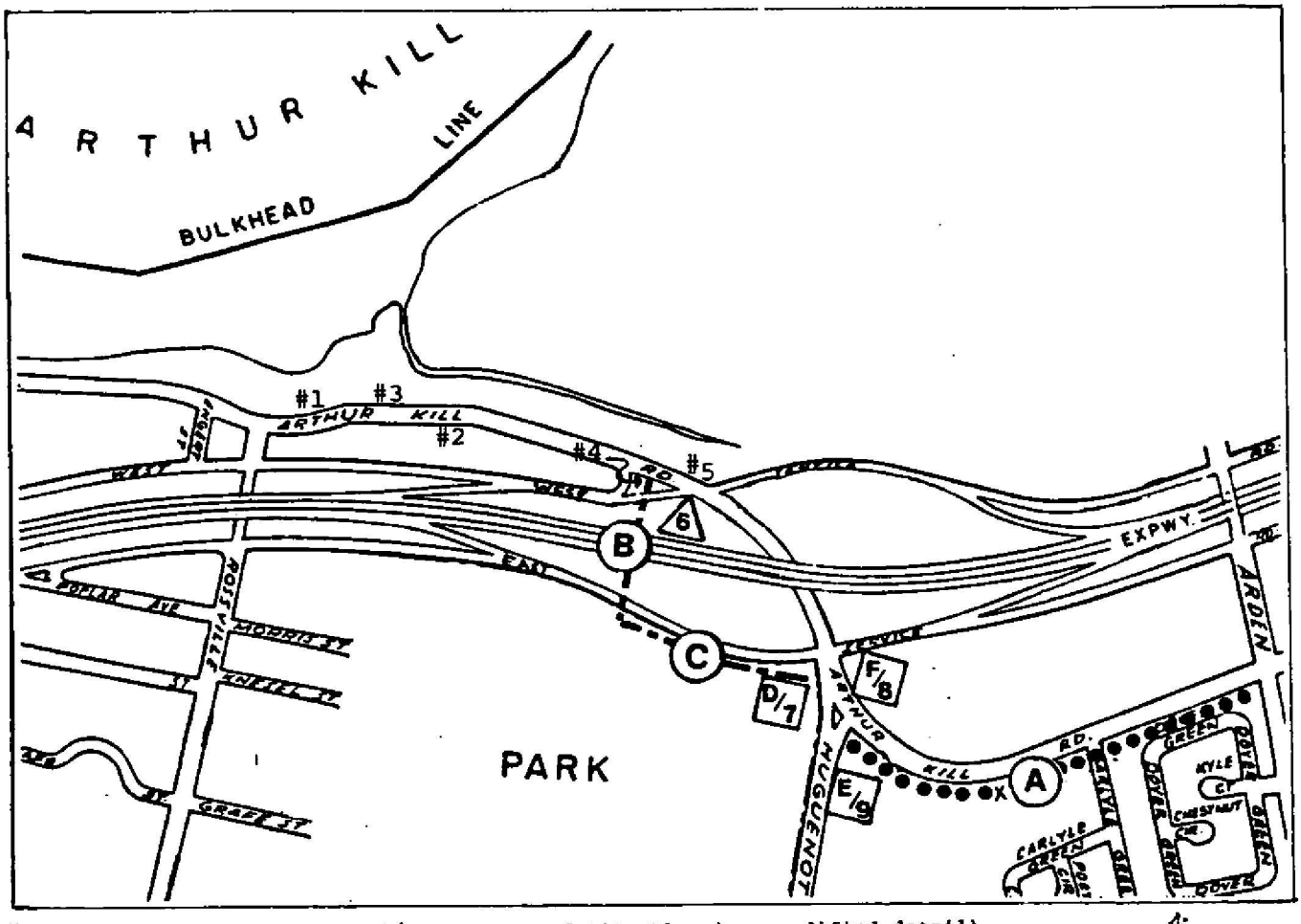
Documentation indicated that the project is located in an area long-utilized by Native Americans. In fact, the first findings of the earliest Indians in metropolitan New York City came from the Cutting site located just northwest of the project area. More recent Indian material has been found as close as the north side of the intersection of Arthur Kill Road and Huguenot Avenue, apparently near or within the project limits, but in an area that is now highly disturbed (Anderson 1984, 1985: personal communication).

Historically this section of Staten Island has been occupied at least since the mid-18th century, and its main roads date from before the Revolutionary War. Undoubtedly, it is an area that was affected by the thousands of British and Hessian soldiers stationed on the island throughout the war. Several local homesteads were established at this time and others were built in the 19th century. While many of these homes have now been destroyed, some are still



(based on a map prepared for the NYC Dept. of City Planning--modified detail)

Fig. 1. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Project Location



(based on a map prepared for the NYC Dept. of City Planning--modified detail)

0 1000 ft.

interceptor route

force main route

D/7 alternate pump station site (tested)

6 alternate pump station site (untested)

A section designation

x Village Greens Sewage Treatment Plant (private)--approx. location

#1-#5 alternate pump station site eliminated from consideration

Fig. 2. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Proposed Interceptor and Force Main Routes and Alternate Pump Station Locations

Plate 1. Alternate pump station site #1, north side of Arthur Kill Road. Note reeds marking wet area and mound of landfill in background (arrow).

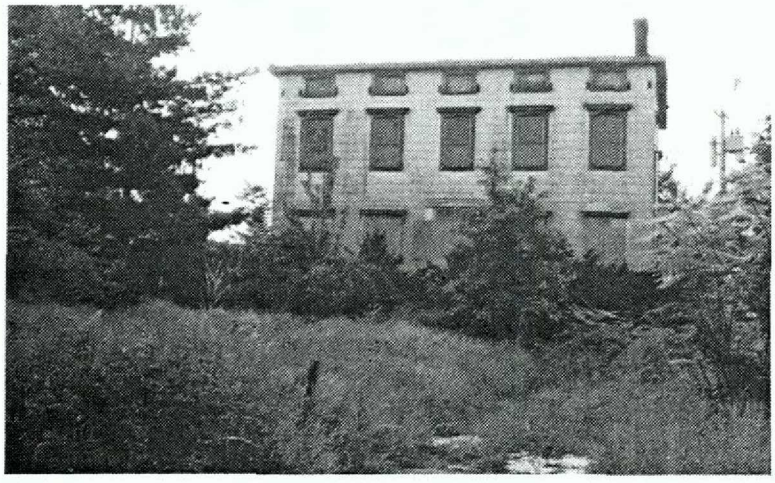


Plate 2. Abandoned Italianate-style house dating at least to the mid-19th century (Jacobson 1980a:112-113). This impressive structure is located in the area considered as alternate pump station site #2.

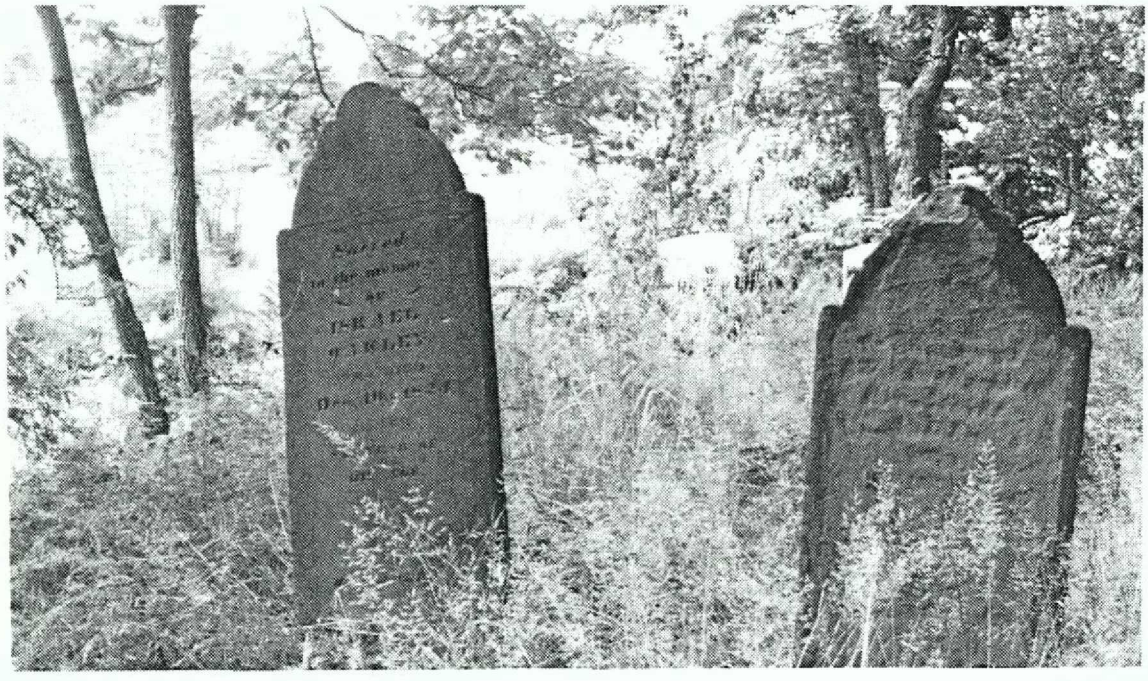


Plate 3. Blazing Star (Sleight/Slaight Family) cemetery near alternate pump station site #3 and across from site #2. This is an historic mid-18th to mid-19th-century cemetery on the north side of Arthur Kill Road. Isreal Oakley's headstone, dated 1824 and carved by "H. Osborn, Woodbridge", is on the left (photo 9/12/84).

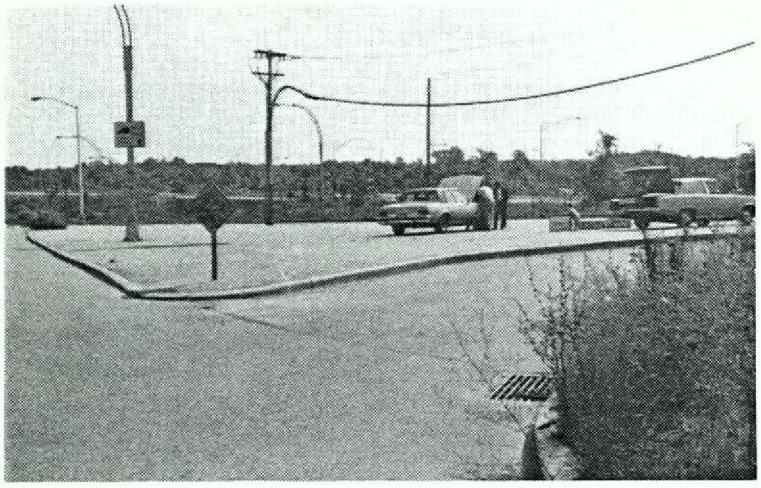


Plate 4. Alternate pump station site #4 looking south to the West Shore Expressway from Arthur Kill Road. The triangle is formed by Arthur Kill Road, the West Service Road, and an unnamed road joining them.

Plate 5. Alternate Pump station site #5 looking northeast from #4. The West Service Road is to the right rear, with a massive landfill mound seen in the background.

Plate 6. Alternate pump station site #6 (general location) looking south from Arthur Kill Road to the West Shore Expressway. This area, which has been greatly disturbed by cutting and filling, may have been the location of a house in the 19th and early 20th centuries.

Plate 7. Alternate pump station sites #7 (foreground) and #9 (background) looking southeast on Arthur Kill Road toward the Huguenot Avenue intersection (triangle in photo).

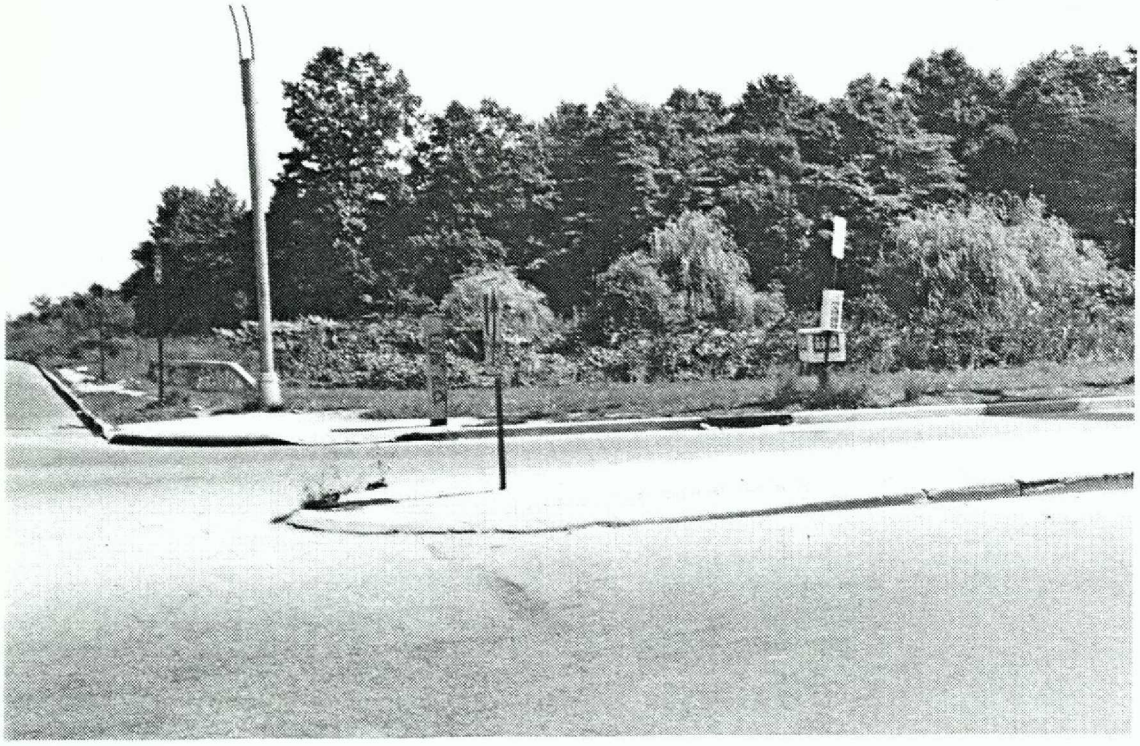


Plate 8. Alternate pump station site #8 looking northeast across Arthur Kill Road from #7. East Service on left. Note wetland vegetation (reeds and willows) in foreground and mixed forest in background.

in use; however, none of these historic buildings will be impacted during the proposed construction.

An ultramarine works to the west that produced paint and other products, and brick yards located near ancient clay pits to the west, north, and east are among the industries that encroached upon the area in the mid- to late-19th century. Today, ever-growing deposits of sanitary landfill are reshaping the land immediately northwest of the project area, and residential development continues to replace what had been farms and orchards.

For the field phase, test holes initially were planned at 50-ft. intervals along the proposed force main and interceptor routes and within the parameters of the alternate pump station locations. Ideally, these were to be dug to a depth of 36 in., however field conditions occasionally altered this plan. When testing occurred in areas of extensive modern fill (as was found to be the case along the force main route), or when ground cover and brambles limited access (a situation that occurred at several of the pump station sites where effective removal of this cover might also have disturbed archaeological deposits located on or near the surface), fewer and sometimes shallower test holes were dug. Also, in a few instances tests were shifted slightly when obstructions were encountered. In all, 43 tests were shovelled to depths averaging 30 in. and their contents screened through quarter-in. mesh. No Native American artifacts were uncovered in any of these tests and historic material was limited to incidental finds.

As noted above, testing determined that the Arthur Kill Road force main route, currently planned in the New York City easement zone just south of the roadway, is located in modern fill. In addition, since its current surface elevation coincides with that documented on a 1913 topographic map (Fig. 3), it appears that the original ground surface in this filled strip was destroyed and replaced sometime in this century. Consequently archaeological material, typically found on or just below the surface in this area and therefore usually identifiable within the first two to three feet of excavation (for example, see Skinner 1909), would not be impacted by the relatively shallow sewer line. Undoubtedly, this disturbance was the result of construction related to road building as well as the development of the adjacent Village Greens housing in the 1970s that included a short sewer line to a private treatment plant (see Fig. 2, lower right corner).

Modern fill solely related to road construction was encountered along the proposed interceptor route that crosses the West Shore Expressway and parallels the south side of the East Service Road. In this area, where a hill was graded, archaeological deposits located on or just below the surface would have been destroyed during leveling and filling. However, soil profiles from borings indicate a deep stratum of organic silt that could cover an ancient, buried ground surface about 44 ft. below the present grade. When this information is correlated with sea level curves, it seems possible that early Native American deposits may be located under this ancient silt (Fairbridge 1985: personal communication). However, overlying this level are sands that appear to be of Cretaceous origin, indicating that both the sands and the silt predate human occupation by at least 65,000,000 years (Newman 1985: personal communication; Baskerville 1985: personal communication). Pollen analysis of the silt level

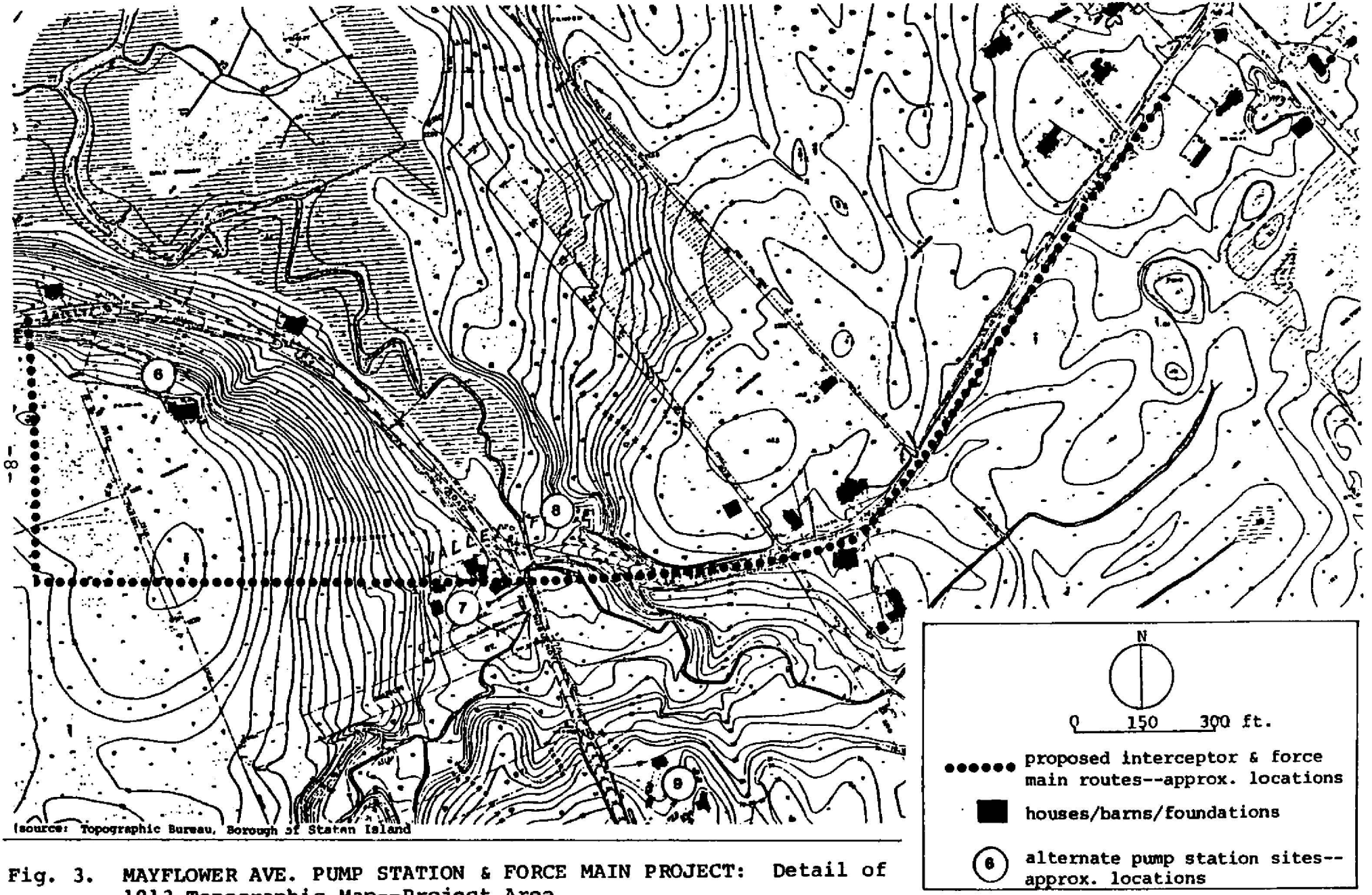


Fig. 3. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Detail of 1913 Topographic Map--Project Area

would determine its age and establish whether there is any possibility of finding underlying deposits related to human activity.

Of the four pump station sites considered in this report, two (#8 and #9) appear only partially disturbed, and although not observed in the field because of the dense vegetation, house foundations documented on maps dating from the 18th through the early-20th centuries render areas adjacent to these sites sensitive. Another alternate site (#7) is located on land that may have been settled by the Revolution, however, in the area of proposed construction, disturbance occurred during the channeling of a stream and in the course of road building, and there are currently no standing structures. The fourth alternate site (#6) is located between the expressway and its west service road, an area greatly disturbed by cutting and filling, but, as is the case with the nearby interceptor route, undated buried ground surfaces may exist here.

At this writing, alternate site #8 in the northeast corner of the Arthur Kill Road and Huguenot Avenue intersection is the location preferred by both the New York City Department of Environmental Protection and O'Brien & Gere. Testing indicated that the pump station currently planned at this site presents no threat to any known cultural resources. However, since there are no borings available from this site, and since the entire project area is culturally sensitive, borings planned at the site finally selected and the impact of final construction plans should be evaluated.

Recommendations

Project-specific historical documentation and field testing, the Stage 1b assessment of cultural resources for the Mayflower Avenue Pump Station and Force Main (Capital Project No. WP-136), indicate that construction as planned on maps provided by O'Brien & Gere in September and October, 1984, will have no impact on known cultural resources. However, since the entire project area is culturally sensitive, we recommend an assessment of construction-related borings and finalized plans.

The data from the borings required by New York City and to be drilled under its auspices will provide a cost-effective means to assess the potential impact of construction on unknown but possibly deeply buried cultural resources (pollen analysis of the buried silt layer is the method recommended for this assessment); evaluation of the finalized plans would ensure that any potentially significant areas beyond those that have been tested will not be impacted. Since it is possible that the boring data may indicate the need for monitoring to document deeply buried, potentially sensitive surfaces, or for a Stage 2 data recovery at the finalized pump station location, to avoid any interference with construction schedules we strongly recommended that the survey and boring program begin as soon as possible.

The summary and recommendations presented here are based on detailed information found in the following sections. This includes a description of the geological and ecological setting, boring and soils information, a section on prehistoric data relevant to the project, and a project-specific history. In addition, field procedures and an appendix summarizing field data, as well as miscellaneous appendices and a bibliography, will be found in the report.

SETTING

Introduction

Located in southwestern Staten Island, the project area represents a once-rural district (see Plate 9) undergoing change and development. Today it is bounded to the north by an extensive and growing mound of sanitary landfill initiated in 1938 and said to be the world's largest garbage dump (Jacobson 1980a: 14, 26; see Plate 5 this report), and it is traversed by both a modern expressway and its access roads.

Development in the form of clustered housing is another aspect of the change that is occurring, as is the need for new or additional sewer facilities. However, parts of the project area offer a glimpse of what it must have been like prior to its recent development. This includes two streams, albeit with their courses altered, and stands of trees at several alternate pump station sites as well as the north side of Arthur Kill Road which remains undeveloped along the proposed force main route.

Although the Village Greens housing and private sewage treatment plant are adjacent to the proposed force main line on the south side of Arthur Kill Road between Huguenot and Arden Avenues, there are no standing structures directly in the path of the proposed construction. Early in the century, however, several old houses and farms were located along the general route. Among these was a house owned by the Cropsey family since the mid-19th century that may have stood west of the treatment plant site from the Revolutionary War period until it was torn down in the 1970s (see History section). Today, the foundation for this structure, an abandoned rose garden, a dirt driveway, and two large spruce trees flanking a cement walkway that marks what was its entrance (see Plate 17) are the remnants of this old homestead. However, these features are not directly in the path of impact and therefore, with some care, should not be disturbed by the proposed construction. On the north side of Arthur Kill Road, across from the Cropsey house, two old houses are currently occupied (Plate 10) as is a mid-19th century structure to the east just beyond the project area, but these structures will not be directly affected. (At this writing, private development is anticipated that may ultimately affect the Cropsey property, but the degree of potential impact is presently unknown.)

Since its ecological setting offered essential resources to both prehistoric and early historic populations, the project area has long been occupied. The timber for constructing shelter and other amenities as well as marshes and streams that would have provided rich food supplies and fresh water were by-products of the geology of the area and its postglacial history and ecology. These factors produced not only the means to obtain shelter and food, but to the Native American it offered access to clay for pottery-making and stone for tool manufacture; to the early European settlers it meant rich farmland.

