AKRF

Phase 1A Archaeological Documentary Study

Charleston Bus Annex – Stormwater Sewer
Arthur Kill Road and Allentown Lane
Charleston, Richmond County, New York

Prepared for:

Metropolitan Transportation Authority-New York City Transit

(MTA-NYCT)

Prepared by:

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November 10, 2006

A. PROJECT GOAL

The goal of this Phase 1A Archaeological Documentary Study is to determine the likelihood that potential archaeological resources have survived the destructive forces of time including agricultural use, the cutting of streets, the installation of utilities, and the construction of buildings. The entire APE was to be investigated in order to identify the project area's original topography, its prehistoric and historic usage and/or occupancy, past disturbance, and potential impacts.

B. PROJECT REVIEW NUMBERS

Project review numbers associated with the previous cultural resource investigation into the Charleston Bus Annex site, excluding the stormwater sewer (Louis Berger and Associates 2001):

State Historic Preservation Office Review Number: 04PR00763
New York City Landmarks Preservation Commission Review Number: 88-223R

C. INVOLVED AGENCIES

Metropolitan Transportation Authority-New York City Transit (MTA-NYCT)

D. PHASE OF SURVEY

Phase 1A Archaeological Documentary Study

E. LOCATION

Charleston, Staten Island, Richmond County, New York

F. SURVEY AREA

Portions of the streetbeds of Allentown Lane—including all the area between the shore of the Arthur Kill and the intersection of Allentown Lane and Arthur Kill Road—and Arthur Kill Road—including the section stretching 1400 feet north of its intersection with Allentown Lane.

G. USGS 7.5 MINUTE QUADRANGLE MAP

Located on the Arthur Kill quadrangle.

H. PREHISTORIC SENSITIVITY ASSESSMENT

Before European contact, the Charleston area of Staten Island had been an important hunting and fishing location for the local Raritan Indians who resided there. Many temporary campsites

dating from the Paleo-Indian period (beginning 11,000 BP) through the Late Woodland (which ended ca. AD 1500) have been identified on the shores of the Arthur Kill in the vicinity of the project area as well as in the surrounding areas. The project site's natural topography would have made it an ideal location for the exploitation of food resources, if not for a habitation site, throughout the entire prehistoric period.

In general, Native American habitation sites on Staten Island dating to all periods of occupation are most often found in proximity to "well-drained areas near streams or wetlands" (Boesch 1994: 9). Most sites are located along the coast near water courses. More specifically, Late Archaic sites have been identified mostly in low-lying areas near water courses and marshes, while temporary camping sites during the Late Archaic were commonly found on sandy knolls (Ibid).

Because of the project area's close proximity to marine resources, high elevations, a Native American trail, and archaeological evidence of a great number of temporary campsites, it is highly likely that the project area was utilized by Native Americans as a temporary hunting, fishing, and camping location. It is possible that archaeological resources related to those activities, including stone tools and debitage, faunal remains, shell middens, fire-cracked rocks, and other artifacts associated with temporary camp sites may be located at the site. Such artifacts have been recovered from the area immediately north of Allentown Lane, which was excavated as part of the Arthur Kill Factory Outlet Center and Tides of Charleston development projects. In addition, in 1996, a possible chert core was recovered from the "abandoned portion of Allentown Lane" during Phase 1B excavations for the Arthur Kill Factory Outlet Center, a proposed project in the area bounded by Allentown Lane, Arthur Kill Road, Androvette Lane, and the Arthur Kill, which was never developed (Hunter Research 1996: 6.20). Most often these deposits have been uncovered within the top 1 to 3 feet of the ground surface, although in the areas of higher elevation to the north of the project site, prehistoric deposits were uncovered at depths of up to 7 to 9 feet.

Soil erosion, landscaping, and mid to late 20th century soil removal have altered the landscape in the vicinity of the project area (Louis Berger and Associates 2001b) and may have resulted in bringing prehistoric artifacts closer to the present ground surface and therefore making them more vulnerable. In addition, in 1991 an interceptor sewer was installed along Arthur Kill Road, disturbing a large portion of the roadbed within the project area, which most likely disturbed the ground down to depths of approximately 10 feet below the present ground surface. Arthur Kill Road also has water, gas, and electrical lines running through it, which would also have disturbed the ground to depths of 5 to 7 feet in those areas. Therefore, it is not expected that archaeological resources dating to the prehistoric period would be recovered from within Arthur Kill Road.

Allentown Lane has also been somewhat disturbed by the installation of utilities in association with the Tides at Charleston development project currently being constructed north of Allentown Lane. A water main with associated fire hydrants and water valves are located on the northern side of the road, extending westward from Arthur Kill Road for approximately 400 feet. In addition, dry wells and manholes have been constructed at the western end of the road, near the shore, and near the intersection of Allentown Lane and Arthur Kill Road. Both sets of drywells have manholes above them as well as associated catch basins.

In mid-2006, Allentown Lane was graded and paved as part of the Tides at Charleston development. Approximately 3 to 4 feet of earth was excavated for this purpose at that time. Earlier soil borings, undertaken by Future Tech Consultants of NY, Inc. in 2004 **(Appendix B)**,

indicate that the western end of the road, near the Arthur Kill, contained 3 feet of fill (top soil) and the eastern end, near Arthur Kill Road, contained 4 feet of fill (top soil). In both locations, the fill layers overlay strata of clay, silt, and sand, presumably the original ground surface. Therefore, it is likely that the grading work undertaken in 2006 only affected the stratum of upper fill, and it is possible that potential prehistoric archaeological resources remain beneath portions of Allentown Lane.

While it is not expected that significant undisturbed prehistoric resources would be recovered from the disturbed portions of the project area within Allentown Lane and Arthur Kill Road, it is possible that prehistoric remains could be located beneath the pavement as well as on either side of the existing water main. The area to the west of Allentown Lane, a grassy hill which slopes down to a marshy area which then leads out to the Arthur Kill, appears to be undisturbed and could be sensitive for the recovery of prehistoric archaeological remains.

Therefore, the Charleston Bus Annex stormwater sewer site is determined to have high potential for the recovery of prehistoric archaeological resources within the undisturbed portions of Allentown Lane as well as the grassy and marshy areas west of the road's end.

I. HISTORIC SENSITIVITY ASSESSMENT

The installation of an interceptor sewer along Arthur Kill Road in 1991 would have disturbed a large portion of the roadbed within the project area down to depths of approximately 10 feet below the present ground surface. Arthur Kill Road also has water, gas, and electrical lines running through it, which would also have disturbed the ground to depths of 5 to 7 feet. Arthur Kill Road was established in the mid 19th century, well after the construction of the houses which were situated along the shoreline road. However, Arthur Kill Road was sufficiently distant from those earlier houses that there is little likelihood that the road would have impacted any domestic shaft features such as privies, cisterns, and wells which may at one time have been located in their rear yards. Therefore, it is not likely that historical archaeological deposits would have survived both the cutting and grading of Arthur Kill Road as well as the subsequent installation of utility lines along its length.

Although the 1844 Coastal Survey (**Figure 9**) does not depict Allentown Lane, it was presumably constructed in the early 1800s, after the death of John Van Allen (URS 2005). The 1844 map suggests that it ran between several houses, although none of the houses were located in its path. Furthermore, based on documentary evidence, it is presumed that the lane was constructed around the same time as the nearby houses, which would have been erected as each Van Allen child came of age and was given a portion of the family's property (URS 2005). It is not likely that privies associated with those houses would have been located in the road's path, as they were generally placed at a distance from both domestic structures and streets (Wheeler 2000). The homes also appear to be sufficiently distant from the lane that other domestic shaft features—such as cisterns and wells, which were generally constructed close to houses for easy access to water sources (Cantwell and Wall 2001)—would also not be situated within the roadbed.

Therefore, the Charleston Bus Annex stormwater sewer site is determined to have low potential for the recovery of Historic period archaeological resources.

J. RECOMMENDATIONS

Further study in the form of Phase 1B testing is recommended in order to identify any prehistoric archaeological resources which may be present in the grassy area to the west of Allentown Lane as well as the marshy area that connects it with the Arthur Kill. This testing could include surface reconnaissance, shovel tests and test units. Archaeological monitoring during all construction excavations—including both the installation of the sewer and pre-construction test pits—is recommended for the portion of project area located within Allentown Lane.

K. REPORT AUTHORS

Diane Dallal, R.P.A., and Elizabeth D. Meade

L. DATE OF REPORT

November 10, 2006 *

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Chapter I: Introduction

A. PROJECT OVERVIEW

AKRF, Inc. has been contracted by New York City Transit (NYCT), an operating entity of the Metropolitan Transportation Authority (MTA) to perform cultural resource services for a proposed development project. The Charleston Bus Annex stormwater sewer would be installed in portions of the streetbeds of Arthur Kill Road and Allentown Lane in the Charleston (formerly Kreischerville) section of Richmond County (Staten Island), New York **(Figure 1)**. The proposed sewer would be associated with another proposed project that would consist of a new bus annex to be used by NYCT's Department of Buses for the storage and servicing of NYCT buses.

A previous Phase 1A Archaeological Documentary Study and Phase 1B Archaeological Survey of the site of the Bus Annex, Block 7487, Lot 100, was completed in 2001 by Louis Berger and Associates **(Figure 2)**. While the Documentary Study for that site indicated that significant archaeological resources might have been present on the site of the proposed bus annex, the subsequent Phase 1B archaeological testing determined that the area had experience significant disturbance and was not likely to yield intact archaeological resources.

The following Phase 1A Archaeological Documentary Study focuses on the proposed stormwater sewer line which will redirect stormwater from the Bus Annex site towards the Arthur Kill via Arthur Kill Road and Allentown Lane **(Figure 2)**. The proposed projects, including both the sewer line and the Bus Annex building, would be fully constructed and operational by 2009.

The beginning of the proposed stormwater pipe would be installed within the street bed along Arthur Kill Road near the northwest corner of the Bus Annex site on Block 7487 and would travel south on Arthur Kill Road approximately 2000 feet. It would then turn west onto Allentown Lane and run an additional 1000 feet. The sewer would continue past the end of Allentown Lane via an easement and would terminate at the shoreline of the Arthur Kill. An outfall structure would be constructed on the shoreline, where stormwater from the site would be discharged into the Arthur Kill. The stormwater pipe would be approximately 3,000 feet in length. The sewer would likely be used to convey off-site stormwater flows in addition to the on-site stormwater. Therefore, the pipe would likely increase in size from 24 inches in diameter at its origin near the bus annex site to 54 inches at the outfall.

Before the construction of the proposed sewer line, test pits would be dug in several locations to identify the placement of utilities within the streets.

The following Phase 1A Archaeological Documentary Study of the proposed Charleston Bus Annex storm-water sewer line has been designed to satisfy the requirements of the New York State Historic Preservation Office (SHPO) and the New York City Landmarks Preservation Commission (LPC) and it follows the guidelines of the New York Archaeological Council (NYAC).

The study documents the history of the proposed project site as well as its potential to yield archaeological resources including both prehistoric and historic cultural remains. In addition, it also documents the current conditions of the project area and previous cultural resource investigations which have taken place in the vicinity of the APE.

B. RESEARCH GOALS AND METHODOLOGY

The goal of this Phase 1A Archaeological Documentary Study is to determine the likelihood that potential archaeological resources have survived the destructive forces of time including agricultural use, landfill, the cutting and grading of streets, and the installation of utilities. The entire APE was investigated in order to identify the project area's original topography, its prehistoric and historic usage and/or occupancy, past disturbance, and potential impacts.

As part of the background research, published and unpublished resources were consulted at various information repositories, such as the Humanities and Social Sciences Branch of the New York Public Library (including the main research, local history, and map divisions), the LPC, the Municipal Archives, the archives of the Staten Island Institute of Arts and Science, the office of the Richmond County Clerk, the local history division of the Saint George branch of the New York Public Library, the Richmond County Topographical Bureau, and the New York City Department of Environmental Protection Bureau of Water and Sewers, among others.

File searches were conducted at the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP), the LPC, and the New York State Museum (NYSM) to determine if prehistoric or historic sites had been reported within a half-mile of the project area.

The background research included a site inspection, analysis of primary sources including historic maps, deeds, census records, historic street directories, utilities installation records, land and tax photographs, and newspaper articles, as well as secondary sources including local histories.

The background research was analyzed in order to formulate recommendations for future archaeological work and/or research.

C. PROJECT TEAM

This Phase 1A Archaeological Documentary Study was managed by Diane Dallal, M.A., R.P.A. Elizabeth D. Meade, M.A., completed the research and writing for the majority of the report with the editorial assistance of Ms. Dallal. Additional research assistance was provided by Molly McDonald, M.A. ✷

Chapter II: Environmental/Physical Setting

A. GEOLOGY AND TOPOGRAPHY

The northwestern half of Staten Island, including the project area, is found within a geographic bedrock region known as the Northern Piedmont Lowland Section, while the southeastern half is within the Atlantic Coastal Plain (Louis Berger & Associates, Inc. 2001a). The northwestern portion of Staten Island is composed of conglomerates, red sandstone, red shale, and diabase that dates to the Triassic and Jurassic periods, 245 to 208 million years ago. The southeastern section contains sandstone, shale, slate, and graywacke that dates to the Later Proterozoic Cambrian and Early Ordovacian period, 570 to 505 million years ago (NYSOFT 2004). The vicinity of the project area is composed mostly of the Cretaceous period Raritan sedimentary rock formation but with some Pleistocene age Harbor Hill Moraine glacial deposits to the south (Reeds 1925).

The island's physical setting was shaped by massive glaciers of up to 1,000 feet thick that retreated from the area towards the end of the Pleistocene, which lasted from approximately 1.6 million to 10,000 years before present [BP]. There were four major glaciations which began approximately 17,000 years ago and affected New York City until roughly 12,000 years ago when the Wisconsin period—the last glacial period—came to an end. During the Wisconsin ice age, a glacial moraine traveled southwest across Staten Island, resulting in the separation of the Atlantic Coastal Plain (Reeds 1925).

The glacial movements also brought about the creation of hundreds of sand hills, or kames, throughout the New York City region, some of which reached heights of around one hundred feet. These hills were contrasted by many small streams, rivers, and lakes that were fed by the glacial runoff. As temperatures increased, those small water courses transformed into swamps and marshlands. The melting of the glaciers also caused the sea levels to rise by approximately 300 feet which subsequently caused the coastlines to recede between 60 and 90 feet, separating Staten Island from the mainland (Louis Berger & Associates, Inc. 2001b).

The original topographic setting of southern Staten Island was quite unlike the one found there today. The glacial retreat ultimately resulted in the creation of low-lying wetlands traversed by small creeks and streams across most of the island's coastline. Before this, the Arthur Kill, which separates Staten Island from the eastern shores of New Jersey, was originally a narrow stream (Louis Berger & Associates, Inc. 2001b). At a site adjacent to the APE, groundwater was found to be flowing west towards the Arthur Kill, 42 to 47 feet below the ground surface [bgs] (Ibid).

A 1913 topographic survey of Staten Island shows that the elevation of the land in the vicinity of the project area was approximately 50 to 60 feet above sea level at Arthur Kill Road and sloped down to sea level along the shores of the Arthur Kill. Elevations depicted on current USGS maps indicate that these elevations have remained consistent through the present day.

B. PALEOENVIRONMENT

Due to the extended glacial period that left the Northeast blanketed in thick ice sheets for thousands of years, the area was not inhabited by humans until approximately 11,000 years ago. As temperatures increased, a variety of flora and fauna spread through the region. At this time, large open forests of spruce, fir, pine, and other tree species expanded across the Northeast, interspersed with open meadows and marshland. A wide variety of animal life could also be found, including large mammals such as mammoth, mastodon, caribou, musk ox, moose, as well as smaller mammals such as fox, beaver, hare, and many kinds of marine animals.

Climate changes continued to re-shape the environment of the Northeast as time progressed. As the climate grew increasingly warmer, jack pine, fir, spruce and birch trees were replaced with hardwood forests of red and white pine, oak, and beech (Ritchie 1980). Furthermore, a decrease in glacial runoff resulted in the creation of small bodies of water such as lakes as well as, later on, low-lying marshes and swampy areas. By the time of the Early Archaic period, beginning approximately 10,000 BP, there was "considerable environmental diversity, with a mosaic of wetlands, oak stands, and a variety of other plant resources...[making it]...an attractive and hospitable quarter for both human and animal populations" (Cantwell and Wall 2001: 53).

Warmer temperatures forced the herds of large mammals to travel north before eventually dying out. The new surroundings attracted other animals such as rabbit, turkey, waterfowl, bear, turtles, and white-tailed deer. The expanded water courses became home to a variety of marine life, including many varieties of fish, clams, oysters, scallops, seals, and porpoises, among others (Cantwell and Wall 2001).

By 5,000 BP, sea levels were only a few meters away from their current locations (Hunter Research 1996) and the modern climate in the northeast was established by approximately 2000 BP (Louis Berger & Associates, Inc. 2001a). By that time, the Native American population was flourishing in the area and had developed an intricate culture tied to the natural resources of the region **(see Chapter III)**.

C. CURRENT CONDITIONS

Both natural forces and the actions of humans have permanently changed the geographic setting of Staten Island. Much of the coastline has been dramatically altered by landfilling and dock construction, although the coastline in the vicinity of the project area does not appear to have been altered significantly.

Most of the Area of Potential Effect (APE) covers preexisting, asphalt-paved streetbeds. The northern branch of the project area extends along Arthur Kill Road **(Photographs 1 through 4)**. The remainder of the APE is situated within Allentown Lane, which runs perpendicular to Arthur Kill Road **(Photographs 6 through 9)**. While Allentown Lane was a dirt road for centuries, it has recently been completely paved, almost all the way to the water.

Sanborn insurance maps from 2005 indicate that the area immediately surrounding the APE is currently largely undeveloped. There are several construction staging areas located on the northeast corner of Arthur Kill Road and W. Veterans Road, and a custom furniture store on the southwest corner. In addition to being overgrown, the undeveloped areas east of Arthur Kill Road were observed by AKRF staff members to be the sites of recent illegal dumping activities, and are filled with debris.

Table II-1
Project Area Soils

Name	Soil Horizon Depth (inches)	Color	Texture	Slope	Drainage	Landform
Riverhead	Ap: 0-12 Bw: 12-27 BC1: 27-32 2BC2: 32-35 2C1: 35-40 2C2: 40-65	Brn StrBrn TBrn YBrn Brn VPlBrn	Sandy loam Sandy loam Loamy sand Gravelly loamy Sand Sand Coarse and medium sand with gravel	0-50%	Well-drained	Outwash plains, valley trains, beaches, and water-sorted moraines

Notes:
Brn = Brown
RBrn = Red Brown
StrBrn = Strong Brown
VdkGBrn = Very dark greenish brown
VPlBrn = Very pale brown
YBrn = Yellowish brown
Source:
USDA Official Soil Series Descriptions, http://soils.usda.gov/technical/classification/osd/index.html
Louis Berger & Associates, Inc. 2001b

A large residential development is currently being constructed in the northwest corner of Arthur Kill Road and Allentown Lane. Fire hydrants and manholes were observed along Allentown Lane near its intersection with Arthur Kill Road **(Photographs 5 and 6)**. These connect to an 8 inch water main that currently runs east-west, beginning approximately 400 feet west of Arthur Kill Road and traveling east, out of the project area. In addition, a series of dry wells was constructed at either end of Allentown Lane within the APE to help manage stormwater runoff. Manholes and catch basins are situated over both sets of drywells **(Photographs 8 and 9, Chapter V)**.

At the western end of Allentown Lane, adjacent to the shore, a grassy hill slopes down to a wet, marshy area which then leads out to the Arthur Kill **(Photograph 10)**.

Within the Arthur Kill itself, the wreckage of several rectangular barges is located in the vicinity of Allentown Lane **(Figure 1, Photograph 11)**. The barges that could possibly be affected by the proposed Charleston Bus Annex stormwater sewer line are wooden coastwise hold barges, and might have been Coal Barges, Coal Boxes, New Haven Boxes, Grain Boxes, or Box Barges (Raber Associates 1996). These barges were determined archaeologically insignificant by the United States Army Corps of Engineers in 1996 (Rakos, personal communication, 10/20/2006). However, because of the distance between these barges and the coastline where the proposed sewer's outfall would be located, it is not anticipated that the project would affect these vessels.

D. PREVIOUSLY CONDUCTED CULTURAL RESOURCE INVESTIGATIONS

Several previously conducted cultural resource studies within one half-mile of the project area **(Table II-2)** indicate that the project area was situated within a region that is highly sensitive for prehistoric and, to a lesser extent, historic period archaeological resources. Archaeological sensitivity will be discussed in more detail in **Chapters III and IV**.

Table II-2
Previously Conducted Cultural Resource Investigations Within One Half-Mile of the Project Area

Project Name	Location	Findings	Reference
Phase 1A Archaeological Survey for the Arthur Kill Factory Outlet Center	Area bounded by Allentown Lane, Arthur Kill Road, Androvette Street, and the Arthur Kill	Recommended archaeological testing for prehistoric and historic archaeological resources.	Hunter Research (Blades and Tomkins, 1995)
Phase 1B Archaeological Survey for the Arthur Kill Factory Outlet Center	Area bounded by Allentown Lane, Arthur Kill Road, Androvette Street, and the Arthur Kill	Shovel tests and excavation units recovered prehistoric archaeological resources (mostly in the form of lithic flakes and debitage, fire cracked rock, and pottery). Most of those resources were located at the southern end of the site at depths of .67 feet to 5.2 feet in different locations throughout the site. Historic period archaeological resources (including ceramics) were also uncovered at various depths.	Hunter Research (1996)
Phase 3 Archaeological Data Recovery at the Van Allen Farmstead and the Price Prehistoric Site for the Proposed Residential Development, the Tides at Charleston.	Area bounded by Allentown Lane, Arthur Kill Road, Androvette Street, and the Arthur Kill	Recovered archaeological resources related to the project area's historic farmsteads as well as prehistoric materials representing temporary campsites.	URS Corporation (2005)
Phase 1 Cultural Resource Survey: Oakwood Beach Water Pollution Control Project	Hylan Blvd at Richmond Ave to Arthur Kill Road at Kreischer Street	Prehistoric artifacts found at several locations	Pickman and Yamin (1984)
Preliminary Cultural Resource Assessment: Literature Search and Windshield Survey Oakwood Beach Water Pollution Control Project: Phase III and Future Plans.	Hylan Blvd at Richmond Ave to Arthur Kill Road at Kreischer Street	Area considered sensitive for prehistoric archaeological resources.	Pickman and Yamin (1978)
Evaluation of Archaeological Potential	Block 7527, Lots 17, 19, 21, 23, and 25.	Low sensitivity for the recovery of historic archaeological resources and moderate sensitivity for the recovery of prehistoric resources.	Pickman (1988)
Stage 1 Archaeological Survey	Block 7527, Lots 17, 19, 21, 23, and 25.	No significant resources identified.	Pickman (1989)
Phase 1A Cultural Resource Investigation, Chateau Du Bois Development	Near intersection of Arthur Kill Road and the Outerbridge Crossing	Area considered sensitive for prehistoric archaeological resources.	Louis Berger and Associates (1987)
Stage 1B Cultural Resource Investigation: Gateway Cathedral	Near the southeast corner of Arthur Kill Road and the Outerbridge Crossing	Area considered sensitive for prehistoric and historic archaeological resources.	Louis Berger and Associates (1989)

Table II-2 (cont'd)
Previously Conducted Cultural Resource Investigations Within One Half-Mile of the Project Area

Project Name	Location	Findings	Reference
Stage 1 Cultural Resource Investigation: Gateway Cathedral	Near the southeast corner of Arthur Kill Road and the Outerbridge Crossing	No significant resources identified.	Louis Berger and Associates (1990)
Harborview Project Cultural Resources Documentary Study	Along the shores of the Arthur Kill, south of the Outerbridge Crossing	No impact expected because the project area was situated on made land.	Ebasco Environmental (1991)
Stage 1B//II Archaeological Survey of Page Avenue Development Project	Near Page Avenue, south of the Outerbridge Crossing	Native American stone and ceramic artifacts recovered from disturbed context; similar finds dating to the Middle Woodland, Archaic, and Transitional periods had been found at the site during earlier investigations.	William I. Roberts, IV, and Nancy A. Stehling (Greenhouse Consultants, Inc) (1987)
Stage 1B Archaeological Survey of Chateau Du Bois Development	Near intersection of Arthur Kill Road and the Outerbridge Crossing	One possible lithic artifact recovered; no significant archaeological resources identified.	William I. Roberts, IV, and Nancy A. Stehling (Greenhouse Consultants, Inc) (1987)
Sharrott Estates Archaeological Project: Report On Mitigation Procedures In The Sandy Ground National Rgister District.	Near intersection of Sharrott's Road and Arthur Kill Road	Identified prehistoric resources within two feet of the ground surface, layers of topsoil had previously been removed. Some prehistoric artifacts were intermixed with historic period artifacts.	Multiple Authors – Archaeological Research Consultants, Inc (1985)
Charleston Plaza: Environmental Impact Statement	Northwest corner of the intersection of Richmond Parkway and the West Shore Expressway	Area considered sensitive for prehistoric archaeological resources.	Greenhouse Consultants, Inc. and John Vokral (1985)□
Charleston Retail Center: Phase 1A Archaeological Assessment	Northeast corner of Veterans Road West and Arthur kill Road	Area considered sensitive for prehistoric and historic archaeological resources.	Historical Perspectives, Inc. (1996)

Sources: The files of OPRHP and LPC, Boesch (1994), Louis Berger and Associates (2001a, 2001b)

*

A. INTRODUCTION

Archaeologists have divided the time between the arrival of the first humans in northeastern North America and the arrival of Europeans more than 10,000 years later into three prehistoric periods: Paleo-Indian (11,000-10,000 BP), Archaic (10,000-2,700 BP), and Woodland (2,700 BP–AD 1500). These divisions are based on certain changes in environmental conditions, technological advancements, and cultural adaptations, which are observable in the archaeological record.

B. PALEO-INDIAN PERIOD (11,000-10,000 BP)

As mentioned in **Chapter II**, human populations did not inhabit the Northeast until the glaciers retreated some 11,000 years ago. These new occupants included Native American populations referred to as Paleo-Indians, the forbearers of the Delaware—also called the Lenape Indians—who would inhabit the land in later years.

The Paleo-Indians most likely exploited all the different resources provided by their environment. It has been suggested that they did not only actively hunt the large mammals that roamed about the region (mammoths, mastodons, etc.), but they also hunted and trapped smaller animals and supplemented their diet with fish and gathered plants (Cantwell and Wall 2001).

There was a very distinct Paleo-Indian style of lithic technology, typified by fluted points. These were elaborately detailed stone points that would have been used for a variety of functions, most notably for hunting. They were often made of high-quality imported chert, but were also known to have been crafted from local materials. Other stone tools manufactured at this time included knives, scrapers, drills, and gravers. Wood, ivory, and other materials were also used for the manufacture of composite tools, such as hunting spears.

Archaeological evidence indicates that the Paleo-Indians were likely highly mobile hunters and gatherers. They appear to have lived in small groups of fewer than 50 individuals (Dincauze 2000) and did not maintain permanent campsites. In addition, most of the Paleo-Indian sites that have been investigated were located near water sources.

It is because of the close proximity of Paleo-Indian sites to the coastline that so few of them have been preserved in the New York City area. As the glaciers continued to melt, sea levels rose and much of what was once adjacent to the water line became submerged. Of the few Paleo-Indian sites that have been discovered in New York City, nearly all have been found on Staten Island. One such site is that of Port Mobil, on Staten Island, immediately north of the project area. Like most precontact sites, this location is situated on high ground overlooking the water. Because of heavy disturbance in the area – it is currently an oil tank farm -- the site has yielded nothing more than a collection of fluted points and other stone tools characteristic of the period (Ritchie 1980). Paleo-Indian artifacts were also found along the eroding shore line 500

yards south of the Port Mobil site, closer to the APE (Ibid) and at the Cutting site in the Rossville section of Staten Island (AKRF, Inc. 2003).

C. ARCHAIC PERIOD (10,000-2,700 BP)

The Archaic has been sub-divided into three chronological segments, based on trends identified in the archaeological record which reflect not only the ecological transformations that occurred during the Archaic, but the cultural changes as well. These have been termed the Early Archaic (10,000–8,000 BP), the Middle Archaic (8,000–6,000 BP) and the Late Archaic (6,000–2,700 BP) (Cantwell and Wall 2001). The Late Archaic is sometimes further divided to include the Terminal Archaic period (3,000-2,700 BP) as well.

The aforementioned environmental transformations included the continued post-glacial warming trend, the extension of hardwood forests, and a decrease in glacial runoff which resulted in the creation of lakes and other small bodies of water. There was a subsequent migration of new animal and plant species into the area, while the herds of large mammals traveled north, eventually dying out. The new surroundings attracted smaller animals, such as rabbit, turkey, waterfowl, and white-tailed deer.

As the Archaic progressed and the number of plant and animal species inhabiting the area increased, the size of the human population did as well. In general, archaeologists have shown that Archaic Native American sites were most often located near water sources. The abundance of food resources which arose during this period allowed the Archaic Native Americans to occupy individual sites on a permanent or semi-permanent basis, unlike their nomadic Paleo-Indian predecessors. These individuals migrated on a seasonal basis within specific territories and consistently returned to and reoccupied the same sites.

The arrival of new food sources allowed the human population to expand their subsistence strategies, but at the same time forced them to develop different technologies that would allow such resources to be exploited. Perhaps the most important of these developments was the advent of fishing technology, which occurred during the Middle Archaic in response to an increasing dependence on the area's marine resources. The new technology included stone hooks and net sinkers. In addition, the influx of nut- and seed-bearing foliage resulted in the development of stone mortars and pestles as well as stone axes, used to process plant material.

In order to successfully hunt the smaller game animals that had established themselves in the region, narrower spear points and knives were manufactured, along with weighted spear throwers. Domestic technology was advanced as well, with the development of a wider variety of hide scrapers and, later in the period, the origin of bowls made from steatite or soapstone. Tools continued to be crafted in part from foreign lithic materials, indicating that there was consistent trade among Archaic Native American groups from various regions in North America throughout the Archaic.

Once again, due to rising sea levels and to the rapid development of the area, as well as the dominance of coniferous forests at that time which generated a habitat ill-fit for human habitation (Boesch 1994), few Early Archaic sites have been identified in New York City. Most of those that have been identified are located on Staten Island, including Ward's Point, Richmond Hill, the H. F. Hollowell site, and the Old Place site. Sites such as Ward's Point—a domestic habitation location which due to lowered sea levels was originally inland—tend to be deep and stratified and have yielded stone tools related to cooking, woodworking, and hide processing. The many years of constant occupation caused the artifacts to be deeply buried under

more recent debris deposits (Cantwell and Wall 2001). However, at the Old Place Site, the only artifacts which were discovered—stone tool assemblages—were found at relatively shallow depths of around 42 inches (3½ feet) (Ritchie 1980).

There are few Middle Archaic sites in the region as well. The majority of these tend to consist of large shell middens, which are often found near major water courses such as the Hudson River, although stone points have also been found in such locations. These sites were in great danger of obliteration because of their proximity to the shrinking coastlines.

Unlike the Early and Middle periods, many Late Archaic sites have been found throughout the New York City area including many in Staten Island. Late Archaic habitation sites are often found in areas of low elevation near water courses and temporary hunting sites are often located near sandy areas (Boesch 1994). Late Archaic sites identified in Staten Island include the Pottery Farm, Bowman's Brook, Smoking Point, Goodrich, Sandy Brook, Wort Farm, and Arlington Avenue sites, among others (Ibid).

In addition, many Terminal Archaic sites from all across the city have provided examples of what archaeologists call the Orient culture, which is characterized by long fishtail stone points and soapstone bowls. There have been extremely elaborate Orient burial sites found on eastern Long Island, but none have been identified on Staten Island. Orient-style fishtail points have been discovered along the shores of Charleston, it is assumed that they fell from eroding cliffs located nearby (Boesch 1994). In addition, most Richmond County sites dating to this period have been characterized by large shell middens (Louis Berger & Associates 2001a).

D. WOODLAND PERIOD (2,700 BP-AD 1500)

The Woodland period represents a cultural revolution of sorts for the Northeast. During this time, Native Americans began to alter their way of life, focusing on a settled, agricultural lifestyle rather than one of nomadic hunting and gathering. Social rituals begin to become visible in the archaeological record at this time. There have been many elaborate human and canine burial sites identified from this period. The first evidence of smoking has also been found—stone pipes have been uncovered at Woodland sites—and it was at this time that pottery began to be produced.

In general, there was a greater emphasis placed on composite tools during the Woodland period. While stone scrapers, knives, and hammerstones were still in use, there was an increased use of bone, shell, and wood in tool making. Furthermore, the development of bows and arrows revolutionized hunting practices. Fishing continued to be important to the local economy and wooden boats and bone hooks were often utilized (Historical Perspectives, Inc. 2005). Many tools were still made from imported materials, indicating that the trade networks established earlier were still being maintained (Cantwell and Wall 2001).

Pottery was introduced into Native American society early in the Woodland period and by the time of European contact in the 1500s, well-crafted and elaborately decorated pottery was being manufactured. Like the Archaic period, the Woodland has been divided into Early, Middle, and Late sections, which differ mostly based on the style of pottery which was produced at that time. Woodland pottery had simple beginnings; the first examples were coil pots with pointed bases, which were made with grit temper. These were replaced during the Middle Woodland period by shell-tempered vessels bearing a variety of stamped and imprinted decorations. As the period drew to a close, the decorative aspect of the pottery was further augmented with the addition of intricate ornamental rims (Louis Berger Group 2004).

Woodland-era sites across North America indicate that there was an overall shift toward full-time agriculture and permanently settled villages. Archaic sites in New York City indicate that the Native Americans there continued to hunt and forage on a part-time basis. This was most likely due to the incredibly diverse environmental niches that could be found across the region throughout the Woodland period (Cantwell and Wall 2001, Grumet 1995). Nevertheless, Woodland societies were considerably more sedentary than were their predecessors. There was, however, some farming of maize, beans, squash, and tobacco. The development of pottery, increasingly complex burial sites, and the presence of domesticated dogs are all consistent with sedentary societies, which have a close association with a particular territory or piece of land.

