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PHASE IA LITERATURE REVIEW AND ARCHEOLOGICAL SENSITIVITY ASSESSMENT

CROSS HARBOR FREIGHT MOVEMENT PROJECT PORT IVORY YARD, ARLINGTON YARD, ELEVEN RAILROAD CROSSINGS AND PROPOSED TUNNEL STATEN ISLAND, RICHMOND COUNTY, NEW YORK

HAA #2390

(+/- 5411 y (R) Ay. 5410 y (R))

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Abstract

As part of the Cross Harbor Freight Movement Project, Hartgen Archeological Associates, Inc. (HAA, Inc.) was retained by Allee, King Rosing and Flemming, Inc. (AKRF) to conduct a Phase IA archeological sensitivity assessment for the Staten Island portion of the project. The Phase IA was prepared as part of the preparation of an Environmental Impact Statement for the proposed improvements to rail freight operations across Upper New York Harbor between New Jersey and New York. The New York City Economic Development Corporation (NYCEDC) is the project sponsor and the Federal Highway Administration and the Federal Railroad Administration are co-lead agencies.

The site files of the New York State Museum and the New York State Office of Parks, Recreation, and Historic Preservation were examined for reported resources in the vicinity of the study areas. Documentary research was carried out at the New York State Library, the Manuscripts and Special Collections of the New York State Library, the New York State Archives, and the St. George Library on Staten Island.

Based on the project location and characteristics, as well as reports of several archeological sites in the vicinity, portions of the Staten Island Cross Harbor Freight Movement project area are considered highly sensitive to the presence of precontact and historic archeological remains. The reported sites in the vicinity include precontact sites ranging in date from the Paleo-Indian to the Contact period. The project area is in the vicinity of areas settled by Europeans as early as the late 17th century and is also in the vicinity of Revolutionary encampments and skirmishes.

The northern portion of Staten Island has undergone significant development during the past century. Most of the development is related to industrial use and rail transportation. It is possible however, that portions of these areas are free from development or may have been filled, in effect protecting buried resources. Recommendations concerning archeological investigations are made based on proposed construction plans.

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REPORT FOR ARCHEOLOGICAL POTENTIAL

INTRODUCTION

Hartgen Archeological Associates, Inc. (HAA, Inc.) was retained by Allee, King Rosing and Flemming, Inc. (AKRF) to conduct a Phase IA archeological sensitivity assessment for the Staten Island portion of the Cross Harbor Freight Movement Project. The Phase IA was prepared as part of the preparation of an Environmental Impact Statement for the proposed improvements to rail freight operations across Upper New York Harbor between New Jersey and New York. The New York City Economic Development Corporation (NYCEDC) is the project sponsor and the Federal Highway Administration and the Federal Railroad Administration are co-lead agencies.

PROJECT INFORMATION

Description

The goal of the Cross Harbor Freight Movement Project is to reduce traffic on a regional scale in New York by facilitating freight operations by rail and to create redundancy of the existing bridge and tunnel network. In addition to the No Action alternative, the project may involve more efficient management of the current transportation infrastructure; rehabilitated or new float bridges; new rail yards; increased clearance heights along rail lines; new rail connections; and construction of a rail freight tunnel under New York Harbor.

Under the Staten Island tunnel option, freight travelling via rail lines in New Jersey would cross the Arthur Kill Lift Bridge and travel along the Staten Island Railroad in northern Staten Island to the tunnel.

Location

This report addresses the Staten Island portion of the Cross Harbor Freight Movement project. Staten Island is the southernmost of the five boroughs that comprise New York City. The study areas are located across the northern portion of the island and are divided into four areas (Maps 1a and 1b).

Port Ivory Yard

The westernmost study area is the Port Ivory Yard, located in the northwestern portion of Staten Island (Maps 1a and 2). The Arthur Kill is located to the north, Western Avenue is to the east, the Howland Hook Marine Terminal is to the west, and the former Staten Island Railroad alignment is to the south. The Port Ivory Yard consists of the former Procter and Gamble Port Ivory Plant. The main plant facilities are located south of Richmond Terrace. To the north are parking areas, storage tanks, abandoned railroad

sidings, concrete slabs, open land, and wooden piers. A pipeline that carries jet fuel to Newark Airport crosses the property.

Arlington Yard

Just to the south of the former Procter and Gamble Port Ivory Plant is the former alignment of the Staten Island Railroad and the former Arlington Rail Yard (Maps 1a and 3). The portion of the former rail yard currently owned by the NYCED and the subject of this assessment extends between Western Avenue on the west, South Avenue on the east and Goethals Road to the south and includes a portion of the Travis Branch of the former B&O Railroad.

Clearances

The Staten Island tunnel alignment would require increased clearance heights and installation of new tracks along the now abandoned Staten Island Railroad North Shore Line from Arlington Yard to the tunnel. As part of the proposed improvements to existing railroad structures, it would be necessary to increase clearance heights to 22 feet, 6 inches along the former Staten Island Railroad. This would involve the excavation of a trench approximately 6,000 feet long and up to 5 feet deep within the existing railroad right-of-way between South Avenue and John Street (Map 1a).

Tunnel Alignment

The Rail Freight Tunnel Alternative of the project would consist of the construction of a rail freight tunnel under New York Harbor. Two tunnel routes are under consideration, including one from the Staten Island Railroad, Staten Island, New York to the Bay Ridge Line, Brooklyn, New York. The Staten Island tunnel would begin near Elm Avenue and extend east along the alignment of the former Staten Island Railroad to approximately Tysen Road where it would run southeast toward New York Harbor (Map 1b and 4). From Elm Avenue the tunnel would be built by open cut construction east to approximately Davis Avenue. This portion of the tunnel would be 1,500 feet long, 40-feet wide and progress from 0 to 35 feet deep. From Davis Avenue the tunnel would be constructed by cut and cover excavation to Tysen Street. This portion of the tunnel is 2,900 feet long and will increase in width from 40 to 100 feet and increase in depth from 35 to 65 feet. From this point the tunnel will be bored southeast toward New York Harbor (65 feet below grade). The study area includes the tunnel alignment and the area located within one block on either side of the tunnel alignment and extends into the water beyond the existing shoreline.

It is possible that construction of the tunnel off the northeast shore of Staten Island may be of an immersed tube method instead of a bored tunnel. If an immersed tube method is used, it would require cut and cover construction, which, according to preliminary vertical profiles dated October 2001, would extend to elevations of approximately –120 feet at Station 590 to –150 feet at Station 620 at the Anchorage Channel (Map 4). A coffer dam would be required for the cut and cover excavation.

ENVIRONMENTAL INFORMATION

Topography

Tidal marshes in the northwestern portion of Staten Island are less than 10 feet above sea level. The Port Ivory Yard Area and portions of Arlington Yard are relatively level with elevations of approximately 20 feet above sea level. Elevations near the former railroad in the vicinity of the proposed clearances fluctuate between 20 and 40 feet above sea level, although the rail line has apparently been cut to accommodate the bridges and eliminate grade crossings. The northeastern portion of Staten Island is characterized by more undulating topography with numerous knolls dotting the landscape. Elevations range between 20 and 160 feet above sea level.

Forest Zone and Vegetation

The original forest of Staten Island is characterized as the Appalachian oak forest zone dominated by red and white oak (Kuchler 1964). Presently, the study areas consist of varying vegetation. A former industrial complex occupies the majority of the Port Ivory Yard. The undeveloped portions in the northern part consists of open grassy areas, small areas of secondary forest growth and a variety of wetland species along the water front and low lying areas. Arlington Yard contains railroad tracks and gravel with scattered brush along the northern extent of the study area. The southern portions contain mature secondary forest growth and brush. Although the abandoned alignment of the Staten Island Railroad is quite discernible, the areas of the clearances are overgrown with grass, brush and small trees.

Geology

The underlying bedrock geology varies across the northern portion of Staten Island. From west to east the study areas are underlain by Upper Triassic sandstone, conglomerate, siltstone, mudstone and arkose of the Brunswick Formation; Palisade Diabase; arkose, conglomerate and mudstone of the Stockton Formation; Lower Ordovician Serpentinite; and Upper Cretaceous age coastal plain deposits consisting of clay, silty clay, sand and gravel of the Raritan Formation (Fisher, Isachsen and Rickard 1970).

Soils

> "Staten Island's most recent glacial event was the Wisconsin. The terminal moraine that crosses Staten Island represents the southern boundary of the Wisconsin glacier. As the glacier retreated, a blanket of loose consolidated, poorly sorted glacial till was deposited. Glacial meltwater deposited outwash plain sediments south of the terminal moraine. A gradual rise in sea level during the retreat of the glacier resulted in flooding of former stream and glacial valleys, altering drainage patterns of streams and rivers. During this period identified as the Pleistocene Epoch, western Staten Island was submerged under glacial

> Lake Hackensack. A few thousand years later, tidal marsh vegetation began to occupy the lower lands adjacent to rivers. The influence of human disturbances has resulted in a high variable of soil composition in the area" (United States Department of Agriculture, Natural Resources Conservation Service, Staten Island Field Office, personal communication).

Soil mapping in Staten Island has been completed, however until the soil survey is published the soils information is preliminary and subject to change. Based on the preliminary information provided by the Staten Island office of the United States Department of Agriculture Natural Resources Conservation Service, numerous soil types are found in the vicinity of the project area (United States Department of Agriculture, Natural Resources Conservation Service, Staten Island Field Office, personal communication). All of the study areas contain soil complexes that include the Pavement and Building Unit, which consists of impermeable layers of pavement and buildings, so intermingled with other soils that it is not practical to map them separately.

In the vicinity of Port Ivory Yard are soils of the Pavement and Building, Laguardia-Ebbetts complex (0-8% slopes), Laguardia-Ebbetts-Pavement and Building complex (0-8% slopes) and soils of the Pavement and Building, Windsor-Verazano complex (0-8% slopes). The Laguardia series consists of very deep, well drained soil formed in thick mantle of construction debris intermingled with fill. The Ebbets series consists of very deep, well drained soils. These soils also formed in humanly transported natural soil materials intermingled with demolished construction debris.

Soils in the vicinity of Arlington Yard include those of the Pavement and Building, Laguardia-Ebbetts complex (0-8% slopes) and Laguardia-Ebbetts-Pavement and Building complex (0-8% slopes) described above as well as Ipswich-Pawcatuck-Matunuck mucky peat. The latter soils consist of very deep, very poorly drained soils formed in partially decomposed organic material from salt tolerant herbaceous plants. They are in tidal marshes subject to inundation by salt water twice daily.

Soils along the former Staten Island Railroad in the vicinity of the Clearances are different than those of the other study areas. Soils in this area consist of the Bridgehampton-Granitville complex (0-8% slopes), Pavement and Building-Windsor-Verazano complex (0-8% slopes), and Pavement and Building-Wotalf-Todthill complex (15-50% slopes). The Bridgehampton series are very deep, well drained and moderately well drained soils that formed in thick silty deposits over glacial drift. They are found on outwash terraces and glaciated uplands. The Granitville series (pending final approval as an Official Series Description) is characterized by very deep, moderately well drained soils formed in silty glaciolactustrine materials over glacial drift. These soils are found on glacial lake plains and terraces. Windsor is a temporary designation and no information as to soil characteristics was provided. The Verazano series consists of very deep, well drained soil formed in a loamy mantel transported by humans over sand sediments. The Wotalf series is characterized by shallow, well drained soils formed in a

loamy mantle of fill overlying serpentinite bedrock. Todthill soils are deep and well drained and are found on hills and ridges.

The open cut portion of the proposed tunnel as well as the eastern side of Staten Island consists of the Pavement and Building-Laguardia-Ebbetts complex described above. Soils in the vicinity of the cut and cover portion of the tunnel include the Pavement and Building-Unadilla complex (0-8% slopes) and Unadilla fine sandy loam (0-8% slopes). The Unadilla series consists of deep and very deep, well drained soils formed in silty, lacustrine sediments or old alluvial deposits found on valley terraces and lacustrine plains.

DOCUMENTARY RESEARCH

Office of Parks, Recreation and Historic Preservation (OPRHP) and New York State Museum (NYSM)

Archeological Sites

An examination of the OPRHP and NYSM site files identified numerous reported archeological resources along the north shore of Staten Island. The OPRHP files contain twenty reported sites within one mile of the study areas (Table 1). Six of these sites are precontact, thirteen are historic and one has both precontact and historic components.

Table 1: OPRHP Sites within One mile of the Study Areas

Site Number	Site Name	Description/Findings	Site Location
A085.01.000004	Ascension Church (Std 9-2)	Described by Skinner (1909) as Native American burials and artifacts found when the Parish house was constructed in 1903.	Between Cedar and Dongan Streets north of Castleton.
A085.01.000010	Sailor's Snug Harbor Historic Archeological Site	"Complex developed from 1831 on."	Sailor's Snug Harbor.
A085.01.000137	Arlington Ave. (Std 5-1)	Concentration of precontact materials shown on Skinner's map (1909: Fig.1 Site 4)	Along Arlington Ave. near Richmond Terrace.
A085.01.000138	Arlington Station (STD-7-1) Site	About 6 bowl-shaped pits 4-6 feet deep and equally wide containing bone, oyster shell, bone & antler tools, Algonkin pottery, project points scrapers, hammerstones, & a mortar; also shell heaps.	On west side of South Avenue opposite Arlington Station.

Site Number	Site Name	Description/Findings	Site Location
A085.01.000139	Arlington Place (STD 6-1)	Late Archaic through Woodland periods; scattered sites; points, debitage, hearths, argillite blades, scrapers, axes and pottery.	Along Arlington Place between Northfield & Holland Avenues. The site is occupied by private homes – destroyed.
A085.01.002361	Stratified 19th Century Deposit	No specific information on the form.	Sailor's Snug Harbor.
A085.01.002362	Staten Island Cemetery	Early 19th century cemetery; Native American burial found in 1901 during excavation for church.	South of Richmond Terrace between Alaska and Van streets.
A085.01.002364	Bowmans Brook North (MAAR Locus 1)	Late Archaic-Late Woodland; argillite drill tip, point, triangular biface and lithic debris found in disturbed context on north side of road.	Payne & Baumgardt tested the north side of Richmond Terrace east of Catharine Pl.; Skinner investigated the site on the south side of the road.
A085.01.002365	Richmond Terrace Historic Archeological Site (MAAR Locus 2)	Pre-1845 domestic site consisting of a razed structure and a refilled well.	Adjoining and to the east of 3599 Richmond Terrace.
A085.01.002366	Old Place Amerindian Site (MAAR Locus 9)	Archaic, Transitional, Early Woodland and Late Woodland; points and pottery.	North of Old Place west of Western Avenue.
A085.01.002367	Whalen Trucking Co. (MAAR Locus 10)	1790 domestic site; on 1878 map associated with name Haughwout.	Old Place; in 1986 the area was surfaced with asphalt over fill Maar 1996.
A085.01.002368	Whalen Trucking Co. (MAAR Locus 11)	Unidentified structure.	Old Place; in 1986 described as an unidentified structure buried under asphalt and fill.
A085.01.002369	Whalen Trucking Co. (MAAR Locus 13)	1790 domestic site; on 1878 map associated with George Bowman.	Old Place; in 1986 described as an area surfaced with asphalt and fill.
A085.01.002370	Whalen Trucking Co. (MAAR Locus 14)	1790 domestic site; on 1878 map associated with W.J. Halsey.	Old Place; northwest corner of Western and Goethals Road.
A085.01.002371	Whalen Trucking Co. (MAAR Locus 15)	Outbuilding associated with Locus 14 in the 20th century.	Old Place; area was surfaced with asphalt in 1986.

Site Number	Site Name	Description/Findings	Site Location
A085.01.002373	Whalen Trucking co. (MAAR Locus 17)	General area of a structural site probably associated with Locus 16.	Old Place; area was surfaced with asphalt in 1986.
A085.01.002374	Tunissen's 1680 Domestic Structure (MAAR Locus 18)	Map documented structure.	Old Place; the area was covered by asphalt roadway surfacing.
A085.01.002375	Rev. Kinney Property; Revolution Skirmish & Burial, (MAAR Locus 19)	Site of Revolutionary War skirmish and burials. Skinner uncovered graves in 1909.	Northeast of Old Place; testing in 1986 identified deposits of fill of 2-3 feet except for an area immediately adjacent to Bridge Creek wetlands. No precontact or 18th century artifacts found; No human remains found. Possibility that deposits are at greater depths.
A085.01.002601-.002703	Arthur Kill and Kill Van Kull Vessels	Variety of vessel types in varying states of ruin.	Along shores of Arthur Kill and Kill Van Kill.
A085.01.002760	Quarantine Grounds or Marine Hospital (originally 30 acres)	Complex was established in 1799; compound included many buildings, a formal cemetery, and secondary cemetery. Burned to ground in 1868 by angry citizens.	St. George parking field.

The NYSM files contain thirty reported archeological sites within one mile of the study areas (Table 2). Six of these sites are also recorded in the OPRHP files. Twenty-nine of the NYSM sites are precontact and one is possibly precontact and historic Native American as well as historic European.

Table 2: NYSM Reported Sites within One Mile of the Study Areas

Site Number	Site Name	Description/Findings	Site Location
728 (Std 5-1) same as A085.01.0137)	Arlington Avenue	Traces and concentration.	Northeast of Arlington Yard.

Site Number	Site Name	Description/Findings	Site Location
729 (Std 6-1) same as A085.01.0139	Arlington Place Sites	Late Archaic, Transitional, Early and Late Woodland camps or villages.	Arlington Place.
730 (Std 7-1) same as A085.01.0138	Arlington Station	Woodland middens.	South Avenue north of railroad.
731 (Std 10-1)	Gerties Knoll	Traces, concentration.	Richmond Terrace east of Port Ivory.
732 (Std 11-1)	Goodrich	Early and Late Archaic, possibly Middle Archaic.	Near South Avenue and railroad.
733 (Std 9-2) same as A085.01.0004	Ascension Church Site	Woodland? Village and cemetery.	Between Cedar and Dongan Streets north of Castleton.
734 (Std 8-2)	Peltons Cove; Upper Cove; The Cove	Village and cemetery.	Along Kill Van Kull near Bement Avenue.
4591	ACP Rich 01	Village and cemetery.	Near Sailor's Snug Harbor.
4592	ACP Rich 02	Village and burials.	Found during excavation Church of Ascension parish house.
4593	ACP Rich 03	Villages, shell middens and traces.	Near Harbor Road and railroad.
4594	Bowman's Brook?; Newtown's Creek,DeHarts; ACP Rich 04	Village and cemetery. Abundant pottery, other implements and cemetery.	Near DeHart Avenue north of railroad.
4595	ACP Rich 05	Precontact(?), Historic Native(?) and Historic European village middens, burials.	Covers large area near Goethals Br. between Travis Branch and Arthur Kill.
4612	ACP Rich 22	Camp and traces of occupation.	South of Sailors' Snug Harbor.
4614	ACP Rich 24	Camp.	West of Tompkinsville.
4629	ACP Rich 23B; ACP Rich no #	Traces of occupation.	Along shore near St. George.
4630	ACP Rich no #	Camp.	East of P&G Port Ivory Plant near Richmond Terrace.
6956	ACP Rich no #	Camp.	Between Tompkinsville and Stapleton.
7215 same as A085.01.2366	Old Place Loci 1-8	Early Archaic through Late Woodland; points, pottery, and steatite sherds.	Old Place.

Site Number	Site Name	Description/Findings	Site Location
7216	ACP Rich no #	Traces of occupation.	Southeast of Goethals Bridge toll plaza.
7321 same as A085.01.2364	Bowman's Brook; Milliken	No information.	East of P&G Port Ivory Plant near Richmond Terrace.
7322	Unnamed	Traces of occupation.	Near South Avenue and railroad.
7811	ACP Rich no #	Camp.	Near South Avenue north of railroad.
7812	ACP Rich no #	Camp.	Large area between Taylor Rd. and Jewett Ave. south of Richmond Terrace.
7813	ACP Rich no #	Traces of occupation.	Large area between Taylor Rd. and Jewett Ave. south of Richmond Terrace.
8472	Unnamed	Camp.	Near Tompkinsville.
8474	Unnamed	Camp.	Bement Ave. south of Richmond Terrace.
8475	Unnamed	Camp.	North Burgher south of Richmond Terrace.
8505	Unnamed	Traces of occupation.	Former P&G plant east of Western Ave.
8506	Unnamed	Camp.	Near Van Pelt Ave. south of railroad.
8507	Unnamed	Camp.	Midway between Arlington Yard and Richmond Terrace.

State and National Registers

The portion of the former Procter and Gamble Manufacturing Co. Port Ivory Plant located on the west side of Western Avenue has been determined eligible for the State and National Registers. This portion is located within the current Port Ivory Yard study area. The evaluation did not include the Procter and Gamble buildings on the east side of Western Avenue. According to the Resource Evaluation on file at the ORPHP (Site #085.01.002729 dated 12/1/99) the plant is significant for its association with American industrial and commercial history. It may also be considered a relatively intact complex of 20th century brick industrial buildings representing the 85-year evolution of manufacturing at this site.

Numerous sunken vessels have been identified in the Arthur Kill and Kill Van Kull to the west and north of Staten Island. Several of these have been determined eligible for the National Register, although none of the eligible vessels appears to be located within the study areas.

Previous Surveys

Several cultural resources surveys have been previously conducted in the vicinity of the current study areas. Results of these surveys included documentation of cultural resources as well as prior disturbance.

Port Ivory Yard

Two studies have been previously conducted within and adjacent to portions of the Port Ivory Yard study area. The earlier study (MAAR Associates, Inc. 1986) included archeological field survey while the later study (Historical Perspectives Inc. 1992) consisted of a Phase IA for the former Proctor and Gamble Plant south of Richmond Terrace, including the current study area.

MAAR Associates, Inc. (1986) conducted archeological investigations at the Howland Hook terminal. The study area consisted of six areas identified as the Old Place Study Areas and the Howland Hook Study Areas. The latter included the portion of the current Port Ivory Yard project area located north of Richmond Terrace. The MAAR survey included documentary research, surface reconnaissance, and shovel testing, although it is not clear if any tests were excavated within the current study area. Sixteen cultural resources were identified as well as an undetermined number of abandoned wooden vessels on the shore and offshore near Port Ivory and Schuyler's Ferry. The sites included both precontact and historic sites in vicinity of Old Place and Richmond Terrace adjacent to current study area (Table 1).

As part of the Generic Environmental Impact Statement being prepared for the New York City Long Range Sludge Management Plan, Historical Perspectives Inc. (1992) conducted a Phase IA archeological assessment for a portion of the Procter and Gamble plant on Staten Island. The study area included the former Procter and Gamble property located between Richmond Terrace on the north and the Staten Island Rapid Transit Rail Yard to the south. Initially the project area included the plant property to the east and west of Western Avenue, including the current Port Ivory Yard study area. Although the survey report includes it in its discussion of archeological potential, the western portion was removed from the sludge management project. The report concluded that the study area, including the portion of the plant west of Western Avenue, was considered sensitive for archeological deposits dependent on the extent of prior disturbance associated with the industrial development of the property. The extent of disturbance by construction activities was considered undetermined. Therefore, additional research on areas of proposed construction and archeological testing was recommended (Historical Perspectives, Inc. 1992:8-9).

Geothals Bridge

Hartgen Archeological Associates, Inc. (1995) conducted an archeological and historical sensitivity assessment immediately south of the Arlington Yard study area. The study was conducted as part of the Staten Island Bridges Program and included the study of an area to be impacted by the proposed expansion of the Goethals Bridge. The

study area included the Goethals Bridge where Route 278 crosses the Arthur Kill roughly between Route 440 on Staten Island, New York and the tollgate in Elizabeth, New Jersey. The southern extent of the Travis Branch portion of the Arlington Yard study area is located in this vicinity. The 1995 study concluded that the Staten Island portion of the proposed project was highly sensitive for both precontact and historic archeological resources. This assessment was based on the proximity of reported precontact sites, such as Skinner's Old Place Site (Map 5). It was suggested that many of the locations of structures depicted on 18th and 19th century maps and identified by MAAR Associates, Inc. in 1986 may have been covered by construction, but it is possible that these areas were not drastically modified and historic resources may be present.

Subsequent to Hartgen's study, Geoarcheology Research Associates conducted gemorphological analysis within the Goethals Bridge project area (Geoarcheology Research Associates 1996). The study consisted of the examination of fifteen borings excavated to depths of up to 13 feet (4 m) in areas selected in part on Hartgen's archeological sensitivity assessment. The study concluded "extensive landfilling and disposal of hazardous materials have compromised archeological potential in most of the areas investigated. It was proposed that there are discrete, but isolated locales across the impact area that preserve the critical, undisturbed sandy sediments long recognized as preserving culture-bearing deposits on the order of 8000 years old" (Geoarcheology Research Associates 1996:1). Borings conducted during the study indicated that the estuarine marsh along the northwestern shore of Staten Island was actively aggrading between 2000 and 2500 years ago at depths of 12-14 feet below the present sea level and that sea level curves demonstrate that marine coast lines were three to four meters lower at this time area (Geoarcheology Research Associates 1996:8).

Drift Removal in New York Harbor

Several cultural resources surveys have been conducted as part of the proposed collection and removal of drift along the Arthur Kill, Kill Van Kull and New York Harbor along the north and east sides of Staten Island. The drift removal projects were aimed at ridding New York Harbor of potential sources of drift such as deteriorating piers, bulkheads, and vessels. These surveys (Kardas and Larrabee 1977; Louis Berger & Associates, Inc. 1982; Raber Associates 1996 and Panamerican Consultants, Inc. 1999) identified numerous resources along these waterways.

The earliest of these drift studies was conducted along the northeast shore of Staten Island (Kardas and Larrabee 1977). The study consisted of surface reconnaissance only. According to the report, the current shoreline from the Coast Guard Station south to the Alice Austen House beach is east of the historic shoreline. An area where additional investigation was recommended included the enclosed pier of the Coast Guard Station where the Old Quarantine Station Pier stood until 1858. This is in the vicinity of the proposed tunnel alternative.

The Cultural Resource Group of Louis Berger & Associates, Inc. (1982) conducted a supplemental reconnaissance survey of three National Register sites located

along the waterfront of Staten Island. The purpose of the study was to supplement the 1977 Kardas and Larrabee study and to determine if the planned drift removal project would impact these three properties. The resources included the U.S. Coast Guard (Old Quarantine) Station, the Alice Austen House and Drumeltan, and Battery Weed, Fort Wadsworth. Only the Old Quarantine Coast Guard Station is in proximity to the current study area. The study concluded that the proposed work would not directly impact these properties but recommendations were made that the points of access for heavy machinery be at a distance from the properties to ensure that movement of the machinery would not impact them.

Raber Associates (1996) conducted cultural resource reconnaissance investigations of proposed project areas along the north shore of Staten Island to identify potentially significant or significant resources. The assessment of resources was limited to structures, derelict vessels, and unclassified objects with some remains of former recognizable features. Areas of miscellaneous, disarticulated timber or loose debris were not studied.

The most recent cultural resources survey associated with collection and removal of drift in the New York Harbor area was conducted in 1999 by Panamerican Consultants, Inc. The study was conducted for the Kill Van Kull Reach and both the New York and New Jersey Reaches of the Arthur Kill. The Kill Van Kull Reach study area extended along the north shore of Staten Island from Port Ivory east to the Staten Island Ferry Terminal. The reconnaissance for this portion of the study identified 44 individual vessels and 6 vessel clusters encompassing 210 individual vessels.

Sailor's Snug Harbor

Four studies were conducted at Sailors' Snug Harbor, a National Historic Landmark located in the northeastern part of Staten Island near the proposed tunnel. The studies were confined to Sailor's Snug Harbor and identified resources associated with its historic use and development. The earliest of these studies was conducted by Ulana D. Zakalak in 1981. The field survey consisted of the excavation of backhoe trenches adjacent to buildings that were slated for reuse. According to the report, most of the trenches lacked significant stratigraphy, evidencing backfilling associated with construction of retaining walls. Artifacts recovered included building materials, cinder, bone and shell fragments, and 20th century glass and ceramic sherds. Three years later, Archeological Research Consultants, Inc. (1984) conducted archeological investigations prior to the installation of utilities and wall stabilizations. Archeological deposits were identified and recommendations for alternative utility routes were made. The Landmarks Preservation Commission (1985a) prepared an archeological predictive model for Snug Harbor Cultural Center and conducted archeological testing (1985b) in several areas slated for disturbance associated with construction activities.

Other Areas

Greenhouse Consultants, Inc. (1985) conducted an archeological investigation for two parcels as part of the proposed Arlington Homes Development Project. The survey was conducted for an area along the north side of the Staten Island Railroad between Arlington Place and Holland Avenue just north of the current Clearance study area. Documentary research conducted for the project indicated six reported precontact sites in the immediate vicinity of the proposed development. The testing methodology consisted of the excavation of 42 power auger holes, four hand excavated post holes and four 3-foot by 5-foot hand excavated units. No precontact materials were retrieved from the tests. Observations made during the field survey indicated that the project area had been previously disturbed, including removal of the topsoil and areas of fill.

Greenhouse Consultants, Inc. (1990) also conducted Phase I and II archeological investigations for four distinct parcels located in the northern portion of Staten Island. Three of these parcels were located long Richmond Terrace in the Mariners Harbor vicinity and one area was located in Arlington. The latter area, identified as Parcel B, was located along the north side of Brabant Avenue between South Avenue and Grandview, east of Arlington Yard and southeast of the South Avenue clearance area. Documentary research indicated that Parcel B did not have any potential for historic archeological evidence. Although considered sensitive for precontact resources, none was identified within Parcel B during the Phase IB testing. No further investigations were recommended for Parcel B.

PRECONTACT RESOURCES

Precontact Overview

The earliest occupation of New York State was probably as early as early as 12,000 years ago (Ritchie 1969:1-30). Human populations entered the state from the south following the retreat of the glacial ice sheets. The exact dates are unknown, but existing evidence suggests ca. 10,000 B.C. as the probable beginning of human occupation of the region (Funk 1976:212). The earliest known occupation of Staten Island is represented at the Port Mobil Site located on the southwestern shore of Staten Island along the Arthur Kill. The site has been interpreted as a small resource procurement camp. Since sea levels were lower during the Paleo-Indian period, the Arthur Kill did not exist as it does today so the Port Mobil occupation probably represents a hunting camp rather than a marine resource based camp (Louis Berger and Associates 1994).

New York State residents of the Paleo-Indian period manufactured distinctive chipped stone projectile points of clovis-like fluted form. The flutes were long narrow flakes removed from both faces of the basal portions of the projectile points. In addition, a variety of other chipped stone tools, both bifacial and unifacial including knives, hide and wood scrapers, and gravers have been recovered from New York State sites of the Paleo-Indian period. In general, Paleo-Indian groups were probably quite small and

highly mobile. The frequent presence of exotic chert and other chippable lithic material on Paleo-Indian sites indicate travel or trade across considerable distances.

By 8,000 B.C., there is no recognizable evidence of Paleo-Indian societies in the northeastern United States. Based upon the known archeological record, it appears that the Early and Middle Archaic populations were as small or smaller than those of Paleo-Indian period. Ecological and climatic changes could account for this apparent decrease in population. The pollen record shows a change in forest type around 7000 B.C. resulting from a warming trend. The forests of New York State changed from an open spruce forest to a closed red pine forest less favorable to both game animals and human populations which were probably dependent upon them (Ritchie and Funk 1973, Salwen 1975). The limited archeological remains of the presumably smaller precontact population of the time may be scattered over much of the state.

Early Archaic sites on Staten Island include components found at the Old Place Site. Late Archaic sites on Staten Island are typically found on tidal inlets, coves and bays (Louis Berger and Associates 1994).

The division between the Late Archaic and subsequent precontact periods is based more upon the introduction of, first, stone cooking vessels and, later, ceramic pottery than upon any significant alteration of subsistence patterns among the aboriginal residents of New York. The relatively short time that soapstone vessels were in use, along with what are known as "broad" projectile points, has been called the Transitional period (1250-1000 B.C.) by Ritchie (1969:150-178).

The Woodland period (ca. 1000 B.C. to A.D. 1600) is defined by the presence of pottery on archeological sites (Ritchie 1969:179-299). The introduction of ceramic pottery has been viewed as a possible indication of a less mobile lifestyle for the aboriginal population of the time since the pottery was quite fragile. Since sedentary lifestyles are usually associated with the development of horticulture, it is presumed that New York's Woodland period precontact population was in some way acquiring at least some of its food resources in that manner.

It seems almost certain that for most of New York State, life in the Woodland period resembled that of the Archaic period. Hunting, fishing, freshwater, brackish, and saltwater shellfish, and plant collecting may have been gradually augmented by the cultivation of food plants such as squash, gourds, and eventually corn.

Around A.D. 1000 large, permanent villages dependent upon maize, bean and squash cultivation developed in western, central, and central eastern New York. However, larger communities seem not to have developed in eastern New York as early as in the areas to the west, possibly because the abundance of resources in the Hudson River and coastal environments eased the pressures of acquiring sufficient food for groups living there.

Precontact villages, usually located near more easily cultivated bottomlands, became increasingly larger through time. Fifteenth and sixteenth century villages were

usually surrounded by stockades and situated in defensible elevated locations. Some Iroquois villages had populations approaching or exceeding 1000 inhabitants. The eastern New York tribes had communities that were somewhat smaller.

The Old Place Site located south of the Port Ivory and Arlington Yards also included Woodland and Contact components. The former characterized by the presence of pottery and the latter by a brass point, gun flints, lead bullets, a pewter ring, and trade pipe fragments (Skinner 1909:8-9). The Bowman's Brook site is the type-site for the Bowman Brook ceramic type (Ritchie 1969:269).

Documented Precontact Resources in the Vicinity of the Study Areas

The precontact site of "Old Place" has been documented to the south of the Port Ivory and Arlington Yards since the early 1900s. The first report on the site was published by Alanson Skinner (1909:8-9) and depicted as a large area running along the north side of Old Place Creek just south of the Staten Island Railroad near Arlington Yard (Map 5). It is unclear who conducted the work reported by Skinner, but he describes artifacts and features that appear to date to the Late Woodland and Contact periods. The features mentioned are shell pits and hearths spread over a wide area. Included in his listing of artifacts are Iroquoian-like pottery, a brass arrow point, gun flints, lead bullets, a pewter ring, kaolin pip fragments, and a brass kettle fragment.

The Old Place Site appears to be a multi-component site spread over a large area. Suggestions of encroaching wetlands coincide nicely with the archeological materials recovered to indicate a sequence of occupation that shifted from west to east through time. Extension of this pattern into untested areas to the west indicates earlier Paleo-Indian loci, as have been found to the south at Port Mobil (Kraft 1977), may be located further to the west in presently submerged soils along Old Place Creek closer to the Arthur Kill (Hartgen Archeological Associates, Inc. 1995:13). Limited testing in this area by MAAR Associates did not recover any cultural materials, but they did not investigate the saturated soils and excavated very few shovel tests (MAAR Associates, Inc. 1986).

In the early 1960s Anderson and Sainz, two avocational archeologists on Staten Island, conducted excavations in the vicinity of Old Place, however, it is unclear exactly where their excavations were located. They reportedly recovered artifacts ranging in age from the Late Archaic through the Late Woodland periods. Primary diagnostic artifacts listed by Anderson include Perkiomen Broad, Susquehanna Broad, Bare Island, Snookkill, Poplar Island, Levanna, and bifurcated projectile points, Vinette I and Late Woodland ceramics (Anderson 1964).

Also in the 1960s Jacobson conducted fieldwork in four areas (Loci A, B, E, and S) on land owned at the time by the New York Transit and Terminal Company and located west of Western Avenue and slightly to the west of Skinner's site. Jacobson identifies the site as the Goethals Bridge Site. It was located in an area disturbed by cutting and filling for commercial and industrial purposes as well as pothunting activities.

Although the extent of the site was undetermined, Jacobson thought the site extended into the marsh areas surrounding the area. Artifacts dating from the Archaic through the Woodland periods were recovered. Locus B appears to have been stratified with the whole range of periods represented. One projectile point fragment recovered by Jacobson may be a Clovis point, however, it appears to have been reworked (Jacobson 1963-1964:64).

A large village and cemetery, called the Bowman's Brook site, was located to the east of the former Procter and Gamble plant near Richmond Terrace. The site was identified when Milliken Bros. began construction on their steel plant at that location. The site contained between 50 and 100 pits averaging four to six feet in width and three to six feet in depth. Findings included a dog burial as well as numerous pottery sherds including those described as Algonkin-like and Iroquoian. Artifacts recovered included those of stone, bone and antler (Skinner 1909:6-7).

In the vicinity of West New Brighton Skinner relates finds near Upper or Pelton's Cove between Livingston and West New Brighton. Burials were encountered when the Shore Road (part of later Richmond Terrace) was cut through this area. A village site was reported at West New Brighton as well. Burials, shells and artifacts such as stone axes were found when the parish house of the Church of the Ascension was being constructed in 1903.

According to Skinner, "at Mariners' Harbor, beginning about half a mile south of the station and running north to Bowman's Point, in every field are traces of prolonged occupation, fire-cracked stones, flint chips, potsherds and the like"(Skinner 1909:5). In particular, Skinner notes the former location of a sandy knoll (predominantly gone by 1909) on South Avenue opposite the Arlington Station of the Staten Island Rapid Transit Railroad. In 1902, six shell pits averaging four to six feet deep were excavated. The pits contained animal bones, shells, bone and antler implements, pottery, clay pipes fragments, projectile points, scrapers, and hammerstones.

HISTORIC RESOURCES

Historic Overview and Map Review

In order to trace the development of the study areas, a review of historical maps was conducted. The maps include 19th century landowner maps, mid to late 20th century topographic maps, and highly detailed late 19th to 20th century fire insurance maps.