Geology and Postglacial History

The bedrock underlying Staten Island is composed of formations of schists, gneisses, and serpentinite of preCambrian and

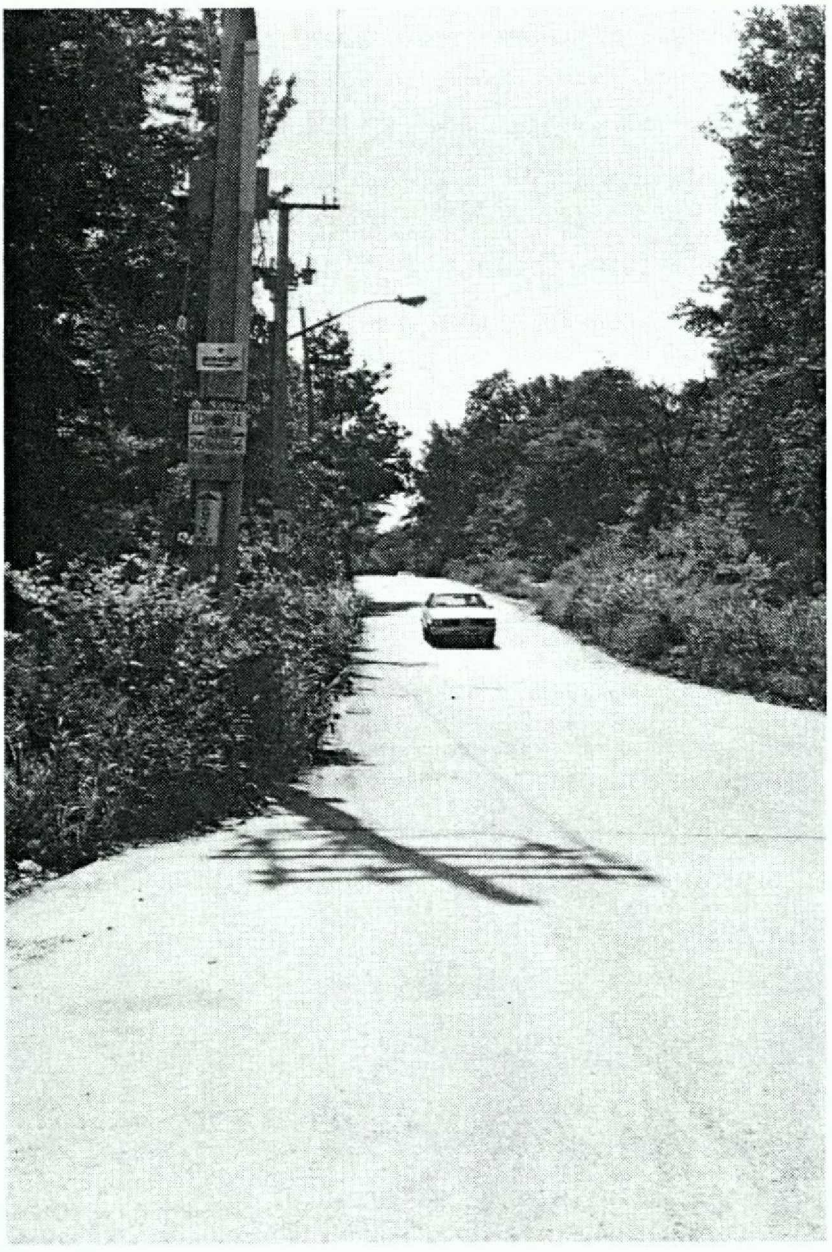


Plate 9. View south on Huguenot Avenue from general area of alternate pump station site #9 which is located on the left. This view suggests the rural aspect of the site area.

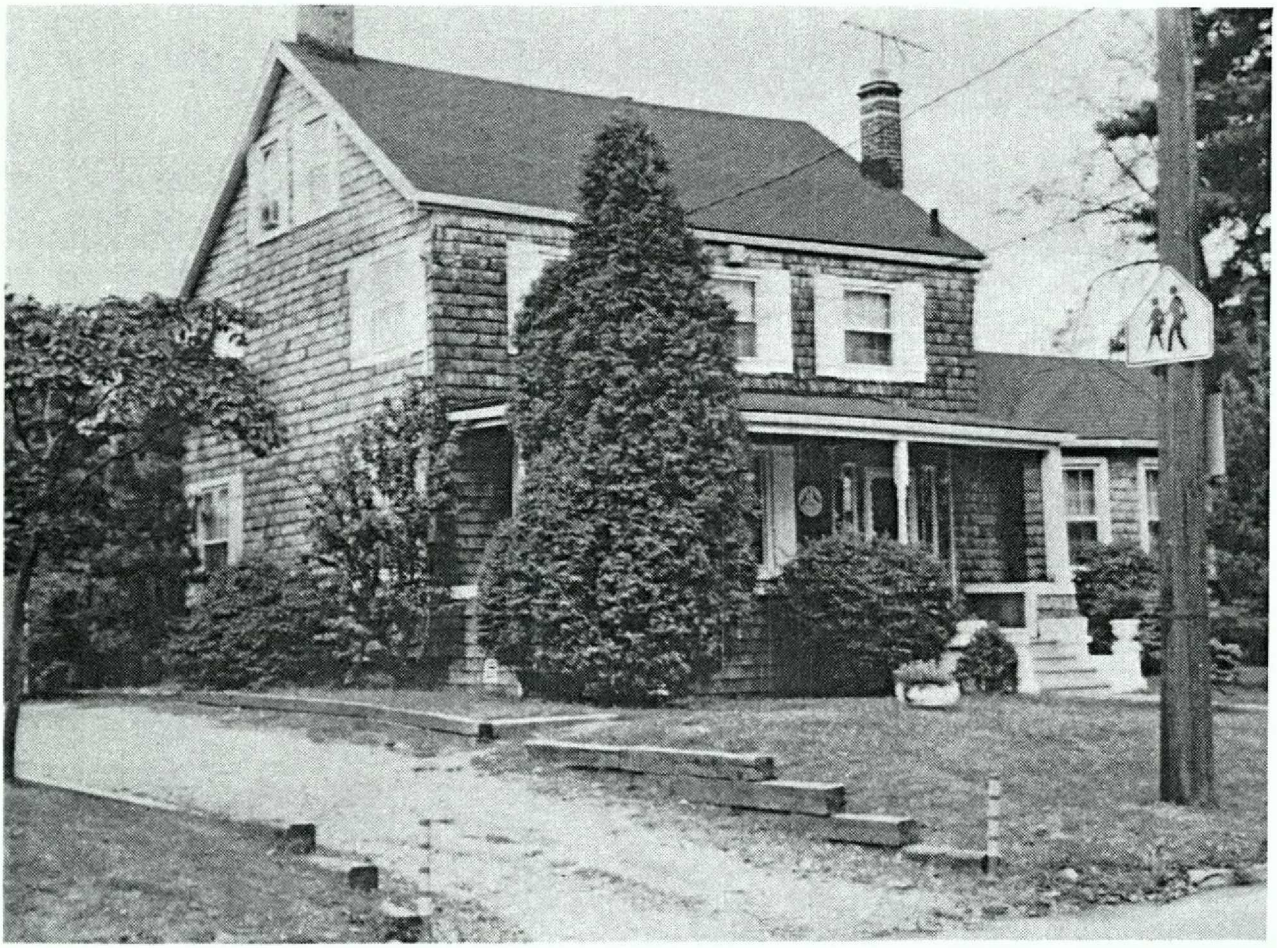


Plate 10. House on north side of Arthur Kill Road across from Cropsey property. This house, which is currently occupied, may retain some late-18th or early 19th-century elements.

early Paleozoic origin similar to and continuous with those found in Manhattan and the Bronx. Overlying them is a sequence of red shales, sandstones, and some gray argillite of the upper Triassic Newark Series often incorporating intrusions of the late Triassic diabase sill usually called the Palisades diabase. These rocks were extensively eroded prior to the beginning of the upper Cretaceous period. Following this, a sequence of gently seaward-dipping sands, silts, and muds was deposited in a shallow marginal sea (Johnson 1971: III-3/III-4). Specific to the project area are the black, brown, yellow, and white clays formed many millions of years ago in the Cretaceous period and later covered with more recent glacial drift (Gratacap 1909: 175; see Fig. 4 this report).

During the Pleistocene, or ice age, advancing and retreating ice sheets and the action of lowered sea levels caused cutting and erosion of the sediments of the coastal plain. On Staten Island, the terminus of the last ice advance that ended about 10,000 years ago is marked by a ridge of glacial till that extends from Stapleton on the northern part of the island to Tottenville in the southwest (Perlmutter and Arnow 1953: 23). As the ice melted and retreated, the meltwater created the streams and rivers that helped form the deposits of sands, silts, and gravels found on the island today (Johnson 1971: III-3/III-4).

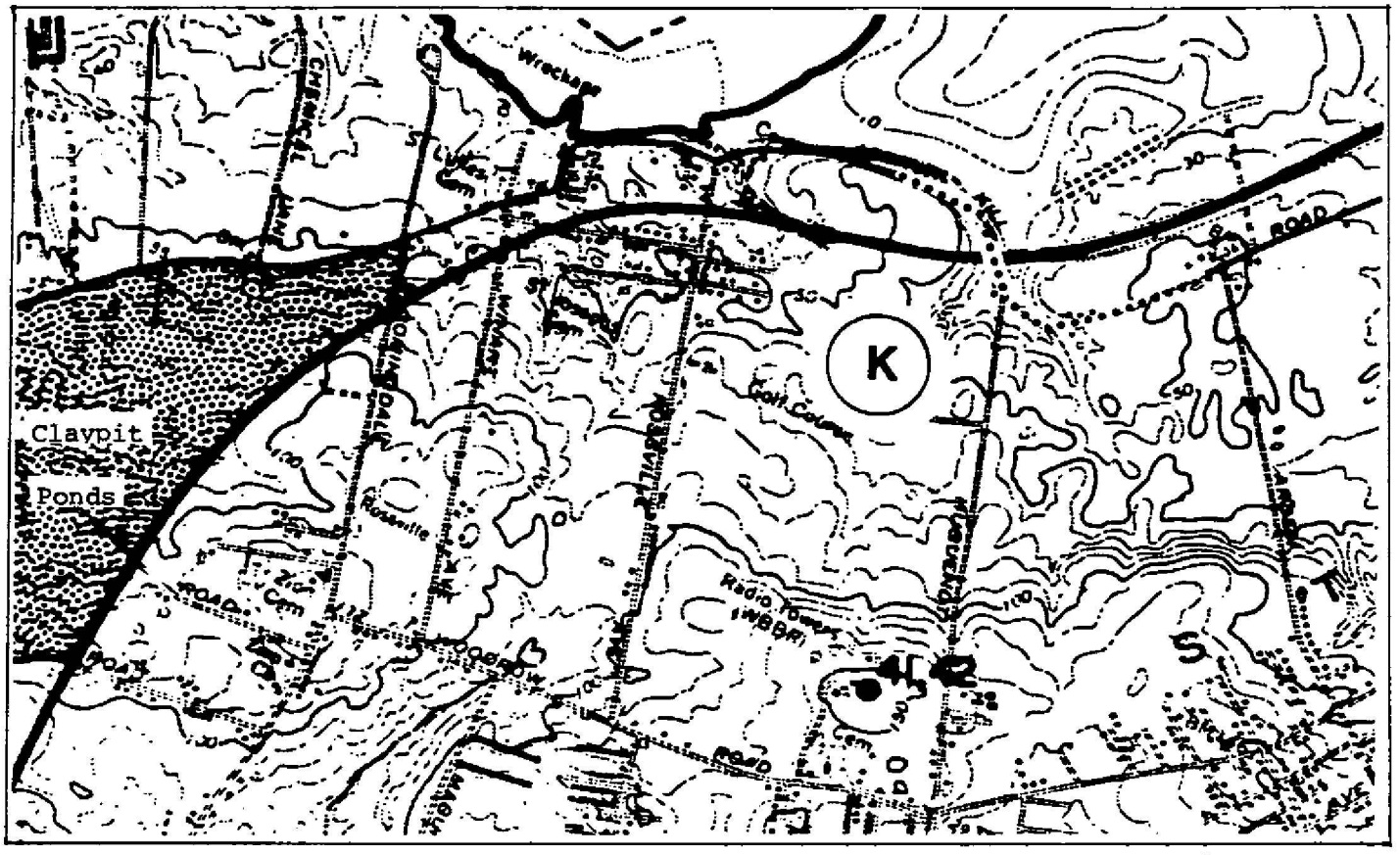
It is apparent, then, that Staten Island's surface features and deposits are mainly of relativlely recent glacial origin. These would be the features left by the movement of the Wisconsin ice sheet that covered much of the northeast 55,000 to 10,000 years ago. Glacial material in the form of ground and terminal moraines and outwash sediments may be locally overlain by beach, dune, marsh, swamp, and estuary deposits as well as artificial fill (Jacobson 1980a: 5 citing Wapora 1978: 10-13; see Fig. 5 this report).

General Soils Description (partially excerpted from the Johnson Soils Engineering Report 1971: III-1/III-2)

Generally, the soils overlying the bedrock in the project area consist of Cretaceous sands and silts overlain by morainal till from the Pleistocene (Ice Ages). The Cretaceous sand and silts formed the Coastal Plain and were exposed to erosion prior to the glacial ice age. Within this blanket of sediment may be found typical shoreline deposits such as barriers, off-shore bars, lagoons (often indicated by debris in the silts) and localized erosional features such as channel cuts. These are often filled with coarse-bedded materials from a somewhat later period.

The glacial deposits consist of till and stratified drift or outwash. Glacial till is a non-sorted, non-stratified accumulation of eroded rock particles with a wide range in grain size; the thickness of the till varies throughout the area. Stratified drift occurs randomly throughout the morainal area and represents deposition by streams or lakes of glacial melt water.

A major soil feature dominating the landscape adjacent to the project area is the sanitary landfill mentioned above. This extensive deposit consists of intermittent layers of soil and garbage that are extremely heterogeneous in character.

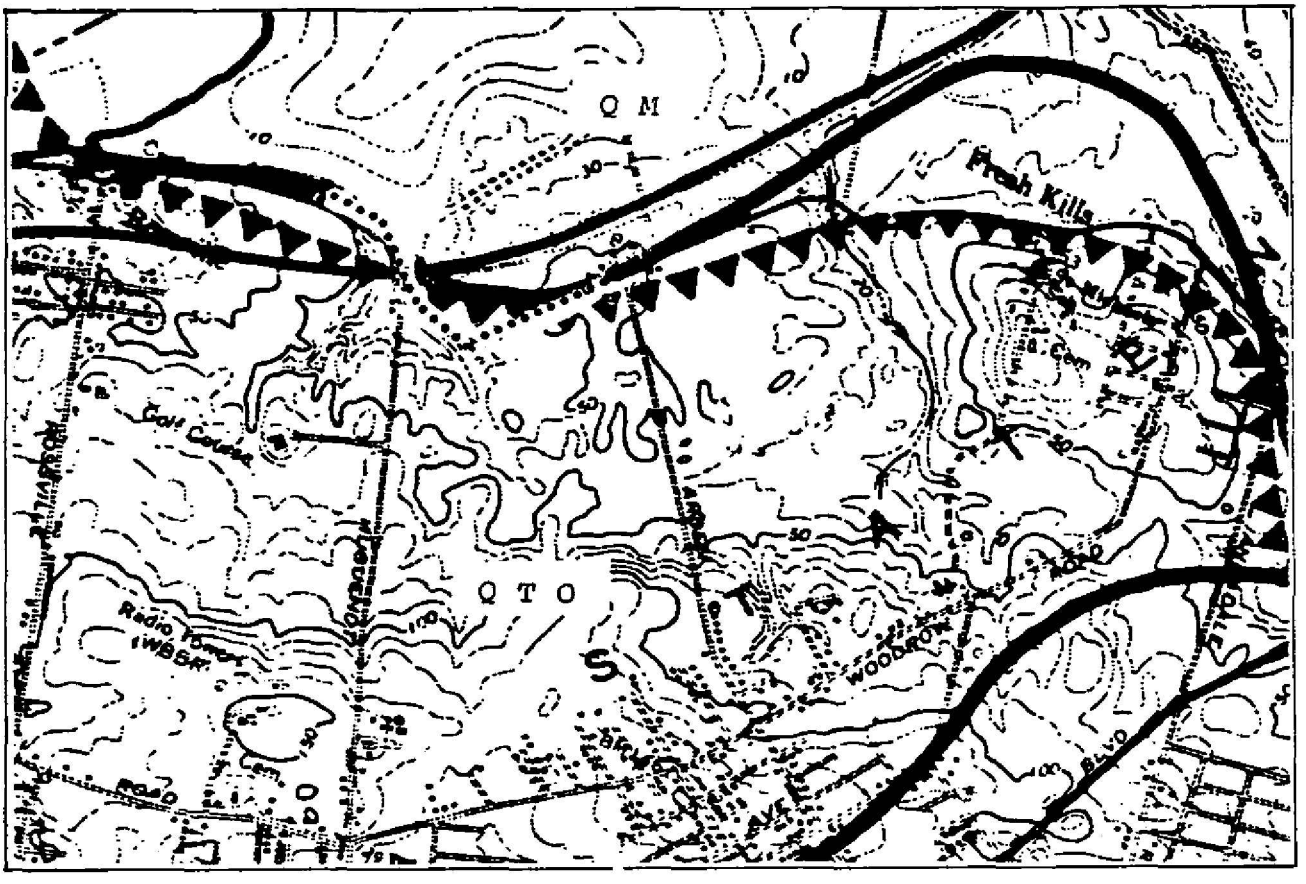


K — Raritan and Magothy Formations (Cretaceous)

● — commercial water well (numbered)

•••••• — Arthur Kill Rd. in the project area

Fig. 4. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Subsurface Geology (from DEIS USEPA 1980:Fig. 3-1--modified detail)



Q T O till overlying sand and gravel (ground moraine over outwash)

Q M silt, sand, clay, and organic material (marshes, estuaries, and artificial fill)

..... Arthur Kill Rd. in the project area

Fig. 5. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Surfical Geology (from DEIS USEPA 1980:Fig. 3-1--modified detail)

Specific Soils Information: Soil Profiles

The most specific soils information from the project area comes from a series of soil borings drilled between 1963 and 1973 in anticipation of sewer installation (Potter 1971) and the building of the West Shore Expressway (NYSDOT revised boring plan 1973). Located on or near Arthur Kill Road, fifteen of these borings provide project-specific information (see Fig. 6 and Table 1).

With few exceptions, the upper levels of the soils in these profiles reveal the red-brown to brown fine to coarse sands, the coarse to fine gravels, the silts, and the clays that characterize Pleistocene deposits in the area. These may be natural deposits or fill comprising material of glacial origin. The deeper strata reveal a depositional history that bears on an archaeological assessment.

Several factors render the borings from the force main route (#167-#174) archaeologically less significant than those near the interceptor line (#175, #A56, #A54, and #36). The proposed force main, with a bottom or invert depth of 5 to 12 ft., is relatively shallow and will be located in a disturbed and filled area (see section on Field Procedures and Appendix A). Consequently, no surface or subsurface features or, should they exist, no deeply buried ground surfaces would be impacted during construction. The interceptor route, however, is another situation entirely.

In the mid-1970s, a hill that stood where the interceptor route will run was leveled by approximately 16 ft. during the grading of the West Shore Expressway (Fig. 7), a circumstance that, again, would have destroyed cultural deposits on or just below the surface. However, the proposed construction extends approximately 55 ft. below the existing grade near a boring (#A54) that documents a 2-ft. level of organic silt 42 ft. below the current surface (estimated at elevation 35.5 [see Fig. 7]). The organic silt level found here and in two adjacent borings (#175 and #A56) suggests the presence of an ancient, deeply buried and undulating (see Fig. 8), possibly culturally sensitive ground surface beneath it (Fairbridge 1985: personal communication; Pickman 1978: III-3/III-4); moreover, the depth of the organic silt related to sea level curves suggests that it could date from 4,000 years ago or more (Newman 1985: personal communication). However, the fact that fine white sand, apparently a Cretaceous rather than a more recent Pleistocene deposit, overlies this organic silt indicates that all these deposits are too old to be associated with human occupation (Newman 1985: personal communication). It seems feasible that the organic silt may date from a time when deciduous trees were developing about 65,000,000 years ago (Baskerville 1985: personal communication). Radio-carbon dating or a pollen analysis of the organic silt would establish its age and determine the likelihood of any cultural associations for the underlying surface (Newman 1985: personal communication).

Soil profiles for the four alternate pump station sites are not currently available. (Alternate site #6, which is situated in a disturbed area between Arthur Kill Road and the West Shore Expressway [see Plate 6], would undoubtedly produce soil profiles somewhat analogous to those from the vicinity of the interceptor line.) However, when the pump station site is chosen, the New York City Department of Environmental Protection, Department of Water Pollution Control, will authorize an extensive boring program and will provide

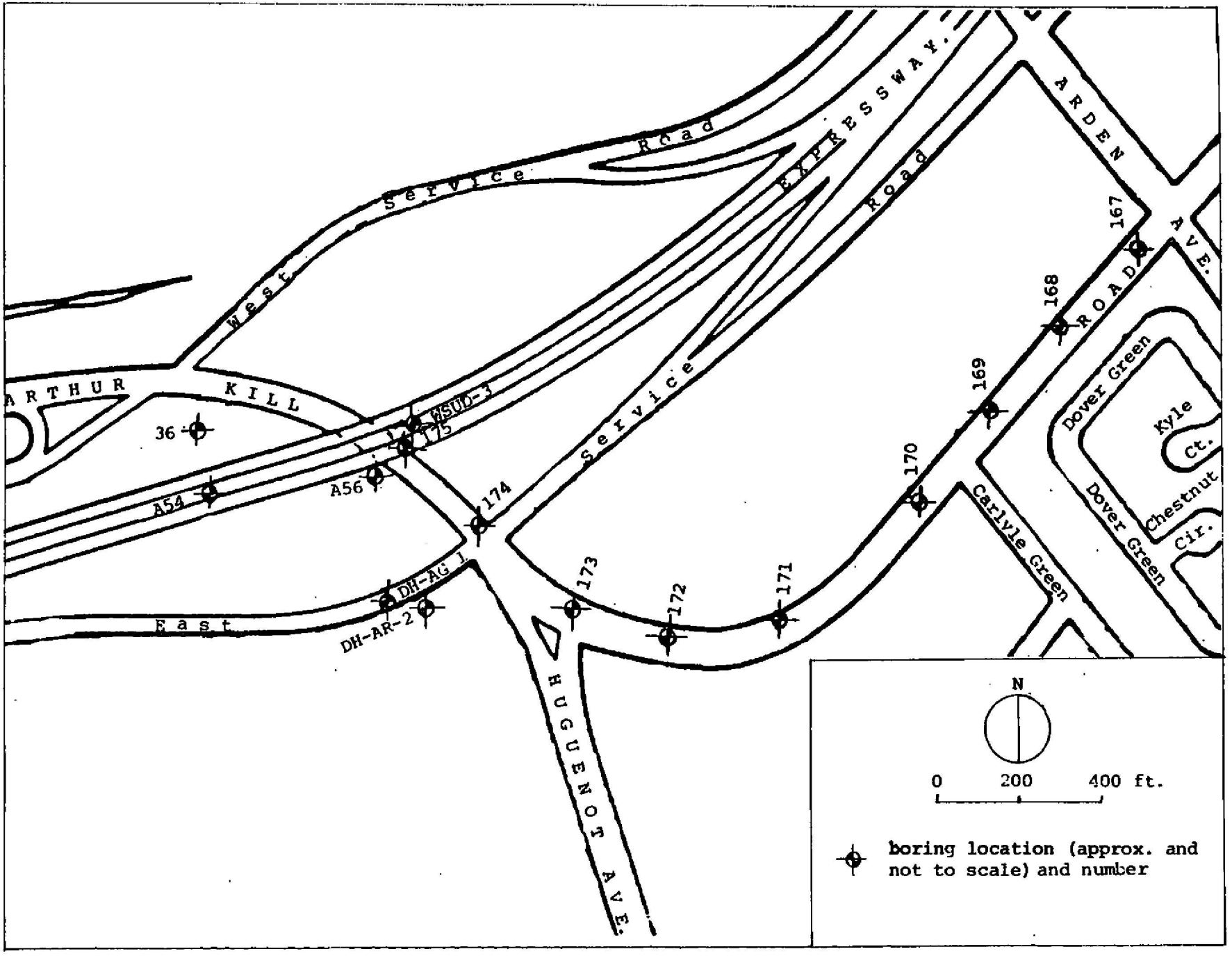


Fig. 6. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Boring Location Plan (1963-1973)

Table 1. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Data from Borings (1963-1973)

Boring #	Boring Elev. (in ft.)	Current Elev. (in ft.)	Stratum Depth (in ft.)	Stratum Description and Comments
167	51.58		0-7	red-brown gravelly silty fine to coarse sand, compact
			7-16	light brown silty fine to coarse sand, layers of fine sand and clay, compact
			16-30	light gray silty fine sand, trace clay, compact
168	49.43		0-9	fill--dark brown silty fine to medium sand, compact
			9-15	red-brown silty gravelly fine to medium sand, compact
			15-18	red-brown sandy gravelly silt, trace of clay, dense
			18-25	yellow-brown gray silty clayey fine to medium sand, compact
169	42.76		0-1	dark brown silt and roots
			1-5.5	red-brown silty gravelly fine to medium sand, compact
			5.5-17	dark brown sandy gravelly silt and clay, trace lignite, dense
			17-22	brown silty gravelly fine to coarse sand, compact
			22-30	gray silty fine to medium sand, compact
170	38.32		0-10	red-brown gravelly silty fine to medium sand, compact
			10-20	red-brown clayey gravelly sandy silt, dense
171	33.39		0-10	red brown gravelly silty fine to medium sand, compact
			10-25	red-brown clayey sandy gravelly silt
172	25.47		0-10	red-brown gravelly silty fine to medium sand, compact
			10-17	gray clayey silt, trace fine sand
			17-25	gray silty fine sand
173	9.09		0-1	dark brown silt and roots
			1-9	red-brown silty gravelly fine to medium sand, loose
			9-10.5	dark gray clayey silt, trace gravel
			10.5-14	brown silt and fine sand, lense of decomposed rock, compact
			14-20	dark gray clayey silt, trace gravel and fine sand, dense
DH-AR-2	5.90		0-4	red till, trace roots
			4-6	gray fine to coarse sand, trace gravel, some silt
			6-20	gray silt, trace fine sand, trace mica
			20-29	black lignite and gray silt, trace fine sand and mica
			29-41	light gray silt, trace fine sand and mica
			41-42	black lignite
			42-46.5	gray silt, trace fine sand

continues

Source: Borings prepared by Alexander Potter, Assoc. for the NYCEPA, Dept. of Water Resources, Bureau of Water Pollution Control, 1968-1970, and by Frederic R. Harris, Inc. for the NYSDOT, 1963-1973

Table 1. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Data from Borings (1963-1973)--(continued)

Boring #	Boring Elev. (in ft.)	Current Elev. (in ft.)	Stratum Depth (in ft.)	Stratum Description and Comments
DH-AG-1		7.57	0-9.5	red till
			9.5-19	gray silt, trace fine to coarse sand and gravel
			19-30	gray silt, slight trace fine to coarse sand
			30-35	gray silt, trace fine to coarse sand, trace gravel
			35-41.5	gray fine to coarse sand, trace to some silt
174		5.31	0-7	fill--red-brown silty fine sand
			7-13	brown-gray silty clay, trace of fine sand, dense
			13-20	gray-brown silty fine sand, trace of clay, compact
A56		12.0	0-9	brownish-gray fine sand
			9-23	dark gray silt, trace fine sand
			23-25	decomposed wood and organic silt
			25-29	gray silt
			29-39	gray fine sand, trace silt
			39-59	gray silt
			59-63	fine sand, some silt
			63-69	silt, traces of fine sand
			69-71.6	silt, traces of lignite
175		8.19	0-9	fill-brown silty fine sand, trace gravel
			9-12	gray-brown clay and silt, trace fine to medium sand, decomposed rock
			12-14	black organic silt
			14-20	gray clay and silt, trace of fine sand and lignite
			20-30	light gray sandy clayey silt, dense
A54	52.0	34.85	0-8	fine sand, trace of silt and gravel
			8-30	fine white sand, trace of silt
			30-58.5	gray silt, trace of fine sand and clay
			58.5-60.5	black organic silt, some decomposed wood
			60.5-76.5	gray silt, traces of clay, fine sand, and decomposed wood
36	44.0		0-3	dark red-brown silt, some sand, trace fine gravel
			3-9.5	salmon colored fine sand, trace silt, yellow at 5 ft.
			9.5-12.5	dense light gray silt and clay Note: last sample--very shallow.