Woodland sites, like those of the Paleo-Indian and Archaic periods, are usually found alongside water courses. They were often occupied for long periods of time, although there was still some seasonal migration that may have left them unoccupied for brief periods throughout the year.

One Woodland period archaeological site that has been identified on Staten Island is the Bowman's Brook site, located along the island's northwest coastline **(Figure 3 and Table III-1)**. That site yielded a type of incised pottery, which has since become known as the Bowman's Brook Phase. Sites with this particular type of pottery are most often located near tidal streams or coves and are usually associated with large shell middens and refuse pits, indicating long periods of occupation (Ritchie 1980). The Bowman's Brook site also contained several human and dog graves, as well as bundle burials (Cantwell and Wall 2001).

The Ward's Point site, located at the southernmost point of Staten Island, was also occupied during the Woodland period. Many Native American artifacts and elaborate burials with varied grave offerings have been uncovered there (Cantwell and Wall 2001).

E. CONTACT PERIOD (AD 1500-1700)

The Woodland period ended with the arrival of the first Europeans in the early 1500s. At that time, a division of the Munsee Indians known as the Raritan occupied southern Staten Island (Bolton 1975). They entered the area towards the end of the Woodland period (Boesch 1994). They referred to Staten Island as "Aquehonga Manacknong," possibly meaning "haunted woods," "bushnet fishing place," or "the high bank fort place" (Grumet 1981: 2). The name may have also referred to the village settlement at Ward's Point (Ibid). In land transactions with the Europeans, the island was also referred to as "Matawucks" and "Eghquaous" (Boesch 1994).

Giovanni de Verazzano was the first European to view New York in 1524. However, Henry Hudson's expedition to New York in 1609 marked the true beginning of European occupation in the area, and subsequently marked the beginning of violent encounters with the Native Americans as well. Shortly after Hudson's men explored Staten Island, a skirmish ensued with the local Indians, resulting in the death of one of Husdon's crewmen.

Because of this incident, the Native Americans of Staten Island were extremely wary of Europeans. They even set up look-outs on tall hills in an effort to spot approaching ships so as to prevent such vessels from landing (Historical Records Survey 1942: xii). Although the land had been "sold" to the Europeans in 1630 (Grumet 1981), it was not until 1638 that a successful European colony, that of Olde Dorpe, could be established on the island. Violence between the Native Americans and the Europeans would cause this village to be burned down and rebuilt several times throughout the contact period.

With the introduction of European culture into the indigenous society, the way of life once maintained by the Native Americans was thoroughly and rapidly altered. European guns, cloth,

kettles, glass beads, and alcohol soon became incorporated into the Native American economy. The Native Americans began to suffer from the side-effects of European colonialization: disease, alcoholism, and warfare. As land in other parts of New York City was sold off to the Europeans, many displaced Native Americans relocated to Staten Island to the point where "the Raritan consisted of a heterogenous assortment" of Native Americans from all over the New York metropolitan area (Grumet 1981: 45).

Native Americans at first maintained the village sites they had established near water sources. As their trade with European settlers intensified, they became increasingly sedentary. However, as the European population grew and required more land, the relationship between the two groups turned sour. Fierce wars broke out between the Dutch and the Indians. This was most intense during the early 1640s when Dutch Director-General William Kieft ordered many ferocious and unprovoked attacks on the Native population. While the Kieft war ended with a treaty signed in 1645, the Raritans did not agree to peace until 1649 (Grumet 1981).

The warfare was somewhat abated when Kieft was replaced by Peter Stuyvesant, who brought some stability to the area. However, the "Peach War" of 1655 caused more inter-cultural violence on Staten Island. After that war ended, the land was re-sold to the Dutch in 1657. The Native Americans were no match for the growing numbers of armed European settlers, and the natives agreed to sell what was left of their land on Staten Island in 1670, although some Native American villages remained until the early 20th century (Grumet 1981). In the land transaction recorded in 1670, the Native Americans sold all of their holdings on Staten Island in exchange for "four hundred fathom of wampum, thirty match coats, eight coats of dozens made up, thirty shirts, thirty kettles, twenty gunnes, a ffirkin of powder, sixty barres of lead, thirty axes, thirty howes, [and] fifty knives" (Bolton 1975: 73).

There are several Contact period archaeological sites that have been identified in New York City, including the aforementioned Ward's Point site on Staten Island (Grumet 1995).

F. PREVIOUSLY IDENTIFIED NATIVE AMERICAN ARCHAEOLOGICAL SITES

A review of the files at the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP), the New York State Museum (NYSM), the New York City Landmarks Preservation Commission (LPC), and cultural resource surveys of projects in the immediate vicinity showed that there are at least 20 archaeological sites within a one mile radius of the project area. In addition, LPC's prehistoric sensitivity model indicates that the site is situated in an area that is expected to be highly sensitive for Native American archaeological resources.

The southwestern coast of Staten Island, including the project area, has yielded a relatively large amount of Paleo-Indian artifacts, the only such artifacts found in New York City. At that time, the Native American population appears to have lived in the high lands adjacent to the Arthur Kill and exploited the resources in the low-lying coastal region below (Boesch 1994). There is evidence that these campsites were consistently reoccupied through the Late Woodland period. In fact, the shores of the Charleston area have been described as "the locus of offshore shellfishing in the prehistoric and recent past" (Greenhouse Consultants, Inc. and Vokral 1985: 4-5). Many of the relics recovered from this area were plucked from the surface by avocational archaeologists and pot-hunters in the early 20th century. It is not entirely clear if they were in situ or if they were exposed by erosion or the movement of soils during construction.

Many temporary campsites used by Native Americans have been identified within a one-mile radius of the project site. Early 20th century archaeologists noted that "continuous camps occur along the [southwestern] shore...with scattered relics in nearly every field" (Skinner and Schrabisch 1913:44, quoted in Historical Perspectives, Inc. 1996: 11). These sites are designated as "L" in **Table III-1 and Figure 3**. Another nearby campsite, Canada Hill—"A" in **Table III-1** and **Figure 3**—was excavated in the late 1960's and presumably was near a small pond (Boesch 1994). In the past, these sites and others like them have yielded large amounts of lithic debitage—waste flakes created during the manufacture of stone tools—as well as occasional stone tools, fire-cracked rock, and shell middens. The remnants left behind at these campsites indicate that they were used by the Native Americans during hunting and fishing excursions, but not necessarily for full-time habitation.

A series of cultivated fields used by Native Americans—site "Q" in **Table III-1** and **Figure 3**—was also very close to the project area. It is presumed that the Native Americans would have grown corn and possibly beans and squash in fields such as these (Historical Perspectives, Inc. 1996).

Grumet (1981) indicates that a Native American trail was once located near the project area **(Figure 20)**. In some locations, this trail appears to be running along the line of today's Arthur Kill Road before turning west and heading toward the shore of the Arthur Kill. Both Grumet's map and Bolton's 1922 map of Indian paths, on which Grumet's is based, indicate that the western branch of this road runs in the vicinity of the project area, but it is unclear if Allentown Lane itself was a Native American trail or if the scale of Grumet's map is incorrect. Furthermore, on Bolton's map, the trail is shown leading to a site incorrectly labeled "91" (the real site #91 is located to the northeast of the project site). No other information was uncovered which could confirm that Allentown Lane was a Native American Trail and it does not appear as such on historic maps.

Table III-1
Previously Identified Prehistoric Archaeological Sites Within One Mile of the Project Area

Key to Fig 3	Site Name	OPRHP #	NYSM #	Approximate Distance from APE	Time Period	Site Type
A	Canada Hill	A08501.0073	770	.34 mile (1,760 feet)	Woodland	Campsites,: debitage, shell fragments
B	RMSC/ Salamander	A08501.2378	—	1 mile (5,280 feet)	Prehistoric	unknown
C	Abraham's Pond, Locus A	A8501.0878	—	.75 miles (3,960 feet)	Archaic to Woodland	unknown
D	Abraham's Pond, Locus B	A8501.0879	—	.70 mile s (3,696 feet)	Archaic to Woodland	Temporary Camp sites
E	Abraham's Pond, Locus C	A8501.0880	—	.65 miles (3,432 feet)	Archaic to Woodland	Temporary Camp sites

Table III-1 (cont'd)
Previously Identified Prehistoric Archaeological Sites Within One Mile of the Project Area

Key to Fig 3	Site Name	OPRHP #	NYSM #	Approximate Distance from APE	Time Period	Site Type
F	Park Headquarters	A08501.0130	----	.70 mile s (3,696 feet)	Archaic to Woodland	Temporary Camp sites
G	Junkyard Site	A08504.131	----	.9 miles (4,752 feet)	Archaic to Woodland	Temporary Camp sites
H	Clay Pit Road Bluff North	A08501.0123	----	.9 miles (4,752 feet)	Archaic to Woodland	Temporary Camp sites
I	Winant House	A08501.0083	----	1 mile (5,280 feet)	Prehistoric	unknown
J	Clay Pit Pond East	A08501.0121	----	1 miles (5,280 feet)	Archaic to Woodland	unknown
K	Clay Pit Road	A08501.0124	----	.75 miles (3,960 feet)	Temporary Camp sites	Temporary Camp sites
L	Kreischerville Campsites	----	4606	0-0.9 miles (0-4,752 feet)	Paleo-Indian to Late Woodland	Campsites: Shell Middens, stone points, fire cracked rock, traces of occupation
M	Charleston Beach	----	----	.9 miles (4,752 feet)	Paleo-Indian to Late Woodland	Native American artifacts
N	Port Socony Site-South	----	----	1 mile (5,280 feet)	Paleo-Indian	Stone points and debris
O	Parker: ACP RICH 19C	----	8471	.25+ miles (1,320 feet)	Prehistoric	Shell Middens and Traces of Occupation
P	Richmond Valley: Northeast side of Page Ave at Amboy Road	----	----	.85 miles (4500 feet)	Late Woodland	Campsite, stone tools, bone, shell, pottery
Q	Indian Fields	----	771 and 4620	.19 miles (1,000 feet)	Woodland	Traces of occupation
R	Bethel Church Site	----	----	.8 miles (4,200 feet)	Woodland	Campsite (under active cemetery)
S	Sharrott Estates	----	----	1 mile (5,280 feet)	Late Woodland	Small hunting camp
T	Unnamed Site: Parker (1922) - - ACP-RICH	----	----	.95 miles (5,000 feet)	Early Woodland	Small village

Sources:
Louis Berger & Associates, Inc. (2001a)
Boesch (1994)
Historical Perspectives, Inc. (2001)

G. PREHISTORIC SENSITIVITY

In general, most Native American habitation sites on Staten Island have been found along the coast near "well-drained areas near streams or wetlands" (Boesch 1994: 9). Late Archaic sites have been identified mostly in low-lying areas near water courses and marshes, while temporary camping sites from this period were commonly found on sandy knolls (Ibid).

Although the LPC prehistoric sensitivity model indicates that the project area was not characterized by marshland, as were the areas to the north and south, historic maps depict the entire coast of the Arthur Kill in the vicinity of the project area as a marshy tract **(Figure 9)**. Historic maps also indicate that small streams and brooks ran to the north and south of the project area. These coastal areas would have provided a variety of marine resources, most notably shellfish, which had become integral to the Native American diet. It has been noted that a small pond was located at the nearby Canada Hill site (Boesch 1994), but it is not immediately clear if there were any sources of fresh water in the immediate vicinity of the project area.

Topographic maps of Staten Island from 1913 **(Figure 15)** indicate that there were two hilltops in the area, one along the western side of Arthur Kill Road and the other partially extending into the southern border of Allentown Lane. Elevated areas such as these would have been useful to Native Americans attempting to spot game or even enemies.

Because of the project area's close proximity to marine resources, high elevations, a known Native American trail, and archaeological evidence of a great number of temporary campsites in the area, it is highly likely that the project area was utilized by Native Americans as a temporary hunting, fishing, and camping location. It is possible that archaeological resources related to those activities, including stone tools and debitage, faunal remains, shell middens, fire-cracked rocks, and other artifacts associated may be located at the site. Such artifacts have been recovered from the area immediately north of Allentown Lane, which was excavated as part of the Arthur Kill Factory Outlet Center (Hunter Research 1995) and Tides of Charleston Development (URS 2005) projects.

It has been noted in previous cultural resource investigations that only very rarely have archaeological resources been recovered from active roadways (Historical Perspectives, Inc. 2001). In 1996, a possible chert core was recovered from the "abandoned portion of Allentown Lane" during Phase 1B excavations for the Arthur Kill Factory Outlet Center, a proposed project in the area bounded by Allentown Lane, Arthur Kill Road, Androvette Lane, and the Arthur Kill, which was never developed (Hunter Research 1996: 6.20). Because the streetbed of Allentown Lane was not included in the area of potential effect for that particular site, it is assumed that the chert core was a surface find. It does appear from some historic maps that Allentown Lane was located within a plot of farmland **(Figure 9)**, it is not clear if any agricultural activity ever took place in that location.

Furthermore, archaeological testing performed in other parts of southwestern Staten Island recovered prehistoric artifacts within two to three feet of the present ground surface, if not on the surface itself (Archaeological Research Consultants, Inc 1985, Greenhouse Consultants, Inc. and John Vokral 1985). Recent archaeological testing for the Arthur Kill Factory Outlet Center (which was never developed) and the Tides of Charleston Development project (which is currently under construction) located prehistoric artifacts at relatively shallow depths in the area immediately north of Allentown Lane. Intact deposits in that location were located between .67 and 1.67 feet below the ground surface (Hunter Research 1996). Paleosol was also identified at

this site, located approximately 2.3 to 3.3 feet below ground surface; although no artifacts were recovered from that location (Ibid).

The artifacts recovered from this area included large amounts of fire cracked rock and lithic debitage, indicating that the area was used for temporary campsites. Additional evidence for the site's use as a "resource procurement camp" was found during recent excavations in the area north of Allentown Lane as well (URS 2005: i). The later episodes of archaeological testing also found prehistoric artifacts at deeper levels—even at depths of 7 to 9 feet—in more northerly parts of the Tides of Charleston Development site, suggesting that the site's occupation may date back to the Archaic period (Ibid). Testing also identified large disturbed areas throughout the site.

Soil erosion, landscaping, and mid- to late- 20th century soil removal have altered the landscape in the vicinity of the project area (Louis Berger and Associates 2001b) and may have resulted in bringing prehistoric artifacts closer to the present ground surface and therefore making them more vulnerable.

ARTHUR KILL ROAD SENSITIVITY

In 1991 an interceptor sewer was installed along Arthur Kill Road, disturbing a large portion of the roadbed within the project area, which most likely disturbed the ground down to depths of more than 10 feet below the present ground surface (interceptor sewers are generally placed even deeper than sanitary and stormwater sewers). Arthur Kill Road also has water, gas, and electrical lines running through it, which could have disturbed the ground to depths of 5 to 7 feet. Therefore, it is not expected that any significant prehistoric archaeological resources could be located within the streetbed of Arthur Kill Road.

ALLENTOWN LANE SENSITIVITY

Plans on file at the Richmond County Department of Environmental Protection's (DEP) Bureau of Water and Sewer Operations do not indicate the presence of any water or sewer lines along Allentown Lane. However, utilities have recently been installed within the roadbed in association with the Tides at Charleston development project currently being constructed north of Allentown Lane. A water main with associated fire hydrants and water valves are located on the northern side of the road, extending westward from Arthur Kill Road for approximately 400 feet. In addition, dry wells and manholes have been constructed at the western end of the road, near the shore, and near the intersection of Allentown Lane and Arthur Kill Road. Both sets of drywells have manholes above them as well as associated catch basins.

In mid-2006, Allentown Lane was graded and paved as part of the Tides at Charleston development. Approximately 3 to 4 feet of earth was excavated for this purpose. However, soil boring samples taken by Future Tech Consultants of NY, Inc. in 2004 **(Appendix B)** indicate that the western end of the road, near the Arthur Kill, contained 3 feet of fill and the eastern end, near Arthur Kill Road, contained 4 feet of fill. Therefore, it is likely that the grading only affected these fill layers, and potential prehistoric archaeological resources remain underneath the disturbed earth.

It is therefore not expected that significant prehistoric resources would be recovered from the disturbed portions of the project area situated in the roadbeds of Allentown Lane. However, it is possible that prehistoric remains may be located below the pavement as well as on either side of the existing water main. The area to the west of Allentown Lane, a grassy hill **(Photograph 10)**

which slopes down to a marshy area which then leads out to the Arthur Kill—the proposed location of the stormwater sewer outfall—appears to be undisturbed and is also sensitive for the recovery of prehistoric archaeological remains.

Therefore, the Charleston Bus Annex stormwater sewer site is determined to have high potential for the recovery of prehistoric archaeological resources within the undisturbed portions of Allentown Lane as well as the grassy and marshy areas west of the road's end. *

A. INTRODUCTION: STATEN ISLAND HISTORY

New York was "discovered" by Giovanni de Verrazano in 1524 and explored by Henry Hudson in 1609, thus marking the beginning of European occupation in the area. In 1621, the States-General in the Netherlands chartered the Dutch West India Company (WIC) to consolidate Dutch activities in the New World. It was at this time that the WIC began to purchase large tracts of land from the Native Americans. The Native Americans believed that land was for hunting and planting, and did not share the European view that it could be owned in perpetuity. In exchange for furs, entrepreneurs and government officials supplied Native Americans with a wide range of goods. These included not only conventional adornments such as finger rings, glass beads and wampum, but utilitarian objects such as axes, kettles and cloth. Merchandise from around the world arrived in New Amsterdam destined for Europeans and Native Americans alike, including Italian and Dutch dishes, glass beads from Venice, combs and clay pipes from Amsterdam, and glassware from Germany (Dallal 2004).

As mentioned in **Chapter III**, bad relations between the Dutch and the Native Americans had prevented the formation of a successful European settlement on Staten Island until the late 1630's. Even afterwards, peaceful relations between the two groups were not established until after the British had seized the colony in 1664. A large English population grew all throughout New Netherlands, and soon they outnumbered the Dutch, making it easy for them to seize the colony in 1664. Although the Dutch were able to re-take the colony, now known as New York, in 1673, they traded it back in 1674 for "the far more lucrative colony of Surinam" (Cantwell and Wall 2001: 181). New York would remain under British control for the next hundred years.

The exodus of the bulk of the Native American population beginning in 1670 made it easier for Staten Island to become a thriving part of the New York economy – rumors of the island having been won for New York from New Jersey by Captain Christopher Billopp in a sailboat race are most likely false (Botkin 1956). Without a substantial Indian presence, there were no longer any obstacles blocking the settlement of the island and Richmond County was officially established in 1683.

Under British rule, Staten Island's open farmland and vast coastline became essential for the production of agricultural products and collection of marine resources for export the city. The colony's progress was both halted and facilitated in the mid-18th century during the French and Indian War, which concluded in 1763. Although the region experienced the economic side effects of being at war, thousands of British armed forces were stationed throughout the New York City area, bringing money to the region while at the same time increasing its population. During this time, New Yorkers were not completely loyal to the English crown at this time, and goods were secretly (and illegally) traded to French colonies via Staten Island's more secluded ports (Burrows and Wallace 1999).

Despite the treacherous conduct during the French and Indian War, New York remained loyal to the British during the Revolutionary War which began in 1776. Staten Island proved to be a key asset during that war. In 1776, unsuccessful peace negotiations were held at Captain Billopp's former house (now known as the "Conference House") on the southern tip of Staten Island, south of the Charleston Bus Annex APE. The British continued to use Staten Island as a rudimentary home base due to its strategic location (Historical Records Survey 1942). It was sufficiently close to both New York and New Jersey that British soldiers' could easily be dispatched in the event of an impending battle. And, reminiscent of the activities of the Raritan Indians, the island's tall hills provided views essential to tracking ships approaching the city. However, the British troops stationed in New York City caused a great deal of trouble by burning farms and homes and stealing from private citizens. This resulted in horrible and brutal living conditions for many New Yorkers.

Despite New York City's loyalty to the British during the war, after the American victory the conversion to the new American government was relatively smooth. Land which had been previously owned by British loyalists was divided and sold, which brought about a surge in population and development in the outer boroughs. This trend continued through the 19th century. In 1788, the island was officially divided into four townships, Castleton, Northfield, Southfield, and Westfield, where the project area is situated (Louis Berger and Associates 2001a).

Between 1840 and 1880, the population of Staten Island nearly quadrupled. This surge was caused in part by the increasing population density in Manhattan, which drove many people to the outer boroughs. The region's prosperity caused the counties in the New York City region to become increasingly codependent, both economically and culturally. It was therefore suggested that the counties around New York Harbor be consolidated under the name New York City. Although there was some resistance from some Staten Island residents, it officially became a borough of New York City on New Year's Day, 1898.

As part of the city proper, Staten Island flourished throughout the 20th century. Increased mass transit connected all the boroughs and allowed more people to live outside of Manhattan while still having access to the city's varied resources. The remainder of the 20th century saw continued growth and increasing population density throughout Staten Island.

B. SEVENTEENTH CENTURY: SITE HISTORY

On of the earliest known maps depicting Staten Island is Vinckeboon's 1639 "Manatus Map." While this map shows the boroughs of Manhattan and Brooklyn as having multiple plantations and settlements, only one farm is located on Staten Island, that of David Pietersen de Vries, along the island's northeast coast (Kouwenhoven 1972). As discussed previously, Native American resistance made it very difficult for the Europeans to settle the island. However, after the exodus of Native Americans from Staten Island in 1670, settlements gradually grew there.

In 1680, Captain Christopher Billopp built the aforementioned stone house, known as "The Manor of Bentley" at the southernmost tip of Staten Island, which would later become known as "Billopp's Point" (Burrows and Wallace 1999). Billopp had been granted a huge plot of land in 1676, comprising more than 960 acres of land and marsh (Historical Perspectives, Inc. 2001). This appears to be the first settlement in the southern half of Staten Island, which had remained virtually empty throughout the 17th and early 18th centuries. At that time, it appears that the project area was unoccupied and no structures were situated on it **(Figures 4 and 5)**.

The Skene map of original land patents in Staten Island (not pictured) shows that Billopp's property was located a little more than half a mile south of the project area. The Skene map also indicates that the majority of the project area is situated in a 255 acre plot of land that was patented to Mark Dusachoy, a French Huguenot immigrant, in 1653, some of which was then granted to Paulus Richards in 1694 (URS 2005). The northernmost portion of the project area is located within land granted to William Merrill in 1686. An eighty-year old man named Mark Dusway, Sr. was recorded in a 1706 local census, as was Mark Dosway, Jr. Two large plots of land adjacent to the one previously mentioned were owned by Mark Dusachoy in the late 1600's and early 1700's, this is assumed to be the younger man. A thirty year-old man named Powell Rigar (possibly a variation of Paulus Richards) was also recorded in that census. It does not appear that any of these men or their families lived on the land, as historic maps do not show any structures in the area until later. However, members of the Dissosway family (the incarnation of the name "Dusachoy" used in later centuries) were major land owners in the area adjacent to the mill pond, about a half mile south of the project area, so it is unclear if the land was vacant or used as farmland.

C. EIGHTEENTH CENTURY: SITE HISTORY

As mentioned previously, early 18th century maps depicting Staten Island give no indication that any structures or settlements were situated in the vicinity of the project area at that time. Towns were growing slowly along the coasts of the northern half of the island, as seen in the 1733 Popple map **(Figure 5)**. This map also shows that a ferry had been established at the southern tip of the island, running between Billopp's Point and Perth Amboy, New Jersey.

By 1764, a colonial thoroughfare was constructed which connected the ferry with others[1] located at the Narrows, the island's easternmost point, as seen on the Bellin map **(Figure 6)**. This road appears to follow the line of modern Amboy Road. In addition to the Billopp's Point ferry, many other ferries were established along Staten Island's western coast, facilitating the transportation of people and goods between New York and New Jersey. The Blazing Star and New Blazing Star ferries[2] were established in 1722 and 1750, respectively (Louis Berger and Associates 2001a), and another ferry was constructed at Smoking Point by at least 1776.

The establishment of these ferries generated a great deal of traffic in lower Staten Island and prompted a surge of growth along the southwestern shore. Road construction increased, and soon the various ferries were connected by a small network of roads that crossed the entire island. The 1777 Des Barres map **(Figure 7)** shows that a road had been constructed that linked the Smoking Point ferry with the precursor to Amboy Road mentioned above. This road does not appear to have a modern corollary in the vicinity of the project area. The Des Barres map also shows that a significant number of structures had been established along both roads. In the vicinity of the project area, all but two were located adjacent to the roads themselves. The two exceptions were constructed along the western shoreline, presumably south of the project area, but the map's inaccuracy (the mill pond and brook located to the south of the project area is not even shown) makes this determination difficult.

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[1] Two ferries are depicted at the Narrows in the 1776 Barber map (not pictured): "Watson's Ferry" to the north and "Vanderventer's Ferry House" to the south.

[2] These ferries do not appear on maps until the 1770's.

The structures are more clearly identified on the 1933 McMillan map **(Figure 8)**, which incorporates data from the Taylor and Skinner map of 1781, The Hessian map of 1777, and a French map detailing English and Hessian camps on Staten Island between 1780 and 1783. McMillen's map shows that the area surrounding the APE was for the most part occupied by a series of three structures belonging to "C. Dusaway," which would later be spelled "Dissosway." These structures are all situated along the road that originally ran along the shoreline. The Dissosway mill is depicted to the south of the project area, and the Winant house -- which stood near the intersection of present-day Ellis and Arthur Kill Roads (Greenhouse Consultants, Inc. and Volknar 1985) – to the north of the project area. It is impossible to determine the exact location of the project area on this map, although it appears to fall between the northernmost Dissosway property and the Winant home. The portion of the Dissosway property that is situated within the project area was sold to Charles Drake in 1795 (URS 2005).

Archaeological testing at the Arthur Kill Factory Outlet site indicated that the northern portion of that project area was not occupied until the second half of the 18th century (Hunter Research 1996).

D. NINETEENTH CENTURY: SITE HISTORY

Some or all of Charles Drake's property was sold in 1824 to John Van Allen, who died soon after the purchase (URS 2005). The Van Allens were an old Staten Island family, and were so entrenched in the island's history that the area in this section of Charleston, became known as "Van Allentown." This name was later shortened to "Allentown," after which Allentown Lane was named (Davis 1896). Van Allen's widow divided the property among her children as each came of age and established a country lane "from the beach to the woods" in order to access the different homes (URS 2005: 5.6). This was the road which would eventually become Allentown Lane.

A coastal survey of Staten Island performed in 1844 **(Figure 9)** provides a clearer depiction of the structures located throughout southwestern Staten Island in the early 19th century. A cluster of small farms is depicted in the vicinity of the project area. The line of future Allentown Lane projects though the middle of these farms, each of which presumably belonged to a member of the Van Allen family. Besides the construction of additional farmhouses near the Van Allen property, this map shows that not much development had occurred in the vicinity of the project area during the late 18th and early 19th centuries.

The 1853 Butler map **(Figure 10)** is the first historic map which portrays Allentown Lane and shows that the Van Allen family still owned most of the property on either side of the road, adjacent to the shore. The map also indicates that a moderate amount of development had occurred throughout southwestern Staten Island and many new structures, presumably domestic residences, had been constructed. There were many new property owners in the vicinity of the project area—although Arthur Kill Road was still not in its current location—including H. Drake, E. Price, Elting—whose property included a small dock or pier labled "Elting's Landing," outside the project area—C. Shea, N.B. Combs, and M.S. Taylor.

The occupations of the area's residents in the 1850 census indicate that it was still relatively rural; most are listed as boatmen, carpenters, farmers, and the like. However, in 1854, a German immigrant named Balthazar Kreischer established a brick works just north of the project area (Sachs 1988). The success of the brick factory brought about a new era of industrialization

which would characterize southwestern Staten Island during the second half of the 19th century and even resulted in the neighborhood becoming known as "Kreischerville."

The 1874 Beers atlas **(Figure 11)** reflects the construction of the Kreischer factory. More importantly, it also shows that Arthur Kill Road had been relocated to its current position, and that no roads are evident along the shore of the Arthur Kill. The 1859 Walling map (not pictured) depicts both current Arthur Kill Road as well as the shoreline road, but that map appears to be inaccurate in terms of the location of structures and smaller roads, such as Allentown Lane, have been omitted. The 1874 map shows that the Van Allens had sold their property north of Allentown lane to the McComber family, and the property to the south of O.H. Barnard, a prominent silk manufacturer (Leng and Davis 1930). In addition, the Elting property had been sold to G.A. Powers. Only two structures appear to be adjacent to the streetbeds included in the project area: a small building along Arthur Kill Road, within the property belonging to Mrs. Drake, and a house on the M.S. Taylor property on the southern side of Allentown Lane. The 1887 Beers atlas **(Figure 12)** shows that other than a handful of ownership changes, the project area had remained exactly the same.

An 1891 United States USGS map (not pictured) shows the locations of Arthur Kill Road and the houses that occupied the adjacent lots, but Allentown Lane is not depicted. In an 1898 version of the same map **(Figure 13)**, no changes to the project area are shown as having occurred with the exception of the addition of Allentown Lane, which is shown as extending approximately 300 feet west of Arthur Kill Road (only as far as the houses labeled "Drake" and "M.S. Taylor" on the 1887 Beers atlas) and 1600 feet to the east of the intersection. It is not clear why the road is not depicted on the 1891 map, although it may indicate some sort of grading or paving in that area.

An 1898 atlas drawn by Robinson **(Figure 14)** shows that more structures had been constructed in the lots adjacent to the project area's streetbeds. None of the new buildings were located immediately adjacent to the street with the exception of two small structures located at the southwest corner of Arthur Kill Road — on this map called Riverside Avenue — and Allentown Lane. The map shows the buildings to be the property of John Hillyer. More importantly, however, the map indicates that an 8 inch water line was constructed running the length of Arthur Kill Road. No sewers are evident, however, so it must be assumed that the residents in the surrounding houses continued to use privies or cesspools for waste management and sanitation purposes.

It should be noted that two late 19th century water lot grants were issued covering the area at the end of Allentown Lane. The southern half of the road was included within a water lot granted to Ann Eliza Barnard in 1886 and the northern half to William H. Jobelman in 1895. Both grantees owned the land adjacent to those water lots at that time. However, it does not appear that any significant landfilling events occurred there.

E. TWENTIETH CENTURY: SITE HISTORY

Throughout the 1890's, Staten Island's industrialization continued. The Atlantic Terra Cotta Company was founded in Tottenville in 1897. That company produced decorative architectural pieces that were incorporated into many historic New York buildings, including the Woolworth Building in Lower Manhattan (Sachs 1988). At around the same time, the Tottenville Copper company, located near the Mill pond south of the project area, was also established (Landmarks Preservation Commission 2006). Both companies employed hundreds of worker and brought

many more residents into the area, something which is reflected in early 20th century census records, as many of the local residents are listed as working in copper, terra cotta, or brick factories.

A topographical survey of Staten Island completed in 1913 **(Figure 15)** indicates that Arthur Kill Road – labeled with yet another old name, Fresh Kills Road -- was paved with macadam and was lined with picket fences on its western side and post and rail fences on the eastern side. Fire hydrants are also depicted along this road, indicating the presence of a water main. Allentown Lane is shown on that map as a dirt road lined with board, picket, and wire fences along its southern side and wire and picket fences on the north. A driveway made of cinders is shown extending from two different structures on the Jobelman property and then down Allentown Lane towards Arthur Kill Road. This map also indicates that the farm in the northwest corner of the two roads -- attributed to Hrs. Jas. Drake on other historic atlases – was a cultivated field.

The 1917 Bromley atlas **(Figure 16)** does not show any new development within the project area, although it does depict the water main along Arthur Kill Road as being 12 inches in diameter. It also shows several fire hydrants located along the western side of the road.

The success of local industries in southwestern Staten Island continued to increase during the 20th century; however, it resulted in the decline of the local environment and many of the smaller neighborhood areas. While the Kreischer Brock Factory was still operational, its German name became unpopular during World War I, and the neighborhood was re-named "Charleston" (Fioravante 2002). The oyster beds in the area were condemned in 1916 because of the pollution caused by the nearby factories (Louis Berger and Associates 2001a). The construction of the Outerbridge Crossing in 1928, approximately 1,000 feet south of the project area, also permanently affected the area (Ibid). A New York Times article dating to 1927 claimed that twenty homes were going to be built along Allentown Lane, north of the location of the (at that time) proposed Outerbridge Crossing, but it does not appear that such development occurred in the vicinity of the project area.

The area became increasingly less residential as the 20th century progressed. The buildings in the lots adjacent to the project area were gradually demolished and were not replaced. A certificate of occupancy provided by the New York City Department of Buildings indicates that in 1946, a building that served as a motor vehicle repair shop, gasoline service station, and one family dwelling was situated on Block 7608, Lot 1, which is the lot located at the northwest corner of Arthur Kill Road and Allentown Lane. A gasoline service station would most likely have required underground storage tanks, but it is unclear if any such tanks existed on the site, or if their construction and use would have also caused disturbance in the adjacent streetbeds.

In 1961, the New York Times reported that the Crown Zellerbach Corporation, a San Fransico-based paper company, purchased from the city of New York the entire plot of land between Arthur Kill Road, Allentown Lane, and Androvette and Kreischer Streets, north of the project area, in 1961. According to the article, the company had intended to build a paper plant on the site, an event that does not appear to have ever taken place. Deed records indicate that Crown Zellerbach, and its successor in interest, the Arthur Kill Associates, retained some or all of this property throughout at least the 1990s.

The land surrounding the project area soon became deserted, and was then used as an illegal dumping ground by local residents. In 1979, 75 drums of chemical waste were found in the area (New York Times 1979).