Maps of the northern portion of Staten Island dating from the late 18th century to the 20th century depict many structures that were located in and in the immediate vicinity of portions of the current study areas.

Port Ivory Yard and Arlington Yard

The first settlement of the areas on the north side of Old Place Creek south of Port Ivory Yard and Arlington Yard occurred about 1680 (Louis Berger and Associates, Inc. 1992:IV-81), although it is not until the Revolutionary War era that the first house in the area, the Tunissen house, is shown on a map (MAAR Associates 1986:I-26; Figures 20 and 21). During the Revolutionary War, British forces occupied a site near Old Place referred to as the Reverend Kinney property, named for the 20th century occupant of a house near there. A skirmish took place in the vicinity and casualties were buried on the south side of the property (MAAR Associates 1986:I-35-6).

Map 6 shows the colonial land patents of the northwestern part of Staten Island. The map depicts an east west patent belonging to John Tunison that extends into the wetland areas near Old Place. The map of Staten Island during the Revolution shows structures along what is now Richmond Terrace, including near the western part of the road near the Port Ivory Yard area (Map 7). Tunesons (sic) Neck also contains structures.

After the Revolution, the vicinity of Old Place was occupied by a number of small farmsteads that survived to the late 19th or early 20th century (MAAR Associates 1986:I-36). Throughout the late 17th and early 18th century, Staten Island contained somewhat dispersed communities separated except by a few ferries from the mainland (Raber 1996:22 and 23). During the 19th century and into the early 20th century, the north shore developed into several villages or neighborhoods containing residential, industrial and maritime areas (Raber 1996:23).

Maps 8-14 represent a series of 19th century landowner maps with the general vicinity of the Port Ivory and Arlington Yard study areas indicated on each map. The earliest of these maps is the 1850 Sidney *Map of Staten Island or Richmond County* (Map 8). Port Ivory Yard is situated at the eastern end of what is now Richmond Terrace, although earlier maps show the road extending through the study area to the Arthur Kill. Much of Arlington Yard is shown as wooded, although the vicinity of the Travis Branch extends south toward the vicinity of Old Place and structures associated with the surname Van Pelt.

The 1859 Walling map shows a road (Western Avenue) extending north from Old Place to Richmond Terrace (Map 9). One structure associated with the name Peter Colyer is shown at the southwest corner of the intersection of these roads within the current Port Ivory Yard study area. Arlington Yard is predominantly vacant land with the western portion shown as marshy. The Van Pelt structures are shown in the vicinity of the Travis Branch extension of the study area.

The subsequent 1860 Higginson and 1874 Beers maps (Maps 10 and 11) do not show any significant changes in the vicinity of the Port Ivory and Arlington Yards. The Beers map shows one structure in the vicinity of the Colyer structure although it is now associated with G. Bowman. Bowman apparently owns large tracts of land in the vicinity.

The 1884 Colton map of the area is similar to the preceding maps except for the addition of the Staten Island Rapid Transit Railroad (Map 12). The line is shown extending sharply to the northwest from South Avenue to Bowman's Point. The Beers map of 1887 shows the rail line extending westward to the Arthur Kill along an alignment more similar to the existing line (Map 13). The latter map also shows much of the land formerly associated with G. Bowman as belonging to the B&O Railroad Company. Other than the rail line, development within the Port Ivory and Arlington Yards is non-existent at the end of the 19th century (Map 14). The residential structures in the vicinity of Old Place were gradually abandoned during the industrial development.

Although it was constructed in 1907, the Proctor and Gamble Port Ivory plant is not shown on early Sanborn maps. A notation is made that the company refused admittance to the plant.

> Procter and Gamble, manufacturer of household products, was established in Cincinnati in 1837 and opened the Port Ivory plant in 1907. The plant manufactured soaps, detergents, toilet goods, vegetable oil, and food and paper products. At its height in the 1920s the plant occupied 129 acres and employed fifteen hundred workers to manufacture soap bars, flakes, and granules (most under the brand name of Ivory), vegetable shortening (Crisco), and related products for the northeastern United States. As the firm diversified during the following decades the factory also made synthetic detergents and cleansers (such as Tide), cooking oils, baking goods under the name of Duncan Hines, and orange juice (Citrus Hill). Because of mounting costs the firm began phasing out selected operations in the mid 1980s and it closed all of Port Ivory in 1991. Procter and Gamble was an innovator in developing close relations with advertising and communications firms in Manhattan; it was the first firm to use direct radio promotion (1923) and produce daytime serial "soap operas" on radio (1933) and television (1950) (Jackson ed. 1995: 942).

The earliest buildings constructed on the site were completed around 1906. These buildings were removed in the early 1980s for construction of a woodburning boiler house (Flagg 1991:3). The fuel oil tanks north of Richmond Terrace date to 1929, possibly when the plant converted from coal to oil to run its powerhouse (Flagg 1991:4). Finished products were shipped by rail as well as other modes. The plant made use of rail connections with the Baltimore & Ohio Railroad and maintained piers and a rail car transfer bridge on its waterfront (Baltimore & Ohio RR 1912 in Flagg 1991). Sachs (1988) states the four miles of rail sidings were located within the plant. The plant also relied on water transportation at its piers on the Kill Van Kull. In the New York region, soap was distributed by barge. A warehouse for finished products was located next to its piers, in more recent years the piers were used by barges bringing fuel oil and vegetable oil (Flagg 1991:5). Map 15 shows the extreme northeast corner of the Port Ivory Yard study area in 1917. The rail line leading to the piers is shown as well a warehouse near the shore and a dwelling near the eastern boundary. By 1950, the northern part of the

Port Ivory Yard study area is occupied by several rail sidings, fuel tanks and warehouses (Map 16). A large portion of the area is shown as a sludge pond.

Clearances

The north shore rail line was originally built by the Staten Island Rapid Transit Railroad Company, which was incorporated in April 1880. In 1899, the company was acquired by the Baltimore & Ohio Railroad. In August of that same year the Staten Island Rapid Transit Railroad Company, a subsidiary of the B&O Railroad, was acquired by the Staten Island Rapid Transit Railway Company.

The Arlington line was double-tracked. The trains ran at 30-minute intervals (20-minutes during rush hour) and took 16 minutes to run between Arlington and St. George stations. Stations along the line included New Brighton, Sailors Snug Harbor, Livingston, West Brighton, Port Richmond, Tower Hill, Elm Park, Lake Avenue, Mariners Harbor, Harbor Road, Arlington (Figures 1 and 2) and a rush-hour only stop for Proctor & Gamble employees called Port Ivory. The line was electrified with a third rail in 1925 and was operated with MU-type subway cars that stopped at high-level platforms (Kiss 1993). During the first half of the 20th century, grade crossings were eliminated due to the frequency of accidents at the crossings (Medditto et al. 1973).

With the advent of automobiles and bus lines, the popularity of the rail line lessened. The last run was made on the 5.9-mile Arlington line on March 31, 1953 (Kiss 1993). The freight service ended in 1990 with the closing of the Procter and Gamble Port Ivory plant (Eisenstein and Darlington 2000).

Maps 17 through 21 are a series of maps dating from the last quarter of the 19th century to the mid-20th century showing the vicinity of the proposed railroad clearance area. The earliest map is a portion of the 1874 Beers map, which predates the construction of the rail line (Map 17). The approximate alignment of the railroad is indicated. The railroad alignment crosses through predominantly lightly developed residential areas, although several structures are shown near the alignment on Harbor Road and on Van Pelt and Simonson Avenues. The railroad is constructed by 1887 (Map 18). The 1898 map shows the line crossing through a somewhat more developed area. Many lots are indicated on the map but not all are occupied by structures. Stations are indicated along the railroad near South Avenue, Van Pelt and Morning Star. The Sanborn maps of 1917 and 1950 show the area in a little more detail (Maps 20 and 21). Comparison of the two maps shows the construction of bridges over the tracks by 1950. The Arlington Station near South Avenue is indicated on the south side of the tracks on the earlier map but in the center of the tracks on the later edition. Both the Mariners Harbor Station east of Van Pelt Avenue and the Elm Park Station east of Morning Star have platforms on both sides of the tracks on the 1917 map but have been moved to the center of the tracks by mid century. Also by 1950, two additional stations have been added along the rail line at Harbor Road and Lake Avenue. The John Street pedestrian bridge was constructed between 1937 and 1950 between John Street to the east and

Newark Street to the west. At least two structures shown on the earlier Sanborn maps may have been impacted by construction of this bridge.

Tunnel

The proposed tunnel is located in the northeastern portion of Staten Island in the vicinity of New Brighton, Tompkinsville and St. George. This area is shown on a series of maps dating from the mid-19th century to the mid-20th century (Maps 22-28). By the mid-19th century the area is well developed with areas identified as Factoryville or Castleton, Elliotsville, and New Brighton. The 1874 map shows the open cut and cut and cover portions of the proposed tunnel near the northern shore of Staten Island. Richmond Terrace and a horse car railroad occupy the northernmost part of the shore. Colton's 1884 map, although still showing the railroad in a different location than other maps, shows land extending slightly north of Richmond Terrace in the vicinity of the open cut and cut and cover portions of the tunnel (Map 24). The 1887 map shows the Staten Island Rapid Transit Railroad running along the north shore of Staten Island, presumably on a causeway by the way the shoreline is drawn. Several structures, including a boat house are indicated in the vicinity of the proposed open cut portion of the rail line. The vicinity of the open cut portion and the western part of the cut and cover portion of the tunnel undergoes an increase in the amount of industrial development as depicted on the 20th century Sanborn maps (Maps 26–28). The area north of the open cut portion is dominated by warehouses, piers and drydocks associated with the Vernon & Co in 1917 and later the Delaware and Lackawanna & Western Railroad. In 1917, near the western part of the cut and cover portion of the tunnel is the Richmond Light & Railway Co. facility, later identified as the Staten Island Edison Co. To the east are the Livingston Passenger station located along the railroad just east of Bard Avenue, and the Sailors Snug Harbor boat house and dock located on the Kill Van Kull near the Sailors Snug complex.

Documented Historic Resources in the Vicinity of the Study Areas

Documented historic resources in the vicinity of the study areas are predominantly located in the vicinity of the Port Ivory and Arlington Yards. The vicinity of Old Place contains the reported locations of early residences. The area is reportedly in proximity to a Revolutionary War skirmish. Map-documented structures are indicated near the open cut and cut and cover portions of the tunnel.

EXISTING CONDITIONS

Port Ivory

The Port Ivory Yard consists of the former Procter and Gamble Port Ivory Plant. The waterfront portion of the study area contains the remains of piers and rail sidings (Photos 1-3). A pipeline carrying jet fuel to Newark Airport crosses the property (Photo 4). Between Richmond terrace and the Arthur Kill are parking areas, storage tanks, abandoned railroad sidings, concrete pads representing the remains of former industrial

structures and open land. Photo 5 shows a typical parking area and former fuel oil tanks north of Richmond Terrace. The main plant facilities are located south of Richmond Terrace (Photos 6-8).

Arlington Yard

The former Arlington Rail Yard, like the Staten Island Railroad, is no longer in service. Tracks along the northern portion of the yard are in good condition and generally clear of vegetation (Photos 9 and 10). Large mounds of soil, some approximately 20 feet high, occupy portions of the study area (Photos 11 and 12). A large wooded area is located between the northern tracks and the Travis Branch (Photo 13). Evidence of dumping was noted in this area. The southern portion of the Travis Branch traverses through a large marsh (Photo 14).

Railroad Clearances

Photos 15-28 show conditions along the former Staten Island Railway between South Avenue and John Street. Generally the rail line is overgrown with vegetation. The difference in grade along the tracks and the adjoining areas varies from approximately 10 to 20 feet. The rail line must have been cut into the landscape at the time the grade crossings were eliminated, probably in 1934 when the bridges were constructed. The remains of platforms of the former passenger stations were noted near Van Pelt and Simonson avenues, and east of Morning Star.

Many of the bridges along the proposed clearance trench have underground utilities beneath them (Table 3). At the time of the site visit in November, 2001, the sewer line near Lake Avenue was overflowing. The bridges were each constructed in 1934 with some of them undergoing either reconstruction or rehabilitation in 1983 or 1984. Drainage is a constraint in substantially undercutting the bridges. Several wet areas near the proposed clearances were noted during the field visit.

Table 3: List of Underground Utilities along Staten Island Railroad Clearance Crossings (Source: Cross Harbor Freight Movement Project MIS October 25, 2001)

Crossing Name	Date of Construction	Date of Reconstruction	Underground Utilities	
			Parallel to Tracks	Perpendicular to Tracks
South Avenue	1934		6" sewer 18" vitrified pipe	12" water ¾" water
Harbor Road	1934	1984 superstructure	18" vitrified pipe 20" C.I.P	None
Union Avenue-north track	1934	1984 superstructure	20" vitrified pipe 20" C.I.P	None
Union Avenue-south track	1934	1984 superstructure	2-12" split vitrified pipe	None
DeHart Avenue	1934	None	2-20" vitrified pipe	None
Van Pelt Avenue	1934	1983 superstructure	22" vitrified pipe 20" vitrified pipe	None

Crossing Name	Date of Construction	Date of Reconstruction	Underground Utilities	
			Parallel to Tracks	Perpendicular to Tracks
			12" vitrified pipe	
Van Name Avenue	1934	1983 superstructure	24" vitrified pipe 20" vitrified pipe	None
Simonson Avenue	1934	1983 deck	24" vitrified pipe 22" vitrified pipe 6" vitrified pipe	None
Lake Avenue	1934	1983 superstructure	27" vitrified pipe 22" vitrified pipe 12" vitrified pipe	None
Granite Avenue	1934	1984 rehabilitation	None	None
Morning Star Blvd.	1934		12" water line 6" water line 6" C.I.P. Transmission ducts	2'-2" x 3'-3" brick sewer
John Street	1934		Transmission ducts	12" C.I.P. (storm?) 6" C.I.P. (storm?) 4" gas

Tunnel Alignment

The western portion of the proposed Staten Island tunnel would run along the former alignment of the Staten Island Railroad along the north shore of Staten Island. The tunnel will begin in the vicinity of Elm Avenue and extend east to approximately Tysen Street where it will run southeast toward New York Harbor (Map 1b and 4). The open cut and cut and cover portions of the tunnel are located in a heavily industrial area located behind a fence (Photo 29).

DISCUSSION OF ARCHEOLOGICAL POTENTIAL

Precontact Resources

The archeological sensitivity assessment of the study areas for precontact sites is based on several factors including physiographic characteristics (topography, drainage), the distance to known sites, and existing conditions. Generally areas in the vicinity of streams or swamps suggest a higher than average probability of occupation or use by Native Americans who may have inhabited the area. These streams and swamps represent potential food and water sources as well as potential transportation corridors. Numerous precontact sites are reported along northern Staten Island in the vicinity of the study areas.

Over the past thousands of years, natural fluctuations in sea level have at times dramatically altered water level in streams, rivers, and lakes, thus changing the locations of shorelines over time. Areas that are currently categorized as wetlands or that are submerged in water may have been drier in historic and precontact times. Boesch (1994:17-23) indicates that areas near the mouth of Old Place Creek may contain precontact sites that were once on dry ground. In particular, inundation of these areas due to the rise in sea level at the end of the Pleistocene suggests that Paleo-Indian sites may exist in this vicinity. Paleo-Indian sites located elsewhere on Staten Island (Port Mobil) demonstrate that the area was occupied during this period and suggest such early sites could be preserved below the present sea level.

Historic Resources

The study areas are located along the northern portion of Staten Island. Historic development in this vicinity is documented as early as the 17th century. Development into the 18th, 19th and 20th centuries included industrial pursuits in the northwest portion of Staten Island and along the north shore. Residential and commercial areas developed in the north-central and northeast portions of the island.

Archeological Sensitivity of the Study Areas

Port Ivory Yard

An archeological sensitivity assessment conducted as part of a sludge management plan (Historical Perspectives 1992) assessed areas within the former Procter and Gamble site as potentially sensitive for precontact and historic archeological deposits. According to the report, soil borings conducted as part of the project identified areas containing up to five feet of fill. This assessment included the portion of the current study area south of Richmond Terrace. The portions of the Cross Harbor study area currently occupied by parking areas, rail sidings, and slab foundations were assessed as potentially archeological sensitive. The areas to the north that are occupied by buildings or contain underground utilities such as sewers may have experienced greater disturbance associated with the industrial use of the property and would be considered less sensitive for the presence of archeological deposits.

The files of the NYSM and the OPRHP contain numerous reported precontact sites in the vicinity of the Port Ivory Yard. These include NYSM 8505, which is shown covering the former Procter and Gamble plant east of Western Avenue and described as traces of occupation. Several of the reported sites are indicated east of the plant in the Port Ivory section including the Bowmans Brook North site located during the 1986 survey for the Howland Hook Marine Terminal expansion project and the Gerties Knoll site. The proximity of these sites to the Port Ivory Yard study area suggests a high sensitivity for precontact resources in the study area. Areas now submerged along the north shore of Staten Island may also be considered sensitive for precontact resources. The presence of intact deposits within the Port Ivory Yard and along the shoreline,

however, is dependent upon the extent of disturbance associated with construction and operation of the Proctor and Gamble plant and associated facilities.

The most dominant feature occupying the Port Ivory Yard parcel is the former Proctor and Gamble plant, which has been determined eligible for the National Register of Historic Places. Many of the early plant structures remain. Surface evidence of former structures was noted during the site visit. To the north of the Richmond Terrace and the main complex of the plant are parking areas, storage tanks, foundation remains, and a fuel pipeline. The examination of historical maps shows that the Port Ivory Yard study area had limited historic development prior to construction of the Proctor and Gamble plant in the early 20th century. One map-documented structure is indicated near the intersection of Richmond Terrace and Western Avenue. Vacant industrial buildings currently occupy this area. Based on historical accounts and the examination of historical maps, the Port Ivory Yard study area is considered to have a low to moderate sensitivity for early historic deposits and a high sensitivity for archeological deposits associated with the Proctor and Gamble plant. The areas where earlier historic deposits may be encountered below historic fill include the areas along Richmond Terrace and the southernmost areas near Old Place.

Arlington Yard

The northwestern portion of Staten Island contains many reported precontact resources inventoried in the NYSM and OPRHP files. While none of these sites are shown within the Arlington Yard study area, several are immediately adjacent to the property. To the north is the Bowmans Brook North site mentioned above. Near the northeast corner of the Arlington Yard study area are the Arlington Avenue, Arlington Place, and Arlington Station sites. To the immediate south is the Goodrich site. Near the southwest portion of the study area along the Travis Branch are precontact sites identified in the vicinity of Old Place.

Arlington Yard was constructed in the late 19th century and the Travis Branch of the B&O railroad was constructed in the 1950s. Other than the rail lines, the examination of historical maps shows very little historic development within the study area. The Travis Branch portion of the study area does, however, approach the vicinity of Old Place and several map-documented structures in the vicinity of what is now Goethals Road.

Although the extent of prior disturbance associated with construction and operation of the Arlington Rail Yards is unknown, the area presumably did not consist of major subsurface disturbances such as in the areas presently occupied by buildings in the other study areas. It is assumed that minimum grading was required for construction of the yard and thus intact soils may exist beneath the rail lines. Some disturbances have occurred in portions of the former Arlington Yard as evidenced by large spoil piles noted during the site visit. However, previous surveys conducted in the vicinity of Old Place, including the 1986 survey for the Howland Hook Marine Terminal Expansion and the 1995 study for the Goethals Bridge improvement project, indicate that precontact and

early historic archeological resources have survived historic development in this vicinity. Therefore, the Arlington Yard study area is considered highly sensitive for precontact resources. The southernmost portion of the Travis Branch is considered moderately to highly sensitive for early historic resources associated with map-documented structures located in the vicinity of Old Place.

Clearances

The Staten Island Railroad was constructed along the north shore of Staten Island in the 1880s. The examination of historical maps indicates that prior to that, the vicinity of the clearances was sparsely developed. During the first half of the 20th century, grade crossings along the railroad were eliminated. Since the rail line is located anywhere from 10 to 20 feet below adjacent grades, it is assumed that the grade crossings were eliminated by cutting the rail line to its present grade. Currently, buried utilities run along and perpendicular to the rail line. Although the site file review indicated reported precontact resources in the immediate vicinity of the clearances, the prior disturbance associated with removal of grade crossings and the installation of utilities eliminates the possibility of encountering intact precontact deposits within the railroad right-of-way. Likewise, it is unlikely that early historic deposits associated with map-documented structures would have survived as well. Therefore, the areas of the clearances are not considered sensitive for precontact or historic archeological resources.

Tunnel

The proposed Staten Island tunnel contains areas of open cut trenching, cut and cover construction, and mining. The mined portion of the tunnel would be at a depth of 65 feet below grade. This portion of the tunnel is not considered archeological sensitive for precontact or historic archeological resources.

Reviews of the NYSM and the OPRHP site files identified several reported precontact sites along the northern portion of Staten Island in the vicinity of the open cut and cut and cover portions of the proposed tunnel. These include reported village, cemetery and camp sites located in the vicinity of Port Richmond and near Bement Avenue and Sailors Snug Harbor. Like the shoreline areas of the Port Ivory Yard, the shoreline areas in the vicinity of the open cut and the cut and cover portions of the tunnel may contain precontact deposits in areas that are now submerged but which would have been above sea level in precontact periods. Therefore, the open cut and cut and cover portions of the tunnel are considered sensitive for precontact resources.

The open cut and cut and cover portions of the tunnel are located in a heavily industrial area along the north shore of Staten Island between Elm and Davis avenues and Davis Avenue and Tysen Street, respectively. The examination of historical maps shows that Richmond Terrace ran along the northern shoreline and that the alignment of the Staten Island Railroad was built on fill north of the road and within the Kill Van Kull. By the early 20th century the area between the railroad and Richmond Terrace had been filled. Soil borings conducted in the vicinity indicate fill to depths of 8 to 13.5 feet.

Based on the examination of historical maps, other than a sash and blind factory near Bement Avenue and a store and dwelling near Davis Avenue, little development occurred in the area between the railroad and Richmond Terrace along the open cut portion. To the north of the railroad along the western half of the open cut area, however, were dry docks, piers, and buildings associated with ship yards and machine shops. The use of this area for marine and repair yards continued into the mid-20th century. The examination of historical maps indicates that limited historic development occurred along the proposed cut and cover portion of the tunnel as well. Near the western end of this section was the Staten Island Edison Co. located in the block bounded by Davis and Bard avenues, Richmond Terrace and the railroad. This block was previously occupied by three buildings. The only other map-documented development along the cut and cover portion of the study area was the Livingston Passenger station located along the railroad just east of Bard Avenue and the Sailors Snug Harbor boat house and dock located on the Kill Van Kull near the Sailors Snug complex.

Presently the vicinity of the open cut and the cut and cover portions of the tunnel remains highly industrial. Neither of these sections is considered sensitive for early historic deposits. The open cut portion of the tunnel is considered archeologically sensitive for deposits and structures associated with the early 20th century shipbuilding industry in this area. The cut and cover portion may contain limited archeological deposits associated with the power station, railroad station and the Sailors Snug Harbor boat house and dock.

Immersed Tube Alternative

It is possible that construction of the tunnel off the northeast shore of Staten Island may be of an immersed tube method instead of a bored tunnel. If an immersed tube method is used, it would require cut and cover construction, which, according to preliminary vertical profiles dated October 2001, would extend to elevations of approximately –120 feet at Station 590 to –150 feet at Station 620 at the Anchorage Channel. A coffer dam would be required for the cut and cover excavation.

A survey conducted in this vicinity (Kardas and Larrabee 1977) indicated that the current shoreline from the Coast Guard Station south to the Alice Austen House beach is east of the historic shoreline. Soil borings near and within New York Harbor in the vicinity of the tunnel were provided. Soil Boring 321-R was conducted just west of the piers. Fill was encountered to a depth of 15 feet. Blocks and cobbles were found at depths of 12 to 14 feet and were interpreted as possibly an old sea wall structure indicating this area consists of made land in previously submerged areas. Soil Boring 323E-W was taken near the pierhead line. The depth of the water extended to 24 feet. Below the water was organic silty clay with a trace of shell and vegetation at depths of 50 to 55 feet.

Over the past thousands of years, natural fluctuations in sea level have at times dramatically altered water levels in streams, rivers, and lakes, thus changing the locations of shorelines over time. The cut and cover portions of the tube near the present shoreline

are considered sensitive for precontact resources as they may contain precontact deposits in areas that are now submerged but which would have been above sea level in precontact periods. The potential for encountering precontact resources deeper within the harbor would depend upon the location of shorelines during early precontact times. Underwater strata may contain evidence of early human occupation along earlier shorelines. Therefore, it may be necessary to conduct additional studies in order to determine the extent of precontact shorelines in this area in order to assess the potential for the harbor to contain precontact resources.

Except for some landings and piers, the examination of historical maps shows limited development along the Staten Island shoreline in the vicinity of the tunnel during the mid-19th century. The late 19th and early to mid- 20th century maps show extensive warehouses west of the piers. Several studies have been conducted in the Kill Van Kull and New York Harbor areas as part of drift removal projects and have identified numerous vessels along the shores of Staten Island. The potential of the study area to contain shipwrecks is being investigated by others. The sensitivity of the study area for historic period cultural resources is limited to the potential presence of waterfront related features such as piers, bulkheads and seawalls (see soil boring 321-R).

MITIGATION OF POTENTIAL IMPACTS

Potential National Register eligible archeological sites within the impact area of proposed construction areas must be identified for proper mitigation or avoidance. Therefore, archeological sites, with visible or below-surface remains, would need to be located and investigated to determine if they meet National Register criteria. To identify any potential sites, Phase I archeological field testing would be undertaken in the areas determined to be archeologically sensitive. Phase II site evaluation may then be necessary to provide data for an eligibility assessment if any resources are identified. Phase II investigations would focus on identifying site boundaries, chronological placement and cultural affiliations. Any sites determined to be eligible for the National Register, on consultation with the OPRHP, would need to be avoided or would require data retrieval and documentation to mitigate the potential impacts to the site before construction.

PROPOSED CONSTRUCTION AND RECOMMENDATIONS

The study areas are located in an urban setting and have undergone varying degrees of prior disturbance associated with historic development and use. Based on the results of archeological surveys conducted in the immediate vicinity, it is possible that archeological remains associated with the prior occupation and development in the area are located at varying depths within the study areas. The site file search and historic research have provided data that indicate a high archeological potential for the Port Ivory and Arlington Yards. The unknown factor is the degree to which archeological materials are preserved in (1) undisturbed areas, (2) filled areas, (3) wetland areas, and (4) areas of recent construction. Arlington Yard has limited areas of prior disturbance. However, depending on the location of proposed development, it is possible that archeological

deposits may be encountered in the Port Ivory Yard and along the railroad clearances if construction extends outside the current right-of-way. The open cut portion and cut and cover portions of the tunnel where excavation will extend from about 0-20 feet are also highly sensitive for precontact and historic archeological deposits. Depending on the type, extent, and depth of proposed construction associated with the Cross Harbor Freight Improvement Project, it is possible that extant archeological deposits will be encountered.

Preliminary plans call for no new construction within Port Ivory Yard, therefore no archeological investigation would be recommended. Within Arlington Yard, two new mainline tracks would be constructed along the Staten Island Railroad extending to the proposed tunnel. The new lines would run straight across the existing right-of-way and may include replacing the existing tracks in the same location. Depending on the extent of excavation required for construction of the new lines within Arlington Yard, limited archeological investigation may be required. If tracks will be replaced on the existing grade and will not involve excavation below the existing gravel base, no testing is recommended. However, if excavation will extend below the existing gravel base, subsurface testing is recommended. Within the Clearance area, the project requires increasing clearance heights along the former Staten Island Railroad, laying two new tracks and conducting associated utility work. All proposed work will be limited to the existing right-of-way. Proposed excavation will extend between 1.5 feet and 5 feet at the overpasses located at Harbor Road, Union, DeHart, Van Pelt, Van Name, Simonson, Lake, Granite, and Morningstar avenues. The proposed clearance trench at South Avenue will be 40 feet wide, 3 feet deep and extend 500 feet on either side of the South Avenue overpass. Between Harbor Road and Morningstar Avenue the trench will be 40 feet wide and five feet deep. Earth retaining structures will be built within the cut area and will be nine feet high with three feet of embedment. As long as the impacts associated with the clearance work are limited to the existing right-of-way, no archeological investigation is recommended for the clearance areas between South Avenue and John Street. Historic resources located in the clearance areas include the remains of some of the former Staten Island Railway Stations. However, these station remains are not considered to have a high research potential, therefore no further consideration is recommended.

The mined portion of the tunnel would be at a depth of 65 feet below grade. This portion of the tunnel is not considered archeological sensitive for precontact or historic archeological resources. Therefore, no archeological investigation is recommended. In order to determine the presence of cultural resources within any open cut or cut and cover portions of the proposed tunnel, archeological investigation is recommended.

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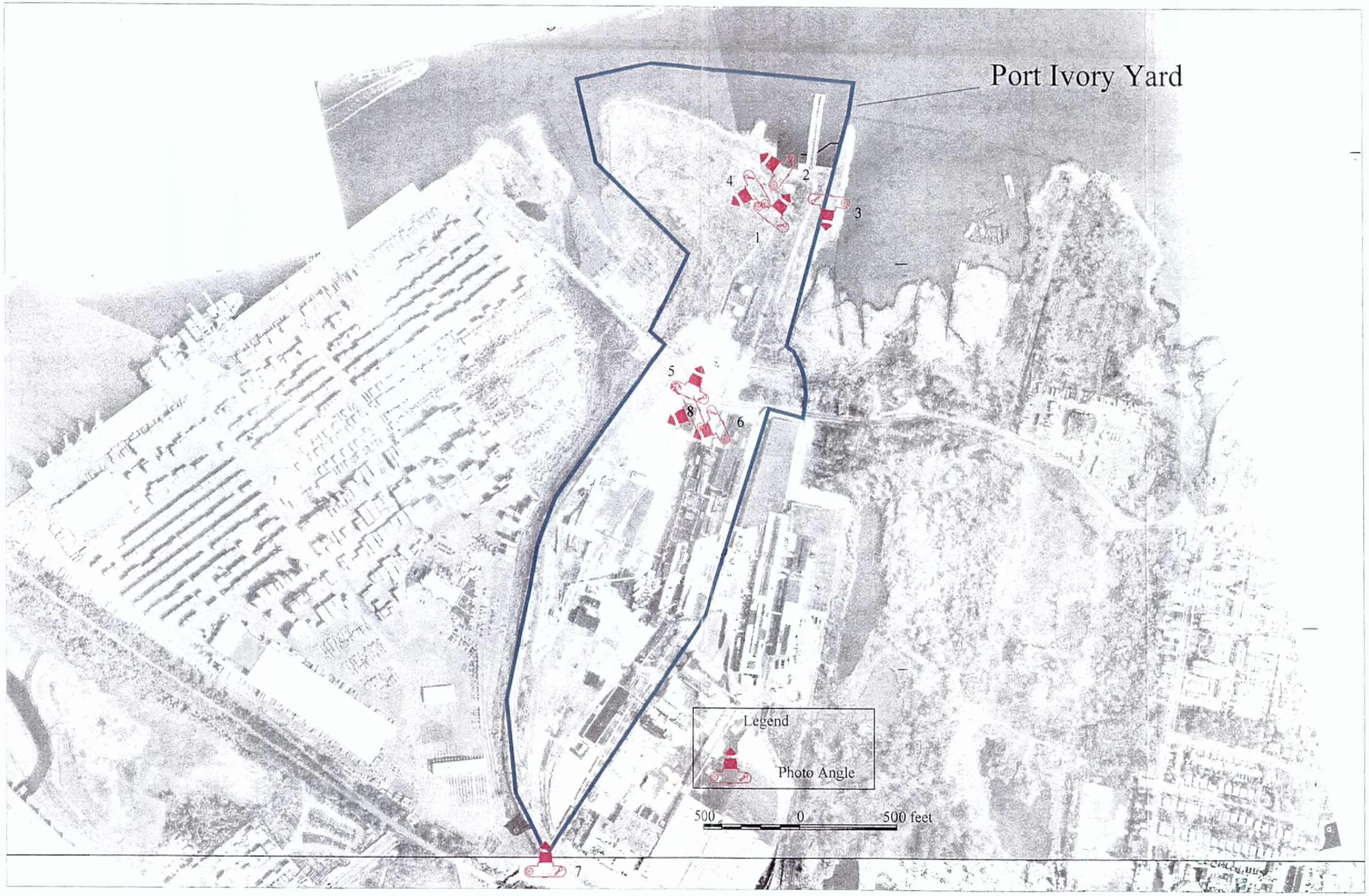
MAPS



Map 2
Port Ivory Yard
AKRF 2001
April 2002

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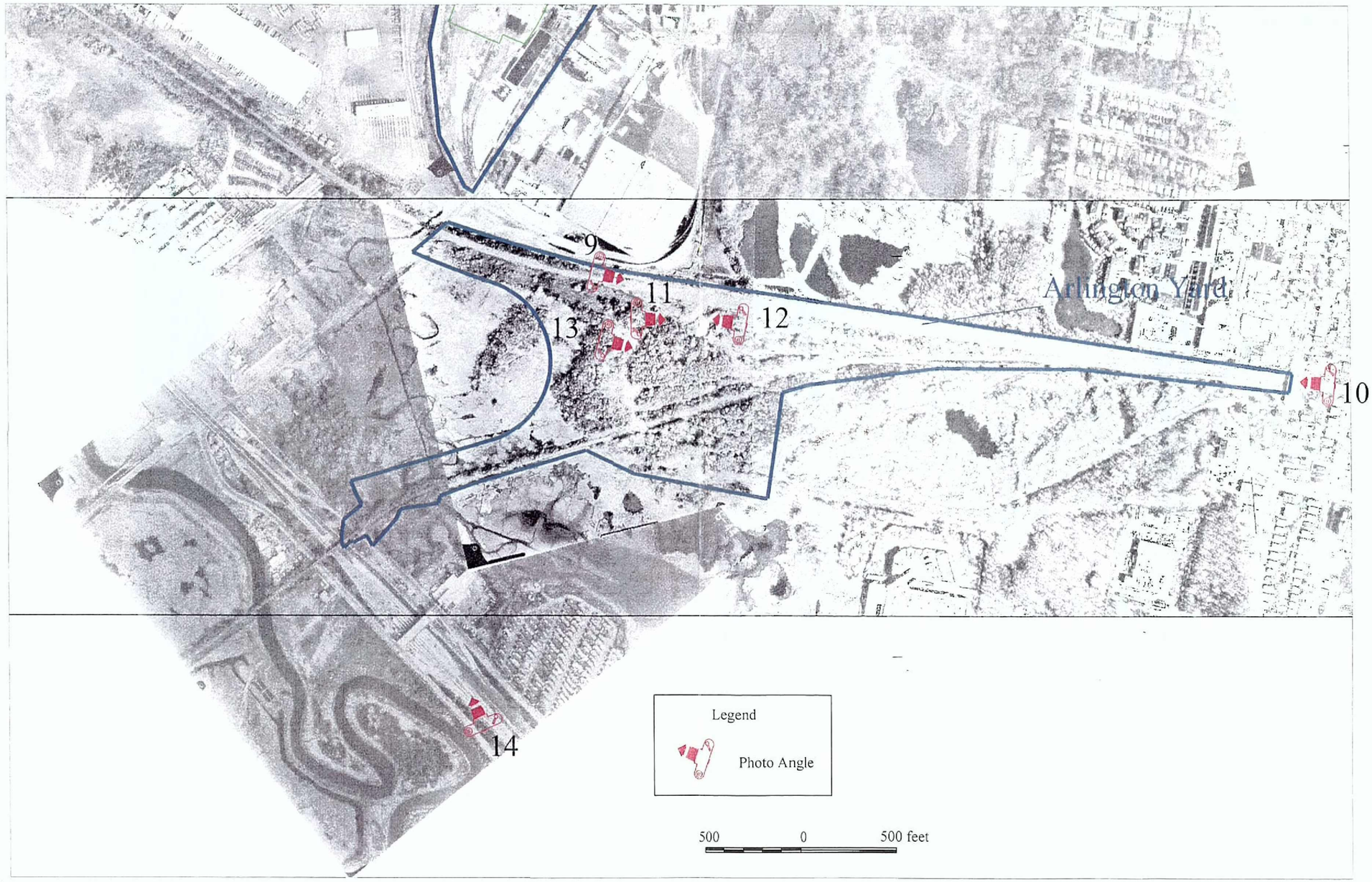