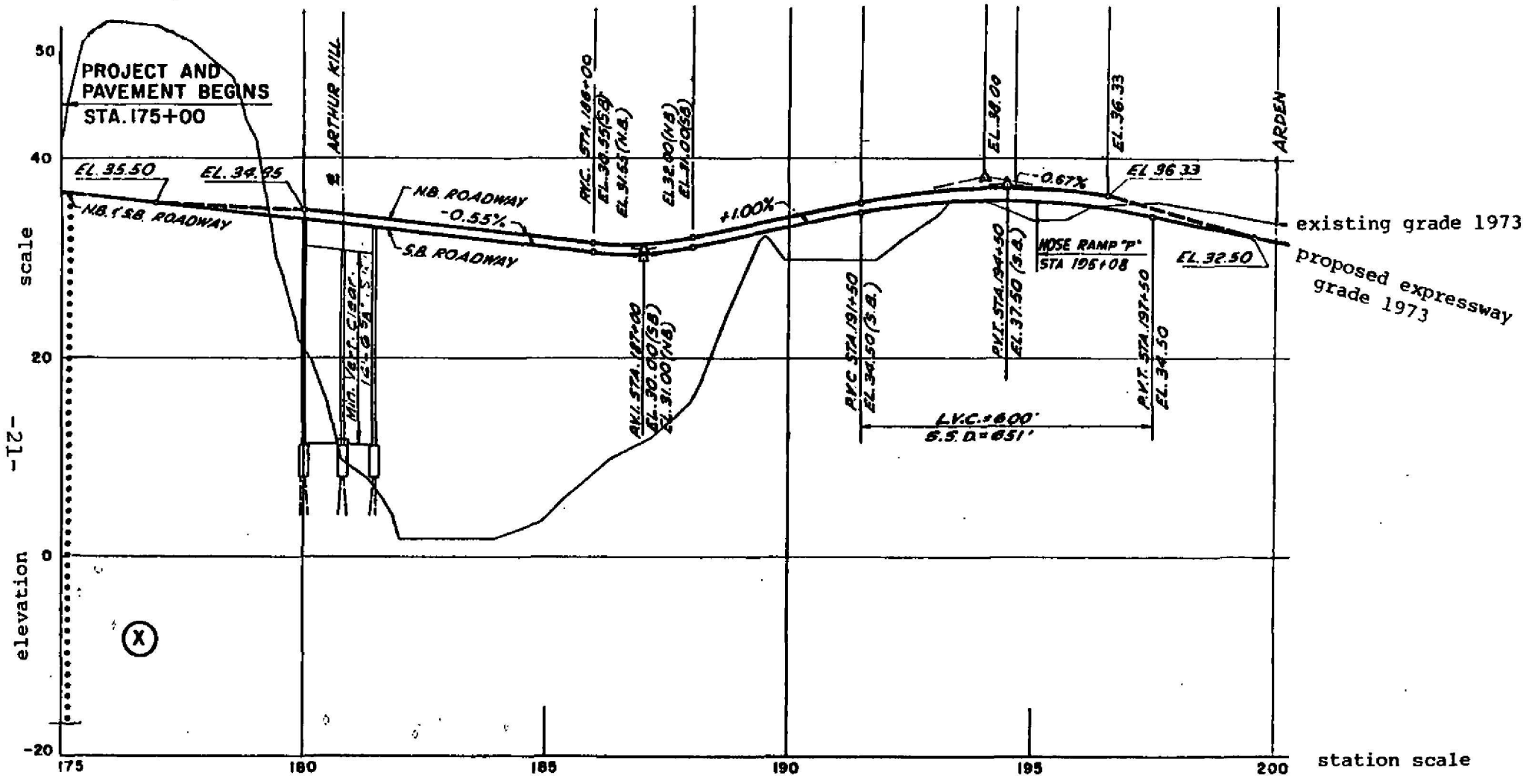
continues

Source: Borings prepared by Alexander Potter, Assoc. for the NYCEPA, Dept. of Water Resources, Bureau of Water Pollution Control, 1968-1970, and by Frederic R. Harris, Inc. for the NYSDOT, 1963-1973 Underlined depths indicate ancient wetland deposits.

Table 1. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Data from Borings (1963-1973) --(continued)

Boring #	Boring Elev. (in ft.)	Current Elev. (in ft.)	Stratum Depth (in ft.)	Stratum Description and Comments
WSUD-3	?		0-11.5	gray organic silt varved with brown fine sand and gravel
			11.5-25	gray organic silt, slight trace fine sand, mica, clay, slightly plastic
			25-28	gray organic silt, trace of fine sand, mica, lignite, gravel
			28-35	gray organic silt, trace to some fine sand
			35-45	gray organic silt, trace of fine sand, mica, very hard
			45-55	gray-brown organic silt, trace fine fine sand, hard
			55-59	gray organic silt, slight trace of fine sand, trace clay, hard
			59-65	gray fine sand, some organic silt
			65-75	gray organic silt, trace of fine sand, mica, trace lignite, hard
			75-82	gray organic silt, some fine sand, trace of mica, decomposed rock
				Note: this boring located northeast of Arthur Kill Road in what appears to be a perpetual stream or wetland.

Source: Borings prepared by Alexander Potter, Assoc. for the NYCEPA, Dept. of Water Resources, Bureau of Water Pollution Control, 1968-1970, and by Frederic R. Harris, Inc. for the NYSDOT, 1963-1973



source: revised NYSDOT boring location plan, 1973--modified detail

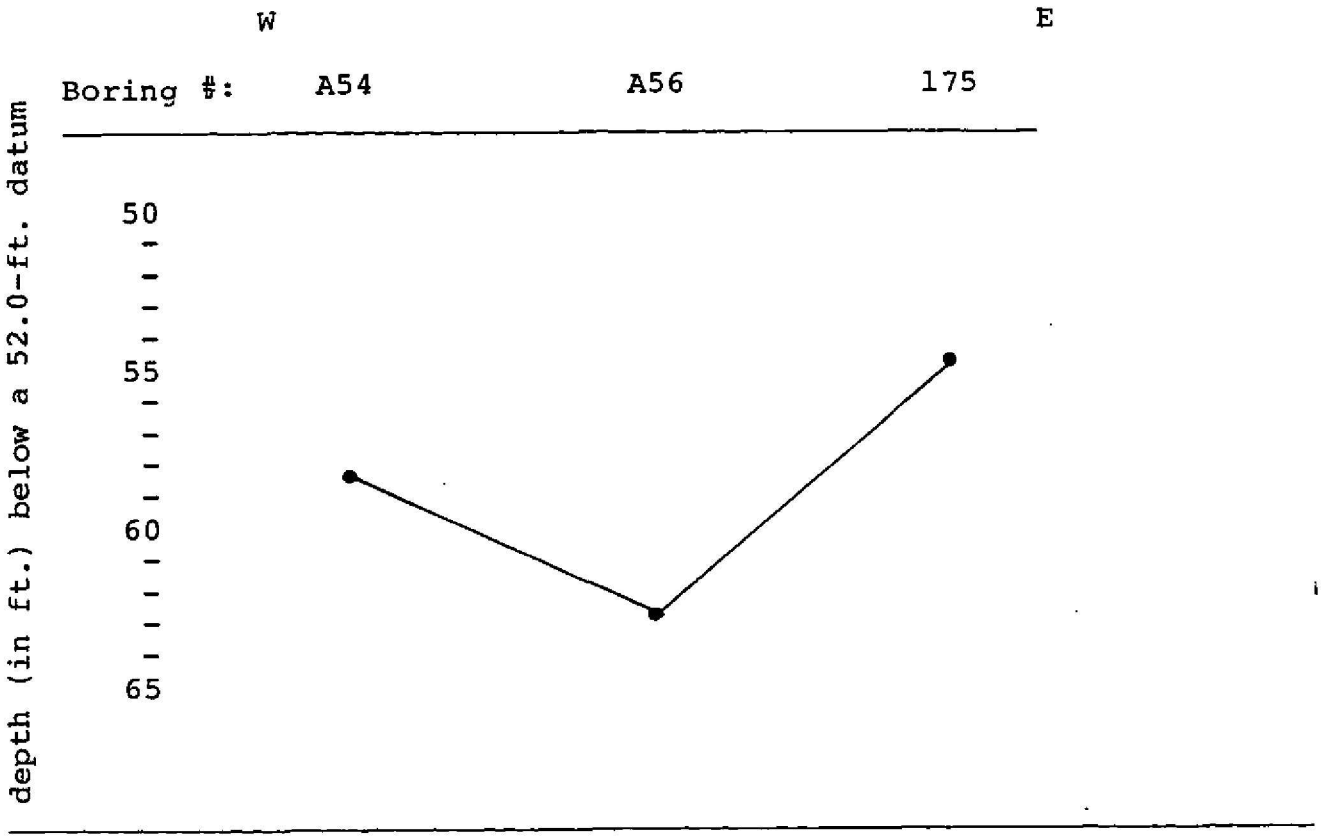
0 200 ft.

••••••••• approximate location of proposed interceptor line (maximum depth c. elevation -16.38)

(X) approximate location of top of silt stratum in NYSDOT boring A54

Fig. 7. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Existing and Proposed Grade for the West Shore Expressway in the Project Area (1973)--Relationship Between Proposed Interceptor Line and NYSDOT Boring A54 Indicated

Fig. 8. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT:
Reconstructed East-West Profile of Organic Silt Stratum



Note: Since the actual surface elevations of borings A56 (12.0) and 175 (8.19) are much lower than A54 (52.0), an elevation of 52.0 has been adopted in order to make these three borings comparable. Top of the stratum is shown.

the archaeologists access to the samples for analysis (Gelfand 1985: personal communication).

Vegetation (partially excerpted from the DEIS, USEPA, 1980:3-9)

Like the rest of south Richmond, the project area is covered by a mixture of suburban land, some commercial land (including landfills), and stands of various vegetation. Much of the current vegetation is scrub and mixed deciduous forest that has been greatly impacted by human activities. Even specific environments that exist throughout the project area, such as wetlands on parts of the proposed alternate pump station sites, have been altered. In the draft environmental impact statement for the Oakwood Beach Water Pollution Control Project, areas immediately adjacent to the project area have been designated urban (see Fig. 9 and Appendix B this report), but here this implies commercial activity, such as the sanitary landfill mentioned earlier, rather than population density.

Three of the four alternate pump station sites under consideration offer a rural if altered environment. At sites #8 and #9, in addition to the reeds and willows that grow along the wet areas in the city easements, the gentle slopes are covered with second growth woodlands. Here, stands of sassafrass and sweetgum, often found on Staten Island but particularly in the south shore area, are mixed with several oak varieties and with brambles and vines that include catbriar and poison ivy (identifications were made by Beil 1985: personal communication). The result is a profusion of dense, impenetrable thickets.

The general vegetation distribution in the project area is shown in Fig. 9.

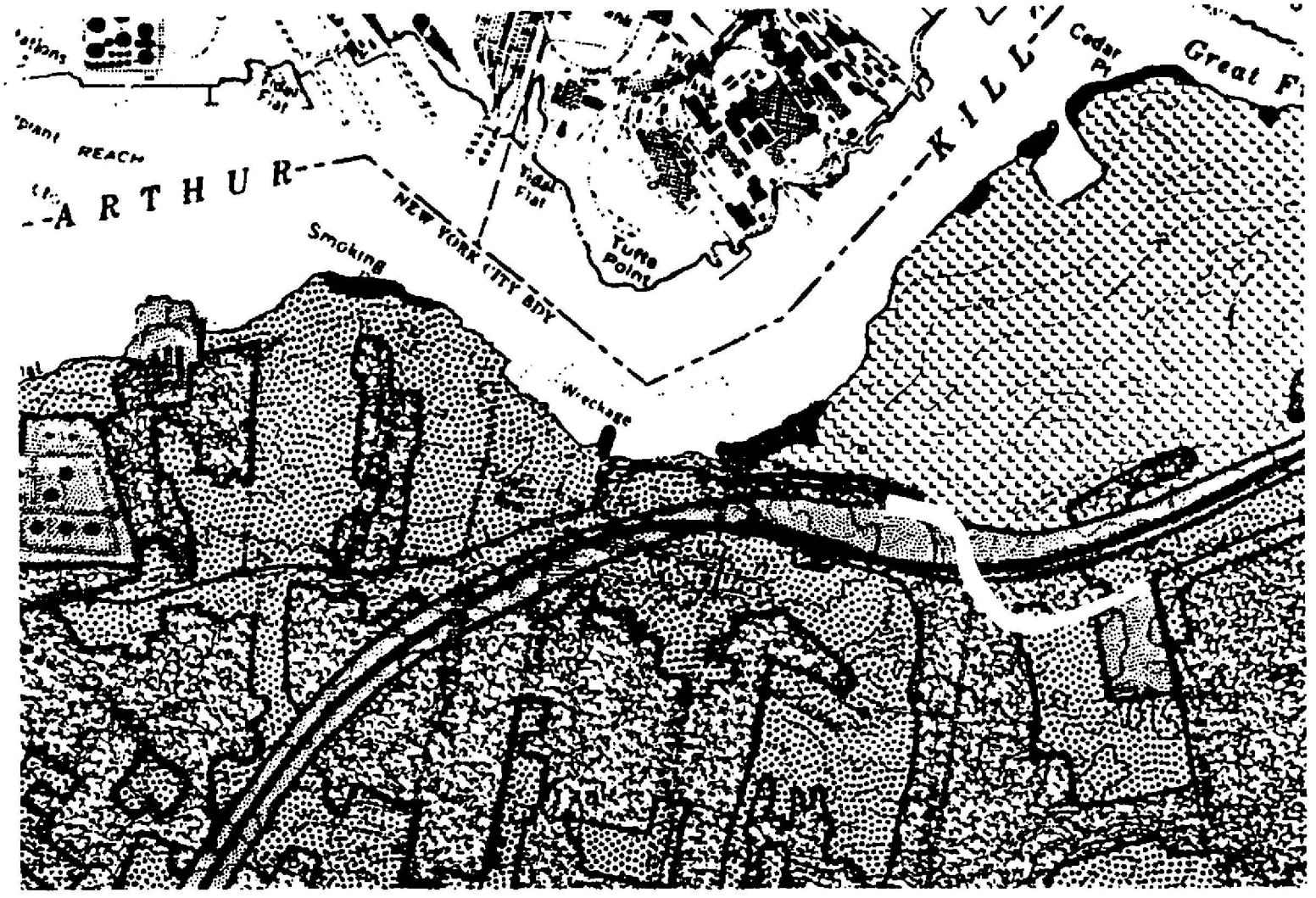
CULTURAL RESOURCES

Prehistoric Data

The earliest European settlers on Staten Island were made painfully aware that it was an Indian stronghold (see History section) and, since early in the 20th century, archaeologists have known and recorded Native American sites throughout the island (for example, Skinner 1909; see Fig. 10 this report). More recently, archeology has determined that this Native American occupation or use extends back to the earliest Indians known in the northeast.

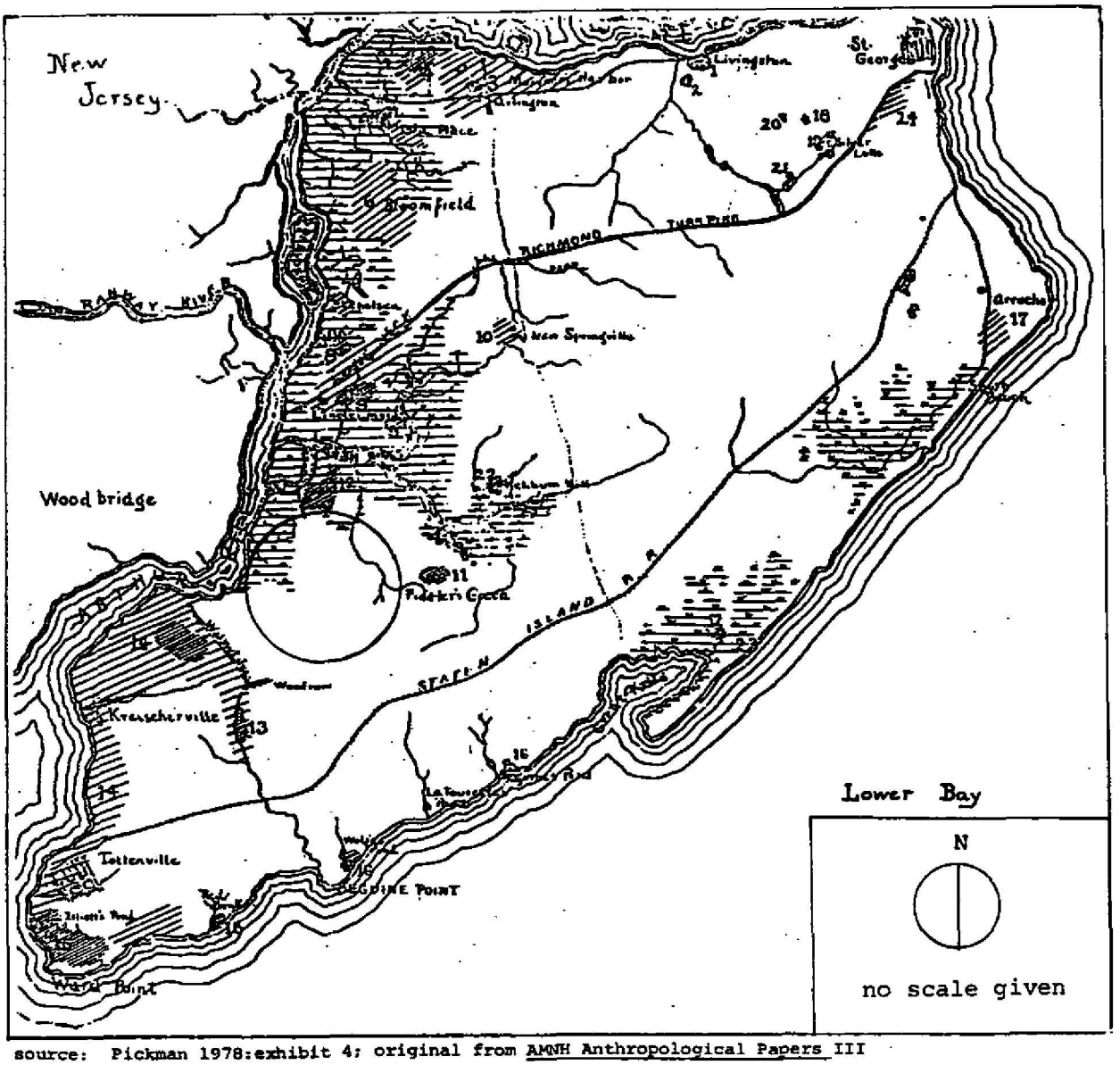
More specifically, the first finds of this Native American cultural period, which dates from approximately 10,000 to 12,000 years ago in the northeast, were made in 1917 on the Cutting farm just west of the project area (#4, Fig. 11 and Table 2). These finds, which included the fluted points and stone scrapers that are now Paleo-Indian diagnostics, predated an awareness of the great age these artifacts represent. Not until the 1950s, when Radio-carbon dating had been developed and the antiquity of similar finds from the American southwest been established, was the age of these artifacts realized (Sainz 1962).

Since the Cutting site discoveries, several other Paleo-Indian deposits have been excavated near the project area. Similar material came from three sites or components from the Socony-Port Mobil area situated about three miles to the southwest along the



Note: curved white line indicates Arthur Kill Rd. in the project area

Fig. 9. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Vegetation Types (detail from DEIS USEPA 1980:Fig. 3-5--modified)



source: Pickman 1978:exhibit 4; original from AMNH Anthropological Papers III

listed sites:

1. West New Brighton, Upper or Pelton's Cove
2. West New Brighton, Ascension Church
3. Mariner's Harbor, Arlington
4. Mariner's Harbor, Bowman's Brook
5. Mariner's Harbor, Old Place
6. Bloomfield, (Watchogue)
7. Chelsea
8. Long Neck (Linoleumville), north side
9. Long Neck (Linoleumville), south side
10. New Springville, Corson's Brook
11. Green Ridge, near Richmond Plank Road
12. Green Ridge, Lake's Island
13. Woodrow
14. Rossville
15. Tottenville
16. Huguenot
17. Arrochar
18. New Brighton, Harbor Hill Links
19. New Brighton, Silver Lake, etc.
20. New Brighton, Harbor Hill
21. New Brighton, Nannyberry Hill
22. Richmond
23. Oakwood
24. Tompkinsville

[general project area circled]

Fig. 10. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Skinner's Map of Staten Island Archaeological Sites (Skinner 1909)

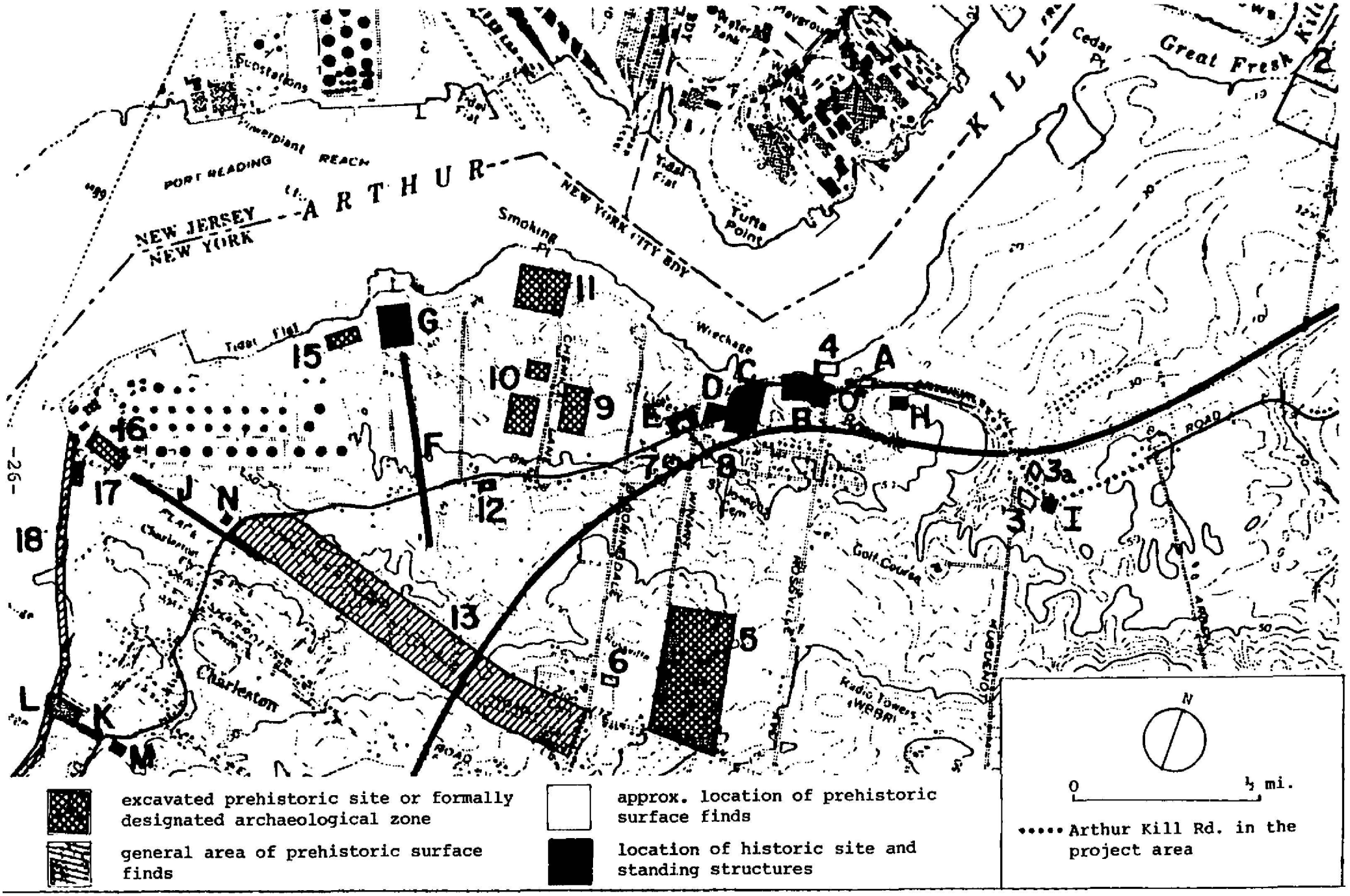


Fig. 11. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Known Historical and Archaeological Sites (from DEIS USEPA 1980: Fig. 3-6, modified detail--see Table 2. for Site Identifications)