Thoughts of development in Charleston were revived in the 1990s. In 1991, an interceptor sewer was constructed along the southern portion of Arthur Kill Road. In 1999, the New York Times reported that a large residential development project, known as the Kalien Commons, was proposed for the area in the northwest corner of Arthur Kill Road and Allentown Lane, to be constructed by the Arthur Kill Association. However, the project was not approved by the local community board and was never actualized. This project does appear to have been a precursor for the Tides of Charleston development, which is currently under construction in the same area.

F. PREVIOUSLY IDENTIFIED HISTORIC PERIOD ARCHAEOLOGICAL SITES WITHIN ONE MILE OF THE PROJECT AREA

File searches at OPRHP and LPC identified several historical archaeological sites within one mile of the project area. Most involve historic homes, although the cluster of wrecked vessels off the coast of Allentown Lane has also been identified as a historic-period archaeological site. As noted previously, two vessels are potentially in the path of the outfall for the proposed Charleston Bus Annex stormwater sewer. However, these were determined to be not significant by OPRHP in 1996. The historic brick works located to the northwest of the project site was also identified as an archaeological resource.

Table IV-1
Previously Identified Historical Archaeological Sites

Site Name	OPRHP #	Approximate Distance from APE	Time Period	Site Type	AdditionalReference
Canada Hill	A08501.0073	.42 miles (2,200 feet)	Historic	Historic Scatter	Referenced in: Cultural Resource Consulting Group (Tomaso, 2006)
Anderson Brick Works Site	A08501.0079	.125 miles (660 feet)	Historic	Foundation	Referenced in: Louis Berger and Associates (2001a)
Historic Vessels	A08501.002601-A08501.002703	Along shores of the Arthur Kill	Historic	Vessels	Reported by: Panamerican Consultants, Inc. (1999)
Clinton Residence	A08501.0229-A08501.0231	1 mile (5,280 feet)	Historic	Domestic residence	Referenced in: Louis Berger and Associates (2001a)
Porzio House	A08501.0082	.75 miles (3,960 feet)	Historic	Domestic residence	Referenced in: Louis Berger and Associates (2001a)
Dubois House	A08501.0080	.6 miles (3,168 feet)	Historic	Domestic residence	Referenced in: Louis Berger and Associates (2001a)
RMSC/Salamander	A08501.2378	1 mile (5,280 feet)	Historic		Referenced in: Louis Berger and Associates (2001a)

G. HISTORIC ARCHAEOLOGICAL SENSITIVITY

The installation of an interceptor sewer along Arthur Kill Road in 1991 would have disturbed a large portion of the roadbed within the project area down to depths of approximately 10 feet below the present ground surface. Arthur Kill Road also has water, gas, and electrical lines running through it, which would also have disturbed the ground to depths of 5 to 7 feet. Arthur Kill Road was established in the mid 19th century, well after the construction of the houses which were situated along the shoreline road. However, Arthur Kill Road was sufficiently distant from those earlier houses that there is little likelihood that the road would have impacted any domestic shaft features such as privies, cisterns, and wells which may at one time have been located in their rear yards. Therefore, it is not likely that historical archaeological deposits would have survived both the cutting and grading of Arthur Kill Road as well as the subsequent installation of utility lines along its length.

Although the 1844 Coastal Survey (**Figure 9**) does not depict Allentown Lane, it was presumably constructed in the early 1800s, after the death of John Van Allen (URS 2005). The 1844 map suggests that it ran between several houses, although none of the houses were located in its path. Furthermore, based on documentary evidence, it is presumed that the lane was constructed around the same time as the nearby houses, which would have been erected as each Van Allen child came of age and was given a portion of the family's property (URS 2005). It is not likely that privies associated with those houses would have been located in the road's path, as they were generally placed at a distance from both domestic structures and streets (Wheeler 2000). The homes also appear to be sufficiently distant from the lane that other domestic shaft features—such as cisterns and wells, which were generally constructed close to houses for easy access to water sources (Cantwell and Wall 2001)—would also not be situated within the roadbed.

Therefore, the Charleston Bus Annex stormwater sewer site is determined to have low potential for the recovery of Historic period archaeological resources. *

Chapter V: Existing Utilities and Subsurface Infrastructure

A. EXISTING SUBSURFACE UTILITIES

ARTHUR KILL ROAD

Arthur Kill Road has been heavily disturbed by the installation of utilities in recent years **(Appendix A)**. According to Richmond County DEP files, an 18 inch, extra-strength verified pipe interceptor sewer with a concrete cradle was installed just west of the midline of Arthur Kill Road in 1991. This sewer begins south of the project area, and extends past the southern border of Allentown Lane, where it enters the APE, for an additional 700 feet before it terminates. In general, sewers are placed around 10 feet below the ground surface and therefore can disturb more than 12 feet of earth during their installation, however, interceptor sewers are generally placed at even lower depths, so the level of disturbance associated with this sewer most likely extends past 12 feet.

Arthur Kill Road also contains two water lines, one measuring 20 inches in diameter and the other measuring 8 inches. Both lines originate at a point south of Allentown Lane and travel up the eastern side of Arthur Kill Road throughout the entire length of the project area. At a point approximately 560 feet north of the southern edge of Allentown Lane, the 8 inch water line angles northwest and continues through the rest of the project area along the western side of Arthur Kill Road. An 8-inch water line first appears along that road in the 1898 Robinson atlas **(Figure 14)**. Water lines are generally located approximately 5 feet below the ground surface, and therefore, 6 to 7 feet could have been disturbed during their installation.

In addition, a 12 inch gas main currently runs along the eastern side of Arthur Kill Road throughout the length of the project area. Gas mains are generally located 2 to 3 feet below the ground surface, and therefore, 4 to 5 feet could have been disturbed during the line's installation.

Two sets of existing drainage structures which are associated with the Tides of Charleston development in the northwest corner of Allentown Lane and Arthur Kill Road are located on the west side of the road. One of these begins approximately 1300 feet north of Allentown Lane, and the other approximately 210 feet north of Arthur Kill Road. The depth of these drainage structures is not immediately clear, although their capacity—the basins could potentially contain "runoff generated during storms up to and including a 10 year storm event" (Rampulla Associates Architects 2004: 16)—implies that they are very large and could therefore be deeply buried. These dry wells also have associated manholes and catch basins.

It does not appear that any electrical lines have been installed in the area; local streetlights are powered by overhead lines.

ALLENTOWN LANE

Current maps of the project area's utilities **(Appendix A)** do not indicate the presence of any existing sewer, gas, or underground electrical lines along Allentown Lane. An 8 inch water line

is depicted as running east-west, beginning approximately 400 feet west of Arthur Kill Road and traveling east, out of the project area.

A series of dry wells was also installed within Allentown Lane to facilitate the drainage of storm water from the nearby Tides of Charleston development. One of these drainage structures is located at the western end of Allentown Lane. This cluster of dry wells has associated catch basins along the western end of the street as well. The second series of dry wells is located on the northern side of Allentown Lane, between 40 and 80 feet west of the western curbline of Arthur Kill Road. Manholes are visible in the vicinity of both dry well locations. The depth of these drainage structures is also unclear.

Recent grading and paving along Allentown Lane might also have altered its subsurface infrastructure. In mid-2006, Allentown Lane was graded and paved as part of the Tides at Charleston development. Approximately 3 to 4 feet of earth was excavated for this purpose. However, soil boring samples taken by Future Tech Consultants of NY, Inc. in 2004 **(Appendix C)** indicate that the western end of the road, near the Arthur Kill, contained 3 feet of fill and the eastern end, near Arthur Kill Road, contained 4 feet of fill. In both locations, the fill layers overlay layers of clay, silt, and sand, presumably the original ground surface. Therefore, it is likely that the grading only affected these fill layers, and potential prehistoric archaeological resources remain underneath the disturbed earth.

B. PROPOSED UTILITIES INSTALLATIONS

ARTHUR KILL ROAD

The proposed sewer that will extend through the center of Arthur Kill Road will begin approximately 1370 feet north of the southern curbline of Allentown Lane **(Appendix A)**. The line will begin with a manhole with two associated catch basins, the westernmost of which will be connected to an existing catch basin located to the south by a 60 foot long connection that will be 12 inches in diameter. Each catch basin will connect to the sewer via a 12 inch ductile iron pipe. At this point, the sewer will be a 24 inch reinforced concrete pipe on a concrete cradle that will run for approximate 165 feet before it connects to another manhole. The sewer will continue from that location as a 30 inch reinforced concrete pipe on a concrete cradle for 165 feet before it reaches another manhole with two associated catch basins, one on either side of the road and each connected to the sewer via 12 inch ductile iron pipes. After this manhole, the sewer will proceed as a 48 inch reinforced concrete pipe on a concrete cradle for approximately 255 feet, where it will connect to another manhole with associated catch basins and 12 inch connection pipes. At that point, the sewer will continue as a 54 inch reinforced concrete pipe on a concrete cradle through the remainder of the project area, approximately 775 feet, towards the end of the project area. Two additional manholes with associated catch basins and 12 inch connecting pipes are located along this branch of the line, located approximately every 250 feet.

At this southern end of the sewer line, a turning chamber will be installed to divert stormwater from the Arthur Kill Road sewer to the connecting line within the streetbed of Allentown Lane. This turning chamber will be directly under a new manhole that will be connected to a catch basin to the northwest.

The new sewer will be located to the east of the existing interceptor sewer, however, for the southernmost 300 feet of the project area, the 12 inch gas main and 8 and 20 inch water mains will have to be relocated so that they are east of the proposed sewer. In the northernmost 600

feet of the project area, the 8 inch water main that currently runs to the west of the existing sewer will be relocated to the far western side of the road. Water valves will connect the relocated water line to the residential development to the west. The existing drainage structures on the western side of the road near the end of the sewer line will be removed.

Because of the area's variable topography, the sewer is expected to be installed so that the top of the sewer line will be located anywhere between 5 and 20 feet below the ground surface (and therefore the bottom of the sewer line would be approximately 10 to 25 feet below). However, because the road was already disturbed by the construction of the existing utilities, it is not expected that the proposed work would generate a significant amount of new disturbance. Prehistoric sites in the area have generally been found at relatively shallow depths and would most likely have already been disturbed. Arthur Kill Road was distant from historic structures that pre-date its construction and it is not expected that domestic shaft features -- including privies, cisterns, and wells – would have been located in the area.

ALLENTOWN LANE

The sewer to be installed within Allentown Lane will extend west from the turning chamber where it connects to the stormwater sewer along Arthur Kill Road **(Appendix A)**. It will terminate at the mean high water line. The existing dry well structures, constructed in relation to the Tides of Charleston development, and any associated equipment—i.e. pipes and bulkheads—will be removed. A 54 inch reinforced concrete pipe sewer on a concrete cradle be installed through the center of the road. For the eastern half of Allentown Lane, the top of the sewer will be located approximately 5 feet below the ground surface. However, west of the central manhole, this depth extends to up to 15 feet in some locations.

Catch basins located on both the north and south sides of the road will connect to the main sewer via 12 inch ductile iron pipes at three locations where manholes will also be constructed; one at each end of the road and the third in the center. The westernmost manhole will be connected to a third catch basin, on the western border of the road.

This portion of the project area would have experienced some disturbance at the western end, where dry wells were constructed, and at the eastern end, approximately 115 feet from the western curbline of Arthur Kill Road, where drainage structures and a water main may have disturbed the area to depths of 5 to 7 feet. The extent of disturbance related to the construction of the Tides of Charleston development located north of Allentown Lane is unknown, but the presence of a water valve and two hydrants may indicate that the water main continues for an additional 80 feet or more, although it is possible that those utilities are connected to alternate water sources. If this is not the case, then the middle portion of Allentown Lane—west of the water line's terminal point and east of the dry well structures at the end of the road—as well as the possibly undisturbed areas on either side of the water main installation have the potential to yield prehistoric archaeological resources.

C. TEST PITS AND SOIL BORINGS

A series of test pits is planned to identify the locations of various utility lines prior to construction of the proposed stormwater sewer **(Appendix B)**. In addition, 15 geo-tech borings are planned for the entire length of the project area along Allentown Lane and Arthur Kill Road. These borings are generally small in diameter—measuring approximately 3"—and are not expected to significantly impact archaeological resources. An archaeologist will examine the

boring logs and the results and the boring logs will be included in any subsequent archaeological studies that might be generated by this project.

One planned test pit (TP #1) is located along Allentown Lane, approximately 180 feet west of its intersection with Arthur Kill Road, and it is presumably located directly over an existing 8-inch water line. The planned test pit would measure 5 feet in length, width, and depth. Due to the fact that the areas on either side of the water main may be undisturbed, it is possible that prehistoric archaeological resources may be present in the location of this test pit. Because this work is exploratory, is also possible that the test pit could be widened or that other pits may be excavated in Allentown Lane.

Three additional test pits are planned for Arthur Kill Road. Two of these (TP #2 and 3) will be 18 feet in length and 5 feet in width and depth. They will be located at distances of approximately 20 and 350 feet north of the intersection with Allentown Lane. The third test pit on Arthur Kill Road (TP #4) will be larger, measuring 36 feet in length and 5 feet in width and depth. This test pit is located just north of the Charles Bus Annex Site. Because of the significant amount of disturbance caused by the installation of utilities in Arthur Kill Road, it is not expected that these test pits will affect intact archaeological resources. *

Chapter VI: Conclusions and Recommendations

A. INTRODUCTION

As part of the development process, the preceding Phase 1A Archaeological Documentary Study of the Charleston Bus Annex stormwater sewer route was prepared to satisfy the requirements of the New York State Historic Preservation Office (SHPO) and the New York City Landmarks Preservation Commission (LPC) and it follows the guidelines of the New York Archaeological Council (NYAC). The project area is situated in the streetbeds of portions of Arthur Kill Road and Allentown Lane in the Charleston (formerly Kreischerville) section of Richmond County (Staten Island), New York **(Figures 1 and 2)**.

The proposed project would consist of a new bus annex to be used by NYCT's Department of buses for the storage and servicing of NYCT buses. As a component of NYCT's efforts to manage current and future transit demands, the Charleston Bus Annex would alleviate the current shortage of storage and servicing facilities for the Staten Island bus fleet and would improve overall operational efficiencies as well. The goal of this Phase 1A Archaeological Documentary Study is to determine the likelihood that potential archaeological resources have survived the destructive forces of time including agricultural and domestic use, erosion, the cutting of streets, and the installation of utilities. The entire APE was investigated in order to identify the project area's original topography, its prehistoric and historic usage and/or occupancy, past disturbance, and potential impacts.

The study documents the history of the project area as well as its potential to yield archaeological resources including both prehistoric and historic remains. In addition, it also documents the current conditions of the project area and previous cultural resource investigations which have taken place in the vicinity of the APE.

As part of the background research, published and unpublished resources were consulted at various information repositories, such as the Humanities and Social Sciences Branch of the New York Public Library (including the main research, local history, and map divisions), the LPC, the Municipal Archives, the archives of the Staten Island Institute of Arts and Science, the office of the Richmond County Clerk, the local history division of the Saint George branch of the New York Public Library, the Richmond County Topographical Bureau, and the New York City Department of Environmental Protection Bureau of Water and Sewers, among others. In addition, file searches were conducted at the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP), the LPC, and the New York State Museum (NYSM) to determine if prehistoric or historic sites had been reported within a half-mile of the project area.

B. CONCLUSIONS AND RECOMMENDATIONS

PREHISTORIC SENSITIVITY ASSESSMENT

Before European contact, the Charleston area of Staten Island had been an important hunting and fishing location for the local Raritan Indians who resided there. Many temporary campsites dating from the Paleo-Indian period (beginning 11,000 BP) through the Late Woodland (which ended ca. AD 1500) have been identified on the shores of the Arthur Kill in the vicinity of the project area as well as in the surrounding areas. The project site's natural topography would have made it an ideal location for the exploitation of food resources, if not for a habitation site, throughout the entire prehistoric period.

In general, Native American habitation sites on Staten Island dating to all periods of occupation are most often found in proximity to "well-drained areas near streams or wetlands" (Boesch 1994: 9). Most sites are located along the coast near water courses. More specifically, Late Archaic sites have been identified mostly in low-lying areas near water courses and marshes, while temporary camping sites during the Late Archaic were commonly found on sandy knolls (Ibid).

Because of the project area's close proximity to marine resources, high elevations, a Native American trail, and archaeological evidence of a great number of temporary campsites, it is highly likely that the project area was utilized by Native Americans as a temporary hunting, fishing, and camping location. It is possible that archaeological resources related to those activities, including stone tools and debitage, faunal remains, shell middens, fire-cracked rocks, and other artifacts associated with temporary camp sites may be located at the site. Such artifacts have been recovered from the area immediately north of Allentown Lane, which was excavated as part of the Arthur Kill Factory Outlet Center and Tides Development projects. In addition, in 1996, a possible chert core was recovered from the "abandoned portion of Allentown Lane" during Phase 1B excavations for the Arthur Kill Factory Outlet Center, a proposed project in the area bounded by Allentown Lane, Arthur Kill Road, Androvette Lane, and the Arthur Kill, which was never developed (Hunter Research 1996: 6.20). Most often these deposits have been uncovered within the top 1 to 3 feet of the ground surface, although in the areas of higher elevation to the north of the project site, prehistoric deposits were uncovered at depths of up to 7 to 9 feet.

Soil erosion, landscaping, and mid to late 20th century soil removal have altered the landscape in the vicinity of the project area (Louis Berger and Associates 2001b) and may have resulted in bringing prehistoric artifacts closer to the present ground surface and therefore making them more vulnerable. In addition, in 1991 an interceptor sewer was installed along Arthur Kill Road, disturbing a large portion of the roadbed within the project area, which most likely disturbed the ground down to depths of approximately 10 feet below the present ground surface. Arthur Kill Road also has water, gas, and electrical lines running through it, which would also have disturbed the ground to depths of 5 to 7 feet in those areas. Therefore, it is not expected that archaeological resources dating to the prehistoric period would be recovered from within Arthur Kill Road.

Allentown Lane has also been somewhat disturbed by the installation of utilities in association with the Tides at Charleston development project currently being constructed north of Allentown Lane. A water main with associated fire hydrants and water valves are located on the northern side of the road, extending westward from Arthur Kill Road for approximately 400 feet. In

addition, dry wells and manholes have been constructed at the western end of the road, near the shore, and near the intersection of Allentown Lane and Arthur Kill Road. Both sets of drywells have manholes above them as well as associated catch basins.

In mid-2006, Allentown Lane was graded and paved as part of the Tides at Charleston development. Approximately 3 to 4 feet of earth was excavated for this purpose at that time. Earlier soil borings, undertaken by Future Tech Consultants of NY, Inc. in 2004 **(Appendix B)**, indicate that the western end of the road, near the Arthur Kill, contained 3 feet of fill (top soil) and the eastern end, near Arthur Kill Road, contained 4 feet of fill (top soil). In both locations, the fill layers overlay strata of clay, silt, and sand, presumably the original ground surface. Therefore, it is likely that the grading work undertaken in 2006 only affected the stratum of upper fill, and it is possible that potential prehistoric archaeological resources remain beneath portions of Allentown Lane.

While it is not expected that significant undisturbed prehistoric resources would be recovered from the disturbed portions of the project area within Allentown Lane and Arthur Kill Road, it is possible that prehistoric remains could be located beneath the pavement as well as on either side of the existing water main. The area to the west of Allentown Lane, a grassy hill which slopes down to a marshy area which then leads out to the Arthur Kill, appears to be undisturbed and could be sensitive for the recovery of prehistoric archaeological remains.

Therefore, the Charleston Bus Annex stormwater sewer site is determined to have high potential for the recovery of prehistoric archaeological resources within the undisturbed portions of Allentown Lane as well as the grassy and marshy areas west of the road's end.

HISTORIC SENSITIVITY ASSESSMENT

The installation of an interceptor sewer along Arthur Kill Road in 1991 would have disturbed a large portion of the roadbed within the project area down to depths of approximately 10 feet below the present ground surface. Arthur Kill Road also has water, gas, and electrical lines running through it, which would also have disturbed the ground to depths of 5 to 7 feet. Arthur Kill Road was established in the mid 19th century, well after the construction of the houses which were situated along the shoreline road. However, Arthur Kill Road was sufficiently distant from those earlier houses that there is little likelihood that the road would have impacted any domestic shaft features such as privies, cisterns, and wells which may at one time have been located in their rear yards. Therefore, it is not likely that historical archaeological deposits would have survived both the cutting and grading of Arthur Kill Road as well as the subsequent installation of utility lines along its length.

Although the 1844 Coastal Survey **(Figure 9)** does not depict Allentown Lane, it was presumably constructed in the early 1800s, after the death of John Van Allen (URS 2005). The 1844 map suggests that it ran between several houses, although none of the houses were located in its path. Furthermore, based on documentary evidence, it is presumed that the lane was constructed around the same time as the nearby houses, which would have been erected as each Van Allen child came of age and was given a portion of the family's property (URS 2005). It is not likely that privies associated with those houses would have been located in the road's path, as they were generally placed at a distance from both domestic structures and streets (Wheeler 2000). The homes also appear to be sufficiently distant from the lane that other domestic shaft features—such as cisterns and wells, which were generally constructed close to houses for easy access to water sources (Cantwell and Wall 2001)—would also not be situated within the roadbed.

Therefore, the Charleston Bus Annex stormwater sewer site is determined to have low potential for the recovery of Historic period archaeological resources.

RECOMMENDATIONS

Further study in the form of Phase IB testing is recommended in order to identify any prehistoric archaeological resources which may be present in the grassy area to the west of Allentown Lane as well as the marshy area that connects it with the Arthur Kill. This testing could include surface reconnaissance, shovel tests and test units. Archaeological monitoring during all construction excavations—including both the installation of the sewer and pre-construction test pits—is recommended for the portion of project area located within Allentown Lane. ✷

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1891 Staten Island quadrangle.

1898 Staten Island quadrangle.

1975 Arthur Kill Quadrangle

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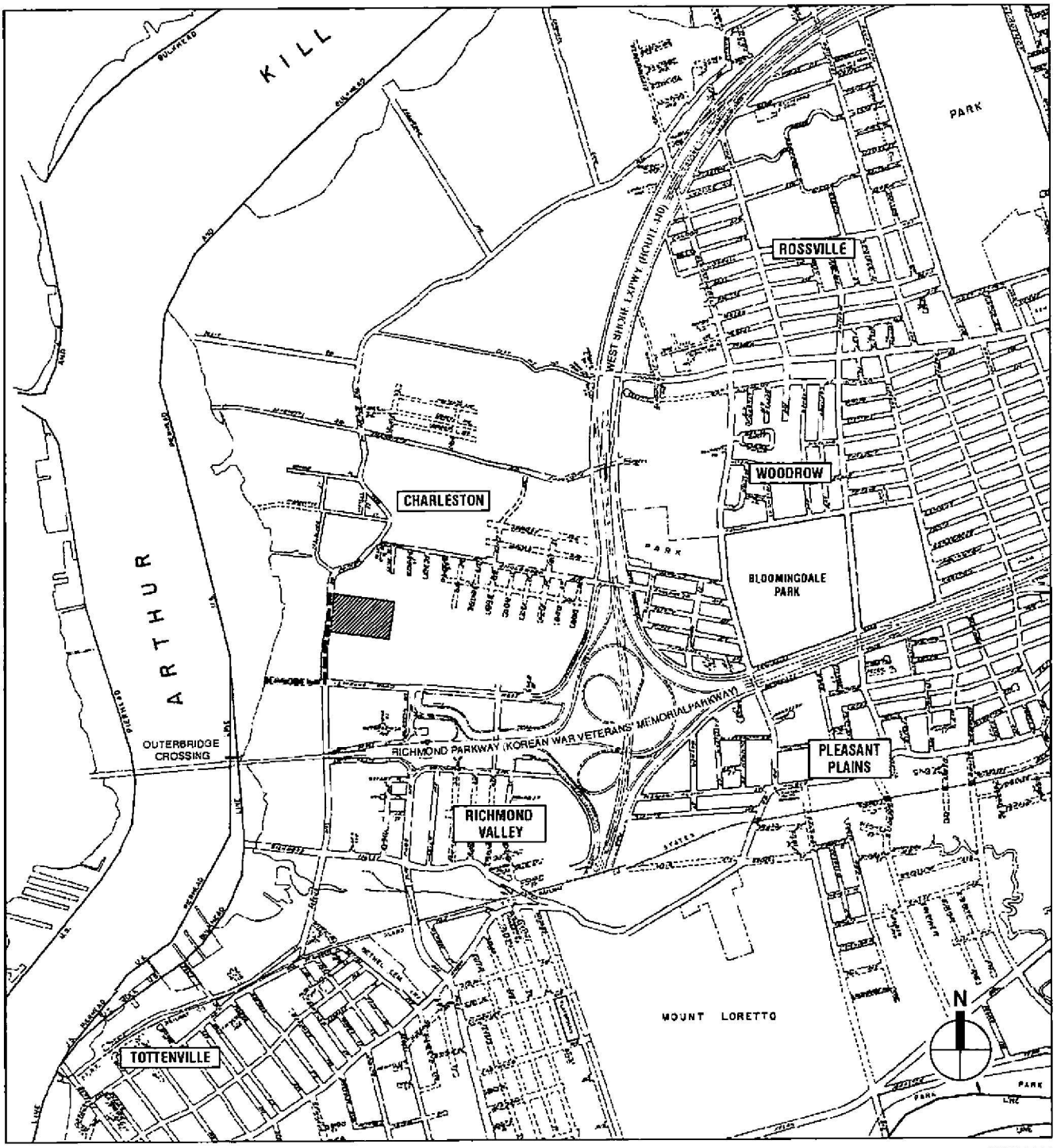
Figures

Project Location
USGS Map, Arthur Kill Quadrangle
Figure 1

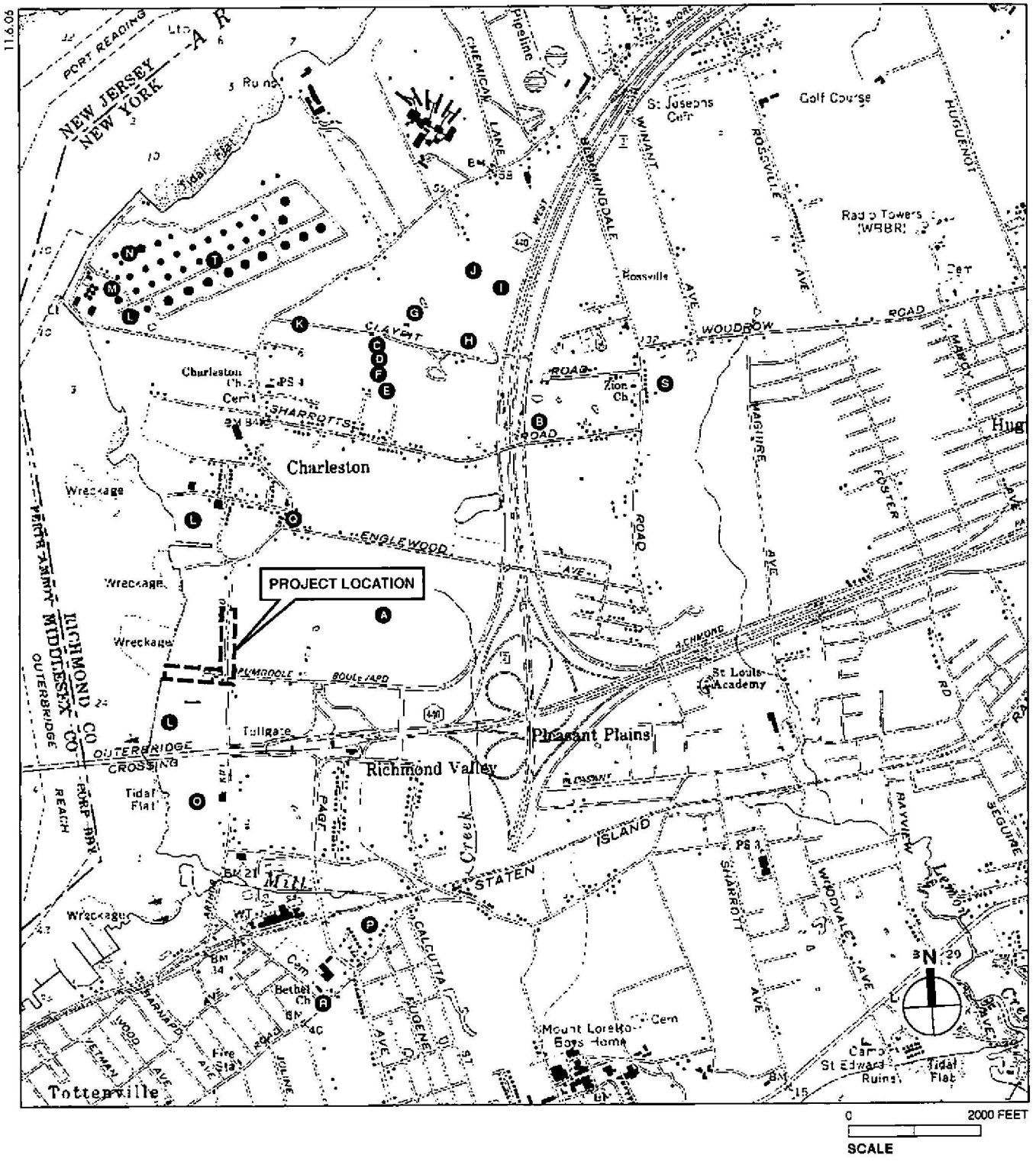
NYCT Charleston Bus Annex

11.15.06



NYCT Charleston Bus Annex

Charleston Bus Annex: Area of Potential Effect
Figure 2



Previously Identified Native American Archaeological Sites
Within One Mile of the Project Area.
USGS Map, Arthur Kill Quadrangle