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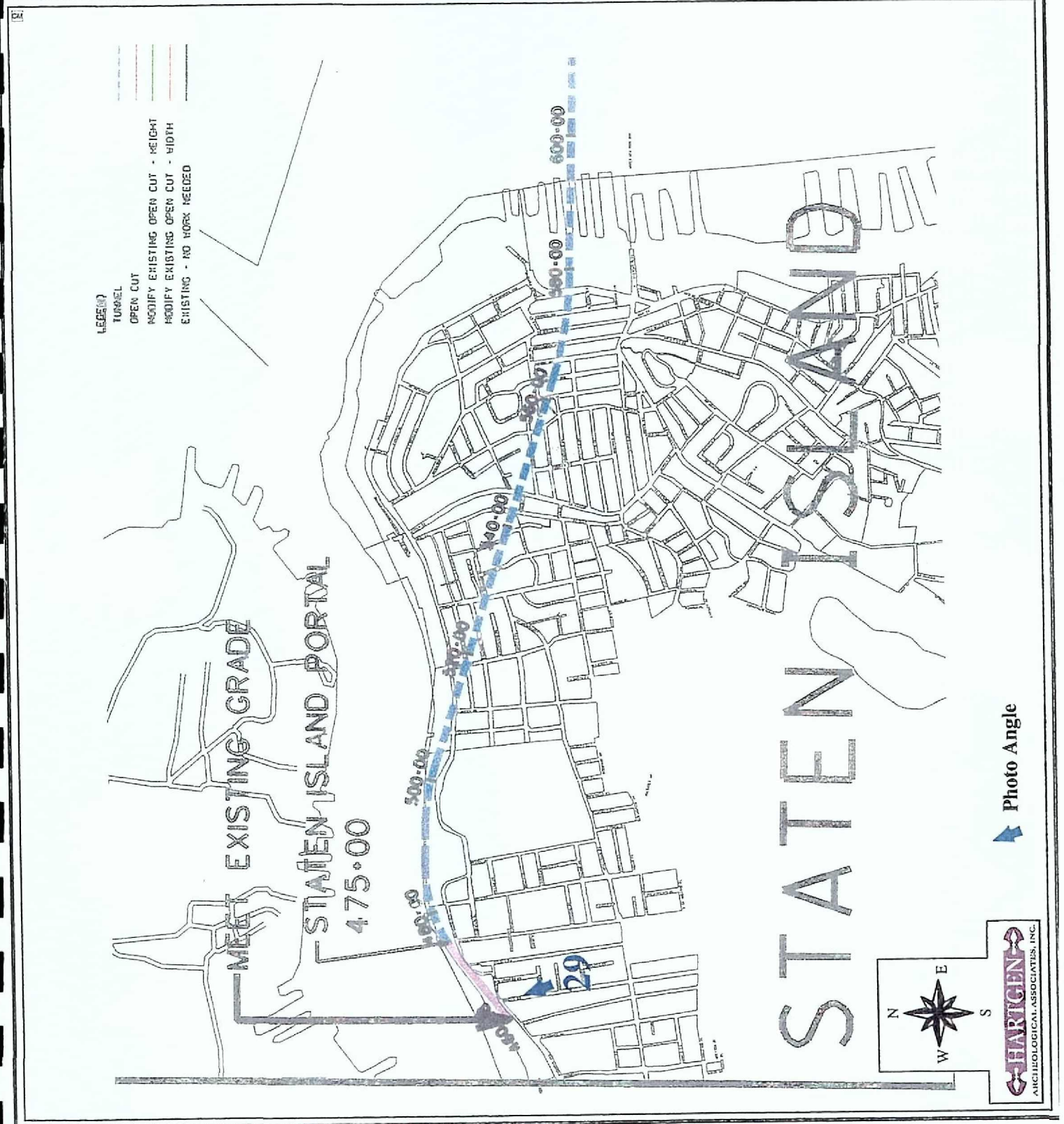

Map 4

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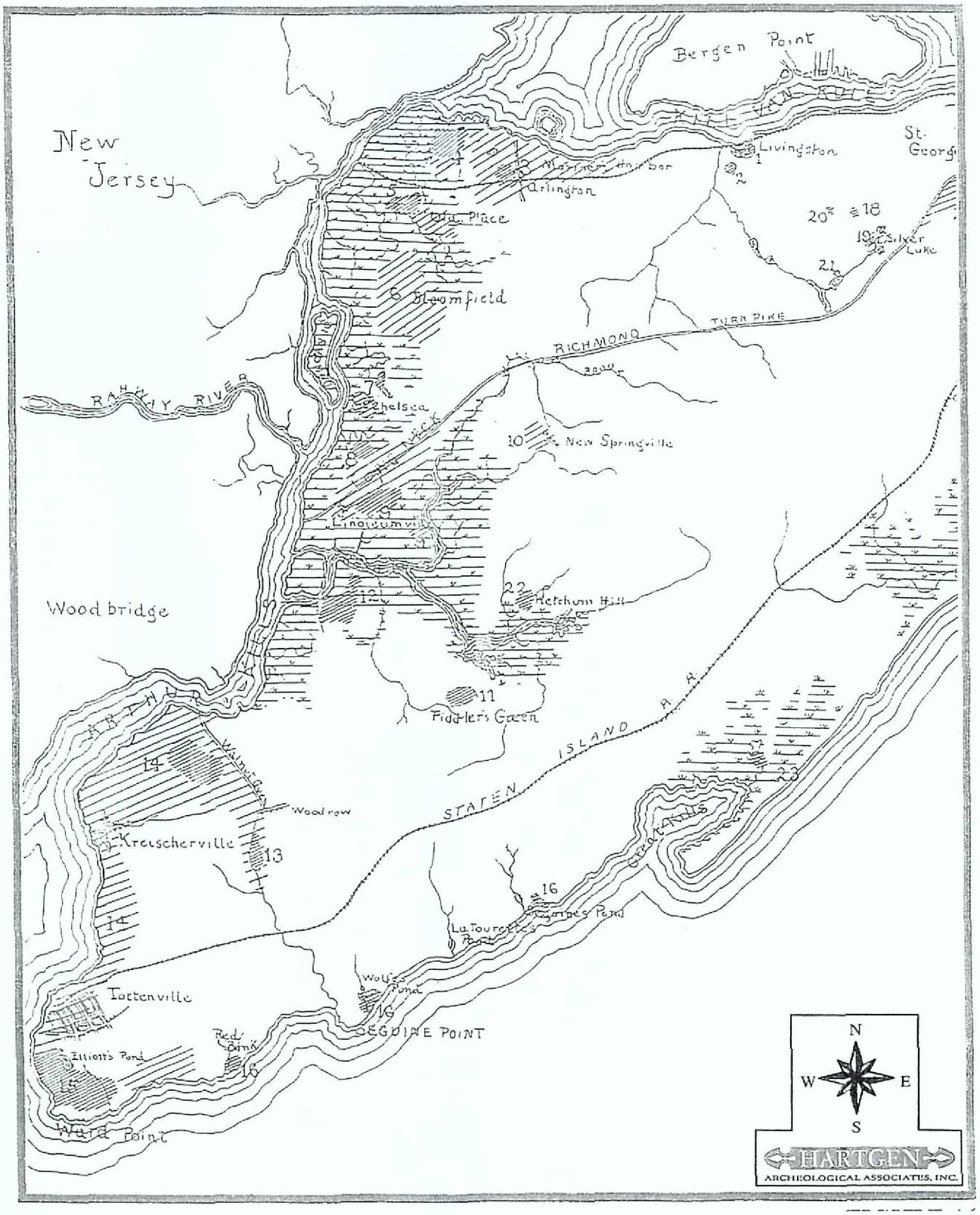

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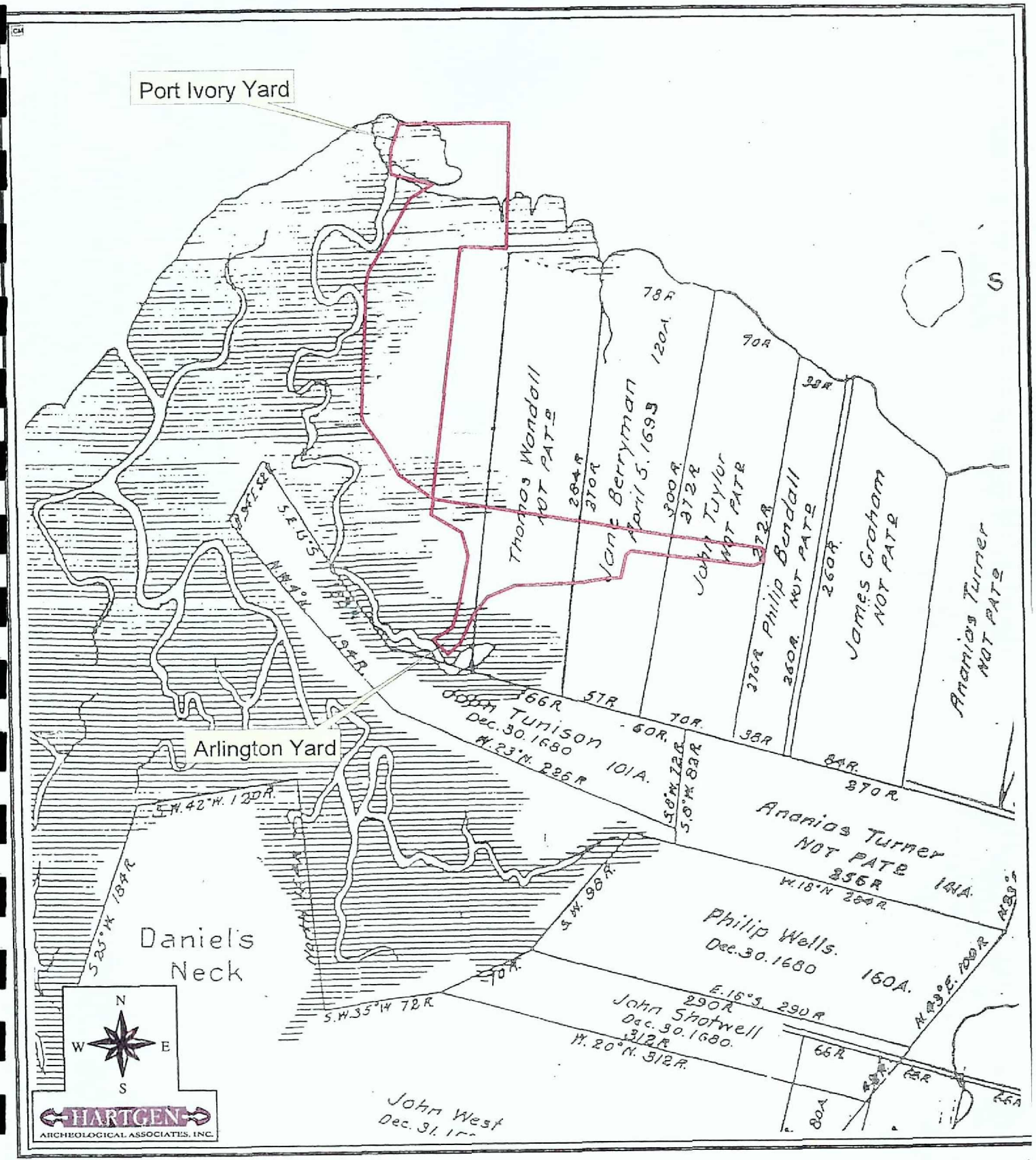

Map 6

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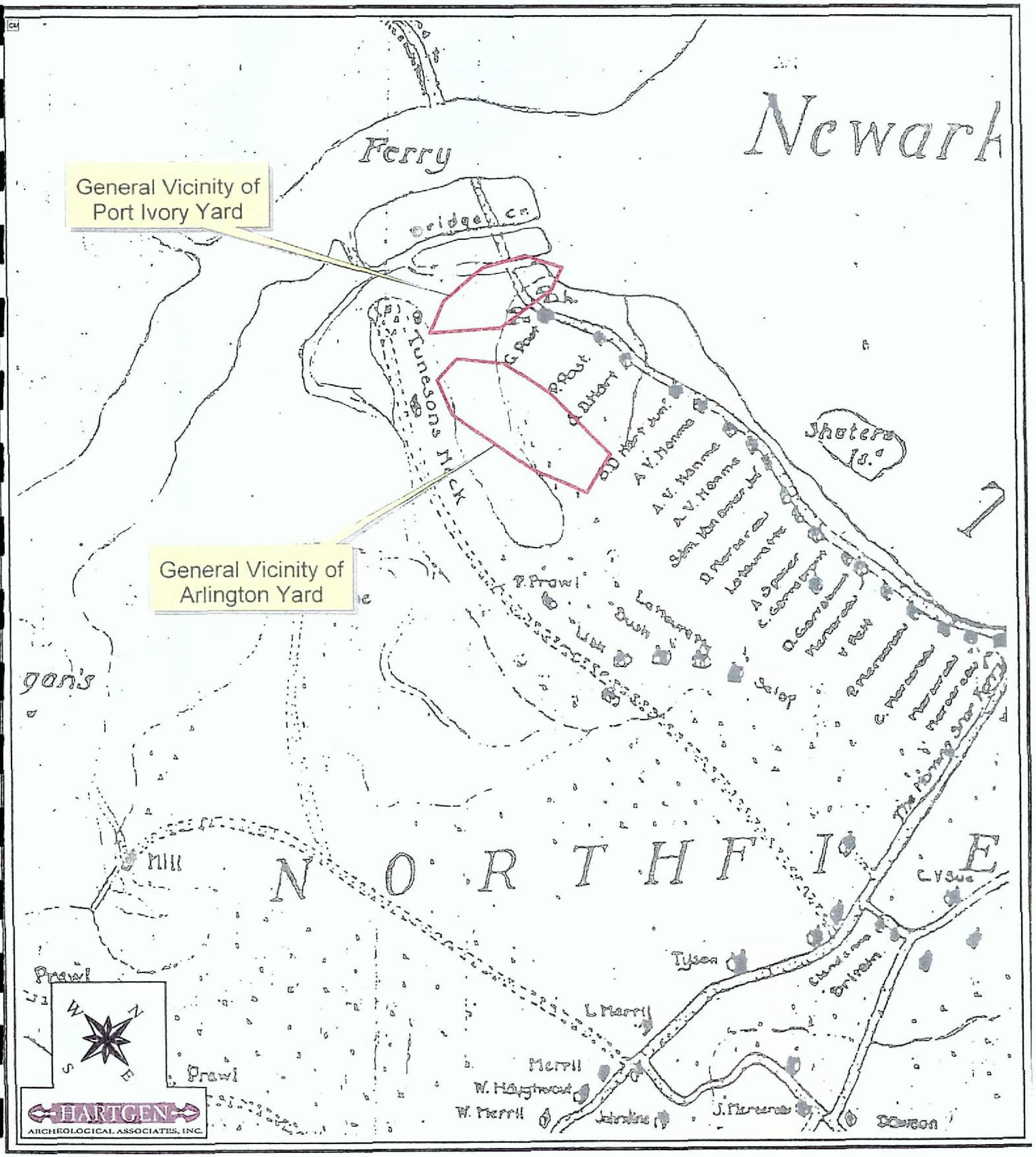

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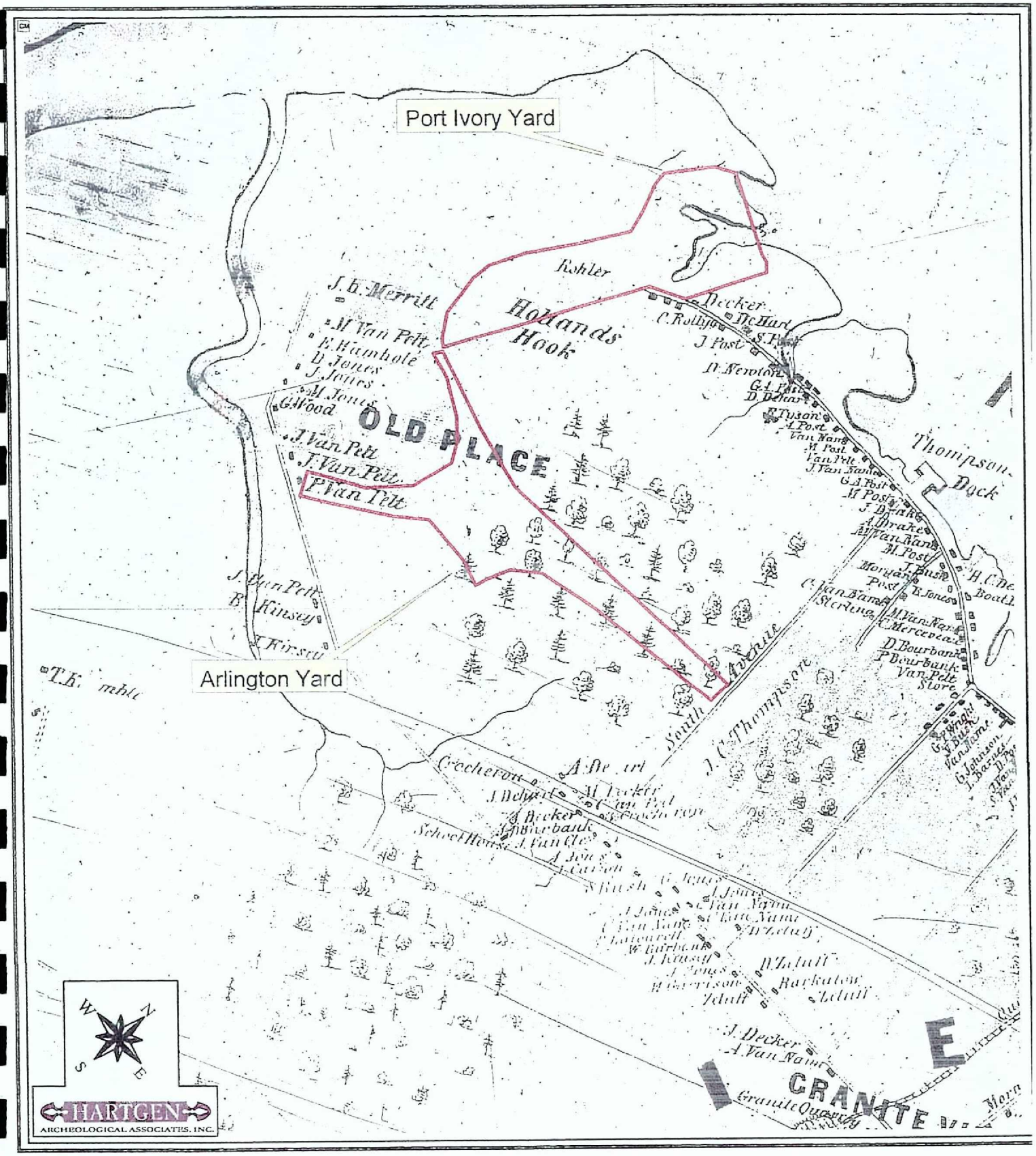

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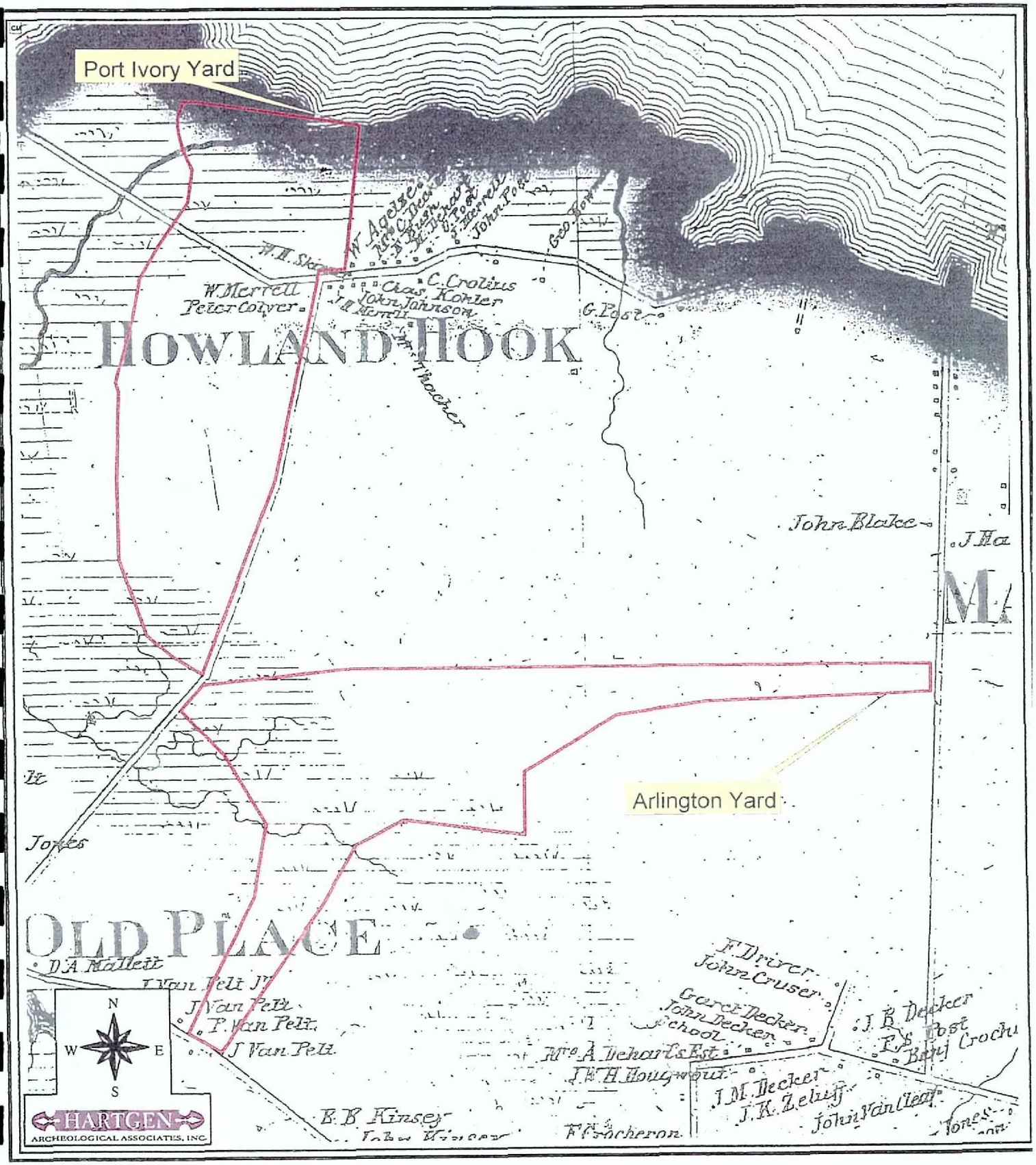

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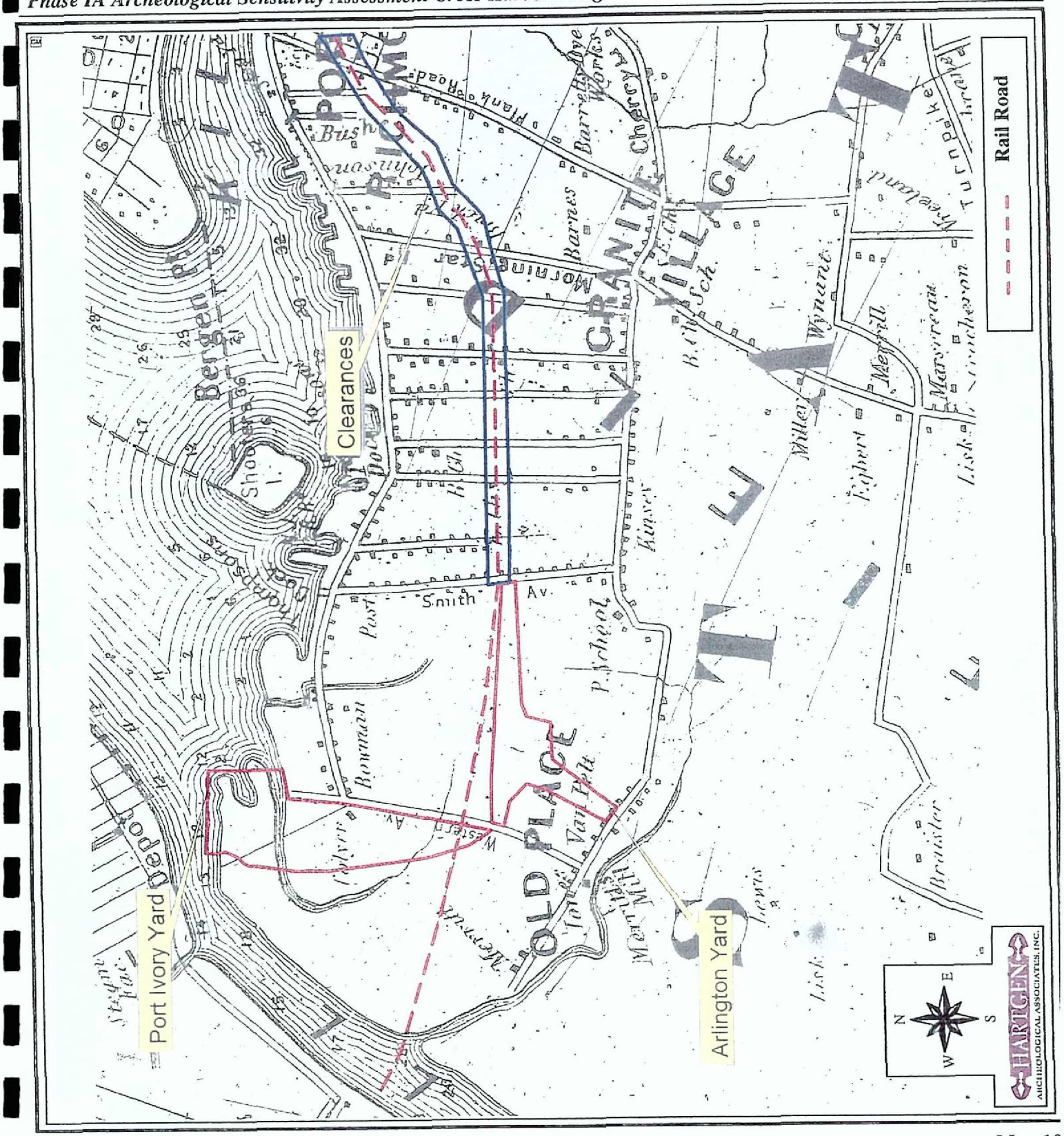

Map 10

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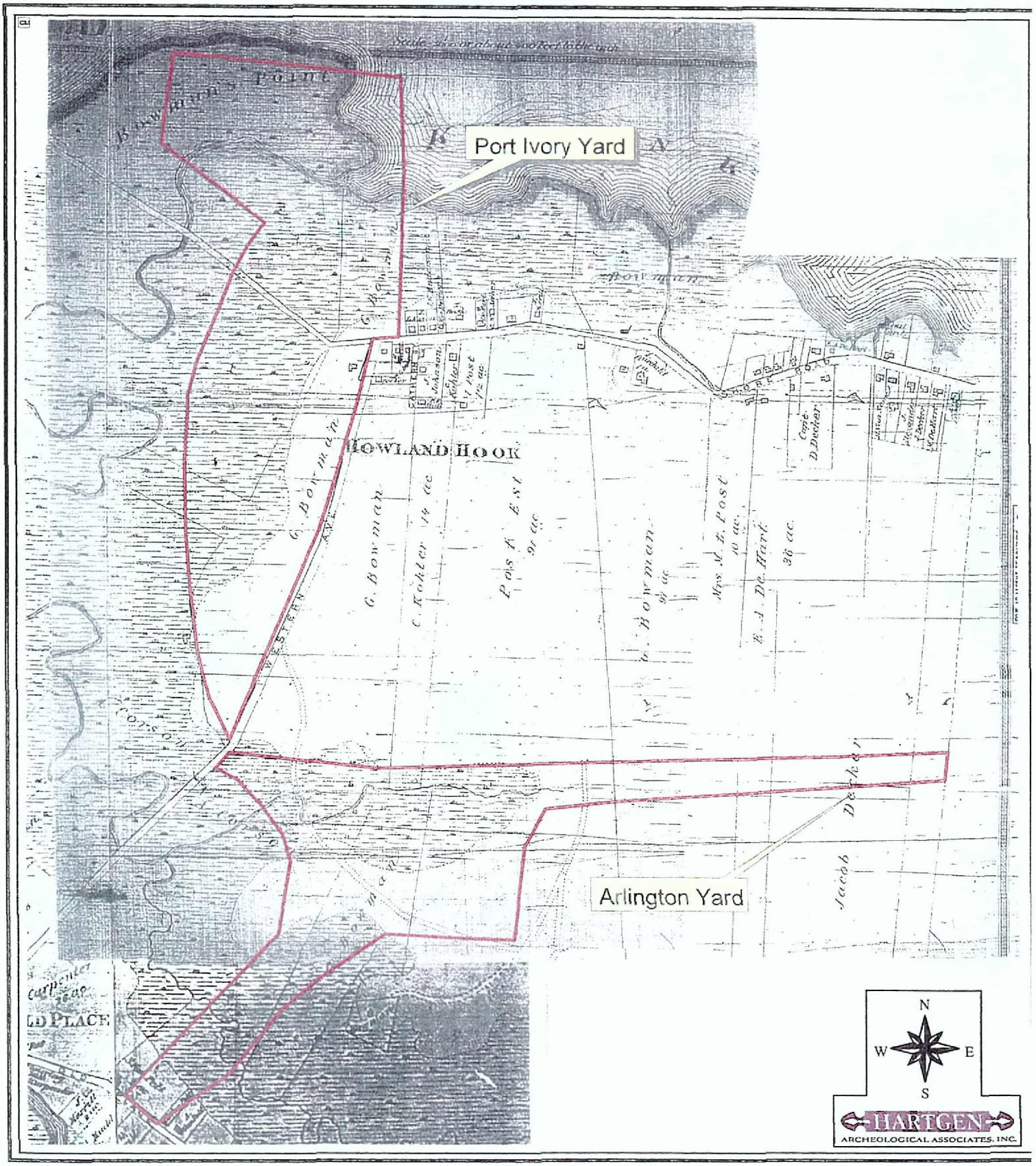

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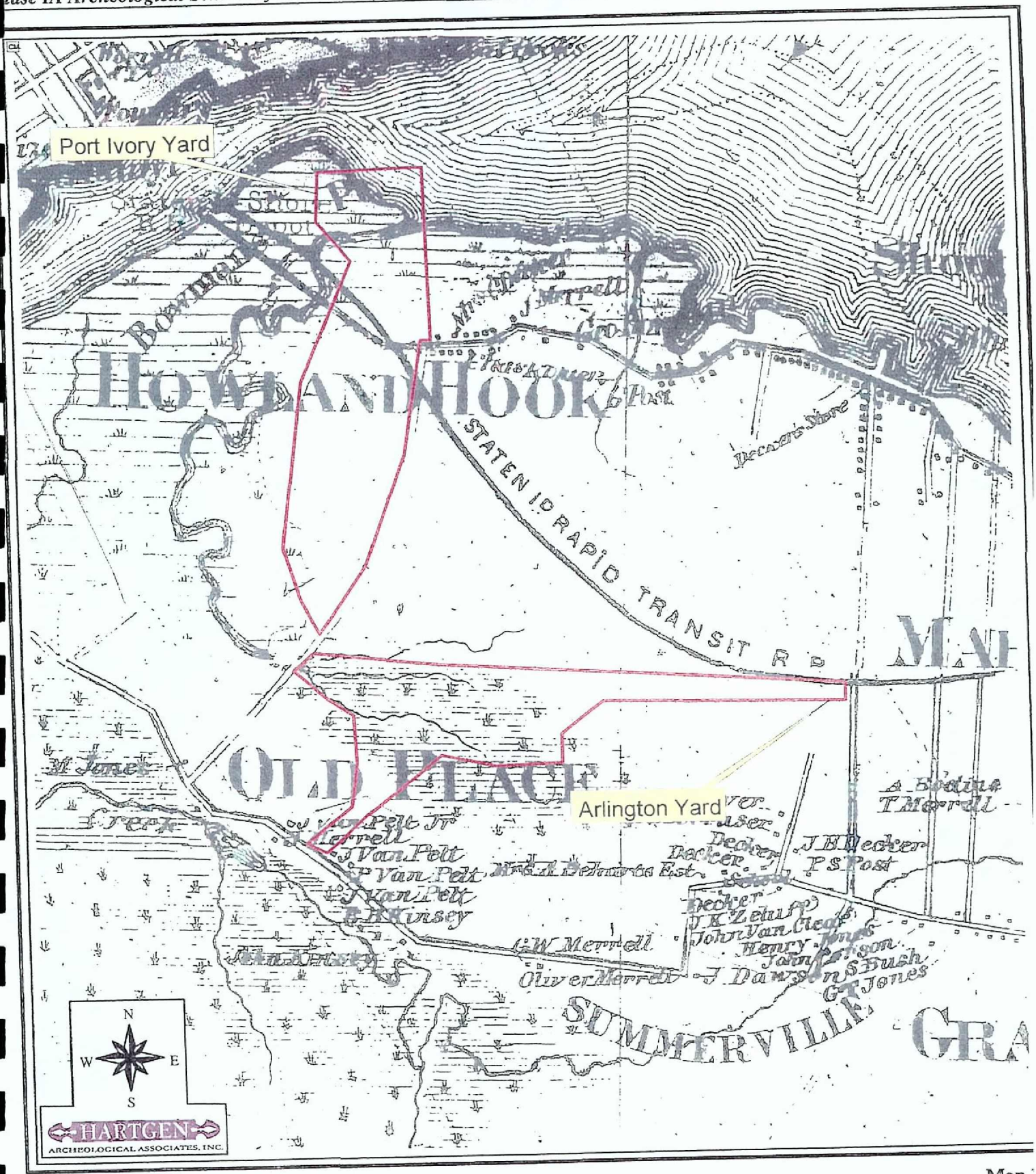

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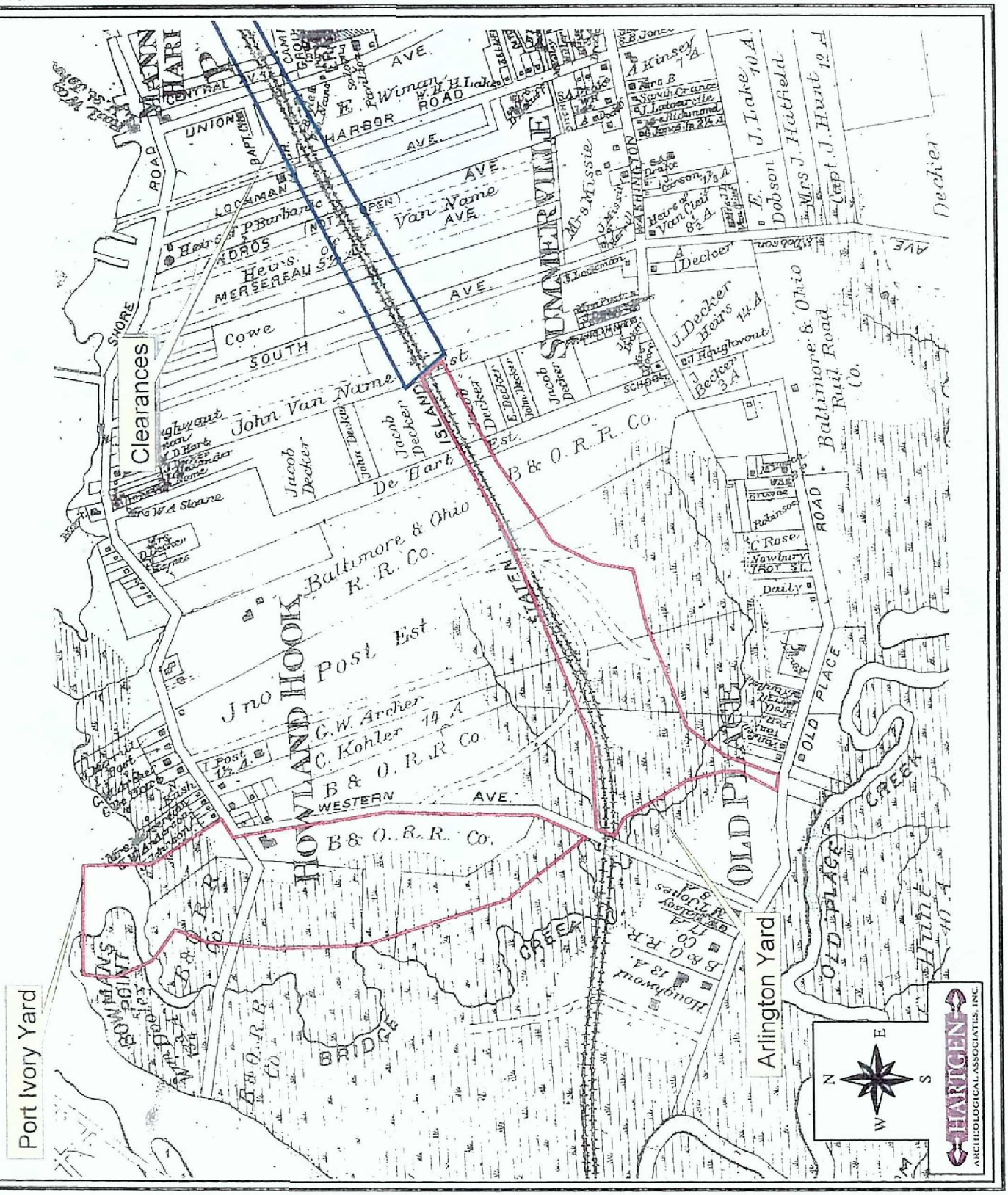