Table 2. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: List of Prehistoric and Historic Sites Relevant to the Project Area (based on Pickman 1978 in DEIS USEPA 1980: Fig. 3-6)

# or Letter	Site / Structure	Native American Cultures/Hist. Time	Selected Reference (other than Pickman)	Remarks
	Prehistoric Sites			
2	Lake's Island	?	Skinner 1909:10	possibly extensive site
3	Huguenot	Mid-Woodland	Anderson 1964	speculatively located (1978)
3a	Huguenot	(same)	Anderson 1984, 1985	reestimate of site location
4	Cutting	Paleo/Archaic/Woodland	Sainz 1962	earliest (1917) local Paleo
5	Wort Farm	Late Archaic-Late Woodland		
6	Rossville Campsite	Woodland		
7	Rossville Shell Heap	Woodland	Skinner 1909: 11	destroyed by West Shore Expwy
8	St. Luke's Cemetery	Archaic & Late Woodland		
9	Pottery Farm	Mid/Late Woodland		
10	Chemical Lane	?		
11	Smoking Point	Late Archaic/Transitional	Silver, in press	may include Paleo; also historic
12	Gerike Farm	Archaic/Mid-Late Woodland		
13	Clay Pit Road	Mid/Late Woodland		
14	Canada Hill	unid.		surface, includes historic
15	North Beach	Paleo		
16	Port Mobil Hill	Paleo	[Kraft 1977 also	may be same as #17
17	Charleston Beach	Paleo/Late Woodland	Salwen 1968; Ritchie 1968]	may be same as #16
18	Kreischerville	Paleo/Late Woodland		
	Historic Sites			
A	Blazing Star (Sleight) Cemetery	1750-1850	Jacobson 1980a: 106-109	NYC landmark since 1968
B	Rossville Blazing Star Ferry	18th-19th c.		
C	Rossville school house, etc.	1791-19th c.	Jacobson 1980a: 92	foundation (?) only
D	Wright house [Winant]	1700(?)/ ca. 1750	Jacobson 1980a: 142-143	later date from Jacobson
E	St. Luke's Cemetery	19th c.	Jacobson 1980a: 149-150	in use prior to 1843
F	Rossville rail spur	mid-late 19th c.		
G	Ultramarine works	mid-late 19th c.		
H	Eighteenth-century midden	18th c. Cole house(?)	Jacobson 1980a: 70	destroyed between 1978-1980
I	Cropsey house foundation	18th-20th c.	Macormack 1984	not listed in Pickman 1978
J	Ellis rail spur	mid-late 19th c.		
K	Kreischer rail spur	mid-late 19th c.		
L	Kreischer brickworks	1854		
M	Kreischer House	rebuilt after 1931		orig. 19th c. foundation may exist
N	Winant-Henrickson house site	?		
O	Oakley (?) house	mid-19th c./earlier	Jacobson 1980a: 112-113	standing 19th-c. Italianate house, not listed in Pickman

tidal beaches of the Arthur Kill (Sainz 1964: 3; Ritchie 1968: xvii-xviii; Pickman 1978: II-13/II-14). In 1967 the Charleston Beach site, the most recently excavated of the three, produced Paleo-Indian through Middle Woodland material in a mixed context apparently caused by tidal action (Salwen 1968 cited in Pickman 1978: II-14).

As discussed earlier, older deposits, perhaps dating back to Paleo-Indian occupation, may not be found on or near the surface, but instead may be deeply buried. As long ago as 1909, well before the antiquity of this kind of material was realized or perhaps confirmed, Skinner noted that the earliest deposits were located along the coast and that others were perhaps inundated (1909: 3). Now we are aware that rising sea levels and shifts in the earth's crust during and since the retreat of the last glacier, in addition to erosional mechanisms that have produced meanderings in streams and brooks, may have caused ancient cultural deposits to be well covered. While early deposits in buried strata have been found along the Arthur Kill, similar deposition is so far only postulated for areas further inland where evidence is found for layers of buried peat or organic silt (Pickman 1978: III-3/III-4).

More recent Native American material has come from several sites in the vicinity of Rossville, just west of the project area (see Pickman 1978 and Fig. 11 and Table 2 this report). Apparently within the project area, a Middle to Late Woodland Indian site was exposed during bulldozing for fill in the early 1960s. Now disturbed and altered by highway construction, this area produced stone points and chips, a scraper, a net sinker, a broken gorget, and some pottery fragments (Anderson 1964).

This site (designated the Huguenot Site by Pickman) has been tenuously located in the vicinity of alternate pump station site #9 (see Fig. 11 #3). However, it appears that this location was somewhat speculative (Pickman 1984: personal communication) and that it was in fact situated near alternate pump station site #8 (Anderson 1984, 1985: personal communication; see Fig. 11 #3a). This may once have been the western fringe of a sensitive area, perhaps an extension of a meadow that included a possibly vast Indian site known as the Lake's Island site (Fig. 11, #2); even if this is so, local archaeologists now consider the area to have been rendered culturally sterile through the construction of the West Shore Expressway and its access roads. Moreover, should any undisturbed cultural deposits remain, they probably are located north of the expressway where they have been rendered inaccessible by the long-accumulating mound of sanitary landfill mentioned earlier (Anderson 1984, 1985: personal communication). However, scattered surface finds are still made in the area (Jacobson 1980a: 75).

From the earliest archaeological investigations (e.g., Skinner 1909) to the most recent (e.g., Pickman and Salwen 1984), archaeological deposits on the island have been found in relatively shallow contexts, often merely as surface finds. Evidence for Native American occupation consists of worked stone tools or the flakes and debris from their manufacture, shell pockets or heaps, fire pits and hearths, some pottery sherds, and shallow burials (one of the largest Indian burial sites in the metropolitan area and beyond is found south of the project area along the Arthur Kill at Burial Ridge in Tottenville, [Jacobson 1980b]). As is the case on Manhattan Island, while extensive camp and burial grounds have been discovered, no

village sites that include evidence for permanent or semi-permanent dwellings have been excavated, or at least been carefully recorded.

From the evidence presented here, it is apparent that the project area and its environs are, or were, highly sensitive in regard to prehistoric evidence. It also appears that much of this potential has been destroyed by relatively recent building and development.

Historic Data

As is the case with its prehistoric occupation, Staten Island has a long history of European-American settlement. Supposedly first named by Henry Hudson in 1609, an abortive Dutch attempt to settle the island may have occurred as early as 1623 or 1624 (Tysen 1842: 5). If so, this settlement would be chronologically comparable to that on Manhattan Island.

The first authenticated settlement was initiated in 1639 near the coast about six miles north of the project area (Tysen 1842: 5; McMillen 1939: 25). Unfortunately, animosity stirred up among the Indians by the actions of Kieft, then the Dutch governor, resulted in a massacre by the Raritans of Amboy that wiped out the entire colony only two years after its inception (Tysen 1842: 6).

Both before and after this disastrous attempt at settlement, Staten Island was repeatedly purchased from the Indians. The final purchasers were the English who had taken Manhattan from the Dutch in 1664. A map reconstructing English land grants on the island indicates that although it remained unsettled in the 17th century, land in the project area was actively acquired (Fig. 12).

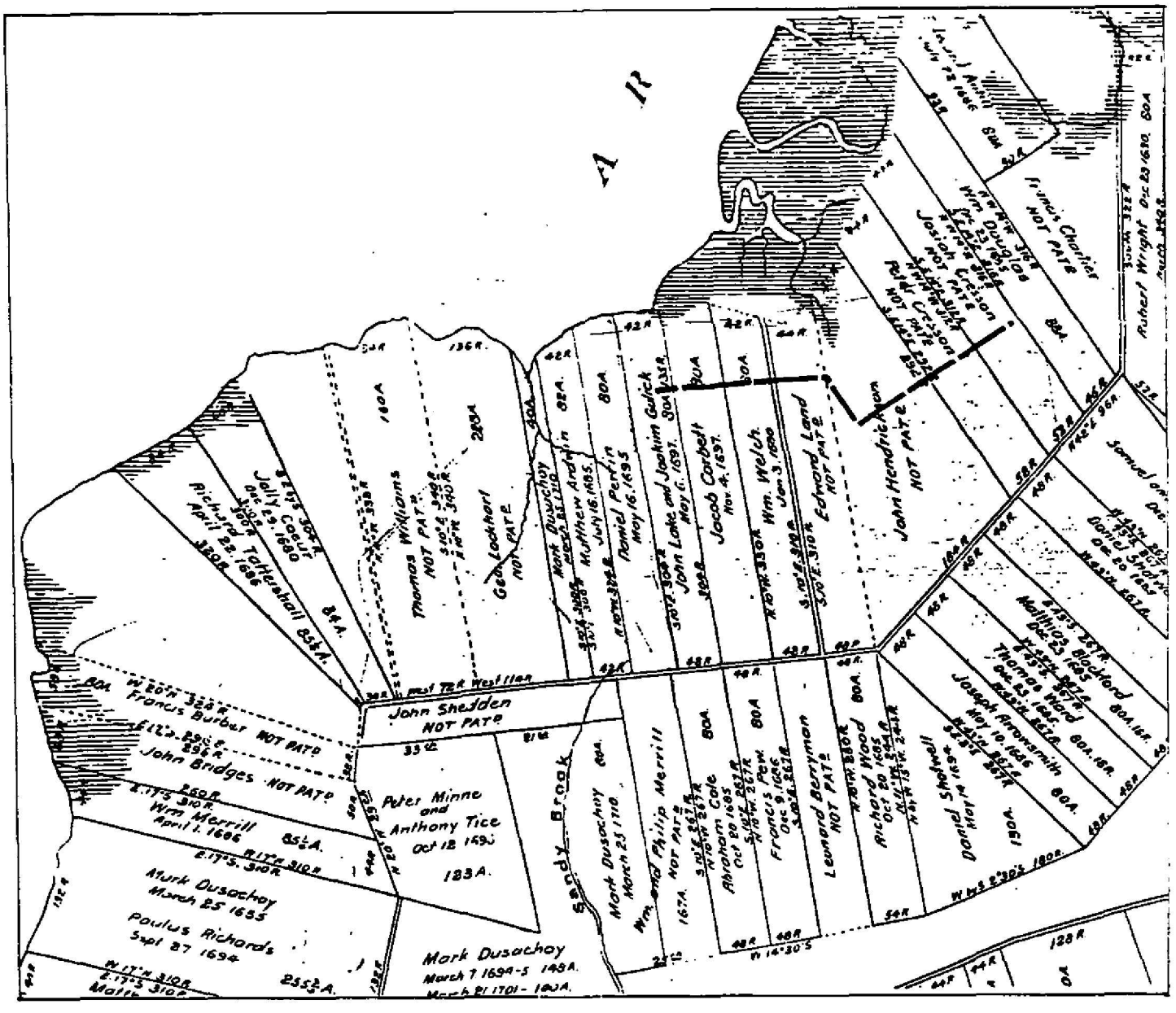
In general, the English apparently found that Staten Island was well situated, that it was blessed with rich soil and abundant wild life, and that the natives were quiet and inoffensive (Tysen 1842: 6-7). Perhaps this was an indication that the hostile Indians encountered by the Dutch were not the local population, but were from the mainland as were those who wiped out the incipient Dutch colony in 1641. Or it may be that the English were better than the Dutch at dealing with the Native American.

When Staten Island was sold for the last time in 1670, the price was 400 fathoms of wampum, guns, axes, kettles, and "watch coats", or warm overcoats. Upon payment, the Indians apparently left the island (Tysen 1842: 7), perhaps abandoning what had only been a seasonally occupied hunting and burial ground prior to European contact.

By 1683 counties were established by the English and, with 200 families living on Staten Island, it became Richmond County. About this time the Huguenots, fleeing persecution in Europe, arrived and numerous schools, churches, cemeteries, and ferries were established prior to the Revolutionary War. Several of these were located in and near the project area.

In 1688, the Staten Island settlements were divided into four (later to become five) towns, and the project area became part of the town of Westfield (Clute 1877: 206). By the beginning of the 18th century, it was considered the wealthiest of the four (Morris 1900: 41).

By 1694, roads had been laid out, including several sections of what is now Arthur Kill Road (McMillen 1946a: 3). By 1764, at



(source: Staten Island Institute of Arts and Sciences)

——— approximate location of Arthur Kill Rd. in the project area

Fig. 12. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Detail of Unofficial Map Reconstructing Land Patents in the Project Area (Skene 1907)

least three of the four roads defining the project area were in use although their names have changed several times in the past two centuries. For example, Arthur Kill Road was apparently first called Old Road then, by 1764, it became Fresh Kill Road (McMillen 1946b: 14), a name that persisted at least until 1913 (see Fig. 3). Huguenot Avenue, called Marshall's Lane in 1774 (McMillen 1946b: 15), has also been known as Killifish Road and Swain's or LaForge's Lane (Davis 1896: 62; also Fig. 13 which shows these and other early place names), and Arden Avenue, perhaps the most recent of the roads in the project area, was called Washington Avenue as late as 1913 (see Fig. 3). By 1900, all these roads had been black-topped (Morris 1900: 454).

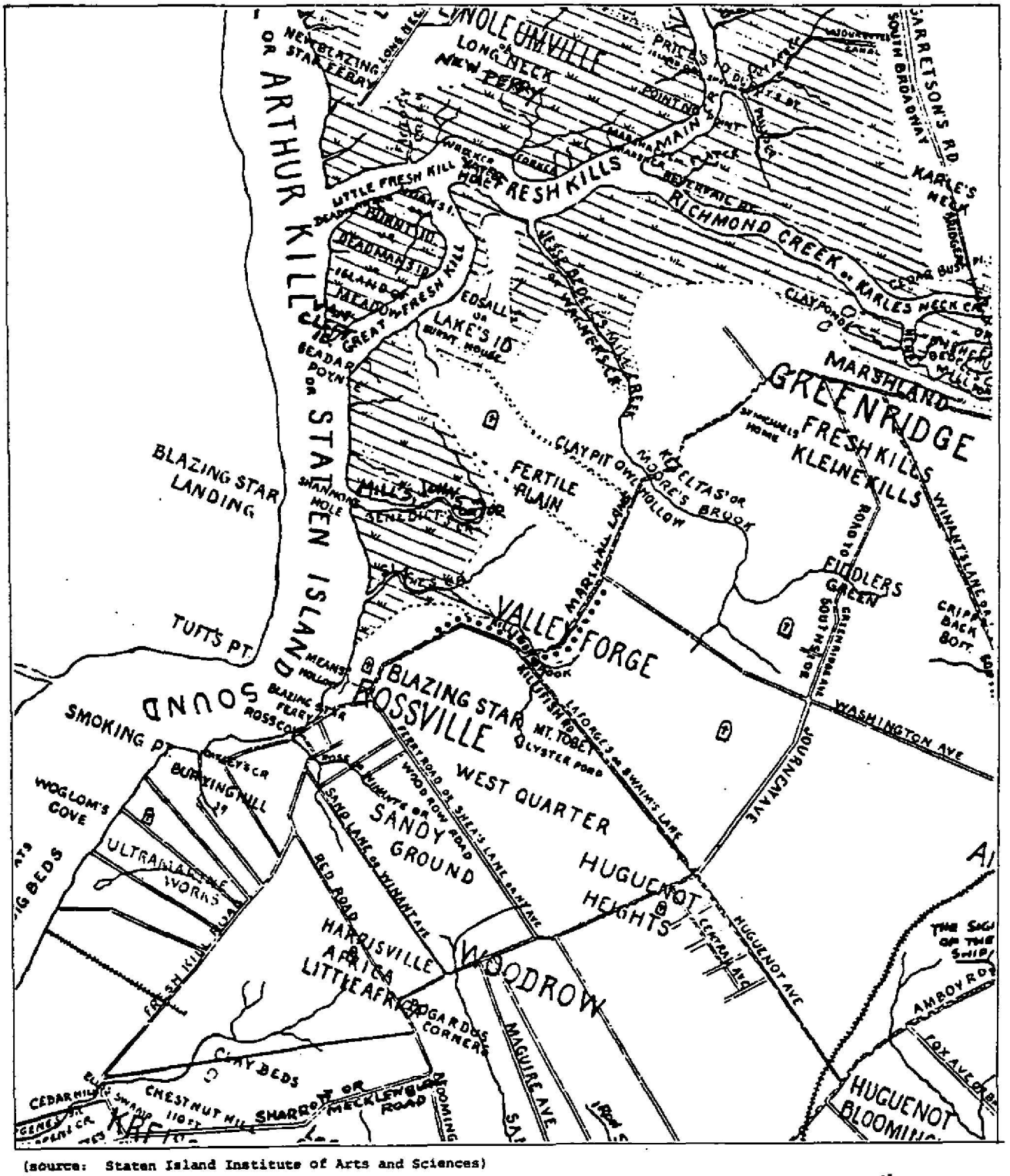
During the Revolution, Staten Island was not so much affected by fighting as by the constant coming and going of British and Hessian troops who used it as a way station as well as an access route. It has been noted that Staten Island was the first position occupied by the enemy in New York State and the last deserted (Tysen 1842: 10).

Several enemy encampments are known, most notably at Richmondtown where archaeologists have documented earthworks and recovered artifacts, among them at least 3000 regimental buttons, many of them identifiable (Sainz 1946). Because it was an integral part of a communication route to the mainland, the project area was also involved in wartime activities, and, in 1777, a skirmish between British and American troops apparently occurred in the vicinity of La Forge's "Corner", or somewhere near what is now the intersection of Arthur Kill Road and Huguenot Avenue (Morris 1898: 223).

Decades before the Revolution a ferry, later known as the Blazing Star Ferry after a popular local tavern, crossed between Staten Island and the New Jersey mainland (Anon. 1940: 13). While all of Staten Island was severely affected by the war, this ferry and its access roads undoubtedly increased the strategic importance of the project area locale. For example, on McMillen's map, two Hessian companies are noted nearby at Old Blazing Star (Sainz 1946: 32; see Fig. 14 this report). It is possible that undocumented camps could also have been located in the project area. In addition to encampments, houses were known to have been impounded by the British, or sometimes to have been willingly turned over by locals sympathetic to the British cause, but no such documentation exists for houses in the project area. (For a detailed discussion of Staten Island during the Revolution see Sainz 1946-1948; also McMillen 1975.)

In the decades following the Revolution, settlement in the immediate project area appears to have remained sparse and relatively constant (see Figs. 14 and 15). Moreover, despite increasing industrialization in neighboring areas, 19th-century development was limited mainly to farms that continued to operate into the early decades of the 20th century (see Figs. 3 and 16-18).

After the Revolution, it appears that development occurred in a period of relative calm. Perhaps the most potentially disruptive situation concerning Staten Islanders in the first half of the 19th century centered around the ongoing question of boundaries, with New York and New Jersey vying for political control of the island. This legislative issue was finally settled in New York's favor in 1833 (Tysen 1842: 12).



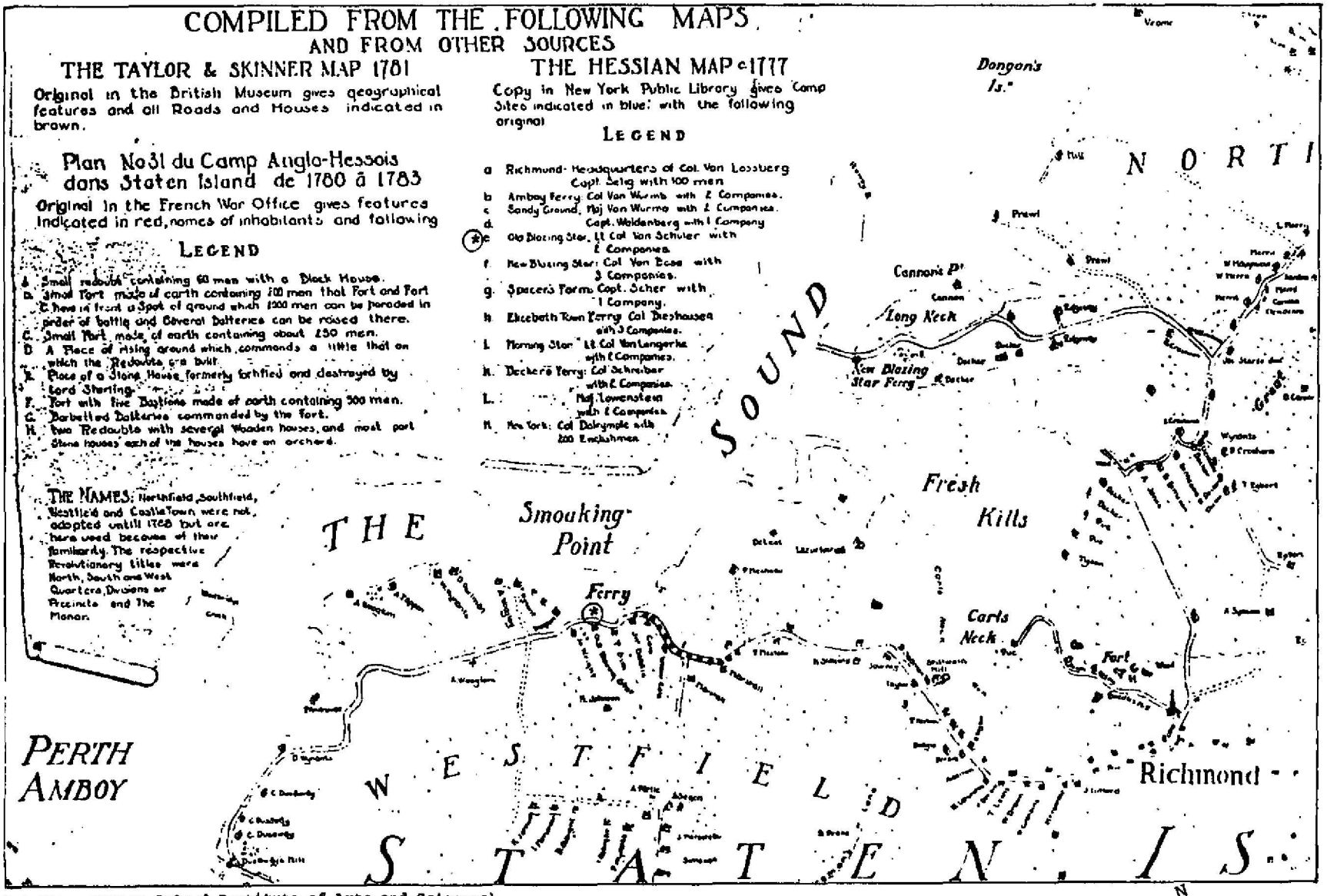
(source: Staten Island Institute of Arts and Sciences)

•••••• approximate location of Arthur Kill Rd. in the project area

N

0 2000 4000 ft.

Fig. 13. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Detail of 1968 Reprint of Davis and Leng's 1896 Map of Staten Island Showing "Ye Olde Names & Nicknames"



(source: Staten Island Institute of Arts and Sciences)

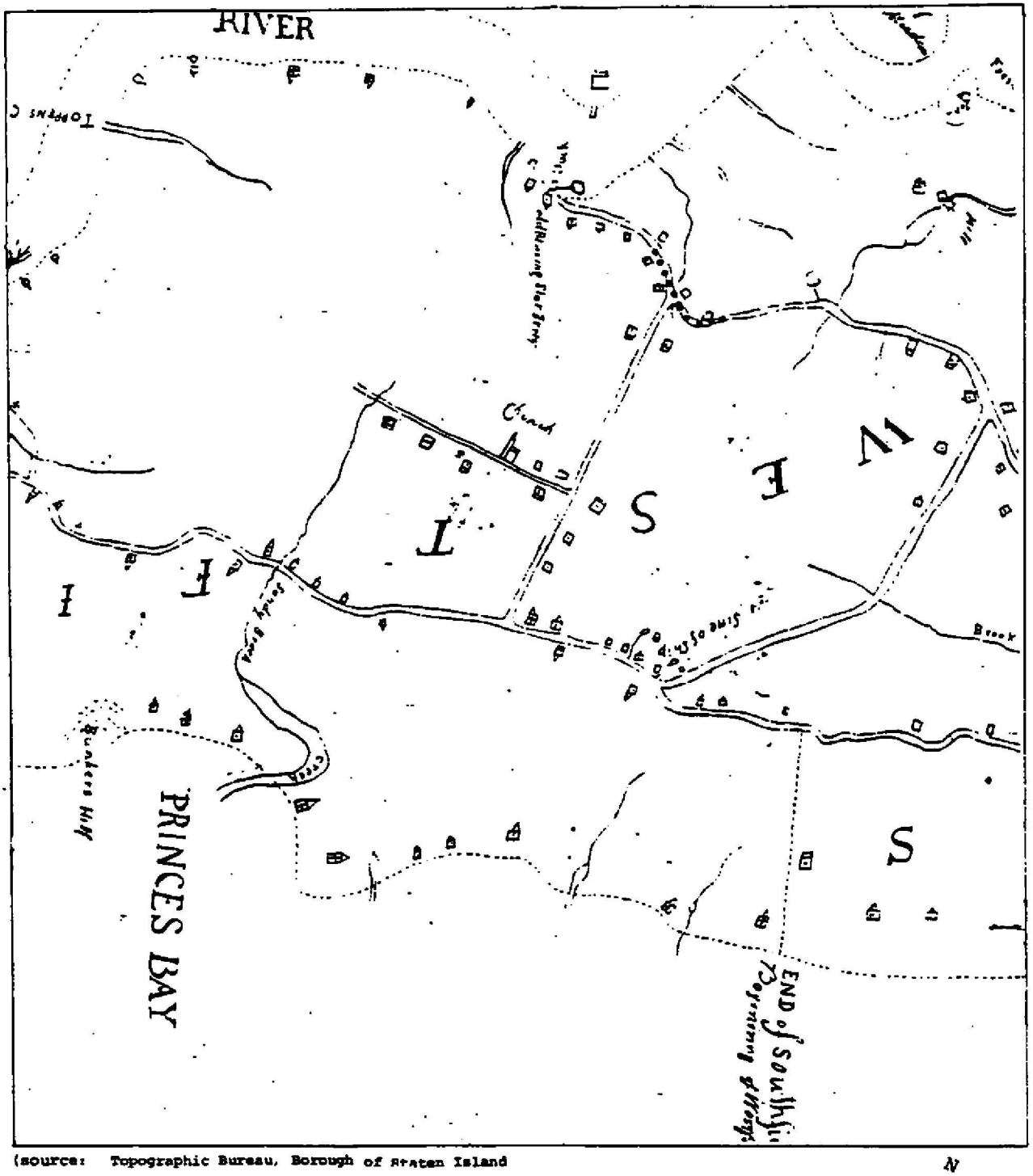
••••• approximate location of Arthur Kill Rd. in the project area

⊛ Old Blazing Star--Lt. Col. Von Schuler with 2 companies

N

0 1 mi.