NYCT Charleston Bus Annex

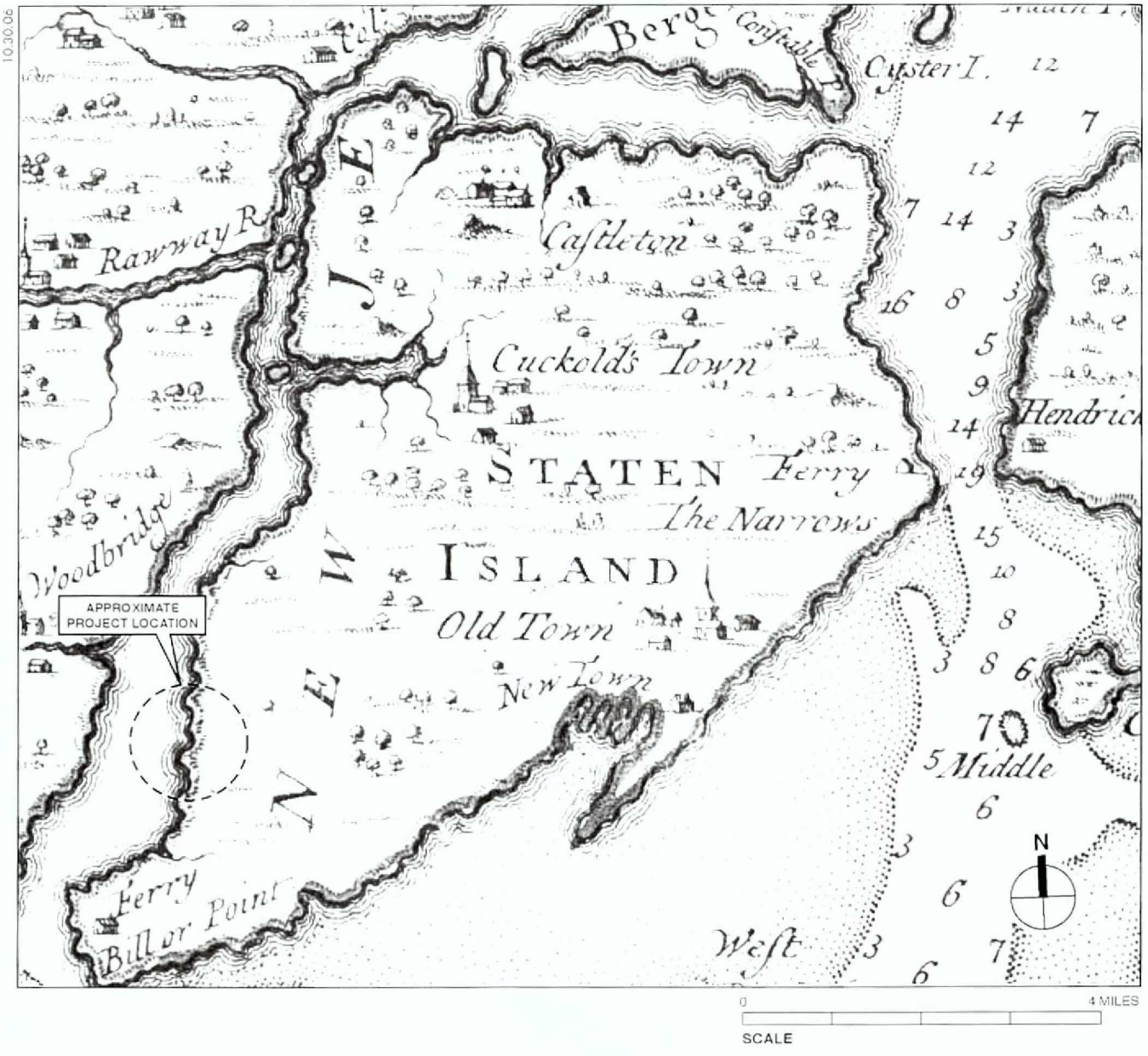
Figure 3

10.27.06

NOT TO SCALE

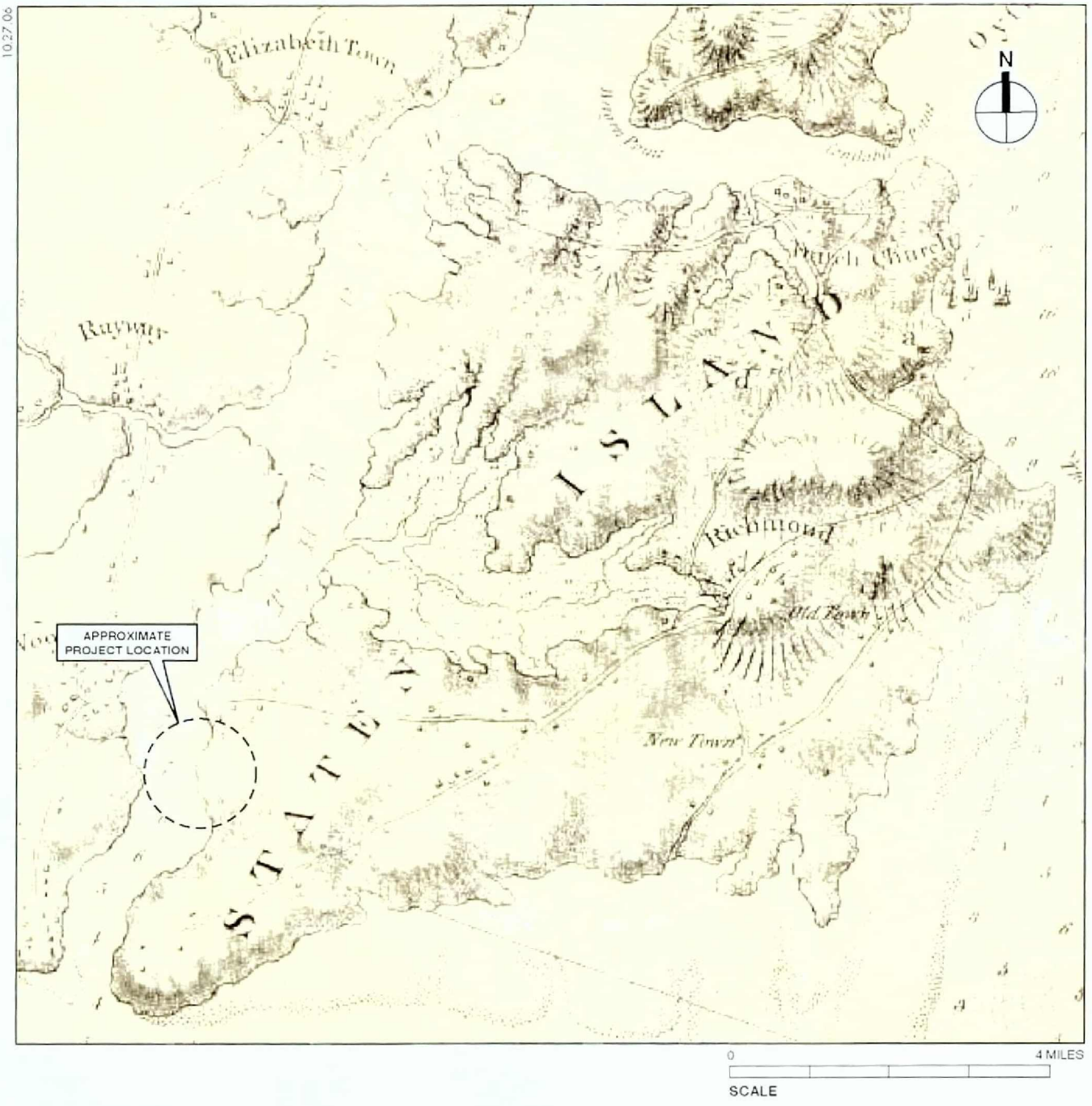
NYCT Charleston Bus Annex

The Manatus Map, 1639
Figure 4



New York and Perthamboy Harbours.
Henry Popple, 1733
Figure 5

Baye et Port d' York, Capitale de la Nouvelle York.
Jacques Bellin, 1764

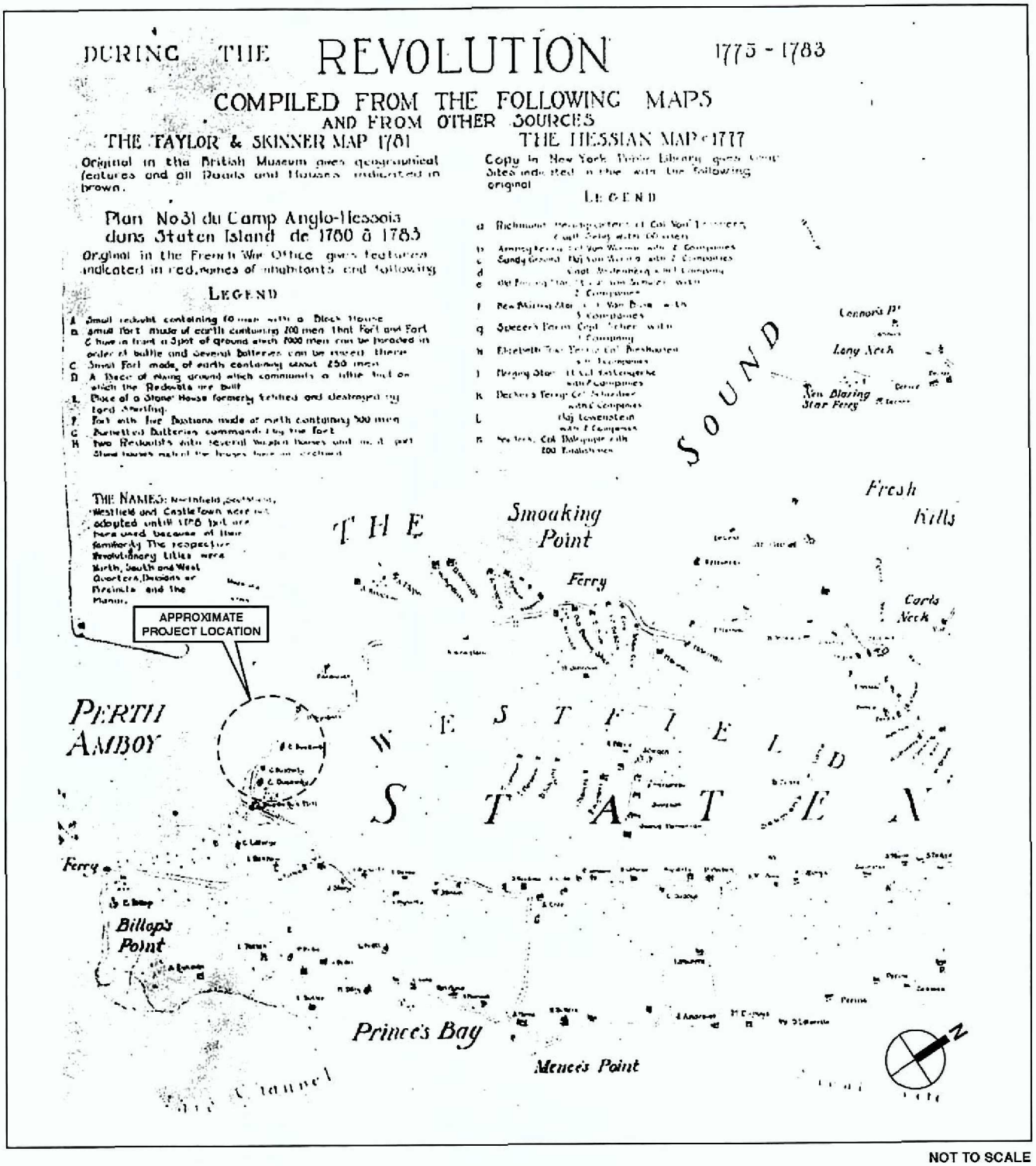


A Sketch of the Operations of His Majesty's Fleet and Army...in 1776.
Joseph Des Barres, 1777

NYCT Charleston Bus Annex

Figure 7

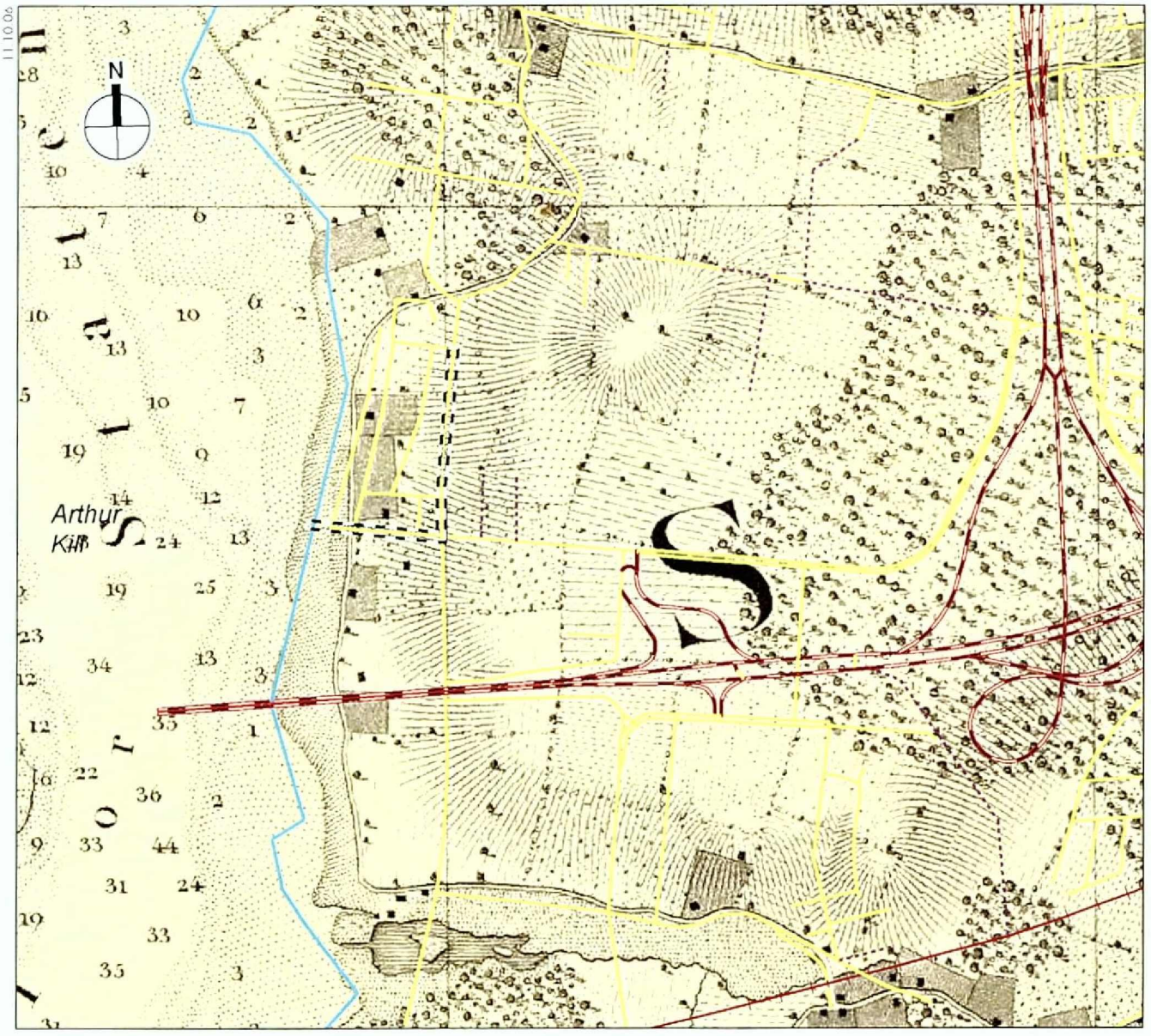
11.2.06



NOT TO SCALE

A Map of Staten Island During the Revolution, 1775-1783.
Loring McMillen, 1933
Figure 8

NYCT Charleston Bus Annex



Project Site Boundary

Modern Features

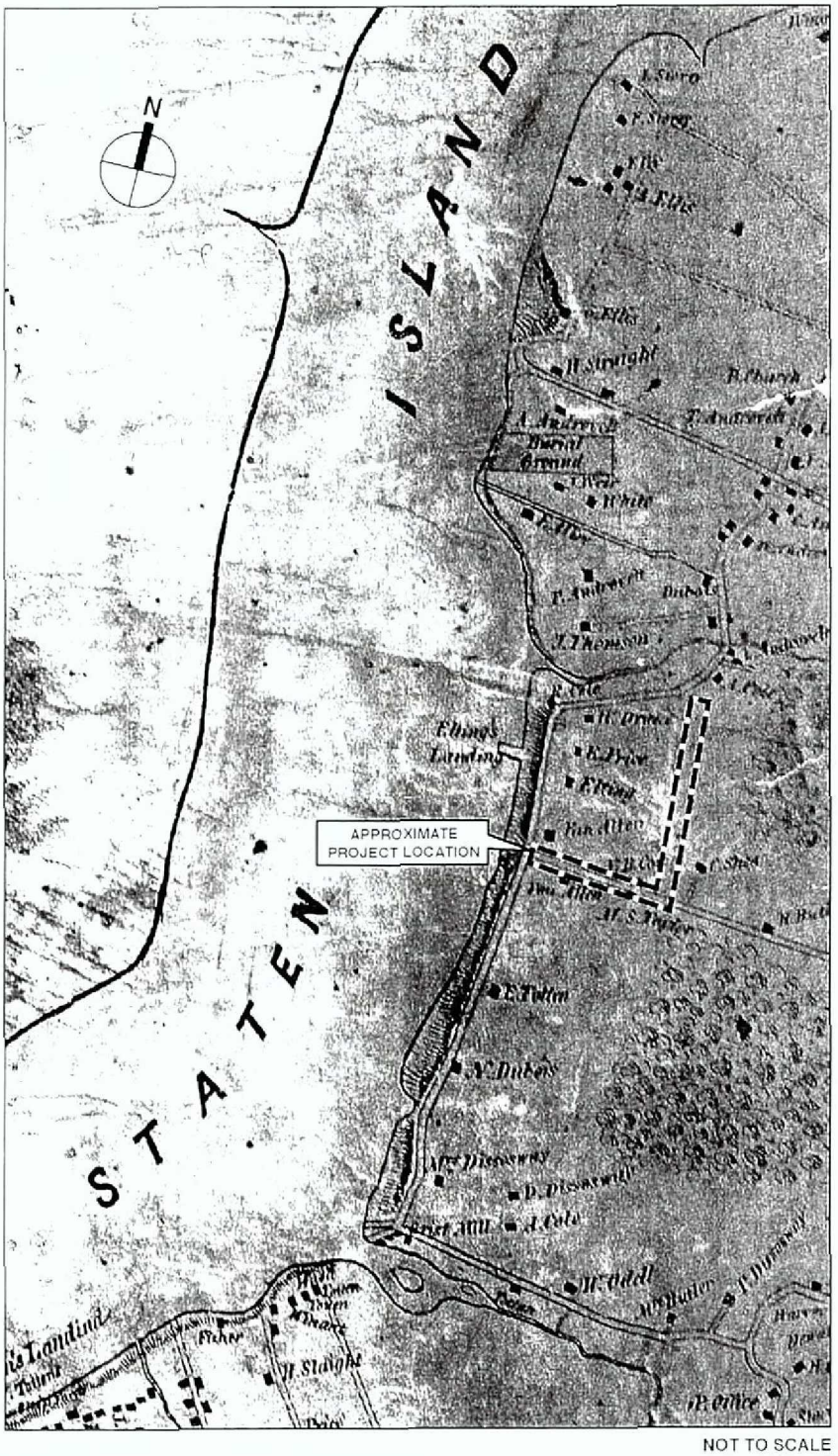
- Street
- Highway
- Railroad Track
- Shoreline
- Paper Street

Map of New-York Bay and Harbor and the Environs.
U.S. Coast Survey, 1844

NYCT Charleston Bus Annex

Figure 9

11.2.06

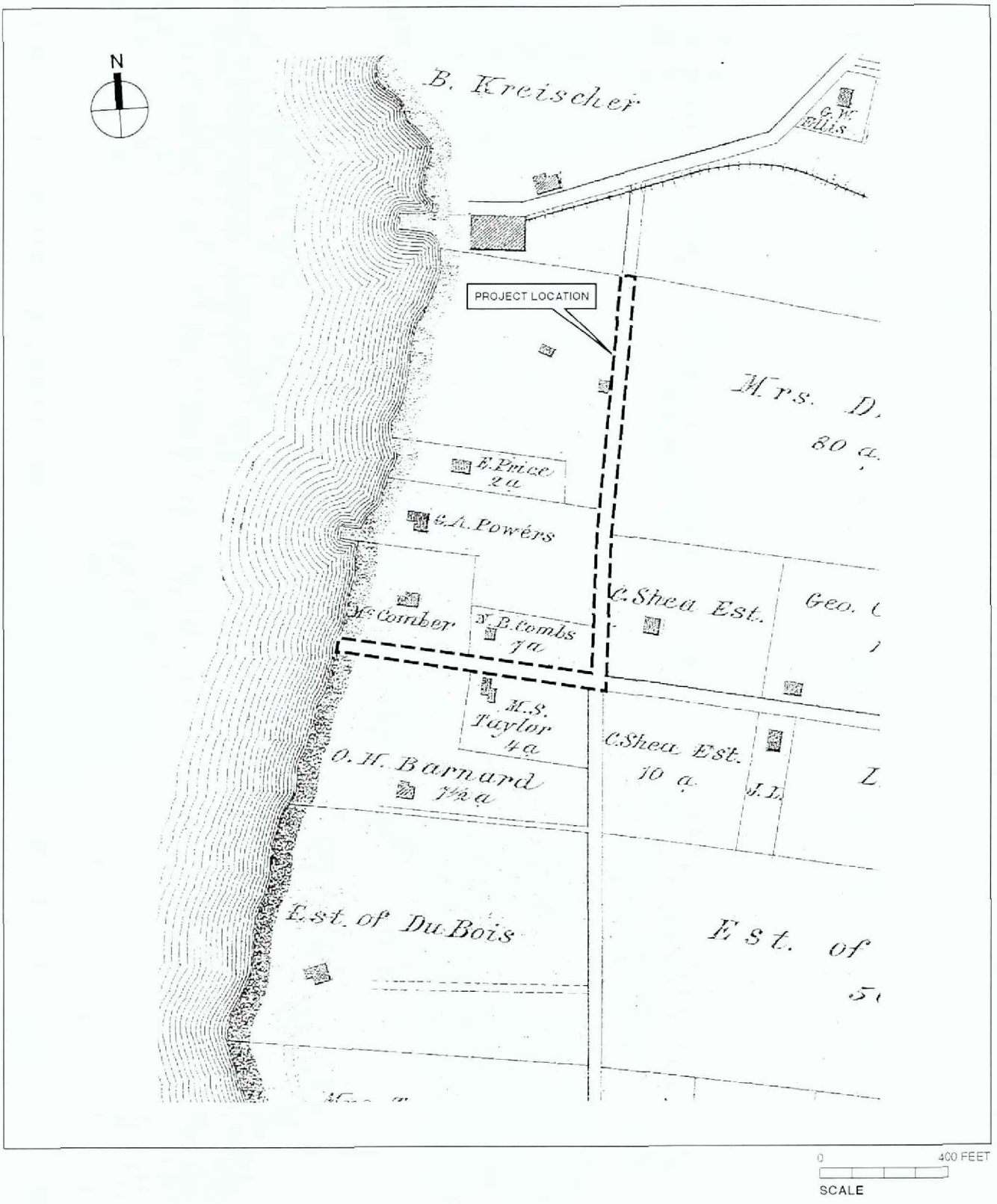


NOT TO SCALE

The Map of Staten Island, or Richmond County, New York.
James Butler, 1853

NYCT Charleston Bus Annex

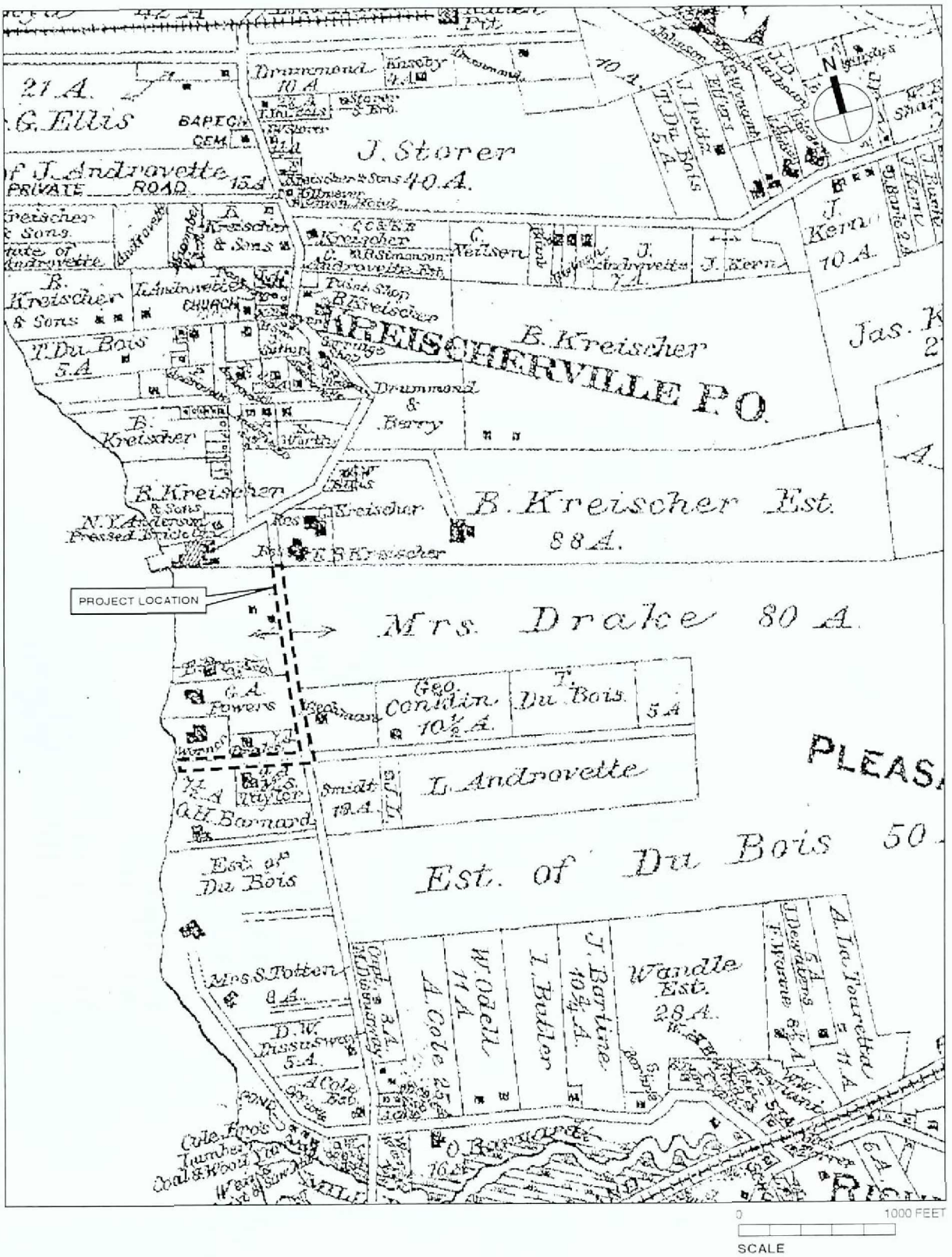
Figure 10



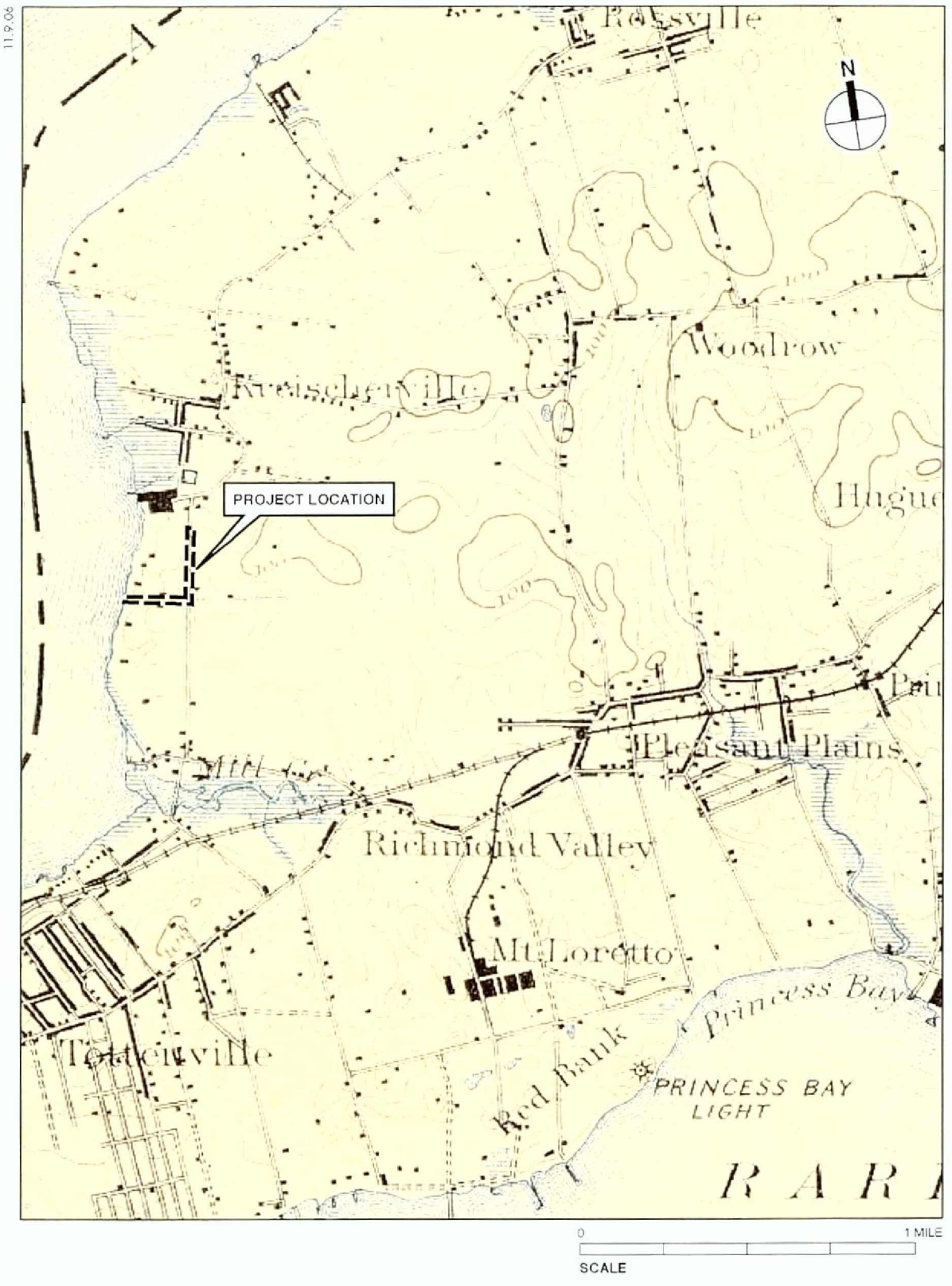
Atlas of Staten Island, New York.
F.W. Beers, 1874

NYCT Charleston Bus Annex

Figure 11



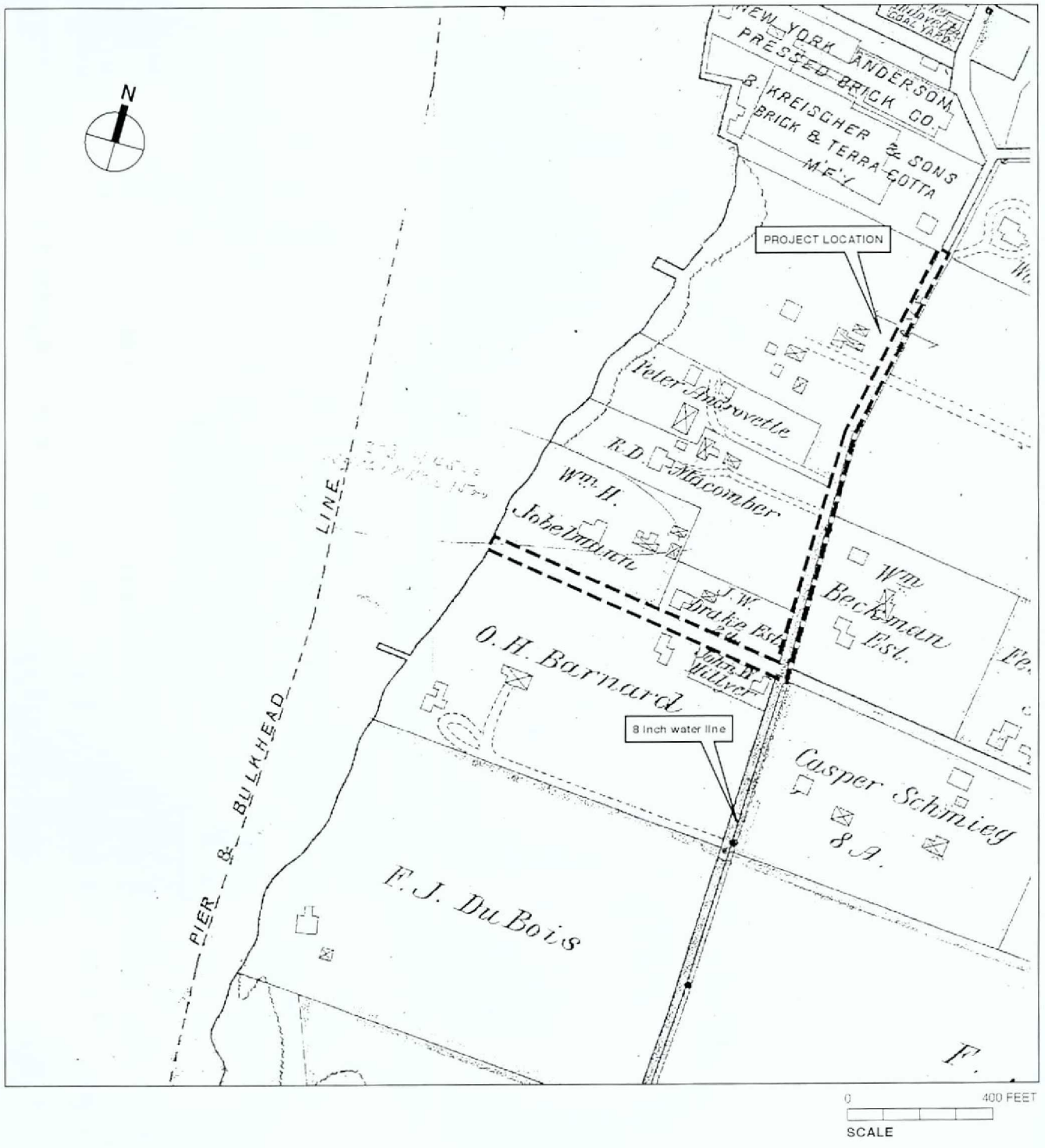
Atlas of Staten Island, Richmond County, New York.
J.B. Beers, 1887
Figure 12



United States Geological Survey:
New Jersey - New York, Staten Island Sheet, 1898

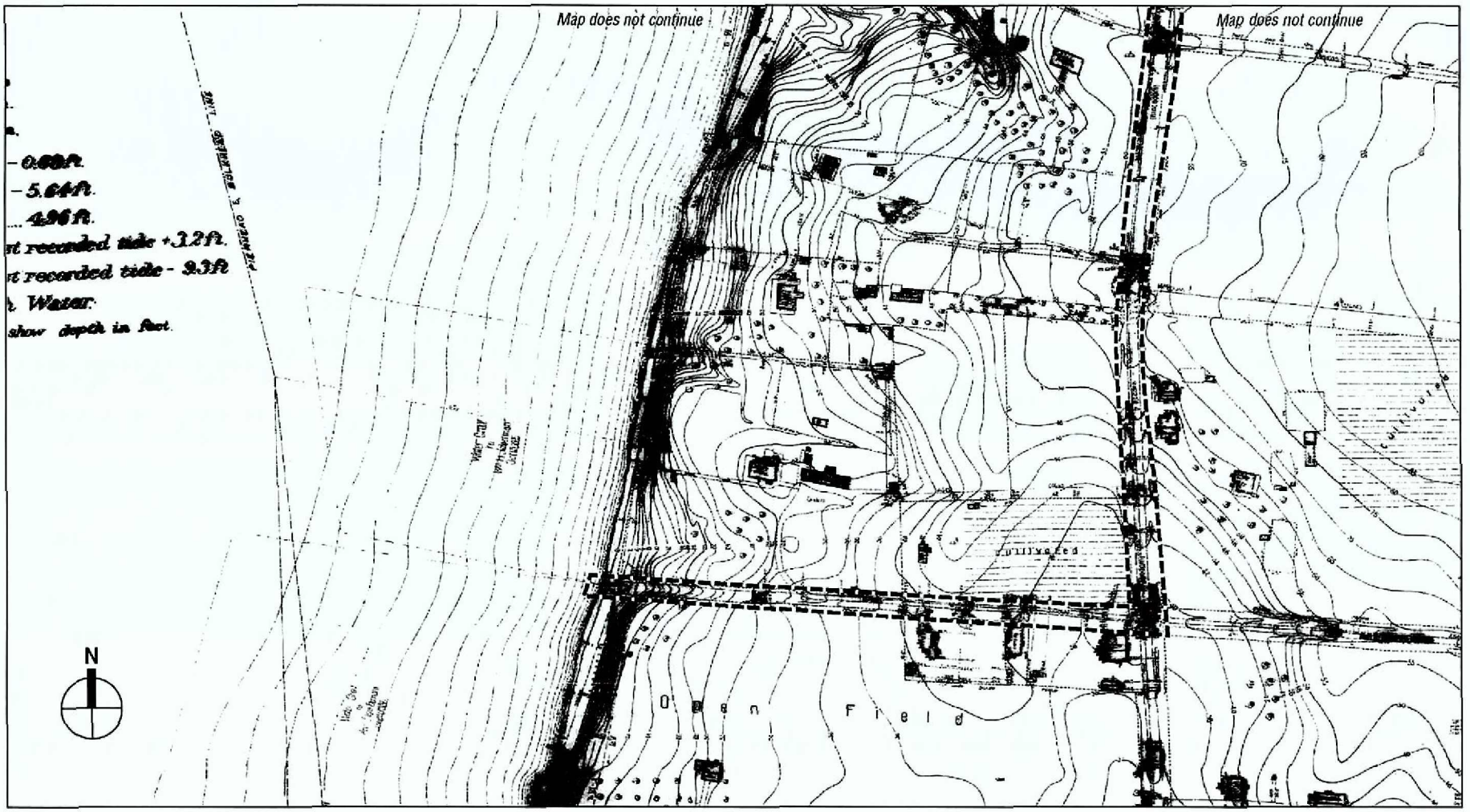
NYCT Charleston Bus Annex

Figure 13



Atlas of the Borough of Richmond, City of New York.
Elisha Robinson, 1898
Figure 14