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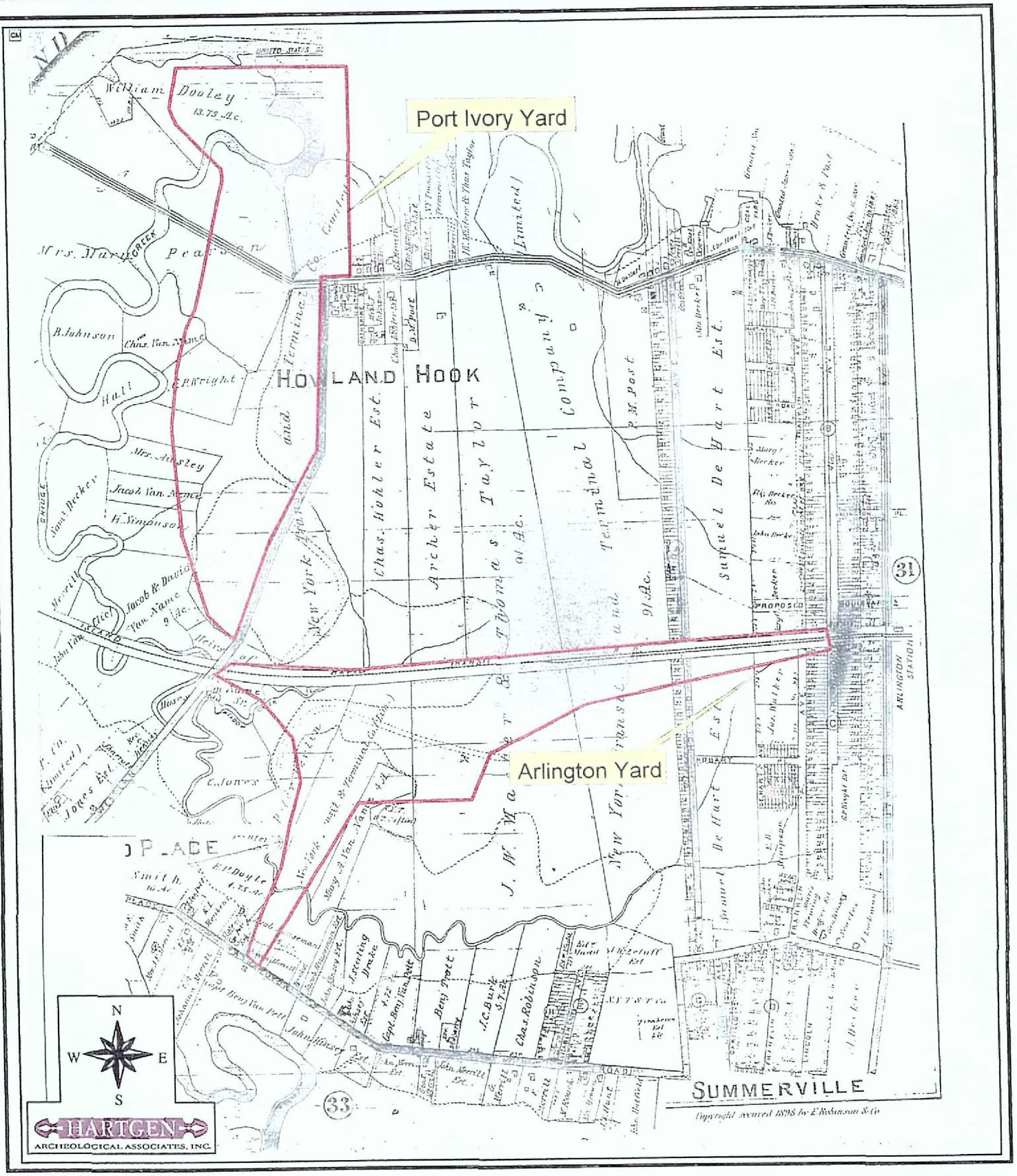

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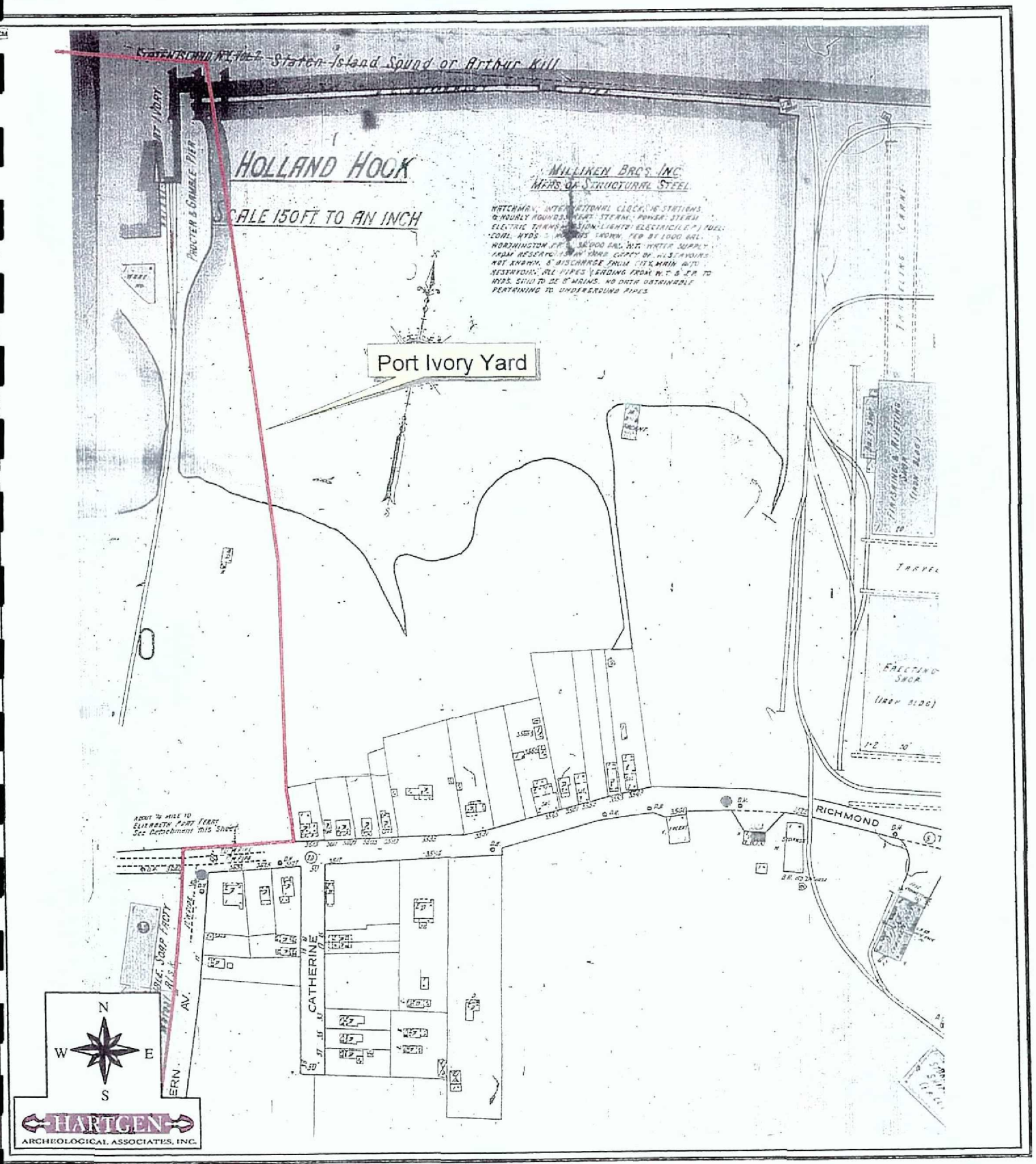

Map 15

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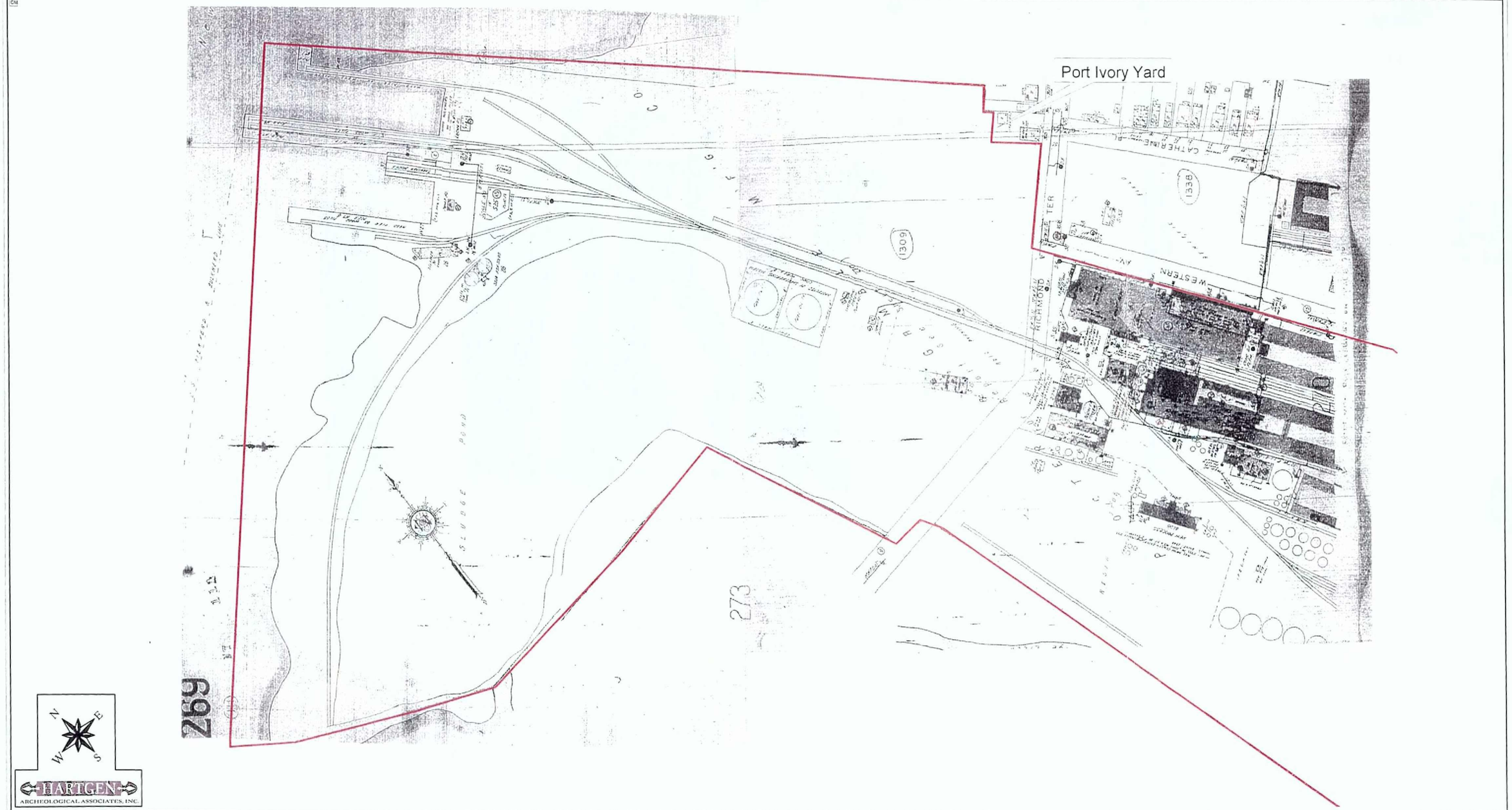

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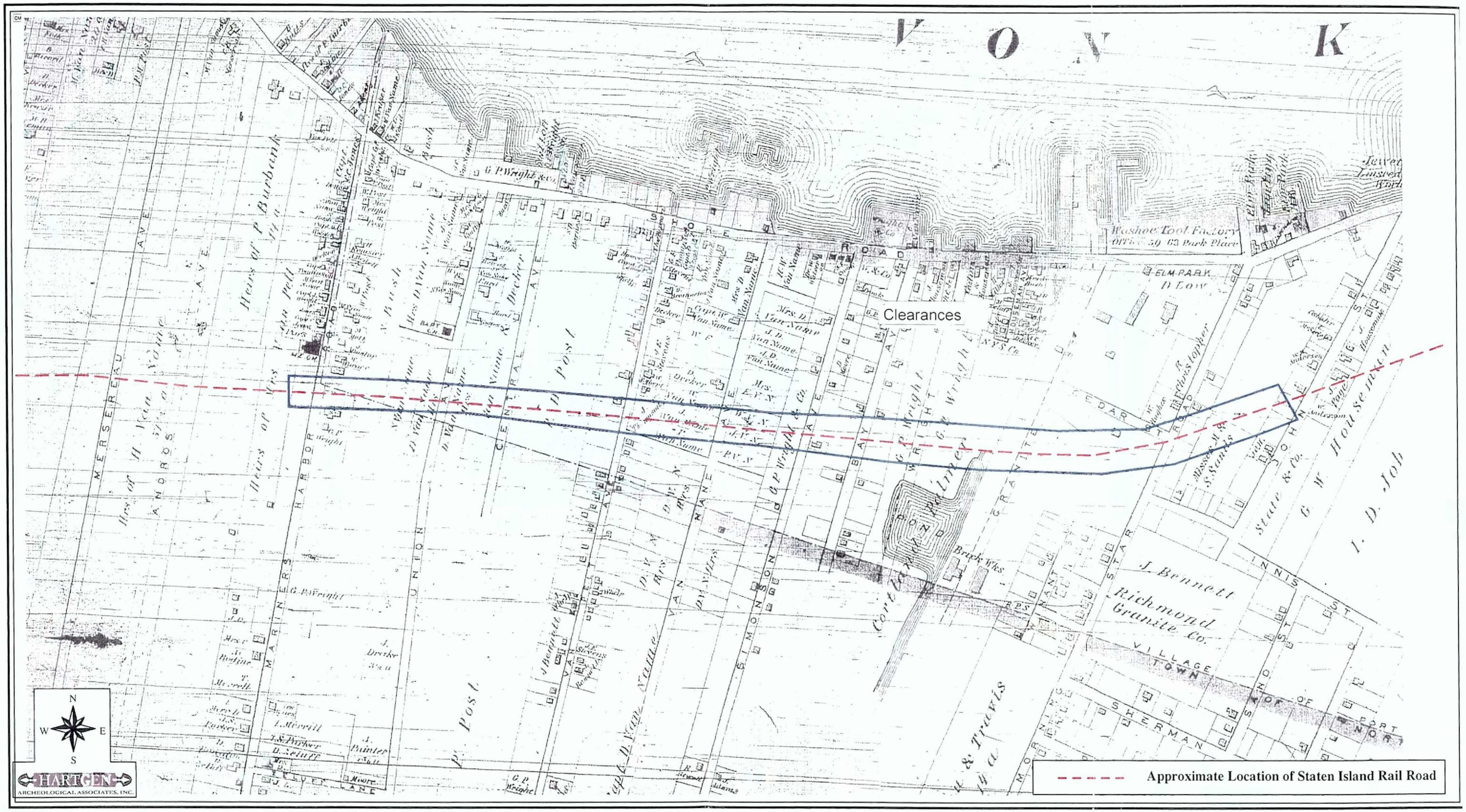

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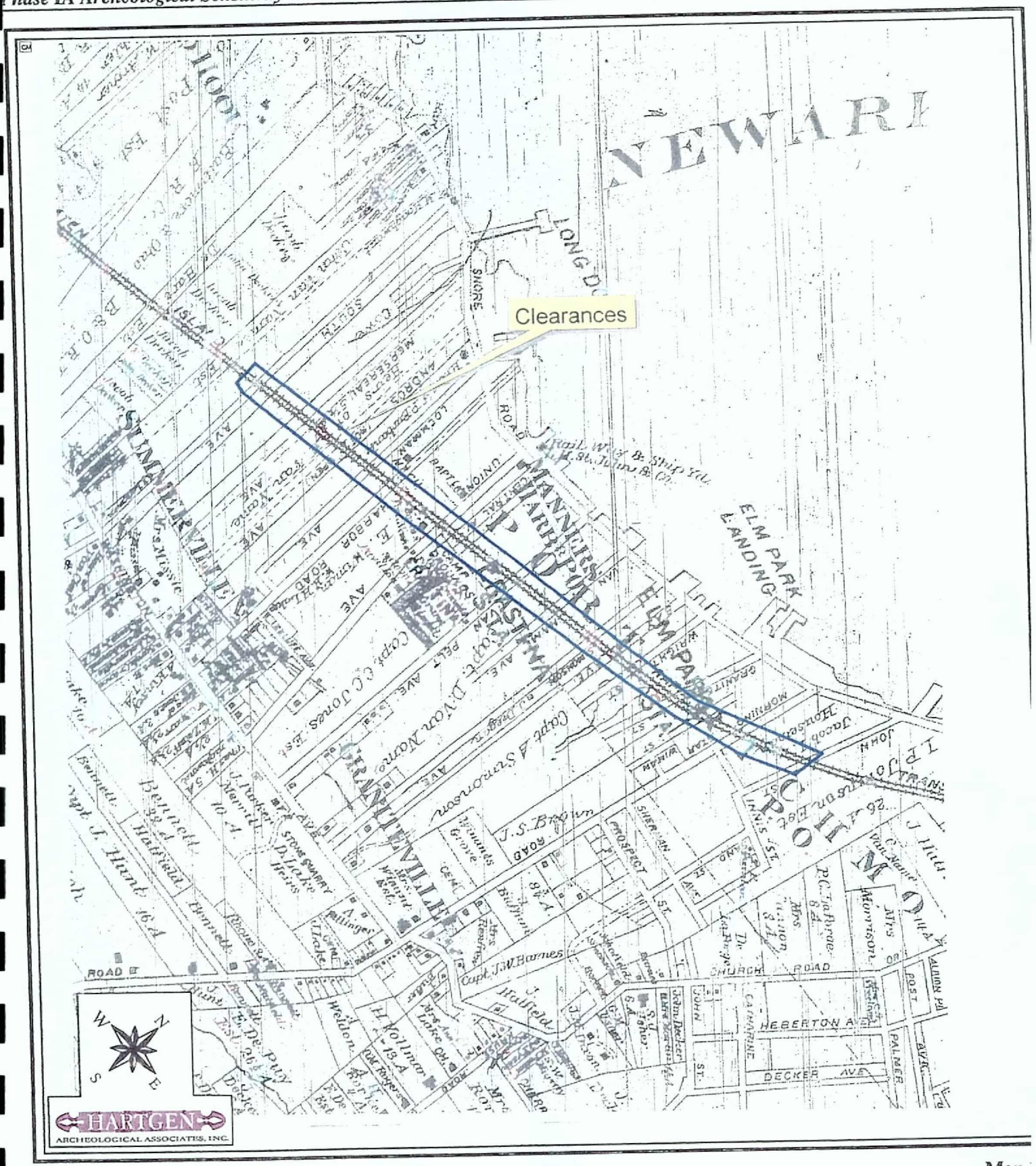

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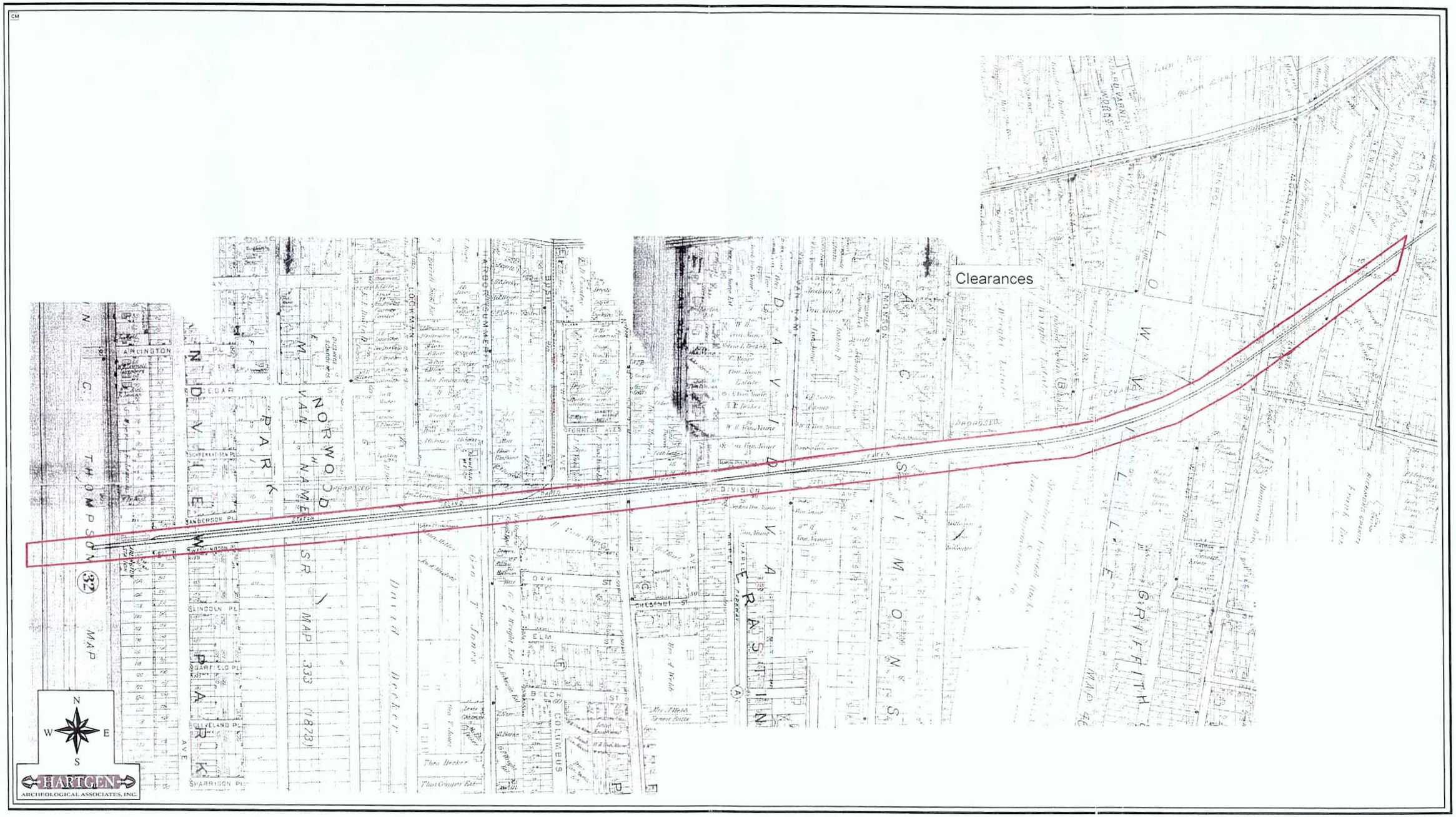

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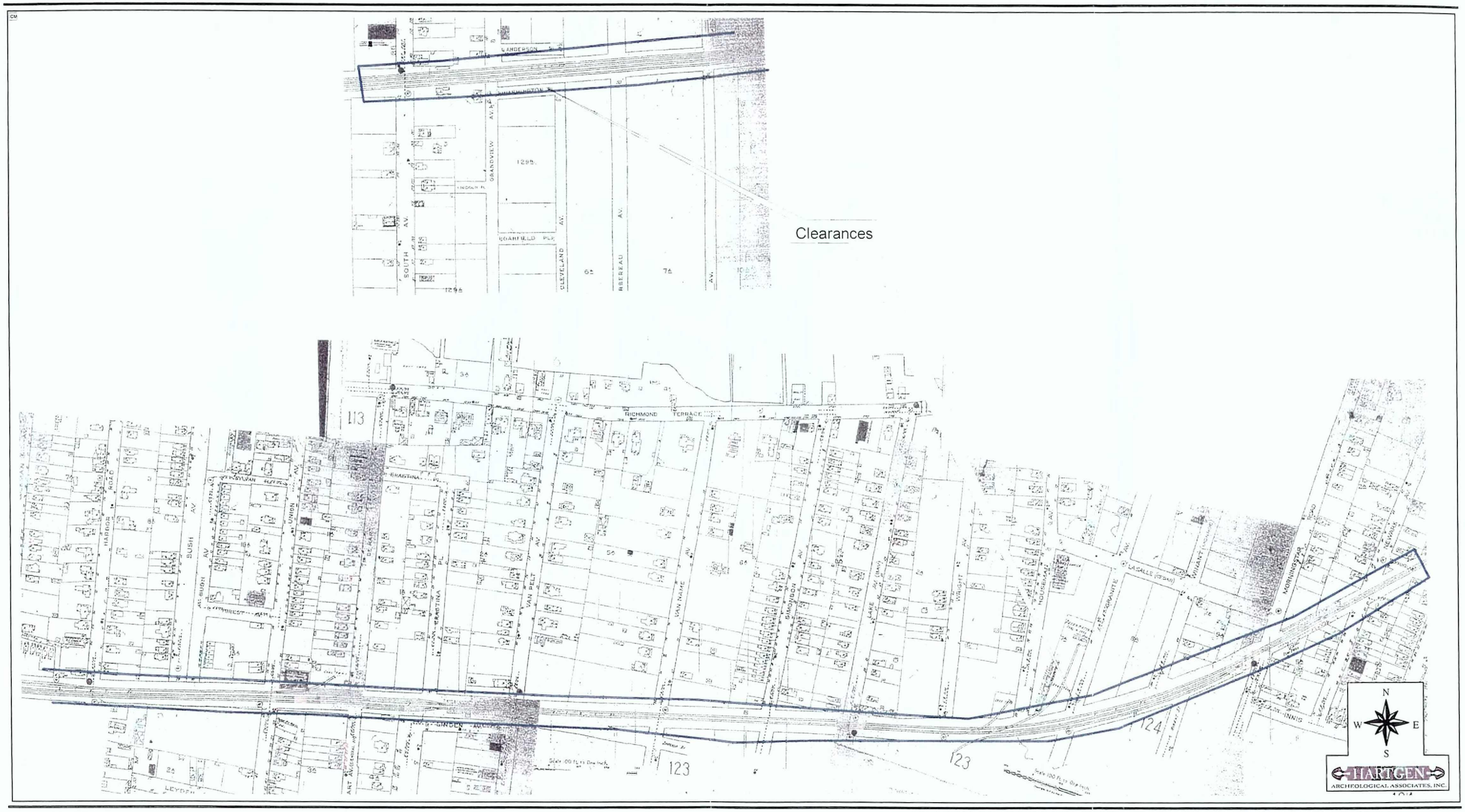

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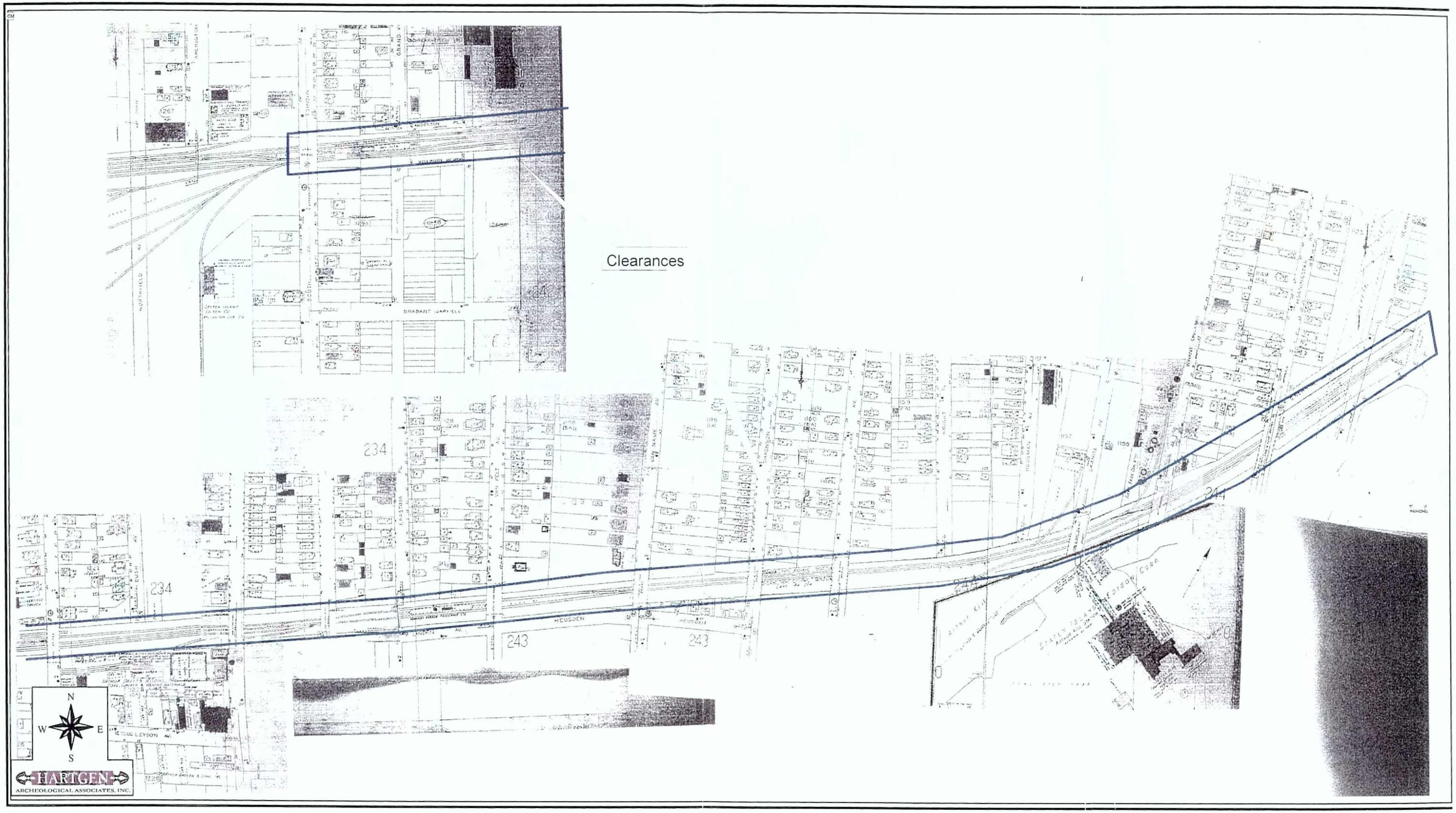

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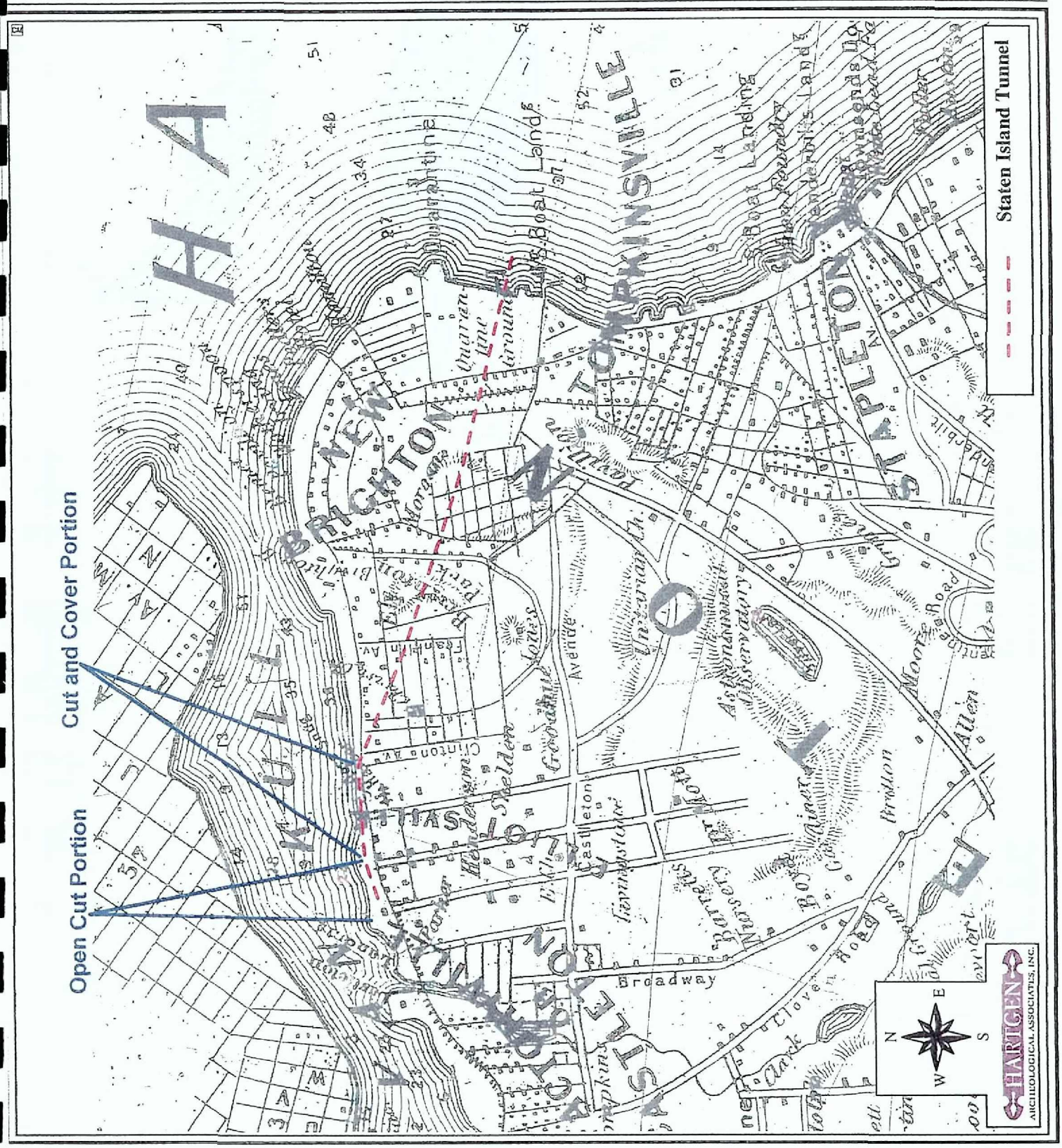

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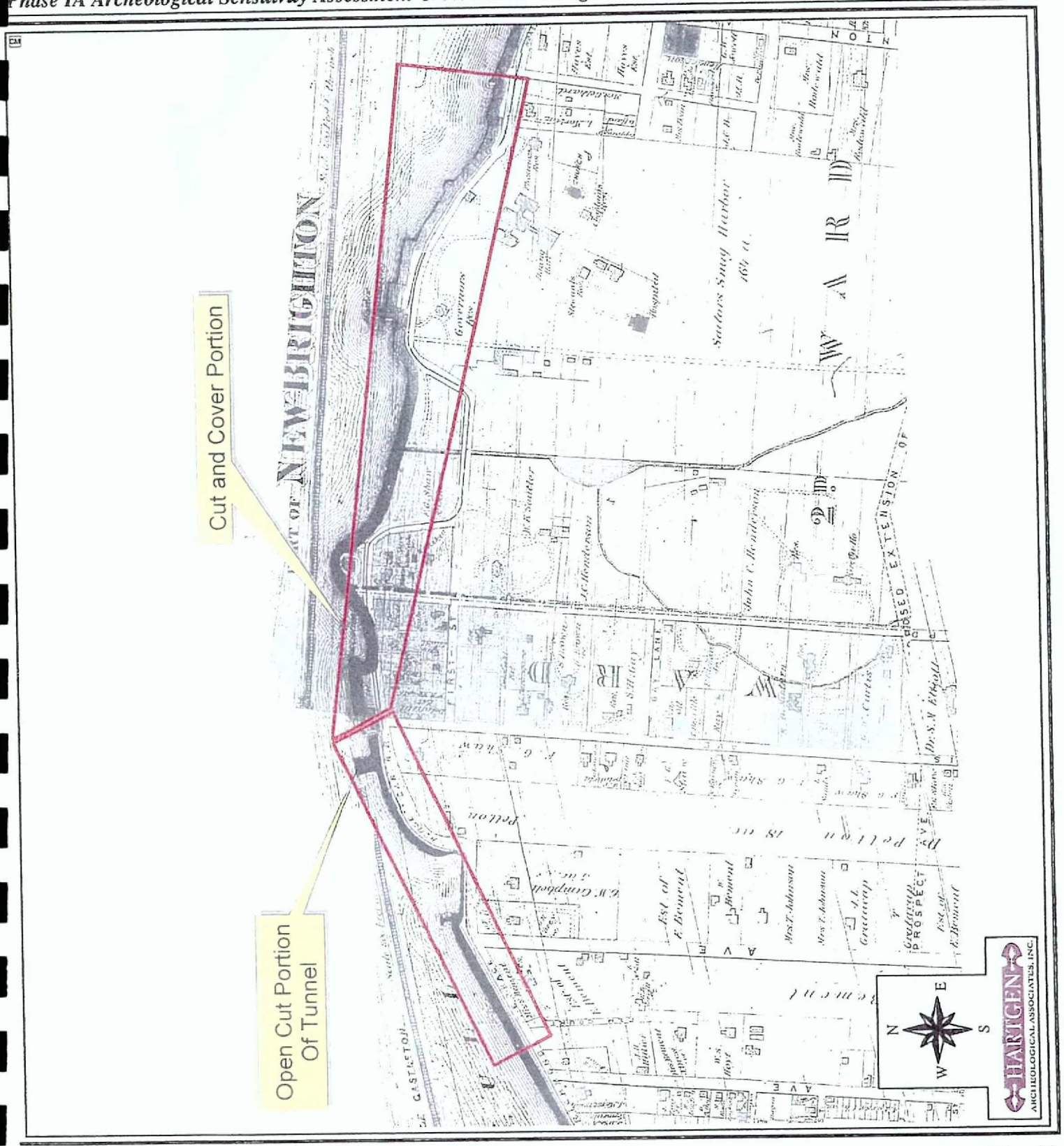