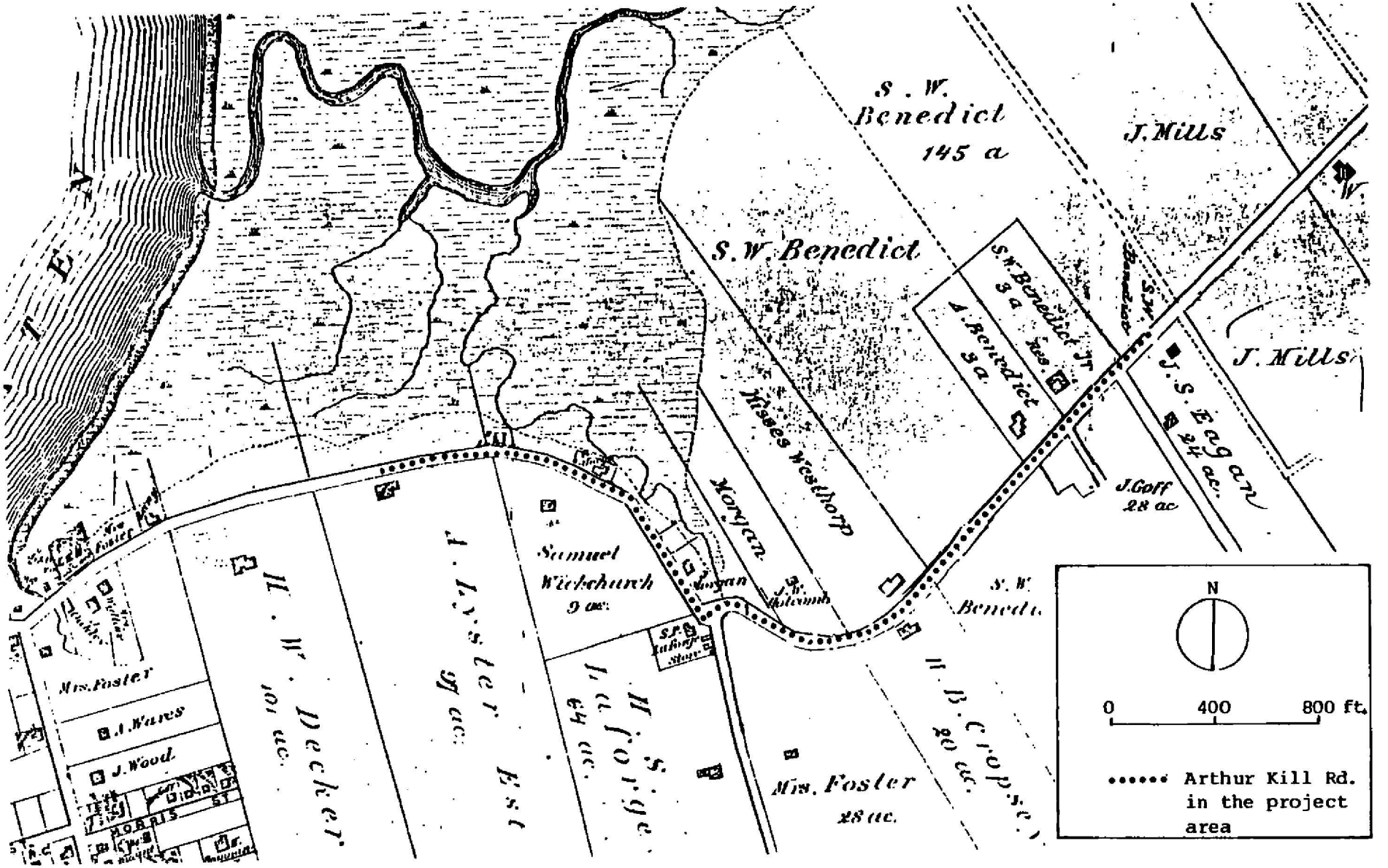
Fig. 14. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Approximate Location of Project Area on Arthur Kill Rd. Superimposed on Detail of a Composite Map of Staten Island, 1775-1783 (McMillen 1933)



(source: Topographic Bureau, Borough of Staten Island

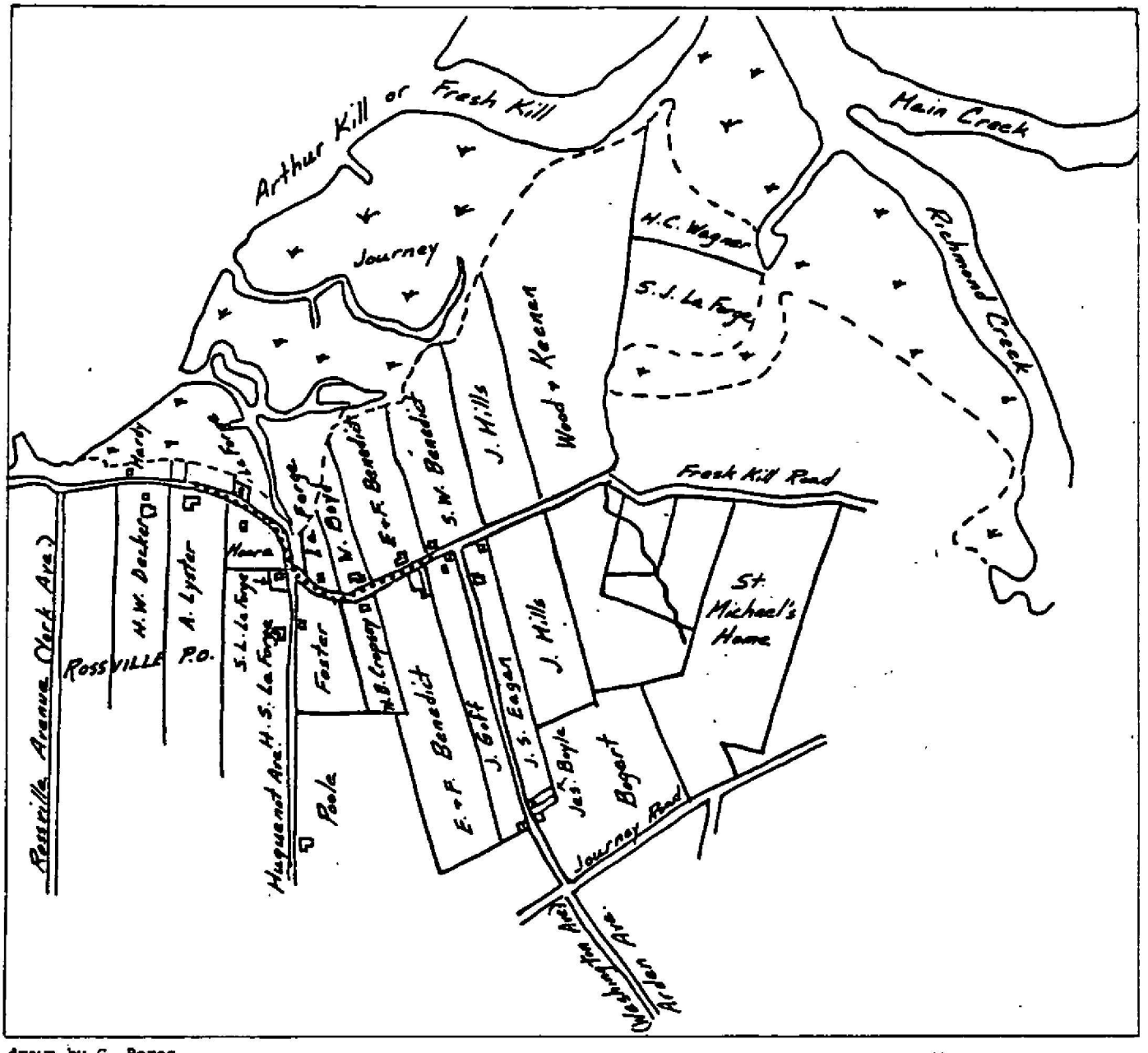
•••••• approximate location of Arthur Kill Rd. in project area

Fig. 15. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Detail of Town of Westfield on 1797 Map of Staten Island



(source: Staten Island Institute of Arts and Sciences)

Fig. 16, MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Detail of Beers' 1874 Atlas of Staten Island in the Project Area (Plates 18, 19, and 24)



..... Arthur Kill Rd. in the project area

no scale given

Fig. 17. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Detail of 1887 Beers' Atlas of Staten Island in the Project Area

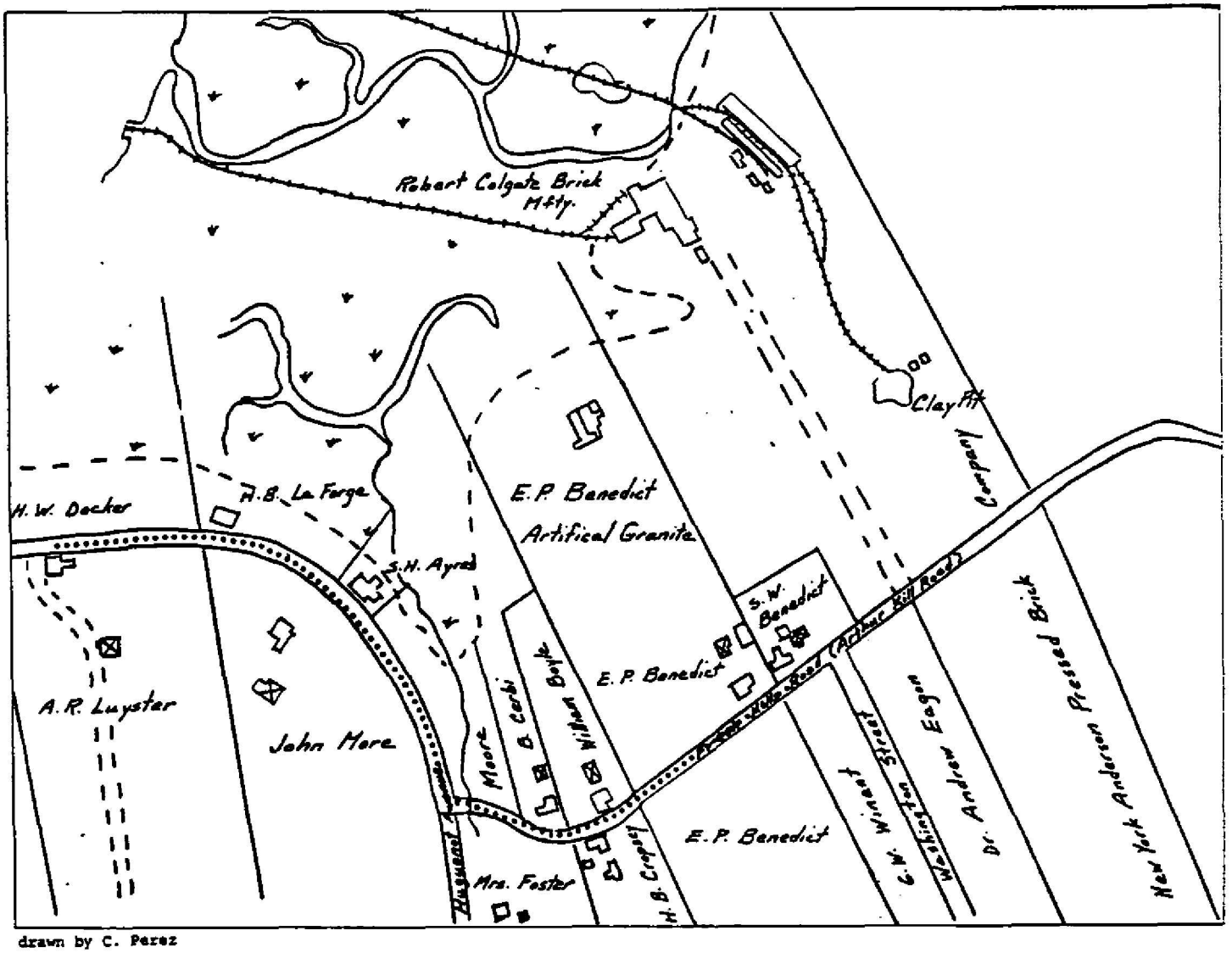


Fig. 18. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Detail of 1898 Robinson's Atlas of Staten Island in the Project Area

Apparently fostered by this tranquility, the project area functioned as a quiet farming community during the first half of the 19th century, although oystering, a prime Staten Island industry, also may have been part of the local economy (Morris 1900: 469). At this time, too, the natural beauty of the area was discovered by wealthy New Yorkers seeking suburban homes and country retreats. Among the newcomers were Col. William Ross, for whom the community of Blazing Star was renamed Rossville in 1837 (Zavin as quoted in Jacobson 1980a: 30), and, more specific to the project area, Mr. Samuel W. Benedict, a well known New York City clock maker and jeweler who bought property on Arthur Kill Road in 1836 (Morris 1900: 501; see Fig. 16 this report).

During this period, the only major new industry in the area appears to be the clay pits southwest of Rossville opened by Balthasar Kreischer in 1835 (Pickman 1978: II-11). By mid-century, the pits were expanded to become brickworks, and a chemical factory and ultramarine blue works were also established. This latter industry extracted a blue element from kaolin clay that was used to make paints and other products, and in 1898 the "International Ultramarine Works, Limited", in Rossville was listed as one of the larger manufacturing establishments on the island (Anon. 1898: 93).

In 1851, at about the time these industries were developing, the Richmond Plank Road was opened. Initially this 10-mile toll road, that began at Vanderbilt's landing in the northeastern part of the island and ended at Rossville, improved access to the ferry, but by 1857 the road had begun to deteriorate (Anon. 1965: 19). With the introduction of railroads followed by the rapid transit later in the century, the village of Rossville began its decline. Apparently the railroad, which at first may have increased accessibility, ultimately brought a halt to the port activity that had first been dependent on the ferry and then on steam ships (Zavin quoted in Jacobson 1980a: 31).

Although families remained, and industry in the form of brickworks developed to the north and east of the project area (see Fig. 18), and while Rossville was still described in 1911 as "one of the most picturesque old villages on Staten Island if not in the State of New York" (Schneider quoted in Jacobson 1980a: 35), by the last quarter of the 19th century the demise of the village and the area had already begun. It is a demise that is belied by the farms and orchards documented in the project area on a 1913 map (see Fig. 3).

Jacobson notes that by 1916, pollution of the waters by the bilge overflows from large ships had halted the oyster industry (others have noted this pollution as early as the 1880s [e.g., Smith 1970: 150]), and for technological reasons the brickworks had closedin 1927 and the chemical plant in 1963. In addition, air pollution from chemical plants in New Jersey befouled the air. Moreover, rezoning for industry allowed the building of two dangerous liquid natural gas tanks and a correctional facility west of Rossville. All this in addition to a vast marine junkyard along the shore of the Arthur Kill, the sanitary landfill to the east, and the construction of the West Shore Expressway has left little to recommend the village except a few old houses and its history (Jacobson 1980a: 35).

More specifically, while the project area remained less obviously industrialized than Rossville, it too was severely affected by change. The extensive mound of landfill, although still somewhat hidden by trees and the terrain, for decades has been a prominent and sometimes odiferous feature. The building of the expressway in the mid- to late-1970s drastically altered the landscape, and several old houses were destroyed just before and during its construction.

In 1970, the city approved a plan for the Village Greens clustered housing (Smith 1970: 219), a multi-unit development on the south side of Arthur Kill Road (see Fig. 2). Initially intended to include several additional units, it currently borders about 650 ft. of the proposed sewer route on land formerly owned or occupied by at least two notable families, the Winants and the Benedicts (see Figs. 16-18). This development prompted the construction of the privately owned Village Greens sewage treatment plant just to the west on Arthur Kill Road (see Fig. 2). An outdoor tennis court has been incorporated into the design of the treatment facility.

Just beyond the Village Greens complex, on the south side of a bend, is the site of the Cropsey foundation, the remnants of a house that stood at 1922 Arthur Kill Road until about fifteen years ago (Macormac 1984: personal communication; see Plates 16-17). Either of German or Dutch origin (Morris 1900: 72; compare with Leng and Davis 1930: 72), the Cropseys have a long history on Staten Island and more than a 150-year association with the general project area (Leng and Davis 1930: 72). From the mid-19th century, the house on Arthur Kill Road was the Harmon B. Cropsey family home (Leng and Davis: 72), but possibly it had been built by others before or by the Revolutionary War (see Fig. 14 which shows the Marshall house at approximately the same location as 1922 Arthur Kill Road; however, no house is documented at this location on the 1797 map shown in Fig. 15).

As noted previously, two of three houses standing directly across the street from the Cropsey foundation also may be quite old. One (at 1919 Arthur Kill Road; see Plate 10) perhaps may be among the few homes in the area remaining from the late-18th or early-19th century (Macormac 1984: personal communication), but this is somewhat speculative.

The house that belonged to S. W. Benedict, Jr., which still stands just beyond the project area on the north side of Arthur Kill Road near the Arden Avenue intersection (see Fig. 16), represents only a small part of the property originally acquired by his father in 1836 (Bayles 1887: 501; Clute 1877: 435). The senior Bendedict's house, reputedly built in the late-18th century, also was located on the north side of the road (Bayles 1887: 501), however, it does not appear on any 18th-century maps. This house burned and was rebuilt by Benedict in 1858.

The LaForges, another notable family local to the project area, can be traced to French Huguenot origins. Two family branches developed on Staten Island, one of them in Westfield (Leng and Davis 1930: 242). By 1853 or before, S. H. LaForge owned a house and store on the southwestern corner of the Huguenot Avenue-Arthur Kill Road intersection (Butler 1853; also see Fig. 16 this report) at what would be alternate pump station site #7. Since the 19th century, area has been known locally as "Valley Forge" (Davis 1896: 69; Morris 1898: 409; see Figs. 3 and 13 this report). If the "LaForge Corner"

noted previously is accurate, the family occupation of the property could date from the Revolutionary War; however, neither a house nor the LaForge name are is documented on McMillen's composite map of the Revolutionary War period (see Fig. 14). By 1797, an unidentified house is indicated on what was later known to be LaForge property, but this is not in the immediate vicinity of site #7 (see Figs. 15 and 16). Recent road construction and stream management has caused extensive disturbance to all of this property, and there are no longer any standing structures.

Two of the alternate pump station sites under consideration (#8 and #9) were homesteads in the 19th century and perhaps before, but the names associated with them in the 19th century (Morgan and Foster respectively) do not appear to be historically significant. It is possible, however, that one of the Marshall houses documented on McMillen's Revolutionary War period map was located on site #9 (see Fig. 14), but this house is no longer standing.

As discussed earlier, the remaining site (#6) has been altered by the grading of a hill during the construction of the West Shore Expressway (see Fig. 7). In the 19th century this was apparently the location of a house attributed to either the LaForges or a man named Samuel Wichcurch (the latter name is indicated on the composite detail of Beers' 1874 atlas found in Fig. 16, however Plate 18 in this atlas attributes the land to LaForge), while the interceptor line crosses property belonging to the estate of A. Lyster (Beers 1874). The West Shore Expressway has obliterated any evidence of structures on these properties.

At one point in the assessment, five additional alternate pump station sites were considered on Arthur Kill Road between Rossville and Huguenot Avenues (#1-#5; see Fig. 2). While much of this portion of Arthur Kill Road has been altered, several historic properties still remain. These include an abandoned 19th-century house as well as another that is still occupied and, most historically significant, a cemetery that was active from the mid-18th to the mid-19th centuries (Jacobson 1980a 106-113; see Plates 2 and 3 this report). Prior to the current field testing, these five sites were eliminated from consideration for technical reasons and because of their historic significance.

The information presented here suggests at least a 200-year history of development for the project area. While not among the island's earliest settlements, for a while it was among its more strategic, with the Old Blazing Star ferry playing a vital role in its development. Unquestionably, it was at least traversed if not occupied by British and Hessian soldiers during the Revolutionary War, and a skirmish between American and British troops may have taken place here. In the 18th century, it attracted settlers who remained for generations, and in the 19th century it was chosen by city-dwellers seeking suburban residences.

It is an area where settlement intensified in the 19th century, but where farms continued to function into the 20th. It is also an area where commercial development ultimately worked against its stability and destroyed much of the evidence of its historic past. Those standing structures or any buried deposits that do remain will not be affected by the construction planned at this writing. However, the project area is obviously culturally sensitive and may harbor undocumented historical deposits in areas that have not been tested.

FIELD TESTING PROCEDURE

The proposed Mayflower Avenue Pump Station and Force Main Project (Capital Project No. WP-136) encompasses six foci: the force main located along the south side of Arthur Kill Road (Section A; Fig. 19, Plates 11 - 15), the combined forced main/interceptor sewer line transversing the West Shore Expressway (Section B; Fig. 20; Plate 18) and continuing along the south side of Veterans East Service Road(Section C; Fig. 20; Plate 19), and three alternate pump station sites (Sections D, E, and F; Fig. 21 and Plates 20 - 25). These three alternate pump station sites are located at the corner of Veterans East Service Road and Huguenot Avenue (Site #7), at the corner of Arthur Kill Road and Huguenot Avenue (Site #9), and at the corner of Arthur Kill Road and Veterans East Service Road (Site #8).

Ideally, hand dug 18-in. diameter test holes were taken to a depth of 36 in. or until clearly sterile strata were reached, but planned test holes were not dug in areas which were obviously disturbed by construction or land modification. All soil was troweled through quarter-in. mesh screening.

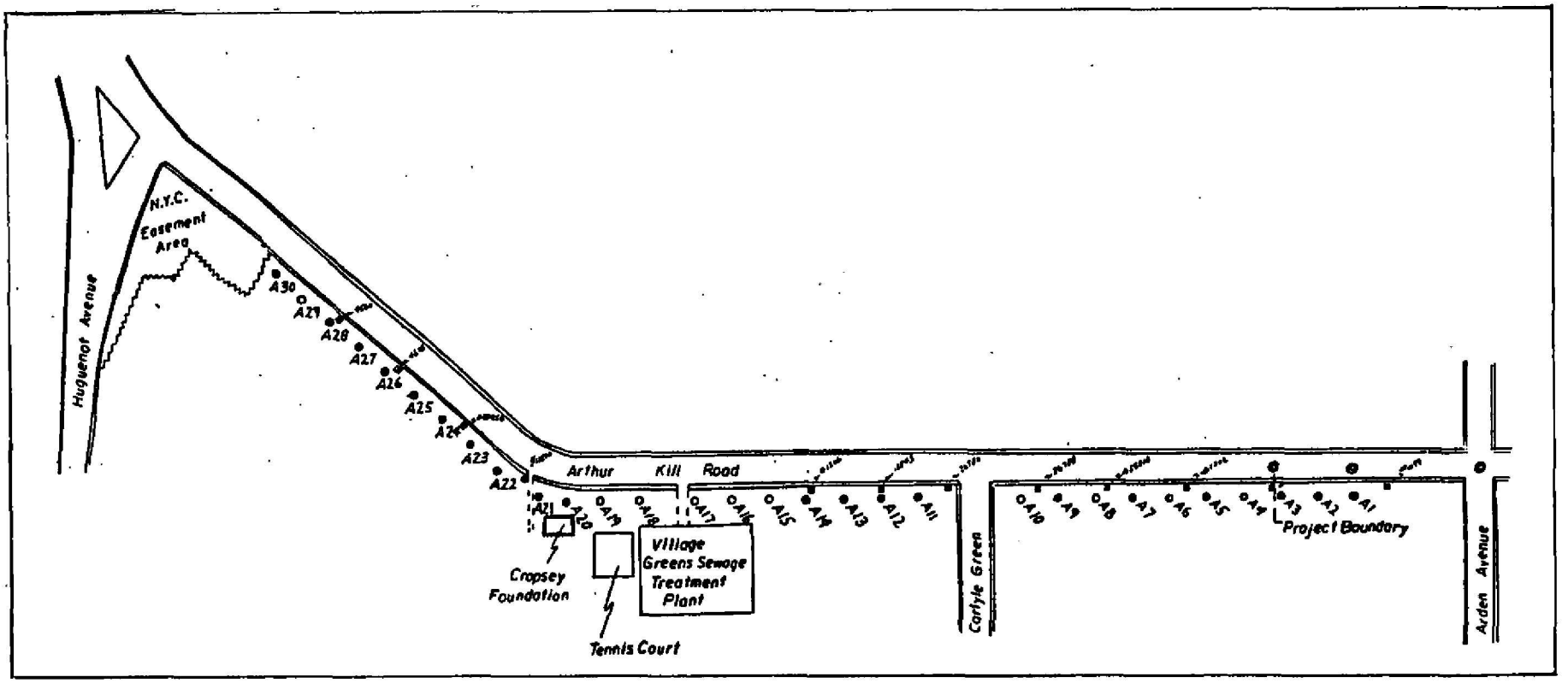
Initially shovel test holes were planned at 50-ft. intervals in Sections A, B, and C along the proposed pipe lines and within the direct and indirect impact zones at the pump station building sites in Sections D, E, and F. However, field circumstances occasionally required flexibility. For example, as noted in the introduction, the present surface elevation along the eastern portion of the proposed force main route (Section A) coincides with that documented on a 1913 topographic map made when the project area was still rural (See Fig. 3 and Appendix A). With few exceptions, however, testing revealed that the original ground surface in this area has been replaced by fill to a depth beyond 36 in. Consequently, depite a seemingly pristine elevation, all surface or subsurface deposits would have been destroyed. This made it possible to terminate a hole at 36 in. or less without fear of missing significant cultural deposits. In addition, borings (See Fig. 6, #167 to 173) indicated that buried surfaces were not a potential problem in this area.