11.2.06

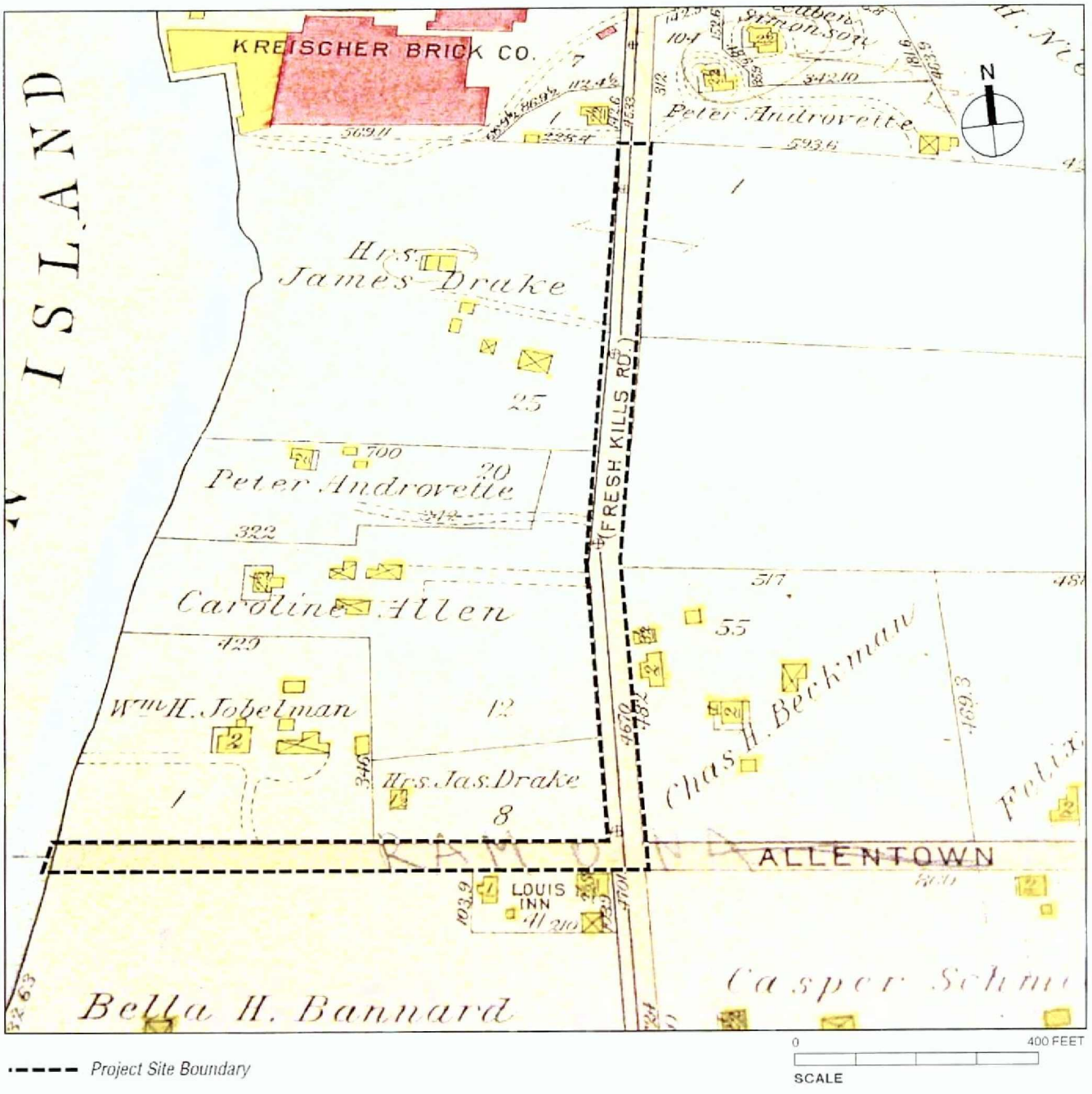


Project Site Boundary

Borough of Richmond Topographical Survey, 1913

NYCT Charleston Bus Annex

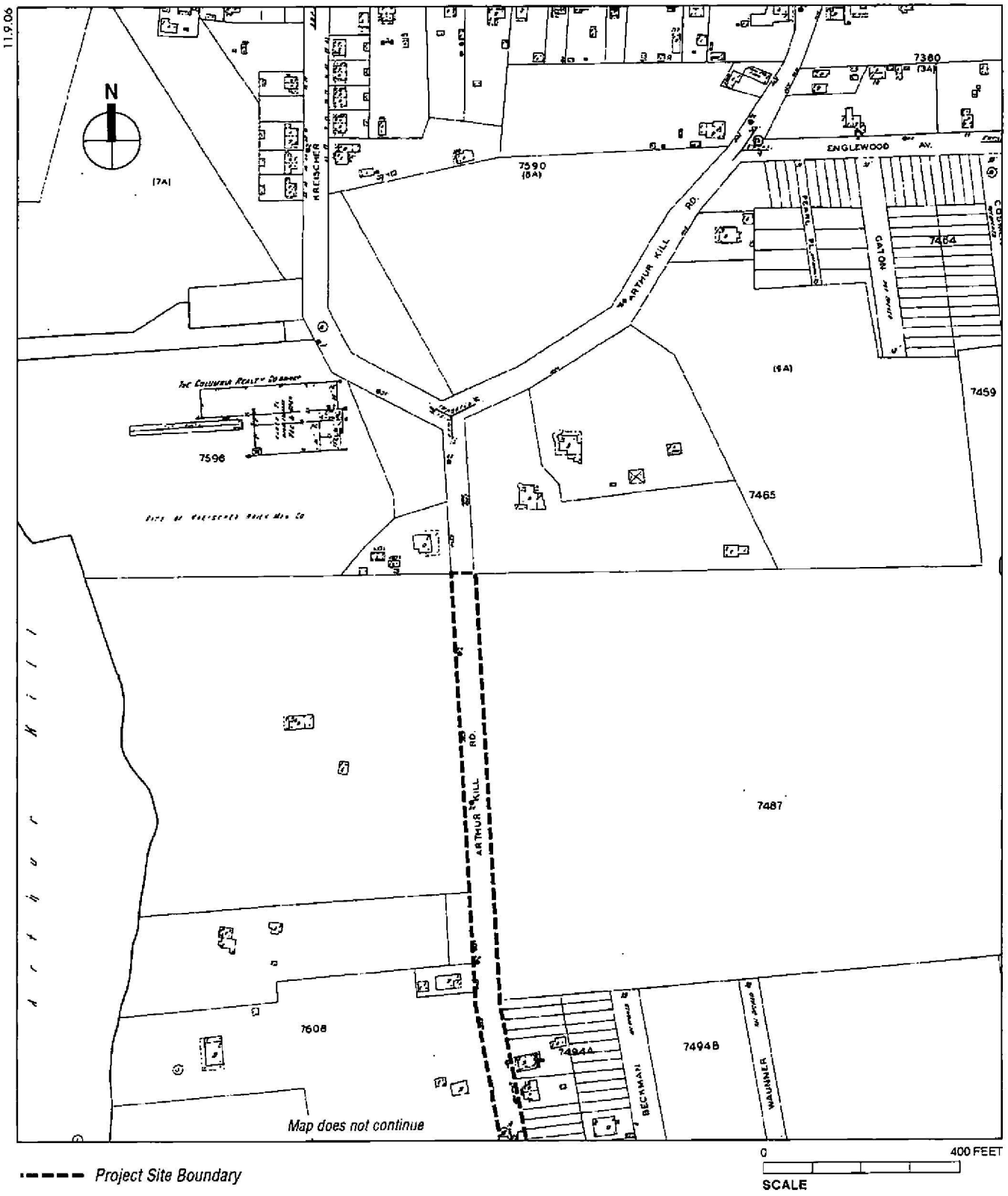
Figure 15



Atlas of the City of New York, Borough of Richmond.
G.W. Bromley and Co., 1917

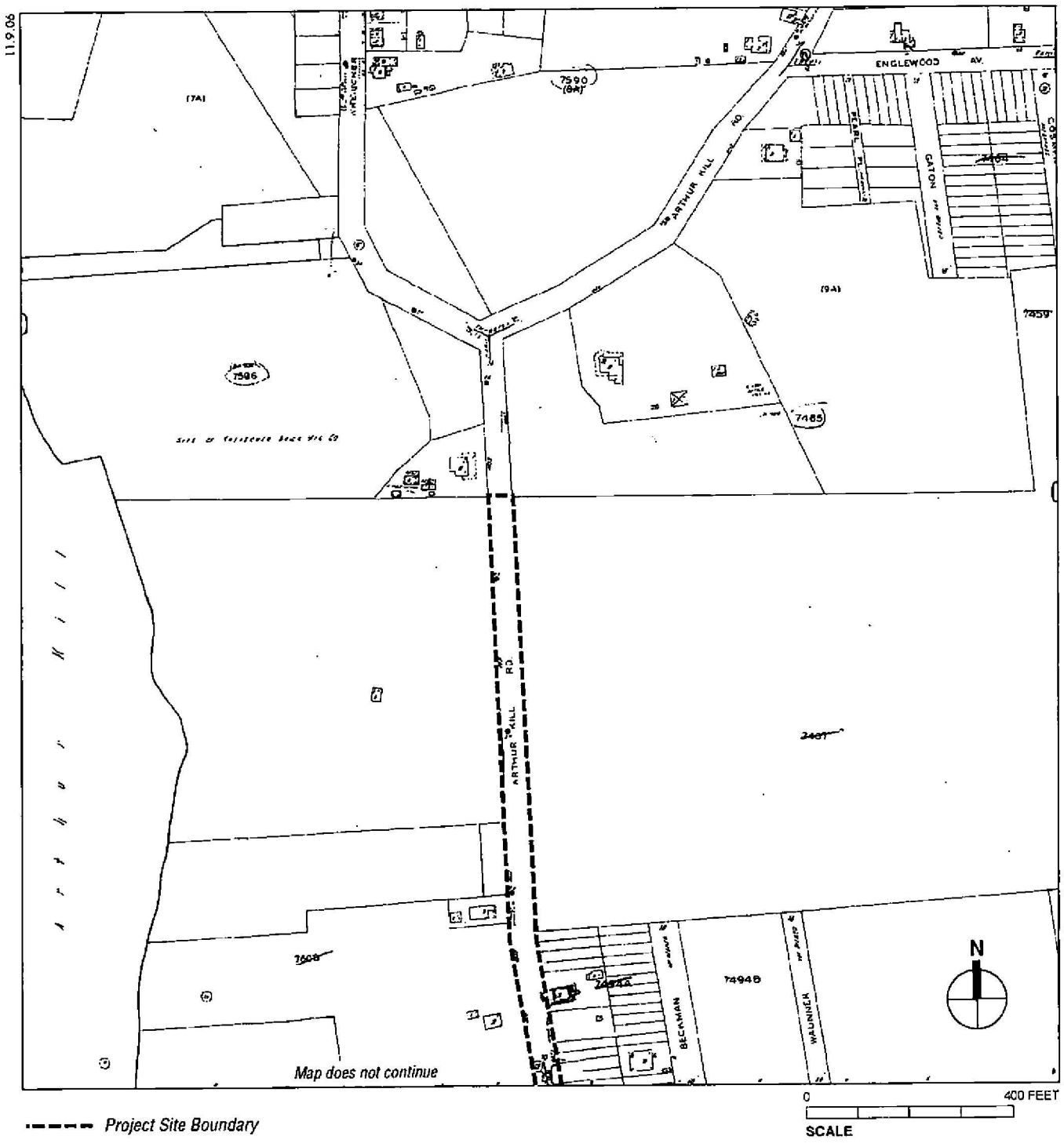
NYCT Charleston Bus Annex

Figure 16



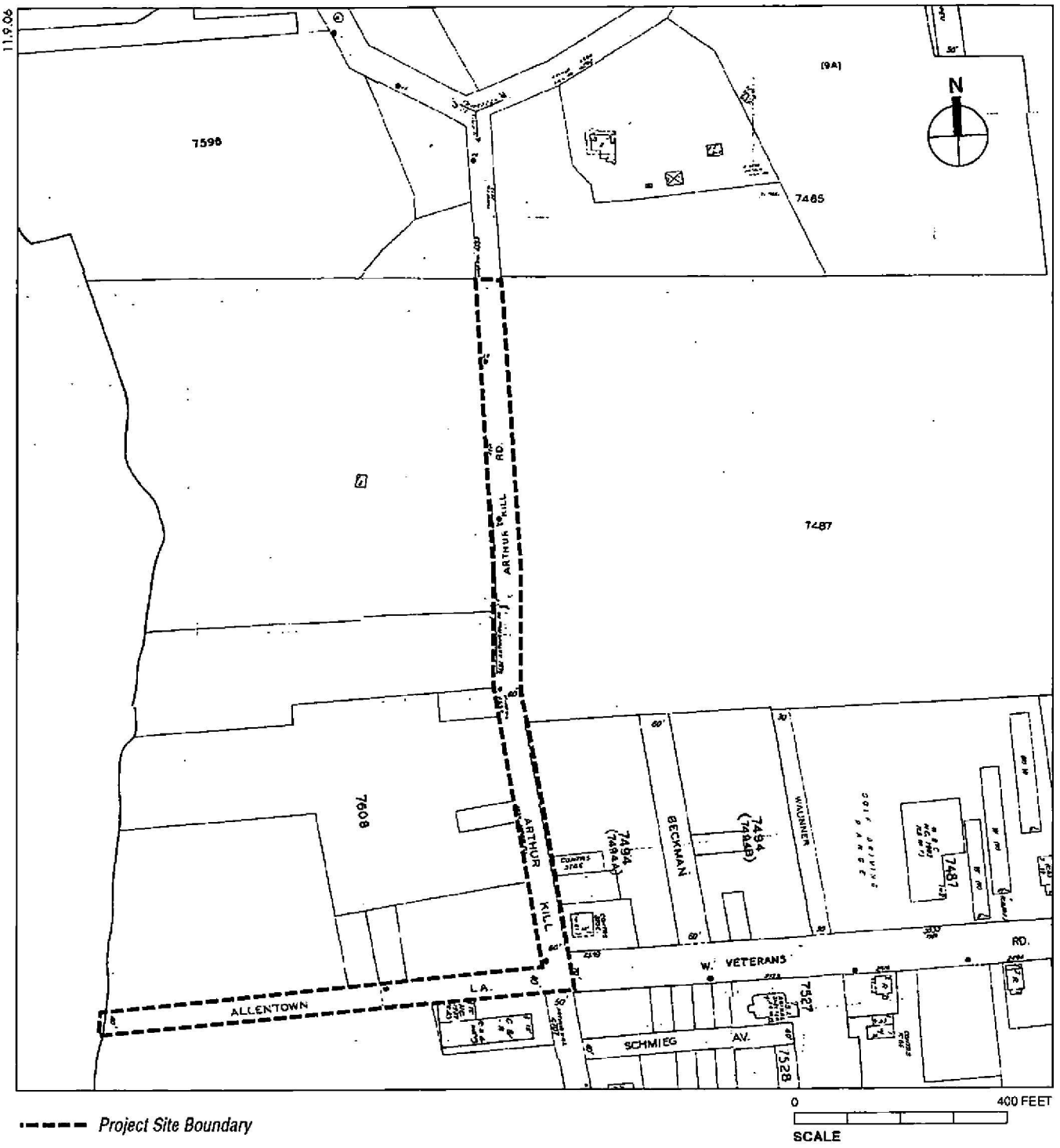
Sanborn Insurance Map, 1938
Figure 17

NYCT Charleston Bus Annex



Sanborn Insurance Map,
1938, Updated Through 1951.
Figure 18

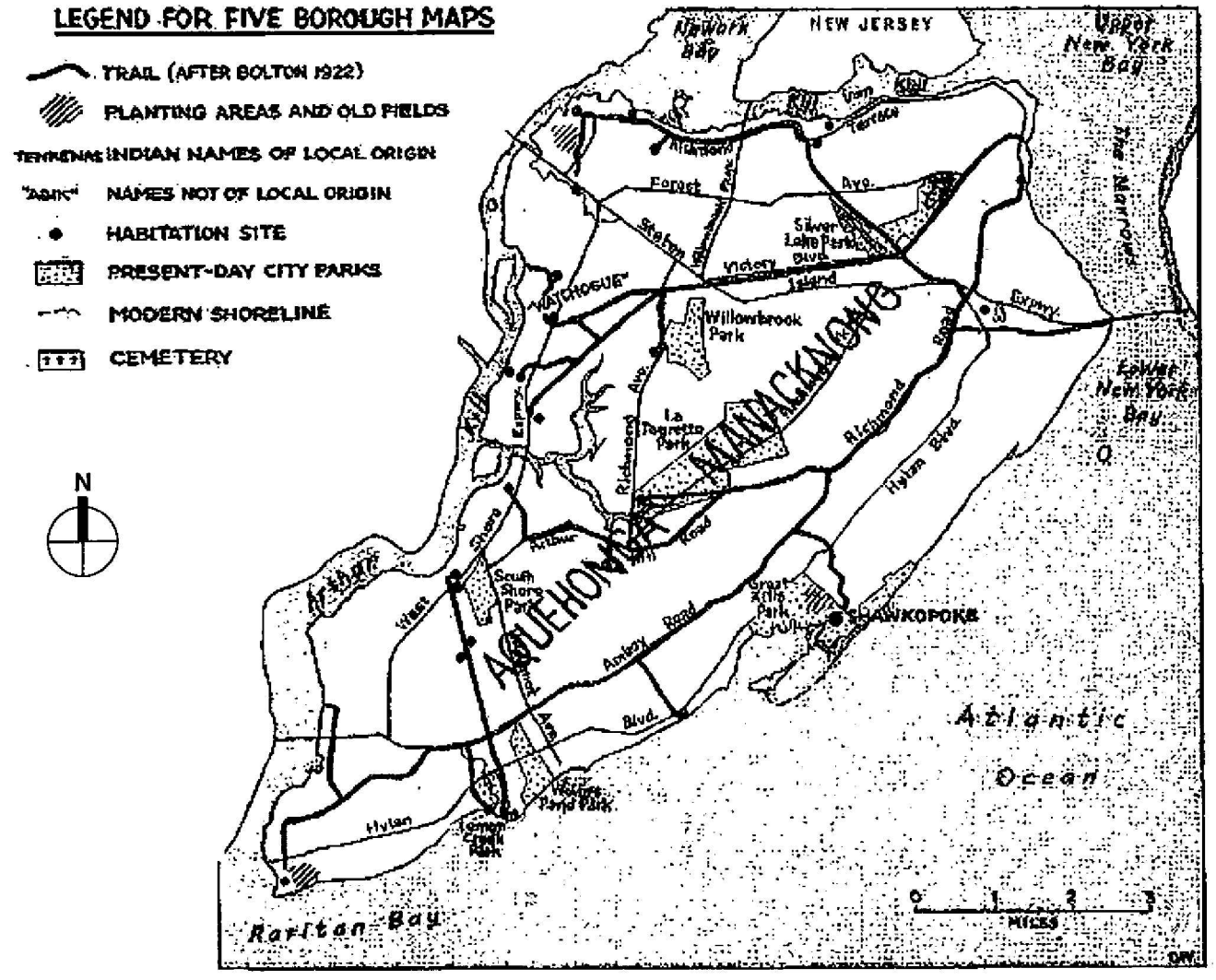
NYCT Charleston Bus Annex



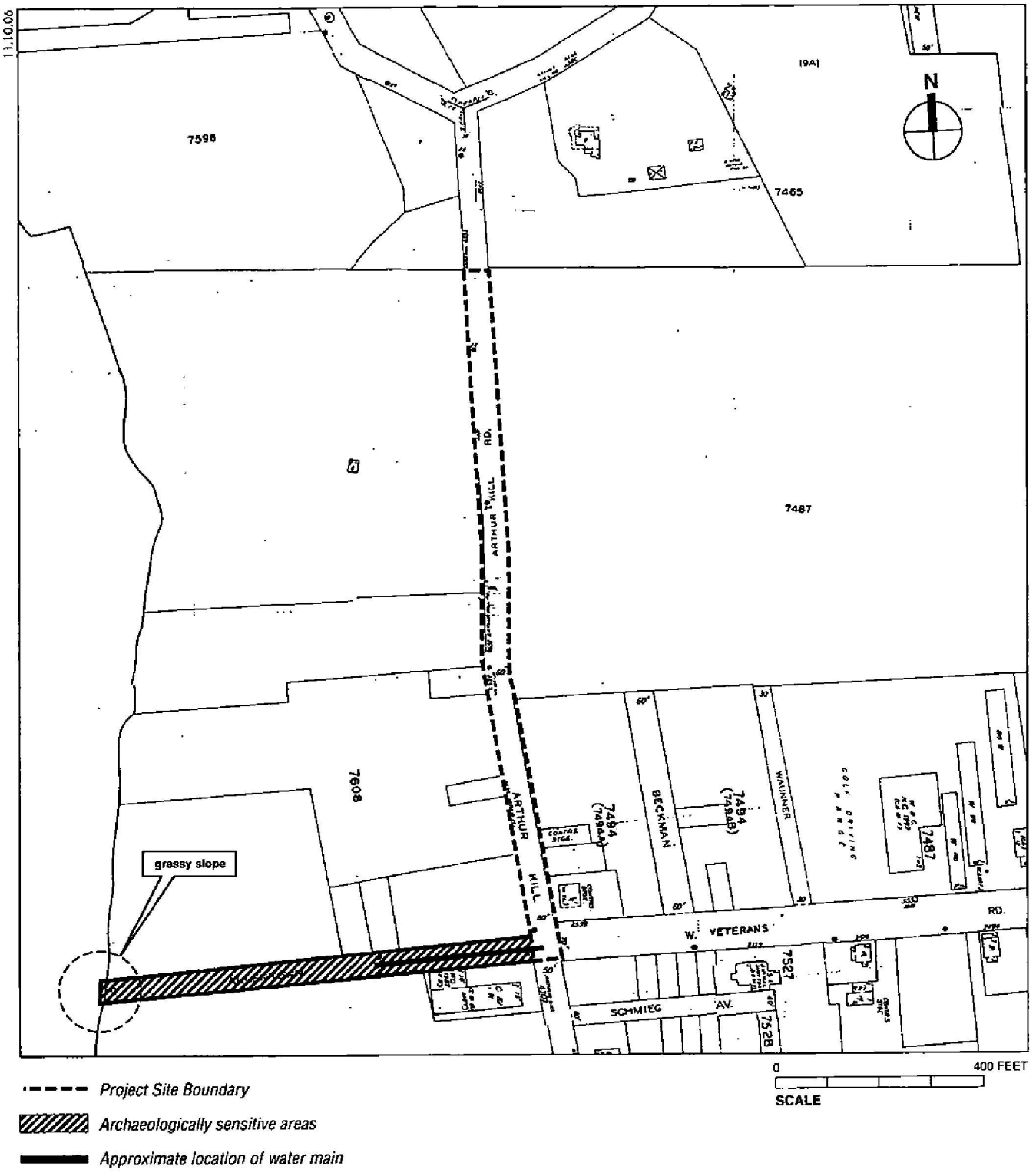
Sanborn Insurance Map, 2005
Figure 19

NYCT Charleston Bus Annex

11.2.06



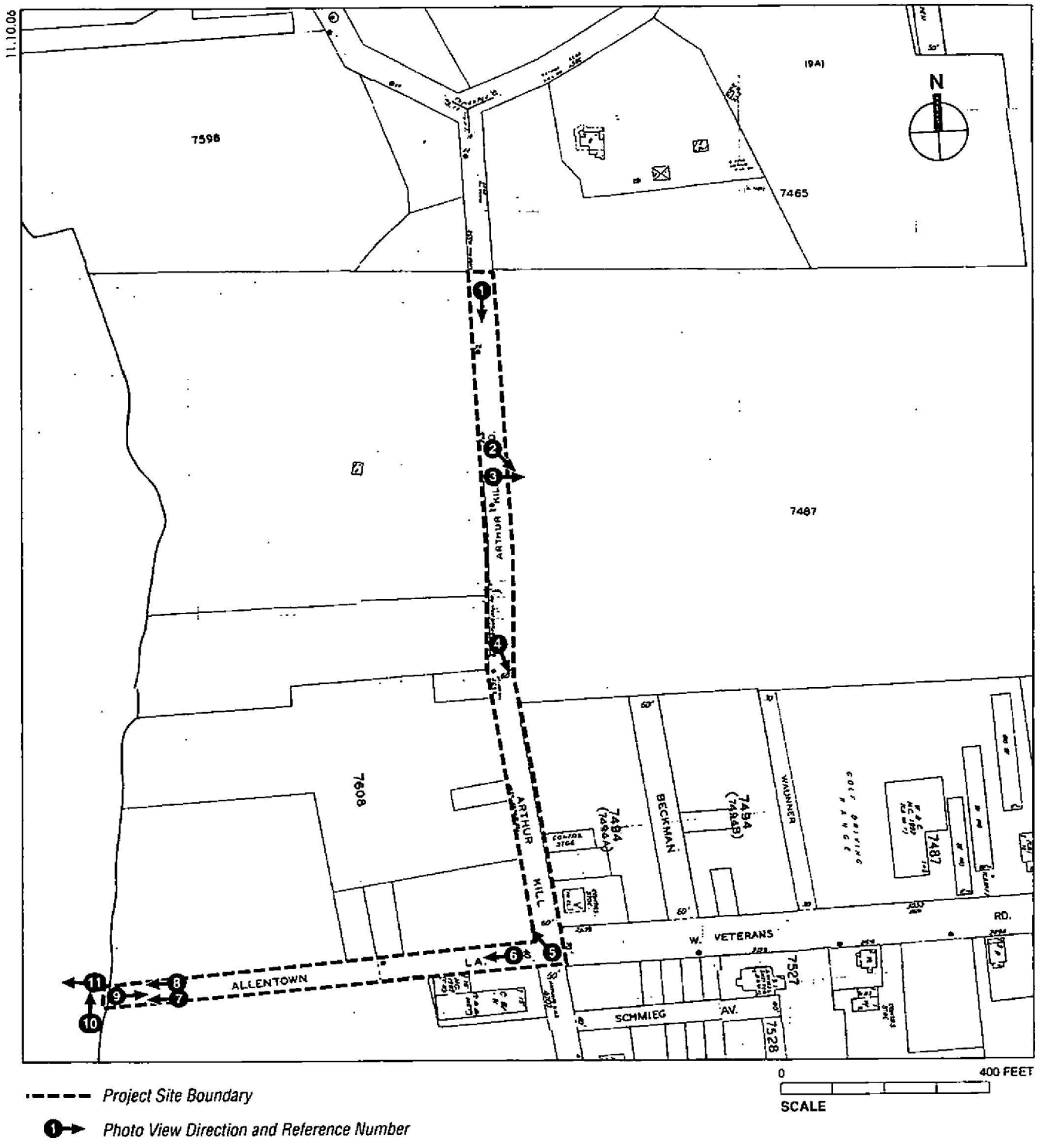
Map of Native American Place Names,
Trails, and Habitation Sites.
Robert S. Grumet, 1981
Figure 20



Map of Archaeological Sensitivity
Sanborn Insurance Map, 2005
Figure 21

NYCT Charleston Bus Annex

Photographs


11.10.06
7598
(9A)
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7487
7608
7484
(7484A)
7484
(7484B)
BECKMAN
WAGNER
GOLF DRIVING RANGE
7487
ARTHUR KILL
W. VETERANS RD.
ALLENTOWN
LA.
SCHMIEG AV.
7527
7528
N
0
400 FEET
SCALE
Project Site Boundary
Photo View Direction and Reference Number

11.10.06

Arthur Kill Road, near Charleston Bus Annex site; looking south **1**

Arthur Kill Road; looking southeast **2**

Arthur Kill Road; looking east **3**

Arthur Kill Road, showing manhole above existing sanitary sewer; looking southeast **4**

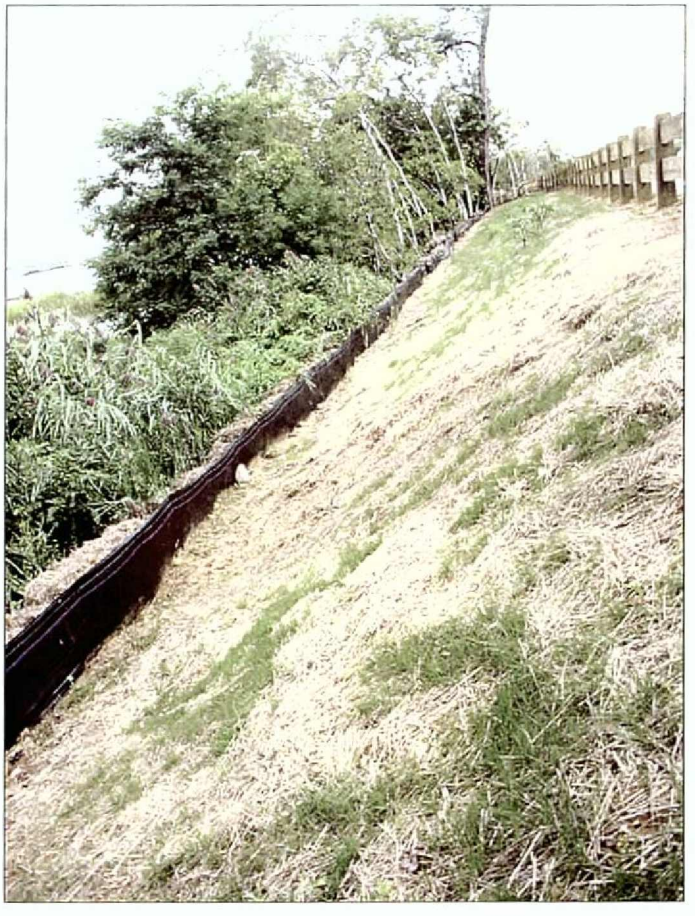
Northwest corner of the intersection of Allentown Lane and Arthur Kill Road, showing the Tides development project; looking northwest **5**

Allentown Lane, showing manhole in street and Tides development; looking west **6**

Western end of Allentown Lane during paving; looking west 7

Western end of Allentown Lane after paving; looking west 8

Western end of Allentown Lane after paving, showing manhole and catch basin; looking east **9**



Grassy hill and location of the proposed sewer outfall west of Allentown Lane; looking north **10**

Marshy area and wrecked barges west of Allentown Lane; looking west **11**

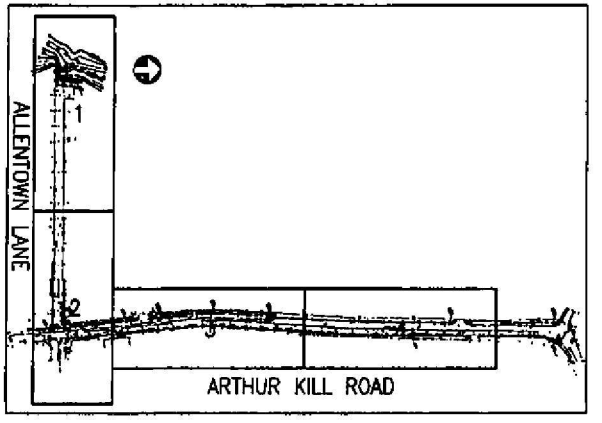
Appendix A:

Plans showing the proposed work for the Charleston Bus Annex stormwater sewer

THE METROPOLITAN TRANSPORTATION AUTHORITY

ACTING BY THE

NEW YORK CITY TRANSIT AUTHORITY



INDEX OF DRAWINGS

SHEET	DWG.	DRAWING TITLE
1		TITLE SHEET
2	A-1	GENERAL NOTES - I
3	A-2	GENERAL NOTES - II
4	A-3	ABBREVIATIONS / LEGEND
5	SS-1	SURVEY STATION TIES
6	SW-1	PROPOSED UTILITY PLAN AND SEWER PROFILE - 1
7	SW-2	PROPOSED UTILITY PLAN AND SEWER PROFILE - 2
8	SW-3	PROPOSED UTILITY PLAN AND SEWER PROFILE - 3
9	SW-4	PROPOSED UTILITY PLAN AND SEWER PROFILE - 4
10	DT-1	SEWER DETAILS
11	DT-2	SEWER CHAMBER DETAILS

PROGRESS PRINTS

DESIGN AND CONSTRUCTION OF THE
CHARLESTON BUS ANNEX
STATEN ISLAND, NEW YORK

CONTRACT CM-1025, TASK NO. 24

OCTOBER 23, 2006

CIVIL CONTRACT DRAWINGS

VOLLMER ASSOCIATES LLP

STANDARD NOTES:

1. ALL SEWER WORK SHOWN ON THIS PLAN SHALL BE IN CONFORMANCE WITH THE LATEST STANDARDS AND SPECIFICATIONS OF THE NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEPARTMENT), BUREAU OF WATER AND SEWER OPERATIONS (BUREAU).
2. NO DEVIATION FROM THE APPROVED PLAN DURING CONSTRUCTION WILL BE PERMITTED WITHOUT PRIOR APPROVAL OF THE BUREAU.
3. THE DEPARTMENT RESERVES THE RIGHT TO REQUIRE ANY CHANGE AND / OR ADDITIONAL WORK NECESSITATED BY A CHANGE AS MAY BE DIRECTED BY THE NEW YORK CITY DEPARTMENT OF TRANSPORTATION (NYCDOT).
4. NO FINAL INSPECTION, MEASUREMENTS OR ACCEPTANCE WILL BE MADE UNTIL FINISHED GRADE ABOVE SEWER CONFORMS WITH THAT SHOWN ON THE APPROVED PLANS.
5. ALL SEWER CUT SHEETS MUST BE FILED WITH THE BUREAU.
6. SUBSURFACE INFORMATION SHOWN HEREON IS AS FURNISHED BY VARIOUS UTILITY COMPANIES AND CITY DEPARTMENTS. THE EXACT LOCATION OF EXISTING SEWERS IS UNKNOWN, BUT IS PLOTTED FROM THE BEST AVAILABLE INFORMATION. HOWEVER, ACCURACY OF THIS INFORMATION IS NOT GUARANTEED BY THE FILING ENGINEER. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION IN THE FIELD PRIOR TO CONSTRUCTION.
7. WHEN CONCRETE CRADLE IS TO BE CONSTRUCTED, PIPE MUST BE SUPPORTED BY SOLID CONCRETE BLOCKS THAT SHALL FORM AN INTEGRAL PART OF THE CONCRETE CRADLE.
8. CONCRETE CLASS 3S FOR THE CONCRETE CRADLE MUST BE MIXED AND PLACED IN ONE POUR.
9. FORMS TO FULL HEIGHT MUST BE USED FOR CONCRETE CRADLE.
10. IN NO CASE WILL MIXED CONCRETE BE PERMITTED INTO THE SEWER TRENCH WITHOUT THE BLOCKS AND FORMS BEING IN PLACE.
11. PLACE PROTECTIVE BROKEN STONE COLLAR 3'-0" WIDE AND 6" DEEP AROUND MANHOLES IN UNPAVED STREETS.
12. SITE CONNECTION SPURS ON ESVP SHALL BE INSTALLED FOR EVERY TAX LOT WITH A MAXIMUM OF 40 FEET ON BOTH SIDES OF PIPE FOR UNDEVELOPED PROPERTIES AS NOTED ON THE PLAN OR AS DIRECTED BY THE ENGINEER. FOR BUILT-UP PROPERTIES, SPURS SHALL BE PROVIDED FOR EVERY HOUSE. SPURS FOR CONNECTIONS ON DUCTILE IRON PIPES MAY BE MADE BY APPROVED FITTINGS OR BY DRILLING.
13. IN PAVED STREETS, A TEMPORARY 4" ASPHALT CONCRETE PAVEMENT IS TO BE INSTALLED IMMEDIATELY AFTER BACKFILLING.
14. ALL ELEVATIONS SHOWN HEREON REFER TO THE BOROUGH PRESIDENT OF RICHMOND SEWER DATUM WHICH IS 3.192 FEET ABOVE MEAN SEA LEVEL AS ESTABLISHED BY THE US COAST AND GEODETIC SURVEY AT SANDY HOOK, NJ.
15. EXISTING UTILITIES SHOWN REPRESENT THE BEST AVAILABLE INFORMATION AND ARE BASED ON UTILITY COMPANY RECORDS, SURVEY DATA AND TEST PITS PERFORMED IN THE AREA. THE DEPICTION OF UNDERGROUND UTILITIES CANNOT BE GUARANTEED FOR ACCURACY AND COMPLETENESS. ACTUAL FIELD CONDITIONS MAY VARY.
16. ALL EXISTING UTILITIES WITHIN LIMITS OF EXCAVATION ARE TO BE SUPPORTED, PROTECTED AND MAINTAINED DURING CONSTRUCTION UNLESS SPECIFIED OTHERWISE.
17. THE LOCATION OF RELOCATED UTILITIES AND DUCT BANK FORMATIONS WERE DEVELOPED BASED ON AVAILABLE INFORMATION, AND MAY BE MODIFIED DURING CONSTRUCTION WITH THE APPROVAL OF THE AFFECTED UTILITY AGENCIES.
18. STORE TEMPORARILY AND LATER RESTORE ANY STREET LIGHTING OR TRAFFIC CONTROL FACILITY REMOVED DURING CONSTRUCTION. IMMEDIATELY PROVIDE A TEMPORARY SYSTEM OF EQUIVALENT FUNCTION AS PER NYCDOT REQUIREMENTS AND MAINTAIN SAME DURING CONSTRUCTION. FINAL RESTORATION SHALL BE IN ACCORDANCE WITH THE LATEST NYCDOT STANDARDS.
19. METHODS FOR TEMPORARY SUPPORT OF UTILITIES SHALL BE SUBJECT TO THE APPROVAL OF THE APPLICABLE UTILITY AGENCY OR COMPANY.
20. WHERE NEW SEWERS CONNECT TO EXISTING SYSTEMS, EXISTING SEWER SIZES AND INVERTS ARE TO BE FIELD VERIFIED.