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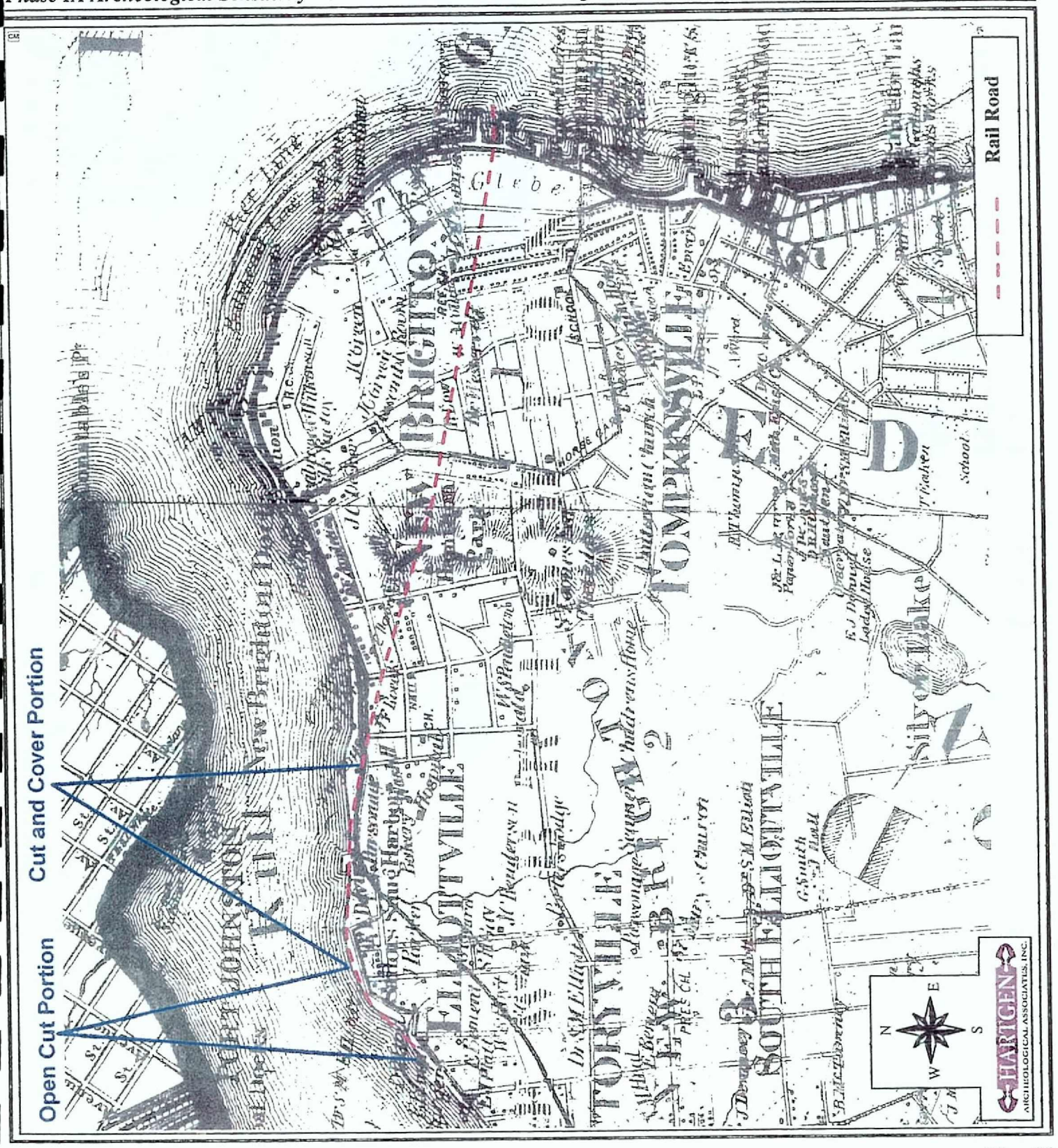

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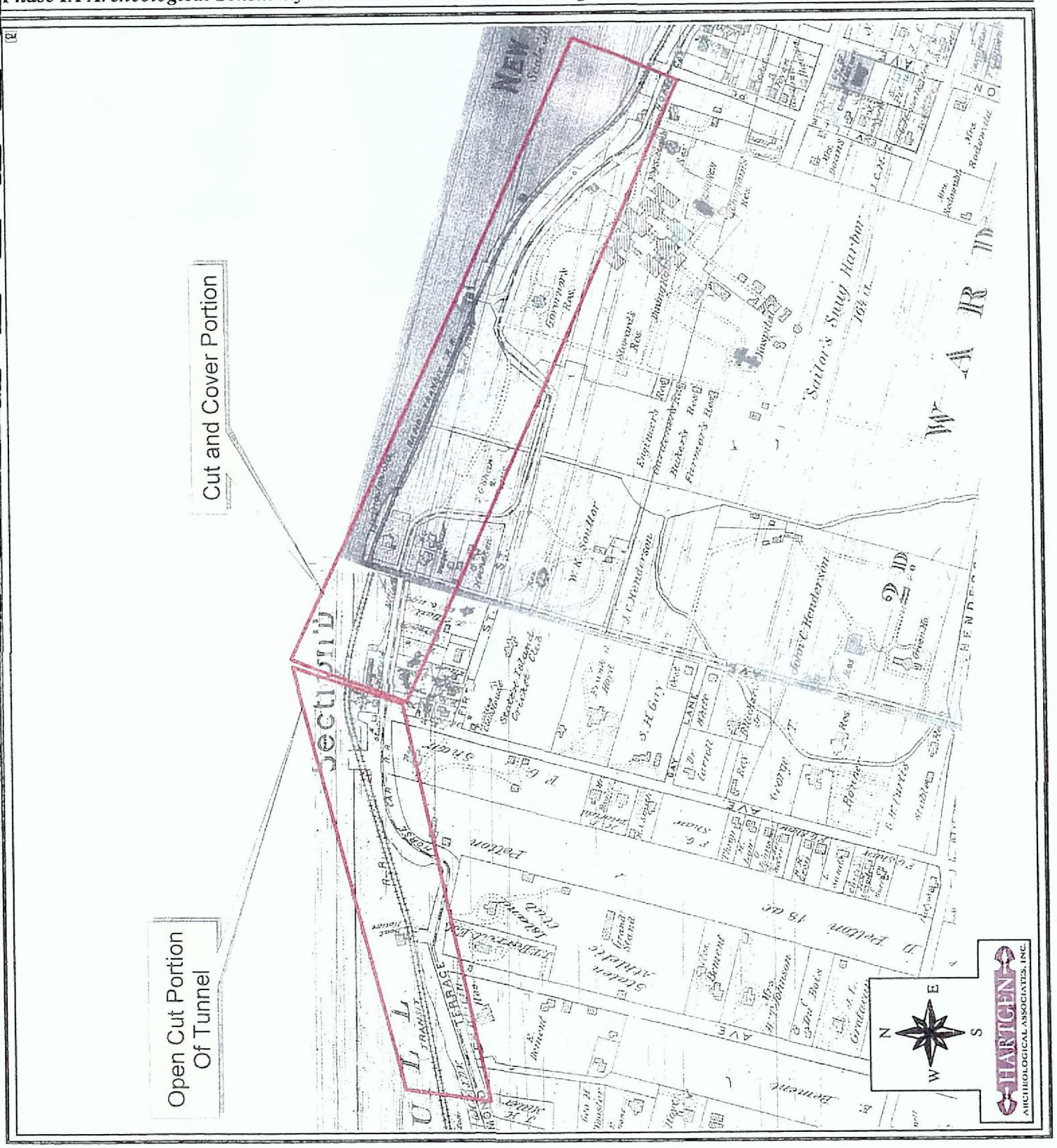

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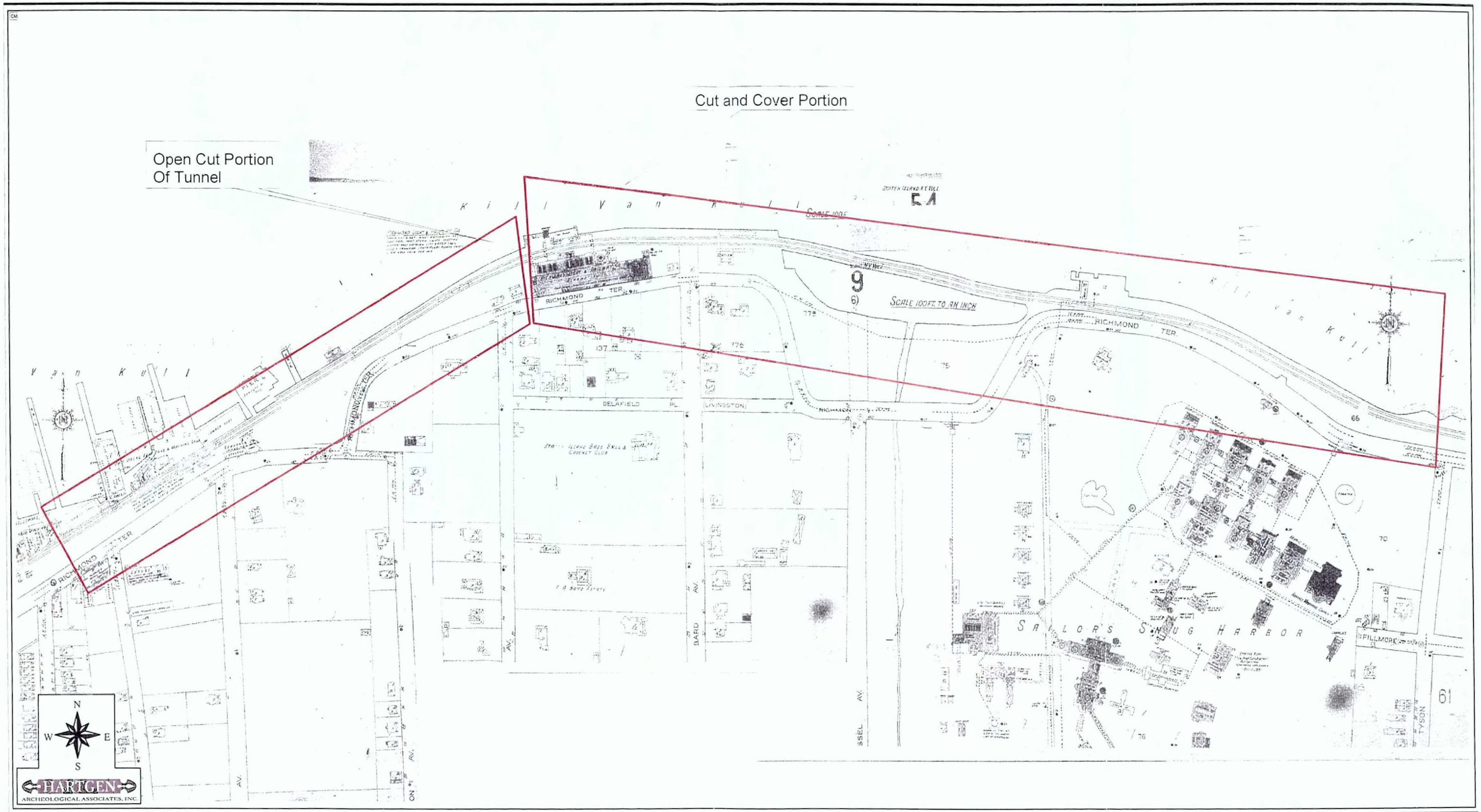
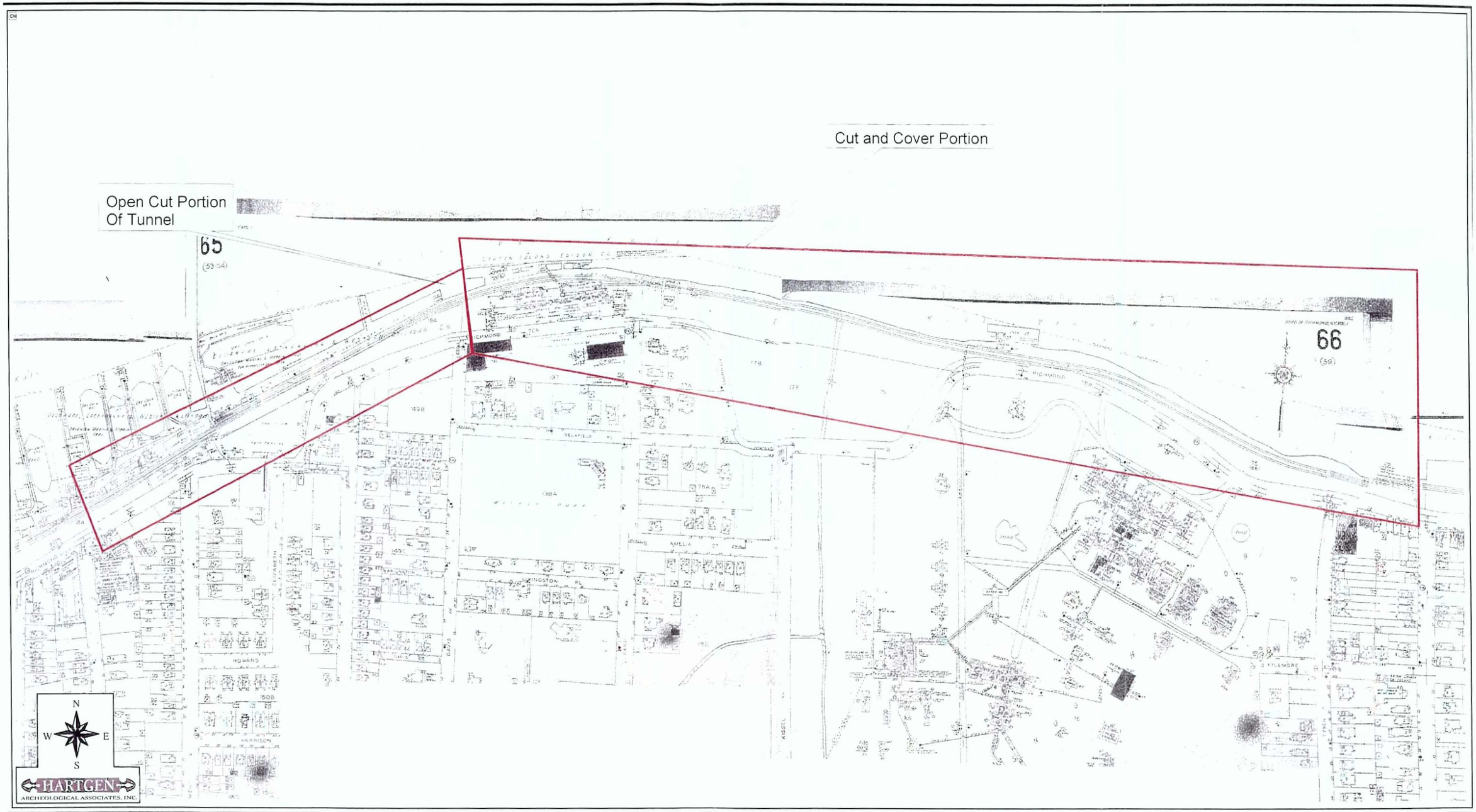


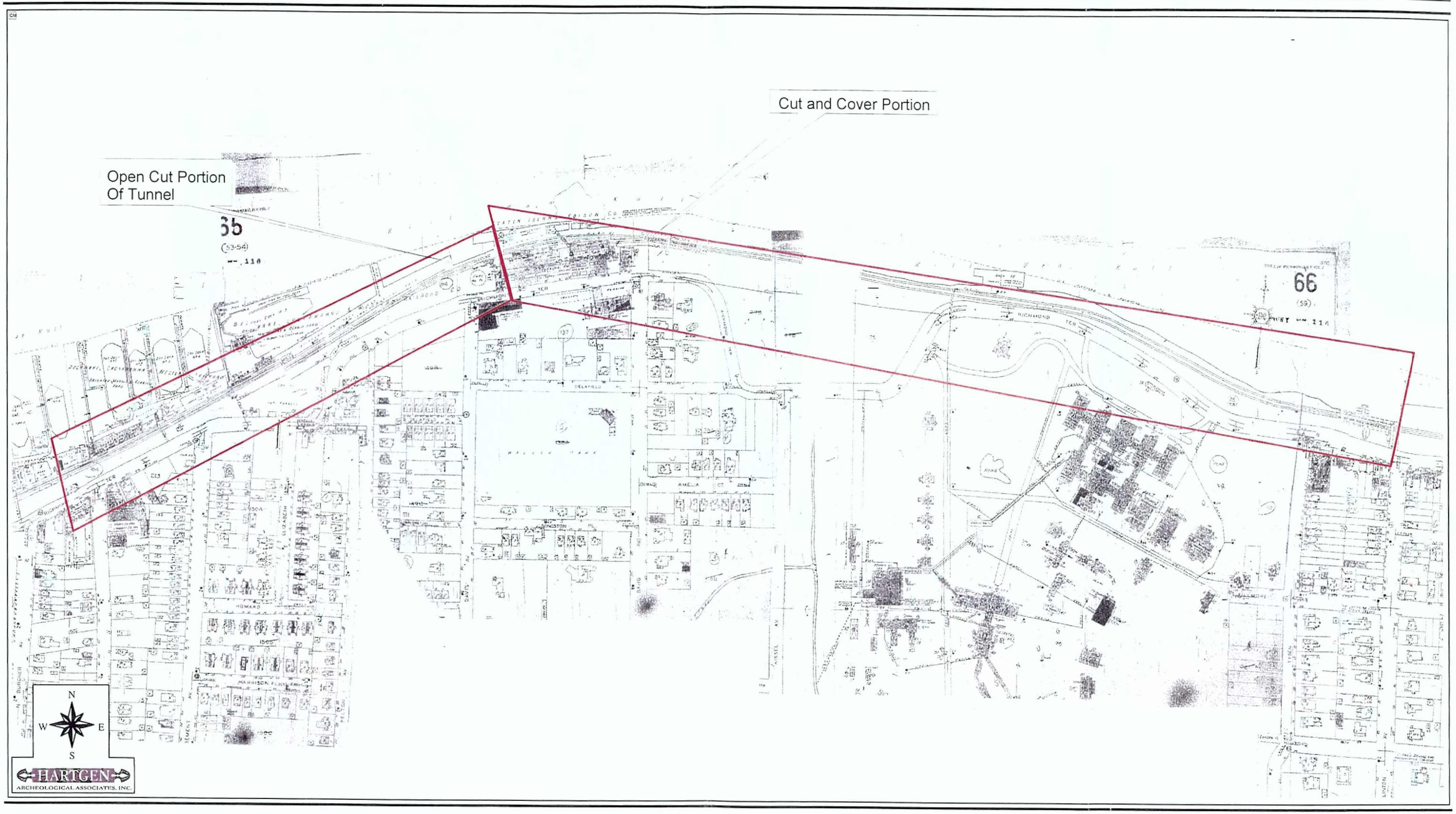
Map 26

1917 Sanborn *Insurance Maps of Staten Island, Borough of Richmond, New York*



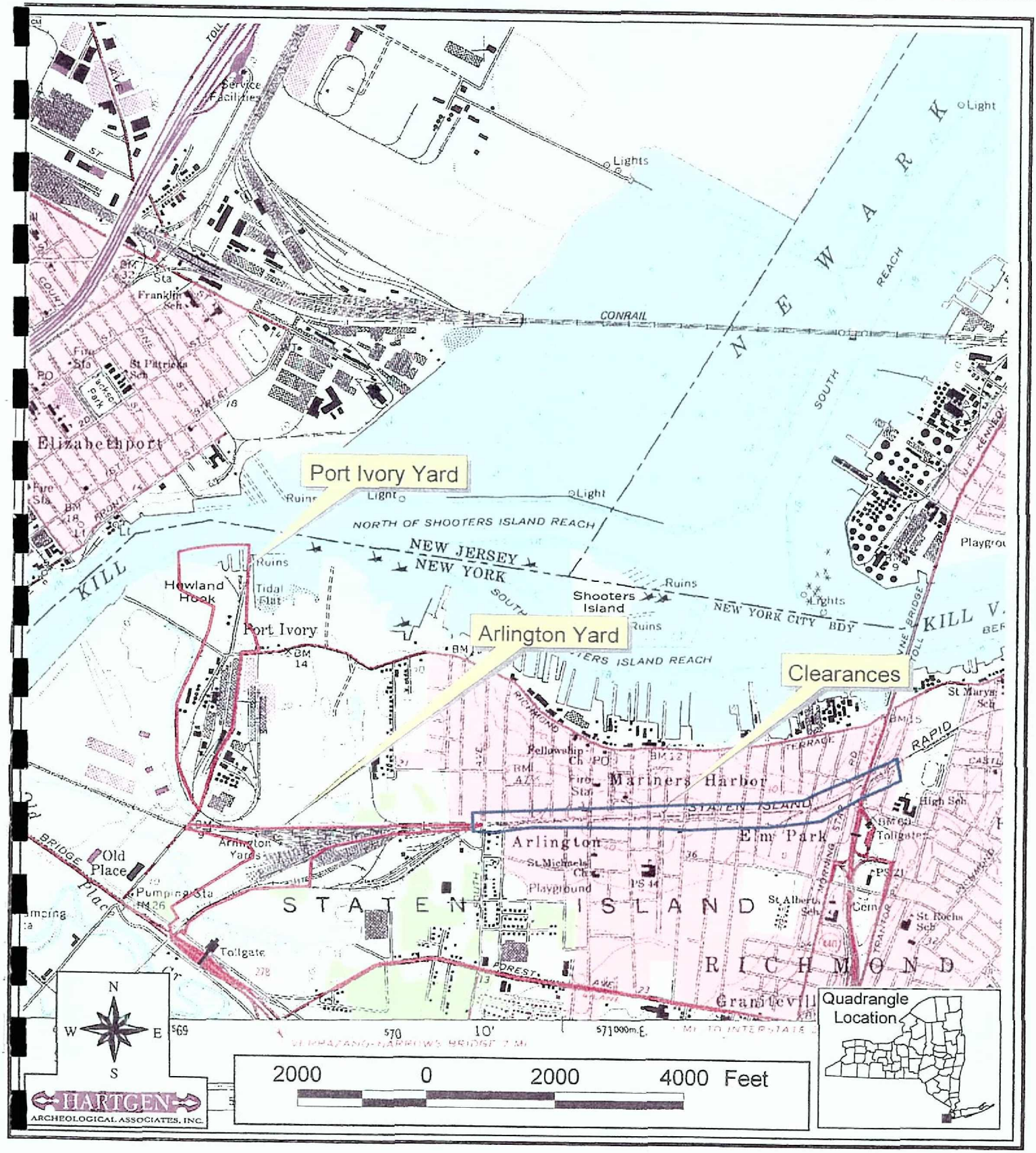
Map 27

1937 Sanborn *Insurance Maps of Staten Island, Borough of Richmond, New York*



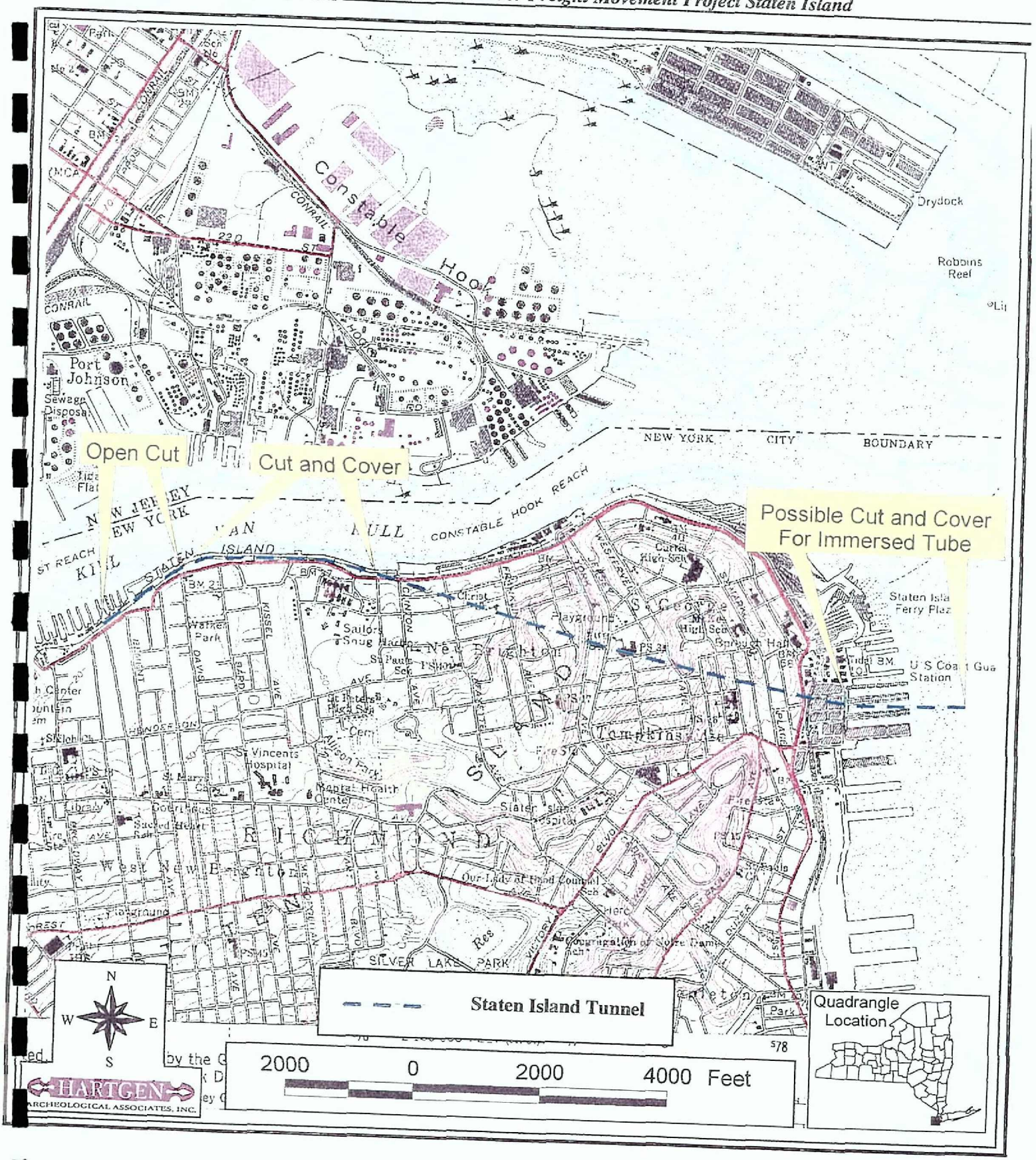
Map 28

1950 Sanborn *Insurance Maps of Staten Island, Borough of Richmond, New York City*



Map 1a

1967/1981 USGS *7.5' Series Elizabeth Topographic Quadrangle*



Map 1b

1967/1981 USGS *Jersey City 7.5' Series Topographic Quadrangle*

PHOTOGRAPHS

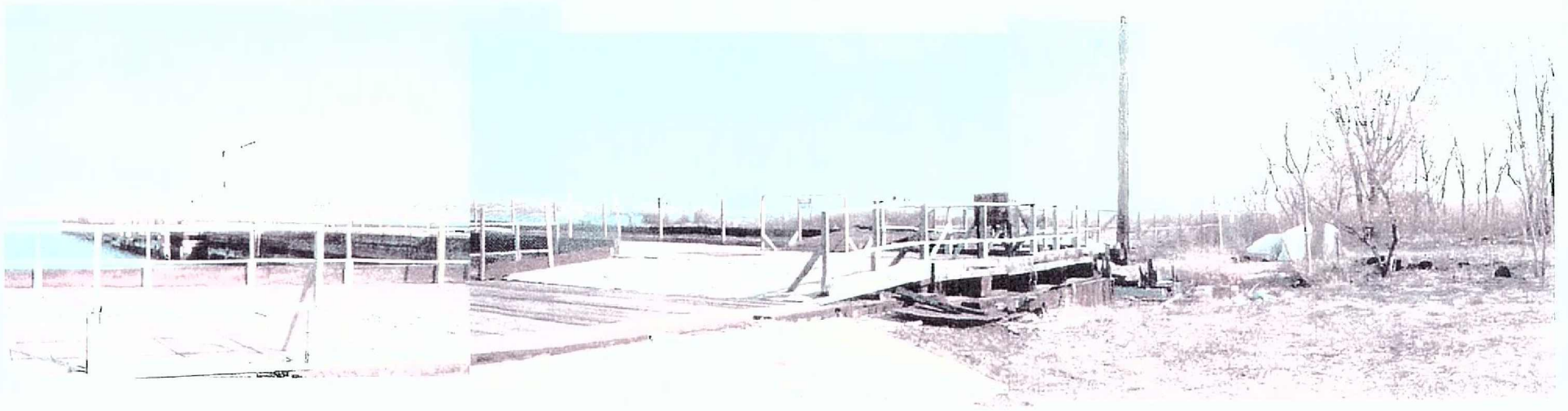


Photo 1: View northeast along the waterfront of the Port Ivory Yard showing the remains of piers and railroad sidings. A concrete slab foundation is located in the right of the photograph.

Photo 2: View northwest along the waterfront of the Port Ivory Yard showing remains of piers.

Photo 3: View south toward the former Procter & Gamble Port Ivory complex. The road shown is a former rail siding leading to the waterfront piers shown in Photo 1.

Photo 4: View southwest across the northern portion of the Port Ivory Yard. A pipeline carrying jet fuel for Newark Airport crosses the property. This area is identified as sludge pond on Sanborn historic maps.

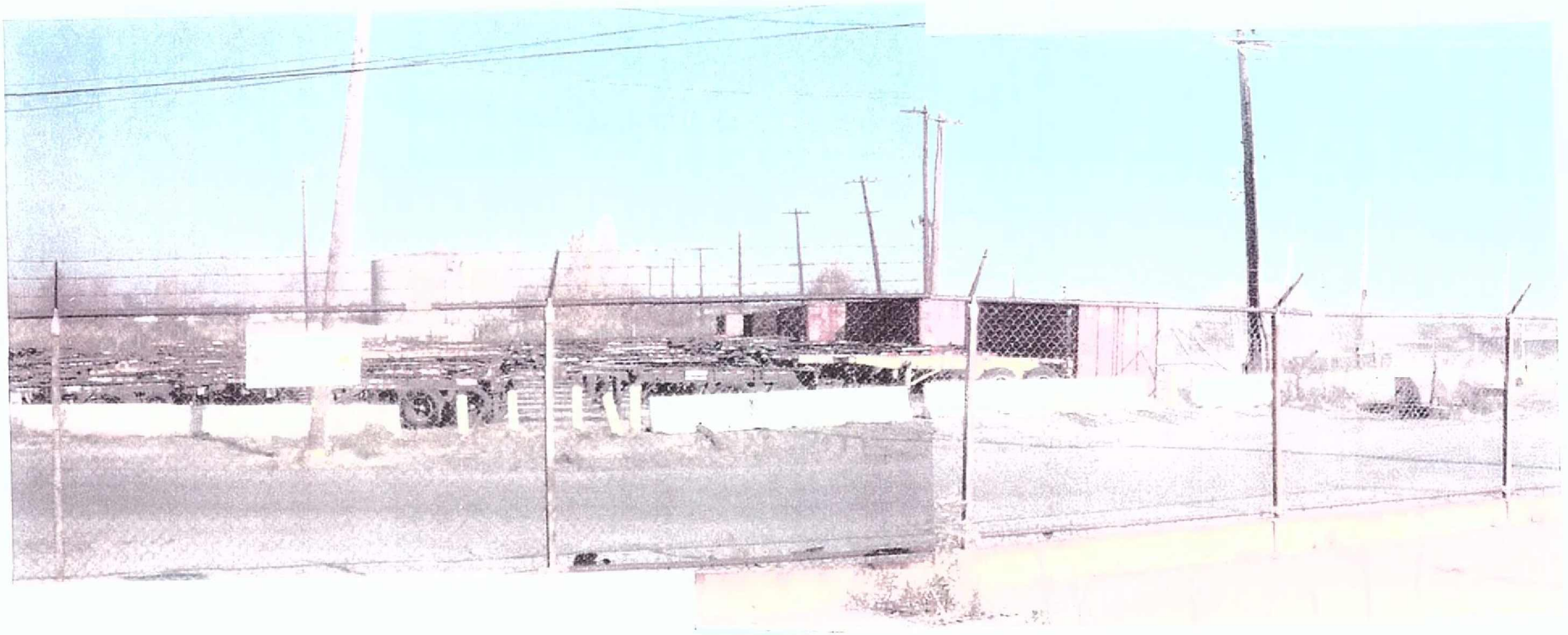


Photo 5: View north across Richmond Terrace toward tandem trailer parking and tanks located in the northern portion of the Port Ivory Yard.

Photo 6: View southeast across the interior of the former Procter and Gamble Port Ivory Plant. Former rail sidings, underground utilities, concrete pads, asphalt and gravel areas, and former plant structures occupy the area.

Photo 7: View north from the former Staten Island Railroad toward the Port Ivory Yard. Western Avenue is shown in the right of the photograph.

Photo 8: View southwest across the former Proctor and Gamble Port Ivory Plant. The Goethals Bridge and the railroad lift bridge are shown in the background.

Photo 9: View east along the northern tracks of the former Arlington Yard. The South Avenue bridge is visible in the background. A large wetland is located to the north (left) of the tracks. Note the large soil piles and brush areas to the south (right) of the tracks. Tracks in varying states of disrepair were noted throughout the brush and wooded areas of the study area.

Photo 10: View west from the South Avenue bridge showing the eastern portion of the Arlington Yard study area. Note the good conditions of the tracks and the cut to accommodate them in the foreground.

Photo 11: View northeast within the Arlington Yard study area showing typical vegetation. In the center of the photograph a person is shown standing atop a large mound of soil.

Photo 12: View west from the large mound of soil shown in Photo 11 toward the northwestern portion of the Arlington Yard study area. The Goethals Bridge and Arthur Kill Lift Bridge are shown in the background.

Photo 13: View east from within the central portion of the Arlington Yard study area showing the typical vegetation in the wooded areas. Evidence of dumping and remains of railroad sidings were evident throughout this area.

Photo 14: Aerial view west toward the Goethals Bridge. The toll plaza is in the center-foreground. The Travis Branch is just to the west (above) the toll plaza. The Arlington Yard study area is seen in the right of the photograph. Note the Bridge Creek running through the marsh and an empty Howland Hook Marine terminal in the top right of the photograph (c.1995 Port Authority photograph).

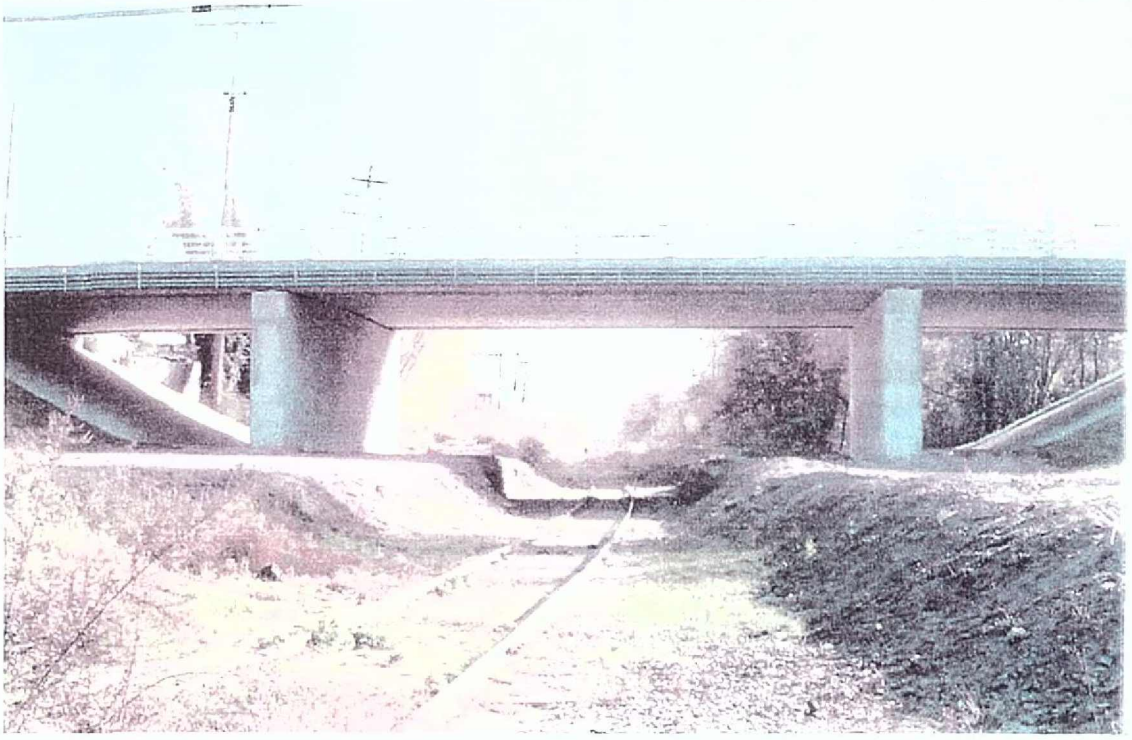


Photo 15: View east toward South Avenue Bridge. The Arlington Station was located on the east side of the bridge.

Photo 16: View east toward Harbor Road Bridge. The 1950 Sanborn map depicts the Harbor Station west of the bridge (shown in the foreground) in the center of the tracks.

Photo 17: View west from Union Avenue. The Harbor Road bridge is visible in the center of the photo.

Photo 18: View east from Union Avenue toward DeHart Avenue Bridge. The tracks are located approximately 25 feet below the adjacent grade.

Photo 19: View west from DeHart Avenue toward Union Avenue Bridge.

Photo 20: View east from Van Pelt Avenue. The track area was wet and approximately 20 feet below the adjacent street level.

Photo 21: View west from Van Pelt bridge. The former Mariners Harbor Station is shown in the center of the railway area.

Photo 22: View west from Van Name Avenue showing typical overgrown vegetation along the former railroad.

Photo 23: View east from Simonson Avenue. The concrete platforms of the former Lake Avenue Station are located on both sides of the tracks. The tracks are about 20 feet below grade.

Photo 24: View west from Granite Avenue where the tracks are only about 10 feet below the adjacent street grade.

Photo 25: View east from Granite Avenue. Note difference in grades at track level and street level to the north.

Photo 26: View west from Morning Star. The Granite Avenue bridge is visible in the rear of the photograph.

Photo 27: View east from Morning Star. The remains of the former Elm Park Station platform are visible in the left of the photo.

Photo 28: View west from John Street pedestrian bridge. The Bayonne Bridge is seen in the top of the photograph.

Photo 29: View northwest from Bement Avenue across Richmond Terrace. The Staten Island Railroad and open cut portion of the proposed tunnel is located in an industrial area behind the fence shown in the right.