Details of archaeological field testing are described below, and specific field and artifact data will be found in Appendix C.

Section A (Fig. 19; Plates 11-17)

Ten shovel test pits were plotted between the existing concrete sidewalk and curb on Arthur Kill Road west of Arden Avenue to Carlyle Green. Although very detailed, the construction maps provided did not show the intersection of Arden Avenue and the location of the first numbered light pole in the project area. As a result, test holes A1, A2, and A3, were dug outside the project area where previous construction of the existing sewer line on Arden Avenue had disturbed subsurface soil strata. These test holes provided data on the extent of construction disturbance and served as a reference for suceeding holes. For example, based on this information, shovel Test A4 was not dug when A5 confirmed that the disturbance contined westward.

Test hole A5 reflected disturbance similar to that found in holes A1 through A3 which showed a succession of narrow strata of alternating soil types and textures (see Plate 11 for an example of strata encountered in this section), and the decision was made to dig every other



drawn by C. Perez

- shovel test hole, dug
- shovel test hole, not dug
- manhole
- light/telephone pole, numbered when possible
- NYC easement area, fenced

N

0 100 200 ft.

Fig. 19. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Test Hole Plan, Section A

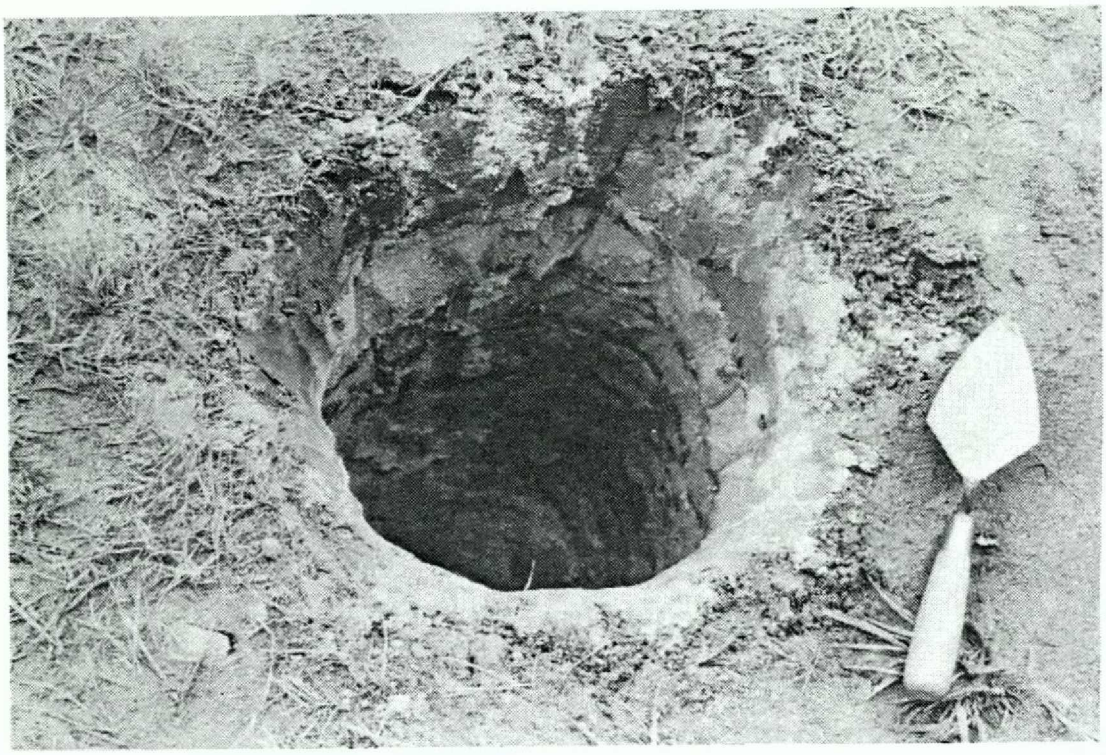


Plate 11. Test hole A1 (Section A) at 36 in. Note series of banded sand deposits comprising fill (see Fig. 19 for location). 9½-in. trowel shown on right for scale.

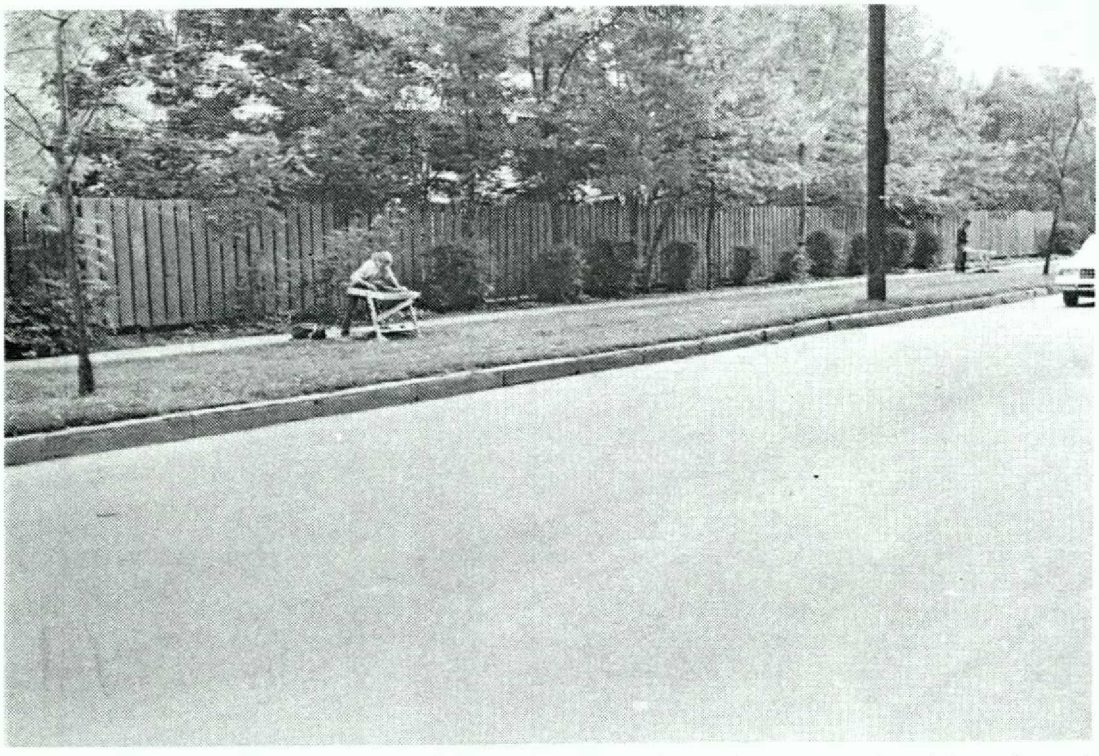


Plate 12. Part of force main route (Section A) on south side of Arthur Kill Road. Crew members Sandra Norvell (left) and Eileen Craig (right) are shown screening test material. The Village Greens development is behind fence.

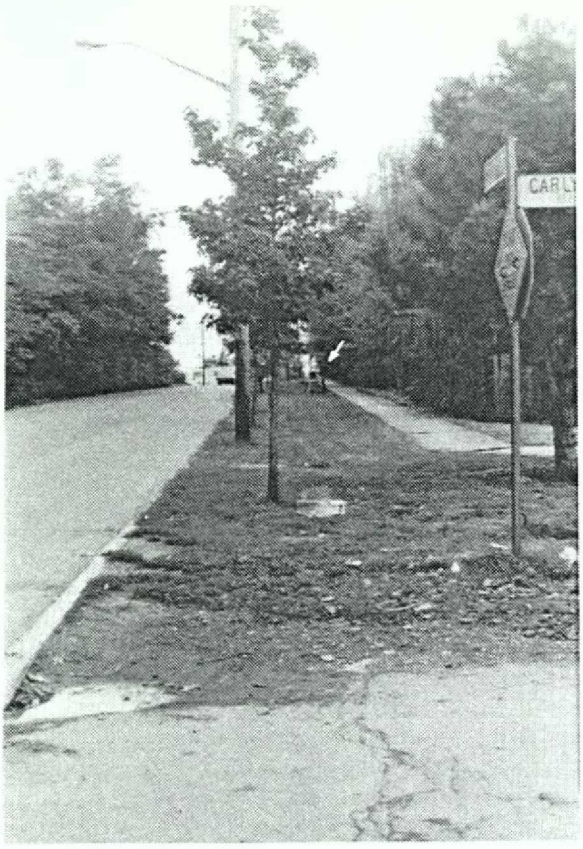


Plate 13. Test Section A (force main route) looking east from Carlyle Green on south side of Arthur Kill Road. Crew member Eileen Craig (arrow) is screening test material in background.

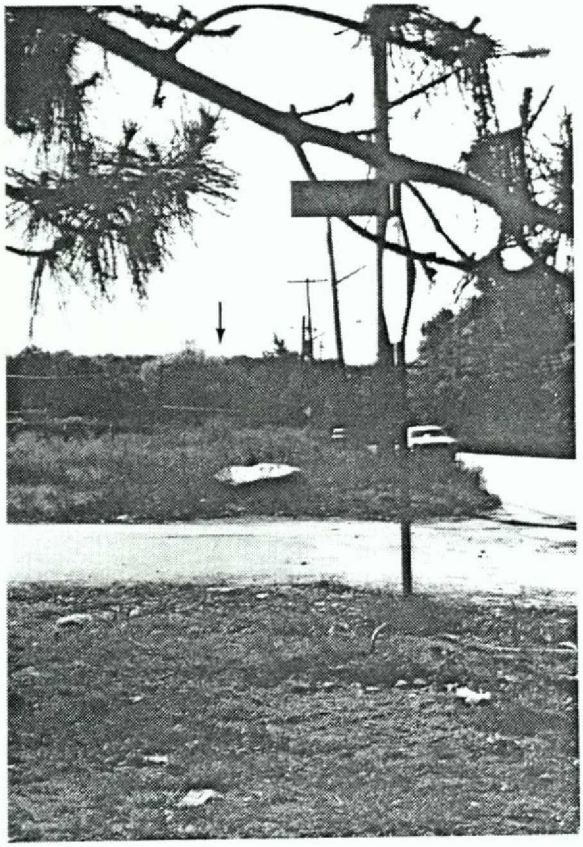


Plate 14. Test Section A (force main route) on south side of Arthur Kill Road looking west from Carlyle Green. Private Village Greens treatment plant is within treed area in background (arrow).

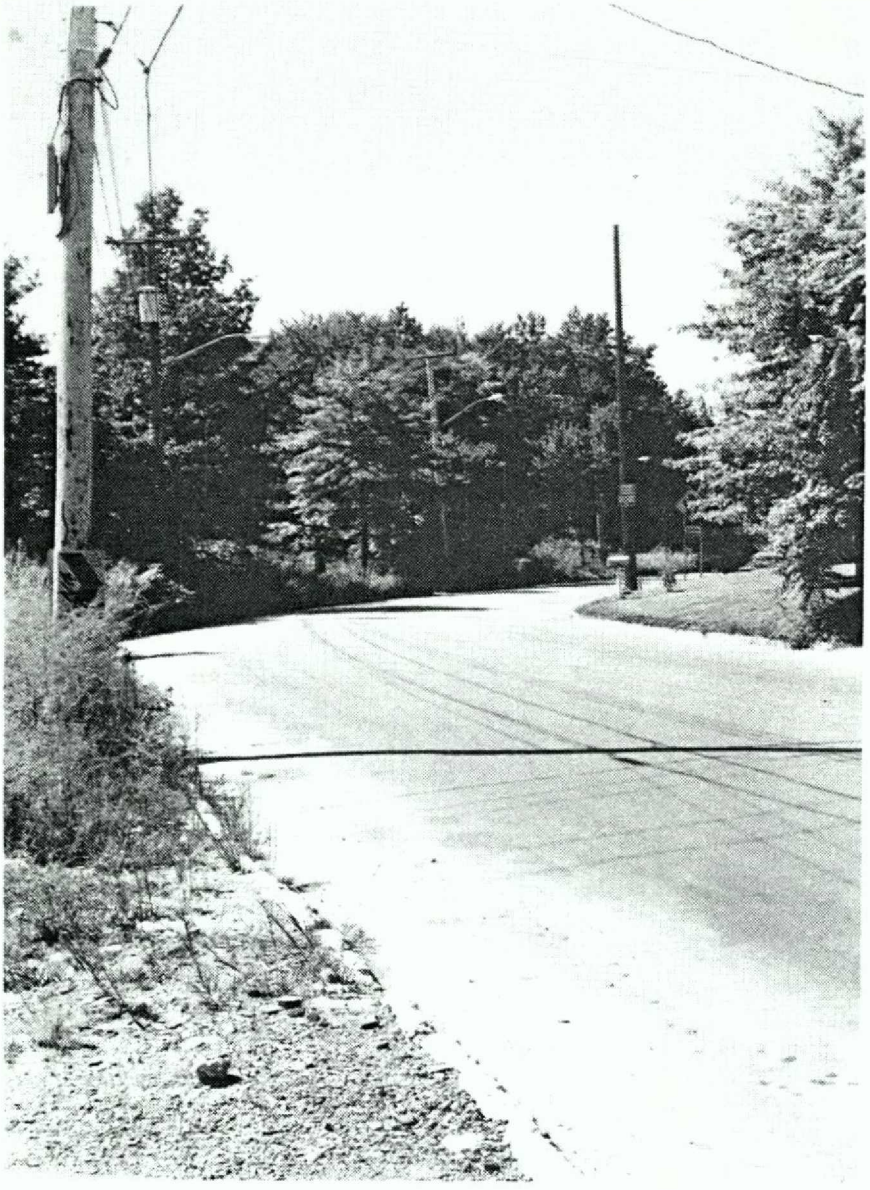


Plate 15. Test Section A (force main route) looking west from entrance to Village Greens Treatment plant on south side of Arthur Kill Road. Trees at bend in background mark the Cropsey property. House shown in Plate 10 is located on the property to the right on north side of the road.

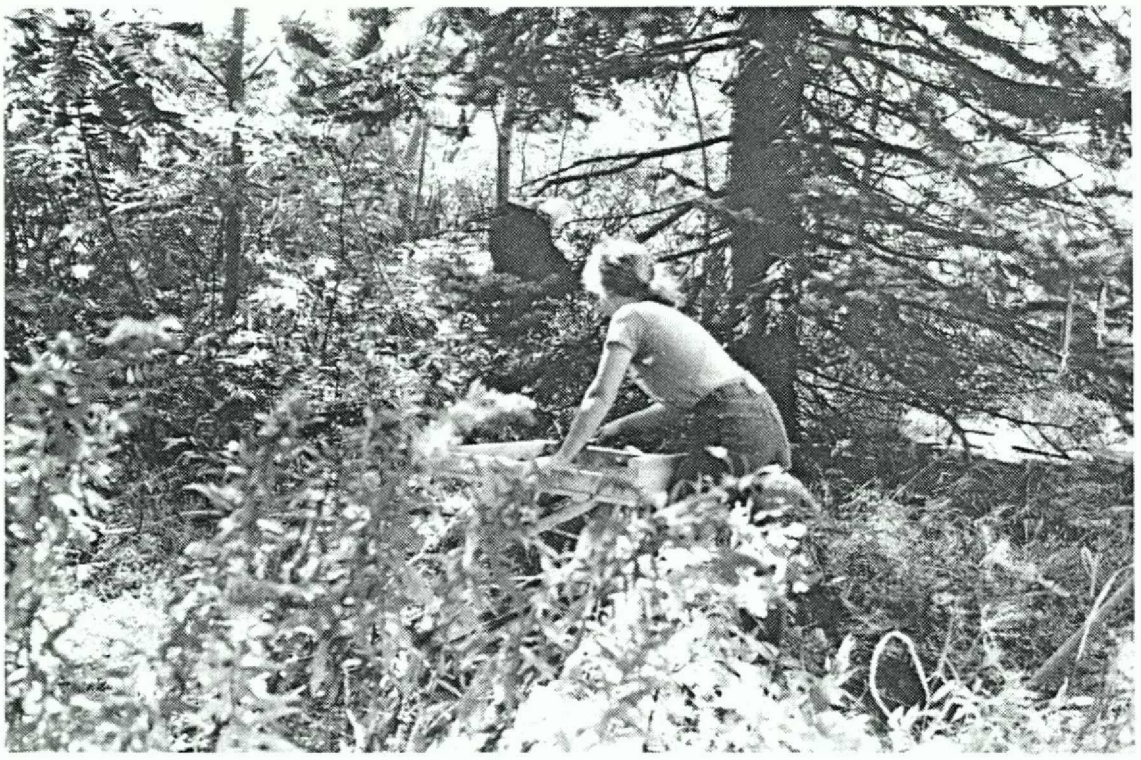


Plate 16. Crew member Sandra Norvell screening material from Test hole A20 located near walkway to what was the 19th-century Cropsey house. Note spruce tree on right, one of two that mark the walkway.

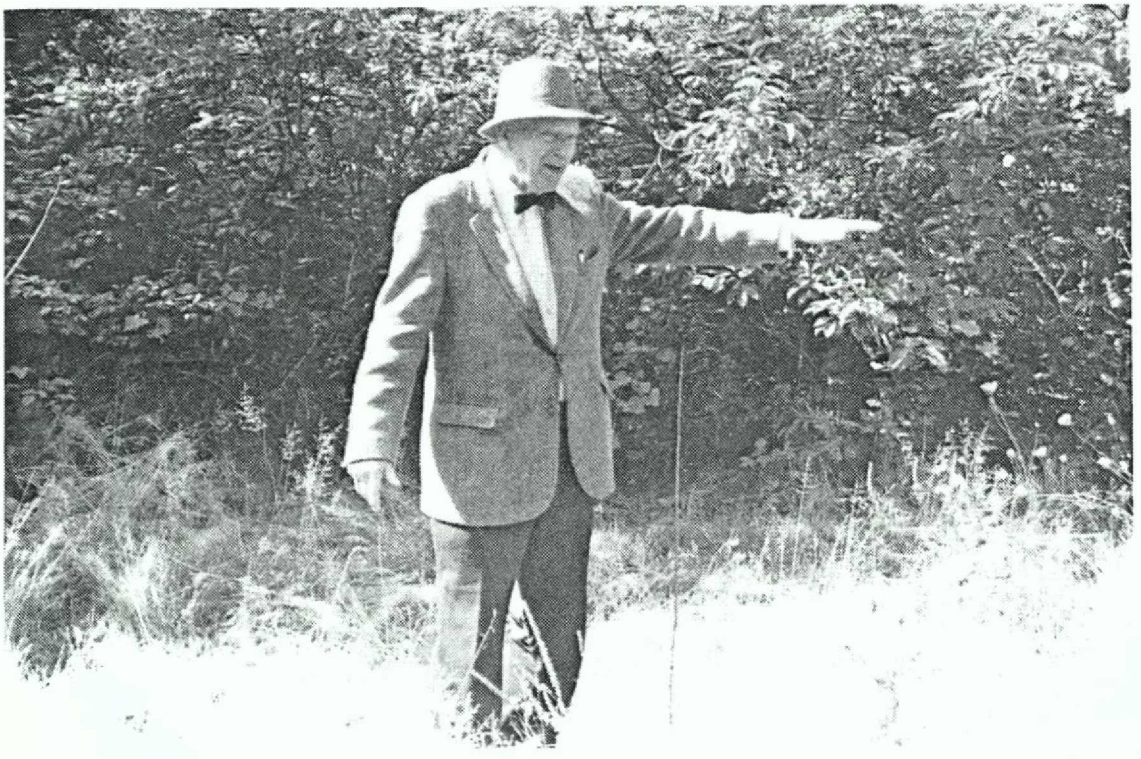


Plate 17. Harold Macormac at Cropsey property in October, 1984. The 87 year old Mr. Macormac, a Staten Island native who keeps bees and lives on Arden Avenue, is the son of Samuel A. Macormac, a notable Staten Islander (Leng and Davis 1930: 294).

plotted hole as long as the disturbance continued. The soil in A7 was different from that found in previous test holes in that it consisted of compact, moist, clayey silt from 1 in. to 36 in. (Appendix C). Construction sand and concrete mortar excavated from test hole A9 indicated continuing disturbance. The soil in these tests was probably associated with the construction of the sidewalk and curb located immediately to the south and north of the hole, respectively. Artifacts recovered in the first 19 in. consisted of 20th-century brown, green and clear bottle glass fragments, a square-cut nail and styrofoam cup fragments (Appendix C).

As was the case with test holes A4, A6, and A8, A10 was not dug because of the disturbed nature of the area. This latter test hole was located at the edge of Carlyle Green, a street leading to one cluster of the Village Greens housing development. With the exception of A3, A5, and A9, all of which produced construction debris, no artifacts were recovered from any of these test holes.

Section A continued west of Carlyle Green paralleling the privately owned sewage treatment plant and a tennis court owned by the Village Greens housing development and terminated at an inaccessible and highly disturbed fenced-in area owned by New York City. The soils in test holes A11 through A14 again showed evidence of recent disturbance. Test hole A13, located near a concrete sidewalk associated with the sewage treatment plan, may have been the concrete mixing site for the sidewalk construction. Stratum III (5 - 12 in.) was composed of 90% concrete mortar and 10% red-brown silt with a matrix of 80% gravel and 20% soil/concrete mortar. Recovered artifacts consisted of red brick fragments, a drinking vessel a glass fragment, an iron valve handle, and pieces of coal & mica (Appendix C).

Several employees of Consolidated Edison Electric Company working near the sewage treatment plant entrance informed us that the area between Carlyle Green and the tennis court had been repeatedly disturbed to a substantial, but undetermined, depth through construction. Fill had been used and the surface had been compacted. Based on this information, shovel test holes A15 through A19 were not dug.

Test hole A20 was located near the former Cropsey house site (Plates 16 - 17), just east of the walkway to the house. A rose garden, located just south of the proposed force main route, had not been disturbed by any construction activities. Cultural material recovered from Stratum II (1 - 6 in.) of test hole A20 included clam shells, red brick fragments, thin plate glass fragments, corroded nails, and one ceramic fragment (Appendix C).

A second test hole, A21, was located east of the Cropsey driveway, approximately 15 ft. south of the curb (Fig. 19). A modern green glass fragment was recovered from the topsoil (Appendix C). Another hole, A22, was dug west of the driveway among rose bushes, privet and sassafras trees. Non-diagnostic artifacts were excavated within the first 9-1/2 in.

Test holes A23 through A30 reflected the cut and fill operations associated with construction on Arthur Kill Road. These included a cut embankment and subsequent regrading and the deposition of fill around test hole A30, an area which, at present is covered by dense reeds. The fill area terminated 10 ft. south of test hole A30 which is marked by a severe drop into a marshy area where several streams converge and a culvert has been constructed.

Items recovered from the fill strata in test holes A23 through A30 contained brown and clear bottle glass, burned wood, burned and unburned brick fragments, mortar, wire, linoleum, a beer can, aluminum foil, a metal latch, and an iron beam measuring 1 1/2 x 2 1/2 x 18 in. with two iron bolts in place.

Section B (Fig. 20; Plate 18)

Section B, the proposed interceptor line located between the West and East Service Roads, traversed the West Shore Expressway. Test holes B1 and B2 were placed north of the expressway; B3 and B4 were located to the south. Previous construction activities had resulted in land modification and this prior disturbance was reflected in the test holes.

Test hole B1, dug to a depth of 36 in., contained a total of 14 in. of sand in three strata, varying in color from red to white. No artifacts were encountered (Appendix C).

Stratum II of test hole B2 (1/4 - 8 in.) contained a clam shell fragment, an aluminum foil candy wrapper, clear, brown and light green bottle glass, a 20th-century tan glazed stoneware bowl (?) rim with a pink band, a glass tumbler sherd, plastic, and a wire nail. Stratum III (8 - 38 in.) consisted of white sterile sand (Appendix C).