DRAINAGE WORK NOTES:

1. ALL PROPOSED DRAINAGE WORK SHALL BE DONE IN CONFORMANCE WITH THE LATEST STANDARDS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION. (NYCDEP)
2. ALL EXISTING SEWER MANHOLES TO BE RETAINED WITHIN THE CONTRACT LIMITS SHOULD BE ADJUSTED AS NECESSARY, SO THAT THEY WILL BE FLUSH WITH THE FINISHED GRADES AFTER COMPLETION OF THE WORK. ANY OF THESE MANHOLES WHICH HAVE DAMAGED, WORN OR NON-STANDARD FRAMES AND COVERS SHOULD BE PROVIDED WITH NEW 27" CASTINGS IN ACCORDANCE WITH THE LATEST STANDARDS OF NYCDEP INCLUDING ANY NECESSARY MODIFICATIONS OF THE MANHOLE MASONRY. ANY DAMAGE TO THE MANHOLES CAUSED BY THIS WORK SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR, AS DIRECTED BY THE ENGINEER, AND AT NO COST TO THE CITY.
3. CARE SHALL BE TAKEN NOT TO DAMAGE EXISTING SEWERS DURING CONSTRUCTION. ANY DAMAGE CAUSED BY THE CONTRACTOR'S OPERATION SHALL BE REPAIRED BY THE CONTRACTOR AS DIRECTED BY THE ENGINEER, AT NO EXTRA COST TO THE CITY.
4. WHERE THE HEIGHT OF AN EXISTING MANHOLE PERMITS MORE THAN ONE BASIN CONNECTION TO BE MADE ON THE SAME WALL, SPECIAL PRECAUTION SHALL BE TAKEN TO PROTECT THE STRUCTURAL INTEGRITY OF THE MANHOLE. THE MINIMUM CLEARANCE BETWEEN THE OUTSIDE WALLS OF ANY TWO BASIN CONNECTIONS OR BETWEEN A BASIN CONNECTION AND A SEWER, VERTICALLY OR HORIZONTALLY, SHALL BE 12 INCHES.
5. THE COST OF RAISING OR LOWERING CITY-OWNED MANHOLES, BASINS AND INLET HEADS TO PROPOSED GRADES WILL BE DEEMED INCLUDED IN THE PRICES BID FOR ALL THE SCHEDULED ITEMS WHEN THE VERTICAL UPWARD MOVEMENT OF ALL HEADS IS TWENTY-FOUR (24) INCHES OR LESS, WHEN THE VERTICAL DOWNWARD MOVEMENT OF MANHOLE HEADS IS SIX (6) INCHES OR LESS AND WHEN THE VERTICAL DOWNWARD MOVEMENT OF BASIN OR INLET HEADS IS THREE (3) INCHES OR LESS, UNLESS OTHERWISE PROVIDED OR DIRECTED, AND WHERE THE ADJUSTMENT IS WITHIN THE BRICK WORK LIMITS. WHEN THE EXISTING STRUCTURE CONSISTS OF A BRICK CHIMNEY OR A CONCRETE ROOF SLAB OR BRICK ON CONCRETE WALLS, THE MAXIMUM ALLOWABLE HEIGHT OF BRICK AFTER ADJUSTMENT SHALL BE TWENTY-FOUR (24) INCHES. ALL OTHER ADJUSTMENTS WILL BE PAID FOR UNDER THE APPROPRIATE MANHOLE, BASIN OR INLET MODIFICATION ITEMS.
6. ALL EXISTING INLETS, BASINS AND CONNECTIONS WITHIN THE LIMITS OF THIS CONTRACT AND CONTIGUOUS THERETO ARE TO BE CLEANED, FLUSHED AND OTHERWISE MADE OPERABLE TO THE SATISFACTION OF THE ENGINEER. WHERE THE EXISTING BASIN CONNECTIONS ARE FOUND TO BE DAMAGED OR IN DETERIORATING CONDITION, THEY SHOULD BE REPLACED WITH NEW 12" DIAMETER DUCTILE IRON PIPE, CLASS 56, IN ACCORDANCE WITH THE LATEST NYCDEP STANDARDS. DAMAGED AND NON-STANDARD CASTINGS SHOULD BE REPLACED WITH NEW STANDARD CASTINGS. EXISTING NON-STANDARD BASINS AT LOCATIONS WHERE BASINS ARE REQUIRED SHALL BE REPLACED WITH NEW STANDARD BASINS. THE COST IS TO BE INCLUDED IN THE RESPECTIVE ITEMS.
7. ALL ABANDONED BASINS, INLETS AND DRAINAGE STRUCTURES AS SHOWN ON THE CONTRACT PLANS ARE TO BE BULKHEADED AND CUT DOWN TO TWO (2) FEET BELOW THE SUBGRADE AND FILLED WITH COMPACTED CLEAN SAND. BASIN CONNECTIONS NOT REQUIRED SHALL BE PLUGGED AT BOTH ENDS. COST FOR THIS WORK SHALL BE DEEMED INCLUDED IN PRICES BID FOR ALL SCHEDULED ITEMS.
8. CATCH BASINS SHALL NOT, UNDER ANY CIRCUMSTANCES, BE CONNECTED TO A SANITARY SEWERS.
9. ALL NEW CATCH BASIN CONNECTIONS SHALL BE CONNECTED TO EXISTING SEWERS AT MANHOLES, WITH 12" DUCTILE IRON PIPE, CLASS 56, WITH INTERNALLY LOCKED "PUSH-ON" JOINTS LAID ON 6" OF BROKEN STONE FOR THE ENTIRE WIDTH OF THE TRENCH AND FOR ONE-HALF THE PIPE DIAMETER. THE BROKEN STONE SHALL BE HARD UNWEATHERED STONE UNIFORMLY GRADED FROM 1/4" TO 3/4" IN DIAMETER. IT SHALL CONFORM TO COMMERCIAL 1/4" TO 3/4" STONE. ALL NEW CATCH BASINS SHALL HAVE A HOOD ON THE OUTLETING PIPE.
10. CATCH BASINS SHALL NOT BE LOCATED WITHIN PEDESTRIAN CROSSWALK LIMITS. CATCH BASINS NEAR BUS STOP PADS SHALL BE LOCATED EITHER ENTIRELY WITHIN OR OUTSIDE OF BUS STOP PADS.
11. SLOPE ON ALL NEW CATCH BASIN CONNECTIONS SHALL BE A MINIMUM OF 1/2% AND A MAXIMUM OF 4% PROVIDED THE TOTAL DROP BETWEEN THE BASIN AND THE BASIN/MANHOLE IS AT LEAST 8 INCHES.
12. CATCH BASINS IN THE PROJECT AREA SHALL BE MAINTAINED OPERABLE AT ALL TIMES. THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO AVOID FILLING THE CATCH BASINS WITH DEBRIS WITHIN THE CONTRACT LIMITS DURING THE CONTRACT OPERATIONS. IF, AS A RESULT OF CONSTRUCTION, A FLOODING CONDITION OCCURS OR IN THE EVENT THE CONTRACTOR'S OPERATIONS DAMAGE OR BLOCK THE DRAINAGE SYSTEM, THE CONTRACTOR SHALL AT HIS/HER OWN EXPENSE IMMEDIATELY REPAIR OR RESTORE THE DRAINAGE SYSTEM AS DIRECTED BY THE ENGINEER AT NO EXTRA COST TO THE CITY.
13. IN ACCORDANCE WITH PARAGRAPH (1.06.10) OF THE GENERAL PROVISIONS OF THE STANDARDS SPECIFICATIONS, ALL CASTING AND HARDWARE FROM THE EXISTING MANHOLES AND BASINS WHENEVER FOUND TO BE IN GOOD CONDITION, UPON EXAMINATION BY THE ENGINEER, SHALL REMAIN THE PROPERTY OF THE CITY AND SHALL BE DELIVERED BY THE CONTRACTOR TO A DESIGNATED CITY-OWNED YARD.
14. CONTRACTOR SHALL PROVIDE TEMPORARY MEANS (PIPES, PUMPS, ETC.) TO DRAIN ANY STORM WATER WHICH MAY DEVELOP WITHIN THE PROJECT LIMITS FOR THE DURATION OF CONSTRUCTION. CONTRACTOR SHALL SUBMIT A DRAINAGE SCHEME WHICH MUST BE APPROVED BY THE ENGINEER, PRIOR TO THE START OF EACH CONSTRUCTION STAGE. COST OF THIS WORK WILL BE DEEMED TO HAVE BEEN INCLUDED IN THE PRICE BID FOR ALL SCHEDULED ITEMS.
15. ALL EXISTING SEWERS AND SEWER HOUSE CONNECTIONS SHOULD BE CONTINUOUSLY MAINTAINED DURING CONSTRUCTION. IF ANY SEWER OR SEWER HOUSE CONNECTION IS TO BE DISCONNECTED FOR CONSTRUCTION PURPOSES, FLOW SHALL BE MAINTAINED BY PUMPING OR OTHER SUITABLE MEANS AS DIRECTED BY THE ENGINEER AND IN SUCH A MANNER THAT NO BACK-UPS OCCUR. EXISTING SEWERS, HOUSE CONNECTIONS OR OTHER SEWER APPURTENANCES WHICH ARE TO REMAIN, AND WHICH MIGHT BE DISTURBED FOR CONSTRUCTION PURPOSES, SHALL BE RESTORED TO THEIR PRESENT CONDITION AFTER COMPLETION OF THE WORK, AND DAMAGE DONE AS A RESULT OF THE WORK SHALL BE REPAIRED AT NO EXTRA COST TO THE CITY.
16. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL DETERMINE BY TEST PITS, TELEVISION INSPECTION, OR ANY OTHER MEANS NECESSARY, FOR EACH AND EVERY HOUSE WITHIN THE LIMITS OF THE PROPOSED CONSTRUCTION, THE LOCATION AND ELEVATION OF THE HOUSE TRAPS, HOUSE CONNECTION, ETC, AND THE LOCATION OF THE EXISTING SEWER TO WHICH THEY ARE CONNECTED. BASED ON THE FINDING, THE CONTRACTOR SHALL INFORM THE ENGINEER IN WRITING, OF ANY ANTICIPATED DIFFICULTIES HE/SHE MIGHT ENCOUNTER IN RECONNECTING THESE EXISTING HOUSE CONNECTIONS TO THE PROPOSED AND EXISTING SEWERS.
17. ALL RCP MANHOLES, EXCEPT TURNING CHAMBERS, SHALL BE STANDARD 5'-0", 6'-0" OR 7'-0" DIA. PRECAST CONCRETE MANHOLES, AS INDICATED ON PLANS, AS PER STANDARD NYCDEP DWG. NOS. 29 AND 30.
18. TURNING CHAMBERS SHALL BE CONSTRUCTED OF THE SIZES AND SHAPES SHOWN, COMPLETE WITH FRAMES AND COVERS, IN ACCORDANCE WITH SECTION 5.08 OF THE STANDARD SEWER SPECIFICATIONS.
19. ALL CATCH BASINS SHALL BE STANDARD TYPE 2 AS INDICATED ON THE PLANS. TYPE 2 BASINS SHALL BE IN ACCORDANCE WITH STD. NYCDEP DWG. NO. 48, OR ALTERNATE PRECAST TYPE 2 BASIN PER STD. DWG. NO. 53. ALL BASIN ALTERNATE PRECAST TYPE 2 BASIN PER STD. DWG. NO. 53. ALL BASIN ALTERNATE PRECAST TYPE 2 BASIN PER STD. DWG. NO. 53. ALL BASIN CONNECTIONS SHALL BE 12" CLASS 56 DUCTILE IRON PIPE WITH CEMENT LINING AND SHALL BE INSTALLED ON A 6-INCH THICK CRUSHED STONE BEDDING.
20. THE CONTRACTOR SHALL NOTIFY MR. LUIS CAMINERO, P.E. OF NYCDEP BUREAU OF WATER AND SEWER OPERATIONS (TELEPHONE NO. (718) 595-4204) FOR THE PROPOSED WATER MAIN WORK AND MR. ADEL YAKOUB, P.E. OF NYCDEP CONSTRUCTION COMPLIANCE UNIT (TELEPHONE NO. (718) 595-6188) FOR THE PROPOSED SEWER WORK AT LEAST FIFTEEN (15) DAYS BEFORE COMMENCING SEWER AND WATER MAIN CONSTRUCTION (NYCDEP OFFICES LOCATED AT 58-17 JUNCTION BLVD., FLUSHING, NY 11373-5108).

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

VOLLMER ASSOCIATES LLP

CM-1205, TASK ORDER NO. 24

CHARLESTON BUS ARMS
STATEN ISLAND, NY.

GENERAL NOTES - I

DRAWN BY	T. YEE		DATE : OCT. 23, 2008
DESIGNED BY	E. SMITH / T. YEE		DRAWING NO. A-1
CHECKED BY	L. NAPOLITANO		
APPROVED BY	S. LERNER		REVISION

HOUSE CONNECTION AND SEWER NOTES WITH RESPECT TO WATER MAIN INSTALLATIONS:

1. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL DETERMINE BY TEST PITS, TELEVISION INSPECTION, OR ANY OTHER MEANS NECESSARY, FOR EACH AND EVERY HOUSE WITHIN THE LIMITS OF THE PROPOSED WATER MAIN, THE LOCATION AND ELEVATION OF THE HOUSE TRAPS, HOUSE CONNECTION, ETC, AND THE LOCATION OF THE EXISTING SEWER TO WHICH THEY ARE CONNECTED. BASED ON THE FINDING, THE CONTRACTOR SHALL INFORM THE ENGINEER IN WRITING, OF ANY ANTICIPATED DIFFICULTIES HE/SHE MIGHT ENCOUNTER IN RECONNECTING THESE EXISTING HOUSE CONNECTIONS TO THE PROPOSED AND EXISTING SEWERS.

2. ALL EXISTING SEWERS AND SEWER HOUSE CONNECTIONS SHOULD BE CONTINUOUSLY MAINTAINED DURING CONSTRUCTION OF THE WATER MAIN. IF ANY SEWER OR SEWER HOUSE CONNECTION IS TO BE DISCONNECTED FOR CONSTRUCTION PURPOSES, FLOW SHALL BE MAINTAINED BY FLUMING OR OTHER SUITABLE MEANS AS DIRECTED BY THE ENGINEER AND IN SUCH A MANNER THAT NO BACK-UPS OCCUR. EXISTING SEWERS, HOUSE CONNECTIONS OR OTHER SEWER APPURTENANCES WHICH ARE TO REMAIN, AND WHICH MIGHT BE DISTURBED FOR CONSTRUCTION PURPOSES, SHALL BE RESTORED TO THEIR PRESENT CONDITION AFTER COMPLETION OF THE WORK, AND DAMAGE DONE AS A RESULT OF THE WORK SHALL BE REPAIRED AT NO EXTRA COST TO THE CITY.

CLEARANCE REQUIREMENTS BETWEEN WATER MAINS AND SEWERS:

WITH RESPECT TO WATER MAIN INSTALLATIONS, THE REQUIREMENTS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF WATER SUPPLY & WASTEWATER COLLECTION, REGARDING CLEARANCES TO BE MAINTAINED DURING THE COURSE OF CONSTRUCTION ARE AS FOLLOWS:

A) FOR WATER MAINS INSTALLED PARALLEL TO SEWERS:

WHERE THE DEPTH TO THE BOTTOM OF THE SEWER CRADLE IS LESS THAN TEN (10) FEET, THE CLEARANCE BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE CENTERLINE OF THE SEWER SHOULD BE NOT LESS THAN SIX (6) FEET PLUS ONE-HALF THE SEWER DIAMETER.

WHERE THE DEPTH OF THE BOTTOM OF THE SEWER CRADLE IS TEN (10) FEET OR MORE, THE CLEARANCE BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE CENTERLINE OF THE EXISTING SEWER SHALL BE INCREASED ONE (1) FOOT FOR EACH ADDITIONAL FIVE (5) FEET OF DEPTH OVER TEN (10) FEET, OR PORTION THEREOF.

B) FOR WATER MAINS CROSSING SEWERS:

WHEREVER THE CLEARANCE BETWEEN THE TOP OF AN EXISTING SEWER AND THE BOTTOM OF THE PROPOSED WATER MAIN, AT THEIR CROSSING, IS LESS THAN ONE (1) FOOT, THE WATER MAIN IS TO BE SUPPORTED BY A TRUSS ARRANGEMENT AND THE CLEARANCE SPACE IS TO BE FILLED WITH LAYERS OF COMPRESSIBLE MATERIAL TO AVOID EXCESSIVE BEARING PRESSURE ON THE SEWER PIPE. IN NO CASE, HOWEVER, SHOULD THIS CLEARANCE BE LESS THAN SIX (6) INCHES.

GENERAL DISTRIBUTION WATER MAIN NOTES:

1. ALL WATER MAIN WORK AND MATERIALS SHALL BE DONE IN ACCORDANCE WITH THE CONTRACT PLANS AND IN CONFORMANCE WITH THE N.Y.C. D.E.P. STANDARD WATER MAIN SPECIFICATIONS, APPLICABLE STANDARD DRAWINGS, AND SPECIFIC CONTRACT REQUIREMENTS.

2. CONTRACTOR SHALL NOTIFY THE FIRE DEPARTMENT AND N.Y.C. D.E.P.- CONSTRUCTION AT LEAST 72 WORKING HOURS IN ADVANCE PRIOR TO SHUTTING OFF VALVES. NO REMOVAL SHALL TAKE PLACE BEFORE SHUT-OFF VALVES HAVE BEEN CLOSED BY THE D.E.P. PERSONNEL.

3. THE ALIGNMENT OF THE WATER MAINS AND THE LOCATION OF THE VALVES AND HYDRANTS ARE SHOWN SCHEMATICALLY. THE EXACT ALIGNMENTS SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER, AS THE WORK PROGRESSES.

4. ALL DUCTILE IRON WATER MAINS UP TO AND INCLUDING 24" DIAMETER SHALL HAVE RESTRAINED JOINTS AND SHALL BE CEMENT LINED AS PER N.Y.C. D.E.P. STANDARD "SPECIFICATIONS FOR DUCTILE IRON PIPE WITH PUSH-ON JOINTS AND DUCTILE IRON FITTINGS WITH MECHANICAL JOINTS 6" THROUGH 48" IN DIAMETER," LATEST REVISION.

   ALL FITTINGS SHALL EMPLOY FULL BODY TYPE MECHANICAL JOINTS WITH RETAINER GLANDS AND SHALL CONFORM TO THE REQUIREMENTS OF N.Y.C. D.E.P. STANDARD SPECIFICATIONS FOR "DUCTILE-IRON AND GRAY-IRON FITTINGS, 3"-48" IN DIAMETER," LATEST REVISION.

5. ALL WATER MAIN VALVES SHALL BE DUCTILE IRON GATE VALVES IN ACCORDANCE WITH N.Y.C. D.E.P. STANDARD SPECIFICATIONS FOR GATE VALVES 3"- 20" IN DIAMETER, LATEST REVISION. ACCESS TO WATER VALVES WITHIN THE WORK AREA SHALL BE MAINTAINED AT ALL TIMES.

6. PRIOR TO CONNECTING THE NEW MAINS TO THE EXISTING ONES, IT MUST BE MADE ABSOLUTELY CERTAIN THAT ALL THE REPLACEMENT/RESTRAINT REQUIREMENTS DUE TO NEWLY INSTALLED VALVES AND FITTINGS ARE FULLY MET. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY DAMAGE TO PROPERTY AND FOR PERSONNEL INJURY CAUSED BY NEGLIGENCE OR OMISSION REGARDING COMPLIANCE WITH THE REPLACEMENT/RESTRAINT REQUIREMENTS.

   FOR TYPICAL MINIMUM LENGTHS OF REQUIRED REPLACEMENT/RESTRAINT, SEE TABLE AB-2 IN "STANDARD SPECIFICATIONS FOR DUCTILE-IRON PIPE WITH PUSH-ON JOINTS AND DUCTILE-IRON FITTINGS WITH MECHANICAL JOINTS 6" THROUGH 48", LATEST REVISION.

7. PRIOR TO BEGINNING ANY WATER MAIN WORK, THE CONTRACTOR MUST IDENTIFY THE LOCATION, SIZE, AND TYPE OF ALL EXISTING UTILITIES, INCLUDING ALL SEWER AND WATER HOUSE/SERVICE CONNECTIONS.

8. ALL WATER AND SEWER HOUSE SERVICES SHOULD BE MAINTAINED AND PROTECTED AGAINST FREEZING DURING CONSTRUCTION.

9. ALL TAPS AND WET CONNECTIONS ON THE EXISTING WATER MAIN SHOULD BE TRANSFERRED TO THE NEW MAIN, AND ALL SERVICES SHOULD BE INSTALLED PERPENDICULAR TO THE DISTRIBUTION MAIN.

10. ALL HYDRANTS SHALL BE MAINTAINED IN SERVICE AS PER NEW YORK CITY FIRE DEPARTMENT REQUIREMENTS. HYDRANTS SHALL BE "BREAKAWAY" TYPE, AND SHALL HAVE HYDRANT FOODERS AS PER N.Y.C. D.E.P. STANDARDS.

11. ALL EXCAVATION SHALL BE DONE BY HAND WITHIN ONE FOOT (1'-0") OF EXISTING WATER MAINS, SEWERS, HOUSE CONNECTIONS, DRAINS AND OTHER UTILITIES.

12a. FOR WATER MAINS INSTALLED PARALLEL TO SEWERS:

   WHERE THE DEPTH TO THE BOTTOM OF THE SEWER CRADLE IS LESS THAN TEN (10) FEET, THE CLEARANCE BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE CENTERLINE OF THE EXISTING SEWER SHOULD NOT BE LESS THAN SIX (6) FEET PLUS ONE-HALF THE SEWER DIAMETER.

   WHERE THE DEPTH TO THE BOTTOM OF THE SEWER CRADLE IS TEN (10) FEET OR MORE, THE CLEARANCE BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE CENTERLINE OF THE EXISTING SEWER SHALL BE INCREASED ONE (1) FOOT FOR EACH ADDITIONAL FIVE (5) FEET OF DEPTH OVER TEN (10) FEET, OR PORTION THEREOF.

12b. FOR WATER MAINS CROSSING SEWERS:

   WHEREVER THE CLEARANCE BETWEEN THE TOP OF AN EXISTING SEWER AND THE BOTTOM OF THE PROPOSED WATER MAIN, AT THEIR CROSSING, IS LESS THAN ONE (1) FOOT, THE WATER MAIN IS TO BE SUPPORTED BY A TRUSS ARRANGEMENT AND THE CLEARANCE SPACE IS TO BE FILLED WITH LAYERS OF COMPRESSIBLE MATERIAL TO AVOID EXCESSIVE BEARING PRESSURE ON THE SEWER PIPE. IN NO CASE, HOWEVER, SHOULD THIS CLEARANCE BE LESS THAN SIX (6) INCHES.

13. ALL WATER MAINS WITH A COVER LESS THAN 2'-6" SHALL BE PROTECTED BY SHALLOW COVER PROTECTION. TYPE AND SIZE OF THE SHALLOW COVER PROTECTION SHALL BE AS SPECIFIED ON THE CONTRACT PLANS.

14. STEEL WATER MAINS SHALL BE USED WHERE SPECIFIED IN THE PLANS AND AS ORDERED BY THE ENGINEER. THE STEEL MAINS SHALL BE FABRICATED, TESTED, LINED, COATED, AND INSTALLED IN ACCORDANCE WITH "N.Y.C. D.E.P. STANDARD SPECIFICATIONS FOR FURNISHING DELIVERING AND LAYING STEEL PIPES AND APPURTENANCES", LATEST REVISION, ALL APPLICABLE N.Y.C. D.E.P. STANDARD DRAWINGS, AND AS ORDERED BY THE ENGINEER.

15. CONTRACTOR SHALL SUBMIT GEOMETRY DRAWINGS FOR FABRICATION AND LAYING OF STEEL PIPE, INCLUDING PIPE SUPPORTS AND SHALLOW COVER PROTECTION, TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.

16. CONTRACTOR SHALL SUBMIT ALL STEEL WATER MAIN FABRICATION SHOP DRAWINGS AND CATALOG CUTS FOR THE WATER MAIN(S) AND APPURTENANCES, ALL IN ACCORDANCE WITH APPROVED/ACCEPTED GEOMETRY OF THE PIPE, AND ALL APPLICABLE D.E.P. STANDARDS, TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.

17. ALL STEEL WATER MAINS UP TO AND INCLUDING 24" IN DIAMETER SHALL HAVE FLANGED JOINTS, UNLESS OTHERWISE NOTED ON THE PLANS. JOINTS SHALL BE FORGED STEEL SLIP-ON FLANGES, CLASS E, AS PER NYCDEP STANDARD DRAWING NO. 30338-Y-A, LATEST REVISION.

18. ALL BENDS ON STEEL WATER MAINS SHALL BE STANDARD WEIGHT LONG-RADIUS ELBOWS OR SHALL BE SHOP FABRICATED FROM PIPE SEGMENTS AS PER "N.Y.C. D.E.P. STANDARD SPECIFICATIONS FOR FURNISHING DELIVERING AND LAYING STEEL PIPES AND APPURTENANCES", LATEST REVISION.

19. THE CONNECTION BETWEEN STEEL AND DUCTILE IRON WATER MAINS, SHALL BE ACCOMPLISHED BY INSULATED FLANGED JOINTS, AS SHOWN ON N.Y.C. D.E.P. STANDARD DRAWING NO. 46104 - W, LATEST REVISION.

20. AFTER WATER MAIN WORK UNDER THE CONTRACT IS SATISFACTORILY COMPLETED, THE CONTRACTOR SHALL SUBMIT FIVE (5) COMPLETE SETS OF AS-BUILT DRAWINGS, APPROVED BY THE RESIDENT ENGINEER, FOR THE BUREAU'S FILES.

21. CONTRACTOR SHALL MAINTAIN 4 FEET OF COVER OVER ALL WATER MAINS AND THE COVER SHALL NOT BE LESS THAN 2 FEET. DUE TO FIELD CONDITIONS, IF WATER MAINS HAVE LESS THAN 3 FEET OF COVER, BUT MORE THAN OR EQUAL TO 2 FEET OF COVER, PIER AND PLATE THE WATER MAIN IN ACCORDANCE WITH NYC DEP STANDARD DRAWING NUMBERS: 46464-2, 42083-Y, AND 22765. IF ADJACENT UTILITY INTERFERENCES RESTRICT THE CONSTRUCTION OF PIER AND PLATE AS PER NYC DEP STANDARD DRAWINGS, THE CONTRACTOR SHALL SUBMIT CUSTOMIZED SHOP DRAWINGS FOR PIER AND PLATE DETAILS FOR THE WATER MAIN CONSTRUCTION FOR NYC DEP APPROVAL.

ROADWAY WORK:

1. SAW-CUT ROADWAY PAVEMENT FOR TRENCHING REQUIRED FOR CONDUIT AND OTHER UTILITIES IN ROADWAYS. SAW-CUT PARALLEL TO THE TRENCH, EXCAVATE PAVEMENT NECESSARY FOR UTILITY TRENCHES, BACKFILL AND RESTORE PAVEMENT (TRENCH RESTORATION DETAIL M-1042A) IN ACCORDANCE WITH N.Y.C.D.O.T. SPECIFICATIONS).

2. IF THE STREET IS MODIFIED IN THE VICINITY OF MANHOLES, THE FRAME AND COVER, VENTS, GRATES, ETC. SHALL BE ADJUSTED TO MATCH THE NEW STREET GRADE IN ACCORDANCE WITH THE APPLICABLE STANDARD DETAILS OF THE GOVERNING UTILITY COMPANY OR CITY AGENCY.

3. FINISHED ROADWAY PAVEMENT AT THE APEX OF ALL CORNERS SHALL BE CONSTRUCTED TO ELEVATIONS SO AS TO PROVIDE POSITIVE SURFACE DRAINAGE FROM THE APEX TOWARDS THE CATCH BASINS, WHERE APPLICABLE.