FIGURES

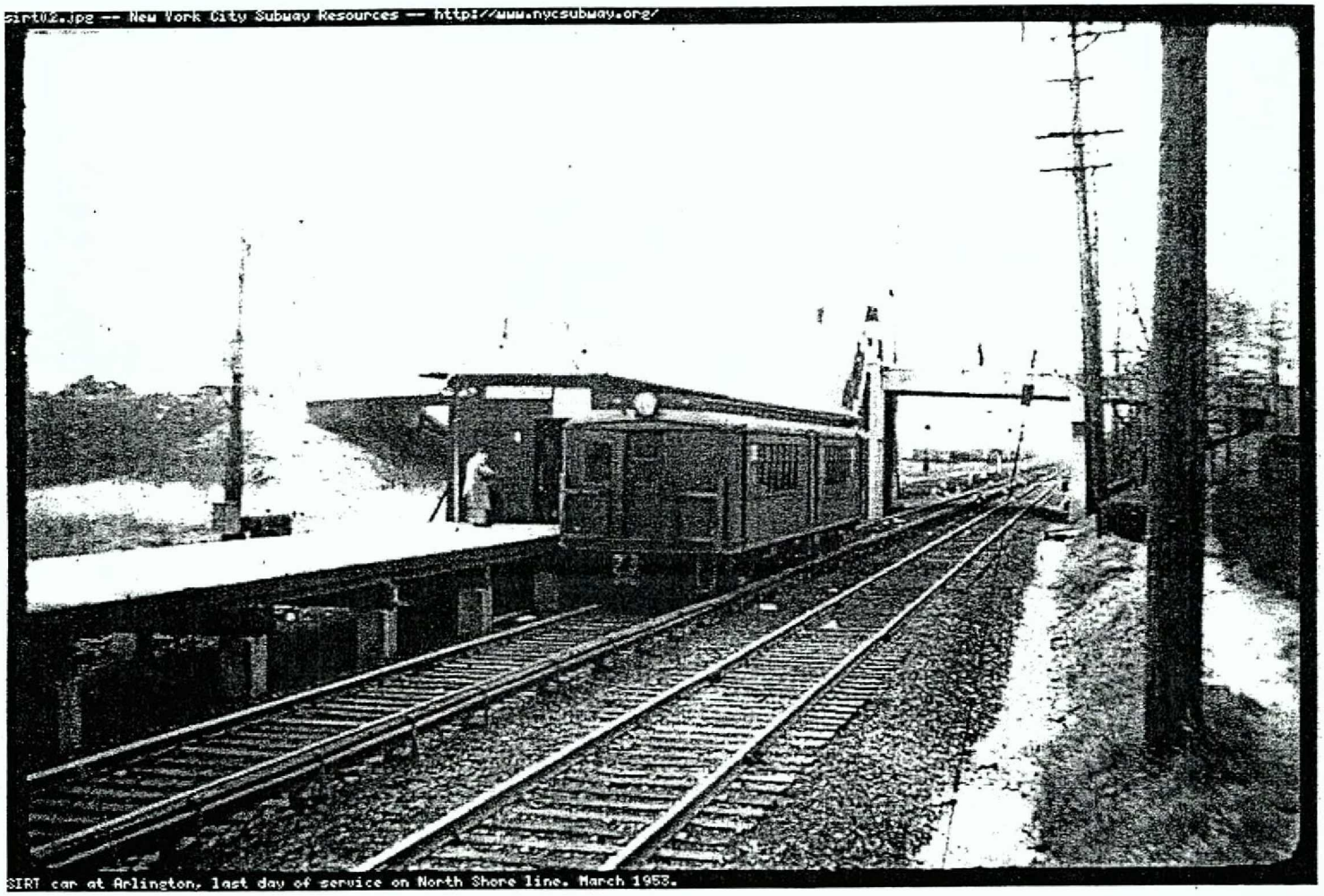


Figure 1: View west toward South Avenue and Arlington Station on last day of service on North Shore Line, March 1953 (photo from New York City Subway Resources – http://www.nycsubway.org/).

Qualifications of Principal Investigator

Hartgen Archeological Associates, Inc.

Cultural Resource Specialists

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KAREN S. HARTGEN, RPA

Qualifications: **36 CFR 61 Qualified Archeologist**

Education:

State University of New York at Albany
Master of Arts, Anthropology, December 1988

State University of New York at Albany
Bachelor of Arts, Anthropology, January 1970

Experience:

March 1973 to Present

President and Principal Investigator
Hartgen Archeological Associates, Inc.

I have directed the cultural resource management firm since 1973, completing over 2500 cultural resource projects in New York and New England. The firm currently has a full time staff of 25 and a trained seasonal staff of 40. We provide services in historical documentation, site file searches, field reconnaissance, archeological survey and excavation, artifact preservation, collection management, cartography, GIS, architectural history, historic structure survey, National Register nominations, Environmental Impact Evaluations as mandated under NEPA, NHPA, SHPA and SEQR. Archeological surveys include initial surveys to locate sites (Phase IA and IB), development of research designs and field methodologies to identify sites (Phase II), and subsequently data retrieval as mitigating measures (Phase III).

June 1974 to 1978

New York State Museum and Science Service
State Education Department, Albany
Assistant Highway Salvage Coordinator

Administration and coordination of the Highway Salvage Archeology Program for New York State during field seasons. Intermediary between various State agencies and cooperating institutions in the process of project evaluation and impact mitigation. Also prepared detailed financial reports for Federal reimbursement.

Professional Affiliations:

Registered Professional Archaeologist (RPA)
Adjunct Research Associate, University at Albany, SUNY

Board Member, Rensselaer County Historic Society (RCHS)
Chair, RCHS Preservation Committee
Board Member, Iroquois Indian Museum
State Plan for Historic Resources Steering Committee Member, for Office of Parks, Recreation and Historic Preservation
Town Historian, North Greenbush

American Cultural Resources Association
Archaeological Conservancy
Archaeological Institute of America
Council for Northeast Historic Archaeology
Eastern States Archeological Federation
Greenbush Historical Society
Historic Albany Foundation
The Holland Society of New York
Hudson-Mohawk Industrial Gateway
Maine Archaeological Society
Maryland Archeological Society
National Trust for Historic Preservation
The Native American Institute at Columbia-Green Community College
New Hampshire Archaeological Society
New Hampshire Preservation Alliance
New York Archaeological Council
New York State Archaeological Association
Northeastern Anthropological Association
Preservation League of New York State
Society of American Archaeology
Society of Historic Archeology
Scenic Hudson
Society for Industrial Archeology
Vermont Archaeological Society
Women's Transportation Seminar

Former President, New York State Archaeological Association (NYSAA)
Former Board Member, American Cultural Resources Association (ACRA)
Former Board Member, Cornell Cooperative Extension of Rensselaer County
Former President, New York Archaeological Council (NYAC)

Publication:

1997 Preserving Albany's Past: The Battle over the Broadway-Maiden Lane Archeological Site. *De Halve Maen*, The Holland Society of New York.

Cross Harbor Freight Improvement Project, Greenville Yards Jersey City, Hudson County New Jersey

Stage 1A Archaeological Assessment

Prepared for:

Allee King Rosen & Fleming, Inc.
117 East 29th Street
New York, New York

Prepared by:

The Louis Berger Group, Inc.
120 Halsted Street
East Orange, New Jersey

December 2001

Cross Harbor Freight Improvement Project, Greenville Yards Jersey City, Hudson County New Jersey

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December 2001

EXECUTIVE SUMMARY

At the request of Robert Conway, Vice President of Allee King Rosen & Fleming, Inc., The Louis Berger Group, Inc., has prepared a Stage 1A Archaeological Assessment for the Cross Harbor Freight Improvement Project, a federal undertaking. This assessment covers proposed areas of excavation for various proposed project activities in the Greenville Yards Alternative in Hudson County, New Jersey. Proposed activities involve various improvements to the existing Greenville Yards, including construction of new track and support structures, rehabilitation of railcar float bridges, cut and cover tunnel construction, and mined tunnel construction. Since detailed plans are not final and precise locations for any proposed improvements are not known for the Greenville Yards Alternative, the area of potential effect for this assessment includes the entire 622.4-acre (251.9-hectare) Greenville Yards and 259.7 acres (105.1 hectares) of near shore submerged land.

The goal of this assessment is to determine whether prehistoric and/or historic archaeological resources are or might be present in the areas where subsurface excavation is anticipated and to determine whether the proposed undertaking may have an effect on any such resources. The assessment involved collection of information of predictive value in determining whether archaeological sites are or might be present in the area of potential effect and analysis of the collected information to identify areas that are known to or may contain archaeological resources.

A thorough search of primary and secondary sources focused on gathering (a) general background information concerning prehistoric and historic use of the area, (b) narrative and cartographic evidence for specific prehistoric and historic archaeological deposits in or in the immediate vicinity of the Greenville Yards area of potential effect, and (c) narrative and cartographic evidence for late historic and recent ground disturbance that may have compromised the integrity of any archaeological deposits in the area of potential effect. The collected information was analyzed in a number of ways to determine whether uncompromised prehistoric and/or historic archaeological deposits are present or likely in the area of potential effect.

The archaeological sensitivity of the Greenville Yards area of potential effect was determined by Berger to be very low. The Yard's location in an intensively industrialized area generally lowers the probability that intact archaeological deposits survive. Specifically, as more than 97 percent of the Yard was constructed on imported fill, any archaeological materials that may be present were brought in from somewhere else, were thoroughly mechanically disturbed on-site, or were so deeply buried under the fill that they are, practically, inaccessible.

Since no intact prehistoric or historic cultural materials or features are possible in the area of potential effect, the construction of the portions of the Cross Harbor Freight Improvement Project in the Greenville Yards will have no effect on historic properties. No further archaeological investigations are recommended in the area of potential effect.

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I. INTRODUCTION

At the request of Robert Conway, Vice President of Allee King Rosen & Fleming, Inc. (AKRF), The Louis Berger Group, Inc. (Berger) has prepared a Stage 1A Archaeological Assessment for the Cross Harbor Freight Improvement Project, a federal undertaking. This assessment covers proposed areas of excavation for various proposed project activities in the Greenville Yards Alternative in Jersey City, Hudson County, New Jersey (Figure 1). Proposed activities involve various improvements to the existing Greenville Yards, including construction of new track and support structures, rehabilitation of railcar float bridges, cut and cover tunnel construction, and mined tunnel construction. Since detailed plans are not final and precise locations for any proposed improvements are not known for the Greenville Yards Alternative, the area of potential effect (APE) for this assessment encompasses 882.1 acres (357.0 hectares) and includes the entire 622.4-acre (251.9-hectare) Greenville Yards and 259.7 acres (105.1 hectares) of near shore submerged land (Table 1).

TABLE 1

AREA OF PROJECT APE

	SQUARE MILES	SQUARE METERS	ACRES	HECTARES	PERCENT OF TOTAL
Total APE	1.3783	3,569,664	882.1	357.0	100.0
Total Land	0.9725	2,518,681	622.4	251.9	70.6
Fill	0.9359	2,423,891	598.9	242.4	67.9
Bay	0.4058	1,050,983	259.7	105.1	29.4
Original Land	0.0366	94,790	23.4	9.5	2.7

The assessment was conducted in compliance with the National Historic Preservation Act of 1966, as amended; Public Law 93-291; and 36 CFR 800. Work conformed to the New Jersey Historic Preservation Office's *Guidelines for Archaeological Investigations*. The cultural resource specialists who performed the investigations meet or exceed the criteria outlined in 36 CFR 66.3(b)(2) and 36 CFR 61.

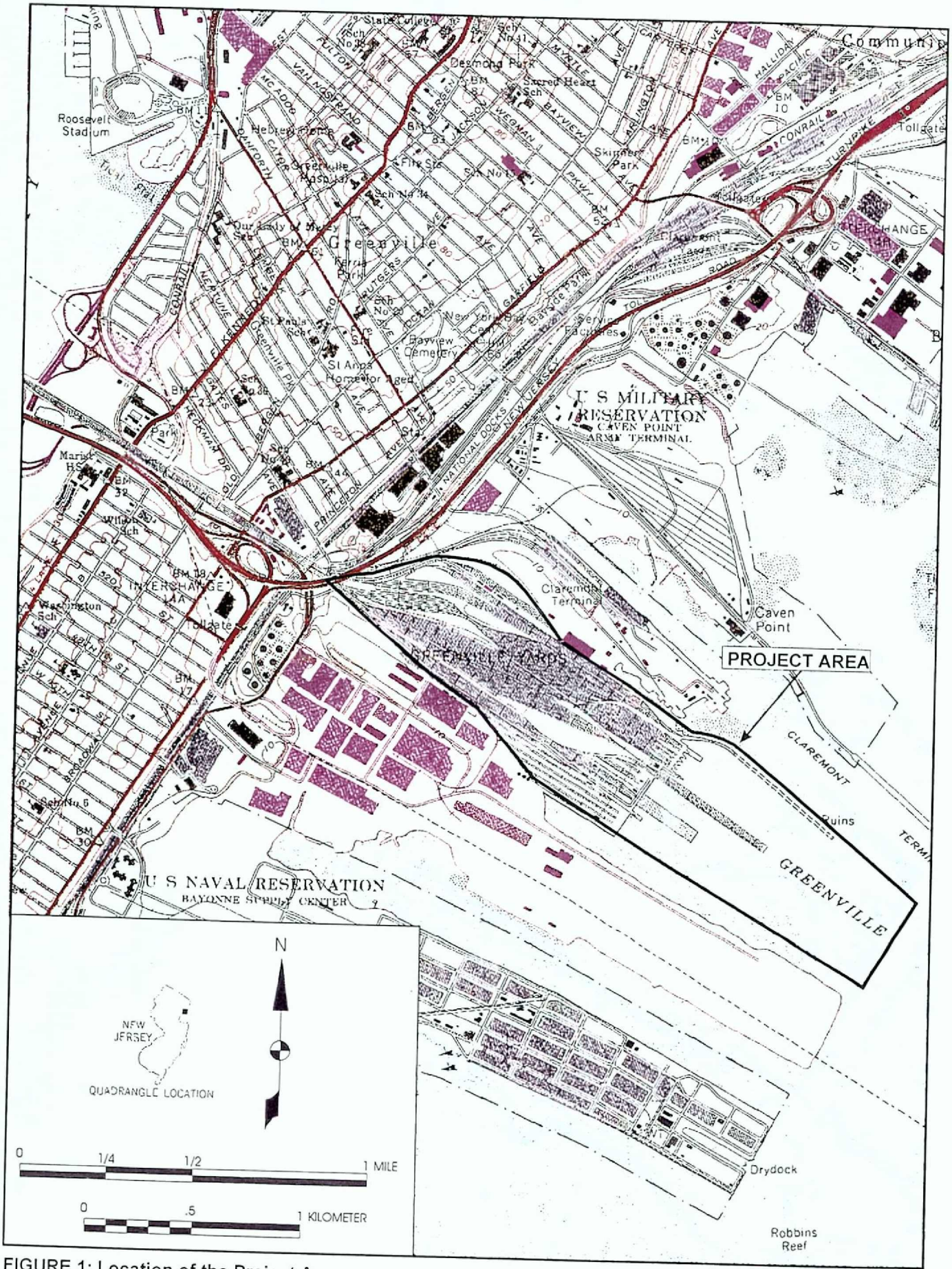

FIGURE 1: Location of the Project Area

SOURCE: USGS 7.5 Minute Jersey City, NJ-NY 1967 (Photorevised 1981)

II. RESEARCH GOALS AND METHODOLOGY

The goal of this Assessment is to determine whether prehistoric and/or historic archaeological resources are or might be present in the areas where subsurface excavation is anticipated and to determine whether historic and modern development may have affected any such resources. The assessment involved collection of information of predictive value in determining whether archaeological sites are or might be present in the APE and analysis of the collected information to identify areas that are known to or may contain archaeological resources.

Berger conducted a thorough search of primary and secondary sources, including files at the New Jersey State Museum, the New Jersey State Library, and the New Jersey Historical Society. The records search was focused on gathering (a) general background information concerning prehistoric and historic use of the area, (b) narrative and cartographic evidence for specific prehistoric and historic archaeological deposits in or in the immediate vicinity of the APE, and (c) narrative and cartographic evidence for late historic and recent ground disturbance that may have compromised the integrity of any archaeological deposits in the APE. The collected information was analyzed in a number of ways to determine whether uncompromised prehistoric and/or historic archaeological deposits are present or likely in the APE.

Information concerning the geomorphological, climatic, and biological development of the area during the Late Pleistocene and Holocene eras was compiled and summarized. This natural history depicts the context within which any human presence in the area occurred. It contributes to overall questions concerning whether the area provided necessary and sufficient conditions and resources for human habitation or use and whether the natural development of the area influenced the likelihood of finding any archaeological evidence of human presence.

Files were examined at the New Jersey State Historic Preservation Office for records of previously identified prehistoric and historic archaeological sites. Written summaries were prepared describing what is known of the prehistoric and historic people who used or may have used the area. These summaries, in combination with the natural history, help define the types of evidence that, if found, would suggest the likelihood of human use during particular periods for particular purposes. Cartographic and narrative evidence was compiled and summarized concerning the historic development of the area, both to identify possible unrecorded historic archaeological deposits and to document historic and recent ground disturbance. The results of the various analyses are presented below.

PLATE 1: Remaining Railroad Tracks Within the Greenville Yards, Looking West

PLATE 2: Transfer Bridge Structure and Extant Railroad Tracks Leading to the Transfer Bridges, Looking East

IV. PREHISTORIC RESOURCES

Based on data from fossil pollen remains and associated radiocarbon dates, the regional environment during the earliest recognized aboriginal occupation of New Jersey, prior to 10,000 years before present (BP), could generally be characterized as periglacial. Peat borings from the continental shelf indicate that the fairly level plain supported an open spruce parkland or spruce woodland environment, including pine, fir, and other vegetation (Sirkin 1976, 1977). Inland, the cooler and wetter climate of that time would have supported a mosaic of grassland and spruce-pine-oak woodland (Edwards and Merrill 1977, Sirkin 1977, Sirkin et al. 1970). The key term here is *mosaic*. The majority of the floral species from this early time are still found in modern environments; however, the frequencies and combinations of species within late Pleistocene/early Holocene communities have no exact modern analogs. Brown and Cleland characterized this period in the eastern United States:

> The vegetation grew in a mosaic of boreal, deciduous, and grassland communities rather than in zoned communities like those of today. The effect of the mosaic pattern of vegetation upon the distribution of mammals would have been to support species that would otherwise not be found together [Brown and Cleland 1968:114].

Preserved pollen remains and associated radiocarbon dates suggest that there was a gradual warming trend after the retreat of the Pleistocene glaciers that began about 17,000 BP. The general pattern of ecological succession suggests that the vegetation was predominantly herbaceous (i.e., mosses, lichens, and sedges) following glaciation. The herbaceous stage was succeeded by open-parkland vegetation, and then by mixed-forest zones with pine and spruce predominating at about 13,000 BP. In central New Jersey, pine began to predominate sometime after 12,000 BP. During this period, the sea lay below its modern level and the New Jersey shoreline was therefore some 50 miles east of its present position (Marshall 1982).

A. PREHISTORIC CONTEXT

The prehistory of the Northeastern United States is traditionally divided into five cultural periods: the Paleoindian period prior to ca. 10,000 BP, the Archaic Period between ca. 10,000 and ca. 4000 BP, the Transitional Period between ca. 4000 and ca. 2700 BP, the Woodland Period between ca. 2700 BP/750 BC and ca. AD 1500, and the Protohistoric Period between ca. 1500 and ca. 1600.

The above prehistoric cultural periods are assumed to reflect temporally and culturally distinct occupations and assume that changes in artifact types and styles reflect cultural changes. Stylistic variation in projectile points and (later) ceramics traditionally define the cultural periods (Coe. 1964, Kent et al. 1971; Kinsey et al. 1972).

A reorganization of the above traditional chronologies based on ecological adaptation has been proposed by Gardner (1977, 1978) and applied by Raber (1985). This alternative views changes in adaptive strategies rather than artifact styles as the milestones in cultural chronology (see also Custer 1996; Custer and Wallace 1982). Table 2 correlates the periods proposed by advocates of the alternate chronologies.

TABLE 2

COMPARISON OF ECOLOGICALLY ORIENTED AND TRADITIONAL PREHISTORIC CHRONOLOGIES

ECOLOGICAL		TRADITIONAL	
Paleoindian/ Early Archaic	To 6000 BC	Paleoindian	To 8000 BC
		Early Archaic	8000-6000 BC
Middle Archaic	6000-4000 BC	Middle Archaic	6000-4000 BC
		Late Archaic	4000-1000 BC
		Transitional	1000-700 BC
		Early Woodland	700 BC-AD 1
Late Archaic/ Mid. Woodland	4000 BC-AD 1000	Middle Woodland	AD 1-1000
Late Woodland	AD 1000-1500	Late Woodland	AD 1000-1500

The following discussion of the prehistoric period is based on a review of independently published reports and literature resulting almost exclusively from compliance driven archaeological efforts. The descriptions and interpretations that follow are based on archaeological investigations in areas selected largely by the dictates of infrastructure and commercial development and not by reference to a regional sampling strategy. As a result, the existing knowledge base is focused on areas that are not statistically representative of actual prehistoric site distributions in the region during any period.

In addition, the majority of site-specific archaeological studies so far undertaken have not been methodically consistent or systematic. The investigations have employed a wide variety of sampling, recovery, analytical, and reporting methods, and their findings are difficult or impossible to compare. The result is a corpus of site descriptions and interpretations variously gathered, analyzed, and reported that do not constitute statistically reliable or comparable data.

The archaeological record itself is not representative. For example, prehistoric people likely spent much of their time in the riparian/woodland ecotonal areas, taking advantage of the relative abundance and variety of resources therein. But the Late Pleistocene and Early Holocene rivers were much more energetic than in the middle and late Holocene and many Paleoindian and Early Archaic floodplain sites have likely been substantially scoured and/or buried by river action. Older sites have been longer exposed to erosion, sedimentation, and decomposition that tend to obscure and/or destroy them and their contents. It may only appear, for example, that older cultures were less populous. In addition, progressive and substantial rises in sea level since the arrival of the earliest inhabitants has certainly inundated a series of resource-rich coastal ecotones that were probably exploited by early peoples.

The above factors have a substantial influence on our ability to test diachronic and synchronic site distribution models and to present a reliable characterization of prehistoric archaeological sites and the cultures that created them. Current population estimates, settlement distribution models, and interpretations of their behavioral correlates are based on unsystematic regional and site sampling and should be considered untested and very preliminary. The characteristics of the surviving artifact/ecofact assemblages - their forms, distributions, and ecological associations - constitute the bulk of the evidence for the presence and behavior of prehistoric people. Their projectile points, ceramic vessels, tools, debris, intra site feature distributions, and site distributions varied over time and space. Similar constellations of these

characteristics found at different places or dating to different times are almost certainly indicative of the relatedness of the people who left them. These similarities are indicative of related cultural and/or technological adaptations. Conversely, diachronic and synchronic variations in the characteristics of artifact assemblages are indicative of strategic and/or cultural differences. Changes through time resulting from a mix of *in situ* innovation, diffusion, and migration are not yet clearly understood. Nevertheless, the following discussion generally reflects current understandings.

1. The Paleoindian Period (prior to ca. 10,000 BP)

Distinctive fluted lanceolate points characteristically evidence Paleoindian people. While over 200 such fluted points have been found throughout New Jersey, the largest number have been located in the Delaware River drainage, and almost all of these were surface finds (Marshall 1982). Three Paleoindian sites have been identified within 50 miles of the project area: the Port Mobil Site, located on the western shore of Staten Island (Eisenberg 1978, Funk 1977, Kraft 1977); the Zierdt Site, located in Sussex County (Werner 1964); and the Dutchess Quarry Cave Site, located in southeastern New York State (Funk and Steadman 1994). The nearest of these, the Port Mobil Site, has been dated to circa 10,000 BP, and was interpreted as a small, resource-procurement/hunting encampment (Eisenberg 1978, Funk 1977). The artifact assemblage from the site includes fluted points, unfluted trianguloid points, scrapers, knives, borers, and gravers.

Subsistence of Paleoindian people depended in great measure on the hunting of large game animals. The distribution of their sites likely reflects seasonal big game hunting strategies influenced (probably significantly) by hunting and gathering of terrestrial and aquatic plant and small animal foods (Roosevelt et al. 1996). Most of their activities have left little or no trace in the archaeological record. Lithic technological considerations may have also contributed to Paleoindian landscape settlement patterns. Goodyear (1989) suggests that high-quality cryptocrystalline materials (chert, jasper, chalcedony) were highly desirable when manufacturing fluted lanceolate projectile points. This hypothesis derives in part from the great distances (up to 300 kilometers) over which lithic materials are known to have moved during the Paleoindian period. However, recent geoarchaeological surveys have challenged this assumption by identifying local lithic sources for Paleoindian lithic material (LaPorta 1994, Moeller 1999). The location of known Paleoindian sites in New York and New Jersey suggests a preference for high, well-drained ground, near streams or wetlands, offering vantage points for observing game and proximity to aquatic resources. Sites have also been located in rock shelters, near lithic source areas, and on lower river terraces. Given the substantial rise in sea levels during and since the Paleoindian Period (greater than 75 meters), it is probable that Paleoindian people utilized and occupied what is now the continental shelf (Marshall 1982).

2. The Archaic Period (10,000 – 2,700 BP)

The ecological changes brought about by the warmer Holocene climates encouraged the development of new subsistence strategies that characterize the Archaic period (10,000 to 3000 BP). Compared with the Paleoindian period, a wider variety of artifact types were used during the Archaic. This suggests the pursuit of a greater diversity of subsistence and technological activities, although hunting still appears to have been a major focus. Based on changes in material culture and subsistence patterns, the Archaic period in New Jersey is

commonly divided into three subperiods: Early, Middle, and Late. A fourth subperiod, the Terminal Archaic or Transitional period, has also been defined for at least the northern portion of the state and adjoining areas of New York and Pennsylvania (Kraft and Mounier 1982a).

The Early Archaic period (10,000 to 8000 BP) is characterized by corner-notched, stemmed, and bifurcate-stemmed projectile points (Broyles 1971, Coe 1964). Several sites containing Early Archaic components have been identified in the region, including the Old Place, Ward's Point, and Richmond Hill sites on Staten Island (Ritchie and Funk 1971, 1973). Sites in northern New Jersey containing Early Archaic components include the Harry's Farm Site (Kraft 1975), the Rockelein Site (Dumont and Dumont 1979), and the Shawnee-Minisink Site (McNett et al. 1977), all located in the Upper Delaware River Valley. Although the transition from the late Paleoindian to the Early Archaic period was marked by a change in projectile point morphology, some researchers have recently suggested that such a shift does not necessarily indicate a new way of life.

Gardner (1974, 1979, 1980) and Cavallo (1981) have suggested that Early Archaic peoples were maintaining patterns of settlement and subsistence similar to those exhibited by Paleoindian populations. The preference for high-quality cryptocrystalline stone evident during the Paleoindian period appears to have persisted into Early Archaic times. This hypothesis is based on the high incidence of resharpened points and multipurpose tools in localities far removed from raw material sources. Early Archaic toolkits share the hunting and processing orientation of their predecessors, with some stylistic and technological additions. Early Archaic remains are found in the same types of settings as Paleoindian sites as well as in a variety of other environments. Gardner therefore places the Early Archaic with the Paleoindian period. Custer (1981) has shown this approach to be effective in dealing with Early Archaic manifestations on the Delaware Coastal Plain. What little Northeastern data exist also suggest a continuum between the Paleoindian and Early Archaic periods (Funk 1978). These researchers have argued that late Paleoindian populations and Early Archaic peoples continued the same basic adaptation, and that change in projectile point morphology implies only a technological shift rather than an economic one.

The Middle Archaic period (ca. 8000 BP-6000 BP) marks a period of adaptation to an environment that may have begun to approximate that of historic times (Kraft and Mounier 1982a). While the overall configuration of Middle Archaic environments still cannot be directly compared to recent conditions, climate in the Middle Atlantic after 8500 BP (Atlantic episode) continued the warming trend of earlier times and can be characterized as warm/moist or mesic (Carbone 1976). Forests would have been dominated by oak and hemlock (Carbone 1976). By 7500 BP oak-hemlock forests definitely covered portions of the New Jersey Coastal Plain between Camden and Trenton and probably persisted until 5180 BP (Sirkin 1977, Sirkin et al. 1970). Pine apparently lingered here throughout this portion of the Atlantic (Carbone 1976, Sirkin et al. 1970). In the Upper Delaware Valley, oak-hemlock dominance may have begun by 9261 BP and continued to 4660 BP. Beech, hickory, elm, and chestnut also appeared during this time (Dent 1979).

It was during the Atlantic episode that the first deciduous-dominated forests came into existence in the Middle Atlantic region. Mast-producing tree species would have increased the carrying capacity of forest communities relative to earlier times. The preponderance of deciduous elements would have also given forests a seasonal quality that was probably not

characteristic of earlier environments. This seasonality would have been reflected in the movements and distributions of faunal species throughout the year. In general, the composition of faunal communities would have begun to resemble that of historic or modern times. The closed forested environment, however, may have reduced populations of deer and other species adapted to open environments or ecotonal settings.

Middle Archaic remains have been only rarely documented in the region, possibly because of the unclear typological definitions for this period. Since so little is known about the Middle Archaic occupation of New Jersey, it is often linked with either the Early or the Late Archaic (Kraft and Mounier 1982a). Although the traces of this period in New Jersey and the Middle Atlantic are largely derived from disturbed surface contexts and plowzone sites, the general hypothesis is that Middle Archaic settlement and subsistence focused on a broader resource base than the Paleoindian period and portions of the Early Archaic. Direct evidence of Middle Archaic subsistence is generally lacking as it is for earlier periods. Based on inferences from site settings and their local resource potential, the exploitation of deer, turkey, migratory waterfowl, and anadromous fish is indicated (Kraft and Mounier 1982a). Shellfish exploitation has been suggested, according to evidence from the lower Hudson Valley in New York (Brennan 1977). Toolkit elements have shown that a variety of plant resources may also have been exploited.

In addition, there is a discernible change from the Early Archaic in the kinds of lithic materials preferred for the manufacture of tools (Cavallo 1982). While locally available cryptocrystalline stones were still employed, there was a shift in New Jersey toward a greater reliance on shales and argillites from Triassic formations in north and central portions of the state (Cavallo 1982; Didier 1975; Kraft and Mounier 1982a).

In northern New Jersey, evidence of Middle Archaic occupation is sparse, and as Kraft and Mounier (1982a) have noted, is based primarily on typological similarities with southeastern projectile points such as Morrow Mountain, Stanly, and certain Big Sandy-like points, or with Neville-like points found in New England. Middle Archaic points have been recovered as surface finds on sites widely distributed across the northern part of the state. As Kraft and Mounier (1982a) observe, these sites invariably contain multiple components; however, intensive plowing or other surface disturbance has usually destroyed the contextual associations. The Rockelein Site in the Upper Delaware Valley is the only deeply stratified site in New Jersey to have yielded in situ Middle Archaic points.

Late Archaic period (6000 to 3000 BP) sites are more common than in the Early Archaic Period leading some researchers to infer a population increase during the period. In some instances, Late Archaic base camp sites appear to represent occupations of longer duration. A variety of narrow-bladed notched and stemmed projectile points, including Lackawaxen, Poplar Island, Lamoka, and Sylvan types, are diagnostic of the Late Archaic period. Tool assemblages from Late Archaic sites also include atlatl weights, ground stone and pecked-stone implements, heavy and light woodworking tools, net sinkers, and food-grinding implements (Kinsey et al. 1972; Kraft 1975). Milling stones and other food-grinding implements attest to an increased reliance on gathered wild plants; netsinkers, stone-boiling features, and faunal remains indicate the importance of fishing and shellfishing.

Methods of tool manufacturing during the Late Archaic remained similar to those of the Middle Archaic. Archaeological evidence indicates the coexistence of two tool making

traditions: one based on the use of primary lithic resources and the other on pebble and cobble resources (secondarily derived). Late Archaic groups, which relied on primary lithic resources such as argillite from the Lockatong Formation, seem to have used a staged biface reduction sequence and participated in low-level regional exchange of this material. The pebble and cobble reduction technology employed within the state may not have resulted in staged sequences of bifaces and associated debitage patterns. In New Jersey's Inner Coastal Plain, the use of a staged biface technology appears to have been more prevalent. The location of substantial outcrops of argillite north of Trenton and the location of outcrops of Triassic argillaceous shale near Princeton may have been factors influencing this trend.

Lithic preference during the Late Archaic is markedly greater than in the Middle Archaic and is not common to other areas in the Middle Atlantic region. Within 20 to 30 miles of the Lockatong Formation, the frequency of argillite in Late Archaic sites is generally high. Beyond 30 miles from the primary lithic source, the frequency of argillite artifacts begins to decline, but is still well represented. Cavallo (1982) suggests that regional intensification of argillite utilization during the Late Archaic may be tied to an elaboration since Early Archaic times. This apparent exchange network may have been tied to an increased use of major drainages as interregional transportation routes.

The Terminal Archaic or Transitional period (3000 to 2700 BP) is distinguished by broad-blade projectile points, including Susquehanna, Perkiomen, and Orient Fishtail types. The appearance of soapstone or steatite vessels and artifacts on New Jersey Coastal Plain sites of this period provides evidence of interregional trade and may also suggest residential stability, since stone bowls are items not easily transportable from site to site. Information on the Terminal Archaic period in northern New Jersey is limited. No controlled excavations have been carried out in the northern part of the state beyond those in the Delaware Valley, reported by Kinsey (1975), Kinsey et al. (1972), and Kraft (1970, 1975), and at Twombly Landing (Brennan 1968, 1977).

3. *The Woodland Period (2700 BP [750 BC] to AD 1500)*

The Woodland Period is divided into three successive subperiods: Early, Middle, and Late. Prior to the beginning of the Early Woodland Period (750 BC to AD 1), the climate began to increase in moisture and temperatures cooled (Carbone 1976). By 800 BC, the moist temperate climate of modern times may have been established. Climatic shifts after 800 BC were probably alterations of modern patterns rather than long-term shifts such as those in earlier prehistory (Carbone 1976). Notable among these minor variations are a period of increased dryness and lower temperatures that probably occurred from AD 210 to 645 and a period of increased dryness that may have taken place from AD 1080 to 1200 (Carbone 1976).

Postulated climatic patterns would have supported a basic oak-hickory-pine forest in Coastal Plain areas throughout remaining prehistoric times (Carbone 1976, Sirkin 1977, Sirkin et al. 1970). Climatic variations over time would have affected the extent of open environments and the representation of minor deciduous elements in what may have been comparable to a modern mixed, mesic upland forest (Robichaud and Buell 1973). Essentially modern faunal patterns were probably established by 2800 BP. By 3000 BP, Delaware Bay sea level was only 3.4 meters lower than at present (Kraft and John 1978). The upriver extent of estuarine environments and tidal influence may have also approximated modern configurations at this

time. Although sea level continued to rise, by AD 1 the rate of its change may have been more gradual than ever before (Kraft and John 1978). In conjunction with regularized climate and reduced rates of erosion, this would have resulted in increasingly stable riverine, estuarine, and tidal environments.

The Early Woodland is generally viewed as a continuation of Late Archaic lifeways with the addition of some technological elements. In a recent overview, Gardner (1982) emphasized the continuity of lifestyle but also suggested that a greater degree of sedentism is evident during Early Woodland times.

The introduction of a ceramic technology also increased the capacity of Early Woodland populations to store foods for use during periods of low environmental productivity (Cavallo 1982, Schalk 1977). Trends toward greater sedentism and subsistence specialization begun during the Terminal Archaic continued and were eventually accompanied by experimentation with cultigens. The earliest ceramics are termed the Marcey Creek and Plain ware types and consist of flat-bottomed, straight-sided vessels with lugs or handles. Subsequently, Early Woodland people made Vinette I conical-based, coarse-gritted, coil-constructed vessels, the interiors and exteriors of which are covered with the marks of cord-wrapped paddles (Kraft 1975). Williams and Thomas (1982) concur that data from the Early Woodland sub period in New Jersey support Gardner's hypothesis of increasing sedentism.

Early Woodland subsistence, like that of the Late Archaic, is viewed as having been focused on the exploitation of deer and other terrestrial fauna, fish, shellfish, and nuts. Williams and Thomas (1982) suggest that in New Jersey, plant cultivation may have been a part of subsistence activities during then Early/Middle Woodland sub period. At present, there is no reliable evidence to support the practice of horticulture during the Early Woodland subperiod in the Middle Atlantic region (Gardner 1982). Besides the absence of physical remains of cultigens, there are no shifts in settlement patterns that might reflect the importance of plant cultivation in prehistoric subsistence.

The Middle Woodland period (ca. AD 1-7000) is characterized by archaeological components containing net-impressed ceramics in association with diagnostic point types Gardner 1982). Its temporal span in the Northeast is based primarily on a series of radiocarbon dates from Middle Woodland components in New York's Hudson Valley (Funk 1976). Changes in cultural systems occurred during this time but not over the entire Middle Atlantic region. In some areas, life ways continued to reflect those of the Early Woodland Period (Gardner 1982) and, in these situations, the recognition of a Middle Woodland Period is nothing more than a heuristic device. Regardless of local variation, settlement and subsistence patterns generally indicate increased sedentism and adaptation to essentially modern environmental conditions.

During the Middle Woodland period, coarse cord-marked pottery was replaced by net-impressed ceramics and, at least at the Abbott Farm Site, near Trenton, zoned ceramics. Rossville, Fox Creek, and Jack's Reef are the predominant projectile point types recognized. Pestles, hammerstones, and anvil stones are important processing implements recovered from sites of this period, while the presence of net sinkers attests to the continued exploitation of fish resources (Stewart 1985, Williams and Thomas 1982). Settlement patterns during this period appear to reflect a continuation of those postulated for the preceding Early Woodland periods.