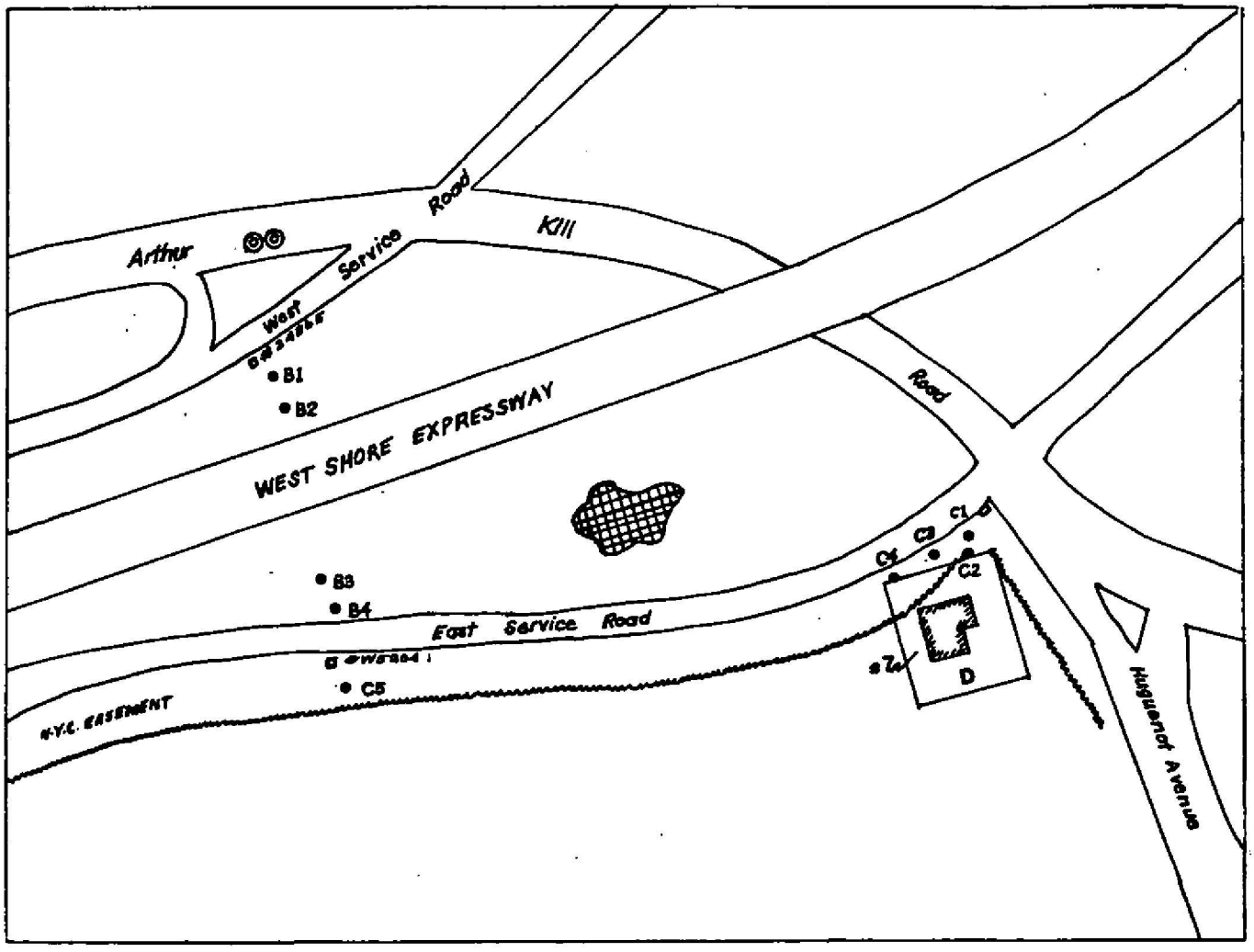
Test hole B3, which contained no artifacts, was primarily composed of a red-brown clay infused with many poorly sorted rocks, similar to the fill-type soil in Section A. Three pieces of mortar were recovered from Stratum II (8 - 21 in.) in B4 which was a fill area located near a chain-link fence.

Section B - Surface Collection (Fig. 20; Plate 19)

A non-systematic surface collection was made at what was the site of the John More (Moore) property from 1887 - 1898, an area bordered by the West Shore Expressway and the East Service Road. The land has been severely altered through highway construction. Artifacts were scattered over a large area and were predominately of 20th-century manufacture. Included were a body/rim sherd and bowl base imprinted "HALL 3528, MADE IN U.S.A."; a decorated whiteware saucer imprinted with "SCAMMELL'S TRENTON CHINA", Made in America"; a platter (?) base imprinted with "...P.C.O., [Syr]acuse [C]hina", a porcelain saucer rim with a geometric design; and an earthenware cup rim decorated with a handpainted blue stencil floral motif. The latter may date from the 19th century; all appear to have been recovered from a disturbed context. However, it is impossible to ascertain whether the artifacts are part of fill material trucked onto the site or whether they represent household items discarded by the More family prior to the demolition of their home and subsequently brought to the surface through grading or the effects of erosion, which are severe in the area (Plate 19).

Section C (Fig. 20; Plate 19)

Five shovel test holes were dug on the south side of the East Service Road, again, along the proposed interceptor route. Four tests were placed on the eastern area near the intersection of Huguenot Avenue and Arthur Kill Road; the fifth was located parallel



(based on a map prepared for the NYC Dept. of City Planning--modified detail)

drawn by J. Geismar

N

0 200 ft..

- test hole location
- light/telephone pole, numbered when possible
- manhole

NYC easement area, not fenced

D alternate pump station site D/#7 (to scale)

area of surface collection

Fig. 20. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Test Hole Locations, Sections B and C

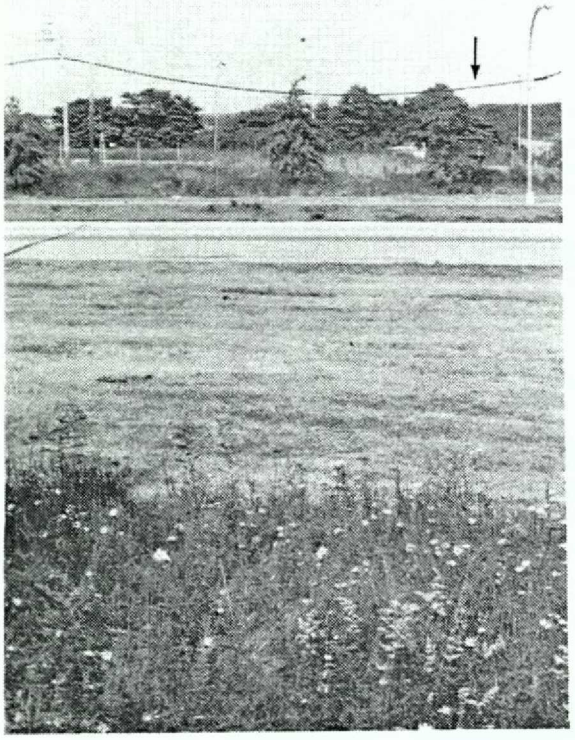


Plate 18. General location of test Section B, the proposed interceptor line, looking north from the East Service Road to the West Shore Expressway and the West Service Road. Note mound of landfill in background (arrow).

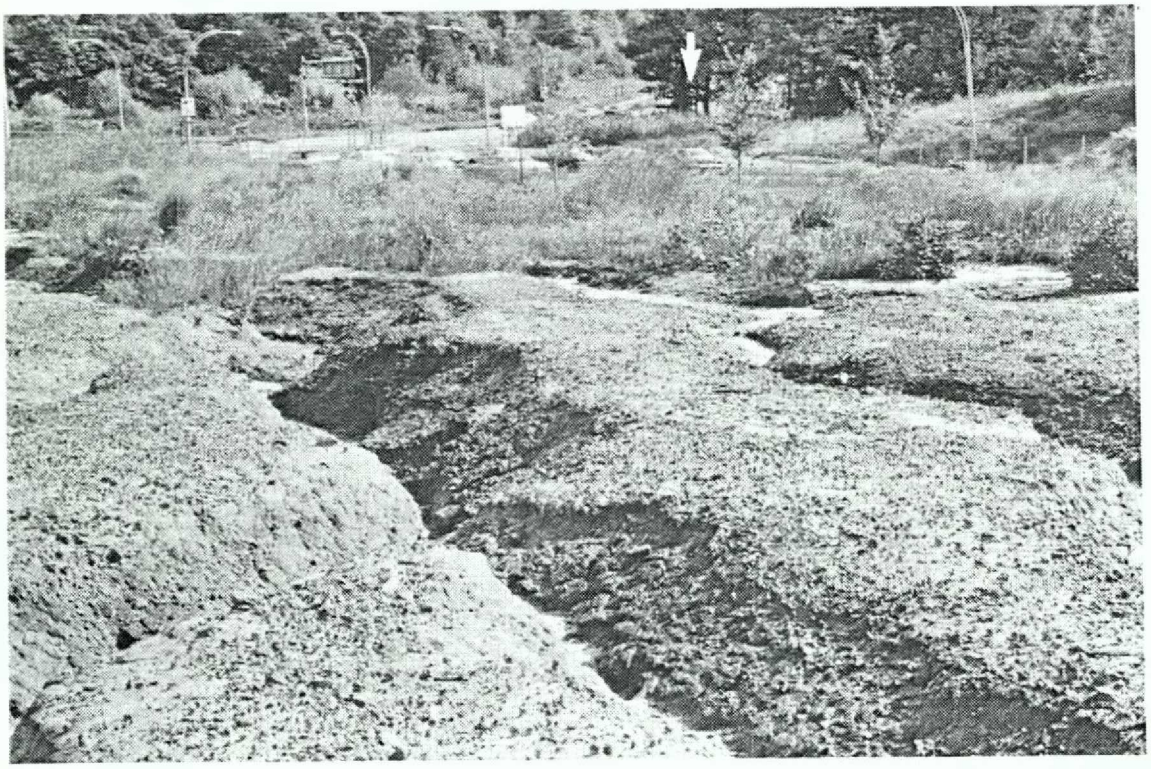


Plate 19. Looking east across cut and filled area between the West Shore Expressway and the East Service Road (on right). Test Section C can be seen in the right background. Alternate pump station site #7 is located in the middle of the photo (arrow) and site #8 is across Arthur Kill Road in the upper left corner.

to and south of B4 (Fig. 20). The area between C4 and C5 was not tested due to the obvious and severe land cut and fill modification which occurred during roadway construction (see Plate 24).

Test hole C1 was located in highly disturbed soil and contained 20th-century debris: a plastic garbage bag, brick and concrete fragments, black roofing material, burned wood, and clear bottle glass (Appendix C).

Test hole C2 was placed at the edge of a reedy area and a cut-away embankment north of proposed Pump Station Site #7. Again, the soil contained poorly sorted rocks and recent 20th-century cultural material to a depth of 30 in. (Appendix C).

Test hole C3 was terminated at 36 in. after penetrating five strata. Clear glass was recovered in Stratum I and oyster shells in Stratum II. The excavators interpreted all strata as fill.

Test hole C4 was dug on the slope of the road cut. Water was encountered at 30 in. in a dense clay matrix; modern bottle glass was recovered in Stratum I (0 - 2 in.) and the upper level of Stratum II (2 - 18 in.) (Appendix C). Again, this strata was interpreted as fill.

Test hole C5 contained a pearlware and a whiteware fragment, both with blue transfer prints, and two glass fragments; one of them at 27 in. in a moist clay matrix (Appendix C), indicated a fill context to the excavators.

Section D (Alternate Pump Station #7; Fig. 21, Plates 7, 21, and 24)

The area abounds in reeds (Plate 20), poison ivy, 15 ft. high blackberry bushes, and many trees, few of which exceed 20 in. in diameter. Although two test holes (D1 and D2) were dug at the north and west corners of the proposed pump station building, it was impossible to place a test hole at its center due to the dense brambles. Three additional holes (D3, D4, and D5) were dug in the indirect impact zone.

Triangulation was used to position the test holes, but the dense vegetation precluded the possibility of the accurate placement of D1. Test hole D1 was excavated in a reedy area through disturbed soil which contained bricks, shells, macadam, plastic, and green bottle glass (Appendix C). At 23 in., a construction-type sand and gravel were encountered. At 24 in., a smooth-surfaced concrete slab was revealed, perhaps part of a drainage system associated with the nearby roadway system.

Test hole D2 was located on a graded slope at the edge of the tree line in what was found to be disturbed soil containing bottle glass, shells, brick, and a heavy concentration of poorly sorted rocks (Appendix C).

Test hole D3 was placed in a low-lying area that showed signs of frequent flooding (Plate 20). The soil was predominately clay and water was reached at 24 in. No artifacts were found.

Excavation at test hole D4 revealed three ceramic fragments: a pearlware sherd with a blue transfer print on both sides, a second pearlware fragment with blue transfer on one side, and a blue shell-edged pearlware rim sherd (Appendix C). These were recovered in a rock free, fine grained silt in Stratum II (1 - 6 in.).

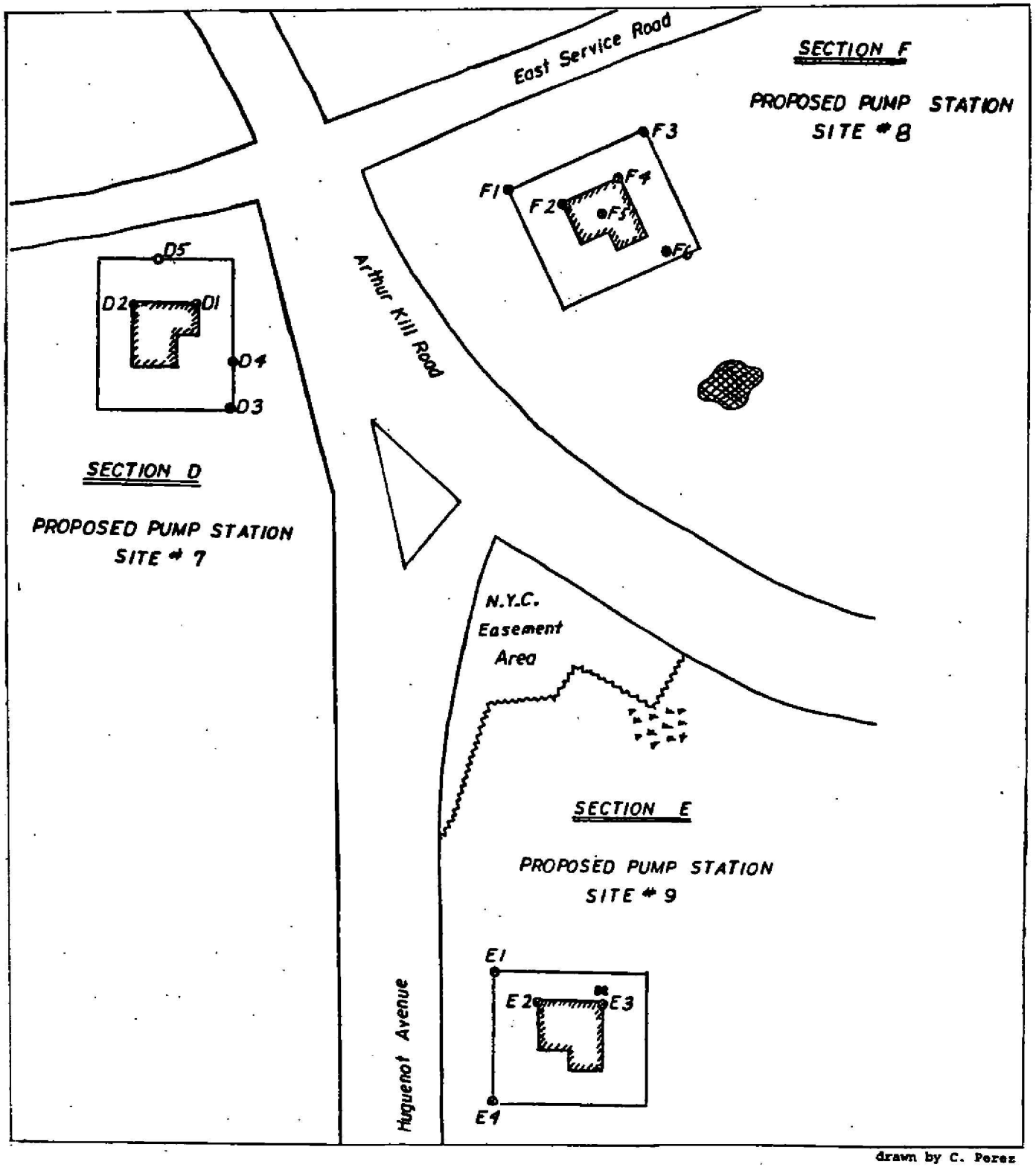


Fig. 21. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Alternate Pump Station Sites (D/#7, E/#9, F/#8), Test Locations

Plate 20. General location of Test hole D3 at alternate pump station site #7. Note reeds in this wet area, part of Section D.

Plate 21. Section E at alternate pump station site #9. Crew member Sandra Norvell (arrow) screening material from Test hole E2. Note dense ground cover that included catrbriar and poison ivy.

Plate 22. Screening material from Test hole F2 at alternate pump station site #8 located near an altered stream just beyond the City easement area (see Fig. 21). Crew members Eileen Craig and Sandra Norvell are seen screening.

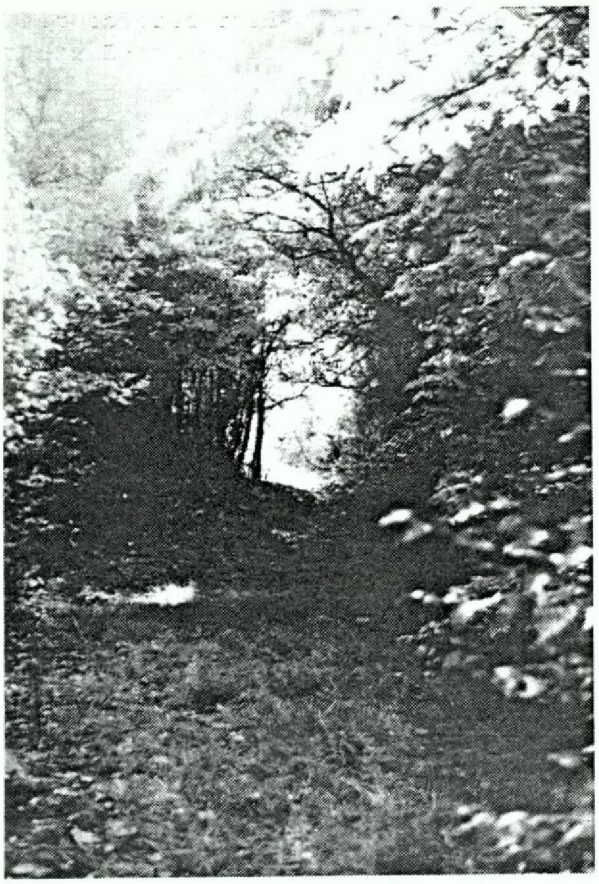


Plate 23. Grass and dirt covered roadway running south from the East Service Road up slope through and beyond Section F (alternate pump station site #8).

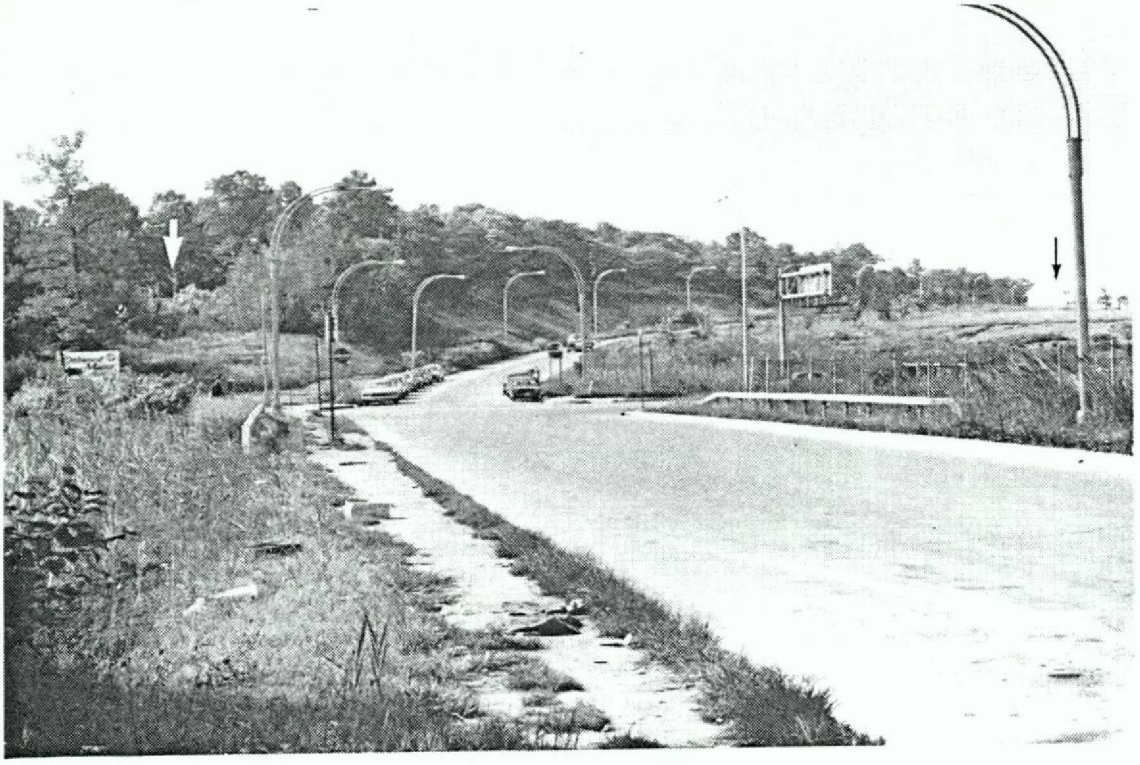


Plate 24. View along East Service Road from alternate pump station site #8. Site #7 (white arrow) is on left, beyond Arthur Kill Road intersection, with Section C running near light poles on the left, again beyond the intersection. Note the obvious cutting along Section C, the result of grading for the West Shore Expressway and the East Service Road. The general location of the interceptor line (Section B) is indicated by a black arrow.

A fifth planned test hole was not dug since it was located near the C line an area which had been determined to consist of fill (Fig. 20).

Section E (Alternate Pump Station Site #9; Fig. 20, Plates 7 and 21)

Triangulation at alternate pump station site #9 was difficult due to a dense growth of brambles (Plate 20). Therefore, triangulation for test holes E1, E2, and E3 was less accurate than desired and test hole locations are approximate. No triangulation for test hole E4 was attempted. Dense vegetation prohibited the placement of test hole E5 in the center of the building site.

Test hole E1 was located on level ground surrounded by a bramble. Dug to a depth of 36 in. through silt, poorly sorted rocks, and clay, the test hole was devoid of any cultural material (Appendix C).

In test hole E2, located on a slope covered with brambles, poison ivy, and trees (Plate 21), two non-diagnostic earthenware sherds and a glass fragment were unearthed at a depth of 6 in. The soil was undisturbed, dry silt which was very compact from 29 to 36 in. (Appendix C).

Undisturbed sterile rocky soil was excavated in test hole E3, an area densely covered by brambles and mature trees on a slope which fell to the north. A large wet spot was clearly noticeable farther down the slope in a area which normally would have provided excellent drainage. The wet area may be a surface spring or it may indicate that the soil contains a layer of clay that prevents proper drainage. Several streams converge north of the wet spot in a marshy area.

Test hole E4 was situated on a plateau in a heavily wooded area covered with brambles. Artifacts were recovered from undisturbed silt at depths between 5 to 12 in. These include ceramic sherds, brown and clear glass, amethyst milk (?) bottle fragments with "..ON, ...TATEN" in embossed letters, charcoal, and possible shell fragments (Appendix C). The soil was culturally sterile between 12 and 26 in.

The site of alternate pump station #9 is situated between two foundations documented on a 1913 topographic map (see Fig. 3), 525 ft. south of Arthur Kill Road as it is currently plotted.

Section F (Alternate Pump Station #8; Fig. 21, Plates 8, 22 - 24)

Alternate pump station site #8 is located on land owned by the J. Morgan family in 1874 (see Fig. 16). Currently, the property is bounded by Arthur Kill Road and the East Service Road. The land subject to impact by proposed construction ranges from a low lying area populated by willow trees and reeds (Plate 22) to a heavily wooded slope densely covered with brambles and poison ivy. An unpaved road, approximately 9 ft. wide, rises southward up the slope from the East Service Road. For the sake of clarity, it is referred to here as the Morgan Road. Since it is relatively vegetation free, it may be currently, if unofficially, in use.

Accurate triangulation was possible in the low-lying area where test holes F1 and F2 were located but was less accurate for F3, F4, and F5. No triangulation was attempted for F6.

Test hole F1 was dug in disturbed soil composed of 30% rocks in Stratum II (3 to 16 in.) and 80% rocks in Stratum II (16 to 24 in.). Decayed reeds and charcoal were encountered from 24 to 29 in. in

gray sand devoid of rocks. The hole was terminated at 36 in. in a gray-white sand; no artifacts were recovered (Appendix C).

Test hole F2 was positioned in the flood plain of the low-lying area approximately 15 ft. from a stream. One sherd of non-diagnostic earthenware and two bottle glass fragments were recovered from Stratum I at 0 - 10 in. Stratum II was a fill level with many poorly sorted rocks. A 2-in. black organic lens (Stratum III) with clearly visible burnt reeds overlaid 14 in. of densely packed gray-white sand (Appendix C).

Test holes F3 through F6 were placed on the slope to the east. F3, located east of Morgan Road in a dense bramble, contained a kaolin pipe stem fragment and an undecorated whiteware sherd in Stratum III at a depth of 5 in. Additional and undiagnostic earthenware sherds were recovered at 15 in. (Appendix C).

Test hole F4, located west of the edge of Morgan Road in an undisturbed area, proved to be culturally sterile (Appendix C).

Test hole F5 was placed mid-way between holes F2 and F4 at the approximate center of proposed pump station #8. It was located on a slope that dropped to the low-lying reedy area. A 5-ft. square pre-cast concrete container of unknown origin or use had been dumped at the edge of the reeds.

The soil in test hole F5 again was undisturbed and culturally sterile. A soil sample of a yellow colored silt which had not been previously encountered was taken from Stratum II (8 to 36 in.).

The all-too-familiar brambles were present at the site of test hole F6 located 75 ft. south of F4, east of Morgan Road. A carbon lens was revealed in Stratum II (6 1/2 to 7 1/2 in.), the probable result of a localized fire. A soil sample of the typical red-brown silt prevalent throughout the site was taken from Statum III (18 - 24 in.).

Section F - Surface Collection

A site reconnaissance was conducted over an area located 125 ft. south of test hole F6 at the southern extreme of Morgan Road. This location, at the crest of the slope, appears to have been a house site (see Figs. 2 and 3) although no foundation was visible. The area is outside the direct and indirect impact zones of alternate pump station #8 (Fig. 21).

A grab sample included sherds of slipped redware, a glazed redware rim, graniteware, a porcelain colander/steaming vessel (?), whiteware, and anthracite. An old motorcycle had also been discarded at the site.

Alternate Pump Station Site #6 (see Fig. 2; Plate 6)

This section, in a highly disturbed area between Arthur Kill Road and the West Shore Expressway, was not tested. However, it is apparent that road construction, which included cutting and filling, would have destroyed any surface or subsurface cultural deposits.

Undisturbed Areas

While most of the proposed sewer project lies within highly disturbed areas, a portion of the tested area proved to be undisturbed by previous construction or demolition activities.

A total of forty-three (43) test holes were dug, ten (10) of them (23.25%) in undisturbed soil. Among these were shovel test holes A20 through A22 (Section A) located on the former Cropsey property. In Section E (alternate pump station site #9), shovel test holes E2 through E4 were located on a wooded slope undisturbed by modern intrusions. Shovel test holes F3 through F6 at alternate pump station site #8 (Section F) were dug on a slope that proved to be a small portion of undisturbed land above an altered stream and its floodplain. In a larger context, this entire pump station site is adjacent to three major roadways: the West Shore Expressway, its East Service Road, and Arthur Kill Road.

Laboratory Analysis

Artifacts recovered from the proposed Mayflower Avenue Pump Station and Force Main Project were washed, analyzed, classified and catalogued according to standard archaeological laboratory procedures. This included numbering diagnostics such as ceramic and glass fragments.

No Native American artifacts were recovered and the few European-American artifacts retrieved were only incidental finds. Included were artifacts classifiable as architectural, domestic, and mechanical/heating.

Architectural artifacts consisted of square-cut and wire nails, window glass, red brick fragments, mortar, a metal latch, an iron beam, iron bolts, linoleum, and black roofing paper (most of this modern material was recovered from Sections A, B, and C).

Domestic artifacts included a wine (?) glass fragment, a portion of a glass tumbler, a stoneware banded bowl fragment, clear and colored bottle glass, whiteware sherds, pearlware sherds with blue transfer prints, a blue shell-edged pearlware sherd, a kaolin pipe stem fragment, and amethyst milk (?) bottle sherds.

An iron valve handle and coal were classified as mechanical/heating components.

Appendix A. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Comparison of 1913 and Current Elevations of Nine Locations in the Project Area

Location	1913 Elevation*	Current Elevation	Remarks
1. Center of Carlyle Green off Arthur Kill Road	+44.0	+44.0[1]	elevation appears constant, but fill
2. stretch from Carlyle Green to eastern limit of the force main route on Arthur Kill Road	+44.0-50.0	+44.0-50.0[2]	elevation appears constant, but fill
3. area of Huguenot Ave. and Arthur Kill Road intersection	+ 6.0-10.0	+11.0[1]	apparently grading occurred here
4. point 700 ft. west of Huguenot Ave. on Arthur Kill Road (south)	+12.0-14.0	+11.5[1]	minor change
5. alternate pump station site #6	+30.0-40.0	+30.0[3](av.)	cut and fill
6. alternate pump station site #7	+ 6.0-20.0	+10.0[3](av.)	reflects topographic variation of site
7. alternate pump station site #8	+10.0-16.0	+ 6.6[3](av.)	reflects topographic variation of site
8. alternate pump station site #9	+34.0	+15.0[3](av.)	reflects topographic variation of site
9. interceptor route between West Shore Expressway and East Service Road	+52.0	+37.0-39.5[2]	exact location undetermined; this is area where a hill was graded in the 1970s during construction of the West Shore Expressway and East Service Road

* 1913 Borough of Richmond Topographic Map, Sheet 67. Topographic Bureau, Borough of Staten Island

[1] Working map of the force main route, 1970s. O'Brien & Gere, engineers

[2] Final map. Proposal of street distances, angles, elevations, etc. (unofficial). Drawn sometime after 1975 (Mustacuilo 1985; personal communication). Topographic Bureau, Borough of Staten Island

[3] Preliminary pump station plans, 1984. O'Brien & Gere, Engineers

Appendix B. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Discription of Vegetation (from Jacobson 1980a: 11-]2)

1. Wetlands

There are three categories of wetlands in South Richmond: non-tidal, tidal, and formerly connected tidal wetlands. Common species in these non-tidal wetlands are broadleaf cattail, water willow, and marsh mallow.

The tidal wetlands represent those areas designated by NYSDEC as intertidal, high marsh, and formerly connected tidal wetlands.

The intertidal marshes are situated between the limits of the daily high and low tides. Smooth cordgrass is the predominant species in this marsh. High marsh or salt meadow areas characteristically are flooded about one-third of the month and during storm tides. Salt hay, spike grass, smooth cordgrass, and groundselbush are the representative vegetation of this marsh type. The formerly connected tidal wetlands are areas which were originally intertidal or high marsh, but now have the tidal flow completely or partially cut off. The vegetation of many of these areas has been invaded by stands of common reed (Pl. 1).

2. Forest

Distribution of the forested areas is random and does not appear to follow any physiographic, cultural, or political patterns, with the exception of its absence from developed communities.

Forests in the southern part of Staten Island vary from intermittent scrub and scrub-forest, to monospecific and mixed stands of deciduous forest. The scrub and scrub-forest areas are highly variable as to density, size, and composition. Generally they are composed of thickets which persist from previous landscaping.

The undergrowth in the scrub-forest is composed primarily of briers, with Japanese honeysuckle, poison ivy, and bittersweet as common associates. The most common trees in the scrub-forests are gray birch, oaks, willows, and American hackberry. The diameter at breast height (dbh) of these trees rarely exceeds 15 centimeters (cm) (6 in.) and generally ranges from 50 to 8 cm (2 to 3 in.).

Other forest types observed during field reconnaissance (1/19/78) were mixed stands of various deciduous trees and small pure stands of sweetgum. Common tree species in the mixed stands are sweetgum, oaks, maples, and American beech. The undergrowth in these forests varies from thick, impassable mixtures of vines and shrubs to open areas with low herbaceous growth.

3. Suburban Type

The suburban vegetation type is characteristic of low and medium density residential areas with associated lawns and landscaped vegetation. Oldfield vegetation, golf courses, cemeteries, institutional grounds, and intimately associated small forests and barren areas also are included in this category. Vegetation in this type represents a mixture of native plants and exotic species typical of landscaped areas.

4. Urban Type

The urban vegetation type is characteristic of industrial areas, high density residential areas, highways, and the surrounding grounds and rights-of-way which contain little or no vegetation.

5. Landfill Type

The landfill type represents active landfill operations devoid of vegetation and other inactive landfill areas which have revegetated with common reed, other herbs, and shrubs.

Appendix C. MAYFLOWER AVE. PUMP STATION & FORCE MAIN PROJECT: Summary of Field Sheets* -- October, 1984

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
A1					(undisturbed)
	I	0-2	medium red-brown sandy loam	---	rocks (1/4-1/2 in. diameter)
	II	2-6	red silty sand	---	---
	III	6-10	light yellowish sand	---	---
	IV - V	10-36	alternating yellow and reddish-brown silty sand	---	---
A2					(disturbed)
	I	0-1	brown sandy loam	---	roots
	II	1-9	red sandy silt, densly packed	---	poorly-sorted rocks
	III	9-10	gray clay, fine texture	---	no rocks
	IV	10-11	red sandy silt	---	tree roots; no rocks
	V	11-12	dark brown organic soil, fine texture	---	rocks
	VI	12-26	mottled sand (tan, brown, yellow red), densely packed, fine texture	---	---
	VII	26-36	light tan sand, coarse texture	---	---
A3					(disturbed)
	I	0-1	reddish-brown loam	---	---
	II	1-17	reddish slightly clayey silt	1 frag brown bottle glass 1 pc. black roofing paper	---
	III	17-25	yellow sand	---	---
	IV	25-30	alternating red and yellow sand	---	---
A5					(disturbed)
	I	0-1	dark brown sandy loam	---	
	II	1-8	red sandy clay, densely packed	---	a few well-sorted rocks
	III	8-13	red clay, mottled with tan, yellow, brown	---	no rocks
	IV	13-22	red sandy clay, densely packed	---	poorly-sorted rocks
	V	22-26	mottled sand (tan, yellow, light brown, brown, red)	---	no rocks
	VI	26-36	red clayey sand	---	---

*see Figs. 19 - 21 - for locations of test holes and surface collections

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
A7					(disturbed)
	I	0-1	dark brown loam	---	roots
	II	1-36	reddish-brown clayey silt; densely packed	---	moist
A9					(disturbed)
	I	0-2	dark brown loam	---	---
	II	2-20	red-brown sandy silt with lenses of sand and concrete mortar, densely packed	1 square-cut nail, brown, clear and green bottle glass, styrofoam cup fragments, concrete mortar	---
A11					(disturbed)
	I	0-1	dark brown loam	---	rocks
	II	1-10 1/2	medium brown silt mottled with gray clay	red brick fragments, 1 pc. clear drinking vessel glass fragment, 3 1/2 x 7 1/2 in. iron valve handle, coal, mica	---
	III	10 1/2-11	black lens	---	---
	IV	11-15 1/2	reddish-brown silt	---	---
	V	15 1/2-21 1/2	gray clayey silt, very dense	---	---
	VI	21 1/2-30	red-brown clayey silt mottled with gray clay, very dense	---	---
A12					(disturbed)
	I	0-1	medium brown loam	---	roots
	II	1-11	reddish-brown silt	5-inch square-head bolt, cellophane	rocks (1/2-1 in. diameter)
	III	11-21	red silty clay mottled with gray clay	---	---
A13					(disturbed)
	I	0-1/2	dark brown loam	---	80% gravel matrix
	II	1/2-5	reddish-brown silt	1 frag. brown bottle glass	soil with 90% mortar and gravel (gravel 80% of total mix)
	III	5-12+	reddish-brown silt	concrete mortar	---

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
A14					(disturbed, fill)
	I	0-1	dark brown loam	1 pc. bottle glass	roots
	II	1-10	red clayey silt mottled with gray clay	1 pc. black plastic	few rocks
	III	10-22	red sandy silt, coarse texture	---	many poorly-sorted rocks
A20					(Cropsey foundation, rose bushes, twin spruce trees, undisturbed)
	I	0-1	dark brown humus	---	---
	II	1-6	red-brown silt, densely packed, dry	red brick fragments, corroded nails, plate glass fragments, clamshells, 1 frag. whitewre with blue transfer print	few rocks
	III	6-36	red sandy silt, densely packed, fine texture, dry	---	few rocks
A21					(Cropsey foundation, undisturbed)
	I	0-3	medium brown humus	1 frag. green bottle glass	---
	II	3-36	reddish-brown sandy silt, dry	---	no rocks
A22					(Cropsey foundation: rose bushes, privet, sassafras trees, undisturbed)
	I	0-4	dark brown humus	2 frags. redware (flower pot) 1 pc. clear drinking vessel, 1 pc. green bottle glass, 5 pcs. coal	---
	II	4-30	red-brown silt, fine texture, dry, densely packed	1 pc. charcoal at 9 1/2 in.	many roots, few rocks
A23					(partially disturbed, cut & fill)
	I	0-5	medium brown loam	beer can	roots
	II	5-11	red-brown clayey silt, mottled with gray clay	---	poorly-sorted rocks (1/2 - 3 in. diameters)
	III	11-12	dark brown humus	---	natural ground level
	IV	12-33	orange/yellowish-brown silt	---	---

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
A24					(disturbed, cut & fill)
	I	0-2	medium brown loam	---	---
	II	2-15	reddish-brown clayey silt	brown bottle glass (5-6 inch depth), metal latch	poorly-sorted rocks
	III	15-17	yellow-red silt	---	---
A25					(disturbed, cut & fill)
	I	0-2	dark brown humus	---	moist
	II	2-18	red clay, densely packed	---	many poorly-sorted rocks (1-6 in. diameter)
A26					(partially disturbed, cut & fill)
	I	0-4	medium brown loam	aluminum foil candy wrapper	poorly-sorted rocks (1/4-3 in.)
	II	4-12	red-brown clayey silt	1 pc. linoleum, 1 frag. clear drinking vessel glass	moist, poorly-sorted rocks (1/4-4 in. diameters)
	III	12-20	red-brown silt	---	natural ground level, few rocks
A27					(disturbed, cut & fill)
	I	0-1	dark brown loam	---	no rocks
	II	1-6	medium brown clayey silt	1 pc. linoleum, brown bottle glass, U-shaped iron beam (1 1/2 x 2 1/2 x 18 in.) with 2 rusted bolts	moist, poorly-sorted rocks (2-5 in. diameters)
	III	6-12	red clay mottled with gray and yellow clay, densely packed	---	no rocks
	IV	12-36	red clay, densely packed	---	many well-sorted rocks (4 in. diameters)
A28					(disturbed, cut & fill)
	I	0-3	dark brown humus	---	moist, no rocks
	II	3-12	medium brown silty clay	---	moist, no rocks
	III	12-22	red clay, densely packed	---	many poorly-sorted rock (2-6 in. diameters)

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
A30					(disturbed, cut & fill)
	I	0-1/2	dark brown humus	brown bottle glass	poorly-sorted rocks
	II	1/2-3	gray-brown silt	brown bottle glass, burned wood	moist, poorly-sorted rocks
	III	3-8 1/2	red-brown silt, very dense	burned wood, bricks	dry, poorly-sorted rocks
	IV	8 1/2-14	yellowish-brown silt, very dense	burned bricks, mortar, linoleum frags.	dry, poorly-sorted rocks
	V	14-20	red-brown silt, very dense	brick, wire	dry, poorly-sorted rocks

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
B1					(disturbed)
	I	0-5	dark brown sandy loam	---	dry
	II	5-8	red sand	---	no rocks
	III	8-12	white sand mottled with red sand	---	dry
	IV	12-19	red clay mottled with brown clay, densely packed	---	poorly-sorted rocks (2-5 in. diameters)
	V	19-29	red clay, densely packed	---	few well-sorted rocks (2 in. diameter)
	VI	29-36	white sand, fine texture	---	dry
B2					(disturbed, cut & fill)
	I	0-1/4	dark brown loam	---	---
	II	1/4-8	medium brown silt	clamshell, aluminum foil candy wrapper, brown and green bottle glass, tan glazed stoneware bowl (?) rim with pink stripe, clear glass tumbler base, green plastic fragment, wire nail	dry
	III	8-38	gray-white sand	---	dry
B3					(disturbed, cut & fill)
	I	0-4	medium brown loam	---	roots
	II	4-20	reddish-brown clay	---	many poorly-sorted rocks (1/2 - 5 in. diameters)
B4					(disturbed, cut & fill)
	I	0-8	dark brown sandy loam	---	few well-sorted rocks (1/2 - 1 in. diameters)
	II	8-20	red clay, very dense	mortar fragments	poorly-sorted rocks (1/2 - 6 in. diameters)

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
C1					(disturbed, cut & fill)
	I	0-5	medium brown sandy silt	plastic garbage bag, brick fragments, clear bottle glass	moist, poorly-sorted rocks
	II	5-22	light brown silt, mottled with gray and red clay and pockets of white and orange sand	paper label, concrete chunks, black roofing paper, clear glass, burned wood	many poorly-sorted rocks (1/4 - 6 in. diameters)
C2					(disturbed, cut & fill)
	I	0-2	medium brown loam	---	roots
	II	2-34	medium brown sandy silt mottled with gray and red clay	clear glass, plastic, 1 pc. charcoal	many poorly-sorted rock (1/4 - 5 in. diameters)
C3					(disturbed, cut & fill)
	I	0-6	dark brown loam	clear glass	no rocks
	II	6-11	light brown/red silty clay mottled with red and gray clay	clam and oyster shells	rocks (1-2 in. diameter)
	III	11-19	yellow sand, fine texture	---	very wet at lower level
	IV	19-24	dark brown loam	---	natural level, no rocks
	V	24-26	yellow sand	---	---
	VI	26-36	gray-yellow mottled clay, densely packed	---	---
C4					(disturbed, cut & fill)
	I	0-2	dark brown loam	bottle glass	moist
	II	2-18	red sandy clay mottled with yellow sand, densely packed	bottle glass	moist, many poorly-sorted rocks
	III	18-26	red sandy clay, densely packed	---	damp, no rocks
	IV	26-30	red sandy clay, densely packed	---	no rocks
	V	30	water table	---	---
C5					(disturbed, cut & fill)
	I	0-6	reddish-brown loam	---	roots
	II	6-16	reddish-brown clay	1 frag. pearlware: body fragment with blue transfer print (both sides), c. 1780-1830, 1 frag. whiteware: rim with blue speckles, 1 frag. milk glass, green glass	moist, few poorly-sorted rocks (1/4-2 in. diameters)
	III	16-36	red silty clay	---	---

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
D1					(LaForge Complex, poison ivy, reeds, disturbed)
	I	0-1/8	dark brown humus	---	---
	II	1/8-23	medium brown silt mottled with gray and red clay	bricks, macadam, green bottle glass, shells (?)	many poorly-sorted rocks (1/4 - 3 in. diameters)
	III	23-24	construction-type sand with gravel	---	---
	IV	24	poured concrete-smooth surface slab	concrete slab	---
D2					(LaForge Complex, disturbed)
	I	0-1	dark brown humus	---	damp
	II	1-15	medium brown sandy silt	bottle glass, brick, shells (?)	many poorly-sorted rocks (1/4 - 2 in. diameter)
	III	15-20	red/yellow/orange/brown mottled clay	---	no rocks
D3					(LaForge Complex, disturbed floodplain)
	I	0-7	medium brown humus	---	roots
	II	7-8	white clay mottled with orange clay	---	moist
	III	8-12	orange clayey silt	plastic sheeting	rocks (1/2 - 1 1/2 in. diameters)
	IV	12-21	gray clay mottled with orange	---	---
	V	21-24	orange silty clay	---	poorly-sorted rocks (1 - 8 in. diameters)
	VI	24	water table	---	---

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
D4					(LaForge Complex site, disturbed)
	I	0-1	dark brown humus	---	roots
	II	1-6	medium brown sandy silt	1 frag. whiteware with brown transfer print, C. 1830-1850; 1 frag. pearlware or whiteware rim/body with blue transfer print, c. 1825-1830/50; 1 frag. pearlware plate (?) rim with blue shell-edge decoration, c. 1780-1830 (3 in. depth); red brick fragment	roots, no rocks
	III	6-36	red clay mottled with gray, densely packed	---	---

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
E1					(Foster Property: blueberry brambles, poison ivy, undisturbed)
	I	0-3	dark brown humus	---	roots
	II	3-12	red-brown silt, very dense	---	poorly-sorted rocks
	III	12-21	red clayey silt	---	rocks
	IV	21-36	red clay mottled with gray clay	---	---
E2					(Foster Property: blueberry brambles, poison ivy, undisturbed)
	I	0-3	black humus	---	no rocks
	II	3-29	red-brown silt	2 earthenware body frags with blue speckles; 1 frag. clear glass	poorly-sorted rocks (1/4 - 2 in. diameters)
	III	29-36	light red-brown silt	---	poorly sorted rocks (1 - 3 in. diameters)
E3					(Foster Property, undisturbed)
	I	0-4	dark brown humus	---	poorly-sorted rocks (1/4 - 4 in. diameters)
	II	4-23	red-brown silt	---	compact soil with 6 in. diameter rocks (unable to remove)
	III	23-30	light red-brown silt	---	---

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
E4					(Foster Property, undisturbed)
	I	0-2	medium brown humus	styrofoam	sassafras trees/roots
	II	2-36	red sandy silt, densely packed	1 small frag. unglazed earthenware (5 in. depth); brown bottle glass & 2 amythest bottle sherds with embossed letters: "...ON, [.ST] ATEN I ...N.Y." (10 - 12 in. depth), c. 1880 - 1916; shell fragment (?) (10 - 12 in depth); glazed whiteware or pearlware frag. at 10 in.; 3 unidentifiable iron fragments (10 - 12 in. depth); charcoal (10 in. depth)	poorly-sorted rocks (1-3 in. diameters)

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
F1					(Morgan Property, disburbed)
	I	0-3	medium brown humus	---	roots
	II	3-16	red sandy silt	---	30% rocks (1/2 - 8 in. diameter)
	III	16-24	gray sandy silt	---	80% rocks (1/2 - 3 in. diameter)
	IV	24-29	gray sandy silt with charcoal and decayed reeds	---	no rocks
	V	29-36	gray-white sand, slightly mottled	---	---
F2					(Morgan Property located within 15 feet of a stream, disturbed area)
	I	0-10	red sandy silt	1 frag. non-diagnostic earthenware, 2 frags. bottle glass	damp soil, well-sorted rocks including chert
	II	10-20	red-brown silty clay, densely packed	---	damp soil, many poorly-sorted rocks
	III	20-22	black organic soil with burned rushes	---	signs of fire
	IV	22-36	gray clayey sand	---	damp soil
F3					(Morgan Property, undisturbed)
	I	0-1/2	dark brown humus	---	very few rocks
	II	1/2-4 1/2	medium brownsilt, fine texture	---	---
	III	4 1/2-30 1/2	red-brown silt, fine texture	kaolin pipe stem fragment (5 in. depth), 1 frag. undecorated whiteware (5 in. depth), 1 earthenware fragment	---
	IV	20 1/2-26	red-brown silt mottled with gray clay	---	---
	V	26-36	red-brown silt mottled with dark red clay	---	---

APPENDIX C. (Continued)

SECTION/ TEST NO.	STRATUM	DEPTH (In Inches)	SOIL DESCRIPTION	ARTIFACTS	REMARKS
F4					(Morgan Property, undisturbed)
	I	0-1/2	dark brown humus	---	roots
	II	1/2-18	red silt, fine texture, densely packed	---	damp soil, no rocks
	III	18-24	red clay, densely packed	---	sandstone rocks (1/4 - 2 in. diameter)
	IV	24-28	red clay mottled with sand	---	few poorly-sorted rocks
	V	28-36	mottled sand (white, yellow, orange, red & brown)	---	---
F5					(Morgan Property, undisturbed)
	I	0-8	medium brown humus	---	roots
	II	8-36	yellow silt, slightly mottled with gray and red silt	---	roots to 20 in., 5% red red sandstone rocks. Soil sample taken.
F6					(Morgan Property, undisturbed)
	I	0-6 1/2	medium brown silt, fine texture	---	roots
	II	6 1/2-7 1/2	carbon lens	---	signs of fire, roots
	III	7 1/2-30	light red-brown silt, very densely packed	---	dry soil, few small rocks (1-3 in. diameter); 1 pc. natural chert at 19 in. Soil sample taken.

APPENDIX C. (Continued)

SECTION	LOCATION	ARTIFACTS
B: Surface Collection	Formerly, John More Property between West Shore Expressway and Veterans East Service Road, immediately north of the service road — disturbed	1 earthenware bowl base imprinted with "HALL 3528, MADE IN U.S.A.", 1 matching body/rim sherd; 1 decorated whiteware saucer frag imprinted with "SCAMMELL'S TRENTON CHINA, Made in America"; 1 platter (?) base imprinted with "...P.C.O., [Syr]acuse [C]hina, ...w" decorated with a blue transfer print house and tree motif, post 1946; 1 porcelain saucer rim frag. with a geometric deign; 1 earthenware cup rim decorated with a handpainted blue stencil floral motif, 19th c. (?).
F: Surface Collection	J. Morgan Property at southern extreme of Morgan Road, 125 feet south of test hole F6	slipped redware sherds; 1 glazed redware rim; graniteware; 1 porcelain colander/steaming vessel (?) sherd; whiteware fragments; anthracite; an old mortorcycle abandoned on property.

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Acknowledgments

There are many people and organizations I would like to thank for the cooperation and support they provided throughout this project. This includes O'Brien & Gere, the project engineers, particularly Andrew Warren, Robert Trotta, Sr., and Paul B. Brzozowski, and those at the City of New York, Department of Environmental Protection, Bureau of Water Pollution Control, who are associated with the project, especially Nicholas Ilijic, Martin Gelfand, William W. Lee, and Stanley Norgalis. In addition, I wish to thank Arnold Pickman and Albert Anderson for providing archaeological information relevant to the evaluation, and Rhodes Fairbridge, Walter Newman, and Charles Baskerville for sharing their geological expertise. Also, Eloise Beil and Christine Hogan of the Staten Island Institute of Arts and Sciences for making archival material available as well as Carl Hempel and Al Mustacuiolo of the Topographic Bureau, Borough of Staten Island, and Carlton Beil, past curator of the Staten Island Institute of Arts and Sciences, for their assistance. And, of course, Claire Perez, the project's field director, and Eileen Craig and Sandra Norvell, the crew members, who were not only tenacious but, fortunately, immune to poison ivy. I also wish to thank those at Materials Investigation, Inc., who were involved with the project, particularly Stephen Oberon, chief consulting archaeologist, and Wanda Hawkins for their support, and Jennie Mason for her part in report typing and production.