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS AND STATION ISLAND, NY

VOLLMER ASSOCIATES LLP

GENERAL NOTES - II

DRAWN BY	F. YEE	DATE : OCT. 23, 2008
DESIGNED BY	E. SMITH / T. YEE	DRAWING NO. A-2
CHECKED BY	L. NAPOLITANO	
APPROVED BY	S. LERNER	REVISION

LIST OF ABBREVIATIONS:

DIA.	DIAMETER
ADA	AMERICANS WITH DISABILITIES ACT
ARCH.	ARCHITECTURAL
APPROX.	APPROXIMATELY
ASPH.	ASPHALT
AVE.	AVENUE
BC	BOTTOM OF CURB
BG	BREAK IN GRADE OF CURBLINE
BR	BRICK
BRG.	BEARING
BLDG.	BUILDING
℄	CONCRETE
C	CENTERLINE
CB	CATCH BASIN
CC	CENTER TO CENTER
CDT	CONDUIT
CIP	CAST IRON PIPE OR CAST IN PLACE
CL CEM	CEMENT LINED
C.I.	CAST IRON
CL	CLAY (MULTIPLE DUCTS)
CLR.	CLEARANCE
CLF	CHAIN LINK FENCE
C.O.	CLEAN OUT
COMB.	COMBINED
CONC.	CONCRETE
CON ED, CE	CONSOLIDATED EDISON CO.
CONN.	CONNECTION
COV	COVER
CTES	CONSOLIDATED TELE. AND ELECTRIC SUBWAY CO. (CON ED)
CY	CUBIC YARD
DC	DISTRIBUTION CONCRETE DUCT
D.I. OR D.I.P	DUCTILE IRON PIPE
DM OR DMH	DUCT MANHOLE
DWG(S)	DRAWING(S)
EA	EACH
E.B., E/B	EASTBOUND
ECS	EMPIRE CITY SUBWAY
EL. or ELEV.	ELEVATION
ELECT.	ELECTRIC
ESVP	EXTRA STRENGTH VITRIFIED PIPE
EXIST.	EXISTING
F	FIBRE
FD	FIRE DEPARTMENT
FG	FIBERGLASS
FT	FOOT OR FEET
G	GAS
GR	GRANITE
GV	GAS VALVE
HP	HIGH PRESSURE
HYD.	HYDRANT
INV.	INVERT ELEVATION
I, IR	IRON
JT.	JOINT
LP	LOW PRESSURE
MAX.	MAXIMUM
MH	MANHOLE
MHW	MEAN HIGH WATER
MISC.	MISCELLANEOUS
MIN.	MINIMUM
MLW	MEAN LOW WATER
MPT	MAINTENANCE AND PROTECTION OF TRAFFIC
NA N/A	NOT APPLICABLE
N.B., N/B	NORTHBOUND
NO.	NUMBER
NOM.	NOMINAL
NTS	NOT TO SCALE
NYC DEP	NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
NYC DOT	NEW YORK CITY DEPARTMENT OF TRANSPORTATION
NY	NEW YORK
NYCT	NEW YORK CITY TRANSIT
NYS	N.Y. STEAM CO.
NYT	NEW YORK TELEPHONE CO. (ECS)
OAL	OVERHEAD AERIAL LINE
O.C.	ON CENTER
OH	OVERHEAD
PL	PLASTIC CONDUITS
P, PC.	PRECAST CONCRETE
PAVT	PAVEMENT
P.C., PC	POINT OF CURVATURE
PCD	PRECAST CONCRETE DUCT
PD	POLICE DEPARTMENT
PE	POLYETHYLENE
PED.	PEDESTRIAN
P.I., PI	POINT OF INTERSECTION
PKG.	PARKING
PL.	PLATE
PLB	PROPERTY LINE BOX
PROP.	PROPOSED
P.T., PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
REF	REFERENCE
REINF.	REINFORCED
REQD	REQUIRED
RET	RETIRED
REV	REVISION
ROW	RIGHT OF WAY
S	SEWER
S	SLOPE
S.B, S/B	SOUTHBOUND
SF	SQUARE FOOT
SFC	STEEL FACED CONCRETE CURB
SMH	SEWER MANHOLE
SQ	SQUARE
ST, STL	STEEL
STD.	STANDARD
STRUCT.	STRUCTURAL
TEL.	TELEPHONE
TA	NEW YORK CITY TRANSIT
TB	TOP AND BOTTOM
TC	TRANSMISSION, CONCRETE DUCT
TC	TOP OF CURB
TCB	TRAFFIC CONTROL BOX
TEMP.	TEMPORARY
TF	TOP OF FRAME
TG	TOP OF GRATE
TI	TRANSMISSION, IRON DUCT
TOF	TOP OF FINISHED FLOOR
TP	TRANSMISSION, PRECAST DUCT
TOW	TOP OF WALL
TS	TRAFFIC SIGNAL
TYP.	TYPICAL
UON	UNLESS OTHERWISE NOTED
USGS	U.S. GEOLOGICAL SURVEY
V.C.P. OR VP	VITRIFIED CLAY PIPE
VF	VERIFY IN FIELD
W	WATER
W/	WITH
W.B., W/B	WESTBOUND
WI	WROUGHT IRON
WMH	WATER MANHOLE
W.P.	WATERPROOFING
WV	WATER VALVE

FEATURE	SYMBOL EXISTING	SYMBOL PROPOSED
UTILITIES		
STANDARD LIGHT POLE		
PULLBOX FOR STREET LIGHTING		
TRAFFIC CONTROL BOX	TCB	
PULLBOX TRAFFIC SIGNALS		
CALL BOX POLICE, FIRE		
CATCH BASIN		TYPE 2 / TYPE 3
PARK CATCH BASIN		
PARK INLET		
SEWER MANHOLE	S	S
WATER VALVE MANHOLE		
WATER VALVE		
STANDPIPE		
LOW PRESSURE HYDRANT-EXIST=NEW WITH FENDERS		
ELECTRIC MANHOLE	E	E
ELECTRIC MANHOLE (WITH MANHOLE NUMBER)	E	E
FIRE DEPARTMENT MANHOLE	F	
GAS VALVE		
OIL FILL	OIL FILL	
TELEPHONE	T	T
TELEPHONE BOOTH	P	P
MISC. MANHOLE		
UTILITY VALVE	UV	
WATER LINE	8" D.I.P. WATER	12" D.I.P. WATER / 12" D.I.P. WATER
SEWER LINE	18" DIP SEWER	12" DIP SEWER
CATCH BASIN CONNECTION		12" CB CONN.
TELEPHONE (CCS) LINE	6-4" PL (ECS)	10-4" PL TEL.
GAS LINE	8" PE GAS	8" PE GAS
ELECTRIC LINE	4-4" F.P.	4-4" PCD ELEC.
TRANSIT AUTHORITY LINE	20-4" PVC DUCTS	20-4" NYCT DUCTS
UTILITIES TO BE REMOVED		12" DIP SEWER / 12" DIP SEWER
DRY WELL		
CONCRETE HEADWALL		

FEATURE	SYMBOL EXISTING	SYMBOL PROPOSED
ROADWAY		
BOROUGH PRESIDENT MONUMENT		
PEDESTRIAN RAMP		
TREE		
PROPOSED SIGN		
SIDEWALK GRATE		
PARKING METER	P.M	P.M
FENCE OR RAILING		
BOLLARD		
CURBLINE		
NORTH ARROW (BOROUGH PRESIDENT OF MANHATTAN)		
FULL-DEPTH ROADWAY PAVING LIMIT (MEET EXISTING GRADE)		
CURB GUTTER SLOPE		1.00%
DIRECTION OF TRAFFIC		
PROPERTY LINE		

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

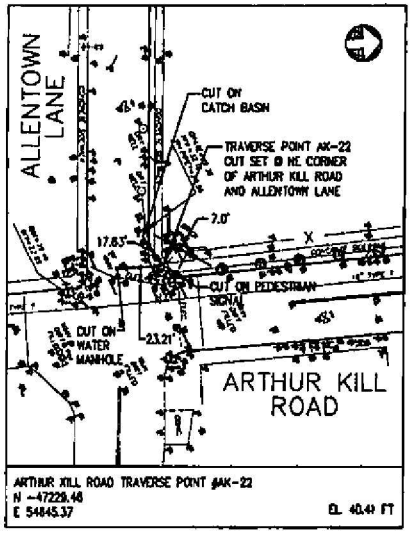
CM-1205, TASK ORDER NO. 24

CHARLESTON BUS ANNEX
STATEN ISLAND, NY.

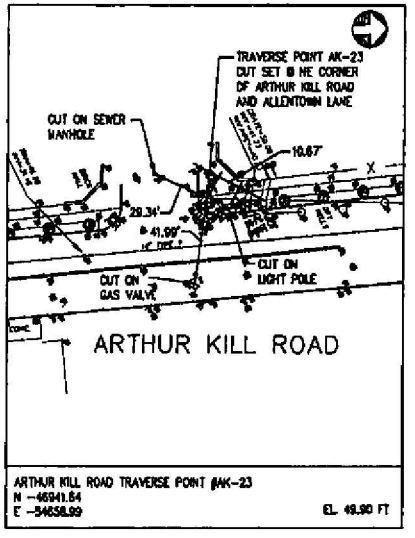
VOLLMER ASSOCIATES LLP

ABBREVIATIONS / LEGEND

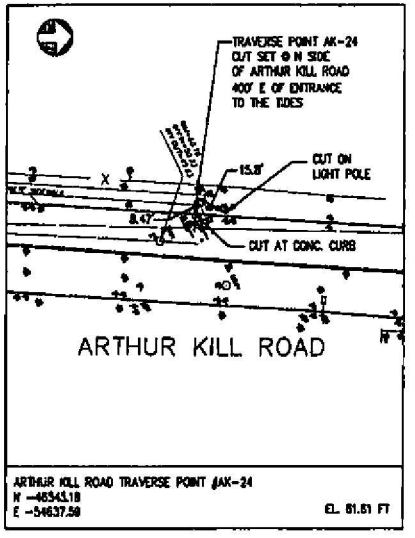
DRAWN BY	T. YEE	DATE : OCT. 23, 2006
DESIGNED BY	E. SMITH / T. YEE	DRAWING NO. A-3
CHECKED BY	L. KAPOLITANO	
APPROVED BY	S. LERNER	REVISION



ARTHUR KILL ROAD TRAVERSE POINT #AK-22
N -47229.46
E 54845.37
EL. 40.49 FT



ARTHUR KILL ROAD TRAVERSE POINT #AK-23
N -46941.84
E -54658.99
EL. 49.90 FT



ARTHUR KILL ROAD TRAVERSE POINT #AK-24
N -46545.18
E -54637.58
EL. 81.81 FT

NOTES:
1.

REFERENCES: DWG. NO.:
1.

SCALE IN FEET
30' 15' 0 30' 60'

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

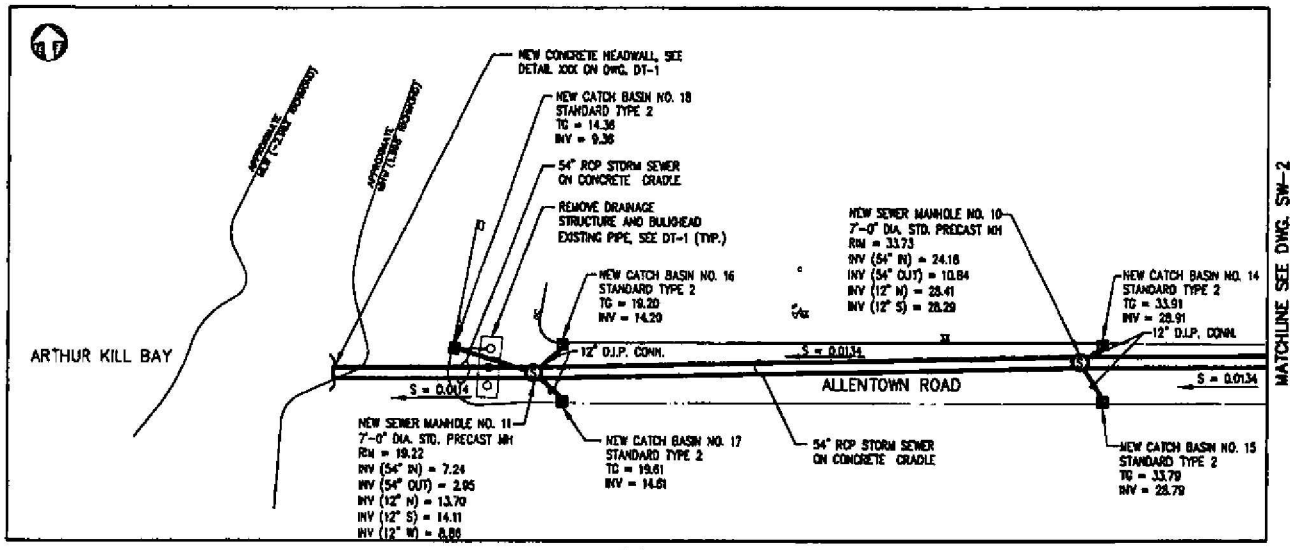
New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS ANNEX
STATEN ISLAND, NY.

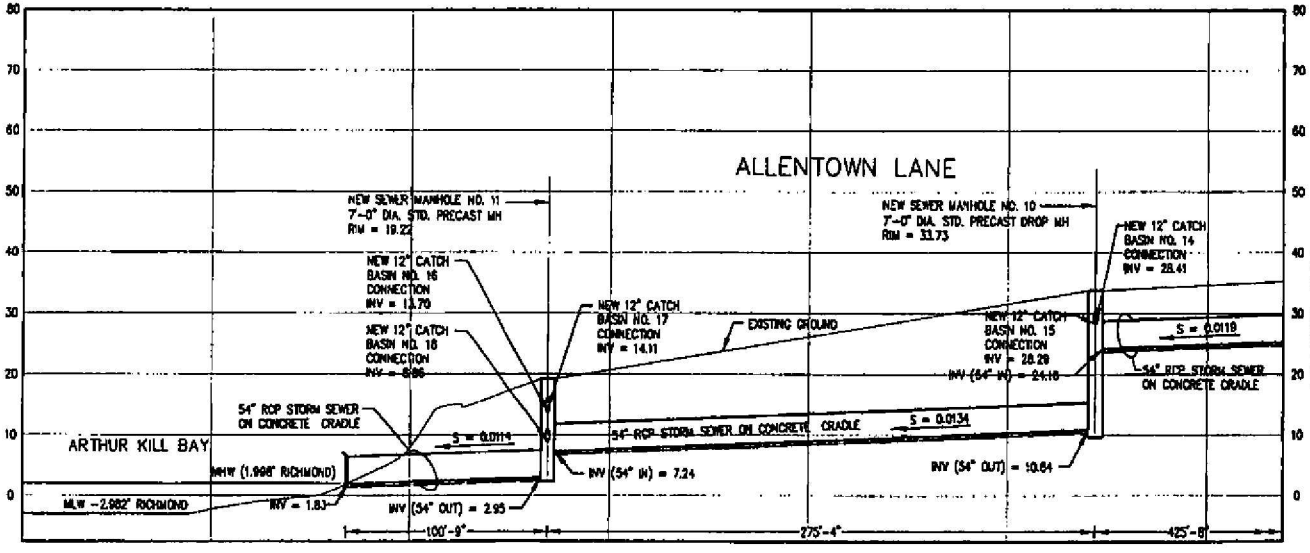
VOLLMER ASSOCIATES LLP

SURVEY STATION TIES

DRAWN BY	T. YEE		DATE: OCT. 23, 2006
DESIGNED BY	E. SMITH / T. YEE		DRAWING NO. SB-1
CHECKED BY	L. NAPOLITANO		
APPROVED BY	S. LERNER		REVISION



PLAN



PROFILE

NOTES

REFERENCES:

		DWG. NO.:
1.	GENERAL NOTES	A-1, A-2
2.	ABBREVIATIONS / LEGEND	A-3
3.	SEWER DETAILS	DT-1

VERTICAL SCALE: SCALE IN FEET 10' 5' 0 10' 20'

HORIZONTAL SCALE: SCALE IN FEET 30' 15' 0 30' 60'

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

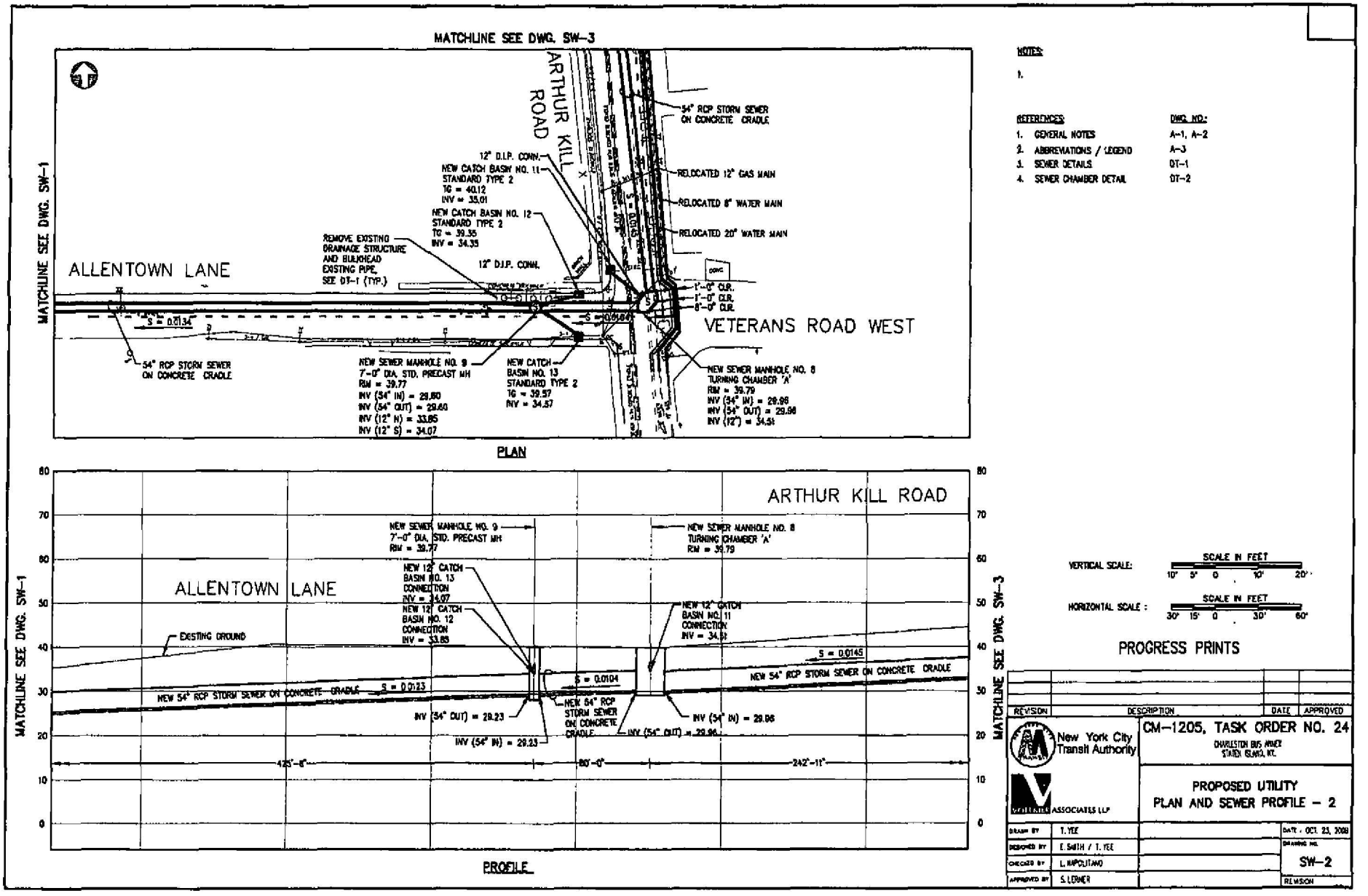
New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS DEPOT
STATEN ISLAND, NY.

PROPOSED UTILITY PLAN AND SEWER PROFILE – 1

ASSOCIATES LLP

DRAWN BY	T. YEE	DATE: OCT. 23, 2008
DESIGNED BY	E. SMITH / T. YEE	DRAWING NO.
CHECKED BY	L. IMPOLITANO	SW-1
APPROVED BY	S. LERNER	REVISION



NOTES:

1.

REFERENCES:	DWG. NO.:
1. GENERAL NOTES	A-1, A-2
2. ABBREVIATIONS / LEGEND	A-3
3. SEWER DETAILS	DT-1
4. SEWER CHAMBER DETAIL	DT-2

VERTICAL SCALE: SCALE IN FEET 10' 5' 0 10' 20'

HORIZONTAL SCALE : SCALE IN FEET 30' 15' 0 30' 60'

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

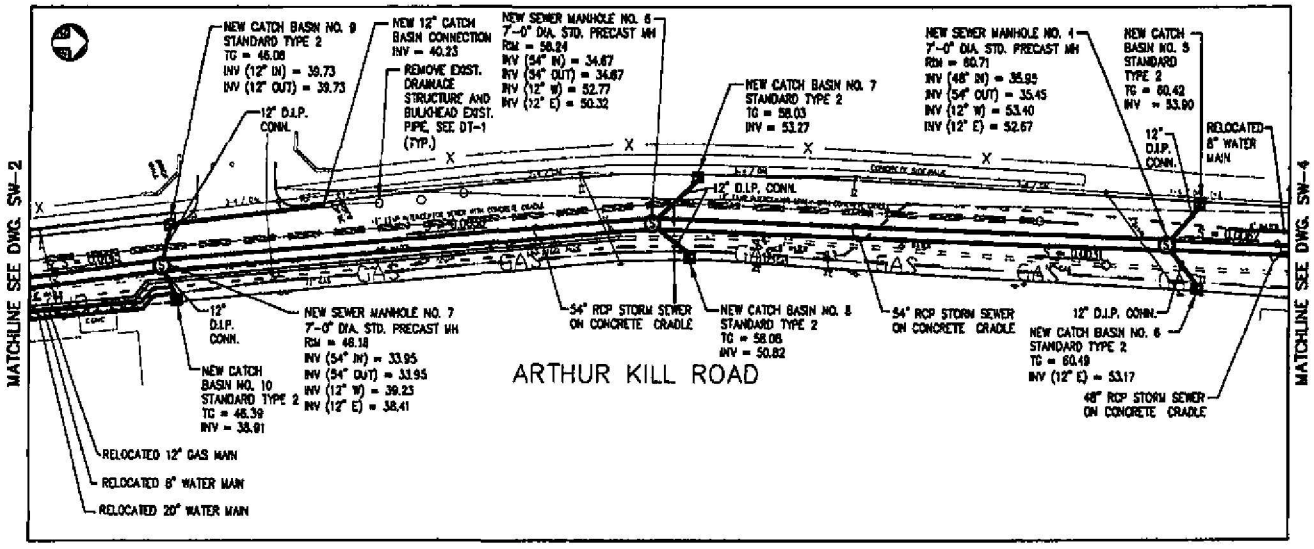
New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS YARD
STATEN ISLAND, NY.

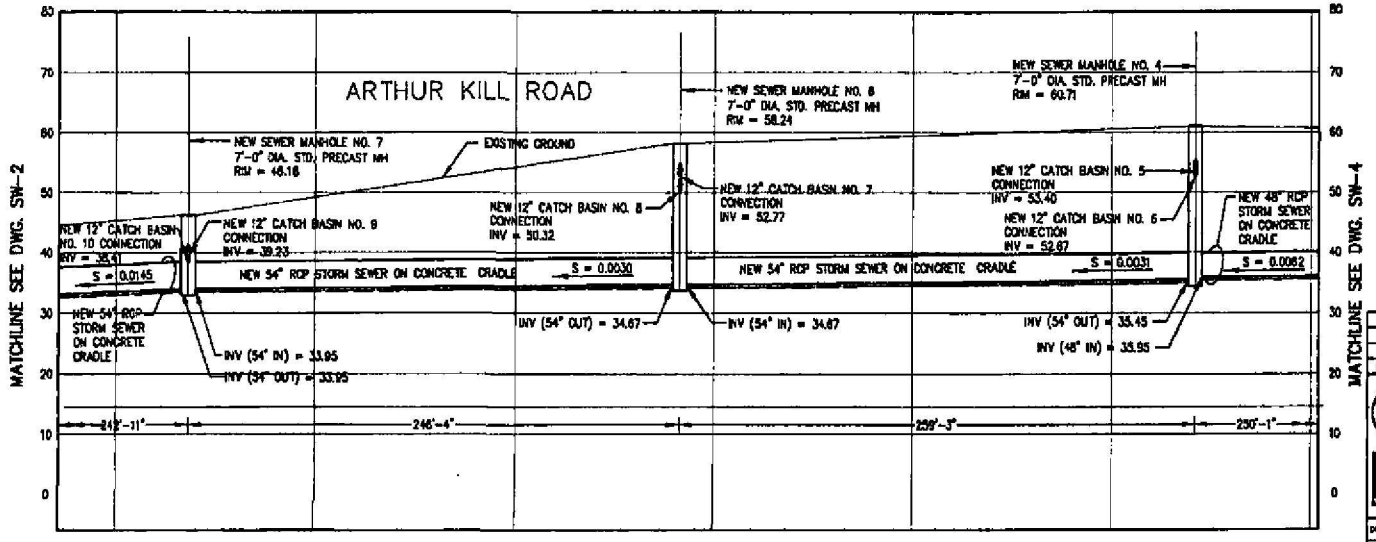
WILLIAMS ASSOCIATES LLP

PROPOSED UTILITY PLAN AND SEWER PROFILE – 2

DRAWN BY	T. YEE	DATE : OCT. 23, 2008
DESIGNED BY	E. SMITH / T. YEE	DRAWING NO. SW-2
CHECKED BY	L. NAPOLITANO	
APPROVED BY	S. LERNER	REVISION



PLAN



PROFILE

NOTES:

1.

REFERENCES:	DWG. NO.:
1. GENERAL NOTES	A-1, A-2
2. ABBREVIATIONS / LEGEND	A-3
3. SEWER DETAILS	DT-1

VERTICAL SCALE: SCALE IN FEET 10' 5' 0 10' 20'

HORIZONTAL SCALE: SCALE IN FEET 30' 15' 0 30' 60'

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

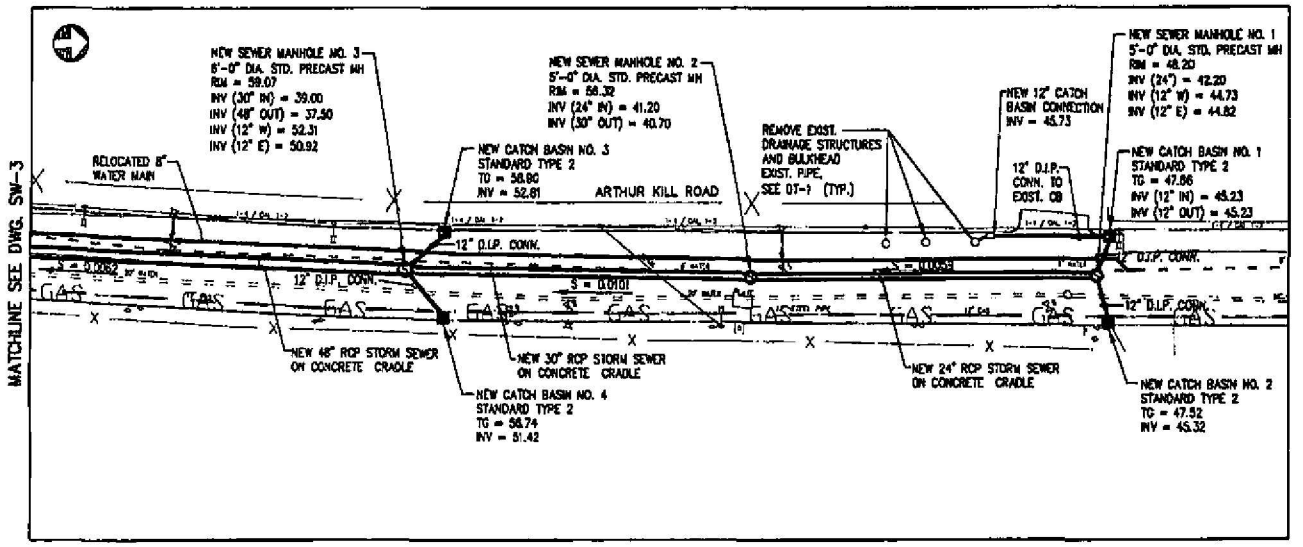
New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS DEPOT
STATEN ISLAND, NY.

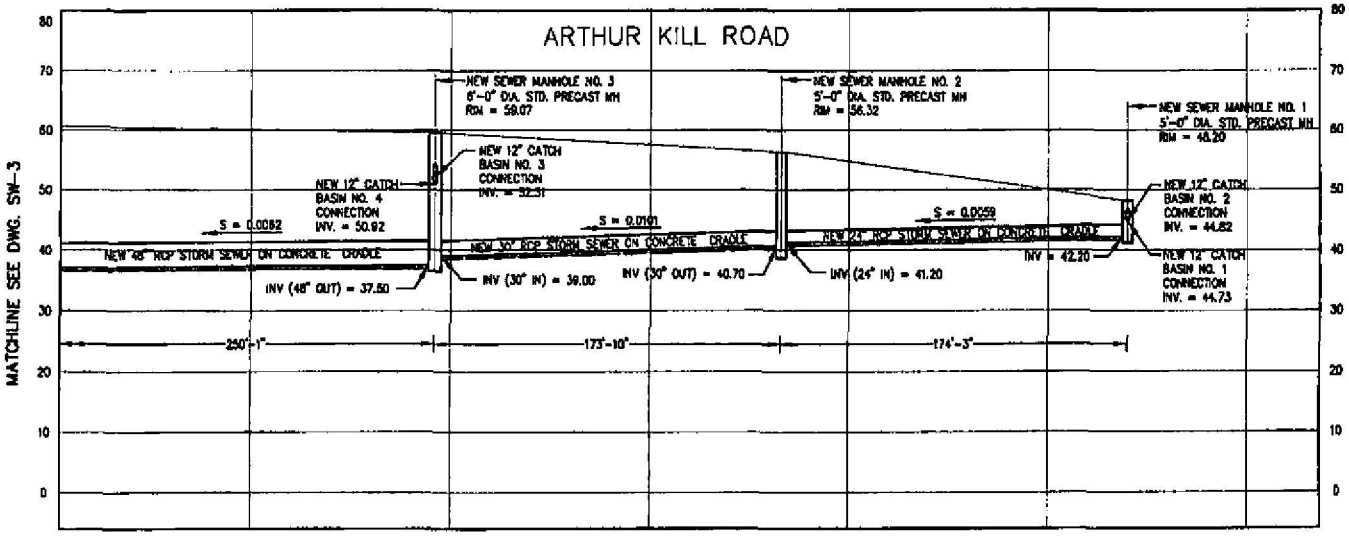
PROPOSED UTILITY PLAN AND SEWER PROFILE - 3

ASSOCIATES LLP

DRAWN BY	T. YEE	DATE: OCT. 23, 2008
DESIGNED BY	E. SMITH / T. YEE	
CHECKED BY	L. NAPOLITANO	DRAWING NO. SW-3
APPROVED BY	S. LERNER	REVISION



PLAN



PROFILE

NOTES:

1.

REFERENCES:	DWG. NO.:
1. GENERAL NOTES	A-1, A-2
2. ABBREVIATIONS / LEGEND	A-3
3. SEWER DETAILS	DT-1

VERTICAL SCALE: SCALE IN FEET 10' 5' 0 10' 20'

HORIZONTAL SCALE: SCALE IN FEET 30' 15' 0 30' 60'

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

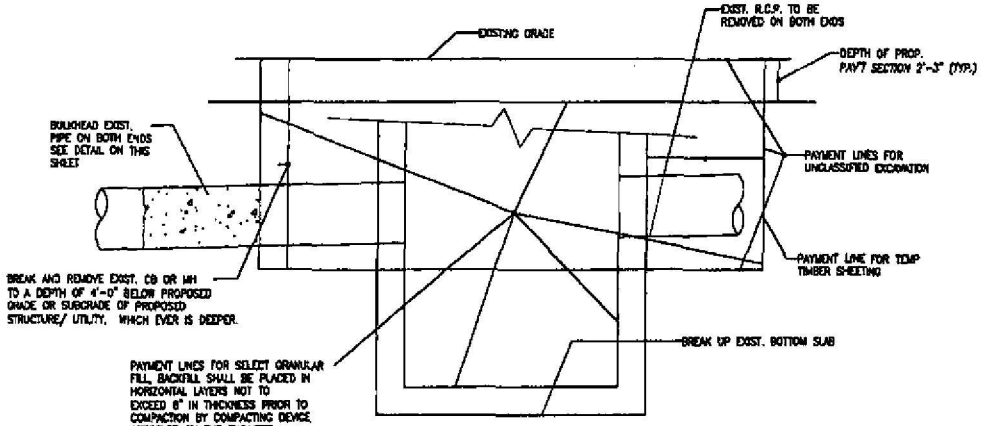
New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS ANNEX
STATEN ISLAND, NY.

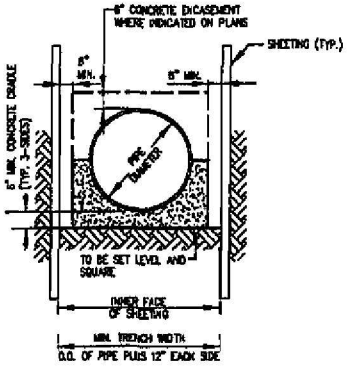
PROPOSED UTILITY PLAN AND SEWER PROFILE – 4

VANTAGE ASSOCIATES LLP

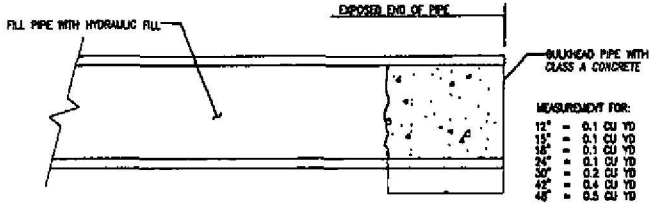
DRAWN BY	T. YEE	DATE: OCT. 21, 2005
DESIGNED BY	E. SMITH / T. YEE	DRAWING NO. SW-4
CHECKED BY	L. NAPOLITANO	
APPROVED BY	S. LERNER	REVISION



DRAINAGE STRUCTURE REMOVAL
N.T.S.



CONCRETE CRADLE/ENCASEMENT DETAIL FOR PIPE SEWER
N.T.S.



BULKHEAD FOR ABANDONED PIPE
N.T.S.

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS DEPOT
STATEN ISLAND, NY.