Examination of Middle Woodland site data collected by Cross (1941, 1956), Pollak (1977), Skinner (1915), Spier (1918), and Volk (1911) indicates that the intensity of cultural utilization seems comparable for both the high terrace upland and the floodplain zones. As a result of her research, Cross (1956) observed that during the Middle Woodland sub period use of the floodplains of the Abbott Farm area increased, but the high terrace bluff zones remained the focus of relatively permanent settlements. Admittedly, the sheer number of sites found in the high terrace upland zone outweighs those of the floodplain; however, the variety and quantity of artifacts, features, and burials known from floodplain sites also appears to support intensive utilization of this zone. Although systematic survey coverage of the entire floodplain area is lacking, site locations within this zone seem to be defined by environmental parameters, such as well-drained ground in proximity to stream junctions, or the limits of tidal action. This is in contrast to the high terrace uplands where site locations seem to be more generalized.

The Late Woodland period (AD 700 to 1500) is well represented throughout New Jersey. The largest sites dating to this period are usually located on major rivers and probably represent base camps that may have been occupied during most of the year. Smaller sites are abundant on tributaries as well as near natural springs. These sites probably functioned as temporary or seasonal camps. The practice of hoe-type horticulture was well established, although hunting, gathering, and fishing continued to be major subsistence activities. Hickory nuts and acorns were important wild foods, as were butternuts and blueberries. Freshwater mussels have been found in large quantities in many of the shell pits and middens on the terraces of the Upper Delaware River (Kinsey et al. 1972; Kraft and Mounier 1982b).

Except for stylistic changes, the Late Woodland stone toolkit remained similar to that of earlier periods and reflects the functional diversity associated with exploiting a broad resource base. The utilization of a wide range of lithic materials coincided with sedentary settlements and the exploitation of immediately available resources. Diagnostic artifacts of the Late Woodland period are triangular points; collared and collarless ceramic vessels bearing incised geometric motifs and cord marking; and a variety of ground stone, chipped-stone, and pecked-stone tools.

4. *The Protohistoric Period (ca. 1500 to ca. 1600)*

The Protohistoric period includes the times during which there is indirect contact between indigenous people and European immigrants. During the Protohistoric period indigenous people encountered European diseases, artifacts, rumors, and second-hand descriptions of Europeans but had no sustained contact with them.

New diseases against which the indigenous people had no immunities spread from indigenous groups in direct contact with Europeans and must have had a substantial and widespread effect on population size and cultural integrity. Snow (1980) calculated mortality rates from imported diseases on New England's Indigenous People at 55 to 98 percent. The young and old were disproportionally affected. Depletion of young people had a devastating effect on the size of subsequent generations. The loss of the elders probably substantially affected their culture's ability to maintain traditional integrity.

Awareness of Europeans and the availability of European artifacts and technologies certainly prompted profound changes in indigenous cultures prior to actual substantial contacts with

Europeans. Indigenous refugees from areas already invaded by Europeans brought not only European diseases and artifacts but also introduced much-altered remnants of their own cultures. The indigenous people probably had been so changed during the more than 100-year Protohistoric period that the people and cultures first actually encountered by the earliest Europeans must have been very different from their prehistoric ancestors.

At the time of European contact, the project area was occupied by the Unami branch of the Lenape, referred to as the Delaware Indians by the European colonists (Goddard 1978, Kraft 1986). These Algonquian-speaking Indians can hardly be described as a tribe, because they maintained loosely structured bands that resided in comparatively small, dispersed settlements. Increased contact with European traders and settlers resulted in a breakdown of cultural traditions and increased reliance on European goods in exchange for land and furs. Warfare, disease, and alcoholism decimated the native population, and by 1759 it was estimated that only 300 Lenape remained in the Province of New Jersey. By 1801 there were scarcely any Lenape left in the state; today their descendants reside primarily in Oklahoma and Canada (Kraft 1986).

B. PREHISTORIC SITE POTENTIAL

At the height of the last glacial maximum, about 18,000 years ago, the terminal end of the Wisconsin ice sheet covered New York Harbor and sea levels were 120 meters below the current level (Imbrie and Imbrie 1979). Since the last glacial maximum, sea level in the New York Harbor has risen in three stages.

The first stage occurred between 18,000 and 10,000 years ago during which sea level had risen to 25 meters below present levels. Ten thousand years ago, at the end of the Paleoindian Period, the project area was on a flat exposed shelf extending to the lower portions of the Hudson River, which, fed by the meltwater from the retreating Wisconsin glacier, flowed energetically to the Atlantic Ocean. The landscape and climate supported taiga or boreal forest conditions, with such species as mastodon, mammoth, woodland caribou, and whitetail deer. These conditions would have been attractive to Paleoindian hunters and gatherers.

During the Early and Middle Archaic periods, between 10,000 and 6,000 years ago, sea level rose to within 5 meters of present levels. As the ocean advanced up the Hudson River its channel began filling with sediments and the environment gradually shifted to a more deciduous forest/wetland ecotonal regime. Whitetail deer were the dominant game species, and deciduous oak and maple forest dominated. Conditions, though substantially altered, were very well suited for human occupation and resource acquisition.

During the Late Archaic, Woodland, and Protohistoric periods (6000 BP-AD 1600) sea level rose the remaining 5 meters to its present level. The shoreline of present New York Bay advanced through the project area from east to west, reaching its present location about 1,000 years ago. Throughout this period ecotonal conditions prevailed and the area was well suited for prehistoric human occupation and exploitation.

A single prehistoric archaeological site is recorded in the vicinity of the APE. Site 28-Hd-3 is noted as a location where red ochre daubed ceramic sherds were found (Skinner and Schrabisch 1913:42). The site's location is mapped by the New Jersey State Museum outside the APE, at a location approximately 500 feet north of the APE's northern boundary.

Although the center of the mapped location is slightly south and offshore of the shoreline depicted on the early maps, that shoreline is not represented on the recent USGS Jersey City, NJ-PA, quadrangle used by the Museum. The site was probably actually located on the small point of land that was just north of the Greenville Yards prior to the filling of the area for construction of the Claremont Terminal. The ceramic sherds are indicative of the Late Woodland period and are not an unexpected find.

V. HISTORIC RESOURCES

A. HISTORICAL OVERVIEW OF THE PROJECT AREA

European settlement of present-day Hudson County began in the early seventeenth century. As early as 1611, two years after Henry Hudson explored the river that bears his name, the Dutch began to establish small, impermanent trading posts on the west side of the Hudson. The earliest settlements in New Jersey were established within Jersey City, in the area known as Pavonia. Although conflict with the Lenape Native Americans eradicated these early settlements, further attempts to settle the western side of the Hudson were successfully completed in the mid-seventeenth century. In July 1630 the Dutch purchased all of the land lying between the Hudson River on the east, the Hackensack River and Newark Bay on the west, and the Kill Van Kull Creek on the south from the Hackensack Indians, a subgroup of the Lenape. During the 1630s and early 1640s Dutch settlers, as well as significant numbers of Walloons and French Huguenots, established themselves in the vicinity of Bergen and Paulus Hook (now part of Jersey City) and in areas to the north between the Hackensack and Hudson rivers (Wacker 1975).

Large-scale permanent colonization of the area west of the Hudson River was delayed, however, by a series of Indian-Dutch wars between 1643 and 1655, which resulted in the destruction of many of the Dutch settlements, including Hackensack. With the cessation of the hostilities, settlement resumed. The Dutch extended their presence further into the Piedmont, generally following the Passaic and Hackensack valleys (Wacker 1975:126).

In 1664 the British took over Dutch New Netherlands, which at that time included New Jersey. In June of that year the Duke of York granted all lands between the Atlantic Ocean (including part of the Hudson River) and the Delaware River to John, Lord Berkeley, and Sir George Carteret (Cunningham 1992:22, 24). It was on the basis of these grants that, in 1676, New Jersey became divided into East Jersey and West Jersey, with Carteret's land (and the current project area) located in East Jersey. In the same year (1664) that New Netherlands was wrested from the Dutch, British colonists had begun to migrate to eastern New Jersey, mainly from New England and the Puritan settlements on Long Island. Although a number of English-speaking islands were formed among the Dutch of Bergen County, most British/New England settlers established themselves further south, in Newark and Elizabeth (Wacker 1975).

In 1682 East Jersey was divided into the four counties of Bergen, Essex, Middlesex, and Monmouth. In that same year Bergen County, composed of all of the land between the Hudson and Hackensack rivers, was divided into the townships of Bergen and Hackensack. The project area at that point was a part of Bergen County.

In 1840 Hudson County was created from the southern portion of Bergen County. When separated from Bergen County, Hudson County was composed of the townships of Bergen and Harrison, the city of Jersey City, and many villages that later became separate municipalities (Snyder 1969:145).

From its initial settlement, Jersey City and the surrounding area remained relatively rural despite its location across the Hudson from Manhattan Island. Despite the construction of a major stagecoach road in 1764, and the town's precarious position between the forces of the

British and American Revolutionists, the quiet and essentially rural nature of Bergen and Jersey City persisted until the early nineteenth century. In 1812 Robert Fulton purchased land in the Paulus Hook area for a steamboat ferry dock, running service to and from Manhattan. Combined with Fulton's ferries from Manhattan to Brooklyn, Fulton's ferries provided convenient transportation links across both sides of Manhattan Island. With the arrival of the Morris Canal in the 1830s, Jersey City's role in the regional economy was sealed. Good transportation and access to fuel from the coal mines of Pennsylvania attracted industry, which in turn drew a growing population. By 1838 the young town was sufficiently robust to separate from Bergen as the new and independent municipality of Jersey City.

Expansion of the railroads along the waterfront, growing industrialization, and a steady supply of workers to man the factories and run the trains continued through the Civil War. By 1870 Jersey City's population and economy had so outpaced its neighbors that the citizens voted to merge into one larger city. This, Jersey City acquired its mother town, Bergen, along with Hudson City, which had become independent in 1855. Three years later (1873), Greenville joined the merger, giving Jersey City its current boundaries. For the next century, Jersey City was known for its rail terminals, the Erie, the Pennsylvania, the Lehigh Valley and the Jersey Central; and for the endless barges, lighters, and ferries that crossed the river and the New York Bay carrying coal, food, manufactured goods, and passengers throughout the greater New York area.

1. History of Greenville

Greenville Township was created in 1863, separating from Bayonne and forming the southern portion of modern-day Jersey City. The dividing point between Bayonne and Greenville was the Morris Canal, where the New Jersey Turnpike Extension is now located. In 1865 the Greenville Street Commission was created and a grid of streets was laid out and graded. In the 1870s the Central Railroad of New Jersey (CRRNJ) began to open tracks leading across Greenville's northern border and along its western border. The presence of the railroad helped to stimulate growth.

The Greenville area of Jersey City grew slowly in the late nineteenth and early twentieth centuries because of a lack of transportation routes into downtown Jersey City. Some industrial development occurred along Caven Point in the mid-nineteenth century, where a wine and liquor distillery was located. In 1863 a window glass factory replaced the liquor distillery, which was in turn replaced by a fertilizing plant and then by an iron works. With the introduction of the CRRNJ lines to Greenville, additional industry came to the area, including a brewery in 1868, small factories in the 1890s, and a thread company in 1890, further expanded in the 1920s. Population increased suddenly between 1900 and 1910 when trolley lines and street patterns were expanded, creating easier access to Greenville from Jersey City.

2. History of the Greenville Yards

The southern portion of Jersey City's shore, including Greenville, remained relatively close to its original configuration up through the late nineteenth century. The singular industrial development in this area was the Morris Canal, constructed west of the project area in 1838. This section of the Morris Canal completed the canal's route from Phillipsburg in Warren County to Jersey City. The Morris Canal traveled about 10 to 20 feet west of the original

shoreline (Rutsch et al. 1977:109-112). Currently, the New Jersey Turnpike Extension marks the approximate position of the Morris Canal in this section of Jersey City.

The introduction of rail lines in the Greenville area came about in the 1860s. The first lines paralleled the canal, running on the western side of the canal. These rail lines are extant today and are used to transport freight.

In the middle of the nineteenth century a ship canal appears to have been proposed for an area immediately south of the Greenville Yards (Beers 1872). In the following year a T. Taylor constructed a small wharf off of the eastern shore of Greenville, between Thompson & Pamrapo avenues (Figure 2). This shipping structure does not appear on an 1880 map of the area, though a large landfilled pier appears to the south, at the southernmost point of the Morris Canal, then called "Fiddlers Elbow" (Spielmann and Brush 1880). This roughly formed pier also appears on 1882 (Vermuele 1882) and 1889 (United States Coast Survey 1889) maps of Jersey City. Apparently, this section of Greenville was developing into a small shipping district.

Greenville's contribution to the shipping industry was greatly enhanced in 1900 with the development of the Greenville Yards. In March of that year the Pennsylvania Railroad Company (PRR) initiated construction on the "New York Bay R.R. Yards," later called "The Greenville Yards." PRR had recently purchased the Long Island Rail Road and was interested in handling traffic from New Jersey to Long Island and beyond (Burgess and Kennedy 1949). The Greenville Yards project was part of a much larger expansion of freight transportation in the Port of New York. The land upon which the Greenville Yards were built was created by filling shallow tidal marsh, using as landfill the rock coming from the excavation of the North River Tunnel and excavations in Manhattan for Pennsylvania Station and its related rail yards (Kardas and Larrabee 1978). Almost all the land on which the yard was built was five or six feet under water. It is estimated that 22,000,000 cubic yards of fill were used to bring the area up to grade (Burgess and Kennedy 1949, Kardas and Larrabee 1978). The construction of the Greenville Yards was completed by 1912. Since then, there have been no modifications to the man-made shoreline of the Greenville Yards. Table 3 summarizes the construction chronology for the Greenville Yards (Kardas and Larrabee 1983:18). Figure 3 depicts construction details of the Yard in 1908.

TABLE 3

CONSTRUCTION HISTORY OF THE GREENVILLE YARDS

1900	Construction begins with placement of heavy rock landfill
1903-1904	Fill extended to east end of yard; north side incomplete
1904-1905	Three carfloat bridges (Nos. 11, 12, 13) are built; three cranes on open plot
1905	12,000,000 cubic yards of landfill in place
1911	Open Pier B, trestle-style coal pier and carfloat bridges present
1912	Additional fill added, completing yard to the north

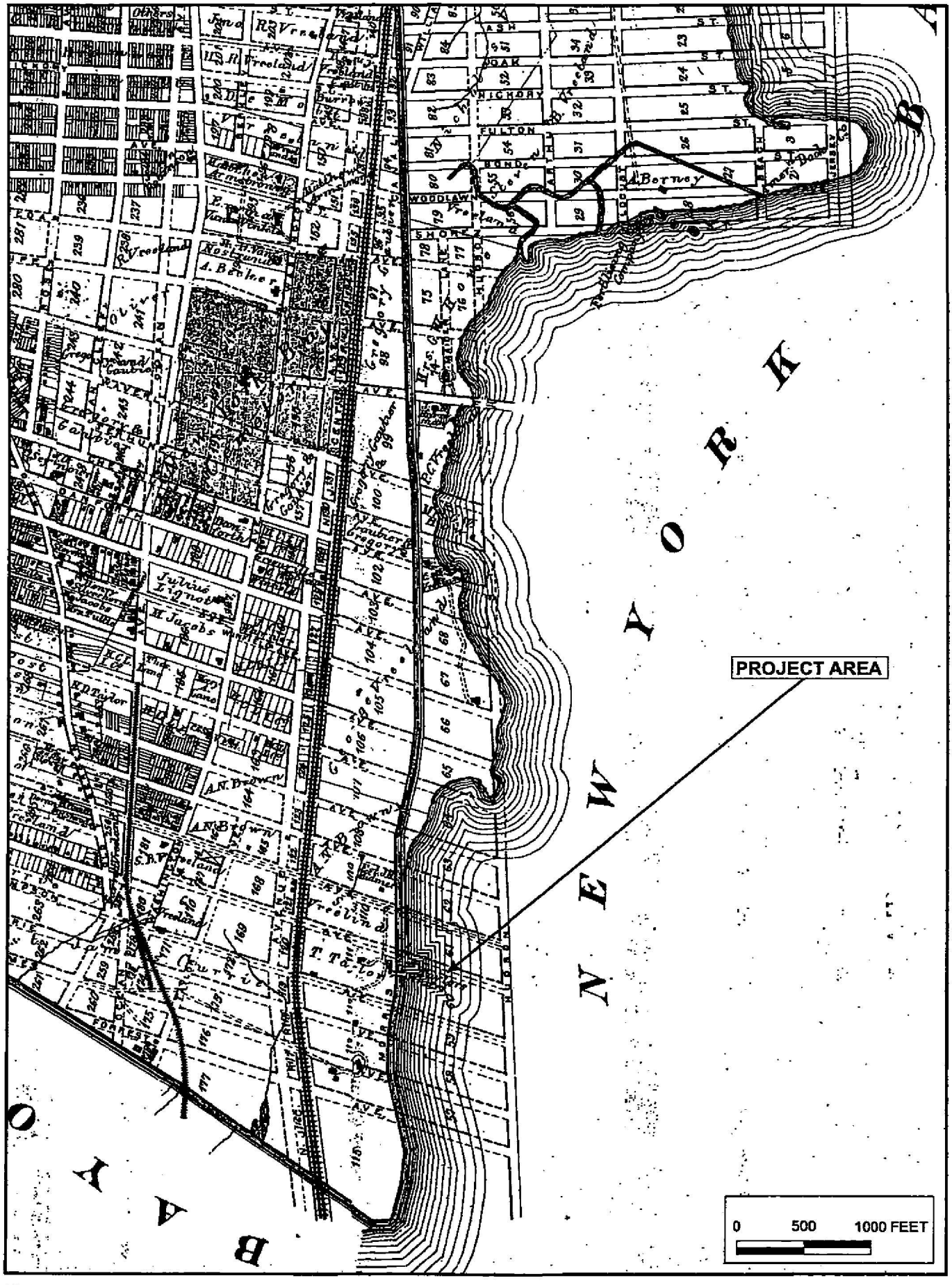

FIGURE 2: 1873 View of the Project Area

SOURCE: Hopkins 1873

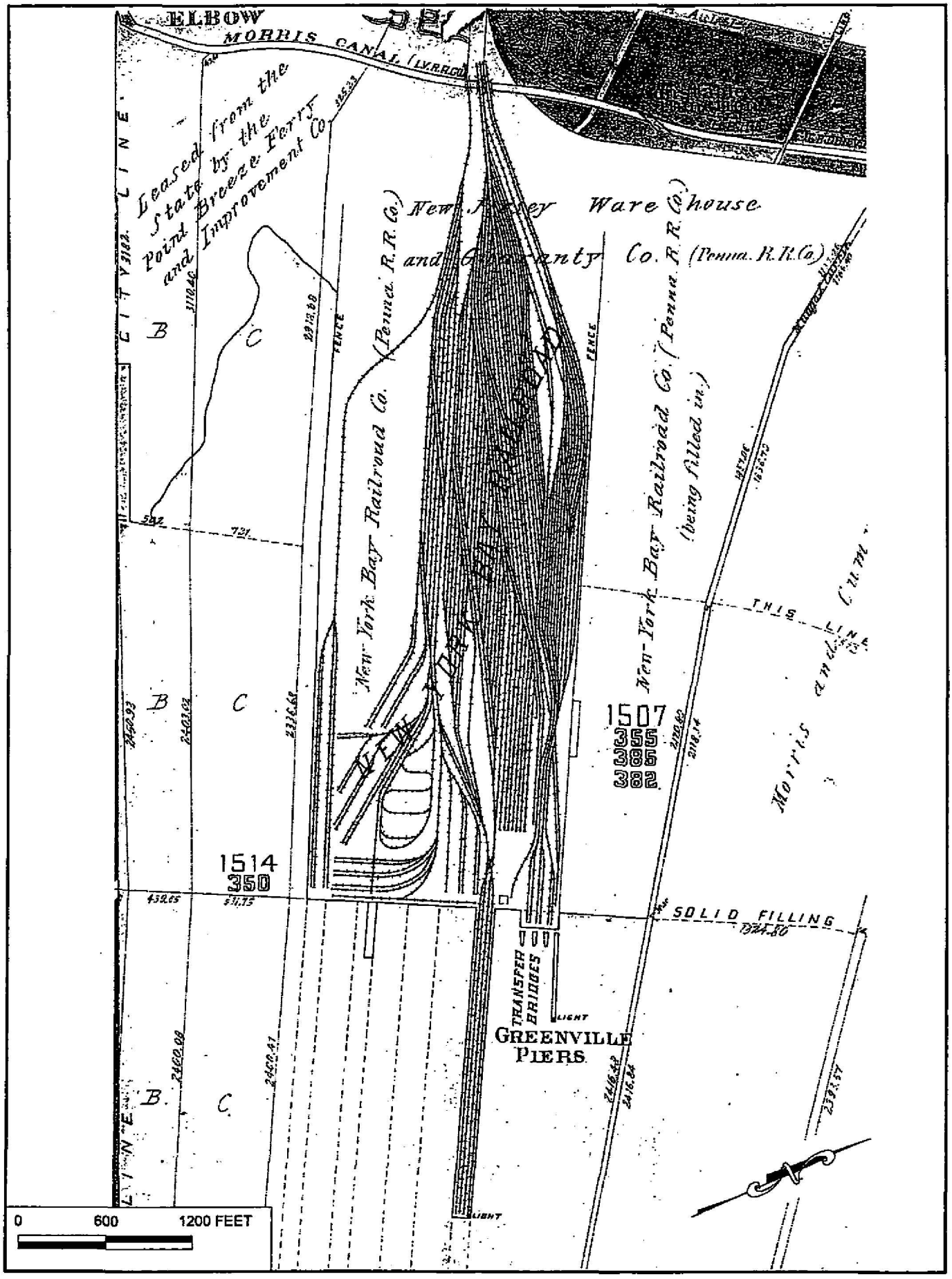

FIGURE 3: Portion of 1908 Hopkins Atlas Showing Construction Details of the Greenville Yards

SOURCE: Hopkins 1908

B. POTENTIAL HISTORIC RESOURCES

The likelihood for historic period archaeological resources in the project area is low. The majority of the project area was constructed through landfilling activities in the early twentieth century. Only the extreme northwestern portion of the project area was a solid landmass during the historic period. This section of the project area, however, lacked any historic period occupation, indicating the potential for historic period archaeological resources is low to almost none. Additionally, the preliminary design plans for the Cross Harbor Freight Movement and Tunnel Project indicate that the northwestern section of the Greenville Yards is not part of the proposed areas of disturbance. For the remainder of the project area, there is no potential for pre-1900 historic period archaeological resources, as the entire area did not exist until it was created by the Pennsylvania Railroad Company in the early twentieth century.

VI. PAST DISTURBANCES IN THE PROJECT AREA

Approximately 96.24 percent (598.9 acres [242.4-hectares]) of the Greenville Yards is situated east of the original shoreline on landfill brought in at the beginning of the twentieth century for the explicit construction of the Greenville Yards. The remaining 3.76 percent (23.4 acres [9.5-hectares]) is west of the original shoreline (Figures 4 and 5). The entire 622.4-acre (251.9-hectare) terrestrial portion of the project area has been thoroughly disturbed by historic and recent construction activities. Cartographic evidence suggests that various near shore, submerged locations in the APE have been the sites of episodic pier construction and removal since the construction of the Yard.

VII. CONCLUSIONS AND SUMMARY

A. POTENTIAL PREHISTORIC AND HISTORIC PERIOD SENSITIVITY

The probability that *in situ* prehistoric or historic archaeological deposits and/or features are present in the APE is very low because the Greenville Yards are situated either on imported fill or mechanically displaced sediments.

The potential for prehistoric archaeological deposits is particularly low. The substantial mechanical disturbance on land has certainly obliterated any relatively shallow archaeological deposits that may have been present. It is possible that intact, submerged, prehistoric archaeological deposits are present in the near shore portions of the Bay. If so, they are not only submerged, but deeply buried under sediments.

A single historic feature, a portion of the Morris Canal, is extant in the extreme western end of the APE. Though no traces of the canal are apparent on the surface of the APE, portions of the canal prism may remain there, buried and possibly well preserved. Any such remains that exist may have the potential to yield information about the methods and materials used in the construction of the canal and concerning its use.

There is no indication cartographically or in the narrative histories that any shore facilities whatsoever were constructed in the APE prior to the construction of the Greenville Yards. Immediately offshore of the Yard, it is likely that the remains (piling stubs and the like) of the several piers that have been constructed and demolished during the twentieth century are present. Underwater survey would not be necessary to locate them as their locations are well-documented on existing maps. In addition, because their original forms and functions are also well documented, such remains, if any, do not have any information potential.

In summary, the archaeological sensitivity of the Greenville Yards APE is very low. The Yard's location in an intensively industrialized area generally lowers the probability that intact archaeological deposits survive. Specifically, as the yards were constructed on imported fill, any archaeological materials that may be present were brought in from somewhere else, were thoroughly mechanically disturbed on-site, or were so deeply buried under the fill that they are, practically, inaccessible. There is, nevertheless, a low probability that a portion of the Morris Canal is present in the extreme western end of the APE.

B. IMPACT ASSESSMENT

The archaeological assessment, herein reported, was conducted in compliance with federal and New Jersey State laws and regulations. The assessment constituted a good-faith effort to identify potential and actual historic properties in the APE. Construction of the portions of the Cross Harbor Freight Improvement Project in the Greenville Yards will have no effect on historic properties since there are no prehistoric or historic cultural materials or features in the APE. No further archaeological investigations are recommended.

Completion of this work fulfills the responsibility mandated by the National Historic Preservation Act (Public Law 89-665), as amended, and Procedures for the Protection of Historic and Cultural Properties (36 CFR 800). The archaeologists who performed this work satisfy the qualifications specified in 36 CFR 61.

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APPENDIX A

RESUMES OF KEY PERSONNEL

SUSAN D. GRZYBOWSKI
Assistant Director/Senior Archaeologist

EDUCATION

- Postgraduate study, Anthropology, State University of New York at Stony Brook, 1988-1989
- M.A., Anthropology, State University of New York at Stony Brook, 1988
- B.A., Psychology, Saint John Fisher College, 1981

PROFESSIONAL AFFILIATIONS

- Society for Industrial Archaeology (SIA)
- Vermont Archaeological Society (VAS)
- New Hampshire Archaeological Society (NHAS)

PROFESSIONAL EXPERIENCE

Ms. Grzybowski is responsible for the general management of Berger's cultural resource operations in the East Orange, New Jersey, office. She is responsible for overseeing archaeological research projects and historic preservation planning studies involving historic and prehistoric resources, as well as marketing and general business development in the Northeast and Middle Atlantic. Her regional areas of expertise include New Jersey, Pennsylvania, Vermont, New Hampshire, and southern New York State, including New York City and its surrounding boroughs, Long Island, and the lower Hudson River watershed. As project manager, her responsibilities include client and subconsultant coordination, technical oversight, financial and contractual administration, staffing and scheduling, and preparation of research proposals and cost estimates. She also plans and conducts archaeological investigations of historic and prehistoric sites, and prepares technical reports and agreement documents in compliance with Section 106 of the National Historic Preservation Act, Section 4(f) of the U.S. Department of Transportation Act, and municipal, city, and state regulations. Since joining Berger in 1989, Ms. Grzybowski's major projects have included:

- **Archaeological and Historic Architectural Investigations and Section 106 Compliance, Ridgewood Station, New Jersey.** Task Manager for the identification and evaluation of archaeological and historic architectural resources, and mitigation of adverse effects associated with the proposed improvements to the circa-1916 railroad station, which is listed in the State and National Registers of Historic Places. For New Jersey Transit.

- **Cultural Resource Screening, Historical Architectural Evaluation, and Historic Bridge Alternative Analysis, Two Bridges Road Bridge, Passaic, Morris, and Essex Counties, New Jersey.** Cultural Resource Task Manager for cultural resource screening of archaeological and historic architectural properties, including five known prehistoric Native American sites, several historic residences pre-dating 1950, and the 1887 National Register-eligible steel truss bridge. Project tasks involve the assessment of archaeological sensitivity, evaluation of buildings greater than 50 years of age, and assistance with the development of alternatives concerning the historically significant historic bridge structure and crossing. For the County of Passaic.

- **Cultural Resource Assessment and Phase IB Survey, Bus Storage and Maintenance Facility, Arthur Kill Road, Staten Island, New York.** Task Manager responsible for the sensitivity

assessment of historic and prehistoric resources and Phase IB survey for proposed construction of a bus depot near Arthur Kill. For New York City Transit.

- **Historic Brochure for Edison and Driscoll Bridges over Raritan River, New Jersey.** Cultural Resource Task Manager for the preparation of a historic brochure for public dissemination concerning the history, bridge design aspects, and bridge-building practices used in the construction of the 29-span continuous plate girder deck Thomas A. Edison Bridge (constructed 1939) and the 29-span Alfred E. Driscoll Bridge (constructed 1954). The Edison Bridge was one of the largest, highest, and longest span bridges of its type in the United States when completed. For the New Jersey Department of Transportation.

- **I-80 Bridges Underclearance Resolution Project, SR 0209, Section 16B and Section 017, Monroe County, Pennsylvania.** Task Manager for Phase IA archaeological assessment study and Phase I archaeological investigations associated with proposed improvements along SR 0209. For Ammann & Whitney and the Pennsylvania Department of Transportation, Engineering District 5-0.

- **Monitoring and Rehabilitation of the Colt Gun Mill Site, City of Paterson, New Jersey.** Cultural Resource Task Manager for the monitoring of debris removal activities, mapping, salvage, and rehabilitation of the 1836 Colt Gun Mill site. For the City of Paterson in conjunction with the National Park Service and New Jersey Historic Trust.

- **Cooper-Hewitt/General Electric Mercury Vapor Lamp Factory, Hudson County, New Jersey.** Project Manager for the Historic American Engineering Record documentation of the Cooper Hewitt Mercury Vapor Lamp Factory, which was associated with the manufacture of mercury vapor lamps invented by Peter Cooper Hewitt under the Cooper Hewitt Electric Company and the General Electric Vapor Lamp Company. Peter Cooper Hewitt made significant contributions in the field of electrical engineering. For Blasland, Bouck & Lee, Inc., and General Electric.

- **Archaeological and Historic Architectural Investigations, Garden State Parkway Improvements at Interchange 142, New Jersey.** Cultural Resource Task Manager for Phase I archaeological investigations and the historic architectural identification and evaluation studies of 171 resources within the designated area of potential effect. For the New Jersey Highway Authority.

- **Engineering District 4-0, Pennsylvania Department of Transportation Open-End Contract for Various Cultural, Historical, and Archaeological Services, 2000-2005.** Project Manager/ Principal Investigator. Responsibilities include design and performance of archaeological investigations and architectural evaluations in areas to be affected by bridge replacements and roadway relocation projects in a six-county region of northeastern Pennsylvania.

  Eighth Street Bridge Replacement Project, Kingston Township, Luzerne County, Pennsylvania. Project Manager/Archaeologist. Assisted in the development of an innovative research design and execution of the geoarchaeological and paleoenvironmental investigations within a 12.0-acre site adjacent to the Susquehanna River. The project was conducted in advance of PennDOT's planned replacement of the bridge and involved reconstructing the ancient landscape and environmental characteristics of a portion of the floodplain prior to and in lieu of more labor-intensive traditional archaeological excavations. Project received a *Distinguished Award for Engineering Excellence* from the Consulting

Engineers Council of New Jersey (CECNJ). For Pennsylvania Department of Transportation, Engineering District 4-0.

- **Bloomfield Avenue Bridge Replacement, Bloomfield, New Jersey.** Project Manager for Phase I cultural resource survey, including archaeological and historic architectural resources, for proposed bridge replacement over Peckman River in the Township of Verona. For County of Essex, Department of Public Works, Division of Engineering.

- **Cultural Resource Screening: Environmental Constraints Report, Proposed Interchange at U.S. Route 22 and Chimney Rock Road, Bridgewater Township, New Jersey.** Cultural Resource Task Manager for field inspection, background research, and preparation of cultural resource constraints report. For Somerset County Engineers.

- **Cultural Resource Assessment, Maintenance Yards and Facilities, Queens County, New York.** Task Manager responsible for the assessment of historic and prehistoric sensitivity for proposed improvement projects along the floodplain of Flushing River. For New York City Transit.

- **Stillwell Avenue Terminal Reconstruction, Brooklyn, New York.** Task Manager for the preparation of the Historic American Engineering Record documentation for the 1916-1919 Stillwell Terminal and 1930s Arcade Building. For New York City Transit.

- **Cultural Resource Assessment: Atlantic City Expressway, Atlantic County, New Jersey.** Project Manager for field inspection, background research, and preparation of technical report for Phase IA archaeological investigation. For the South Jersey Transportation Authority.

- **Phase I and II Archaeological Investigations, Route 47 Improvements, Glassboro, New Jersey.** Project Manager/Principal Investigator for the archaeological survey and evaluation of the Stanger Glassworks vicinity which was historically significant both in the development of the glass industry in New Jersey and the growth of the town of Glassboro. For the New Jersey Department of Transportation.

- **Archaeological Survey and Historic Architectural Assessment, Interstate 676 and Martin Luther King Boulevard, Camden, New Jersey.** Project Manager for Phase I archaeological survey and historic architectural assessment of 74 historic properties. For the New Jersey Department of Transportation.

- **New Jersey Route 21(5), City of Newark, Essex County, New Jersey.** Project Manager for completion of Phase II archaeological evaluations, Route 21(5) TSM improvements. For the New Jersey Department of Transportation.

- **Cultural Resource Screening: Environmental Constraints Study, Route 322 Corridor, Gloucester County, New Jersey.** Cultural Resource Task Manager for field inspection, background research, and preparation of cultural resource constraints report. For the New Jersey Department of Transportation.

- **Cultural Resource Sensitivity Study, Environmental Assessment of the Long Island Motor Parkway/Long Island Expressway Interchange, Village of Islandia, Suffolk County, New York.** Project Manager and Principal Investigator for the identification and assessment of cultural resources within the project area. For New York State Department of Transportation.

- **Lower Manhattan Access Study, New York.** Task Manager for the inventory of historic properties, districts, and archaeological sensitivity. For New York City Transit.

- **Cultural Resource Screening Study for Categorical Exclusion Documentation, Route 47, Sections 4D and 5E, Cape May County, New Jersey.** Project Manager for field reconnaissance, background research, and preparation of cultural resource screening report. For the New Jersey Department of Transportation.

- **Archaeological Investigations, Stewart Airport Access Connection Project, Stewart International Airport, Orange County, New York.** Project Manager and Principal Investigator responsible for survey and testing in areas of archaeological sensitivity along historic Drury Lane and locations for wetland mitigation sites. For the New York Thruway Authority, the New York State Department of Transportation, and Federal Highway Administration.

- **Vermont Agency of Transportation Agreement for Statewide Archaeological Services, 1998-2001.** Contract Administrator/Project Manager. Projects include field inspection assessments and Phase I archaeological studies in advance of bridge and roadway improvement projects, and a study of historic front yard archaeology for highway improvement projects.

- **Cultural Resource Services for the Pilgrim State Hospital Redevelopment Site, Suffolk County, New York.** Project Manager/Senior Archaeologist for archaeological survey and historic architectural assessment of more than 600 acres and 80 extant buildings and structures associated with the Pilgrim State Psychiatric Facility founded in 1931 and once the world's largest mental institution. For Reckson Associates Realty Corporation.

- **Pennsylvania Department of Transportation Statewide Open-End Agreement for Cultural Resource Services, 1994-1999.** Contract Administrator/Project Manager for 27 multidisciplinary work order assignments. Projects have included the performance of background and site file research; site-specific historical research; Phase I, II, and III archaeological investigations for both prehistoric and historic sites; geomorphological assessments; historic structure assessments; determinations of eligibility and effects; preparation of Section 4(f) or 2002 evaluations; memorandums of agreements; and Historic American Engineering Record (HAER) and Historic American Building Survey (HABS) documentation. Some major projects included:

  Proposed Wyalusing Creek Bridge Replacement, SR 0706, Rush Township, Susquehanna County, Pennsylvania. Project Manager/Senior Archaeologist for Phase I, II, and III archaeological investigations and architectural assessments of historic properties along the terraces and floodplain of Wyalusing Creek. Phase I investigations identified six previously unrecorded prehistoric sites and two historic archaeological sites. Phase II and III investigations included the Bennett Site #1 (a prehistoric camp affiliated with the Late Archaic/Lamoka occupation) and Quick Site #3 (a prehistoric camp occupied during the Late Archaic and Late Woodland periods).

Walnut Street Bridge Rehabilitation Project, Harrisburg, Pennsylvania. Project Manager for all environmental and cultural resource studies to support the emergency rehabilitation of the National Register-listed Walnut Street Bridge, East Channel Section. The pedestrian bridge across the Susquehanna River was closed following heavy damage during the January 1996 flood. All project activities were completed under an accelerated schedule and included emergency HAER recordation, measured drawings of the historic bridge, Criteria of Effect documentation, Categorical Exclusion Evaluation, and Section 2002 Findings.

- **Cultural Resource Services for the Greenville Yard Transfer Bridges No. 9-14, Jersey City, New Jersey.** Contract Administrator for the HAER documentation, motion picture film footage and video, and coordination of salvage operations associated with demolition of the last surviving example in New York Harbor of a suspended-type railroad car float transfer bridge circa 1904-1945. For the Consolidated Rail Corporation (Conrail).

- **Vermont Agency of Transportation Agreement for Statewide Archaeological Services, 1995-1998.** Contract Administrator/Project Manager for 23 archaeological studies, ranging from field inspections to Phase I, II, and III investigations, including both prehistoric and historic archaeological resources. Major project assignments included:

  Derby BRF 034-3(14), Derby, Vermont. Phase III historical and archaeological investigations of a National Register-eligible mill complex on the Clyde River, with a focus on Site VT-Ol-22, a nineteenth- to twentieth-century sawmill site.

- **Kratz Road Bridge Replacement, Cultural Resource Investigations and Section 106 Compliance, Montgomery County, Pennsylvania.** Cultural Resource Task Manager for archaeological and architectural investigations and Section 106 compliance activities. Project included the evaluation of a prehistoric site and measures to mitigate impacts to a potentially eligible National Register historic district and historic stone arch bridge in Evansburg State Park. For Ammann & Whitney and the Pennsylvania Department of Transportation, Engineering District 6-0.

- **Historic American Engineering Record Documentation, Lembeck & Betz Eagle Brewery, Jersey City, New Jersey.** Project Manager for HAER documentation of the late nineteenth- and early twentieth-century industrial complex, which was once the fourth largest brewery in New Jersey. For the Jersey City Redevelopment Agency.

- **Historic American Building Survey Documentation, Veterans Memorial Home, Menlo Park, New Jersey.** Project Manager for emergency HABS documentation of the New Jersey Home for Disabled Soldiers, the third such facility built in 1931-1932 by the State of New Jersey to shelter its war veterans. For the State of New Jersey, Department of Military and Veterans Affairs.

- **Historic Architectural and Archaeological Evaluations, and Section 106 Compliance of Railroad Features in Pennsylvania.** Project Manager. Responsible for close coordination with the client, PennDOT, and PHMC/SHPO to address immediate cultural resource concerns and obtain Section 106 clearance for approximately 129 project locations across Pennsylvania. As a fast-track project with multiple tasks, developed weekly task schedules, arranged staffing requirements, maintained overall project tracking, performed cost analysis, supervised preparation of technical

reports, and prepared special exhibits and documents. For the Consolidated Rail Corporation (Conrail).

- **Vermont Agency of Transportation Agreement for Statewide Archaeological Surveys, 1990-1997.** Project Manager. Responsible for client coordination, project tracking, staffing requirements, preparation of technical documents, and task scheduling. Fourteen project assignments involving archaeological assessments, Phase I investigations, and Phase II evaluations were performed.

- **Pennsylvania Department of Transportation Statewide Open-End Contract for Cultural Resource Investigations, 1990-1995.** Project Manager. Responsible for all scope of services, proposals, deliverables, project tracking, and client coordination. Work order assignments in excess of 25 projects, including fast-track and concurrent projects involving multiple tasks, such as Phase I/II archaeological investigations and preliminary architectural assessments, through eligibility and recordation. Critical components of several projects involved the implementation of Sections 106 and 4(f) compliance activities, such as architectural documentation. Major projects included:

  Exton Bypass Wetland Replacement Project, Chester County, Pennsylvania. Project Manager/Senior Archaeologist. Responsible for Phase I archaeological and historical investigations, Section 106 compliance activities, and the coordination and successful completion of all cultural resource services for the proposed wetland replacement and stream enhancement mitigation action associated with the construction of the Exton Bypass in Chester County. Project involved identification surveys on more than 20 individual parcels, evaluation studies of nine prehistoric sites, historical research, geomorphological investigations of each parcel, historic district boundary studies for all National Register-listed or eligible properties, determination of eligibility and effect reports, visual impact analysis of National Register properties including a listed rural historic landscape, and preparation of the Memorandum of Agreement. For Engineering District 6-0.

  Western Center Interchange, SR 1009, Washington County, Pennsylvania. Project Manager. Responsible for overall design, research, scheduling, and coordination for Phase I/II archaeological and historical site investigations within the construction area for a loop interchange and for access roads connecting Interstate 79 with State Route 1009. Project involved identification and evaluation of five prehistoric sites and site-specific historical research of a possible nineteenth-century road trace. Prepared weekly summary reports and arranged weekly conference calls to provide data on the field progress, including preliminary findings and projected schedule of the work to date, to assist coordination and consultation efforts between PennDOT, PHMC/SHPO, FHWA, and other involved agencies. For the Pennsylvania Department of Transportation, Engineering District 12-0.

  Gravel Lick Bridge, SR 1001, Clarion County, Pennsylvania. Project Manager. Supervised all Phase I/II data collection and analysis of impacts to intact archaeological features and stratified deposits associated with Site 36CL89 on the north bank of the Clarion River. For Engineering District 10-0.

  Mill Creek Bridge at Haags Mill, SR 0191, Dreher Township, Wayne County, Pennsylvania. Project Manager. Supervised and coordinated all historic, archaeological, and historic architectural investigations associated with the proposed rehabilitation or

replacement of a National Register-listed stone arch bridge carrying State Route 0191 over Mill Creek. The investigations identified the historic remains of an elaborate farming and milling complex within the project area. Structural remains of two nineteenth-century milling operations along with their associated water-control networks were identified, and a potentially eligible National Register Historic District was identified and recorded. For Engineering District 4-0.

- **Engineering District 4-0, Pennsylvania Department of Transportation Open-End Contract for Archaeological Services.** Project Manager. Responsibilities involved design and performance of archaeological surveys and architectural evaluations in areas to be affected by bridge replacements and relocation projects in a six-county region of northeastern Pennsylvania. Several projects involved complex multidiscipline task coordination and techniques for the identification of previously reported archaeological sites, historical records and map searches to identify potential sites, study of environmental conditions to estimate the potential for prehistoric site locations, and surveys of the proposed project areas to identify archaeological resources. Distinctive projects included:

  Aldenville Bridge Replacement, SR 0170, Wayne County, Pennsylvania. Project Manager and Principal Investigator. Supervised and participated in all aspects of archaeological and historical site investigations, evaluation, and mapping for the nineteenth-century tannery site situated within proposed relocation of State Route 0170 in the village of Aldenville. Detailed study and consideration of the site relative to the proposed project design specifications resulted in a recommendation for no further archaeological or historical research.

  White Mills Bridge Replacement, Wayne County, Pennsylvania. Project Manager and Principal Investigator. Coordinated historical research and architectural evaluation of a twentieth-century fire station, the Delaware and Hudson Canal, and a potential National Register Historic District. Supervised archaeological fieldwork, data analysis, and report preparation.

  Preliminary Cultural Resource Evaluation and Effects Report, Brown Street Bridge Rehabilitation, Honesdale, Wayne County, Pennsylvania. Project Manager. Provided assessment of potential archaeological resources in the areas to be affected by the proposed bridge rehabilitation project. An early twentieth-century coal elevator was evaluated as eligible for the National Register under Criterion C.

  Prompton Bridge Replacement, Wayne County, Pennsylvania. Project Manager and Principal Investigator. Conducted Phase I archaeological investigations of gravity railroad lift plane, engine house, raceway, and towpath associated with Delaware & Hudson Canal Company. Synthesized historical data and architectural information regarding mid-nineteenth-century Bryant House to provide recommendation for potential National Register eligibility under Criterion C.

- **Visual Impact Analysis, Gettysburg Commons Mall Design, Adams County, Pennsylvania.** Project Manager. Supervised all Phase I/II historical research and archaeological investigations of 35-acre area to be developed. Project involved the identification and evaluation of an early

twentieth-century tile-works site and a mid-nineteenth-century farmstead. Also assisted in the evaluation of the overall visual impact of the project on the adjacent Gettysburg Historic Military Park and Historic Battlefield District in Gettysburg. All analyses and investigations for this project were conducted in coordination with the PHMC/SHPO and the National Park Service. For Mark Development Company.

- **Archaeological and Preliminary Architectural Surveys, Tunkhannock Bypass, Wyoming County, Pennsylvania.** Project Manager and Principal Investigator. Managed all archaeological and historic architectural studies for the three proposed bypass alignments in the Borough of Tunkhannock, Pennsylvania. Responsibilities included client coordination, meetings, presentations to PennDOT, FHWA, SHPO, and other involved agencies, and preparation of comprehensive cultural resource reports and information for the alternatives study. As Principal Investigator, responsibilities focused on the identification of cultural resources in the corridors, analysis of site components and cultural affiliations, and evaluation of significance. For Skelly and Loy and the Pennsylvania Department of Transportation, Engineering District 4-0.

- **County Bridge 55501, T-351, Area of Impact Alternative I; County Bridge 15313, T-620; and County Bridge 17013, T-630, Luzerne County, Pennsylvania.** Project Manager for Phase I cultural resource surveys. Responsible for project scoping, cost estimates, research, quality control, and compliance with state and federal regulations for three proposed bridge replacement projects in Luzerne County. The Project Manager was also responsible for assuring the technical quality and consistency in the documents according to PHMC/BHP guidelines. For the Luzerne County Road and Bridge Department.

- **Phase I Cultural Resource Investigation CAN DO Corporate Center, Luzerne County, Pennsylvania.** Project Manager for Phase I cultural resource investigation. Designed and directed stratified archaeological sampling of 180-acre proposed development site. Duties included client coordination, project administration services, and technical collaboration. For the Greater Hazleton Community Area New Development Organization, Inc.

- **Proposed Sanitary Sewer and Manufacturing Facility, South Lebanon Township, Lebanon County, Pennsylvania.** Project Manager and Principal Investigator. Responsible for development of study plan and implementation and coordination of research for 24-acre Phase I archaeological and historical survey. For Gehl Company.

- **New Jersey Route 92, Middlesex County, New Jersey.** Co-Principal Investigator. Phase I/II archaeological investigations. Assisted in data analysis, interpretation, and preparation of technical materials and reports for 11 prehistoric and 18 historic archaeological sites within the proposed corridor and alternative schemes. Responsibilities also included the evaluation of four historic archaeological sites according to National Register eligibility criteria. For the New Jersey Department of Transportation.

- **Harbortowne Waterfront Development, Sayreville, New Jersey.** Principal Investigator for Phase III mitigation.

- **Gateway Cathedral, Staten Island, New York.** Archaeologist for Phase I cultural resource survey.

- **Manor, Village of Irvington, Westchester County, New York.** Principal Investigator for Phase I cultural resource investigations.

- **Phase IA Cultural Resource Survey of Central Florida.** Principal Investigator. For the U.S. Department of Justice, Federal Bureau of Prisons.

- **Consolidated Fire Training School, Windsor Locks, Hartford County, Connecticut.** Principal Investigator for Phase IA cultural resource investigations.

- **Phase IA Cultural Resource Survey of Rockwood, Tennessee.** Principal Investigator. For the U.S. Department of Justice, Federal Bureau of Prisons.

PREVIOUS PROFESSIONAL EXPERIENCE

- **Historic Site Manager/Cultural Resource Analyst, Division of Environmental Protection, Town of Brookhaven, Long Island, New York.** Reviewed private and public land developments for impacts on cultural resources in accordance with New York State Environmental Quality Review Act (SEQRA). Prepared technical reports and determinations for municipal actions, including Town Master Plan, Local Waterfront Revitalization Project, Landmark Nominations, and Nature Preserve sites. Coordinated with the State Historic Preservation Officer, New York State Department of Environmental Conservation, Suffolk County Historic Trust, and Historic District Advisory Committee. 1987-1989.

- **Archaeologist, Archivist, and Manager, Institute for Long Island Regional Archaeology, State University of New York at Stony Brook.** Supervised and participated in all aspects of fieldwork, proposal and report preparation, laboratory analysis, archival research, and graphics. Involved in the excavation of ILIRA-1004, a Paleoindian site in Riverhead, and survey of multicomponent archaeological sites on eastern Long Island. 1988-1989.

- **Researcher, Department of Anthropology, State University of New York at Stony Brook.** Conducted analysis of Native American skeletal remains and investigation of prehistoric human burial sites on Long Island utilizing collection from the Museum of Natural History in New York City. 1989.

- **Archaeological and Historical Consultant.** As a private consultant, completed the evaluation and interpretation of the Hayne-Sherwood Homestead as a center of heritage education sponsored by the Society for the Preservation of Long Island Antiquities. 1988.

- **Instructor, School of Continuing Education, State University of New York at Stony Brook.** Co-instructor for Field Studies in Long Island Natural and Cultural History. Intensive graduate course designed especially for teachers and educators that focused on the exploration and discussion of unique historical, archaeological, and natural areas and sites in Nassau and Suffolk counties, Long Island. 1984-1988.

- **Project Historian and Field Crew Chief, Department of Anthropology, State University of New York at Stony Brook.** Participated in the Summer Field School in Long Island Archaeology. Survey, excavation, and interpretation of the Havens Estate and six Woodland period sites within

the proposed zone of impact for the Oak Tree Bay Development on the Great South Bay of Long Island. 1987.

PUBLICATIONS

- Contributing author, Plowed Fields and Historical Archaeology: The Petty Homestead, Middle Island, Suffolk County. *The Historical Archaeology of Long Island*: Part I - The Sites. *Readings in Long Island Archaeology and Ethnohistory*, vol. VII, edited by G. Stone and D. Ottusch-Kianka, pp. 280-291. Suffolk County Archaeological Association, New York. 1986.

RODERICK S. BROWN
Senior Archaeologist

EDUCATION

- M.A., Quantitative Archaeology, California State University at Long Beach, 1985
- B.A., Anthropology, California State University at Long Beach, 1975
- A.A., Social Science, Santa Ana College, Santa Ana, California, 1970

SPECIAL TECHNICAL TRAINING

- Certified Scuba LACUU, 1968.
- Certified Divemaster NAUI, 1992

PROFESSIONAL EXPERIENCE

Mr. Brown, a Senior Archaeologist at Berger, has over 20 years of experience as a consulting archaeologist. His background includes archaeological investigations at multicomponent prehistoric and rural historic sites throughout the Northeast, geomorphological assessments, coordination with Native American groups under the Native American Graves Protection and Repatriation Act (NAGPRA), cartography, mapping, and surveying. Mr. Brown's responsibilities include client interaction, preparation of innovative research designs, and overall technical supervision and implementation of research and field projects. He also prepares technical reports and agreement documents in compliance with Section 106 of the National Historic Preservation Act (1966), Section 4(f) of the Department of Transportation Act of 1966, as well as state and local regulations. Since joining Berger, Mr. Brown has been responsible for the following projects in Pennsylvania.

- **I-80 Bridges Underclearance Resolution Project, SR 0209, Section 16B and Section 017, Monroe County, Pennsylvania.** Project Archaeologist. Phase IA archaeological assessment study and Phase I archaeological investigations associated with proposed improvements along SR 0209. For Ammann & Whitney and the Pennsylvania Department of Transportation, Engineering District 5-0.

- **Haags Mill Bridge, SR 0191, Dreher Township, Wayne County, Pennsylvania.** Project Archaeologist. Cultural resource support services to PennDOT and field assessment of historic archaeological ruins associated with the Lower Mill Creek Historic District. For Pickering Corts, & Summerson and Pennsylvania Department of Transportation, Engineering District 4-0.

- **Eighth Street Bridge Replacement Project, Kingston Township, Luzerne County, Pennsylvania.** Project Archaeologist. Responsible for the development of an innovative research design and execution of the geoarchaeological and paleoenvironmental investigations within a 12.0-acre site adjacent to the Susquehanna River. The project was conducted in advance of PennDOT's planned replacement of the bridge and involved reconstructing the ancient landscape and environmental characteristics of a portion of the floodplain prior to and in lieu of more labor-intensive traditional archaeological excavations. For Pennsylvania Department of Transportation, Engineering District 4-0.

- **S&L Plastics Warehouse Addition, Upper Nazareth Township, Northampton County, Pennsylvania.** Project Archaeologist. Phase I archaeological survey of a 3.0-acre field to determine the presence or absence of archaeological deposits. For Pany & Lentz Engineering.

PAST PROFESSIONAL EXPERIENCE

Owner and Chief Archaeologist, Hindsite Archaeology, Lake Ariel, Pennsylvania. Responsible for all phases of work for archaeological investigations conducted by Hindsite Archaeology in the Central Atlantic region. Consultant to Pennsylvania Department of Transportation and several archaeological consulting firms regarding NAGPRA, Section 106, and Section 4(f) compliance, research design development, field and laboratory methods, geomorphological methods, cartography, treatment of human remains, and report writing, editing, and review. 1997-2000.

Director of Archaeology, Ecoscience, Inc. Moscow, Pennsylvania. Directed all phases of archaeological work at Ecoscience, Inc., including research design and implementation, preparation of proposals, marketing, report preparation, laboratory processing and analysis, cartography, subconsultant coordination, fieldwork, personnel matters, computer applications, contracts, and Archaeology Division budget. 1999.

Senior Archaeologist/Principal Investigator, Greenhorne & O'Mara, Inc., Greenbelt, Maryland, and Archaeological Consultant, PennDOT, Bureau of Environmental Quality, Harrisburg, Pennsylvania. Responsible for all phases of archaeological project development and implementation, and the integration of archaeological project planning and study results into environmental and engineering projects of larger scope (EAs and EISs). As consultant to the Pennsylvania Department of Transportation, participated in project scoping and review and project management; coordinated Section 106 consultation with the SHPO; reviewed archaeological compliance documents; and participated in planning of departmental compliance efforts. Coordinated Section 106 compliance for more than 250 road and bridge construction/improvement projects involving historic and prehistoric surveys, evaluations, and mitigations. Wrote policies with regard to Native American groups and NAGPRA and coordinated that effort with regionally affiliated Native American groups. Prepared Memorandum of Agreement and Programmatic Agreement templates in consultation with the President's Advisory Council on Historic Preservation and the Federal Highway Administration to facilitate compliance with Section 106 and Section 4(f). Prepared standards for and participated in the management of the development of a statewide prehistoric and historic cultural resources database for incorporation in the state's (PHMC and PennDOT) geographic information system. 1995-1998.

PAPERS AND PRESENTATIONS

- Computer Data Management and Mapping - A Synthetic Approach. Report presented at Society for California Archaeology Annual Meetings. San Diego, California. 1984.

- The Answer Is Blowing in the Wind - Aeolian Site Displacement. Paper presented to the Pacific Science Congress, Dunedin, New Zealand. 1983.

ZACHARY J. DAVIS
Archaeologist

EDUCATION

- Interdepartmental Doctoral Program in Anthropological Science, State University of New York at Stony Brook
- M.A., Anthropology, State University of New York at Stony Brook, 2000
- M.A., Archaeology, Institute of Archaeology, University of London, 1994
- B.A., Archaeological Studies, Boston University, 1993

PROFESSIONAL REGISTRATION

- Register of Professional Archaeologists (RPA)

TECHNICAL TRAINING

- Introduction to GPS using the Trimble Pro XR Training Class (Mike Popoloski, instructor), March 19, 2001.

PROFESSIONAL AFFILIATIONS

- Society for American Archaeology
- Geological Society of America
- Paleoanthropology Society of America
- Society for Archaeological Sciences

PROFESSIONAL EXPERIENCE

Mr. Davis's background includes archaeological investigations at prehistoric sites dating from the Paleoindian through Late Woodland periods and historic sites dating from the seventeenth through early twentieth centuries. As Principal Investigator, he is responsible for the implementation and execution of archaeological research projects involving historic and prehistoric resources in the Northeast. His responsibilities include coordinating and supervising interdisciplinary multitask studies, planning and conducting surveys and excavations of historic and prehistoric sites and their resources, interfacing with clients and subconsultants, maintaining project schedules, and preparing research proposals and technical reports. In addition, Mr. Davis has extensive experience with lithic material analysis and Geographic Information Systems database development and analysis for cultural resources. Since joining Berger, Mr. Davis's major projects include:

- **Nutley, New Jersey.** Principal Investigator for a Phase IA archaeological assessment and Historic Architectural Resource assessment of a proposed Nextel cell tower installation in Essex County, New Jersey. For IVI Environmental, Inc.

- **La Tourette Park, Staten Island, New York.** Principal Investigator for a Historic Architectural Resource assessment of a proposed Omnipoint cell tower installation in Richmond County, New York. For Goodkind and O'Dea, Inc.

- **Bradley Beach, New Jersey.** Principal Investigator for a Historic Architectural Resource assessment of a proposed Verizon cell tower installation in Monmouth County, New Jersey. For Innovative Engineering, Inc.

- **U.P.N. Pallet Co. Cell Tower, Penns Grove, New Jersey.** Principal Investigator for a Phase IB archaeological assessment of a proposed AT&T cell tower installation in Salem County, New Jersey. For Rescom Environmental Corporation.

- **Clayton Cell Tower, Clayton, New Jersey.** Principal Investigator for a Phase IB archaeological assessment of a proposed AT&T cell tower installation in Gloucester County, New Jersey. For Rescom Environmental Corporation.

- **Peach County Cell Tower, Mantua, New Jersey.** Principal Investigator for a Phase IB archaeological assessment of a proposed AT&T cell tower installation in Gloucester County, New Jersey. For Rescom Environmental Corporation.

- **P.S. 234-Q, Long Island City, Queens, New York.** Principal Investigator for a Phase IB archaeological assessment for a proposed New York City public school in Astoria, Queens. For Parsons Brinckerhoff, Inc.

- **Arthur Kill Road Bus Maintenance Facility, Staten Island, New York.** Principal Investigator for a Phase IB archaeological survey. For New York City Transit.

- **Arbutus Avenue Sewer Project, Staten Island, New York.** Principal Investigator for a Phase I archaeological survey for sewage installation project along the Arbutus Creek. For JRC Construction Corporation.

- **Two Bridges Road Bridge, Lincoln Park, Wayne and Fairfield, New Jersey.** Principal Investigator for a cultural resource screening of the area surrounding the confluence of the Passaic and Pompton rivers. For the County of Passaic.

- **Interchange 142 (Garden State Parkway and I-78), Hillside, Irvington, and Union, New Jersey.** Principal Investigator for a Phase IB archaeological survey along the Garden State Parkway at Exit 142, straddling the Union/Essex County line. For the New Jersey Highway Authority.

- **Interchange 142 (Garden State Parkway and I-78), Hillside, Irvington, and Union, New Jersey.** Contributed to the Historic Architectural Evaluation with background research on and evaluation of the Elizabeth River Park, a National Register-eligible park in Union County. For the New Jersey Highway Authority.

PREVIOUS PROFESSIONAL EXPERIENCE

- **Calverton Naval Weapons Industrial Reserve, Calverton, New York.** Geographic Information Systems analyst. Integrated GIS analysis with lithic analysis to interpret prehistoric activity patterns.

- **PS 56R Site, Staten Island, New York.** Lab Director. Analysis, curation, and data entry for cultural material derived from the mitigation of a primarily Late Archaic prehistoric site.

- **Calverton Naval Weapons Industrial Reserve, Calverton, New York.** Field Supervisor. Cultural resource survey of 6,000-acre parcel with several early mid-twentieth-century buildings and several Late Archaic and Late Woodland prehistoric sites.

- **Russian Mission, The Bronx, New York.** Lithic Analyst. Cultural resource survey of a Late Archaic/Woodland quartz quarry site.

- **Long Island College Hospital, Brooklyn, New York.** Excavator. Monitoring heavy machine excavation of eighteenth-, nineteenth-, and twentieth-century historical archaeological deposits for the construction of a parking garage along Atlantic Avenue.

- **Robin's Island, Southold, New York.** Field Supervisor and Lithic Analyst. Survey of 450-acre island located in the Peconic Bay, revealing several prehistoric and historic sites.

- **Hudson Valley Rod & Gun Club, Pawling, New York.** Excavator. Mitigation of a Middle and Late Archaic prehistoric site.

- **Umm el Tlel, Syria.** Excavator. Long-term excavations of an open-air site containing cultural material spanning from the terminal Lower Palaeolithic, through the Middle, Upper, and Epi-Palaeolithic, to the Neolithic.

- **Abri Castanet, Sergeac (Perígord), France.** Excavator. Long-term excavations of an early Upper Palaeolithic rockshelter in the southwest of France.

- **Le col de Jiboui, Haut-Diois (Drôme), France.** Excavator. Salvage excavations of an open-air Middle Palaeolithic site in the French Alps.

- **Fouilles Préhistoriques à Cagny, Cagny (Nord), France.** Excavator. Excavation of two open-air Lower Palaeolithic sites located in Northern France.

- **Spencer-Pierce-Little Farm, Newbury, Massachusetts.** Excavator. Boston University archaeological field school at a late sixteenth-century homestead.

ACADEMIC POSITIONS

Graduate Teaching Associate, Department of Anthropology, SUNY at Stony Brook. Primary Instructor: Anthropology 402, Problems in Archaeology - Landscape exploitation strategies in the Eurasian Palaeolithic.

Graduate Teaching Assistant, Department of Anthropology, SUNY at Stony Brook. Primary Teaching Assistant for Anthropology 102, Introduction to Cultural Anthropology; Primary Teaching Assistant for Anthropology 356, Urban Anthropology; Primary Teaching Assistant for Anthropology 104, Introduction to Archaeology; Primary Teaching Assistant for Anthropology 290, Ancient Science and Technology.

Graduate Teaching Assistant, Department of Anthropology, SUNY at Stony Brook. Lab Instructor for Anthropology 418, Lithic Technology; Lab Instructor for Anthropology 420, Geographic Information Systems in Environmental Analysis.

HONORS/AWARDS

- Graduate Council commendation for excellence in teaching by a graduate student, SUNY at Stony Brook.
- General grant for thesis research, L.S.B. Leakey Foundation.
- Grant for thesis research, Geological Society of America.
- Grant for thesis related research, IDPAS, SUNY at Stony Brook.
- Travel grant to the Annual Meeting of the Paleoanthropology Society, Columbus.
- Travel grant to the 63rd Annual Meeting of the Society for American Archaeology, Seattle.
- Travel grant for summer fieldwork, Sigma Xi Research Foundation.
- General research grant, IDPAS, SUNY at Stony Brook.
- Travel grant to the 62nd Annual Meeting of the Society for American Archaeology, Nashville.

PUBLICATIONS

- Experimental Test of Middle Palaeolithic Spear Points Using a Calibrated Crossbow. By J.J. Shea, Z.J. Davis, and K.S. Brown. *Journal of Archaeological Science*, 28:807-816. 2001.

- Quantifying Lithic Curation: An Experimental Test of Dibble and Pelcin's Original Flake-Tool Mass Predictor. By Z.J. Davis and J.J. Shea. *Journal of Archaeological Science*, 25:603-610. 1998.

PAPERS PRESENTED

- Costs and Benefits of Levallois Flake Production: An Economic Perspective on the Variability in Middle Palaeolithic Stone Tool Assemblages. Paper presented at the 65th Annual Meeting of the Society for American Archaeology, Philadelphia. 2000.

- Levantine Mousterian Mobility Patterns: The View from Mt. Carmel, Israel. Paper presented at the 1999 Paleoanthropology Society Meetings, Columbus. 1999.

- Experimental Test of Middle Paleolithic Hunting Weapons: Preliminary Results. Paper presented at the 64th Annual Meeting of the Society for American Archaeology, Chicago. 1999 (with J.J. Shea and K.S. Brown).

- The Analytical Potential of Refitting Studies: History and Synthesis of Applications. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle. 1998.

- The PS 56R Site: A Vosburg Habitation on Staten Island, New York. Paper presented at the 62nd Annual Meeting of the Society for American Archaeology, Nashville. 1997 (with A.M. Pappalardo).

CONFERENCE SYMPOSIA ORGANIZED

- Refitting Studies in New and Old World Lithic Analyses. Symposium organized for the 63rd Annual Meeting of the Society for American Archaeology, Seattle. 1998.

Solecki, Ralph
1941 The Indians Lived Here. *So This is Flushing* [Flushing Historical Society Newsletter], October 1941. Cited in Historical Perspectives, Inc. (1986), *Phase 1A Archaeological Sensitivity Report on the Resource Recovery Project: Maspeth, Queens*. Historical Perspectives, Inc., Westport, Connecticut.

Sullivan, Lynne P.
1992 Arthur C. Parker's Contributions to New York State Archaeology. *The Bulletin. Journal of the New York State Archaeological Association* 104:3-8.

Tuck, James A.
1978 Regional Cultural Development, 3000 to 300 BC. In *Northeast: Handbook of North American Indians, Volume 15*, edited by Bruce G. Trigger, pp. 28-43. Smithsonian Institution, Washington, DC.

United States Geological Survey [USGS]
1891 *Brooklyn, N.Y.* 15-minute Series Topographic Quadrangle. U.S. Department of the Interior, Geological Survey, Washington, DC. Scale 1:62,500.

1898 *Brooklyn, N.Y.* 15-minute Series Topographic Quadrangle. U.S. Department of the Interior, Geological Survey, Washington, DC. Scale 1:62,500.

1995 *Brooklyn, N.Y.* 7.5-minute Series Topographic Quadrangle. U.S. Department of the Interior, Geological Survey, Denver. Scale 1:24,000.

Versaggi, Nina M.
1999 Regional Diversity within the Early Woodland of the Northeast. *Northeast Anthropology* 57:45-56.

Walling, H.F.
1860 *Map of the City of New York and Its Environs*. S.D. Tilden, New York. Scale 1 inch = ½ mile.

Wizniewski, Stanley
1986 General Notes on the History and Archaeology of Maspeth. Unpublished manuscript, cited in Historical Perspectives, Inc. (1986), *Phase 1A Archaeological Sensitivity Report on the Resource Recovery Project: Maspeth, Queens*. Historical Perspectives, Inc., Westport, Connecticut.

Wolfe, Gerard R.
1995 Geology. In *The Encyclopedia of New York City*, edited by Kenneth T. Jackson, pp. 458-461. Yale University Press, New Haven. New York Historical Society, New York.

Wolverton, Chester
1891 *Atlas of Queens County, New York*. Chester Wolverton, New York. Scale 1 inch = 2,640 feet.

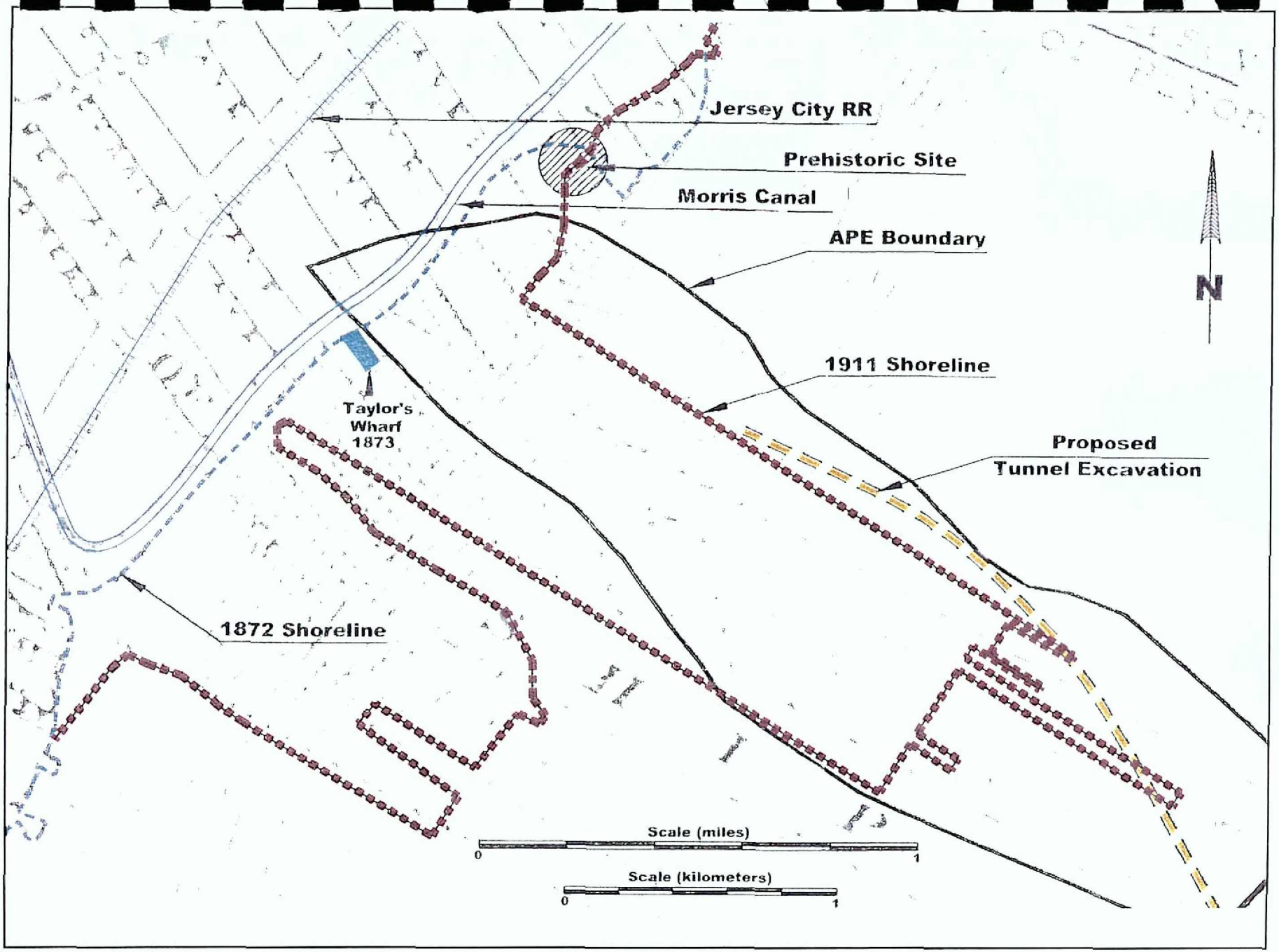

FIGURE 4: Beers 1872 Map Showing Major Historic Cultural Features and Proposed Improvements

SOURCE: Beers 1872

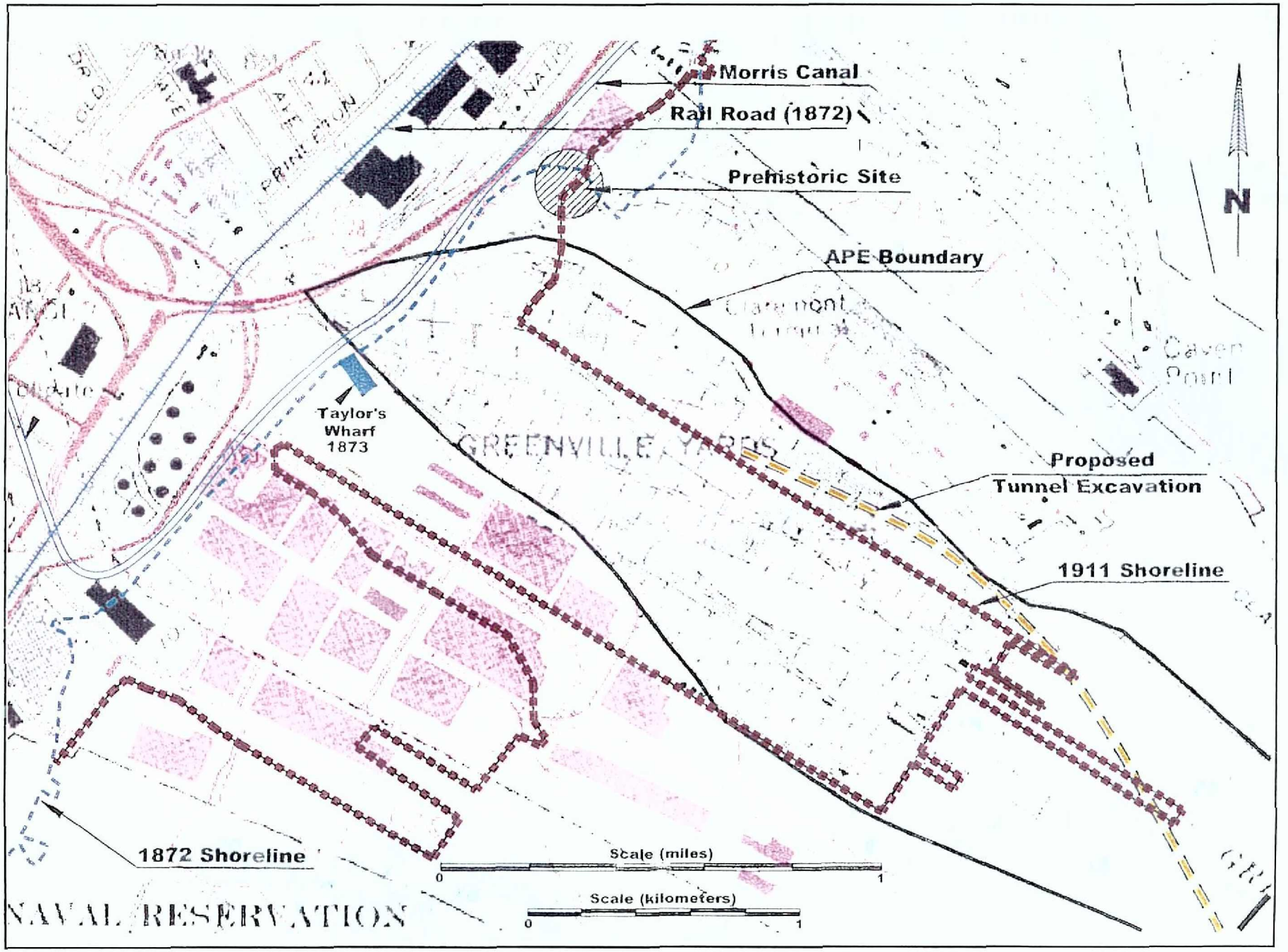

FIGURE 5: 1967 USGS Quadrangle Showing Original Shoreline, Major Historic Cultural Features, and Proposed Improvements

SOURCE: USGS 7.5 Minute Jersey City, NJ-NY 1967 (Photorevised 1981)