SEWER DETAILS

DRAWN BY	T. YEE	DATE : OCT. 23, 2006	
DESIGNED BY	T. YEE	DRAWING NO.	DT-1
CHECKED BY	L. NAPOLITANO		
APPROVED BY	S. LERNER	REVISION	

SEWER CHAMBER DETAIL
TO BE DEVELOPED
BASED ON COMMENTS FROM NYCDEP

PROGRESS PRINTS

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

CM-1205, TASK ORDER NO. 24
CHARLESTON BUS DEPOT
STATEN ISLAND, NY

ASSOCIATES LLP

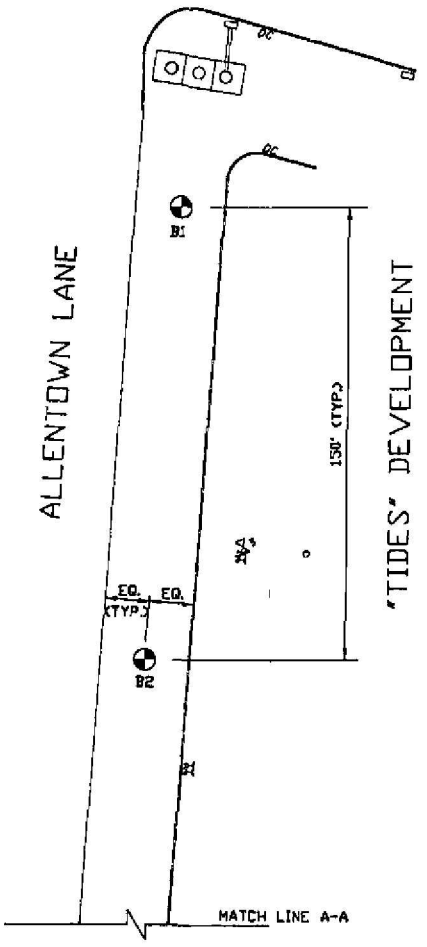
SEWER CHAMBER DETAILS

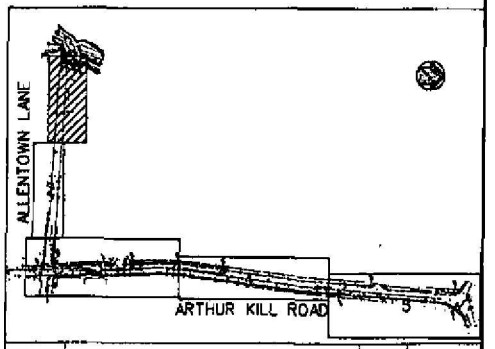
DRAWN BY	T. YEE	DATE : OCT. 23, 2006
DESIGNED BY	E. SMITH / T. YEE	DRAWING NO. DT-2
CHECKED BY	L. NAPOLITANO	
APPROVED BY	S. LERNER	REVISION

Appendix B:

Plans showing locations of planned test pits and soil borings.

NOTE:
1. SOIL BORINGS B1, B6 AND B11 SHALL BE CONVERTED INTO GROUNDWATER OBSERVATION WELLS. THE DEPTH OF GROUNDWATER SHALL BE MEASURED AT THE COMPLETION OF INSTALLATION AND ONCE AGAIN AFTER 7 DAYS HAVE ELAPSED SINCE COMPLETION.





SCALE: 1" = 40'-0"
20' 10' 0 20' 40'

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

CM-1205, TASK ORDER NO. 24
DARLESTON BUS ANNEX
STATEN ISLAND, NY.

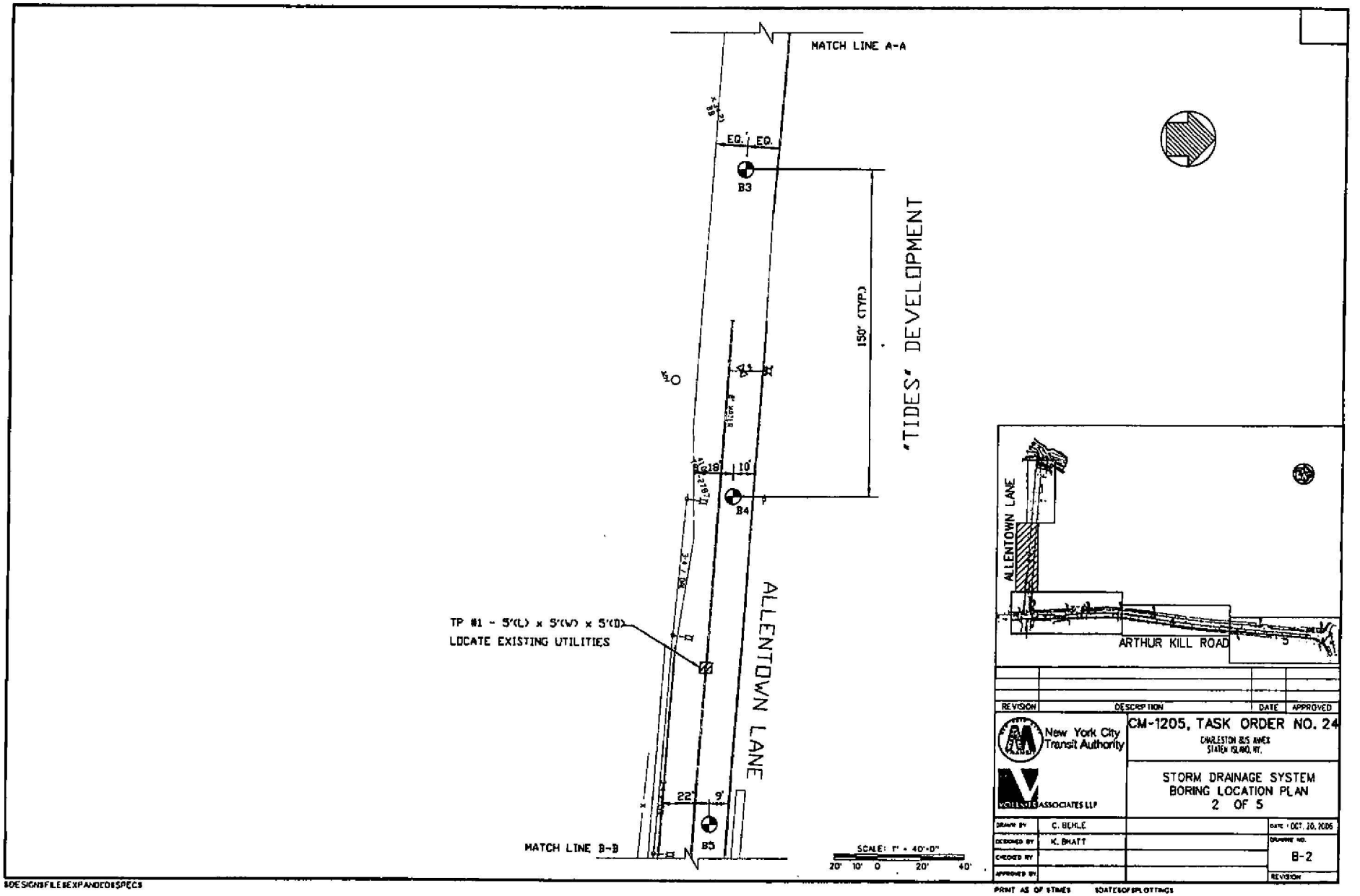
NORTHEAST ASSOCIATES LLP

STORM DRAINAGE SYSTEM
BORING LOCATION PLAN
1 OF 5

DRAWN BY	C. BEHLE	DATE	OCT. 20, 2006
DESIGNED BY	K. BHATT	DRAWING NO	B-1
CHECKED BY			
APPROVED BY		REVISION	

\DESIGN\FILES\EXPANDED\SPECS

PRINT AS OF $TIME$ $DATE$ OF $PLOTTYPE$


MATCH LINE A-A
EQ.
EQ.
B3
150' (TYP.)
"TIDES" DEVELOPMENT
B4
TP #1 - 5'(L) x 5'(W) x 5'(D)
LOCATE EXISTING UTILITIES
ALLENTOWN LANE
22'
9'
B5
MATCH LINE B-B
SCALE: 1" = 40'-0"
20' 10' 0 20' 40'
ALLENTOWN LANE
ARTHUR KILL ROAD
REVISION
DESCRIPTION
DATE
APPROVED
New York City Transit Authority
CM-1205, TASK ORDER NO. 24
CHARLESTON BUS ANNEX
STATEN ISLAND, NY.
VOLLMER ASSOCIATES LLP
STORM DRAINAGE SYSTEM
BORING LOCATION PLAN
2 OF 5
DRAWN BY C. BEHLE
DESIGNED BY K. BHATT
CHECKED BY
APPROVED BY
DATE : OCT. 20, 2006
DRAWING NO.
B-2
REVISION
PRINT AS OF $TIME$
$DATE$OF$PLOTTING$
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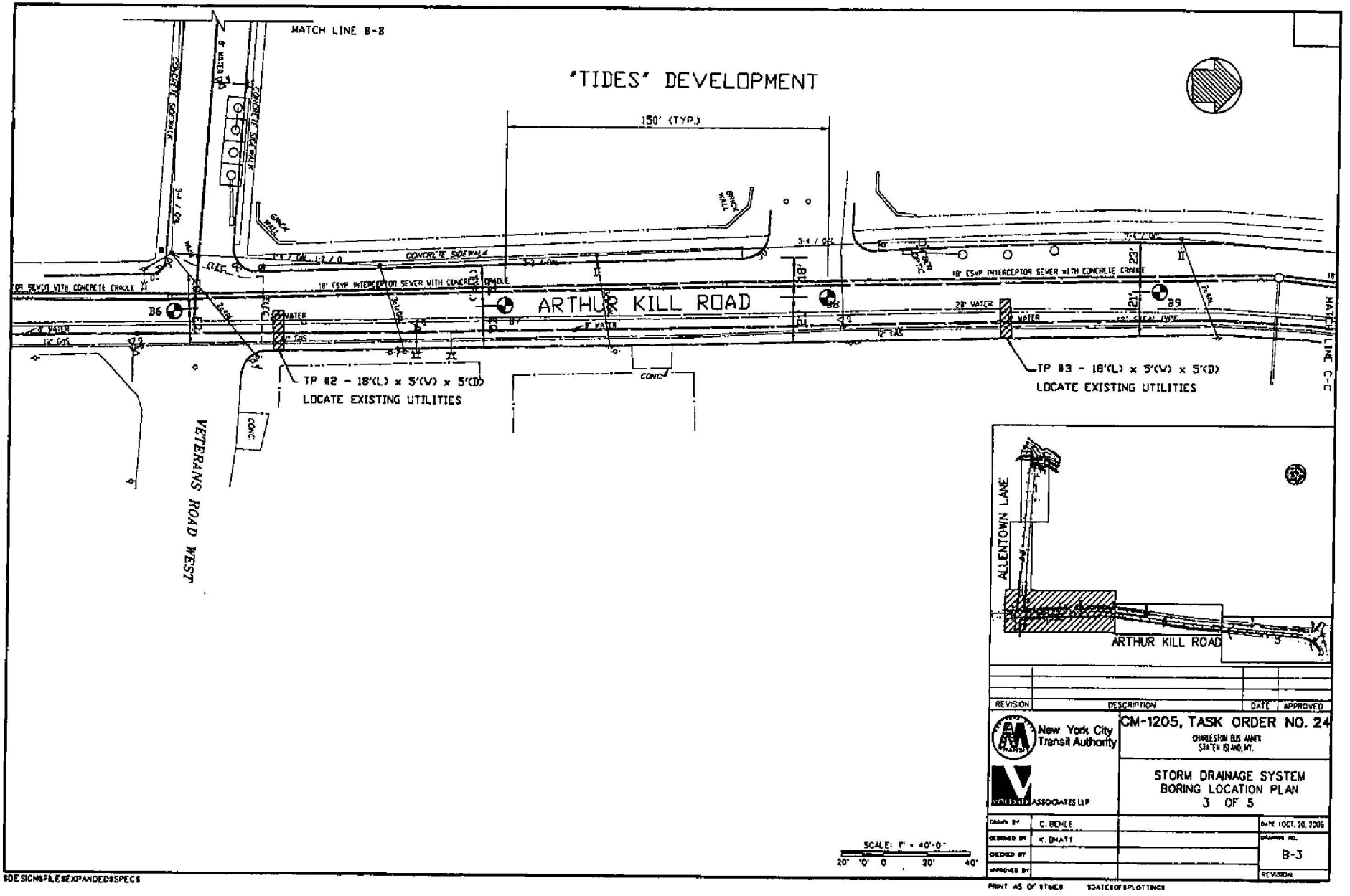

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

CM-1205, TASK ORDER NO. 24

CHARLESTON BUS ANNEX
STATEN ISLAND, NY.

STORM DRAINAGE SYSTEM
BORING LOCATION PLAN
3 OF 5

DRAWN BY	C. BEHLE	DATE	OCT. 20, 2005
DESIGNED BY	K. BHATT	DRAWING NO.	B-3
CHECKED BY			
APPROVED BY		REVISION	

$DESIGNS\FIELDEXPANDED$SPECS

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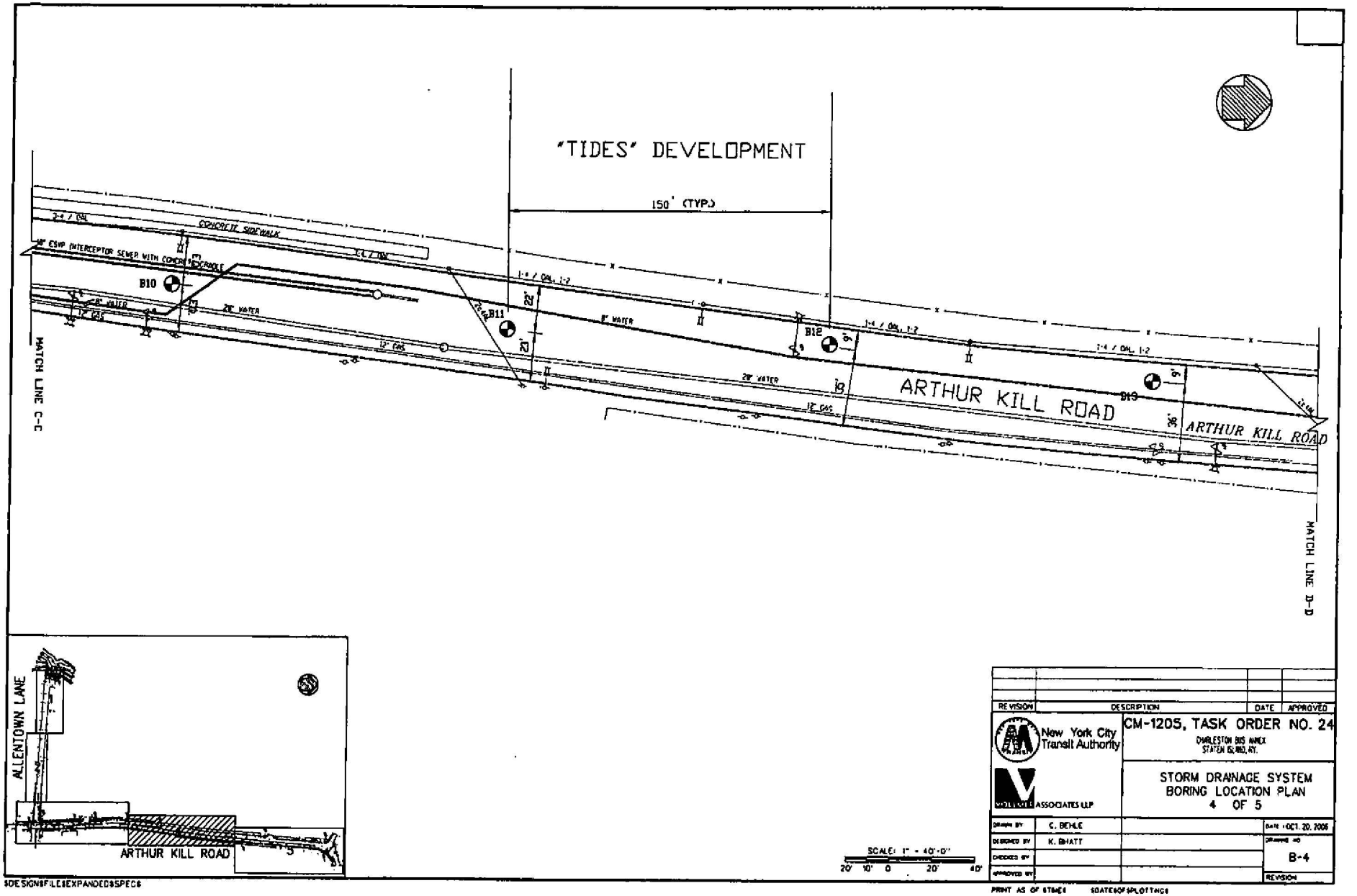

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

CM-120S, TASK ORDER NO. 24
CHARLESTON BUS ANNEX
STATEN ISLAND, NY.

STORM DRAINAGE SYSTEM
BORING LOCATION PLAN
4 OF 5

DRAWN BY	C. BEHLE	DATE	OCT. 20, 2006
DESIGNED BY	K. BHATT	DRAWING NO	B-4
CHECKED BY		REVISION	
APPROVED BY			

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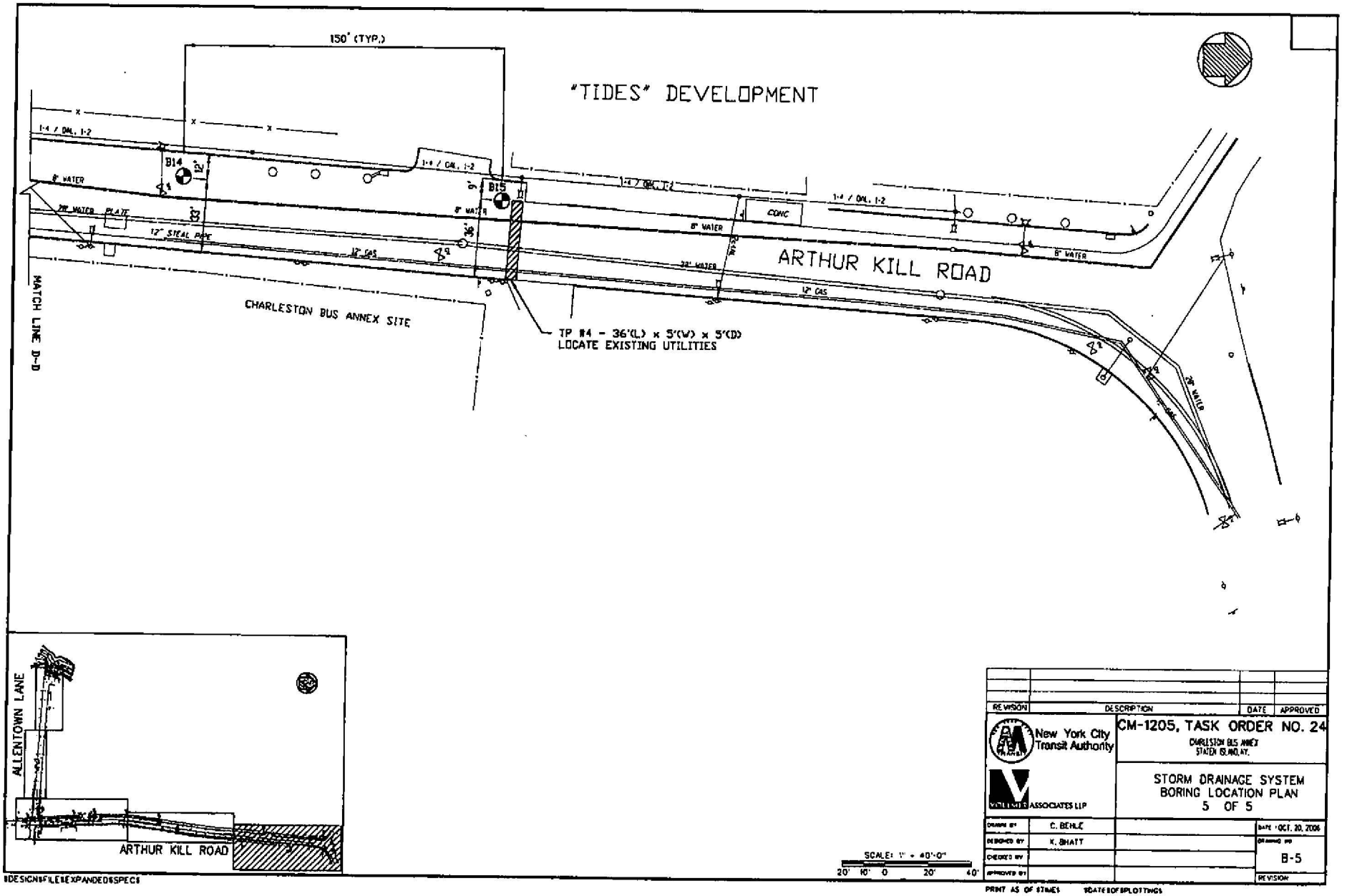

REVISION	DESCRIPTION	DATE	APPROVED

New York City Transit Authority

CM-1205, TASK ORDER NO. 24

CHARLESTON BUS ANNEX
STATEN ISLAND, NY.

STORM DRAINAGE SYSTEM
BORING LOCATION PLAN
5 OF 5

VOLLMER ASSOCIATES LLP

DRAWN BY	C. BEHLE		DATE OCT. 20, 2006
DESIGNED BY	K. BHATT		DRAWING NO. B-5
CHECKED BY			
APPROVED BY			REVISION

PRINT AS OF 8TIME5 %DATE%OF%PLOTTING%

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Appendix C:

Soil borings conducted for the Tides at Charleston development project.

FIELD TEST BORING REPORT

THE TIDES OF CHARLESTON
ALLENTOWN LANE & ARTHUR KILL ROAD
STATEN ISLAND, NEW YORK

PREPARED FOR: Allen Arthur, LLC
c/o The Tides
99 Hook Road
Bayonne, NJ 07002

PREPARED BY: Future Tech Consultants of New York, Inc
52 E 2nd Street
Mineola, NY 11501
FTC Job No.: AAL0104
Date: August 10, 2004

Steve J. J. Lin, P.E.
NY Lic. # 071926

STATE OF NEW YORK
STEVE J. J. LIN
No. 071926
LICENSED PROFESSIONAL ENGINEER

FIELD SOIL CLASSIFICATION SYSTEM

Future Tech Consultants of New York, Inc. uses the following definitions, abbreviations, and terminologies to classify and correlates soil and rock samples in the field.

UNIFIED CLASSIFICATION: The soil samples are described by major constituents, minor constituents, with modifiers, color, odors, moisture and density/consistency. USCS symbols are included in parenthesis when requested.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS):

COARSE GRAINED SOILS

GW - Well graded gravel
GP - Poorly graded gravel
GM - Silty gravel
GC - Clayey gravel
SW - Well graded sand
SP - Poorly graded sand
SM - Silty sand
SC - Clayey sand

FINE GRAINED SOILS

ML - Silts of low plasticity
CL - Clays of low plasticity
OL - Organic silt/clay of low plasticity
MH - Silts of high plasticity
CH - Clays of high plasticity
OH - Organic silt/clay of high plasticity
PT - Peat and high organic soils

SOIL PARTICLE SIZE IDENTIFICATION

Boulder	12 inch diameter or greater
Cobbles	3 to 12 inch diameter
Gravel	Coarse— 1 1/2 to 3 inch
	Medium— 3/4 to 1 1/2 inch
	Fine— 4.75 mm to 3/4 inch
Sand	Coarse-- 2.0 to 4.75 mm
	Medium— 0.425 to 2.0 mm
	Fine— 0.075 to 0.425 mm
Silt & Clay	Smaller than 0.075mm

MODIFIERS (Percentage)

Trace (tr)	1-10
Some (sm)	11-20
Adjective (ty)	21-35
And (&)	36-50

DENSITY - Cohesionless soil (Gravel & Sand)

Density	Approximate range of (N)
Very loose	4 blows/ft or less
Loose	5 - 10 blows/ft
Medium dense	11 - 30 blows/ft
Dense	31 - 50 blows/ft
Very dense	51 blows/ft or higher

CONSISTENCY - Cohesive soil (clay & silt)

Consistency	Approximate range of (N)
Very soft	1 blows/ft or less
Soft	2 - 4 blows/ft
Medium stiff	5 - 8 blows/ft
Stiff	9 - 15 blows/ft
Very stiff	16 - 30 blows/ft
Hard	31 blows/ft or greater

ABBREVIATIONS

Color	Size
Bn - brown	C - coarse grained
Gy - gray	M - medium grained
Blk - black	F - fine grained
Wh - white	Misc. - Miscellaneous
Rd - red	W.O.R. - weight of rod
Lt - light	W.O.H. - weight of hammer
Dk - dark	N.R. - no recovery
Multi - multi-colored	T.B.C. - test boring completed

ROCK QUALITY

R.Q.D. (%)	Rock Description
0 - 25	Very por
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Standard Penetration Test (SPT - ASTM D-1586) - a 2.0" O.D. (1-3/8" I.D.) split barrel sampler is driven into undisturbed soil by means of a 140 pound weight hammer free falling a vertical distance of 30 inches. The sampler is normally driven three or four successive 6-inch increments. The total number of blows required for the last or middle 12 inches of penetrations is termed as Standard Penetration Resistance (N).

Future Tech Consultants of NY, Inc.
52 East 2nd Street, Mineola, NY 11501 Tel: 516-355-0166 Fax: 516-355-0271

FIELD TEST BORING LOG

CLIENT: Allen Arthur, LLC
PROJECT: The Tides of Charleston, Arthur Kill Road, SI, NY
DRILLER: Craig Test Boring
BORING NO.: B-2 Sheet 1 of 1

DATE: 08/02/04
FTC No: AAL 0104
Weather: Sunny
Ground Surface Elev.: * 15'

Ground Water Data				* Method of Advancing Boring		Depth
Depth	Hour	Date	Hrs. After Completion	A	Mud Rotary	0'-20'
12'	11AM	08/02/04				

DEPTH	Sample T	No.	Depth	N	NYC Classification	Soil Description	Remarks
		S-1	0'-2'	1-2-3-3	7-65/11-65	Mfc sand, sm silt, tr clay / bn, moist, loose (SM/Top Soil)	(Fill 0'-3')
5'		S-2	5'-7'	6-11-11-11	9-65	Cmf sand, clayey & silt / bn, moist, m. dense (SC)	3'
10'		S-3	10'-12'	4-5-6-7	9-65	Same (SC)	g.w.t.@12' ▽
15'		S-4	15'-17'	2-4-4-5	7-65	Cmf sand, sm silt / bn, wet, loose (SM)	14'
20'		S-5	20'-22'	3-6-3-9	7-65	Same (SM)	
25'						*Test Boring Completed @ 22'*	
30'							
35'							
40'						* Elevation provided by Rogers Surveying, PLLC	

S-2"O.D. Split Spoon Sample ■ U - Undisturbed Sample, 3" Diam. ☒ - Core Drilling ☐ - No Recovery

N- Standard Penetration Resistance per 6"
(140# Hammer, 30" drop, Automatic Trip)

Inspected By: S. Lin, P.E.

Future Tech Consultants of NY, Inc.
52 East 2nd Street, Mineola, NY 11501 Tel: 516-355-0168 Fax: 516-355-0271

FIELD TEST BORING LOG

CLIENT: Allen Arthur, LLC
PROJECT: The Tides of Charleston, Arthur Kill Road, SI, NY
DRILLER: Craig Test Boring
BORING NO.: B-1 Sheet 1 of 2

DATE: 08/03/04
FTC No: AAL 0104
Weather: Sunny
Ground Surface Elev.: +40'

Ground Water Data				* Method of Advancing Boring		Depth
Depth	Hour	Date	Hrs. After Completion	A	Mud Rotary	0'-40'
35'	11AM	08/03/04				

DEPTH	Sample T	No.	Depth	N	NYC Classification	Soil Description	Remarks
		S-1	0'-2'	1-10-49-12	11-65	Cmf sand, sm clay & silt / bn, moist, v. dense (Topsoil/Fill)	(Fill 0'-4')
							4'
5'		S-2	5'-7'	1-2-2-3	9-65	Clay, sm silt & mf sand / gy,moist, v. soft (CL)	
10'		S-3	10'-12'	1-2-3-3	9-65	Cmf sand, clayey, sm silt / reddish bn, moist, m. stiff (SC)	
15'		S-4	15'-17'	2-7-7-9	9-65	Same / stiff (SC)	
20'		S-5	20'-22'	6-13-13-16	9-65	Cmf sand, clayey, sm silt, tr f gravel / reddish bn, moist, v. stiff (SC)	
25'		S-7	25'-27'	4-7-9-11	9-65	Same (SC)	
30'		S-8	30'-32'	5-9-10-15	9-65	Same (SC)	
							g.w.t.@35' ▽
35'		S-9	35'-37'	7-9-11-17	9-65 7-65	Same (SC) Cmf sand, sm silt / bn, wet, m. dense (SM)	36'
40'							

☐ S-2"O.D. Split Spoon Sample ■ U - Undisturbed Sample, 3" Diam ☒ - Core Drilling ☐ - No Recovery

N- Standard Penetration Resistance per 6"
(140# Hammer, 30" drop, Automatic Trip)

Inspected By: S. Lin, P.E.

Future Tech Consultants of NY, Inc.
52 East 2nd Street, Mineola, NY 11501 Tel: 516-355-0168 Fax: 516-355-0271

FIELD TEST BORING LOG

CLIENT: Allen Arthur, LLC
PROJECT: The Tides of Charleston, Arthur Kill Road, SI, NY

DATE: 08/03/04
FTC No: AAL 0104

BORING NO.: B-1 Sheet 2 of 2 Ground Surface Elev.: *40'

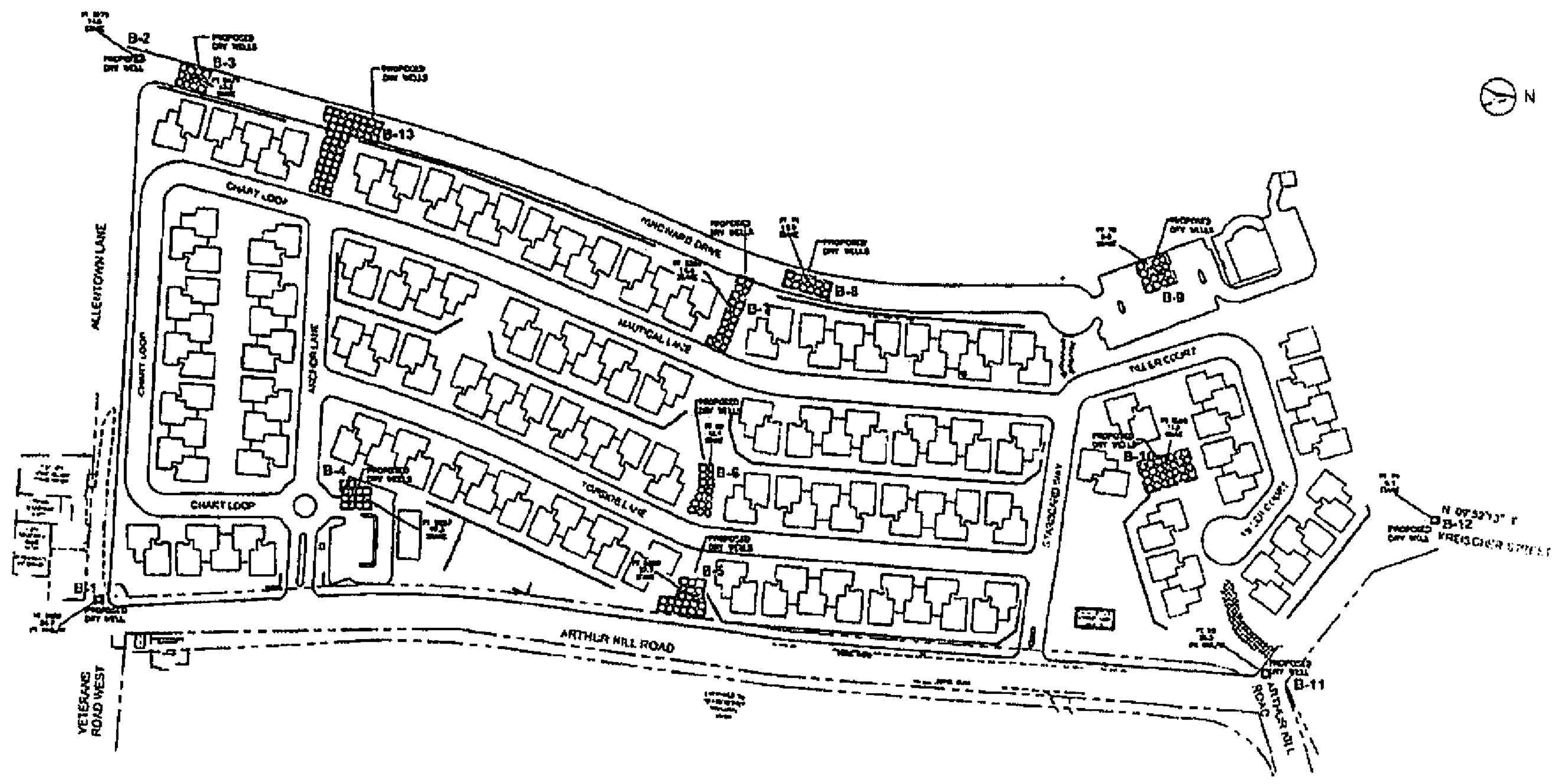
DEPTH	*	Sample T	No.	Depth	N	NYC Classification	Soil Description	Remarks
40'			S-9	40'-42'	10-17-16-22	7-65	Cmf sand, sm silt / bn, wet, dense (SM)	
							Test Boring Completed @ 42'	
45'								
50'								
55'								
60'								

* Elevation provided by Rogers Surveying, PLLC

S-2"O.D. Split Spoon Sample ■ U - Undisturbed Sample, 3" Diam. ☒ - Core Drilling ☐ - No Recovery

N- Standard Penetration Resistance per 6"
(140# Hammer, 30" drop, Cathead & Rope System)

Inspected By: S. Lin, P.E.



NOTES:

1. This drawing was developed based on the drawing of "TIDES AT CHARLESTON PROPOSED DRYWELL LAYOUT AND ELEVATIONS" prepared by Rogers Surveying, PLLC.

2. Drywell borings were generally performed around the stake locations as shown on this plan.

FTC	CLIENT: Allen Arthur, LLC	PROJECT: The Tides at Charleston, Allentown Ln & Arthur Kill Rd, Staten Island, NY	TITLE: DRYWELL BORING LOCATION PLAN
			PROJECT NO.: AAL 0104 · DRAWING NO.:
			DRAWN BY: B.W. · DATE:
			SCALE: N.T.S · SHEET: